AN ANALYTICAL STUDY OF TRADITIONAL ARAB
DOMESTIC ARCHITECTURE

by

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When considering the design of the built environment it is reasonable to assume that no part of this affects man's health and well-being more directly than the house in which he seeks comfort and dignity. So the design of the environment can help to shape man's life and attitudes. Nevertheless, the wider setting in which the house is located, the neighbourhood, is also of importance. Thus, when designing and planning houses, it is necessary to think not just of the individual dwelling but also of the juxtaposition of the whole neighbourhood simultaneously in terms of climate, social, functional and aesthetic aspects.

In this connection, the traditional Arab house would appear to be a good example, emphasizing the positive interrelationship between the different components of the neighbourhood and the vision of the whole within which single parts have meaning.

The thesis adopts this view; that is, it attempts to examine the traditional Arab house in context of the wide geographic and social setting. It commences with a discussion of the city, followed by the neighbourhood (quarter), the street and finally the house. Attention is given to the various factors which have influenced the traditional design, and a series of site experiments are described which focus on climatic and acoustical considerations. Finally, the theoretical and practical implications of the work are discussed.
CONTENTS

Abstract i
Contents ii
List of Tables vii
List of Charts viii
List of figures ix
Acknowledgements xv

INTRODUCTION 1

CHAPTER 1
1.1.0 Religion 12
1.1.1 The Islamic city in terms of Islam 12
1.1.2 Main duties of Islam 13
1.1.3 Islam and society 14
1.1.4 The family social life 15
1.1.5 Representation of the Muslim house through Islam 17
1.1.6 Relationship between the government and society 18
1.1.7 Islam and sculpture 19
1.1.8 Islam and privacy 20

1.2.0 Education 24
1.2.1 Education system 24
1.2.2 Libraries 28
1.2.3 General level of culture 28
1.2.4 The nature of discussion and lecture 29

1.3.0 Building Materials 31
1.3.1 Brick work 31
1.3.2 Masonry work 35
1.3.3 Wood work 37
1.3.4 Summary 43

CHAPTER 2: HISTORICAL STUDIES AND ARCHITECTURAL OUTLINE OF THE THREE CITIES
2.1.0 Cairo, Egypt 45
2.1.1 Egypt's capitals since the Islamic invasion 45
2.1.2 The first phase of Islamic house design in Egypt 45
2.1.3 The Fatimid period 51
2.1.4 A Fatimid Qu'ah (reception hall) 52
2.1.5 The city walls 57
2.1.6 The development of the city since the Islamic invasion 57
2.1.7 The Ayybid dynasty 60
2.1.8 The Mameluk period 60
2.1.9 The Turkish period 61
2.1.10 The people 64
2.1.11 Climate 64
2.1.12 The physical condition of old Cairo 70
2.1.13 Daily life of the house occupants 73
2.1.14 The residential house (description) 76
2.1.15 The palace of the Amir Bashtak 90
2.1.16 The palace of the Amir Taz 95
## 2.2.0 Baghdad, Iraq

- **2.2.1 Historical outline**
- **2.2.2 Baghdad the 'round city'**
- **2.2.3 The decline of Baghdad 'the round city'**
- **2.2.4 Architectural outline**
- **2.2.5 Palaces and houses**
- **2.2.6 Modern Baghdad**
- **2.2.7 The people**
- **2.2.8 Social life**
- **2.2.9 Climate**
- **2.2.10 The residential quarters**
- **2.2.11 The residential house**

## 2.3.0 Jiddah, Saudi Arabia

- **2.3.1 Historical outline**
- **2.3.2 The city of Jiddah**
- **2.3.3 The development of Jiddah**
- **2.3.4 Cultural relations with Egypt and Mesopotamia**
- **2.3.5 Architectural outline**
- **2.3.6 Comparison between building in North and South**
- **2.3.7 Climate**
- **2.3.8 The environment and its influences**
- **2.3.9 The people**
- **2.3.10 The society**
- **2.3.11 The residential house**
- **2.3.12 Traditional joinery work**

## 2.4.0 Summary

---

## 3.0.0 Analysis of the Islamic City

### 3.1.0 Islamic cities of pre-Islamic foundations

### 3.2.0 New Islamic cities

### 3.3.0 The Traditional Islamic Arab city

### 3.4.0 Geographical setting and landscape influences

### 3.5.0 Contents and general arrangements

### 3.6.0 Architecture and planning character
- **3.6.1 Street character**
- **3.6.2 Street focal points**
- **3.6.3 Street layout**

### 3.7.0 Quarters

### 3.8.0 Movement and accessibility

### 3.9.0 The Süq (bazaar)

### 3.10.0 Space
- **3.10.1 Main space**
- **3.10.2 Symbolic space**
- **3.10.3 Residential space**
- **3.10.4 Commercial space**

### 3.11.0 Water supply

### 3.12.0 Sanitation

### 3.13.0 Extension and dimensions of the city

### 3.14.0 Economical values of the compact planning
3.15.0 Aesthetic aspects of the city 188
3.16.0 The philosophy of the city 191
3.16.1 Unity in diversity 191
3.16.2 Equilibrium with nature 196
3.17.0 Summary 197

CHAPTER 4: ANALYTICAL STUDY OF THE ISLAMIC QUARTER (NEIGHBOURHOOD)
4.1.0 The Muslim quarter 201
4.2.0 Analytical study of the social structure of the quarter 201
4.3.0 Analytical study of the physical structure of the quarter 204
4.4.0 Main elements of the quarters 206
4.5.0 The quarter dimensions and values 217
4.6.0 Source of variety and originality 221
4.7.0 Relationship between the physical and social structures 221
4.8.0 Summary 223

CHAPTER 5: ANALYTICAL STUDY OF THE ISLAMIC STREET
5.1.0 The Islamic street 226
5.2.0 Street Facade 226
5.3.0 Street perspective 228
5.4.0 Facade unity 228
5.5.0 Perspective development 232
5.6.0 Street orientation 245
5.7.0 Street pattern 245
5.8.0 Straight and winding streets 247
5.9.0 Street design – source of dimensions 250
5.10.0 Traffic control 253
5.11.0 The street as a bazaar space (suq) 254
5.12.0 Space design of the bazaar 255
5.13.0 Street speed and social relationships 257
5.14.0 Street speed and perception 260
5.15.0 Summary 265

CHAPTER 6: ANALYTICAL STUDY OF THE TRADITIONAL ARAB HOUSE
6.1.0 Introduction 267
6.2.0 Main factors influencing the typical Arab house 269
6.3.0 Study of the house design from the climatic point of view
   6.3.1 Physical influences of climate 269
   6.3.2 Psychological influences of climate 271
6.4.0 Landscape challenges 271
6.5.0 Social and religious challenges 273

6.6.0 Design solutions 273
  6.6.1 Planning solutions 273
  6.6.2 Other solutions 277
  6.6.3 Efficiency and economy of the traditional fountain 280
  6.6.4 Gardens and planting 281
  6.6.5 Malkaf (wind catcher) 284

6.7.0 Internal solutions - house structure 290
  6.7.1 The roof 293
  6.7.2 Walls 295
  6.7.3 Windows 297
  6.7.4 Quantity of illumination through the Mushrabiyyah 304
  6.7.5 The floor 306

6.8.0 Thermal site experiments 307
  6.8.1 Comparison between the traditional and the modern micro-climate 311
  6.8.2 Comparison between air temperature on the roof and in the courtyard of the Sehemi house 312
  6.8.3 Comparison between a modern and a traditional room in terms of air temperature 312
  6.8.4 Summary 327

6.9.0 Acoustic site experiments 327

6.10.0 Measurements of the street noise level inside some traditional houses 330

6.11.0 Study of the efficiency of the Mushrabiyyah in terms of sound insulation 335

6.12.0 Study of the traditional house in terms of room acoustics 340

6.13.0 Measurements of reverberation time of some traditional reception halls 342

6.14.0 The noise of footsteps 353

6.15.0 Summary 353

6.16.0 Study of the house design from the religious and social points of view 354

6.17.0 Different degrees of privacy 355
  6.17.1 First degree of privacy 355
  6.17.2 Second degree of privacy 355
  6.17.3 Third degree of privacy 357
  6.17.4 Fourth degree of privacy 357

6.18.0 The house design in terms of privacy 359

6.19.0 The physical influences of social activities on the house design 363

6.20.0 The traditional Arab house in terms of structural expression and space design 365
  6.20.1 Structural expression 365
  6.20.2 Forms and meanings 365
  6.20.3 Function and form in terms of facade design 369
  6.20.4 Function and form in terms of plan design 369
6.21.0 Space design
6.21.1 Internal space design and surface decoration

6.22.0 Personal sense in terms of wall treatment
6.22.1 Surface decoration in terms of woodwork
6.22.2 Surface decoration in terms of mosaic and marble

6.23.0 External space design – the courtyard
6.23.1 The courtyard proportions

6.24.0 Relationship between internal and external spaces
6.24.1 Intermediate spaces between the interior and exterior

6.25.0 The philosophy of the house
6.25.1 Relationship between devices
6.25.2 Relationship between the architect and the planners
6.25.3 Relationship between man and his house

CHAPTER 7: CONCLUSIONS
7.1.0 The city
7.2.0 The quarter
7.3.0 The street
7.4.0 The house

APPENDIX I

APPENDIX II

GLOSSARY

REFERENCES
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Wind direction (cairo Meteorological Report, 1966)</td>
<td>65</td>
</tr>
<tr>
<td>2</td>
<td>Mean and Maximum amounts of evaporation (Cairo Meteorological Report, 1966)</td>
<td>68</td>
</tr>
<tr>
<td>3</td>
<td>Some specification for wood</td>
<td>159</td>
</tr>
<tr>
<td>4</td>
<td>Surface temperature underneath the top roof, the Sehemi house, Cairo</td>
<td>293</td>
</tr>
<tr>
<td>5</td>
<td>The ratio between solid and void of the different facades of the Sehemi house, Cairo</td>
<td>302</td>
</tr>
<tr>
<td>Chart No.</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>6.1</td>
<td>Air temperature measurements in different parts of the Sehemi house (17-18.7.78)</td>
<td></td>
</tr>
<tr>
<td>6.2</td>
<td>Air temperature measurements in different parts of the Sehemi house (17-18.7.78)</td>
<td></td>
</tr>
<tr>
<td>6.3</td>
<td>Air temperature measurements in different parts of the Sehemi house (19-20.7.78)</td>
<td></td>
</tr>
<tr>
<td>6.4</td>
<td>Air temperature measurements in different parts of the Sehemi house (5-6.8.78)</td>
<td></td>
</tr>
<tr>
<td>6.5</td>
<td>Air temperature measurements in different parts of the Sehemi house (7-8.8.78)</td>
<td></td>
</tr>
<tr>
<td>6.6</td>
<td>Air temperature measurements in different parts of the Sehemi house (9-10.8.78)</td>
<td></td>
</tr>
<tr>
<td>6.7</td>
<td>Air temperature measurements in different parts of the Sehemi house (14-15.8.78)</td>
<td></td>
</tr>
<tr>
<td>6.8</td>
<td>Air temperature measurements in different parts of the Sehemi house (16-17.8.78)</td>
<td></td>
</tr>
<tr>
<td>6.9</td>
<td>Air temperature measurements in different parts of the Sehemi house (18-19.8.78)</td>
<td></td>
</tr>
<tr>
<td>6.10</td>
<td>Air temperature measurements in different parts of the Sehemi house and a Modern house (23-24.8.78)</td>
<td></td>
</tr>
<tr>
<td>6.11</td>
<td>Air temperature measurements in different parts of the Sehemi house and a Modern house (25-26.8.78)</td>
<td></td>
</tr>
<tr>
<td>6.12</td>
<td>Air temperature measurements in different parts of the Sehemi house and a Modern house (10-11.9.78)</td>
<td></td>
</tr>
<tr>
<td>6.13</td>
<td>Air temperature measurements in different parts of the Sehemi house and a Modern house (12-13.9.78)</td>
<td></td>
</tr>
<tr>
<td>6.14</td>
<td>Air temperature measurements in different parts of the Sehemi house (14-15.9.78)</td>
<td></td>
</tr>
<tr>
<td>6.15</td>
<td>Sound insulation of the Mushrabiyyah (unglazed)</td>
<td></td>
</tr>
<tr>
<td>6.16</td>
<td>Comparison between sound insulation of glazed and unglazed Mushrabiyyahs</td>
<td></td>
</tr>
<tr>
<td>6.17</td>
<td>Measurements of the reverberation time, Reception Hall No. 1, the Sehemi house, Cairo</td>
<td></td>
</tr>
<tr>
<td>6.18</td>
<td>Measurements of the reverberation time, Harim Reception Hall, the Keritliya house, Cairo</td>
<td></td>
</tr>
<tr>
<td>6.19</td>
<td>Measurements of the reverberation time, Al-Faskia Reception Hall, the Keritliya house, Cairo</td>
<td></td>
</tr>
<tr>
<td>6.20</td>
<td>Measurements of the reverberation time, Men's Reception Hall, the Musapher Khana House, Cairo</td>
<td></td>
</tr>
<tr>
<td>6.21</td>
<td>Measurements of the reverberation time, Main Reception Hall, Zinab-Khatoun house, Cairo</td>
<td></td>
</tr>
</tbody>
</table>
### LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure No.</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Location of Cairo, Baghdad and Jiddah</td>
<td>5</td>
</tr>
<tr>
<td>02</td>
<td>Planning pattern of Cairo</td>
<td>6</td>
</tr>
<tr>
<td>03</td>
<td>Planning pattern of Jiddah (Pesce, 1974)</td>
<td>7</td>
</tr>
<tr>
<td>04</td>
<td>Planning pattern of Baghdad (Al-Ashab, 1974)</td>
<td>8</td>
</tr>
<tr>
<td>05</td>
<td>Historical building at Madin Salih, Saudi Arabia (Creswell, 1940)</td>
<td>9</td>
</tr>
<tr>
<td>06</td>
<td>Modern buildings in traditional quarters, Baghdad</td>
<td>10</td>
</tr>
<tr>
<td>07</td>
<td>Modern buildings in traditional quarters, Cairo and Jiddah</td>
<td>11</td>
</tr>
<tr>
<td>1.1</td>
<td>The call to prayer (Lane, 1968)</td>
<td>21</td>
</tr>
<tr>
<td>1.2</td>
<td>A Pharaonic residential palace (Lample, 1960)</td>
<td>23</td>
</tr>
<tr>
<td>1.3</td>
<td>School mosque of Sultan Hasan, Cairo (Wilson, 1892)</td>
<td>25</td>
</tr>
<tr>
<td>1.4</td>
<td>Madrasah of Sultan Hasan, Cairo (Creswell, 1952)</td>
<td>26</td>
</tr>
<tr>
<td>1.5</td>
<td>Al-Mustansiryyah School, Baghdad (Al-Ashab, 1974)</td>
<td>27</td>
</tr>
<tr>
<td>1.6</td>
<td>Traditional class-room</td>
<td>30</td>
</tr>
<tr>
<td>1.7</td>
<td>Examples of brickwork, Mesopotamia (Stark, 1937)</td>
<td>32</td>
</tr>
<tr>
<td>1.8</td>
<td>Examples of brickwork, Ancient Egypt (Blackman, 1927)</td>
<td>32</td>
</tr>
<tr>
<td>1.9</td>
<td>Texture and colour of brickwork, Mesopotamia (Thesiger, 1964)</td>
<td>34</td>
</tr>
<tr>
<td>1.10</td>
<td>The Ziggurates (Cresswell, 1948)</td>
<td>36</td>
</tr>
<tr>
<td>1.11</td>
<td>Part of the Fatimid Wall of Cairo (Creswell, 1952)</td>
<td>38</td>
</tr>
<tr>
<td>1.12</td>
<td>Examples of masonry domes and minarets (Henry, 1895)</td>
<td>39</td>
</tr>
<tr>
<td>1.13</td>
<td>A traditional stalactite (Henry, 1895)</td>
<td>39</td>
</tr>
<tr>
<td>1.14</td>
<td>Corbels supporting the projecting upper storeys, Cairo</td>
<td>40</td>
</tr>
<tr>
<td>1.15</td>
<td>A traditional reception hall, Cairo (Nagib, 1938)</td>
<td>42</td>
</tr>
<tr>
<td>2.1</td>
<td>Location of Egypt's Capitals since the Islamic invasion</td>
<td>46</td>
</tr>
<tr>
<td>2.2</td>
<td>A traditional residential house, Yemen (Photograph by Dr. R. Lewcock, in Museum of Mankind, 1976)</td>
<td>48</td>
</tr>
<tr>
<td>2.3</td>
<td>Tūlūnīd house in Fustat, Cairo (Creswell, 1952)</td>
<td>49</td>
</tr>
<tr>
<td>2.4</td>
<td>Tūlūnīd house in Fustat, Cairo (Creswell, 1952)</td>
<td>49</td>
</tr>
<tr>
<td>2.5</td>
<td>The house unit of the Ukhaidir Palace (Creswell, 1940)</td>
<td>50</td>
</tr>
<tr>
<td>2.6</td>
<td>The house unit of the Shirin Palace (Creswell, 1940)</td>
<td>50</td>
</tr>
<tr>
<td>2.7</td>
<td>Plan of the Fatimid Cairo (Cairo, Department of Antiquities)</td>
<td>53</td>
</tr>
<tr>
<td>2.8</td>
<td>Al Azhar Mosque (Creswell, 1952)</td>
<td>54</td>
</tr>
<tr>
<td>2.9</td>
<td>Plan and Section of ad-Dardiri reception hall, Cairo (Creswell, 1952)</td>
<td>55</td>
</tr>
<tr>
<td>2.10</td>
<td>Interiors of ad-Dardiri reception hall, Cairo (Creswell, 1952)</td>
<td>56</td>
</tr>
<tr>
<td>2.11</td>
<td>Plan showing the successive city walls, Cairo (Creswell, 1952)</td>
<td>58</td>
</tr>
<tr>
<td>2.12</td>
<td>Sketch plan showing the development of Cairo since the Islamic invasion (Cairo Municipality Planning, 1970)</td>
<td>59</td>
</tr>
<tr>
<td>2.13</td>
<td>Interiors showing the development of stalactite pendente (Creswell, 1952)</td>
<td>62</td>
</tr>
<tr>
<td>2.14</td>
<td>Some domical constructions, Egypt (Herz-Bey, 1896)</td>
<td>63</td>
</tr>
<tr>
<td>Page</td>
<td>Description</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
<td></td>
</tr>
<tr>
<td>2.15</td>
<td>Climatic chart, Cairo</td>
<td></td>
</tr>
<tr>
<td>2.16</td>
<td>Location of both the mediaeval and modern city centre</td>
<td></td>
</tr>
<tr>
<td>2.17</td>
<td>The historical area in Cairo (Department of Antiquities, Cairo, 1955)</td>
<td></td>
</tr>
<tr>
<td>2.18</td>
<td>Ablutions after a mid-day meal (Wilson, 1892)</td>
<td></td>
</tr>
<tr>
<td>2.19</td>
<td>Exterior of traditional houses, Cairo</td>
<td></td>
</tr>
<tr>
<td>2.20</td>
<td>Interiors of traditional houses, Cairo (Pool, 1896)</td>
<td></td>
</tr>
<tr>
<td>2.21</td>
<td>Plan of the Taktabosh</td>
<td></td>
</tr>
<tr>
<td>2.22</td>
<td>Plans and section of Kock Kadam house, Cairo (d'Hulst, 1890)</td>
<td></td>
</tr>
<tr>
<td>2.23</td>
<td>Floor paving of the Mandarah (Herz-Bey, 1896)</td>
<td></td>
</tr>
<tr>
<td>2.24</td>
<td>Interior of one of the reception halls, Cairo (Fathy, 1970)</td>
<td></td>
</tr>
<tr>
<td>2.25</td>
<td>Interior of one of the reception halls, Cairo (Henry, 1895)</td>
<td></td>
</tr>
<tr>
<td>2.26</td>
<td>The summer reception hall, Maq'ad, Cairo (Pool, 1896)</td>
<td></td>
</tr>
<tr>
<td>2.27</td>
<td>A traditional public fountain, Cairo (Bourgoin, 1879)</td>
<td></td>
</tr>
<tr>
<td>2.28</td>
<td>Women's reception hall, Cairo (Pool, 1896)</td>
<td></td>
</tr>
<tr>
<td>2.29</td>
<td>Wall decoration</td>
<td></td>
</tr>
<tr>
<td>2.30</td>
<td>Bathroom ceiling of a traditional house, Cairo</td>
<td></td>
</tr>
<tr>
<td>2.31</td>
<td>The traditional Malkaf, wind-trap</td>
<td></td>
</tr>
<tr>
<td>2.32</td>
<td>Ancient Egyptian wind-trap, Thebes, Egypt (Fathy, 1970)</td>
<td></td>
</tr>
<tr>
<td>2.33</td>
<td>One of the reception halls of the Amir Bashtāk Palace, Cairo (Lezine, 1970)</td>
<td></td>
</tr>
<tr>
<td>2.34</td>
<td>One of the reception halls of the Amir Taz Palace, Cairo (Lezine, 1970)</td>
<td></td>
</tr>
<tr>
<td>2.35</td>
<td>The site of Al Mansur Capital, Baghdad (Ismail, 1969)</td>
<td></td>
</tr>
<tr>
<td>2.36</td>
<td>Layout of Baghdad (Ismail, 1969)</td>
<td></td>
</tr>
<tr>
<td>2.37</td>
<td>Plan of the outer and inner gates of Baghdad (Creswell, 1940)</td>
<td></td>
</tr>
<tr>
<td>2.38</td>
<td>Location of the traditional quarters, Baghdad (Al-Ashab, 1974)</td>
<td></td>
</tr>
<tr>
<td>2.39</td>
<td>Sketch plan showing the decline of the round city (Al-Ashab, 1974)</td>
<td></td>
</tr>
<tr>
<td>2.40</td>
<td>Sketch plan showing the development of Baghdad (Al-Ashab, 1974)</td>
<td></td>
</tr>
<tr>
<td>2.41</td>
<td>The ancient Babylonian Ziggurat (Al-Allaf, 1902)</td>
<td></td>
</tr>
<tr>
<td>2.42</td>
<td>The great mosque of Samarra, Iraq (Al-Allaf, 1902)</td>
<td></td>
</tr>
<tr>
<td>2.43</td>
<td>Ibn-Tulun mosque in Cairo (Lewis, 1971)</td>
<td></td>
</tr>
<tr>
<td>2.44</td>
<td>The site of the Ukhaidir Palace</td>
<td></td>
</tr>
<tr>
<td>2.45</td>
<td>Plan of the Ukhaidir Palace (Creswell, 1940)</td>
<td></td>
</tr>
<tr>
<td>2.46</td>
<td>Plan and perspective of the Balkuwara Palace (Creswell, 1940)</td>
<td></td>
</tr>
<tr>
<td>2.47</td>
<td>Plan of Al-Ashiq Palace, Iraq (Creswell, 1940)</td>
<td></td>
</tr>
<tr>
<td>2.48</td>
<td>Climatic Chart (Al-Rauri, 1978)</td>
<td></td>
</tr>
<tr>
<td>2.49</td>
<td>Layout of a traditional quarter, Baghdad (Fathy, 1970)</td>
<td></td>
</tr>
<tr>
<td>2.50</td>
<td>Plan of a UR residential quarter (Lample, 1960)</td>
<td></td>
</tr>
<tr>
<td>2.51</td>
<td>Kadhimiyah Townscape (Al-Ashab, 1974)</td>
<td></td>
</tr>
<tr>
<td>2.52</td>
<td>The exterior of traditional houses, Baghdad (Al-Azzawi, 1969)</td>
<td></td>
</tr>
<tr>
<td>2.53</td>
<td>A doorway of a traditional house</td>
<td></td>
</tr>
<tr>
<td>2.54</td>
<td>Plan, section and elevation of a traditional house (Al-Ashab, 1974)</td>
<td></td>
</tr>
<tr>
<td>2.55</td>
<td>The Tarma (Al-Azzawi, 1969)</td>
<td></td>
</tr>
<tr>
<td>2.56</td>
<td>Section through the air scoop (Al-Azzawi, 1969)</td>
<td></td>
</tr>
<tr>
<td>2.57</td>
<td>Silhouette of the traditional Baghdadi houses</td>
<td></td>
</tr>
<tr>
<td>2.58</td>
<td>Roof construction</td>
<td></td>
</tr>
<tr>
<td>2.59</td>
<td>The site of Jiddah</td>
<td></td>
</tr>
</tbody>
</table>
xi

2.60 The city wall of Jiddah (Pesce, 1974) 132
2.61 Sketch plan showing the development of Jiddah 134
2.62 The rockcut tombs of Mada'in Salih (Samih, 1970) 137
2.63a Plans and sections of Yemeni houses (Drawings by Dr. R. Lewcock, in Museum of Mankind, 1976) 140
2.63b Mecca traditional house (Abdaly, 1975) 141
2.63 Plans and sections of a traditional house in Riyadh, Arabia (Mousalli et al, 1976) 143
2.63' Photographs of traditional houses in Jiddah, Arabia (Greenlaw, 1976) 144
2.64 Climatic Chart (Asaad, 1977) 145
2.65 Location of Suakin, Sudan (Greenlaw, 1976) 151
2.66 Location of some traditional houses in Suakin (Greenlaw, 1976) 152
2.67 Plans and elevations of some examples of Suakin houses (Greenlaw, 1976) 153
2.68 Plans and elevations of some examples of Suakin houses (Greenlaw, 1976) 154
2.69 Examples of lattice wood work, Mushrabiyyah (Marcia, 1954) 158
2.70 Example of traditional furniture (Pool, 1886) 160
2.71 Example of traditional furniture (Pool, 1886) 161

3.1 Perspective showing the organic skyline of the city (Briggs, 1924) 171
3.2 Layout of one of the traditional quarters, Riyadh, Saudi Arabia (Mousalli et al, 1976) 172
3.3 Perspective showing the location of the mosque in some Muslim cities, Cairo, Baghdad (Al-Allaf, 1902) 173
3.4 Perspective showing the relationship between street width and building heights (Briggs, 1924) 175
3.5 Sketch plans showing the relation between planning pattern and mobility 177
3.6 Plan showing Al-Azhar square after the modern improvements 179
3.7 Abden Square, Cairo 180
3.8 Section, exterior, and interior of Qalāʿūn's Tomb Mosque (Creswell, 1952) 182
3.9 Plan of sanitation system, Fustat, Cairo (Creswell, 1952) 185
3.10 A building detail (Wilson, 1892) 190
3.11 A courtyard house, a courtyard khan (inn) and a courtyard hospital (Pauty, 1932) 194

4.1 Layout of the traditional quarters, Baghdad (Al-Ashab, 1974) 205
4.2 Interior and plan of Wekalah al-Ghuri (Unsal, 1959) 208
4.3 Interior of a Baghdad Khan (Al-Ashab, 1974) 209
4.4 Interior and plan of Mur-Jan Khan at Baghdad (Al-Ashab, 1974) 209
4.5 Plans and sections of the public bath (Drawings by Dr. R. Lewcock, in Museum of Mankind, 1976) 211
4.6 Plan showing the distribution of the public baths, Baghdad (Al-Ashab, 1947) 213
4.7 A Friday Mosque, Cairo (Pool, 1890) 215
4.8 Some Minarets, Cairo 216
4.9 Plans showing the capacity of the old and new means of transportation 219
4.10 A traffic jam (Gruen, 1965) 220

5.1 Street layout, Cairo 227
5.2 Street layout, Baghdad and Jiddah 227
5.3 Street paving 229
5.4 Street silhouette, Cairo, Jiddah and Baghdad 230
5.5 Sketch showing street unity 231
5.6 Al-Kahim Mosque and the Mu'Ayyad Mosque (Creswell, 1940) 233
5.7 Layout of al-Mu'izz street 234
5.8 Photographs showing the development of the street perspective 235-239
5.9 Sketch showing traditional street perspective 241
5.10 Examples of facade details (Pool, 1896) 242
5.11 Traditional street patterns 243
5.12 Different streets' skyline 244
5.13 Layouts showing the street direction, Cairo, Jiddah and Baghdad 246
5.14 Street perspective showing the sense of containment (Wilson, 1892) 248
5.15 Sketch showing the effect of the street pattern on heat gains 249
5.16 Sketch showing the movement of human beings 251
5.17 Sketch showing a small traditional coffee house (Pool, 1896) 252
5.18 Sketch plan of a traditional and modern street pattern 256
5.19 Traditional shops (Pool, 1896) 258
5.20 Elevation and interior of a traditional house, Cairo 259
5.21 Sketch plan of a motor car street and a pedestrian street 261
5.22 Photograph showing the unsuitability of allowing motor traffic in traditional streets 263

6.1 House plans, 13th, 14th and 19th centuries (Briggs, 1924) 268
6.2 Graph showing the comfort zone (Sealey, 1979) 272
6.3 A cluster of housing at Siwa Oasis, Egypt (Faris, 1965) 274
6.4 Plans and elevations showing the summer apartments 276
6.5 Traditional fountains (Bourgoin, 1873) 278
6.6 The Salsabil (Fathy, 1970) 279
6.7 Picture showing the fountain outlet 279
6.8 The ancient Egyptian God of Gardens (Hyams, 1971) 282
6.9 Ground plan of an Ancient Egyptian Villa at Thebes (Hyams, 1971) 282
6.10 Plans of the ground and first floors of the Sehemi house 285
6.11 Plan of the ground floor at the Sehemi house showing the relation between the kitchen and reception hall No. 3 286
6.12 Section and interiors of a reception hall, Moheb ell-dein house, Cairo (Fathy, 1970) 288
6.13 Sections through the wind catcher of the Iraqi house (Al-Azzawi, 1969) 289
6.14 Section and roof plan of a traditional house in Dubai (Coles and Jackson, 1975) 291
6.15 Section showing a recent cooling system, India (Saini, 1962)
6.16 Plan of the first floor of the Sehemi house showing the location of surface temperature measurements
6.17 Sketch showing reed crates on the roof of traditional houses in Iraq
6.18 Roof vessels, India (Ekisticks, 1961)
6.19 Formation of temperature inversion (Koenigsberger et al, 1973)
6.20 A traditional Mushrabiyyah
6.21 The different facades of the Sehemi house
6.22 An example of using the Mushrabiyyah outside the Arab countries (Fathy, 1970)
6.23 A Mushrabiyyah - the house of Jamal-el-Din-Al-Dhabi, Cairo, (Fathy, 1970)
6.24 Plan, section and elevation of reception hall No. 3, Sehemi house
6.25 Layout showing the site of the Sehemi house
6.26 Layout showing the site of the Modern house
6.27 Plans showing the different locations of the thermal measurements
6.28 Chart showing the decay of noise (Parken, 1969)
6.29 Plans of the Sehemi house showing the sensitive and the insensitive rooms in terms of noise
6.30 Plan of the "round lock" (Parken, 1969)
6.31-6.33 Plans of some traditional houses showing the noise measurements in the different rooms of each house and street noise level
6.34 Equipment used in the acoustics experiments
6.35 Plan showing the location of measuring the Mushrabiyyah insulation at the Sehemi house, Reception hall No. 4
6.36 Plan showing the location of measuring the Mushrabiyyah insulation at the Musapher Khana house
6.37 Plan of Reception hall No. 3, the Sehemi house showing the unparallel walls
6.38-6.41 Plans, sections and surface materials specifications of some traditional halls, Cairo
6.42 Plan of the Ribat-El-Sultan Enal, Egypt
6.43 Layout of the round city of Baghdad (Creswell, 1940)
6.44 Ground floor plans of some traditional houses, Cairo
6.45-6.48 Sketch plans showing the staggered entrance
6.49 Elevations of some traditional houses, Cairo
6.50 Interiors of a traditional reception hall
6.51 Sketch showing the stone corbels carrying the projecting upper floors, Cairo
6.52 Some stone corbels
6.53 Sketch of a traditional bay window
6.54 Sketch of a traditional Mushrabiyyah
6.55 Some traditional forms showing the common convex lines
6.56 The visual balance of the traditional buildings (Briggs, 1927)
6.57 The visual balance of the traditional buildings
6.58 Section showing the reception hall height
6.59  Section showing the Maqu'ad height (d'Hulst, 1890)  376
6.60-6.62  Sketches showing the design of some reception halls, Cairo  379-382
6.63  Photographs showing the different patterns of niches, shelves and recesses of the reception hall  384
6.64  A fine interlacing form of a lamp suspended in a lattice (Pool, 1886)  386
6.65-6.68  The varying designs of the Mushrabiyyah (Briggs, 1924)  387-390
6.69  A door panel (Briggs, 1924)  391
6.70  Ceiling details  393
6.71  A triple panel of a rich house, Cairo (Pool, 1886)  394
6.72  Some examples of floor tiles, Cairo (Briggs, 1924)  394
6.73  Plans and sections showing the proportions of the courtyard of the Sehemi house  397
6.74  The skyline of the Sehemi house  398
6.75  Elevations showing the different facade heights of the Sehemi house  399
6.76  Facade projection of the Sehemi house  400
6.77  The inner facades of the Sehemi house  402
6.78  A bridge between two traditional houses, Cairo  404
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INTRODUCTION
INTRODUCTION

This thesis is concerned with an understanding of the traditional Arab house. In order to achieve this it is necessary to deal with the Arab house in the context of historical, social and environmental influences.

The organisation of the thesis reflects this rationale; that is, it attempts to approach the subject comprehensively, by focusing on these diverse factors in a structured and, hopefully, coherent manner.

Implicit in this approach is the notion that the traditional Arab house is only a part of a total system and that this system operates efficiently only when its various parts work together. A consequence of this is that it is necessary to consider the environment in which the house is located; that is, the city, the quarter (or neighbourhood) and the surrounding streets.

This line of thought is developed in the following four steps, in which each step leads logically to the next. The analytical study starts with the traditional Arab city and then the quarter, and the street and, finally, the typical traditional house.

By its very nature, a comprehensive study of this sort does not permit a complete separation of the different sections. Consequently it was necessary to emphasize the design devices which relate to solutions at all levels: the city, the quarter, the street, and the house. The study brings to light the solutions which rely mainly on natural laws, which we undergo in our everyday life. These natural solutions often satisfy human needs with ways of construction which make life harmonious with the natural environment and not in conflict with it.

This thesis as a whole aims to benefit from the traditional culture and architectural heritage which preceded our modern civilization. This valuable heritage, if well understood, could alter our approach to the design of both new settlements and houses.

It may be noted that the three cities that are discussed in this thesis
were selected because they have much in common.

1. Each of them is located near a significant body of water: Cairo on the Nile River, Jiddah on the Red Sea, and Baghdad on the Tigris (Fig. 01).

2. They bear a close similarity to one another from the Town Planning point of view (Figs. 02, 03, 04). Their layout is characterised by compact planning, narrow winding streets, bay lanes and cul-de-sacs.

3. Each of the three cities demonstrates a historic continuity between the pre-Islamic settlement, which had virtually disappeared, and the Islamic settlement which can be considered to be a newly formed city (Lewis, 1971).

4. The area as a whole has seen the civilizations of A'ad, Thamud, Saba, the Egyptian civilizations in the Nile valley, the Sumerian, Babylonian, Persian, Assyrian civilizations (Hitti, 1937). Fig. 05 illustrates the combination of all these styles in one building at Madian Salih, Saudi Arabia.

5. All, in addition, in their contemporary periods witness a very fast vertical and horizontal expansion surrounding the historical quarters and filling in between with imported styles (Figs. 06, 07).

To achieve a logical format the thesis is divided into the following chapters:

CHAPTER 1 : RELIGION, EDUCATION AND BUILDING MATERIALS

The first chapter shows the main influences of Islam on people from birth to death, materially and spiritually. It also brings to light how the Qur'an affects the education system, social relationships and the solidarity of the Muslim society. Finally, the study reveals that the three cities studied, namely, Cairo, Baghdad and Jiddah, had a long tradition of using nearly the same building materials.

CHAPTER 2 : HISTORICAL OUTLINE

The second chapter comprises the historical outline of the
three cities under study in this thesis: Jiddah, Baghdad and Cairo. This part reveals that the three cities bear a close similarity in terms of the social structure, manners, customs, city architecture and planning concept.

CHAPTER 3: THE ISLAMIC CITY

The third chapter relies on the above-mentioned conclusion. Accordingly, I chose part of one of the three cities, old Cairo, which has not suffered a great deal of modern surgery, i.e. still retains most of its traditional features. The chosen example, old Cairo, was analysed mainly from the landscape influences, the city contents and general arrangement, space design, water supply and sanitation, and the economic and aesthetic aspects of city planning. This part is concluded by bringing to light the philosophy of the Islamic Arab city in terms of planning and human aspects.

CHAPTER 4: THE ISLAMIC QUARTER

This part of the study deals mainly with the social and physical structure of the traditional quarter. It also deals with the relationship between the two structures and the city as a whole.

CHAPTER 5: THE ISLAMIC STREET

In this chapter the traditional Islamic street was examined in terms of its perspective design and development, street orientation, pattern, the street as a bazaar space, and the relationship between street speed, perception and social contacts.

CHAPTER 6: TRADITIONAL ARAB HOUSE

This chapter represents a detailed study of a typical traditional Arab house represented by the Sehemi house, old Cairo. It begins by explaining the different challenges resulting from the environmental conditions and the demands of religion and social life. A study of the solutions of the above challenges follows which brings to light the traditional way of handling the problems and the nature of
the relationships between these design options. This study is supported by thermal and acoustic experiments which were carried out on site in Cairo in the summer of 1978, which show the suitability of the traditional planning and architectural design in scientific terms. Finally, this part ends with a study of the philosophy of the traditional house in terms of planning and space design.

CHAPTER 7: CONCLUSIONS

The final chapter points out the important recommendations in the same format of the earlier chapters, i.e. starts with the city, the quarter, the street and finally the house. In order to illustrate the recommendations it appears useful to contrast the advantages of the traditional concepts against their modern counterparts.
FIG. 01: Location of Cairo, Baghdad and Jiddah.
FIG. 03: Planning Pattern, Jiddah.
FIG. 04: Planning Pattern, Baghdad.
FIG. 07: Modern buildings in the traditional quarters.
CHAPTER 1

RELIGION, EDUCATION AND BUILDING MATERIALS

1.1.0 RELIGION
1.2.0 EDUCATION
1.3.0 BUILDING MATERIALS
1.1.0 RELIGION
1.1.1 The Islamic City in Terms of Islam

What we might call the Islamic city existed in some sense from the seventh century until the Second World War. It is obvious that change did take place whether we look at the city as a group of buildings or as a community of people.

Islamic cities are to be found in different parts of the world: in Spain, North Africa, Saudi Arabia, Iraq, Iran and India. We cannot expect that urban life has taken the same form in all these regions. Not so much because of supposed differences in "national character" as because of varying soils and climates, different traditions and involvement in various commercial systems. We might perhaps discuss separately Indian, Turkish or Iranian cities and the Arab city (Shafii, 1955). Within each area we should again have some difference but because they are very slight, I will treat the three Arabic cities under study from a wide angle as one unit looking for the common important features.

This subject raises an important question. (The answer to the following question will be the natural outcome of this chapter):

Did cities in the Muslim world have any important feature in common, and if so, can they be explained in terms of Islam?

To put the Islamic city in its right context, it ought to be mentioned that there will not be clear understanding of the Islamic city as a group of buildings, or society, or as a community of people without consideration of Islamic religion.

Because Muslims live by the Qur'an from birth to death, marriage, inheritance, business, contracts, all are based on the Qur'an (Bawany, 1955), so we cannot see Muslim thought in the right perspective unless we appreciate and understand the Qur'an. Without such understanding any research work concerning the Islamic city or buildings must continue in the dark. That is because religion made Muslims different from other societies in the way they looked at, estimates and felt about things. They saw what others could not, and did not see what others could (Husaini, 1973).
Historically, Islam may be seen as a new beginning, the foundation of a new religion, a new empire and a new civilization. This is true to a certain extent. In reality the Islamic civilization came into being from a marriage between the spirit of the Qur'an and the existing traditions of various civilizations which Islam inherited such as the ancient civilizations that flourished on the banks of the Tigris and Euphrates and in the land of the Nile (Hitti, 1937). All acted as a medium for reshaping and adapting them in a new spiritual form suitable to the Islamic religion and the environment.

1.1.2 Main Duties of Islam

The main religious duties centre on the so-called five pillars of Islam. The profession of faith (Shahada) which is the first pillar, is summed up in the formula "There is no god but Allah*; Muhammed is the messenger of Allah". The second pillar is the five times a day prayer (salah). The faithful moslem must turn his face towards Makkah. The Friday noon prayer is the only public one and is obligatory for all adult males. The third pillar is alms-giving (zakah). In the Qur'an this is often associated with the prayer (salah). The fourth is fasting in the month of Rumadan; this particular month, because in it the Qur'an was first revealed. The last one is pilgrimage. Once in his lifetime every Moslem of either sex, who can afford it, is supposed to undertake pilgrimage at a stated time of the year to Makkah (Abal-Hassan, 1952).

From what is stated above, it is obvious that to fulfil the five pillars of Islam, or to be a real Muslem, you will create some sort of direct relationship between you and God. No-one can find out that you have made the prayers, fasting, giving money to poor people except God. From this point Islam creates two phases: firstly, personal responsibility, and secondly, direct relationship between creatures and the creator.

* This word, grammatically speaking, is unique. It has no plural and no feminine, so this name itself reflects light upon the fact that Allah is one and only one; he has neither any partner nor any equal.
Orientation and Time.

Due to the necessity of knowing the time for prayer and the orientation of Makkah, Muslims developed the science of "fixed moment" as well as direction by compass. In this connection it may be said that Ibn-Yunus made the first serious study of the mechanical clock. He also made one of the earliest records of an astronomical observation which dates back to the ninth century on the Muqattam hills in Cairo. The orientation of the mosque's niche towards Makkah gave impetus to them to study geography. This experience enabled them later to reach China by sea and by land during the seventh and ninth centuries (Unsal, 1959).

Water.

Because Islam prescribes ablution before prayer, Muslims constructed fountains, public baths and other water supplies.

Mosque.

Because in Islam praying in groups is preferable to praying individually, Muslims erected mosques.

Geography.

As traders and pilgrims the Muslims naturally discovered a great deal about the lands within their empire and on the route to the Far East. One of the many accounts written by travellers was that of the Moroccan Ibn Bauttuta who gave an accurate description of what he found in China, India and Central Africa (Crittenden, 1971).

1.1.3 Islam and Society

One of the strongest links joining the people together is the Islamic religion. There is the possibility of occasional difference between them, but soon it is changed into love and affection through forgiveness. There is much to be learned from the Qur'an on the subject of forgiveness, such as:

"If any show patience and forgive, that truly would be an exercise of courageous will and resolution in conduct of affairs".

(Qur'an: Sura 42:43)
"Forgive, even when angry"

(Qur'an: Sura 42:37)

The Holy Prophet also said:

"A Muslim must forgive the mistakes of his fellow and should sympathize with him in his distress; should cover his defects and pardon his mistakes; should accept his apology, protect him against his back-biters and always be sincere to him; should preserve his friendship, visit him in ailment; accept his invitation and gift, and equally compensate his favour . . ."

As Islam aims at solidarity of society and strengthening human relations it has considered all Muslims equal in everything irrespective of their colour, place of birth and language (Zakat, 1965). The holy Qur'an again emphasizes this point:

"The believers are but brothers to each other, so make reconciliation between your two brothers, and fear Allah that you may receive mercy".

(Qur'an: Sura 49:10)

The above shows in brief how Islam has emphasized the social contacts. The history of Islam is full of such events which clearly show the spirit of fraternity and strong social relations which governed the whole life of the Muslims during the Middle Ages (Kamal, 1964).

1.1.4 The Family Social Life

The Muslim family is an extended family, normally with three or four generations within its circle. Marriage in Islam is not a temporary union and is meant to last for life. The Arab social life is usually based on the ancient traditions, and on the teaching of the Qur'an. The individual is responsible to the family, and the family to the tribe or community. If an individual commits a wrong, the family and community will be held responsible. When a man marries he remains closely connected with his father and mother, sisters and grandparents (Qutb, 1950). Together they share happiness and sorrow, and meet the events and accidents of life.
Status of Women in Islam.

From the material, as well as the spiritual point of view, Islam recognizes the position of woman to be the same as that of man. It claims that both come from the same essence.

The position of the mother is very much exalted in Islamic traditions (Qutb, 1950). The prophet Muhammed has gone so far as to say:

"Paradise lies underneath the feet of your mothers"

In the economic sphere, a woman can earn money and possess property just as a man can do.

The Holy Qur'an describes the mutual relation of husband and wife as a single soul in two bodies.

"He it is who created you from a single being, and of the same did He make his mate, that he might find comfort in her".

(Qur'an 20:13)

The same idea is very beautifully described in different words at another place:

"They (your wives) are an apparel for you and you are an apparel for them".

(Qur'an ii:187)

Islam and Polygamy.

Islam has allowed a man to marry more than one wife. This has been done for the purpose of solving many social and domestic problems. But it should be understood that taking more than one wife is only permissible and not ordained. Secondly, this permission is only for those who can do justice in everything between his wives (Qutb, 1950). The Qur'an says:

"Marry women of your choice, two or three or four, but if ye fear that ye shall not be able to deal justly (with them) then only one".

Finally, if a husband follows the tenets of Islam, he is bound to think many times before entering a new marriage.
The fact that the Arab word for house is "sakan", or "maskan", it is related to the word "sakinah" meaning "peaceful and calm". Also, the organisation of the Muslim family required that the house should provide maximum privacy. In addition to hospitality, the close relation between the family and the strong relations between families together with the imagination of paradise which is described many times in the Qur'an with its gardens and rivers. Now we can imagine the family house according to the above points.

It has to be planned in such a way as to encourage social contacts, to insure privacy and represent some element of the paradise such as water or plants.

Before leaving this part we still have to answer the question - Can cities in the Muslim countries be explained in terms of Islam? As mentioned in the beginning of the section. The answer is in the confession from the then president of the U.S.A. (As reported in Al Ahram Newspaper, 11.12.77) when he said:

"We find ourselves materially rich, but spiritually poor, while we are reaching the moon by our brilliant technology, we are entangled in divisive conflicts on this earth, we find around us empty lives, we want to give hope. We need a spiritual answer to these problems".

(p 2)

When one considers these facts one is bound to respect Islam, Christianity, and all religions. Now, we can point out that the Muslim city could define itself in spiritual terms, this human side explains so much of its physical aspects.

It is Islam which gave its resilience to the Muslim city and to its inhabitants, not because it was necessarily aware of all urban problems but because it had the abstract forms in which all of them could be resolved.

Rights.

Many of the individual's rights may also be duties as the right to be educated is also the duty to learn. The prophet said: "Seeking knowledge is a duty for every Muslim, man or woman". Also the right to work is coupled with the prohibition of unemployment, for it is a duty to work (Andraw, 1936). If a person is completely unable to earn a living, the community has to provide for him.
Freedom.

Freedom is sacred in Islam; for instance, one of the main aims of fasting all through the month of Ramadan (no food or drink from sunrise to sunset) is to train the individual to be able to say "no" to himself.

Private Ownership.

Private ownership is a concept radically different from that of either communism or capitalism. In Islam total ownership is God's. The right of ownership that has been bestowed on us is secondary to His.

1.1.6 Relationship between Government and Society

The Government Pattern.

At the top of the Government stood the ruler and his household, a group closely identified with him, his family, his harem, his palace officials and the army. Beneath the ruler lay a whole system of control. The secretaries, the sahib al-surta who maintained orders, the qadi (judge) who administered justice, other functionaries who supervised public acts of worship, the heads of quarters, of crafts and of non-Muslim communities (Guillaime, 1963).

The Social Pattern.

The social pattern in the Islamic city was influenced by the nomadic tribal way of life. When they settled, they adapted it by developing the quarter system. These quarters were relatively small homogeneous communities, based on religion, national origin, or occupation. Each quarter had its own elected leader (Raihan, 1955). Some quarters specialized in certain types of manufacture of course to a degree. Some quarters were rich and some poorer, but basically they were whole communities made up of notables and commoners both rich and poor. Economic, religious, and social life were not so differentiated as to create quarters by class distinctions.

Each quarter had a chief called the Shaykh who was its spokesman and almost its governor. Each quarter was collectively responsible for the apprehension of criminals. Quarter gates frequently had to be built in times of danger (Grunebaum, 1961).
In cities with pre-Islamic origin, like al-Fustat, the first Islamic capital in Egypt, the arrival of the Arabs was accompanied by the establishment of new residential quarters on the border of the old city (Grunebaum, 1961). In the other case of newly-founded Islamic cities, the Arabs settled by tribes, each tribal quarter to be complete with its own mosque, hammam, and its own market. For example, in Baghdad Persians and Arabs lived apart from the beginning (Coon, 1964). Jiddah was also divided into five main quarters, Ash-Sham, Al-Mazlum, al-Yemen, Quarantine, and al-Baghdad.

To return to the sort of relation between the government and the society, it is interesting to understand it from the following example (taken from Fyzee, 1963):

"The first Caliph, Abu Bakr, in his inaugural speech, said - 'If I do right, support me, if I do wrong, correct me'. Also the second Caliph, 'Umar, asked 'What will you do if I go wrong?' One of those present shouted: 'By God, we will put you right, with the edge of our swords'. Umar replied 'If you do not do so, you will lose God's blessing'.

(p28)

More generally, by this freedom and by this social pattern, the ruler and his government could not easily ignore the wishes of the groups or the quarters in the city.

1.1.7 Islam and Sculpture

From a few passages in the Qur'an, Sura V, 92, VI 74, it is apparent that statues and sculpture are prohibited, because Allah, God, is the true 'fashioner' (musswir); he alone, unlike the human 'muswir' usually a painter, is able to apply the breath of life to his creation. On the day of judgement the human artist, who, in his hubris, has dared to make images, will be called upon to instil life into them (Lewis, 1971); naturally he will be found wanting and be condemned.

Hence Muelem art, especially in the domestic and religious sectors, is prolific in vegetal, geometric, calligraphic decoration. This will be discussed later.
Right and Left.

Another interesting phenomenon is that most of the Arab Muslims believed, and still believe, that the right hand is the symbol of rectitude and things on the left are sinister. For example, they never enter the mosque with the left leg; the Arab writing starts from right to left. Also when they visit the tombs, or during pilgrimage, they usually circle the monument or its enclosure from right to left.

East and West.

Thousands of years have passed, many religions and beliefs have been adopted and changed, civilizations of all kinds and influences have passed by and through Egypt, yet the majority of the Egyptians of today still hold to certain attitudes and customs whose roots are very ancient. They still regard the west as the direct of death (Roes, 1930). Accordingly, they direct the heads of their dead to the west. Peasants in Egypt do not sleep with their heads in the western position and would try, if at all possible, not to open the entrance of their houses to the west (Ibrahim, 1976).

1.1.8 Islam and Privacy

The separation of sexes and privacy are one of the most important characteristics of the Islamic city. These facts are obvious in both the house design and the city plan. For example, the house is designed in such a way that a visitor, on entry, has to pass a doorkeeper, then an angle in the entrance passage that prevents any outsider from gazing into the house, and a locked door from the inner courtyard that gives reluctant access to the women's portion of the house. Furthermore, it is so planned that none of its windows look into any other house, nor can the courtyard be seen by any neighbours from their roofs or windows. Only from one point is it possible to look into these courts and houses, it is from the top of the mosque-minaret (Fig. 1.1). Very soon Muslims solved this problem by giving this job only to blind men, "mu'adhin" (Makrizy, 1853). In planning the design from the public space of the bazaar or the market to the private space of the courtyard inside the house, each intersection of the circulation network marks a distinct point and creates some kind of privacy.
In this connection it may be said that separation of sexes was not only during life time but also after death (Lane, 1968). In a family vault one side is set apart for men, the other for women, between them is the entrance to the tomb.

Before leaving this point I have still to mention that separation of sexes was practised during Pharaonic times. Fig. 1.2 shows that there was a separate residential apartment, or palace, for the king's harims (Lampl, 1960).
FIG. 1.2: The separation of sexes during Pharaonic times.
1.2.0 EDUCATION
1.2.1 Education System

The learning of the Qur'an was the chief business of the school (madrasa). As soon as the child begins to speak his parents teach him to say "There is no God but God". "Mohammed is the apostle of God". When he is five or six years old he usually is sent to learn the Qur'an (Pool, 1896).

The education system was, of course, based on the traditional Islamic concept of knowledge and learning (Hitti, 1937).

At the beginning of the Islamic period, there were no specific buildings used as schools. The whole affair of education took place at some parts of mosques (Fig. 1.3). Each master occupied a corner or pillar of his own. Then as education became formalized and extended, buildings attached to mosques were built.

The architectural form usually taken by the school (madrasa) was as follows:

A square central court flanked by four open halls, or liwans, forming the branches of a cross. This figure is inscribed in a rectangle, the angles of which are occupied by the dependencies, the entrance bay, a staircase to the roof, halls, cells for the professors ... Madrasah of sultan Hasan (1365-1363) is a good example (Fig. 1.4). It covers an area of nearly 8,000 square yards. Creswell (1931) pointed out that "when one stands at the entrance to the court (sahn) and observes its vast proportions, its richness of decoration, its simplicity of lines and rich stalactite balconies of the minaret rising over the south corner one feels that it is one of the most beautiful schools in Cairo". (p66)

In Baghdad, Al-Mustansiryya (Fig. 1.5), Al-Salihiyya and in Jiddah al-Falah are good examples of the Islamic school.

The madrasah developed into a full university around the eleventh century, a university in which a variety of subjects from religious law to astronomy were taught regularly. The best examples still survive, being perhaps the Qarawiyyin in Fez, the Zytuniyyah in Tunis...
FIG. 1.3

School, mosque, and Mausoleum of Sultan Hasan, Cairo
a. Al-Mustansiriyah College looking south-east

First Floor

Ground Floor

b. Plan of Al-Mustansiriyah College

FIG. 1.5
and al-Azhar in Cairo. Al-Azhar was indeed the University of Islam (Lewis, 1914). Its influence was felt wherever the Mohammadan religion reached, and its disciples were collected from all parts of the Muslim world.

But the 'madrasa' or the mosque university was not the only scientific institution. The hospital, for example, played an important educational role. Rayy and Baghdad in the fourth to tenth century had medical schools attached to them with regular programmes for students. The most notable one in Islamic countries is the Mansuri hospital built by al-Mansur Qala'ūn in the third century in Cairo. It had beds for several thousand patients. It also had specific wards for various illnesses and separate sections devoted to each sex (Nasr, 1966). It also included lecture halls, a library, mosque and separate administrative quarters.

1.2.2 Libraries

Libraries were usually meeting places for scientific discussion and debate. Some mosques in Jiddah, Baghdad and Cairo included very valuable libraries attached to reading rooms. Around the tenth century al-Basra, in Iraq, had a very large library whose founder granted stipends for scholars working in it (Makrizy, 1853).

1.2.3 General Level of Culture

There were quite a number of educated men under the first 'Abbasids' in Egypt and in Iraq. But how high the general level of culture was among the masses, is not so easy to determine. The thousand and one nights may be taken as an index of the degree of knowledge after Harūn and down to the twelfth century (Makrizy, 1853).

Finally, the whole affair of education and general culture has always been at the heart of Islamic civilization as one of its basic pillars because it has been inseparable from the tradition itself which forms the marrow and the backbone of the whole of Islamic civilization.
1.2.4 The Nature of Discussion and Lecture

One of the most characteristic features of the traditional education in all the Arab countries is that the students sit on the floor in a rough circle (Fig. 1.6). This arrangement has a very important influence on behaviour, such as:

The organization of the discussions is directed towards encouraging the students to talk freely and to listen to each other;

In such groups' discussion, the emphasis is on the students talking to each other and the lines of communication form a network.
Traditional class room

Modern class room

FIG. 1.6
1.3.0 BUILDING MATERIALS
1.3.1 Brick Work

Although the great majority of the surviving mediaeval monuments in Egypt, Iraq and Arabia are built of stone, the earlier buildings in the three cities under study were in brickwork.

In Iraq, mud was brought down by the great rivers and accumulated to form land; land without a stone or a pebble over thousands of square miles (Huxley, 1954). Consequently, the natural building material is brick made from the sticky soil (Fig. 1.7).

In Egypt the Nile played the same role. As a result mud brick acted as the main building material during the first centuries of Islam. It continued in use up to the end of the thirteenth century. The group of buildings erected by Sultan Qalauh in 1284-5 display the first Egyptian minaret of masonry (Samih, 1970).

The city wall of Jiddah, in spite of the shortage of such material, was built of brick.

Originally the majority of brick works were simply sun-dried bricks, but later an increasing proportion of kiln-baked brick was used. This fact illustrates why we have very few monumental buildings, particularly in domestic architecture, from the opening centuries of Islam. Examples of these few buildings are the mosque adjoining the Lalwyyah minaret at Samara, Iraq, and the great mosque of Ibn-Tulun which was first constructed of brick.

The mortar of brickwork is usually made from lime, obtained probably from the river or the neighbouring quarter, with a thick joint. The same method had been used centuries before Islam by the ancient Egyptians (Blackman, 1927) (Fig. 1.8).

Although they used to cover the brick surface with gypsum or stucco, applied in several layers, we can find several examples in Mesopotamia in a great variety of geometrical patterns in natural texture and colour (Fig. 1.9). Unfortunately, Egypt lost its source of this building material in 1971 after the establishment of the High dam.
FIG. 1.7: The ruins of Babylon with the foundation of the Ishtar gate in the foreground.

FIG. 1.8: Ancient Brick-makers.
PAGE
MISSING
IN
ORIGINAL
1.3.2 Masonry Work

Stone was the most preferred building material in Muslim countries especially for religious buildings and military architecture.

Although Iraq, mainly Baghdad and lower Mesopotamia, is stoneless, the Uruk people used to build with stone in spite of the difficulty and expense of transporting it. They also brought with them the tradition of worshipping on high places, such as the ziggurates (Huxley, 1954)(Fig. 1.10).

In comparison, Cairo is fortunate in possessing an excellent supply of durable limestone in the neighbouring cliffs of the Muqattam hills suitable for all building purposes. The stone chiefly used in Cairo during the Mameluk period was either white limestone of close texture, which turns slightly to grey with the lapse of time, or a yellowish limestone consisting of fossil shells. The latter is more porous than the former and is less suitable for carving but was used almost exclusively after the Turkish conquest of Egypt in 1517 (Baedeker, 1878).

Jiddah has no stone quarries in its immediate surroundings other than coral limestone from raised reefs along the sea shore. A dark brown clay, dug from the shallow bottom of al-Manqabah lagoon, served as mortar for binding the stone blocks. But since coral rag is extremely porous and quite soft as a construction material, it did not last long in the moisture-sodden air of Jiddah. So the structure has to be reinforced with teak beams, horizontally inbedded in the walls and tied to the crossbeams making up the floor (Pesce, 1974). When this method was not employed for cost reasons (teak wood has to be imported) houses tended to disintegrate.

Historically, the introduction and rapid development of masonry during the Fatimid and Ayyubid periods in Cairo, were due to the work of the Armenian architects on the fortifications of Cairo in the latter half of the eleventh century. The traveller, Nasir Khusraw, described in the palace of al-Mu-izzin Cairo, built in 970 but now no longer in existence, says that walls were built of stone "so well joined together
that one would think them cut from a single block'. The first dated example of masonry in Cairo is the Fatimid wall of Cairo (Creswell, 1952), built in 1087 to replace an earlier brick one (Fig. 1.11).

Muslems used stone, not only in walls and foundations, but also in minarets and domes. They display one of the best examples of masonry work in all parts of the Islamic world (Fig. 1.12).

The stalactite also shows the ingenuity of the Muslem craftsman. It is difficult to explain briefly without an elaborate use of geometrical terms and formula; Fig. 1.13 will serve to give a general impression.

Stone corbels are also one of the most important features of the old streets in Cairo. These corbels were used for supporting the projecting upper storeys of houses and palaces. They are usually ornamented in an attractive form (Fig. 1.14).

1.3.3 Woodwork

The three cities have no source of usable wood. They scarcely possess a single tree without the care of man at least in the beginning. Even the palm, which we regard as the tree of the desert, cannot exist unless it be supplied with water. In spite of this shortage, the extensive use made of wood in mosques, houses, palaces and furniture, appears very remarkable (Thesiger, 1964).

In mosques, ceilings, some windows, the pulpit, lecture or Qur'an desk, tribune, tombcasing, doors, and cupboards are of wood. Also, there are wooden inscriptions and stalactites of the same material.

In Mameluk and Turkish houses and palaces, ceiling, doors, carved lattice windows, cupboards and furniture are made of wood.

(a) Carpentry - "woodwork"

In Cairo there are still in existence several wooden domes with pendentives formed of wooden stalactites. In the higher part of the qu'ah or mandarah (reception hall) of houses a small wooden capola or lantern (mamraq) is usually fixed to give light and ventilation.
FIG. 1.14 Corbels supporting the projecting upper storeys. Cairo
Mausoleums and private houses of the fifteenth to the eighteenth centuries were characterized by their gorgeous wooden ceilings. Usually rows of palm trunks, sawn in half longitudinally from massive joists at regular intervals to support the weight of the floor above. The flat or sawn surface forms the upper side of the joint so that the rounded part of the trunk is seen from below. In most ceilings one does not see the actual timber of the trunk as it is cased with wooden panels.

In domestic work the latter is usually curved to follow the natural shape of the joist for most of its length, but from a square section at each end, the transition from circular to square being contrived by a system of stalactites. There is never a sharp angle at the junction of ceiling with the walls.

The qu'ah of the finest old houses in Cairo is divided into three sections, of which the middle one is the loftiest (Fig. 1.15). Between these sections is a deep wooden beam carried on enormous wooden consoles or brackets, embellished with stalactites, carving, and other ornament. Similar consoles are used to carry a beam over each liwan forming part of the general design of the ceiling (D'Hulst, 1890).

Another form of ceiling consisted of plain boarding fixed to the underside of the joists and ornamented with geometrical patterns formed of thin moulded strips of wood. This geometrical pattern was sometimes worked in strips of coloured and gilt plaster. Ceilings of this type are usually found over the great mushrabiyyah windows, wooden lattice work, of Cairo houses.
FIG. 1.15: A traditional reception hall, Cairo
Religion.

The Islamic religion has a great influence on Muslim people. They live by the Qur'an from birth to death. The Qur'an arranges all aspects of Muslim life such as marriage, inheritance, business and education. Islam has five main pillars, the profession of faith (shahada), the five times a day prayer (salah), alms-giving (zakah), fasting in the month of Ramadan (sawm) and pilgrimage to those who can afford it. Such spiritual and religious aspects left many material influences in the form of realizing orientation and time, and because Islam prescribes ablution before prayer, Muslims constructed public fountains and public baths. Meanwhile because praying in groups is preferable Muslims erected mosques.

As for the social relationship and solidarity of the society it is mentioned in the Qur'an that all Muslims are brothers and equal in everything irrespective of their colour, place of birth or language; forgiveness, good relationship with neighbours, helping the elderly people and great respect of the parents are repeated many times in the Qur'an.

Education.

The learning of the Qur'an was the chief business of all schools. The education system was based on the traditional Islamic concept of knowledge and learning.

This close relationship between the Islamic religion and education was expressed physically by practising the whole educational affairs inside the mosque or in a school attached to the mosque.

Building Materials.

a) Brickwork

Brick was widely used during the first centuries of Islam, for building a great proportion of the earlier structures of Cairo, and Baghdad. The mosque adjoining the Malwiyah minaret at Samara, Iraq and the mosque of Ibn-Tulun, Cairo, which was first constructed of brick, are good examples. In spite of the shortage of clay in Jiddah the city wall of Jiddah was also built of brick.
b) Masonry

Cairo is fortunate in possessing an excellent supply of limestone in the neighbouring cliffs of the Muqattam hills. On the contrary, Baghdad and Jiddah have no durable stone quarries in the immediate surroundings. In spite of this fact the Uruk people, Iraq, used to build with stone, e.g. the ziggurat. As for Jiddah, a great deal of the historical houses were also built of stone, namely coralline stone.

c) Woodwork

Despite the fact that the three cities have no source of useful wood, the extensive and sophisticated use made of imported wood in mosques, houses, palaces and furniture appears very remarkable.
CHAPTER 2

HISTORICAL STUDIES AND ARCHITECTURAL OUTLINE OF THE THREE CITIES

2.1.0 CAIRO
2.2.0 BAGHDAD
2.3.0 JIDDAH
2.1.0 CAIRO
a) Al-Fustat: The Tent

The capital of Egypt has grown up on several foundations, and by the incorporation of various suburbs. It owes its origin to the Arabs, whose general 'Amr ibn el-As after conquering the country in 641, determined the site of his capital when he first pitched his tents, and hence it was called al-Fustat – the Tent (Fig. 2.1). He preferred to make al-Fustat his capital instead of Alexandria which was the capital at the time. This choice illustrates the difference between Roman and Arab urbanism (Hamdan, 1962). Arabs usually prefer interior situations than coastal ones, i.e. they prefer an outlook influenced by land-power than one influenced by sea-power. They began as a nation of land traditions without any experience in naval fighting. This fact explains the shift of some other cities such as Antioch to Damascus in the Levant, from Carthage to Kairouan in Tunisia (Hamdan, 1962).

b) Al-'Askher: The Camp

A century later, 751, the representative of the Abbasid Caliph – who had just wrested the empire from the earlier house of Umayyad – moved their residence to a site a little to the north-east of Al-Fustat, to a military suburb called al-'Askher or The Camp (Lane, 1968)(Fig. 2.1).

c) Al-Qaṭā‘ā‘i: The Quarters

The first independent Muhammadan sovereign, Ahmad Ibn-Tülun 876, again changed the seat of government and founded the new capital, al-Qaṭā‘ā‘i or the Quarters (Fig. 2.1). This name was given to the new city because it was divided into distinct quarters, each allotted to a certain class of persons. These quarters were named according to the nationality of soldiers (Lane, 1968). For example, the quarter of Sudan (or blacks), and the quarter of the Rum (or Greeks) and so on.

2.1.2 The First Phase of Islamic House Design in Egypt

Some of the mediaeval travellers pointed out that al-Fustat in the ninth century had big residential apartments, five to seven storeys high. Hypothetically, it is possible that there was a degree of similarity between these apartments and the houses of South Yemen at the
FIG. 2.1: Egypt's Capitals since the Islamic Invasion.
time* (Fig. 2.2).

This hypothesis would find support in the fact that some districts of al-Fustat at the time housed, according to travellers, Arab Descendants from Yemen. In the summer of 1932, Bahgat & Gabrial (1940), discovered the remains of several foundations of the Fustat houses. These excavations made it possible to trace the plan of some houses in the Tūlūnīd period. It also gives an imagination of the narrow, tortuous, irregular streets.

The First House - "Double Court House".

This example (Fig. 2.3) measures about 10.00 x 18.00 m overall; it consists of two distinct parts - "salamlik"* and "haramlik"*. Each of these is developed round a rectangular court (A and B) with a basin in the centre. The basin in Court A is of traditional type, square above octagonal below. It is surrounded on three sides by a sort of trench (H), (Creswell, 1952).

The Second House - "Single Court House".

Unlike the first house, this example (Fig. 2.4) is not divided into two independent parts. It is arranged around one court which measures about 7.00 m² with a basin in the centre.

Influence on Fustat Houses.

The combination of a transverse, triple-arched portico with three parallel rooms behind it off which the central one opens into the portico for its full width; this layout is very like the T-shaped plan of the house unit at most of the Iraq palaces such as Ukhaidir Palace (Fig. 2.5), Samara and Shirin Palace (Fig. 2.6). The only difference between them is that the T-shaped plan at Iraq was on both south and north sides of the court to form summer and winter quarters (Creswell, 1952). This influence


** See Glossary.
FIG. 2.2: A Traditional Residential House in Yemen.
FIG. 2.3: Tulunid Houses, Fustat.
(double court)

FIG. 2.4: Single Court.
Ukhaidir Palace, South Facade of the Court of Honour and Boundary Wall.

FIG. 2.5: The House Unit of the Ukhaidir Palace.

FIG. 2.6: The House Unit of the Shirin Palace.
was possible because Ibn-Tulun was born and lived most of his life in Iraq. As a result the Tulunid art in Egypt was greatly influenced by the Iraqi art at this time.

The most interesting fact in all the above is that the same arrangement had appeared 4000 years ago at Abo-Simble Temple in Egypt (Samih, 1970).

2.1.3 The Fatimid Period (969-1171)

Al-Quahira, Cairo.

When Gohar, the general of the Fatimid* Caliph al-Muizz, took over Egypt from the Tulunids, he chose a site, again to the north of al-Qata'awi (Fig. 2.1) and founded there the new capital, al-Quahira or the Victorious, (Ross, 1931).

Thus the capital of Egypt included four sites, each of which was a slight move to the north-east of the preceding one. Why did they move to the north-east? Perhaps because of the geographical location of the site, or in order to catch and enjoy the fresh breeze which blows from that direction. However the real reason remains unclear.

Politically, the Fatimid period marks a new epoch in the history of the land, which, for the first time since the Pharaonic days, had a completely sovereign power full of vitality and founded on religious basis. On the contrary, the two preceding dynasties had neither national nor religious footing in Egypt. Their rise and existence they owed to the military ability of their soldier-founders and to the dilapidated condition of the Abbasid state (Hitti, 1937).

Architecturally, the Royal City, Cairo, was a very large town when a Persian traveller named Nasir Khusrau saw it in 1046-9. He said:

"The houses roughly estimated at 20,000 were built chiefly of brick, so carefully joined, to the height of five storeys, and separated from other houses by well-cultivated gardens and orchards."

(p 402)
(taken from Ahmad, 1902)

* The Fatimid dynasty originated in North Africa at the beginning of the 10th century.
It also contained two large palaces known as the Eastern, for the Caliphs government offices, treasury, library, astronomy, and hall of science, and the Western for the Caliphs wives or Harim (Ahmad, 1902) (Fig. 2.7). Unfortunately, no fragment of the two palaces remains today.

The Fatimid palaces, as described through historian* and from their layout can show a great deal about Muslim habits and customs such as specifying the western palace for "Harim". It also shows their love for gardens and minor arts.

The most important surviving structure from this period is the long-negational mosque of Al-Azhar (Fig. 2.8), founded in 970, which in 988 began its career as the great Muslim University.

2.1.4 A Fatimid Qu'ah: Reception Hall

In domestic architecture, there is only a Qu'ah remaining from this period. It is the only element that has survived from a very big house known as ad-Dardiri. This remarkable Qu'ah is situated on the north side of a street of the same name (Fig. 2.9). It consists of a central square space (dur Qu'ah) covered by a skylight, beneath it is a fountain and two liwans (C & D) to the north and south. Creswell, (1952) placed it in the first half of the twelfth century according to the features of the pendentives and the treatment of the keel-arch niches. Unlike any other Qu'ah in Cairo, all of which have a flat wooden roof and a stalactite frame, Qu'ah ad-Dardiri has a tunnel-vault ending in a semi-dome.

It is remarkable partly on account of the great height of the two liwans and of the way in which the semi-dome is carried across the corners (Fig. 2.10). It also proves that the type of domestic planning shown in the excavations of Fustat had changed by the twelfth century (Creswell, 1952).

FIG. 2.7

Fatimid Cairo

0 100 200 300 400
FIG. 2.8: Al-Azhar Mosque.
FIG. 2.9: Qu’ah ad-Dardiri.
2.1.5 The City Walls

There have been three successive walls or enlargements of walls since the foundation of al-Quahirah, Cairo (Fig. 2.11). First, Johar, the builder of Cairo, threw a wall round its originally limited extent, (Hoag, 1963).

Secondly, a century later (1087) the Fatimid leader, Badr-el-Gamaly, enlarged the first wall so as to include the new quarters, to the north and south, and built some of the city gates.

Thirdly, when Salah ad-Din succeeded to the Fatimid power in the twelfth century he enlarged the Farimy walls to include his new fortress. This last wall was built of stone from the near Muqattam hills.

It can be said that the city expanded from the square mile or less of the old Fatimid City to about three miles long and a mile and a half wide (Baedeker, 1878). Most of these changes can be traced in the present city.

2.1.6 The Development of the City since the Islamic Invasion

From what has been previously stated, it can be said that the development of the city occurred over three stages (Fig. 2.12).

First Stage - 1st-9th Century.

This stage was the nucleus shape. During this stage the city lay in the protection of the Muqattam hills.

Second Stage - 10th-17th Century.

This is the formulation stage, in which the city came out in caution from the protection of the hills to the south of the Nile, and remained there until the time of the Second World War.

Third Stage - 18th-20th Century.

The stage of "explosion" during which the city expanded to the north and east. According to a report by the Cairo Municipality Planning
Fig. 10. Fāṭimid Cairo: showing position of the Walls of Gauhar (green), Badr al-Gamālī (red), and Ṣalāḥ al-Dīn (blue). Scale 1 : 5000.
FIG. 2.12: The Development of the City since the Islamic Invasion.
Commission (1957), it grew with no limits.

It has not been easy to follow up this growth with figures, because the only source is travellers, such as el-Makrizy. However, we could get a vague picture about the population then (1350-1365) which was about 200,000 (Makrizy, 1912). If we compared the population at the time with the population in 1966 (4,250,000) we will find that it has doubled around ten times in less than two centuries.

2.1.7 The Ayybid Dynasty (1171-1250)

The Ayybid period opens with the military work of Salah ad-Din, who built a great part of the present walls of Cairo and the mighty citadel. It was he who introduced the school "madrassa" plan and the bent entrance. The object of such an entrance is to break up the rush of a storming party in military constructions and to ensure privacy in private houses. He also maintained in Cairo two hospitals. They followed the mosque plan, but have left no traces. Only in military architecture do we have survivals, for example, the citadel of Cairo in which he made his residence (Samih, 1970).

This would seem to indicate that under the Ayybid reign, the Joyful Fatimid capital, Cairo, was changed to a severe and austere soldier camp. The activities of daily life which took place in houses, palaces, markets and mosques, were gathered inside huge walls. The walls acted both as boundaries and fortresses. The buildings of that period were characterised by their lack of luxury and their neglect of decoration, (Ross, 1931).

2.1.8 The Mameluk Period (1250-1517)

In the Mameluk period, in spite of the political unrest and constant wars throughout these three centuries, Cairo continued to be one of the most luxurious cities of the world. The most pleasant surprise of this period is the extraordinary architectural and artistic productivity of a scale and quality that finds no parallel in Egyptian history.

since Ptolemaic and Pharaonic days. In later chapters, domestic architecture as well as their main craftsmanship will be described in detail. It is sufficient at this point to mention that all classes of building - mosques, palaces, houses, khans, public baths - fountains - were erected with an abundance of elaboration and good taste unknown in previous periods.

Mameluk Cairo was not only the religious and political capital of the Islamic world, but also chief centre of its trade (Hitti, 1937). All the rich materials that came from Persia and India were trans-shipped at Suez, Suakin, or some smaller Red Sea ports. There was thus a constant succession of caravans passing across the Arabian desert to Cairo.

In this connection Pool (1898) noted that Mameluk Cairo and not Baghdad is the scene of the "Arabian Nights".

Finally, this period was also noteworthy for the last stage in the development of stalactite pendentive, niches are set out in a triangular frame; there was great increase in the number of tiers, seven, eight, or nine being common (Fig. 2.13). Domical construction culminated; the domes of this period which are always of stone are without rivals for lightness, beauty of outline, and richness of decoration (Samih, 1970) (Fig. 2.14).

2.1.9 The Turkish Period up to the Present

The Turkish conquest (in 1517) caused a serious diminution in every branch of art, architecture and industry. A large number of the best craftsmen were sent to Constantinople, and many crafts became extinct in Cairo. At the end of this period the European began to appear in Cairo announcing the end of the traditional art and architecture.

This modernization movement started by Muhamed Ali at the beginning of the nineteenth century and accelerated by Isma'il by the end of the century led to the vast growth of the city. Two railroads connected Cairo with Alexandria and Suez. The city grew in the direction of the north and north-west and then to the west across the Nile. The new suburbs - Shubra, Rod al-Farag, al-Zamalek, al-Dokki, al-Abbasia, and
FIG. 2.13: The Development of Stalactite Pendentive, Mameluk Period, Cairo
Heliopolis started as small communities without any specific relations to each other and then expanded until they were linked, forming the vast metropolis of Cairo, (Samih, 1970).

2.1.10 The People

The Egyptian population can be divided into three main groups according to where they live and the kind of work they do.

a) Cairane

This name is applied to the people living in Cairo. Most of this group are merchants, craftsmen and religious men, or "Alama". Due to the fact that most of my study mainly deals with the inhabitants of Cairo who are originally either Fallaheen "countryside people" or Bedouin in particular, we will find that it is important to shed some light in a later chapter, on customs and habits of these two groups.

b) Fallaheen

These live generally in the countryside in the Nile valley and Delta. Fallaheen living in upper Egypt are called "Saaida", like the Irish people in the United Kingdom. These two groups of people, Fallaheen, are engaged in agriculture mainly in addition to some other simple local crafts.

c) Bedouin

This name is applied to nomadic and semi-nomadic tribes. Bedouin are the inhabitants of the desert of the western or 'Libyan' desert, the eastern or 'Arabian' desert and Sinai.

2.1.11 Climate

Egypt lies in the sub-tropical high pressure belt, between the parallels of 22° and 32° of North Latitude, with clear skies. Rain, throughout a great part of Egypt proper, is a very rare phenomenon. North winds, as a rule prevail from June to February, and south winds during the rest of the year. Usually the air of the desert is pleasantly cool and possesses the most refreshing and healthy breeze. In accordance with temperature the Egyptian year may be divided into two main seasons, a period of hot
weather, lasting about eight months, and a cool season of four months. These are the prominent features of the climate (Landsburg, 1972).

A study of the climatic data (Fig. 2.15) reveals the following information:

Sunshine.

An average of about 39 years taken from Cairo observation records tell us that there are in Cairo about 3276.00 hours of bright sunshine, or about 8.95 as a daily average, during the twelve months*. It is interesting to compare these records with Greenwich similar observations in U.K. It indicates that there are, in the U.K., 1211 hours, or about 3.5 daily average, of bright sunshine during the year (Sandwith, 1889).

Wind Direction and Speed.

Table 2 shows wind direction during 12 months taken from Cairo and Giza stations. They represent an average of 10 years: 1958-1968.

<table>
<thead>
<tr>
<th>Station</th>
<th>Jan</th>
<th>Wind Direction in Degrees</th>
<th>Dec</th>
</tr>
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<tbody>
<tr>
<td>Cairo,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abasia</td>
<td>195</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>224</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Giza</td>
<td>165</td>
<td></td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>164</td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Table 1.

Sky Conditions.

The sky is normally clear, clouds are few due to the low humidity of the air. It is usually dark blue, with the luminance of 1500 to 2600 cd/m², and further darkened during dust or sand storms to about 850 cd/m² or even less. In general there is a noticeable diurnal variation

All climatic data is taken as an average over 30 years except the wind and sunshine hours which are taken as an average over 10 years.

The highest maximum temperature recorded was $35^\circ C$ in August.

The lowest minimum temperature recorded was $7^\circ C$ in January.

Humidity is relatively low all through the year.

Wind often blows from the North.
of cloudiness, there being more cloud by day than by night, during winter, not only in convective type clouds but also in medium and high clouds.

Solar Radiation.

Solar radiation is direct and strong during the day, but the absence of clouds permits easy release to the heat stored during the daytime, in the form of long-wave radiation towards the sky*.

Precipitation and Dew.

Rain: Rain in Egypt falls in the form of showers and its amount may vary considerably from year to year in the same place and may also differ widely in two neighbouring localities in the same season of the year. For example, Alexandria, the rainiest city in Egypt, may have values as low as 5 mm during the winter months while in other years it may receive over 100 mm in a month*.

Generally speaking, throughout a great part of Egypt, rain is a very rare phenomenon. In Cairo the maximum values, December and February, are about 50 mm and the minimum as low as 7 mm*.

Dew: A small amount of dew is always present in Cairo and the desert on account of the great difference in temperature between that of the day and night. The temperature of the Nile water is a little higher in the early morning than the temperature of the air, and therefore a line of mist can sometimes be seen early in the day during December and January*.

Evaporation.

The amount of evaporation is highly dependent upon the location. Values from a station in a city will be different from those taken only a few kilometres away in the outskirts. The difference will be due mainly to a variation in wind speed. For instance, the mean annual value of evaporation from a Piche instrument located inside the city of Cairo (Ezbakia) is 4.6 mm/day, while at Cairo airport the value is 11.2 mm/day*.

In Table 3, values are given from Cairo station to give representation of mean and maximum amounts of evaporation (mm).

<table>
<thead>
<tr>
<th>Months</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean daily evaporation (mm)</td>
<td>5.6</td>
<td>7.0</td>
<td>8.7</td>
<td>10.6</td>
<td>13.1</td>
<td>13.0</td>
<td>11.2</td>
<td>10.0</td>
<td>8.9</td>
<td>8.5</td>
<td>6.6</td>
<td>5.5</td>
</tr>
<tr>
<td>Maximum daily evaporation (mm)</td>
<td>21.3</td>
<td>23.9</td>
<td>27.7</td>
<td>32.2</td>
<td>42.5</td>
<td>41.0</td>
<td>23.9</td>
<td>32.6</td>
<td>28.3</td>
<td>29.0</td>
<td>23.8</td>
<td>29.6</td>
</tr>
</tbody>
</table>

Table 2

Relative Humidity.

In the Mediterranean coastal areas the mean monthly values of humidity increase eastwards. However, they decrease rapidly southwards, for example, the mean annual value is 69% at Alexandria and only 29% at Aswan. The occurrence of the hot, dry Kamasin conditions in spring lowers the mean values slightly. In general the RH reaches its maximum in December and the minimum in May and June, the difference being about 20% to 22%, in Cairo.

The following paragraphs will serve to illustrate the main features of each season.

Winter: December-February.

The climate of lower Egypt is mild with some rain showers, mainly over coastal areas. Upper Egypt is practically rainless with warm sunny days but rather cool nights.

December - At the end of this month it is liable to be a little cloudy and rain, temperatures, max 21°C, min 8°C, like a September day in England.

January - There is often a cold south wind from the desert, and though the days are not really cold, the evenings usually require an overcoat outside. Temperatures, max 20°C, min 6.2°C, like the last week of
September in England.

February - Temperatures, max 21°C, min 6.8°C, like a dry English September, chilly at the beginning of the month, but warm and pleasant at the end.

Spring: March-May.

The main feature in this season is the southward shift of the tracks of depression. The centres of depressions move either along the coast line of north Africa or further south, where they are known as desert of 'Kamasin'. The depression can be vigorous and cause sandstorms.

March - The temperature is, max 24.4°C, min 8.9°C, as London in July, (Sandwith, 1889). The great feature of this month is the Kamasin wind which is almost certain to blow at least twice for two or more days. It is at first welcomed as a pleasant change after the cold winter but soon becomes disagreeable. The last week of this month is usually hot.

April - Days are usually warm, max 28.7°C, min 11.9°C, like the hottest day in an English summer, but are not felt so oppressive because of the dryness of the air, RH is about 47% (Sandwith, 1889).

It is interesting to mention that people used to adapt themselves according to climate. For example, they usually move during this month to rooms which face the north to enjoy the cool wind and stay there till the end of the summer.

May - The country is still liable to occasional Kamasin winds and each week the weather, max 32.5°C, min 15.6°C, becomes warmer. During May trees have their new foliage, gardens are bright with many subtropical flowering trees and shrubs*.

Summer: June-September.

Spring conditions may extend a week or two into June, but afterwards practically to the end of September, summer conditions prevail. The

general climate is hot, max temperature is 32.5°C and sometimes reaches 40°C, min 18°C and RH varies from 47% to 61% and usually rainless with clear skies, except for some coastal areas.*

Autumn: October-November.

The climate in this season is similar to that in spring for it is another transitional season - Kamasin - like depression being to cross Egypt during late October and cause a breakdown of settled summer regime. The higher humidity, 69%, in this season favours greater frequency of thunderstorms and heavier precipitation, a fact especially true in November, October. The proportion of heat to dampness is still great, max 30°C, 62% RH. November in spite of the high humidity is considered a very beautiful month.

2.1.12 The Physical Conditions of Old Cairo

Old Cairo is a mediaeval town in the fullest sense; it still retains today some of its vigorous aspects of life and character, although it has lost most of its glory. Cairo, in the fifteenth century, was a beautiful place, with many great buildings. The Mameluk palaces and houses were at their best, and the city contained many fine khans, markets, public baths, mosques and other public palaces. The bazaars were very busy with trade. It was three times as big as Paris, with even more irregular streets. In the seventeenth century, it was described as the largest and most densely populated city in the whole Turkish empire, including Constantinople, (Marcais, 1954). Fig. 2.16 shows the location of both the mediaeval and modern city centre.

Few houses and palaces from Mameluk and Turkish periods can still be found in the historical districts of Cairo. Some of them are without serious modification from the original state. Such houses, and such a way of life continued without much change until the second half of the nineteenth century (Marlows, 1966).

The Historical Districts in Cairo.

The historical area in Cairo is transversed by six principal thoroughfares (Fig. 2.17).

Modern City Centre

Mediaeval City Centre

Communication Centre

FIG. 2.16: Location of both the mediaeval and modern city centres.
1 Mosque of el-Hakim
2 Mosque of Barquq
3 Mosque of Nasir
4 Muristan Qala'ün
5 Mosque of el-Azhar
6 Tomb Mosque of Barquq
7 Mosque of el-Muwayyad
8 Coptic Museum
9 Mosque of Mohammed Ali
10 Mosque of el-Rifa'i
11 Qasr-el-Nil Bridge
12 Opera House
13 Khan-el-Khalili (bazaars)

FIG. 2.17: The Historical Area in Cairo.
a. The Musqui street which runs right through the mediaeval city from west to east, starting from the Ezbequia, crossing the Khalig (the old canal which is now a street), and proceeding past the University mosque of al-Azhar to el-Gohriah.

b. The Suq-al-Nahhasin (market of coppersmith), running north and south from the Bab-el-Futuh in the north, past the mosque of al-Hakim on the left and the mosque of Barquq, Nasir and Qalā'ūn on the right, to the Musqi, which it meets at right angles by the al-Ashraf mosque.

c. Al-Gohriah, a continuation of the suq-al-Nahhasin running south from and right angles to the Musqi as far as the Bab-Zuweila, the old southern gate of the Fatimid city, a site of the Muwayad mosque.

d. Mohamed Ali street which runs south-east from the Ezbequia to the mosque of Sultan Hassan, just below the citadel.

e. The Sukkaria, or sugar market, which is a continuation of al-Gohriah running south from Bab-Zuweila to Mohamed Ali street.

f. Darb-el-Ahmar, branching off half-left from Gohriah-Sukkaria at Bab-Zuweila and going past the Agasunkur (blue) mosque to Bab-el-Wazir in Salahdin's wall, just below the north-east of the citadel.

Turning from the wide historical area to its nucleus, which will be our concern later, this nucleus is located on both sides of the main arterial road from Old Cairo. It is made up of a main commercial road, Al-Mu-izz or al-Nahkasin; branching out of it are narrow winding roads and cul-de-sacs.

2.1.13 The Daily Life of the House Occupants

The Muslim Arab family during the last centuries and the first decade of this century, consisted of the master, his wife or wives, and sons. Many families used to accommodate their male son, or sons, and their wives in the same house or palace. The house also accommodated quite a great number of female servants and a male doorkeeper as well.
The Master's Daily Life.

The master usually rises very early to say the daybreak prayers. He often takes a pipe and a cup of coffee. He goes to his shop or warehouse, and remains there until near sunset. Shortly after the noon prayers, he eats a light meal which usually is delivered from his house. Lane (1968) goes on to note that:

"If he has no special occupation, he amuses himself with calling on his friends, or indulges in long dreamy hours in the warm atmosphere of the public bath. The few hours between supper and the last prayer, "esha", are generally passed in smoking and sipping coffee; and sometimes playing chess or other games and conversation. They often visit their friends at or after supper-time."

The Wife's Daily Life - "Harim".

The care of their children is the primary occupation of the Egyptian ladies. They usually spend their leisure time in needlework and other kinds of amusements. The visit of one harim to another often occupies a whole day. Eating, drinking coffee and displaying their finery are sufficient amusement to them. On such occasions, the master of the house is never allowed to enter the harim apartment. These visits to other harim or to the public bath are the chief delights of the ladies of Cairo during the last centuries.

Eating.

The master generally takes his dinner and supper with his wife (or wives) and children but when a friend visits the master during any meal time the master orders the meal to be brought to the salon "Qu'ah". They must wash their hands with soap and water before eating. A servant usually brings the basin and ewer or "ibreek" (Fig. 2.18) (Lane, 1968).

A round copper or brass tray about three feet in diameter, serves as a table, being placed upon a wooden stool about sixteen inches in height. These two pieces compose the dining room furniture. Round cakes of bread sometimes cut in halves across the middle, are placed round the tray, with several lines, and a spoon of boxwood, or of ebony, is put for each person. The bread often serves as a plate. Several dishes of tinned copper, or of china, containing different kinds of viands,
ABLUTIONS AFTER A MID-DAY MEAL.

Of all the people of the East it may be said, "except they wash their hands diligently, eat not," and after a meal it is urgently necessary when fingers have been used instead of forks.

FIG. 2.18
vegetables, etc. The persons usually sit upon the floor around the tray with one knee on the ground and the other raised (Lane, 1968); this being the most approved posture at meals in every case and in this manner as many as twelve persons may sit round a tray three feet wide.

Sleeping.

It is the general custom in Egypt for the husband and wife to sleep in the same bed, except among some of the wealthy classes, who mostly prefer separate beds*. In winter, beds are prepared in small rooms, in summer in large rooms. During the hottest weather, they sleep upon the top floor "Fasahah", which is an uncovered space.

2.1.14 The Residential House

All Cairane houses of the old style are very much alike: they differ only in scale and richness or poverty of decoration.

The Exterior.

The exterior of the building is usually bare in the extreme, except for some lattice-work. One side only faces the street and that street is usually narrow. This severity of external treatment is due partly to the constant fighting among the Mameluks that often made the streets of Cairo dangerous, partly to the narrowness of the street itself – giving no view (Fig. 2.19).

Shops often occupied little space beneath houses in main streets. Sometimes they were connected with the workshop where the wares were made.

The Cairo house has generally two floors; the lower part of the external walls is faced with the fine limestone obtained from the neighbouring Muqattam hills, carefully dressed and with fairly narrow joints. The upper part is of light construction, usually of brickwork** filled in between with wooden posts. This part frequently overhangs the stone substructure and in such cases is supported by great stone corbels or wooden brackets, boldly designed and placed at short intervals. These

* If there is more than one wife each of them occupies a separate apartment within the same house.

** The bricks are burnt and usually of a dark red colour.
brackets form one of the most picturesque features of many old streets. The overhanging upper part is usually plastered. From the main wall-face, project, as a rule, one or more of the magnificent oriel windows filled with mushrabiyyah*.

The top of the facade is usually plain. The roof is invariably flat, and is constructed of palm trunks covered with cement or mud. The chief feature of most facades is the entrance doorway, often decorated with a verse from the Qur'an, in ornamental character, as a protection from the "evil eye". In addition to the principal door** the great houses usually have a small secret one, opening into another street, to serve as a means of escape in case of danger.

The entrance is by a more or less narrow vestibule, which always forms one or two angles to prevent seeing into the court. In the corner of the first angle is the seat of the porter (Bawab).

The interior.

Having past the vestibule, we enter the real heart of the house, 'the hosh' or inner courtyard. Some houses have two courts: no rule can be given for the shape or dimensions of the court. On ceremonial occasions a great awning with red and blue patterns on a cream or buff background, such as is still made, is hung over some parts of the court. No women are ever present in the court on such occasions. In the centre of the court there is often a well or a fountain. This court is planted with trees (Fig. 2.20). Round the court are grouped male reception halls for business or ordinary meeting, servants' apartments and the stalls for horses, donkeys and camels.

Male Apartments - "Salamlik"

The groundfloor usually consists of more than one reception hall for

* These mushrabiyyahs were originally small projecting niches to hold the porous earthen bottles; afterwards enlarged, they offered the double advantage of admitting fresh air and permitting the observation of life in the street without being seen.

** The doorway generally has an iron knocker and a wooden lock. There is no bell for they believe that a bell is the devil's musical instrument.
FIG. 2.20
male visitors, such as Taktabosh, mandarah and qu'ah. The visitor is received in any of them according to his social rank.

Taktabosh.

For ordinary business, visitors of no great social standing are received in a room or alcove called the Taktabosh. It is a square or rectangular recess of which one side, towards the court, is open and in the middle of this side is usually found a pillar (Fig. 2.21) to carry the floor of the room above. The Taktabosh is furnished with a long wooden sofa or "dikkah" on one, two or three sides. The ceiling is of wooden fretwork in the natural wood colour.

Mandarah.

Visitors of any importance are received in the Mandarah, which is a much more pretentious apartment. It consists of a central part, durqu'ah, and two liwans on either side raised a foot or less above the level of the central part. The ceiling of the durqu'ah is often higher than the rest, sometimes rising to the height of three storeys (Fig. 2.22). The floor is frequently paved with marble mosaic (Fig. 2.23) and in the centre of the room is often an ornamental fountain, the fasiyyah (Fig. 2.24). Walls are usually plastered, they have recesses for ornamental cupboards with arches for vases. There is sometimes a suffah, or marble or stone sideboard with an arcaded front, where are placed the beautiful vessels. The only remaining articles of furniture are the seats. These in their simplest form consist of diwans, long stuffed mattresses on the floor, on which host and guests sit cross-legged, on these diwans or seats are laid cushions. The diwan is commonly about a yard wide, and the cushions about a yard square. Sometimes the diwan is placed in small recesses (Lane, 1968). The only utensils commonly found in such rooms are a brass basin and ewer for ablutions, water bottles, coffee cups and vessels containing perfume, all of which stand on the suffah (Fig. 2.25).

The Maq'ad or Verandah.

Upon the first floors in rich houses there is a maq'ad, or a summer reception room for male visitors*. It is always placed on the south

* The Maq'ad, sometimes, is located nearly half the height between the ground and the first floor.
FIG. 2.22

THE MANDARAH.

A - summer reception
B - court
C - mandarrah
D - entrance
E - maq'ad

G FLOOR

F FLOOR
FIG. 2.23: Floor Paving.
side of the court so as to face the north. The Maq'ad has an open front towards the court (Fig. 2.26) with two or more arches supported upon a central column or columns. It has a paved floor, and sometimes a dado of marble mosaic, its ceiling is of wood, with carved beams, generally about a foot apart, richly painted. It is accessible from the court by a staircase. The elevations shown in Fig. 2.26 are good illustrations of the maq'ad, its design resembles the arcades surrounding the court of the mosque, and also a direct imitation of the open galleries over the Sebeel, or 'public fountain' (d'Hulst, 1890)(Fig. 2.27).

Female Apartments - "Haramlik".

Except for the master's office adjoining the maq'ad, the remaining apartments on the upper floor constitute the "harim". There is a separate doorway usually leading from the court to the "harim". This floor, the second floor, usually consists of the harim Qu'ah or reception hall, dining room, bedrooms and bathroom.

Qu'ah el Harim, or Women's Reception Hall.

This qu'ah usually is the largest chamber in the house (Fig. 2.28). In nearly every case this is an imposing and very lofty hall, consisting like the typical mandarah, just described, of a central durqu'ah, which is higher than the two liwanat. In the centre of the ceiling of the durqu'ah is a small lantern cupola with mushrabiyyah sides, providing both light and ventilation. The beams of the gorgeous ceiling are carried on great stalactite consoles. The walls are for the most part plain, decoration being concentrated in the ceiling and the floor is paved (Pool, 1886). Round the upper part of the walls runs a narrow shelf of wood, used to display the owner's china (Fig. 2.29).

Bedrooms.

The Cairo house usually has no room furnished as a bedroom in our sense of the word. There are plenty of separate rooms where they sleep. The main furniture consists of a mattress and pillow and perhaps a blanket in winter and a mosquito net in summer. In the day-time they are rolled and placed in an adjoining closet, whereupon the bedroom becomes a sitting room.
FIG. 2.29
The bathroom of a Cairo house has one notable characteristic - a small domed ceiling of cement, pierced with glazed circular openings for light (Fig. 2.30). The bath is heated in the same way as the public bath, and even those who have a private bathroom in their own home frequently resort to the public baths for amusement.

Cooling, Heating.

Cooling: The Malkaf or wind-trap (Fig. 2.31) is a shaft rising above the rest of the house to catch the north and west cool breeze. It is usually towering over neighbouring buildings to overcome the obstruction that may arise from other houses. Its appearance as Oakley (1961) describes it:

"looks like old-fashioned gramophone horns or like the air vents of the decks of ships".

The malkaf principle goes back to ancient Egypt and this may be seen in some illustrations of houses of the 19th dynasty which are painted on the walls of tombs in Thebes (Fig. 2.32).

Heating: The historic houses of Cairo have no fireplaces, but they usually use a brazier when the temperature in winter drops.

Turning from private houses to other concrete examples still existing such as the Palace of the Amir Bashtäk and the Palace of the Amir Taz. Unfortunately, only the reception halls are all that remain.

2.1.15 The Palace of the Amir Bashtäk (1339)

This palace lies in the sharia an-Nahkasin. It had a great reputation in the days of the fifteenth century historian, such as Makrizy, who states that from its topmost windows one could see the Nile. A modern staircase leads up to the remarkable qu'ah (Fig. 2.33) which consists of durqu'ah and four liwanat. The larger of the two latter are on the east and west, and have noteworthy ceilings coffered in hexagons. The only strange feature is the separation between the liwanat and the durqu'ah by a triple arcade. This sort of separation is not seen in any other palace or house at Cairo (Lezine, 1970).
FIG. 2.30: Bathroom Ceiling of a Traditional House.
FIG. 2.31: The Traditional Malkaf or Windtrap.
FIG. 2.32: Ancient Egyptian Wind-trap (Malkaf) at Thebes, Egypt.
FIG. 2.33: One of the Reception Halls of the Amir Bashtak Palace, Cairo.
2.1.16 The Palace of the Amir Taz

Little more remains of the palace of the Amir Taz. It lies near the great mosque of Sultan Hassan (Fig. 2.34). Only the substructure of the qu'ah exists. It occupies a great portion of the second floor facing one of the two courts. It consists of two unequal liwanat facing a square durqu'ah.
FIG. 2.34: One of the Reception Halls of the Amir Taz Palace, Cairo.
2.2.0 BAGHDAD
2.2.1 Historical Outline

First Phase - Arab Conquest.

On the death of Mohammed in 632 AD, the Arabs were inspired and united by his teaching. In 636 they defeated the Byzantine at the battle of Yarmuk and occupied Palestine and Syria. A year later they reached Iraq and routed the Sasanians at Qadisiyah west of al-Kufah. The following year the Arabs took Ctesiphon, the capital of the Sasnid, and established strongholds at al-Kufah. In 762 - the second Abbasid caliph Al-Mansur, chose a spot on the west bank of the Tigris, Baghdad, to be his new capital.

Second Phase - Mongol Invasion.

In 1258 Hulaku Khan, with his Mongols, sacked Baghdad and the Abbasid dynasty with its Arab rule was wiped out. Iraqi civilisation fell into decay and the country became a waste, though Baghdad just continued to exist. For about 300 years after the Mongol invasion Iraq was not rich in historical events (Coke, 1927).

Third Phase - Turkish Invasion.

In 1534 Iraq became a Turkish possession. Because Iraq is a long distance from Istanbul the Turkish communications were at the mercy of tribesmen from the hills. For this reason Turkish authority was for about 300 years unable to control all parts of Iraq.

Between 1869 and 1872, when Midhat Pasha became the governor of Iraq conditions steadily improved. Progress continued until 1912, when the Iraqi leaders began to lose confidence in the Ottomans partly owing to the development of the Arabs in other countries and partly because of the anti-Ottoman national movement throughout the Arab countries (Thesiger, 1964).

Periods of Special Significance.

The period from 762 to 946 was particularly important in the development of present Baghdad. Most of the traditional centres of present Baghdad like Rusafah, Karkh, Kadimiah and Adhamiyah can be attributed to this period - at least in terms of location.

During the same period Baghdad reached its zenith of intellectual activity and prosperity under the reign of Harun al-Rashid and his immediate successors. It also became a great cultural centre, producing writing, translations and original contributions. During this golden age communications were open with almost all the known world in a very remarkable manner.

From 964 to 1069, this period was full of disasters such as floods, conflagration and famines. Physically, the city plan had shifted and shrunk many times. Most of the public buildings had disappeared. Population during this period was reduced as a direct consequence of floods and insecure state. At the beginning of this period Baghdad experienced a severe famine and many private and public buildings were falling into ruins. As a result of the neglect of irrigations systems, Baghdad was flooded again in 978 and 1010 causing the destruction of several residential quarters or "mahallahs". It is reported that in 971 conflagration on the west side of Baghdad had destroyed most mahallas, hundreds of shops, houses and more than 30 mosques. Also the troubles of 1030 resulted in the destruction of many bazaars. Accordingly many merchants migrated either to Egypt or al Sham, i.e. Syria and Lebanon, (Al Ashab, 1974). These are the most important disasters which occurred during that period.

2.2.2 Baghdad, the Round City, or "Al-Mudawarah"

Baghdad was built by Caliph al-Mansur in the eighth century on the west bank of the Tigris north of the old Persian capital of Ctesiphon (Fig. 2.35). It was the capital of the Islamic empire and a very important trading centre on the routes linking the Mediterranean and the Far East. It had a population of over a million at a time when, apart from Constantinople, only a handful of towns in Europe had reached ten thousand, (Crittenden, 1971).
FIG. 2.35 The Site of Al Mansur Capital

(Baghdad, the Round City)
The City Plan.

The city of al-Mansur consisted of three main architectural elements: the outer fortifications, an inner residential area of symmetrically arranged streets, and the vast inner courtyard (Fig. 2.36) where the Caliph's mosque and residence were situated. The outer fortifications took the shape of two concentric walls separated by an intervallum (fasil) and surrounded by a moat. The inner wall was the larger of the two. Access to the residential area and the central court was gained through four elaborate gateways (Fig. 2.37) and arcades beginning at the outer wall and ending at the great circular courtyard. A second intervallum separated the houses from the outer fortifications, and a third separated them from the enclosure wall of the great central court where the palace mosque was situated.

It had four gates on rectilinear axes intersecting under the green dome of the golden gate palace of al-Mansur (Greswell, 1948). These axes extended to become the main highways to other regions. The four gates were respectively: Khurasan (north-east), al-Basra (south-east), al-Kufah (south-west), and al-Shame (north-west).

The Residential Quarters - "Mahallahs".

Like all Arab cities, certain tribes occupied certain sections. From that time up to 1950 almost all quarters or Mahallahs had the same kind of organisation (Jovan, 1963)(Fig. 2.38).

2.2.3 The Decline of Baghdad, the Round City

The following are the main aspects which led to the decline of the round city (Fig. 2.39):

a. The round city was small, about 5-8 km² and its capacity for population was limited.

b. At the end of the eighth century bazaars were ordered to move outside and merchants were expelled from the city*.

* It is interesting to note that when traders and bazaars were expelled from the round city, they settled in al-Karkh, south west of the round city, and segregated themselves into groups or quarters.
FIG. 2.36 The Main Architectural Element of Baghdad
FIG. 2.37 Plan of the Outer and Inner Gates.
FIG. 2.38 The Location of the Residential Quarters or Mahallahs - Baghdad.
FIG. 2.39 The Decline of the Round City.
c. Near the four gates of the round city there were centres of settlement which attracted migration from the round city.

d. There were several pre-existing settlements in the area near the round city, which began to grow speedily towards the round city.

Furthermore the Caliph himself had left the round city and built the famous al-Khuld (paradise) palace outside the round city on the Tigris river.

Indeed, all these factors together with the lack of places of entertainment and its extraordinary layout, i.e. it was entirely cut off from the natural surroundings, led to the decline of Baghdad, the round city.

Fig. 2.40 shows the decline of the round city and the historical development of the city plan since the establishment of the round city up till now. This development occurred in three main stages (Al-Ashab, 1974).

2.2.4 Architectural Outline

Before discussing the main features of the residential elements in Baghdad, I would like to explain briefly its main phases.

At the beginning Arabs never established specific forms of architecture; preferring the tent. Thus the existing buildings such as churches and palaces were converted into mosques and government houses.

Later, with the establishment of the Islamic empire they copied some Persian, Roman and Babylonian buildings. For example, the ancient Babylonian ziggurat (Fig. 2.41) is analogous to the tower of the great mosque of Samarra (Fig. 2.42). This tower again was copied by ibn-Tulun for the minaret of his mosque (876) in which the pointed arch appears for the third time in Egypt (Fig. 2.43). They also picked up local decorative techniques and materials (Hitti, 1937).

In the golden period of Baghdad they established some palaces and houses. These houses and palaces were the basis of the most patterns of later periods. During the same period the dome, the arch, and the bent entrance became distinct features (Paris, 1965).
FIG. 2.40 The Decline of the Round City and the Development of Baghdad.
FIG. 2.41  The Ancient Babylonian Ziggurat, Iraq.

FIG. 2.42  The Great Mosque of Samarra, Iraq.
FIG. 2.43  Ibn-Tulun Mosque, Cairo.
However, all this glory was reduced to ruins when the city was repeatedly exposed to many powerful conquerers and natural catastrophes.

### 2.2.5 Palaces and Houses

It is in fact surprising that Baghdad, the round city, has left no trace. Meanwhile, some palaces such as "Ukhaidir (778 AD) and Balkuwara" (849 AD) are still surviving in a reasonable condition. These palaces will serve to give us an impression of residential units during the 8th and 9th century.

#### a) Ukhaidir Palace (778 AD)

In the desert, west of Kerbala (Fig. 2.44) there is a fortified palace called Al-Ukhaidir. It consists of fortified rectangular enclosure with a great gateway in the centre of each side. In its description Creswell (1940) pointed out that:

"There are four corner towers, and ten intermediate towers on every side. Within the great enclosure is the main building or palace. The wall of this inner enclosure is also provided with round towers; its main entrance forms on with northern entrance of the outer enclosure"(Fig. 2.45) "The great corridor runs completely round a central block consisting of the Court of Honour and a group of rooms (29-42) to the south of it. These rooms consist of a vaulted Iwan or liwan (29) with a square room (30) at the back of it. On each side of the great Iwan are a pair of vaulted rooms (31, 32 and 41, 42). A vaulted corridor (36) runs round three sides of the square room. On the south side of this corridor is a light court (F). This group on the south side of the Court of Honour was evidently the Throne Room complex. Separated from this central block by a long vaulted corridor (28) are four isolated and self-contained sets of vaulted chambers, each with its own court (B, C, G, and H)."

(p 52)

The Residential Units of the Ukhaidir Palace.

Each one of these houses in accessible by one door only from the Great Corridor, except C, which, in addition, has a door opening into the palace yard. B and C differ from each other, but each is almost identical to its fellow opposite except that everything is transposed from right to left.

The north and south sides are occupied by a triple arched facade, the
FIG. 2.44 The Site of the Ukhaidir Palace
FIG. 2.45 Plan of the Ukhaidir Palace
central arch being wider than the side ones. All these arches are pointed and rest on rectangular piers. Each side room has two doors, one placed as usual near the outer end of the side wall, opening into the central room, and one into the portico (Creswell, 1937).

The central room with its wide archway was of course the reception room and the side rooms ordinary living rooms. The group facing south would form the winter residence and that facing north would be used in summer.

It is interesting to point out that the plan of these houses had a great influence on Fustat, Cairo, during the Tulūnid period, i.e. the T-shape of Fustat houses and the Ukhaidir houses are nearly the same (Creswell, 1937).

b) Balkuwara Palace (849 AD)

The Balkuwara palace, known today as Manqūr, is about 6 km south of modern Samarra*. It has only one entrance in the middle of its north east wall (Fig. 2.46). The plan is divided into three parallel strips like Mashatta and al-Ashiq palaces also in Iraq (Fig. 2.47). A strong axial symmetry is maintained, which was not common in Islamic design (Creswell, 1937). The palace included many courts on which are more living rooms, amongst a very luxurious bath.

The Residential Unit and Bazaar of Bulkuwara Palace.

The single house is a typical example of the private house of Samarra. They consist of 16 rooms grouped around a court. The courts have the proportion 2:3. At one end is the T-shaped hall. These houses served as residences for household and perhaps the Harim of the prince.

Amongst the houses is a bazaar street and great courts, Ya'qubi says that each of these quarters contained barracks for troops, a little bazaar for their needs, baths and mosques (taken from Gibb & Bowen, 1912).

* For 56 years Samarra acted as the capital of Iraq starting from 836 to 892. After this period Baghdad became again the capital.
FIG. 2.46 Balkuwara Palace
AL-'Ashiq Palace

Scale 1:1000.

FIG. 247

Al-Mashatta Palace
2.2.6 Modern Baghdad*

Baghdad is situated on both banks of the Tigris, 39° 19' N and 44° 44' E. The name 'Baghdad' is undoubtedly Iranian and means 'Given by God', the gift of God**.

2.2.7 The People

About four-fifths of the population, which was about 12 million in 1977, are Muslim Arabs. The tribal system, to which almost the whole population is subject, may be considered a heritage from Arabia. There are Bedouin tribes, nomadic pastures of camels, sheep and horses, there are cultivator tribes near the Tigris, Euphrates and the north, semi-nomadic tribes whose manners and customs are similar to other Bedouin in Saudi Arabia, or Egypt. Amongst the rest of the population there are Christians, Greeks, Indians and Jews***.

2.2.8 Social Life

Despite Iraq's eventful history, social life is still very traditional and owes most of its customs to the teaching of Islam. Women are still segregated from men who are not closely related to them. They still wear the black veil which is known as Abaya which covers the head and the body. Family ties are very strong, although there are signs of a gradual weakening. Polygamy is still practised but in Baghdad it is not common (Al-Ansari, 1970).

2.2.9 Climate

Heat is the dominant problem for the greater part of the year (Fig. 2.48). Baghdad has a long hot dry season and a shorter cool season. The hot season usually lasts about 7 to 8 months, from April to October with a daily average of 6 to 9 hours of bright sunshine. During the hot season

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* Modern Baghdad in this sense means Baghdad from the Middle Ages up to World War Two.


FIG. 2.48

Country: IRAU
Location: BAGHDAD
Altitude: 341
Latitude: 33° 26'
Longitude: 44° 24'
no rain may occur, and even during the cool season only occasional
flash rains occur. The sky is normally clear but when laden with dust,
painful glare takes place.

Solar radiation is direct and strong during summer days, but the absence
of cloud permits easy release towards the sky. Winds often carry dust
and sand and often develop into sandstorms. The soil is usually dusty
and dry (Al-Rawi, 1978).

2.2.10 The Residential Quarters

It will be seen that in the layout of residential quarters and construc-
tion of housing there is little difference in the wide sense of the word,
from Iraqi and Cairo or Jiddah quarters. Meanwhile, there is also great
resemblance between the modern quarters in Baghdad, i.e. quarters dated
from 8th to 18th century, (Fig. 2.49), and that of ancient ones like
Assur (UR) residential quarters (Lamp, 1960)(Fig. 2.50).

Mosques are the best representative of public buildings in most of
Baghdad quarters; the main bazaar network is located on both sides of
the main streets and lanes. They were named after crafts or materials
being sold, such as suq al-Safifir (coppersmith), suq al-Saghah (silver
and goldsmith).

Al-Kadhimiya Quarter.

Al-Kadhimiya is one of the historical quarters in the old city of Baghdad.
Originally this part existed outside the circular boundary of the round
city around two shrines of the holy saints (Fig. 2.51). Later it became
one of the religious centres of Baghdad.

It is dominated by its domes and minarets. The dwellings and bazaars
of Kadhimiya have the same general features of Cairo and Jiddah, i.e.
the narrow alleys, bay windows and Mushrabiyyah or shanashil. The
following is one of the houses still existing in Kadhimiya (Al-Allaf,
1902).
FIG. 2.51  Kadhimiya Townscape
2.2.11 The Residential House

The Exterior.

Traditional houses in Baghdad are usually of two storeys and a basement. This basement is not known in Cairo or Jiddah houses and played an important role as an air conditioning system. The first floor is usually of thick sunbaked yellow bricks while the second is of a timber grid framework. The latter has overhanging balcony windows on the street side (Fig. 2.52). As a rule, these windows are covered by lattice work or shanashil (Al-Azzawi, 1969). The only decorative features on the external facade are the doorway and the lattice work which is more or less like Cairo and Jiddah houses. The full height of the house is about 7-9 metres from the courtyard level.

The Doorway.

The doorway is usually made up of thick carved wood with heavy knocker and an iron handle (Fig. 2.53). It is often surrounded by a brick arch. The doorway leads into a lobby which is designed to add further seclusion to the courtyard, i.e. the bent entrance which accompanied most of the residential and military buildings.

The Interior.

Groundfloor: In general this floor is usually used as a reception and living activities. It is arranged around three sides of the court. It consists of guest room, living room, kitchen and Iwan (Al-Ashab, 1974) (Fig. 2.54). The latter resemble the Taktabosh in Cairo houses.

The Iwan.

The Iwan is usually raised by a step above the courtyard level. It is a rectangular space facing the courtyard from its longest side. On this side there is one or more slender columns with a large decorated capital. The floor is often paved with beautiful coloured tiles. The surrounding three walls are carved and decorated with niches of different sizes and shapes. The ceiling is made up of timber. It is usually used for eating and relaxing.
FIG. 2.53 A Doorway of a Traditional House
FIG. 2.54 Traditional Courtyard House, Baghdad
Guest Room.

This room is usually used as a reception hall for male guests. It is often raised by 70-80 cm more than the courtyard level in order to give chance to open some windows for the basement beneath it. The guest room has windows facing the courtyard. These windows are set in brick arches with timber shutters. It also has two doors, one is used as an entrance door, along the main entrance, and the second opens onto the court to permit services.

Along the wall there are some niches to display valuable antiques and gifts. The ceiling of this room and also the living room is often made up of brick domes, arches and vaults and decorated with pendentives.

Living Room.

It is often very close to the kitchen. Mainly it is the family living room, but during winter it is usually used as a dining room. Its internal surfaces are often painted while those facing the court are left with their natural texture. In big houses they are covered with colourful tiles.

Meanwhile this living room is not the only space for this function, but the courtyard also acts as a general space and as an extension of most of the ground floor rooms (Al-Azzawi, 1969).

In case of larger houses there is sometimes a series of courtyards, one patio being endowed with a fountain, made up of coloured and patterned tiles and emerging into another courtyard, which may again lead to a third one. Together they create a quiet, cool luxurious interior and private environment. In some houses there is also a covered terrace on two, three or four sides of the courtyard (Al-Ashab, 1974).

Utility Rooms.

The kitchen, bathroom (hammam) and toilet usually consist of one section on the ground floor. They commonly have no windows. They also have unpainted hard walls of brick. Hammam is a suite of complicated heated stone apartments resembling the public baths. It is only the large houses that have this type of hammam however, and most people used to enjoy the public bath.
Basement or Sirdab.

The Sirdab (a Persian word meaning a place where cold water can be obtained)* is a large room or rooms under the guest room. Sometimes a second sirdab is provided under the living room. It is sometimes several metres below the courtyard level. It is approached by a separate staircase. Since the ceiling of the sirdab is above the ground level, light is provided through small openings placed near the roof, facing either the courtyard or the narrow street (zuqaq).

This basement is considered one of the most unique features of the Baghdadi house (Al-Ashab, 1974). Together with the wind catcher or Badgir on the roof, they represent an indigenous system of ventilation. Simply, air arrives from the inlet of the windcatcher through a tunnel which opens above a ditch of water in the basement. The latter cools and increases the humidity of the air. Finally this cool air is distributed to both rooms in the basement and the ground floor. The ceiling of this floor is made up of brick like the guest room.

Floors.

All floors in the house, except those of the utility rooms, are often covered with coloured tiles. During the winter, they are usually covered with carpets. The use of these tiles goes back to Babylonian and Assyrian times. In fact its origins were known in north Iraq. Later it was used as a decorative element on domes, minarets and mosque floors (Al-Ashab, 1974).

First Floor.

Upon the first floor there is usually a gallery which runs along the three sides facing the courtyard. This gallery represents the only communication between this level and the courtyard. It opens up into a large balcony known as Tarma. The latter resembles the Maq’ad in Cairo houses.

The Tarma.

The Tarma is a room with an open front towards the court and usually faces the north-west direction, i.e. the direction of the prevailing breeze. This space is often used during summer as a living and sleeping space.

When the house overlooks a river or park - an external balcony is constructed to enjoy the scene. This additional balcony is made of timber and divided into many spaces. Its facade is usually covered by wooden lattice work that provides both privacy and view (Fig. 2.55).

Other Rooms of the First Floor.

The rest of this floor is divided into a number of bedrooms. These separate rooms are for parents, harim, children and the male section of the family. Ceilings of this floor are usually made up of plain wood panels.

The Roof Floor.

The roof floor is a very comfortable place for sleeping during the summer nights. It is usually surrounded by a parapet wall to ensure privacy. The main feature of the roof is the brick inlets or air scoops of the Badgir (Fig. 2.56). These inlets are specifically shaped and directed towards the north-west prevailing breeze. They also produce the distinct silhouette of the traditional Baghdadi House (Fig. 2.57).

Roof Construction.

Roofs are made up of irregular beams placed closely and covered by straw mats; finally a mixture of earth clay is overlaid with a thick layer which varies between 20 and 30 cm (AL-Azzawi, 1969)(Fig. 2.58).
FIG. 2.55 The Tarma

FIG. 2.56 Section Through the Air Scoop – Badgir

FIG. 2.57 Silhouette of the Traditional Baghdadi Houses
FIG. 2.58 The Roof Construction
2.3.0 JIDDAH
2.3.1 Historical Outline

After the death of Mohammed in 632 his spiritual and temporal successors were the first four Caliphs, who ruled until 661. The importance of Jiddah dates from that time, when the town became the sea exit of the first Muslim capital. The Caliphs were followed by the Umayyad dynasty through thirteen caliphs until 750. Though the seat of the empire was transferred from Makkah to Syria. During this new period Jiddah retained a large share in the profitable spice trade of the Red Sea, which had past increasingly under Arab control after the rise of Islam (Fisher, 1961).

From 750 to 1258 the seat of the empire was settled at Baghdad by the Abbasid dynasty.

Successively however the Muslim state started to decline for a complex series of reasons, weakened internally and losing a great deal of its territory. When the Mongols entered Baghdad in 1258 they slaughtered the Caliph and his entire family, making the end of the Caliphate of Arab origin. They, the Mongols, were stopped by the Egyptian Mameluks, who united the lands of Palestine and Syria with Egypt.

The Ottomans were the next great power, after the Mameluks, that ruled on the Arabian Peninsula, or more exactly the Hejaz, south of Arabia (Longrigg, 1942).

Arabia and the Red Sea (1500-1750).

The discovery of the sea route to India by Vasco de Gama in 1498 had immense significance for the Muslim countries. They lost much strategic and commercial importance when European ships changed their routes. During the fifteenth century the Portuguese had made many attempts to find a better way round Africa.

During this period Jiddah was reduced to act as a port for pilgrims*.

In 1805 Mohammed Ali, an Albanian soldier, made himself independent in Egypt. He planned to form an Arab empire by the invasion of Arabia. With the encouragement of the sultan Mohammed Ali attacked Jiddah in 1811. During the first half of the nineteenth century he dominated affairs in Hegaz and to a lesser extent farther south. In 1840 he was forced to give up his ambitions and all affairs came directly from Constantinople.

In 1869 the opening of the Suez Canal brought the Red Sea and Arabia back into world affairs*.

2.3.2 The City of Jiddah (21° 29' N, 39° 11' E)

Jiddah is one of the six principal cities of the Western region of Saudi Arabia - the others being Makkah, Medina, Taif, Tabuk and Yembo (Fig. 2.59). Jiddah is the main centre of commercial activity in the Arabian Peninsula. The western region is bound to the west by the Red Sea and to the east by a line that descends from the head of the Gulf of Aqaba and runs to the east of Tabuk, Taima and Medina (Hamza, 1933).

City Wall.

Like all other Arab cities, a protective wall was built by Husayn al-Kurdi (Fig. 2.60), in the early sixteenth century. It was built of stone. In plan, its contours were an irregular hexagon, rising about three or four metres. Entrance to the city was through a gateway opening on each side. To the north Bab-al-Medina (Medina gate) and Bab-al-Jadid (New gate) to the east, nearly halfway on the southern side there was Bal al-Sharif (Noble gate), on the seaward side there were Bal al-Bunt, a gate opening onto the city market (Suq) and Bab al-Magharibah (Maghrebi gate) (Pesce, 1974).

Jiddah after 1947.

With the stabilisation of political conditions and the security achieved under the reign of King Abdul-aziz, the city expanded and flourished.

FIG. 2.60 The City Walls
Moreover, the sudden increase of oil revenues, on the one hand supported the economy and on the other hand put pressure on the government to build reasonable accommodation for the people. Consequently the historical wall was knocked down, in the spring of 1947, and unplanned squatter settlements grew to a considerable size (Pesce, 1974).

During the same period new development and redevelopment has continued in the old city or (al-Medina al Kadimah). In addition to the expansion of the city centre - vertical growth has occurred. Unfortunately, new skyscrapers (Fig. 0.6) replaced the beautiful old buildings to realize the full economic potential of the land value. In short Jiddah began to lose the greater part of the old buildings which gave the city its unique character.

2.3.3 The Development of Jiddah

From mediaeval writers and modern historical books, it can be said that the development of Jiddah occurred over four stages (Ibrahim, 1976).

First Stage - 7th-15th Century.

The city of Jiddah developed through some stages which resemble the development of Cairo or Baghdad. Inside the mediaeval city walls Jiddah was divided into self-contained quarters or Mahallat. Each quarter contained its own mosque, school, public bath, small local market (Suq) and perhaps workshops. These early Mahallat namely were al-Sham, al-Mazlum and al-Yemen (Fig. 2.61).

Second Stage - 15th-18th Century.

During this stage security was not achieved in the full sense. Small Mahallat began to develop near the city gates and on both sides of the main communication ways, namely Makkah road and Medina road. The main features of these new settlements were commercial ones (Fig. 2.61a).

Third Stage - 18th-middle of 19th Century.

During this stage security was achieved completely and the old city became more dense. The establishment of new focal points outside the city walls helped Jiddah to expand outward. These new focal points
Fig. 2.61 The Development of Jiddah
were namely the two Royal palaces and later the airport. With the establishment of such buildings - roads, water supply and all other facilities were later established (Fig. 2.61b)

Fourth Stage - Middle of 19th Century-Present Day.

During this final stage especially the twenty years between 1959 and 1979, Jiddah expanded and experienced a remarkable growth rate which set the main pattern of the present form of the city. During these twenty years the Quarantine hospital, the petrol refinery, Bahdadiyah Palace and many ring roads and main roads were asphalted and lined with modern buildings. No major suburbs were started although there was infilling in some green areas of the existing suburbs (Pesce, 1974).

In short the period is witness to the uncontrolled and unplanned squatter settlements which spread to a considerable size.

2.3.4 Cultural Relations with Egypt and Mesopotamia

The Arabian peninsular lies between the two earliest seats of culture: Egypt and Babylonia. Although it was not brought within the scope of the river valley culture of either of the lands of the one river or the land of the twin rivers, yet it could not entirely have escaped their influence. Its culture was at bottom indigenous. Its south-eastern people were possibly the ones who acted as intermediaries between Egypt and Mesopotamia.

During the twelfth Egyptian dynasty (2000-1788 B.C.) a canal above Bilbeys, Egypt, connected the Nile with the Red Sea. Restored by the Ptolemies, this canal, the antecedent of the Suez Canal, was re-opened by the Caliphs and used until the discovery (1488) of the cape of Good Hope, (Hitti, 1937).

"A relief belonging to the first dynasty at Abydos, Egypt, shows an emaciated Bedouin chief in a loincloth crouching in submission before his Egyptian captor, who is about to brain the Bedouin with his mace".

(p 120, Olmstead, 1930)

This relief reveals that there was some sort of relation between the two countries.
The ancient Egyptians were not the only people who had relations with Arabia. They also had strong commercial interests with Babylon. Eastern Arabia bordered on Mesopotamia. The early inhabitants of the region had already by the fourth millenium before our era become familiar with their neighbours and were able to communicate with them both by land and water.

Results from Cultural Relations.

The obvious outcome of the previous cultural relations with Egypt and Mesopotamia is well illustrated in one of the historical buildings, namely the rockcut tombs of Mada'in Salih (Fig. 2.62)(Samih, 1970). The main influences are:

a. Affect of the Ancient Egyptian art in the form of the crowned cornice on the facade (Fig. 2.62a).

b. The idea itself of carving them inside the mountain is very much like the tombs of "Bany Hassen" in ancient Egypt (Fig. 2.62b).

c. The Assyrian art is obvious in the graded parapet.

d. The influence of Greek art is apparent in the use of pediment over the entrance (Fig. 2.62c).

e. The use of the Corinthian pillars is resemblant to the Roman pillars (2.62d).

2.3.5 Architectural Outline

The tent was the ordinary dwelling. The inhabitant had, and still has today, a rude or very simple kind of architecture represented by stone buildings or sun-dried brick covered with flat roofs of palm wood and clay, devoid, in many cases, of decoration and ornament and suited only to the simplest needs.

The rock cut tombs of Mada'in Salih, the picturesque chambers carved in the multi-coloured sand cliffs of Petra, the colonnaded and arched palaces and sancturaries of Palmyra - all these indeed reveal a high order of artistic technique.

In the case of the Muslem Arabs art found its supreme expression in
religious architecture. The Muslim architects evolved a scheme of building, simple and dignified, based on earlier patterns but singularly expressive of the spirit of the new religion (Samih, 1970). Thus we have in the mosque, an epitome of the history of the development of Islamic civilization and international relationships. Perhaps no clearer example could be cited to illustrate the cultural interplay between Islam and its neighbours than the mosque of al-Medina.

Regarding dwellings in Jiddah, two strong influences can be identified. The first and major influence is local, stemming mainly from nearby Mecca. This is apparent in the house plan, building facade and social usage of the buildings (Abdaly, 1975). For example, the majority of houses in Mecca are occupied by many families, and only the affluent have houses in which they are the sole occupants. Similarly, many houses in Mecca are part rented to pilgrims during the holy season. In his description of houses in Mecca, Hurgronje (1931) drew attention to their intricate layout and the social functions they served. For example, on passing the house door, the hall (dihliz) is reached in which the master receives passing and unexpected visitors. A few small rooms (magaad) are often located on either side of the hall. These serve various functions such as business office, reception area for intimate acquaintances, storage areas and even occasional bedrooms. The ground floor is very similar to the other floors both in layout and the facilities it provides. The only apparent difference is that the upper floors have terraces. These terraces are considered the most private part of each apartment within the house. After sunset the occupants enjoy the comparative coolness there, and during the hottest months people often sleep there. All of these features of houses in Mecca are also characteristic of houses in Jiddah.

The second influence is more diffuse, stemming from external sources. These latter comprise Yemen, Egypt and Sudan. It is difficult however to disengage these external influences due to interactive effect of trade and pilgrimage, though certain features can be identified. For example, the Yemeni influences can be found in aspects of both building interiors and exteriors. Externally, Yemeni houses share with their Jiddah counterparts similarities of building techniques, decoration and furniture (Kirkman & Lewcock, 1976). Internally, the layout and usage of space is quite similar, as is the family structure and customs of both countries. This is particularly
apparent for the uppermost floor, which is called in Yemen (Mafrag) and in Jiddah (Sotooh). The Mafrag is the principal room for entertaining male visitors. Its recreational activities are the smoking of the water-pipe (mada'ah) and the chewing of qät, which is a widespread custom in South Arabia. It ought to be mentioned that while the Mafrag was mainly used for males in Yemen, in Jiddah or Mecca it was used by the whole family.

However, certain critical differences found between the dwellings of both countries may be noted. An example is the courtyard. It is rare to find a courtyard in Jiddah, while it is a common feature of Yemeni houses. Surprisingly enough the Yemeni house often contained a small courtyard which extended through different levels of the house (Fig. 2.63a).

Another difference is that lower floors in Jiddah and Mecca are often rented to pilgrims. As a result the house design reflects this function (Fig. 2.63b) which is absent in Yemen. In this sense the Jiddah and Mecca concept of house design appears more flexible than the Yemeni houses. The facilities of the latter, on the other hand, are concentrated into one or two floors. This indicates that the house was designed to be used by a single family. Finally, the number and location of staircases presents another difference between the Jiddah and Yemeni houses.

2.3.6 Comparison between Buildings in Jiddah and Riyadh

Wooden parapets were used in Jiddah while they were never used in most of North Arabia.

Bay windows and balconies appeared on the facades of Jiddah houses while in the north the facades usually have the same vertical level.

Domes were used in most of the mosques of Jiddah while in the north they were not accustomed to such elements. For example, Najd mosques never used any kind of domes.

* Jiddah houses used to expand vertically to satisfy both the family needs for space and to allow the owner to rent some space to pilgrims. As a result families used to organise their space needs according to the time of year. In all cases each floor was arranged to maintain the family functions and privacy between the sexes.
Plans and sections of a large house, (model in exhibition).
Typical plan of a traditional house found in Mecca. The main entrance (1) leads to the upper floors through a hall without interaction between male and females. The area is used by males and their guests. Space in this floor and the others is flexible to be rented during the pilgrimage days.

The floor is used by a member of the family or as a reception room; here also space shows flexibility in pilgrimage season. Rooms 3, 19, 7 and 4 are rented separately, the other spaces are considered common services shared by users.

The family gathering are with related services and terrace roof is used for sleeping in most seasons.

FIG. 2.63b
Buildings in Jiddah usually extend vertically, but in most of the northern cities they extended horizontally (Fig. 2.63).

Stone and wood were the main building materials in Jiddah, while brick was the main building material in the north.

The previous points illustrate the fact that Jiddah had its own characteristic features.

2.3.7 Climate

Jiddah climatic conditions (Fig. 2.64) are directly affected by its location on the Red Sea on the line between the Mediterranean and the monsoon type of climate. The prevailing wind direction is often NNW (330°-360°); dust storms raised by wind sweeping across the city with a frequency of about thirty days per annum. The major climatic problem at Jiddah is the high relative humidity accompanied by high temperature (Asaad, 1977).

2.3.8 The Environment and Its Influences

To its denizen the desert is more than a habitat; it is the custodian of his sacred tradition, the preserver of the purity and his first and foremost line of defence against the encroachment from the outside.

Its scarcity of water, scorching heat, trackless roads, glare, monotony, lack of food supply, all enemies in normal times. Little wonder then that the Arabians when they settled down tried to represent and substitute the shortage of plants, water, shade by all means in both houses and city planning.

The continuity, monotony and aridity of his desert habitat are faithfully reflected in the Bedouin physical and mental makeup. Anatomically, he is a bundle of nerves, bones and sinews. The leanness and barrenness of his land shows itself in his physique (Abdul-Rahman, 1960).

2.3.9 The People

The inhabitants of Arabia fall into two main groups: nomadic Bedouins and settled folk. The line of demarcation between the wandering and
FIG. 2.63
Traditional House

- Riyadh

Section B-B

Section A-A

GROUND FLOOR

FIRST FLOOR

ROOF PLAN

1. ENTRANCE
2. KITCHEN
3. DINING
4. BED RM
5. STORAGE
6. COURT
7. BATH
8. SLEEPING/LIVING
9. STORAGE
10. LIVING
11. BATH
Temperature:
Mean Max = 37.8
Mean Min = 18.8
Overall Mean = 28.1

Rainfall:
The rainfall unpredictable in timing. It is characterized by sudden heavy showers that run off very rapidly because of the limited amount of vegetation cover.
Thus the problem of urban flooding arises. Simply stating that the average annual rainfall is 40 mm can thus mask a serious problem for the city. However rainfall is spasmodic and there have been periods when no rain has fallen for several years at a time.
T = Trace = 0.05 mm (not counted as rainy day).

Relative Humidity:
It is the greatest source of discomfort to the people of Jeddah. Average monthly maximum figures range between 75% and 80%.

Wind:
The prevailing wind direction is overwhelmingly NNW (330° - 360°). The dust storms is 30 days per annum.
the sedentary in the population is not always sharply drawn. There are stages of semi-nomadism and of quasi-urbanity. Certain townsfolk who were at one time Bedouin still betray their nomadic origin, while other Bedouins are townspeople in the making (Ibn-Said, 1902).

The Bedouin represent the best adaptation of human life to desert conditions. Wherever verdant land is found, there he goes seeking pasture.

Action and reaction between townsfolk and the desert folk are motivated by urgent dictates of self-interest and self-preservation. The nomad, as a type, is today what he was yesterday and what he will be tomorrow. His culture pattern has always been the same; variation, progress, evolution, are not among the laws he readily obeys. He still lives, as his forebears did, in tents of goats' or camels' hair, and grazes his sheep and goats in the same fashion and on the same pastures. Sheep and camel raising, and to a lesser degree horse breeding, hunting and raiding. Agriculture and all varieties of trade and craft are beneath his dignity. Over all the living things of the desert the Bedouin, the camel and the palm are the triumvirate that rules supreme; and together with the sand they constitute the four great actors in the drama of its existence (Hitti, 1937).

The Woman.

The Bedouin woman enjoyed and still enjoys a measure of freedom. She enjoys the freedom of the desert. She lives in a polygamous family and under a system in which the man was the master (Hitti, 1937). This fact of freedom and more than one wife or family in the house illustrates why the house includes more than one apartment together with the special design for the harim halls and rooms. They enjoy freedom in a private manner.

Traditional Dress and Food.

The daily food is dates and a mixture of flour, or roasted corn, with water or milk. The dress is as simple as the food. A long shirt (thawb) with a belt and flowing upper garment (abah'), which pictures have made familiar. The head is covered by a shawl (kūfiyah') held by a cord (oqal).

Main Features of the Bedouin.

Tenacity, endurance (sabr) seems to be his supreme virtue, enabling him
to survive where almost everything else perishes. Passivity is the obverse of his same virtue. Passive endurance is to him preferable to any attempt to change the state in which he finds himself, no matter how hard his lot.

Individualism, another characteristic trait, is so deeply ingrained that the Bedouin has never been able to raise himself to the dignity of a social being of the international type. Discipline, respect for order and authority are no idols in desert life. He is also within his laws of friendship a loyal and generous friend (Abu-Dawud, 1780).

2.3.10 The Society

The clan organisation is the basic unit of Bedouin society. Every tent represents a family; an encampment of tents forms a hayy or quarter, members of one hayy constitute a clan (quawm). A number of kindred clans grouped together make a tribe (qabilah). All members of the same clan consider each other as of one blood, submit to the authority of but one chief - the senior member of the clan "Banu" (children of) is the title with which they prefix their joint name. Blood relationship, fictitious or real, furnishes the adhesive element in tribal organisation. The tent and its humble household contents are individual property, but water, pasture and cultivable land are the common property of the tribe (Hitti, 1937).

Common Responsibility.

If a member of a clan commits murder inside the clan, none will defend him. In case of escape he becomes an outlaw (tarid). If the murder is outside the clan, a vendetta is established, and any fellow clan member may have to pay for it with his own life. In like manner a whole weaker clan might desire the protection of, and become ultimately absorbed by, a strong clan or tribe. An analogous custom in religion made it possible for strangers to become attached to the service of sanctuary and thus become a client of the god. To the present day the pilgrims to Makkah are referred to as 'the guests of Allah' (Hitti, 1937).

Islam also made full use of the units based on tribal lines, settled the colonists in the conquered lands in tribes and treated them in such
a way most suitable to their social pattern. It also softened and mitigated many of the Bedouin bad manners (Azzam, 1964).

Administrative System.

Usually the clan is represented by its titular head, the sheikh. He is the senior member of the tribe whose leadership asserts itself in sober counsel, in generosity and in courage. Seniority in age and personal qualifications determine the choice. In judicial, military and other affairs of common concern the sheikh is not the absolute authority; he must consult with the tribal council composed of the head of the component families.

The Arabian in general and the Bedouin in particular is a born democrat. He meets his sheikh on an equal footing. The society in which he lives usually levels everything down. The title 'malik' (king) the Arabians never used except in referring to foreign rulers and affairs, (Hitti, 1937).

Communications System.

It seems very appropriate that the name of Saudi Arabia in recorded history should be associated with the camel. The camel plays a great role in their daily life. Without it the desert could not be considered a habitable place. The camel is the nomads nourisher, his vehicle of transportation and his medium of exchange. He drinks its milk instead of water, he feeds on its flesh, he covers himself with its skin, he makes his tent of its hair, its dung as fuel and its urine as a hair tonic and medicine. To him the camel is more than 'the ship of the desert'; it is the special gift of Allah.

The Arabian camel can go for about twenty five days in winter and about five days in summer without water. The camel was a factor in facilitating the early Muslem conquest by assuring its masters more mobility than, and consequent advantage over, the settled peoples.

The Caliph 'Umas is quoted as having said: "The Arab prospers only where the camel prospers". It was introduced into Egypt with the Assyrian conquest in the seventh century BC, and into Northern Africa with the
Muslem invasion in the seventh century (Thomas, 1948).

Before leaving this point it is interesting to mention that Saudi Arabia has about 215,000 camels, Iraq 162,000 and Egypt nearly 162,000 camels; this figure is very recent (Fisher, 1961).

2.3.11 The Residential House

Exterior.

The houses, mostly built of coral stone, are usually of two or more storeys in height and have bay windows and balconies, built outwards and fitted with wooden lattices to catch the breeze. The latter were for the exclusive use of the "harim". They also served as extensions of the family living rooms and might be used to entertain close friends. Moreover, the balcony seats were usually fitted with comfortable pillows like Cairo or any other Arab house they had no rooms used solely for particular functions.

Interior.

The interior of a typical merchant's house of old Jiddah was along the following lines:

The Ground Floor or Reception Quarters.

On the ground floor a spacious entrance hall was the place where guests were received. Its stone-flagged pavement was constantly sprinkled with water in summer to keep the room temperature relatively cool. The house-master's office or studio was often at ground floor level, as were guests' and servants' quarters.

The Upper Floor, Living Quarters.

This floor or floors were occupied by the living quarters of the owner, and often by the families of his married sons. Each apartment included a large reception room so that the ladies of the house could meet independently with their relatives and friends. A larger room on the uppermost floor was used for collective meeting of all the ladies and their acquaintances, in the other room of this floor, more airy and
cooler than the rest in the building, the whole household slept on summer nights. The ceilings were high, the staircases were spacious, sometimes they were so low and wide as to allow the housemaster to reach the upper floors without dismounting the horse.

Walls were sometimes panelled in minute cabinet work, inlaid with mirrors, or richly gilt. A flourish of carpets enlivened the floor in winter.

The House Plan.

It was not possible to obtain any data due to the absence of published or recorded material. Furthermore the long formalities necessary to carry out a site survey prohibited any such work during my trip in June, 1978.

However, it is believed that there is a great similarity between the traditional house of Suakin, Sudan, and that of Jiddah. Suakin is located opposite Jiddah on the Red Sea coast (Fig. 2.65). It was built between the 16th and 20th centuries. Its architecture seems to follow the Hedjazis in terms of design and planning. A recent comprehensive survey made by Greenlaw (1976) reveals that Suakin houses built before 1860 are typical examples of Jiddah architecture and those built after 1860 showed the European influences coming through Egypt. In this connection, the houses occupying plots Nos. 169, 172, 220 and 221 (Figs. 2.66 to 2.68) are good examples of Jiddah houses in terms of plan and to some extent the facade design. The apparent difference between Jiddah and Suakin as far as the building height is concerned is that the former was taller. The reason for such vertical expansion is believed to be due to the fact that the owner of the Jiddah house used to rent some apartments on the ground floor during the pilgrimage season.

Comparison between the Traditional Arab Houses of the Three Cities.

The three houses bear to a great extent many common features such as the organisation of the house plan in terms of privacy, the use of Mushrabiyyah, turned lattice windows, furniture, surface decoration and the neighbourhood pattern. Meanwhile there are some differences that could be summarized as follows:
FIG. 2.65
FIG. 2.66
FRONT ELEVATIONS
N.E. FACE

Houses on plots 169 & 172.

Yard (House II only)

Ground-floor plans N.E. face

FIG. 2.67
Fig. 2.68

220 HOUSE 220 - 1

HOUSES

220 SIDE DOOR TO YARD.

SIDE OF

SHOPS

221-3.
a. The Iraqi house used to embody a basement which is absent in Cairo and Jiddah houses.

b. The Iraqi and Cairane houses used to have a windcatcher on the roof while the Jiddah house did not.

c. The Iraqi and Cairane houses were assembled around a courtyard while Jiddah houses seldom had courtyards.

The lack of the courtyard in Jiddah may be due to one or all of the following reasons:

a) Social Aspect

As mentioned earlier, Jiddah houses were partly rented during the pilgrimage season which used to last between 2-4 months. Consequently the privacy of the courtyard would be disturbed by the tenants.

b) Climatic Aspect

As I pointed out earlier with respect to the high relative humidity in Jiddah, this problem can be mitigated by maximum cross ventilation, so the designer may have found it better to increase the height of the house as much as possible to catch the breeze which is usually cooler as the height increases from the ground.

c) Aesthetic Aspect

The typical tall houses in Jiddah would require a spacious courtyard, consequently each house will occupy a greater area which was not available due to the local topography.

2.3.12 Traditional joinery work

Perhaps the light forms of woodwork especially wood carving reaches its highest point at the end of the thirteenth and beginning of the following centuries; the mushrabiyyah is considered one of the main branches of joinery work. These projecting mushrabiyyah form the most picturesque feature of any old street in many Islamic cities. In Jiddah it has another name which is "Rawashan", plural of Persian adjective, rawashan, meaning "splendid", (bright) (Alter, 1971). In Baghdad they call it "shanasil".
In order to understand its unique characteristics, one must keep in mind the social habits, climate and religion, of the countries that brought them into being. Thus mushrabiyyah, or wooden lattice work, was partly the outcome of climatic conditions and partly to afford a view of the outside world to the secluded inhabitants and the harim - "womenfolk".

According to Herz-Bey (1896), the earliest examples in the thirteenth century in Cairo are in the mosque of Al-Imam ash-Shafi'i, in the railing surrounding the tomb of Sultan Qalāūn and in the mimbar in the mosque of Ibn-Tulūn.

**Challenges Facing Joinery Work**

In a cool climate, the use of timber is natural enough; but in Egypt, Saudi Arabia or Iraq, apart from the scarcity of the material, and the necessity of importing it, the heat offers serious difficulties in its use. For example, a plain board of wood keeps its shape well enough in cold or moderate climate, but when exposed to the sun, 5-8 hours daily, it will speedily lose its accurate proportions.

Another problem will arise when employed in combination, pin and oak ebony, beech and logwood, to form windows, doors or pulpits. The joints may open, its carving split, and the whole work may become unsightly and unstable.

**Stages of Deterioration.**

Deterioration of wood through exposure to high intensity sunlight is severe. This solar radiation raises the surface temperature during the day and causes expansion. This expansion in the day, followed by contraction at night leads to disintegration, together with many chemical reactions which are speeded up by temperature differences may accelerate deterioration. Finally, using a great variety of wood every one has special specifications, in the same work may cause another challenge.

**What is Mushrabiyyah?**

In spite of the fact that many writers have left us descriptions of
mushrabiyyah, the only detailed one is by Poole (1886):

"Mushrabiyyah is a turned lattice work, usually of a highly ornamental character, used in houses and palaces to admit subdued light and fresh air without destroying the privacy of the interior".

(p 135)

The word "mushrabiyyah" means a place where drink may be kept cool, hence a place protected against the sun, yet well aired, for the greyish-white porous clay water jars, known as "goola" or "zeer".

More specifically, the framework is formed of miniature turned bobbins, with square knobs at the intersection; but the latter is usually rounded at all its corners, and frequently assumes a spherical or oval form. The bobbins themselves are so varied in design (Fig. 2.69a) that no general rule or description can be given. Sometimes the size of the squares is increased, and diagonal bobbins are inserted with a small knob at their intersections. Thus each large knob has the ends of four five or six bobbins let into it.

In theory the centre line of each square of the grill is arranged so that the human eyes may conveniently look through them, and in domestic mushrabiyyah the spacing between the centres varies from 1.25 to 1.75 inches, but sometimes the mesh is much smaller. One of the finest examples in Cairo includes nine squares run to a square inch. Henry (1895) pointed out that:

"in some cases it is consisted of 1200 units or pieces of one square metre".

(p 37)

Sometimes an inscription is worked in it (Fig. 2.69b). Another interesting variation is the representation of various subjects - a lamp, an animal - in the lattice by filling up certain squares with diagonal bobbins, thus producing a semi-opaque effect.

Bay Windows

These windows usually had a wooden cove beneath them, and a fretted eaves or 'brattishing' above them, and in some cases there is a subsidiary projecting niche, or miniature bay, sometimes called a 'roshan' (Fig. 2.69c) to hold the water jar for which mushrabiyyah was first designed.
Table 1 gives brief specifications for materials used in joinery work in the three cities under study (Kinniburgh, 1966):

<table>
<thead>
<tr>
<th>Name</th>
<th>Source</th>
<th>Density lb/ft³</th>
<th>Other Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beech</td>
<td>Middle East</td>
<td>40-50</td>
<td>Straight grain and fine uniform texture, and varies in colour from white to light reddish brown.</td>
</tr>
<tr>
<td>Ebony</td>
<td>India and W. Africa</td>
<td>70-80</td>
<td>Straight or slightly irregular grain, colour varies from dark brown to jet black</td>
</tr>
<tr>
<td>Oak</td>
<td>India</td>
<td>45</td>
<td>Varies in colour: red-white-brown</td>
</tr>
<tr>
<td>Pine*</td>
<td></td>
<td></td>
<td>Varies in colour: blue, brown</td>
</tr>
<tr>
<td>Teak*</td>
<td>India</td>
<td>45</td>
<td>Varies between dark and light brown, when freshly cut it is light brown, but darkens when exposed. It has somewhat coarse texture, has great strength and durability. Teak was widely employed for most of the high class joinery and furniture in palaces and large houses (p 38)</td>
</tr>
</tbody>
</table>

*The wood commonly used for lattice windows is Pine and Teak, which were imported from India in lengths of about twenty feet (Nagib, 1938).

Table 3

The Solution.

The only mode of combatting the shrinking and warping effects of the sun was found in a skillful division of the surface into panels small enough and easy in their setting to permit slight shrinking without injury to the general outline. In lattice work, each part is designed in such a way to expand without any cracks or splitting in the surrounding portions.

They manufacture all kinds of lattice work simply as their solutions,
CARVED WOODEN TABLE IN MUSEUM OF ARAB ART AT CAIRO.

PANEL OF AN INLAID IVORY AND EBONY TABLE IN ARAB ART MUSEUM.

FIG. 270
the turner sits cross-legged at his work, and uses a very primitive lathe which he causes to revolve with a bow, employing his tools as well as his fingers (Salem, 1958).

Furniture

The furniture of a Muslim house is usually limited. As Poole (1886) summed up the chief wooden objects:

"An ordinary room usually contains, beside structural woodwork, divans, supported on a frame, a little table, and a desk for the Koran. The kursy is generally of inlaid ivory or mother-of-pearl but some are of turned wood (Figs. 2.70 and 2.71). The reading-desk is of the crossed leg or camp-stool order. It is generally inlaid with mother-of-pearl, which covers the greater part of the surface of the table, and is fixed with glue". (p 143)

The patterns are usually very simple and vary from Cairo to Baghdad and Jiddah.

It is interesting to note that Arabs usually used wood in many parts of their buildings except for floors which were always of stone, (Cairo, Jiddah) or brick (Baghdad). Such selection reveals that they not only realised the thermal characteristics of such building materials but also where the best place is for such cool material to create foot comfort.

Finally, one cannot help asking how ancient people managed to use and treat stone, brick and wood in such unity and variety. Wilson (1971) said:

"they, ancient people, believed that rocks, mud, trees had souls. They worked their building materials very carefully, begged stone forgiveness when they removed it from the ground and asked the wood's pardon for thinning her branches".

Furthermore, not only did they believe that building materials have souls, and spirit, but also they revealed its chemical treatment. In this connection it is interesting to point out that ancient people and in particular the ancient Egyptians were the first people to bark-tan leather, inventing the techniques still in use throughout most of the world, (Moret, 1925).

2.4.0 Summary

The above study comprises the historical background of the three cities. Each of them demonstrates a historic continuity between the pre-Islamic and the Islamic culture. In this sense the area as a whole has seen the civilisations of A'ad, Thamud, Saba, the Egyptian civilisation, the Sumerian, Babylonian, Persian, Assyrian civilisations. Architecturally speaking these cultural influences can be traced in some historical buildings such as Madian Salih, Saudi Arabia. It analyses the developing factors which led each of the
three cities to the apex of its greatness in terms of architecture and planning aspects. The study also shows the factors that led to the deterioration of the three cities by the beginning of this century, which could be illustrated in both population explosion and the foreign influences.

Social and Environmental Aspects

The People -
The population of the three cities under study can be divided into three main groups: firstly, the city dwellers, most of which are merchants, craftsmen and religious men (or Alama); secondly, the Fallaheen, those who live in the countryside and are engaged mainly in agriculture, in addition to simple kinds of crafts; thirdly, the Bedouin; this name is usually applied to nomadic and semi-nomadic tribes. They used to be the inhabitants of the desert. About four-fifths of the population in Saudi Arabia and Iraq*are Bedouin, while in Egypt the majority are Fallaheen.**

Social Life -
Social life is still very traditional and owes most of its customs to the teaching of Islam. Women are still segregated from men who are not closely related to them. They still wear the veil (or Abaya) in Saudi Arabia and many parts of Iraq and to some extent in Egypt. The Muslim family is an extended family, normally embodying three or more generations within the same house. Generally speaking, the family ties are very strong although there are signs of gradual weakening.

The Social Pattern

The Bedouin -
The clan organization is the basic unit of the Bedouin society. Every tent represents a family; an encampment of tents form a 'hayy' or quarter; a number of kindred clans make a tribe (qabilah). All members of the same tribe consider each other as of one blood.

The City Dwellers -
The social pattern in the Islamic city was directly influenced by the nomadic tribal way of life. When the Bedouin settled, they developed the quarter system. These quarters were relatively small homogeneous communities based on religion, nationality or occupation.

* In Iraq there are also some Fallaheen.
** In remote areas of Egypt some Fallaheen are veiled.
Environmental Influences

The desert life with its scarcity of water, scorching heat, trackless roads, glare and monotony had a great influence on the Bedouin. As a result when they settled down they tried by all means to substitute the shortage of the mentioned elements. In other words the continuity, monotony and aridity of the desert were the main objects to be changed in their cities.

Climate

Cairo and Baghdad -
Heat seems to be the dominant problem for the greater part of the year. Cairo and Baghdad have a long hot dry summer and a shorter cool winter. Summer often lasts about 7-8 months, from April to October, with a daily average of 6-9 hours of bright sunshine. During summer no rain may occur and even in winter occasional flash rains may occur. The sky is often dark blue.

The mean max and mean min temperatures are about (Cairo - 33°C, 12.3°C) and (Baghdad - 35°C, 14°C), respectively. The relative humidity in both Cairo and Baghdad varies from 10% - 55%.

Jiddah -
Heat together with the high relative humidity appears to be the main climatic discomfort at Jiddah. Air temperature is higher than Cairo or Baghdad. The mean max is 37.8°C while the mean min is 18.8°C. Rainfall and relative humidity are also higher than Cairo and Baghdad. The relative humidity varies between 75% and 80%.

The Residential House

The study of the residential house shows that in Cairo and Baghdad there is a tendency to arrange the house around a central space (courtyard), e.g. Fustat excavation, Cairo and the Ukhaidir Palace and the Balkwārā Palace in Iraq. In this respect Jiddah houses exhibit a lack of the courtyard which may be due to climatic, social or aesthetic reasons. The study also shows that the latter seems to be influenced by both local usage stemming from Mecca in terms of the house plan, building facade and social usage, and a more diffuse one, stemming from external sources namely Sudan, Yemen and Egypt.
This part is ended by a detailed study of the joinery work. It shows the clever use of the different kinds of wood in the form of furniture, bay windows and window screens (Mushrabiyyah). Finally, a detailed study is made of the latter analysing the challenges facing the Mushrabiyyah when exposed to the sun and the way traditional people managed to solve it.
CHAPTER 3

ANALYTICAL STUDY OF THE ISLAMIC CITY
Introduction

The second chapter reveals that the three cities under study bear a close similarity in terms of social structure, life style, city architecture and planning concepts. Accordingly I chose to analyse part of one of the three cities, old Cairo, which has not suffered a great deal of modern surgery.

Classification of the Islamic Arab Cities

The Islamic Arab city evolved from one of the following categories:

3.1.0 Islamic cities of pre-Islamic foundation

Such cities were usually ceded in war, and continued to grow after occupation by Muslim forces. The earlier model was adapted to accommodate peculiar Islamic demands, in particular religious ones (Hourani and Stern, 1970).

Jerusalem, for example, consisted of Islamic flesh upon a pre-Islamic skeleton. It still preserves, in some parts, Islamic architecture elements on Roman street patterns (Lebon, 1970).

Another example is Aleppo, as Sauvaget (1961) showed in his research – it still presents the Hellenistic street plan, and the principal mosque was built upon the Agora.

3.2.0 New Islamic Cities

Those cities were entirely new creations. Their location, planning and architectural design were pure Islamic. Examples of this category are: Askher, Al-Qata‘ā‘i, Al Quahira in Egypt, the old city of Jiddah, Saudi Arabia, Mosul and Baghdad* in Iraq.

In all cases the Islamic religion played a direct role in shaping both city plan and social life. The Qur'ān contains many indirect references concerning city dimensions and social life. It also contains some direct terms, as for example, Umm-al-qurā (metropolis), hadira (emporium), madina (city) and so on.

* Actually Baghdad was first erected on pre-Islamic patterns, but later on the Mongol destroyed it and a new pure Islamic city was established.
Nowadays most of the recent researches, especially in Germany (Ismail, 1969) and France (Sauvaget, 1961), usually classify the Islamic cities under two main titles or groups—spontaneous and created cities. This classification is open to the criticism that, although the title 'spontaneous' and 'created' sound attractive, there is actually no shred of evidence to support it.

In fact, all but one Islamic Arab cities were organic in that they were spontaneously created. The exception was the circular city of Baghdad; of course a special category should not be made on the basis of one extraordinary example. Furthermore, the round city of Baghdad was mainly constructed as a government city (Al-Amid, 1967). It was designed in such a manner that consideration of the ruler's personal safety was the main purpose. Again because its design was unfamiliar it had disappeared less than two centuries later, and the traditional or the organic pattern replaced it.

Before leaving that point I would like to explain a very common phenomenon concerning capital cities in the Islamic Arab world. It was a general custom that most of the Caliphs or rulers used to build themselves a new capital city on attaining the throne (Dodwell, 1931). Examples are Fustat by Amr Ibn-el-As, 641; Al-Askher, founded by Al-Salh Ibn 'Aly, 751; and Al-Qata 'Di, founded by Ibn-Tūlūn, 870; finally, the last one was replaced by al-Quahira or Cairo in 969.

In Iraq also, Samarrā was replaced by the Round City, and the Round City was replaced by Baghdad.

In all cases the new governor used to choose a site some distance away from the existing capital for his new city and transfer the seat of government to it. Sometimes the new creation survives; more often, however, it remains half-completed and perishes after a few generations because his successor has built yet another capital city.

Thus in the course of centuries the capital moved physically and even changed its name. That phenomenon may be related to the following aspects: (a) every ruler had his own point of view about the location
of his capital, or it may be due to the superstitious influences such as living in earlier cities or buildings will bring bad luck, which was also associated with the sense of death; (b) the Ancient Egyptians were used to the love of change. We can find support in the fact that they changed their religion to Christianity after the visit of the Holy Family to Egypt. Once again, it happened that they changed to the new religion - Islam (Ibrahim, 1976). They also changed their language from Pharaonic to Coptic and finally to Arabic.

The same phenomenon can be supported during the same period from a document derived from the third millennium BC, which declared that one of the attributes of the ancient Egyptian God, Ptah, that he founded cities - which was the special, and all but universal, function of kings (Mumford, 1961).

3.3.0 The Traditional Islamic Arab City

Before the modern era of adaptation and expansion most of the Islamic Arab cities possessed common features of town planning, architectural design and social structure.

These features seem to be the outcome of needs, religion, climate, economy and the aesthetic principles of Muslim society.

3.4.0 Geographical Setting and Landscape Influence

There is a closer relationship between Islam and its geographical setting than that of any other of the great monotheistic religions. The general map of the distribution of Muslims through the world reveals a pattern which coincides extensively, at least in its principal features, with the arid zones of the old world (Fourmont, 1823). From the Atlantic to Central Asia, Islam found its primary field of expansion in and around the great deserts. There is only one exception: those additional areas which spread all round the Indian Ocean, on the eastern shores of Africa, the coasts of South India, and especially in Bangladesh and Indonesia.
The coincidence of climatic zone and religion is the more remarkable in comparison with the universal spread of Christianity, which was born in an environment rather of the Mediterranean than of the desert.

How are we to explain such a common geographical restriction of this religion? The answer to such a question is still a mystery. On the other hand, what effect has this restriction on Muslem life and cities? Briefly speaking, a great part of the landscape is barren, of a single dull colour and usually devoid of any striking feature. It is also characterised by flat site, open deserts and infinite vistas in which fierce sun, dust and hot wind punish man.

In turn their cities were mostly characterised by the following features from the natural setting point of view:

(a) The organic compact planning replacing the infinite vistas and loneliness of the desert;

(b) Countless landmarks and points of orientations such as minarets, domes, to substitute the confusion of their previous environment;

(c) The great shortage and the importance of water and plants in the desert made them very keen to introduce such elements wherever it was possible;

(d) Because the lines of approach to most of the buildings were not dictated by natural topography, i.e. the possibility of approaching them from any side, made the designer keener to design the four facades of them.

3.5.0 Contents and General Arrangement

At the heart of the city was the Friday mosque*. Behind or attached to it there was a school (Medrassa) where students were taught Islamic theology and many other subjects. Close by was the most important 'suq' or bazaar, in which trades and crafts were segregated. Around the bazaar there were some Khans and Wikallas to accommodate visitor traders.

* It seems that the most spiritual elements used to occupy the city centre centuries before Islam. According to Childe, V., 'Man makes himself', London, 1936, Shrines occupied the central places in Mesopotamia and Egypt.
The residential quarters were located away from the 'mqq' or on either side of the main streets. These quarters were generally composed of two-storeyed houses of different heights and sizes surrounding interior courtyards. These residential units were entered as a rule from the street through staggered entrances to the courtyard. From the upper floor usually a Mushrabiyyah protruded. Each quarter usually contained public baths, saint's tomb, public fountain, local bazaar and crafts and sometimes a hospital.

Away from the heart of the city there was a huge castle in which the governor lived. Finally, the city was surrounded by a strong wall for security and defence.

3.6.0 Architecture and Planning Character

The following are the main features of the traditional Arab city:

- Buildings are 'earth-bound' and entirely horizontal in conception. In both religious and civil architecture the height is much less than the building length. This horizontal effect emphasises the perpendicular minarets and domes of the mosques (Fig. 3.1) which form the plastic skyline of the city, emphasising the predominance of Islam also.

- Building mass as a rule is dominant rather than space; consequently mass controlled architectural space and enclosed it (Fig. 3.2).

- The heart of the city was the mosque - not set apart from the ordinary life but integrated into it (Fig. 3.3) - meanwhile the city pattern developed outwards from the residential unit.

3.6.1 Street Character

Islam has never designed the street mainly for vehicles, but mostly for pedestrians. This restriction of space for public traffic contrasts with the importance of the space devoted to family life.

Generally speaking streets were characterized by both simplicity and unlimited variety. Variety to the average eye and deep artistic and
The perpendicular minarets and domes form the plastic skyline of the city, emphasizing the predominance of Islam.
Building Mass is dominant rather than space
FIG. 3.3  At the heart of the city was the Mosque, not set apart but integrated into it.
aesthetical pleasure to the trained eye at the same time. They are immediate, tangible and personal. They are also full of sights and sounds.

3.6.2 Street Focal Points

Each section of a street is usually arranged around a focal point, i.e. a mosque, palace, public bath or fountain which helps people to orientate themselves and gives a certain character to the area.

3.6.3 Street Layout

The street layout is characterized by organic compact planning, narrow winding paths and cul-de-sacs. The longest straight section of any main street does not exceed 200 metres and is very much less in side streets. So narrow are they that projecting upper storeys of opposite houses nearly meet in the middle (Fig. 3.4).

3.7.0 Quarters

One important feature of the Islamic city is the neighbourhood unit, quarter (Cairo), Hara (Jiddah), Mahallah (Baghdad). In a sense the city was a collection of little cities each with its homogeneous population formed naturally out of common ties of religion, occupation or origin but never according to level of income. The most interesting point is that as the city grew quarters also increased, but never dissolved into the mass.

Contemporary:

It is true enough that nearly all the Islamic cities were not wholly an achievement of one era but a combination of different periods. In spite of this fact the design concept is honest and contemporary to its own time, whereas the whole combination is harmonious. This is an important wisdom we can learn from our old cities.

3.8.0 Movement and Accessibility

Life style may prove to be one of the main aspects influencing the organisation of the city through specific ways in which areas are
organised. While all urban settings have organisation of space, the principles of this organisation differ so that while the U.S.A. cities maximize movement and accessibility (Fig. 3.5(a)) traditional Muslim cities limit movement and control behaviour by controlling mobility, i.e. each quarter has its own doorway and porter in addition to the street pattern and the quarter's small physical dimensions (Fig. 3.5(b)).

3.9.0 The suq - Bazaar

In the immediate neighbourhood of the mosque stands the commercial quarter, the suq or bazaar. Normally it contains the public bath, which Islam adopted in view of their usefulness for ablution. The arrangement of the bazaar usually follows an order which places the noblest of them nearest to the main mosque, i.e. trade and crafts were classified in hierarchical order based on the location of the great mosque. In general terms the Islamic suq is a highly specialized commercial centre. Each section of the suq provides the city with a specific commodity group.

3.10.0 Space

The Arabs' long struggle with the desert made them more serious in treating space. They used to feel overwhelmed, lonesome and unprotected. The desert taught them to move in the direction of shelter and kindred. So when they settled they tried to determine space in such a way to produce an effect of variety, security, tangibility and containment. The following study aims to show the most important spaces in the city.

Variety of Space Designs

3.10.1 Main Space

I believe that the city plan cannot be adequately described in terms of its two dimensional pattern; for it is only in the third dimension through movement in space; this holds particularly for the Islamic city, for the movement it usually generates leads not merely through horizontal space, but upwards. The disposition of the Friday Mosque is a good example. If one building may be taken as a key structure

* For further details see Section 3.16.1(a) and (b).
FIG. 3.5(a) General access and maximum possible mobility (U.S.A.)

FIG. 3.5(b) Controlled access and limited mobility (Muslim City)
in the Islamic city, it will be the mosque. But when urban 'improvers' who were incapable of appreciating the Islamic space design, removed the smaller structures that crowded around many of the great mosques, like Al Azhar Mosque (Fig. 3.6) to create a wide car park, by such surgery they undermined the very essence of the design approach. The secrecy and the surprise, the sudden opening and the immediate visual impact upwards, the richness of carved detail, was meant to be viewed from a close distance. Judging from the size of many new urban spaces made by the same 'improvers', it is obvious that there is still great confusion between the relative importance of floor area and the volumes lining them. They seem to realise that the larger the square the more impressive it is, regardless of the very critical relationship between the three dimensions (Fig. 3.7). But what should the size be?

In this connection Sitte (1961) says that:

"the problem is, of course, one of the relationship of height to width of the volume, and of the architectural character of the building".

(p13)

According to Sitte the minimum dimension of the square ought to be equal to the height of the principal building in that space or the open square. The maximum dimension, he said:

"ought not to exceed twice that height, unless the form, the purpose, and the design of the building, will support greater dimensions".

(p13)

More specifically Hegemann and Petts (1952) noted that in order to see a building as a whole, the observer should be separated from it by a distance equal to about twice its height, which means that it should be seen at an angle of 27 degrees, and if the observer wants to see more than just one building, he should see it at an angle of about 18 degrees, a distance of three times its height. According to my site survey in Cairo, which was carried out in May 1977, concerning the relationship between the height of a building to the floor area in front whatever it is, a square or a street, I found that results are completely different from both Sitte and Petts' theories.
Fig. 3.7  ARDEN SQUARE
But what I actually realised is that space proportions are a result of other considerations than a physical distance or dimension. To the traditional designers space treatment was, I suppose, the outcome of an organic combination of climate, social, symbolic and aesthetic values.

Actually, traditional people never aimed to view their buildings in full perspective or as a whole. It seems that they preferred to be visualized as a part of a complete panorama. Hypothetically speaking, if we tried to practise the above-mentioned theories in the Islamic city aiming to make only the important public buildings, mosques, public baths, schools, saints' tombs, to be seen as a whole, the result will be an increase of the city area about four to eight times its original size. In addition, the social and human dimensions will disappear together with the amount of shaded areas.

In short, the site survey reveals that there is no specific order or fixed relationship between buildings and external spaces in terms of proportion in the Islamic city, which was not just a heterogeneous conglomeration of buildings arranged according to rigid physical pattern, but it seems to be concerned with the relation of the parts to each other and to the whole. So there is a continuity between buildings, streets and spaces.

3.10.2 Symbolic Space

Throughout the history, man seeks a fitting and final resting place for those whom he has loved. Qalāʿūn's tomb mosque (1284-5) Cairo, may be one of the best examples (Fig. 3.8) of buildings designed to achieve such an aim.

It is a good example to show the relationship between the building function and space design.

The interior is generally characterised by the overwhelming scale that transcends normal human experience and submerges one in a vast well of space. A volume so contrived as to hold man transfixed on a broad base plane and lifts his eye and mind high along the vertical. As
FIG. 3.8 Qala'un's Tomb Mosque
for the exterior, the structure proportions usually raise the eye to heaven, the masses rose over all the surroundings.

3.10.3 Residential Space*

On the contrary the residential space is mainly characterised by human scale - free spaces and visual rhythms expressed in the structure. Privacy and lack of restrictions together with a great integration with natural open space of the garden and the courtyard made the space intimate, apparent and tangible.

3.10.4 Commercial Space

The space configuration of the bazaar, however, usually appears like a maze and confusing because of the winding streets, alleys and cul-de-sacs, together with the few apparent street perspectives. For many reasons the designer aimed to make it so, meanwhile for its inhabitants the situation was completely different. Each part was well known. To them it was designed in such a manner to give the sense of containment, security, amusement and close social contact.

Water Supply and Sanitation

3.11.0 Water Supply

Before studying the Islamic city from the hygiene aspects I would like to mention that Islamic influences appear once again to stamp the physical structure of the city. Because Islam demands ablution before prayer one can realise the widespread need of water supply and public baths. As for water supply for drinking, it used to be from the river or wells, and usually stored in individual reservoirs. Pack animals with skins of water would keep these tanks filled. From the same sources water carriers using donkeys or their own backs used to fulfil the needs of houses, shops, baths and public fountains. Within the domestic complex, distinction had been made between water for cleaning and cooking and that for drinking (Makrizy, 1853).

* Residential space is discussed in full detail in Chapter 6.
3.12.0 Sanitation

On the question of sanitation, the Fustat excavations, Cairo, carried out by Bahgat and Gabriel (1940), reveals that there was a complete sanitation system. They used to dig out covered canals which ran beneath walls, floors and courtyards to cesspools (Fig. 3.9). The system usually ended at al-Mugattam hills or at separate individual trenches but never to or near the river.

Today the disposal of ordure has always been a big problem in most Arab countries, including Egypt. Even many developed countries have not yet shown sufficient technical resourcefulness in dealing with this problem. Now we rely upon the flush toilet which pollutes the Nile and wastes the precious nitrogenous materials that might have enriched the soil. In contrast, during mediaeval times, cultivated land and gardens took advantage of the city's disposals. Thus the city became clean and the land became more fertile.

Another problem facing us now is the non-edible waste which is doubtless more difficult to dispose of. But certainly there was far less of this than in our modern civilized cities; for tins, iron, broken glass, bottles and paper were scarce or even non-existent. Their refuse was mainly organic matter which decomposed and mingled with the earth (Mumford, 1961).

Concerning their refuse, how did they manage to solve it? The answer, I think, was like any other solution, i.e. by natural ways; by fire. The best advantage of such a device is that it subjected the whole streets and even the quarter to the most powerful disinfectants.

Another important matter closely connected with hygiene remains to be discussed: the public bath or Hammam. As early as the beginning of Islam, and even before, the public and private bath was common in the three cities without exception. But if anything is needed to establish the Islamic city attitude towards cleanliness, the prevalence of the public bath should be sufficient. They were mainly for sweating and steaming, for almost antiseptic cleanliness. In short, the public bath was a semi-medical resort and a social club.
FIG. 3.9 Fustat Excavations, Cairo.
Sanitation System.
Extension and Dimensions of the City

Many people think of the Islamic life as sluggish and the city as static. But though the tempo was different from that of the twentieth century, whose dynamism is often disruptive and self-defeating, the Islamic city was a period of dynamic order.

But how did the Islamic city accommodate its increasing population? And what, if any, were the limits of its growth?

Actually, the limits that originally defined the physical city was the surrounding wall. But as long as it was a simple mud dry brick the wall was no real obstruction to the city extension; technically, it was a simple matter to tear down some parts of the wall and extend the city's boundaries to provide larger inner space (Creswell, 1952-59).

So as the quarters spread, the wall usually engirdled them. This was common practice in the growing city, up to the first decades of the twentieth century. Of the dimensions of the city, no Islamic city often extended more than three km from the centre. So, every necessary institution, every friend, relative, associate was, in effect, a close neighbour, within easy walking distance. So one was bound every day to encounter many people by coincidence, whom one could not meet except by pre-arrangement and effort in a bigger city. In this connection Le Corbusier (1947) said: 'a city made for access is made for success'.

But when these limits were overpassed, the Islamic city as a functioning organism composed of separate units joined in a system, a certain breakdown happened.

Economical Values of the Compact Planning

Generally speaking, building was prosecuted with a ready expenditure of energy and constructive zeal for which there are few modern parallels outside the reconstruction of devastated areas. The most important thing is that this vast movement was not governed by the covetousness
of the modern real estate speculator, seeking quick and inordinate gains. Even for investment, human aspects were of more concern than profits.

So the general economic pattern was radically different from the period of concentration and consolidation around great political capitals, which immediately replaced it.

The Islamic pattern was that of many quarters or small cities in active association with each other and with their neighbours. Its urban pattern conformed to the economic one and both favoured the small unit and direct face-to-face communication.

So one of the most economic goals of the organic compact planning was to bring together many people so that, through direct communication with each other they may exchange goods and ideas without undue loss of energy and time.

The same compact planning reduced the cost of all kinds of services, public and private transport, and raised the whole working efficiency of the city.

If we consider for a moment how many mechanised vehicles are put on the road by every single residence in the so-called 'spread settlements' we will never think about it. For example in the U.S.A. it has been reported that 'in the spread settlements beside the two or more cars of each family, there are the vehicles used by the cleaner, the laundress, the post man, the newspaper man, the milkman, the gardener, the plumber, the electrician, the men who read the gas and electricity meters, the television repair man, the tax assessor, the visitors, etc. In this connection it is interesting to note that the yearly fee for parking of the student's car, at the University of California in Los Angeles, is higher than the tuition' (Gruen, 1965). In other words, storage space for the jalopy costs more than the training of the mind.

From the climatic point of view, buildings protected one another from
the heat of the sun and also shaded pedestrians' paths which in turn reduced glare.

Thus if we can evolve the organic principles to accommodate our modern challenges we will reduce to a large extent our reliance on all means of public and private transportation, a great reduction of traffic noise will be available, and our environment will be clean from pollution. All these advantages are very easy to be achieved through a good and simple understanding of the historical heritage of compact planning.

3.15.0 Aesthetic Aspects of the City

We cannot leave the Islamic city without asking a final question about its planning: how far was it pursued as a conscious effort to achieve order and beauty?

I think that the aesthetic unity of the city was not achieved without effort, struggle, supervision and control. No doubt most of the supervision was personal; most of the agreements probably came from face-to-face contacts and discussions which left no record behind.

It is obvious that much of its beauty is due to its organic order which was pliant enough to allow for the new, the spontaneous, the different.

This was a mode of planning that met the requirements of life, and yielded to change and innovation without being shattered by it. In the deepest sense of the words it was both functional and purposeful.

Again, under the organic order together with the unified social structure no-one was tempted to deny either the old designs that still served well, or the new form that represented a new purpose. Unlike present-day designers, i.e. wiping out buildings of different periods and styles in order to make them over wholesale into the fashionable stereotype of the passing moment, the Islamic designer worked the old and the new into an ever richer pattern.

Travellers used to say that there was perfume in the courtyard gardens and in many cases the back garden — for fragrant flowers and herbs were
widely cultivated. There were also the odour of flowering orchards in the spring, or the scent of the new-mown grain, floating across the nearby field in early summer (Montule, 1821). They also mentioned that there were bad smells, such as cow, donkey, horse dung and sometimes, according to Makrizi (1853), rankness and fragrance. But, I think, the bad smells of the old city cannot be compared to our reek of gasolene exhaust, the sour smell of a bus crowd, the pervasive odour of a garbage dump, the sulphurous fumes of a chemical works, or the carbolated rankness of any public lavatory. Again, these bad smells are better than, at least, the chlorinated exudation from a glass of drinking water.

(a) Sounds

As for the city sounds, it has been noted that one awoke to the crowing of a cock, the chirping of birds or the calling for prayer 'Adaan' from the mosque – announcing the beginning of a new day or the opening of the market.

In the daily routine there were work songs, distinct for each craft, often composed to the rhythmic tapping or hammering or swaying of the craftsman himself.

Everywhere nature's noises mingled with man's. As a rule at night there was complete silence, but for the stirring of animals and the calling of the quarter porter. That seems to suggest that deep sleep was possible, immune from the ulcerating tensions of either human or mechanical noises.

(b) Sights

If the ear was stirred, the eye was even more deeply delighted. Actually every part of the city, beginning with the city walls, to the residential house was conceived and executed as a work of art – even parts which might be unseen, were finished as carefully as if they were fully visible (Fig. 3.10). In this connection the Qur'an noted that God, at least, would bear witness of the craftsman's faith and joy.
To them, the aesthetic discipline might lack a name, for it was never separated from religious symbolism.

Also the suq or the bazaar was another expression of the same aesthetic spirit. The array of goods in the market added to the general visual excitement. Each single item in the market was closely related to them; unlike our new civilization with its plastic-coated automation of the American style supermarket, with its ghastly fluorescent lighting, its meretricious packaging, its poisonous forms of preservatives, its frozen and flavourless foods, presents a contrast that betrays both an aesthetic and physiological as well as a social loss. Not only the interior of each shop has been influenced by foreign styles but even the outside.

Historically, some shops were famous because of honesty, readiness, and their best wares, and not because they have Greek cornices over their windows, or their names in huge gilt letters on their shop front. Such strange devices changed the whole shopping area's flavour which used to be an expression of locality and personality. From the economical point of view, huge amounts of money are spent through the use of exotic decoration, gaudy colours, grotesque adornments and the indiscriminate borrowing of styles and names from the most popular places of the world. This is now the case in Cairo, Baghdad and Jiddah.

How much happier, how much wiser, to put their trust upon their own truth and goods and not on the idiocy of the consumer (Ruskin, 1949).

3.16.0 The Philosophy of the City

3.16.1 Unity in Diversity

One of the most essential features of the Qur’an and Shari’ah* is that it is an organic whole. The entire scheme of life propounded by Islam is animated by the same spirit and hence any arbitrary division

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* The Qur’an and the message form a code of life called the Shari'ah.
of the scheme is bound to harm the whole spirit as well as the structure of Islamic order. In this respect it might be compared to the human body which is an organic whole. A leg pulled out of the body cannot be called one-eighth or one sixth of the man, because after its separation it can no more perform its human functions. Likewise, we cannot form a correct opinion about the utility, efficiency and beauty of the hand, the eye and nose of a human being separately, without judging its place and function within the whole, i.e. the living body.

Consequently, neither can it be appropriate to view the different parts of the Qur'an and Shari'ah in isolation from one another and without regard to the whole, nor will it be of any use to take any particular part alone.

This would seem to indicate that the Muslim's long experience with the way of understanding the Qur'an and the Shari'ah made him look and think in a very comprehensive and organic way.

Architecturally speaking, he learned to look at the different, separate aspects as a whole and not individually.

The most realistic example of such philosophy is the city design. Its different elements act as a football team playing all together at the same time towards the same goal. That phenomenon is what we call organic planning, which does not begin with a preconceived goal; it moves from need to need, from opportunity to opportunity, in a series of adaptations that themselves become increasingly coherent and purposeful. Every new building was fitted into the site like a piece of stone into a mosaic pattern.

In this organic manner the Islamic city was formed into a complexity of spatial effects. That effect was partly due to the fact that there were no theories to hamper the work or limit their imagination. Only by trial and error, together with natural intuitive sensing, did they fulfil their target.

In short, the organic Islamic city seems to have two main advantages:
Firstly — Functionally

Its free arrangement made any desired change available without impairing the total harmony. In other words, its flexibility and adaptability enable the designer to cope with the changing needs. So I believe that all scientific consideration of organic designs must start from this point, i.e. organic forms develop as demands change.

Another functional feature is apparent when we compare modern and old designs of a specific function such as a residential house plan.

By looking from a wide angle we will realise that the modern house cannot functionally serve more than one goal, or at most two; while the traditional house, which was usually a quadruple arrangement around a central courtyard, served not only as a residential unit but also as a mosque, school, palace, caravanserai, hospital and khan (inn). All these functions were practised by changing only the proportions of the different elements and not the main skeleton (Fig. 3.11)

Secondly — Aesthetically

Equilibrium: The organic form of the Islamic city was the outcome of many relationships such as social, climatic, religion, culture and economic aspects; these aspects will be examined later. So it was the result of interaction of many different forces; the wholeness of the form indicates that this result achieves an equilibrium. The internal tensions are balanced against one another into a stable configuration — or rather nearly balanced, since the configuration is destined slowly to change as development proceeds.

Rhythm and Pattern: The historical pattern does not make up a rigidly definable pattern, but rather a rhythm, in the sense of Whitehead (1925) who wrote:

"A rhythm involves a pattern, and to the extent is always self-identical. But no rhythm can be a mere pattern; for the rhythmic quality depends equally upon the differences involved in each exhibition of the pattern. The essence of rhythm is the fusion of sameness and novelty, so that the whole never loses the essential unity of the pattern, while the parts exhibit the contrast arising from the novelty of their detail".
CHAPTER 4

ANALYTICAL STUDY OF THE ISLAMIC QUARTER
That theory or phenomenon is strongly felt from the city layout. For example, each of the three cities under study grew out of a unique situation, presenting a unique constellation of forces and produced, in plan, a unique solution. Meanwhile the consensus is complete as to the purposes of city life that the variations in detail only confirm the pattern. That consensus makes it look, when one views the three plans in succession, as if there were, in fact, a conscious theory that guided this planning.

Relationship between Material and Spiritual Aspects of the City

To the Muslem, a city in the first stage was a settlement in which his religious duties could be completely fulfilled.

The mosque is the spiritual centre in which religious, intellectual, social and political aspects were practised.

Next to it was the market place or the bazaar which represents the material one. So it is obvious that in the Muslem city the spiritual and the material centres tend to occupy the same central area. The following brief study aims to show how the two elements were balanced.

(a) The Psychological Balance

The psychological balance between the two opposing elements was well established by the following few simple words from the Qur'an:

- Plan and think for your life as if you will live forever;
- and plan and think for your after life as if you will die tomorrow.

While the first quotation deals with the material life, the second deals with the spiritual one. Meanwhile both principles can easily work in parallel without any kind of conflict.

(b) The Visual Balance

The planner seems to realise that the location of the two elements will present another visual problem between the most powerful and respectful atmosphere of the mosque and the noisy one of the bazaar. So he tried to solve that problem by the sensitive classification of
the different spaces close to the mosque up to the city gates. This hierarchical order was based on the location of the great mosque.

i) **Space attached to the mosque:** Space attached to the main mosque was usually occupied by a holy man's tomb, or a school and a public fountain.

ii) **Space in front of the mosque:** Such space used to be small and in many cases left empty to serve as an outdoor extension which mainly was used during religious festivals.

iii) **Space close to the mosque:** This space usually embodies some sort of shops selling materials related to religion. These are mainly religious books, articles, dealers in incense, prayer rugs, candles, imported perfumes from the Holy Land, and book binders. Following this group are dress makers and food stores.

iv) **Far from the mosque:** This area used to be occupied by workers in wood and metal, the blacksmith, the potter, the basket worker and saddler. So the sellers of different goods were rigidly ranked, separated and located following an order which placed the noblest of them nearest the main mosque. Such order seems to achieve some sort of visual and acoustic balance.

(c) **Architectural Balance**

In spite of the fact that two contradicting focal points used to be close to each other, architecturally they were designed to give a sense of balance. That balance was mainly achieved by their individuality and unity at the same time.

Individuality is apparent from the obviously different proportions of the huge religious structure in relation to the bazaar. Individuality is also felt from the different space configuration of each of them. Meanwhile unity is also realised by the use of the same building materials, architectural form and details in both of them.

3.16.2 **Equilibrium with Nature**

Another remarkable feature of the teaching of Islam, as reflected in
its traditions, sciences and philosophy, is harmony with nature. Muslims realised that in the search for principles, in order to approach any sort of solution from the right angle, they have to go down to the well of creative inspiration, i.e. nature.

Traditional Muslim people would tell us that they have a deep relationship with nature. They tried to make nature a part of their daily life. For example, they introduced into their house fountains, both inside and outside. Furthermore, nearly all their furniture, decorative elements, window screens and pots were representing nature and made of natural materials. They were shaped and finished to reveal the highest natural quality of the material.

In this connection the Qur'an pointed out that there are endless lessons to be learned from nature which are valid at any time and under any circumstances. In the Qur'an, it is mentioned that one of these examples is the natural environment created by bees with its sophisticated ventilation, air conditioning and defense system.

So from the Qur'an and such material lessons in nature the Moslem found the answer to nearly all their problems. Nature seemed to them as life and health whereas any other source meant sickness and death. They were sure that nature was ready to help them in their efforts, simply because they used to speak its language and act parallel to and not against its laws. As a result their cities lasted for centuries and ageing adds to their beauty rather than making them less attractive. Not only has the patina of time brought softness to the general colour scheme in the city, but it has also proved many economical aspects.

To that extent one cannot realise if ageing in nature is a slow process or they made it slow. Of course ageing has a constant influence on historical and modern buildings, but in the mediaeval case they were more practical and sensitive in choosing the most convenient materials in terms of durability and surface colours.

3.17.0 Summary

This chapter describes the most remarkable features of the Islamic
Arab City up to the late 19th century. It lays the foundation for the structuring of a physical hierarchy governing the location of the different elements in the city. The central space is often occupied by the mosque - not set apart from the ordinary life but integrated into it. In its immediate neighbourhood come the bazaar, inns (khans - a combination of warehouse and hotel), and the public bath. In short, Islam strongly influenced the physical pattern of the city.

As for the dominant features and design aspects of the Islamic city they can be summarized as follows:

a. As a rule, building mass is dominant rather than space. Consequently mass has controlled architectural space and enclosed it.

b. The Islamic city is primarily a pedestrian city.

c. The city is a collection of small cities each with its homogeneous population formed naturally out of common ties with religion, occupation or origin but never according to level of income. Such social harmony and religious beliefs led to high consideration and respect from one person to another. This perhaps encouraged them to introduce personal and social privacy in the house for each member, in the street for each family, and in the quarter for a group of families. All this happened through unwritten regulations and social agreement. As a result any kind of problems were solved as they occurred.

d. As the city grew, quarters also increased, but never dissolved into the mass.

e. Muslim cities limit movement and control behaviour by controlling mobility.

f. In spite of the fact that the Islamic cities were not wholly an achievement of one era, but rather a combination of achievements from different periods and architectural styles, the whole combination does achieve harmony. This consistency could never have been achieved without tradition, nor without a sane and natural response to the local environment.

The different buildings of the city exhibit a great variety of spatial
designs, each of which is the outcome of the building function and the convivial atmosphere. Qalaw-un tomb mosque, Cairo, is a good example of symbolic space. Meanwhile the commercial space or bazaar reflects a strong sense of containment, amusement and close social contacts, while the residential space is mainly characterised by the human scale, i.e. in designing any space, the purpose or purposes of each element was clear. Which is dominant – the space, building, or those who use them? Thus, because of the great mixture of functions in the city or even the one quarter, the result was a great variety of space proportions within the same area.

Everything is surprising, attracting, diverting, winding, expanding and dynamic. How different are the spatial requirements of a mosque or cemetary from the bazaar or the residential building? The first has to be monumental, spacious, designed in such proportions to give the essential atmosphere required. On the other hand the bazaar and the residential space have to be conceived in another scale. Actually, it is a very difficult task to design such different spaces into a homogeneous relationship.

The study also brings to light the fact that the traditional Arab people insisted on compact planning for many environmental and psychological reasons. The same planning concept reduces the cost of all kinds of services, public and private transport, air pollution, noise, and raises the whole efficiency of the city.

It has also been found from the Fustat excavations, Cairo, that there was a complete sanitation and water supply systems. So the Islamic city has been an urban city since the first decades of Islam.

As for the philosophy of the Islamic city the Qur'an seems to be the main source of inspiration.

Firstly: the Qur'an pointed out that there are endless lessons to be learned from nature which are valid at any time and under any circumstances. By practising such understanding, traditional architects took the natural patterns, and as a result their buildings have lasted for centuries, and age adds to their beauty.
Secondly: the only way of understanding the Qur'an is to realise its contents with a sense of wholeness. So Muslim people learned how to look at the different problems from a wide viewpoint.

Thirdly: the Qur'an emphasized that all human beings are equal. This fact was practised in the traditional city in terms of its social structure where there was no dominance of man over man.

Fourthly: the Qur'an also advised us to live in harmony with nature. As a result we cannot find any trace of the dominance of man over nature in our sense of the word.
CHAPTER 4

ANALYTICAL STUDY OF THE ISLAMIC QUARTER
4.1.0 The Muslem Quarter

It is obvious that the Islamic city, from the very beginning, was divided or made up of many small quarters. Such quarters used to be wherever the Islamic city was found. Even today some Muslim cities still retain the same characteristic, although the pattern is not as clear as during the mediaeval times. North Afghanistan is a good example where each group has separate quarters (Samizay, 1974). Nigeria and India also had many quarters for different groups, until now. This can indicate that the quarter system is largely accepted all over the Islamic world.

4.2.0 Analytical Study of the Social Structure of the Quarter

The quarter in simple terms is a group of people usually unified by ethnic, occupational characteristics, religion and in many cases by their national origin. Each quarter has its own elected leadership. Some quarters were named after their market or craft.

Quarters on the main roads outside the gates often specialised in caravanning, transport, animal and grain marketing and dealt with services for Bedouins and peasants (Lapidus, 1967).

In both cases quarters were evidently built around families or clans, and from the law codes which I have mentioned (see 2.3.9 and 2.3.10), we can see that the Muslem family was a gigantic clan extending over generations under the leadership of its oldest members. The family was a primary locus of allegiance and responsibility. It was the basic agency for mutual aid and protection, the teaching of religion to the young, the management of private property and the regulation of social intercourse in the community.

But how such families were related and unified into a homogeneous quarter remains a mystery. We may speculate that extended kinship, and religious ties were one means. Ulama* and elites were probably another. In both cases we may say that the planning pattern of the quarter was

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* Ulama are men who study religion in the Azhar University, Cairo.
intended somehow to promote a strong sense of community.

We may also say that quarters had been organised with the nucleus of a household of some important family surrounded by the residence of cadets, lower standard branches, and the families of retainers, servants, employees, disciples and so on. This hypothesis can find support on account of the Cairo riots of 1389, when the house of a judge (gadi), was attacked by pillagers and defended by his family, slaves and servants, and the inhabitants of the quarter (Muir, 1896). Al-Makrizy tells us that certain neighbourhoods were favoured by the wealthy because of their salubrity or proximity to the citadel and public affairs, and gave these quarters an 'upper' class character, but no class came to dominate a quarter (Makrizy, 1936).

It is also an axiom that economic, religious, and social life were not so differentiated from each other as to create the basis for many radical separations of classes. They were communities of both rich and poor (Young, 1927). Another feature of the Islamic social structure is the absence of any formal guilds, i.e. formal regulation and structure. But these were informal, i.e. informal structure and unwritten regulations, a special sort of economic association based on craft affiliation and thus capable of acting on behalf of the economic interests of its members.

The uniting bonds of the inhabitants outside the residential area was apparent because they shared a common station in life, daily experience, and business. The organisation of the markets which kept merchants and artisans of each trade together created informal ties. Another basis for solidarity existed in the attachment of workers to particular local mosques. The hundreds of small places of worship scattered throughout the quarters and markets made them vital centres of social and religious life (Zaky, 1933). Many mosques until now bore the name of the trade of their market.

In religious terms, objection was made to any groups or motions aimed to subdivide the wide unity of the people. That was the role of the Ulama.

The Role Played by the Ulama.

The Ulama were that part of the Muslim community learned in the literature
doctrines of Islam. They were judges, jurists, prayer leaders, scholars, teachers, readers of the Qur'an, reciters of tradition (Combe, 1930).

Their essential duty was to preserve the knowledge of the divine will, and to sustain the community as an Islamic community and give it religious and moral guidance. The Ulama however were an administrative and social as well as a religious elite. In Islam, as I mentioned earlier, religion manifests itself not only in theology, but in a divinely inspired law by which all civil affairs are ordered. Because of the extension of Muslim religious law to familial, commercial, educational and administrative concerns, the Ulama carried on the organisational as well as the spiritual tasks of the communal life. As administrators of the religious law, marriage, divorce, and guardianship were under their jurisdiction.

Meanwhile, the Ulama were not a distinct class, but a category of persons overlapping other classes and social divisions, permeating the whole of society. On the other hand the ties between the Ulama and the merchant class were also exceedingly close. Many Ulama were part-time merchants and earned part of their living from trade while many merchants were part-time scholars and teachers (Grunebaum, 1961).

Social Disadvantage of the Quarters.

Hostilities: While the quarter system seems to solve many of our contemporary problems, it also created some others. Mainly because its pattern and solidarity could lead to the encouragement of hostilities between the different quarters. For example, towards the end of the fifteenth century when the state was weak, Mameluk factions recruited some quarters and encouraged them to attack each other (Combe, 1930).

Prejudice: Another comment has to be maintained here, that some people argue that because the quarter was mainly based on its homogeneous character, it can increase prejudice against other groups (Stuart, 1955).

Theoretically, it is possible, but there appears to be little evidence made by historians to support such a hypothesis. Meanwhile the relationship between homogeneity, heterogeneity and prejudice is still unclear or simple. In this connection, Festinger (1950), says that:
"There is serious doubt that forced mixing would reduce prejudice, it may in fact increase it."

He also stated that:

"Homogeneous areas used to have lower delinquency and crime rates than heterogeneous areas, regardless of poverty."

(p 80)

4.3.0 Analytical Study of the Physical Structure of the Quarter

Now I will try to analyse the physical structure of the quarter aiming to find out the effect of its design on social interaction and behaviour. In other words, did the physical structure help or impede the social structure?

It is obvious that the physical structure and even the layout and space design of the quarter in the three cities is very much the same. Until the beginning of this century Baghdad was divided into 76 Mahallahs or quarters such as Adhamiya, Kadhimya, Karkh, Ruafah, Karradet Mariam and Karradat Alsarigiyah (Fig. 4.1)(Al-Ashab, 1974).

The old city of Jiddah, al-Medina al Kadimah, was first made up of three main quarters of Haras, namely al-Sham, al-Mazlum and al-Yemen. Later another six quarters were established, al-Amariyah Baghdadiyah, Saheifah, Sabeel, Harrat, Barah and Shatie. The third stage was the establishment of Kandarah, Buckariyah and Hindawiya (Pesce, 1974).

Al-Makrizy (1912) described thirty seven Harat or quarters of Old Cairo. Architecturally speaking, the quarter used to contain numerous public buildings, bazaar, as well as residential accommodation, but the basic element of the quarter is the dwelling, not just houses, but all kinds of sizes from the small flat to the big palace and khans. In the residential districts the streets were always very tortuous and narrow. Everywhere there are multitudinous projections from the houses, overhanging Mushrabiyyahs, covered lanes and bridges over the street proliferate, and in many places the cantilevers of opposite houses touch each other. Squares and open spaces are often rare.

Outside the residential area different elements are mixed up. Meanwhile
the shopping place was arranged in strict order.

The most essential social places are the big reception halls of large houses, the public bath and the bazaar. To those must be added the mosque which used to act as the main space for all kinds of activities.

The quarter was also capable of supporting many local services and handicrafts. Industry in fact had no place inside the residential areas but there was no objection against light and clean crafts (Muqaddasi, 1901). These are the most apparent features of the traditional quarter up to the end of the last century.

At the beginning of this century foreign influences together with the introduction of industry and the wide expansion of transportation weakened all aspects of locality and contemporary practice. The same period is witness to the creation of new modern quarters and modernisation of some old ones. All of these aspects and the new mass production gave a final blow of destruction to many crafts on which the majority of the people were dependent.

Nowadays few quarters still exist as a group of buildings and the atmosphere has been changed.

4.4.0 Main Elements of the Quarter

a) El-Harra

El-Harra is a crooked, narrow, through street. Its width varies between 2 and 5.5 metres while the length is variable. The portion of El-Harra between two intersecting streets often have between 12 - 30 buildings and an average of 100 families (Said, 1964).

b) Al-Attfa or cul-de-sac

It is often varying in width but an average between 2 and 4.5 metres is quite common. It seems to exist only in large blocks to provide an entrance to houses in the core of the block. The number of houses that look onto the Attfa varies between five and ten. That means it serves, on average, about thirty families.
c) El-Shārī'  
A Shārī' is a greater thoroughfare, although considerably varying in its width and direction. It is generally lined on each side with shops, which form a succession of markets and occupy part of the ground floor of the houses above.

d) A Great Street  
A Great Street is usually longer and wider than El-Shārī' and has no one general name by which it is distinguished from another Great Street, but many different names, each of which is assigned to a particular portion. Thus a part where a number of persons of the same trade have their shops is called the market of that trade, another part is called after a mosque there situated (Said, 1964).

e) Suq or Market  
The market is generally a portion of a Great Street with shops on each side. Some markets are appropriated to one trade, others to various trades. Some of the by-streets also, or part of them, are Suqs. Most of the principal Suqs of Cairo, Jiddah and Baghdad are roofed with wood extending from house to house across the street, or with mats, either at the top or immediately above the shops. Beside all the fixed bazaars there is also what is called the running or itinerary market of water carriers, coffeesellers, vegetables and fruits.

f) Khans - Wekālahs  
Khans and Wekālahs were buildings chiefly designed for the reception of merchants and their goods. There, they found lodging and store for their merchandise until such time as they could dispose of it. They consist of rows of stores surrounding a court (Fig. 4.2). The Khan or Wekālah is open to the street and is defended by a strong gate which was usually closed at night. This gateway was at the centre of the façade leading to the courtyard through a staggered entrance. The upper floor or floors were the living quarters, frequently served by outer galleries or balconies running all round the courtyard (Abdel-Fattah, 1962). Although size, number of storeys and proximity to the bazaar axis vary, the Khans of Baghdad have developed almost a uniform common shape, a rectangle (Fig. 4.3)(Ya'qubi, 1833).
FIG. 4.2: Wakalah Ẓānūh al-Chūrī, Cairo (1504-5)
FIG. 4.3

FIG. 4.4: Mur-Jan Khan, Baghdad.
Mur-Jan Khan at Baghdad (built in 1459) is of great historical and architectural importance. It is the only covered khan in Baghdad. Its plan is influenced by the Roman Basilica pattern. Lighting in the main vaulting is introduced by small windows (Fig. 4.4).

g) Public Bath or Hammam

'Cleanliness is a part of faith' — so runs a prophetic tradition that is still on every lip in Muslem lands. Baghdad according to al-Kahatib, boasted in the days of al-Muqtadir (908-32) some 27,000 public baths. Al-Ya 'qubi makes the number 10,000 not long after the foundation of Baghdad (Ya 'qubi, 1833). The earliest Hammam in Egypt is the 'Amr' at Fustat. In Iraq the first examples appeared at Basra.

The hammam was an important institution in the mediaeval Islamic city. Both men and women of the upper and middle classes were accustomed to go at least once a week for a steam bath and for a process of massage, called 'cracking of the joints', which was supposed to be very reviving. Some hammams were reserved either for males or for females, others had special days, or times of the day, reserved for females. It was the custom for women in the Harim to make up weekly parties to visit the hammams.

Architecturally speaking, the Hammam (Fig. 4.5) consisted of a certain number of rooms each with its special function. First an undressing and rest room (B), generally known as 'maslakh' in Egypt, or 'mushallah' in Iraq, or 'mahllah' in Saudi Arabia, which communicates with latrines and may be linked to the central part of the bath by staggered corridors of varying length, then a transition room (C), without means of heating but whose atmosphere was nevertheless already warmed by its proximity to the heated section (D), known as 'Barrani' or 'bayt awwal' as in Egypt and Iraq. Next, a first heated room (E), or warm room, finally a second heated room, or steam bath, 'harara'. This steam room is generally provided with a certain number of alcoves, where are found either benches of stone or brickwork, 'mastaba', and swimming pools (F), (Lane, 1968).

The Islamic hammam derived its heating technique and plan from the Roman bath but its decoration with their coloured glass inserts in the domes serving as a miniature skylight is an Islamic element (Samih, 1970).
FIG. 4.5: A Entrance  
B Changing room  
C Transition room  
D Heated section  
E Hot room  
F Swimming pool  
G Boiler  
H Furnace room  
J Cold reserve  
K Store
Due to its function it was usually located in the central area close to the mosque and bazaar, as well as in the residential quarter.

In 1882 and 1884 the number of Baghdad hammams was estimated at 21 and 39 respectively. There were three for men and three for women in the Karkh quarter, whilst in the Rusafah quarter the total number was 18 (Al-Allaf, 1902). Adhamiyah and Kadhimiyal quarters also had five hammams each. Although the number of Baghdad's hammams increased to 60 in 1971 (Fig. 4.6) their significance in the social life has declined as it has done in most other Arab cities owing to the provision of washing facilities within the home. However, its importance is still high in the poor as well as in the traditional mahallahs, quarters. Meanwhile, a number of hammams, particularly in the central area, have changed their function, becoming workshops, warehouses or shops, which provide more profit (Al-Ashab, 1974).

h) Mosque

In a typical Arab city, the influence of Islam is everywhere in evidence. This is obvious in the old and modern parts of the city although it is more distinct in the former. The importance of Islam in the socio-cultural life of the Arab city can be seen in the large number of mosques in any city throughout the centuries.

Islam as well as other religions, is of great importance in the function as well as the physical structure of the settlement. That importance is expressed in the variety of religious buildings that have greatly influenced the morphology of the quarter as well as the city.

These prominent buildings have symbolised the spiritual life of the inhabitants in arches, minarets, domes and spacious courtyards.

During the Caliphate, after the death of al-Nabi, the prophet, the consensus of opinion of religious leaders was that a permanent construction with roof and walls was the only place where Friday noon prayers should be held. Thus the new religion proclaimed by Mohammed, born into the important urban community of Makkah, remained intimately connected with urban life and urban settlements. Since then the Arab settlements have been dominated by religious land use elements mainly represented
FIG. 4.6: Baghdad's Hammams, 1971. (General Distribution)
by mosque (Hassam, 1958). These religious buildings fall into a number of categories: jami (Friday mosque) (Fig. 4.7), masjid (ordinary mosque), tomb mosque, and recently various types of buildings built by al-Awqaf (the religious endowment).

The secondary mosque (masjid) is usually used for ordinary prayers, and may serve a wider area than its own quarter. Finally the tertiary mosque (small mosque) or zawiah is in fact a small chapel—serving the immediate surrounding area. People from the local area usually co-operate in cleaning and furnishing it.

Traditionally mosques had many functions; religious, education, political, administrative and social.

Thus the mosque was the main focal point of the civic, socio-religious and architectural layout of the Islamic city. Central grand mosques have always played a major part in the orientation of both the city gates and the roads leading from them.

The centrality of the mosque was ensured by the Qur'an and tradition (Hadith) which suggests that it is desirable not to build mosques inside cemeteries which are peripherally located (Azzam, 1964). This perhaps was to strengthen the link between God and man because a man's thoughts could easily be cut off from God whilst praying beside a grave. It is difficult to reach a full appreciation of the architectural character of mosques through the medium of photographs and measured drawings. The typical character of the mosque is the outcome of climate, religious requirements and academic study. Mosques and monumental tombs of saints are considered among the noblest houses of worship, and they are usually rich in decoration and colour. In spite of the apparent similarity, each mosque and minaret has its own individual character, (Fig. 4.8). The form of mosques vary widely, from very decorative to very simple, from light to very heavy and from very small (local) to the large (metropolitan) mosques.

In the past mosques with their minarets have formed focal points and guiding elements. Minarets on the skyline arrested the attention and pointed the way to the mosque not only for citizens of the city but also for the distant travellers.
FIG. 4.7: Friday Mosque (Jami), Cairo.
FIG. 4.8: The Individual character of Minarets, Cairo.
At the present time, however, many monumental mosques, namely in Baghdad, have been dwarfed by the erection of modern high rise buildings (Fig. 0.6).

i) Gahwah or Kahwah

Gahwahs or coffee houses have been one of the most characteristic elements of the Islamic quarter, in particular Jiddah and Baghdad since the 17th century. Although they influence the social life of the city they have never been studied. Unfortunately there is no statistical data about their number.

Literally Gahwah means 'coffee' but it mainly serves tea, lemon, and cold drinks. Sometimes it is called 'chai-khanah' which is a Persian word meaning 'tea house'. The first gahwah introduced into Baghdad was in 1590. They were mentioned and described by travellers from the 17th century to the 19th century (Al-Amid, 1967).

They were usually located close to the bazaars, grand central mosques and along the major traffic and business streets.

Sometimes, traditional houses in Baghdad were altered to a gahwah. In such cases, the courtyard has been partially covered. The partition walls between the rooms were removed to create a larger inner space. Some gahwahs have completed their life cycle, others have been replaced by multi-storey buildings to provide more profitable income.

Socially speaking, the gahwah was until very recently the key element in the day-to-day social and recreational life in the three cities. Men of all classes used to meet in gahwahs, gossiping, debating or playing endless table games. Thus it used to complete the daily social life of the male citizens which usually started in the bazaar.

4.5.0 The Quarter's Dimensions and Values

Of the size of the quarter it may be said that it is limited by the requirements that each element was within a reasonable distance from every other. It is interesting to note that all Muslim quarters in the three cities, Cairo, Jiddah and Baghdad have similar physical
dimensions. The average diagonal of any of them is usually between 0.50 and 1.5 km. Such dimensions can indicate the following results:

a. The quarter dimensions are human dimensions. It gives some sort of equality, justice and fairness. Within the quarter, everyone has the same access to services through his small world. While nowadays, comfortable opportunities are only available to those who can afford private vehicles (Fig. 4.9) and even if all people for example, have private vehicles the natural result will be unimaginable traffic jams (Fig. 4.10). But suppose there are no traffic problems - psychologically, one will have the sense of leaving one's own particular area and going to visit friends or for shopping at a foreign place.

b. The limited dimensions together with the traditional street pattern made the movement of strangers apparent. As a result, security was easily achieved without reliance on police and its complicated institutions of our modern times. In other words, if the quarter's dimensions increased, needs will increase which will tend to increase one's dependence on a bigger force which in many times one cannot have control.

c. Because of the small scale of the quarter's manufacturing spaces there was no danger from them, simply because their individual force is small in relation to the recuperative force of nature.

d. By such small dimensions the quarter became a close-knit community in which everyone had his place and his respected status, a small place in which the individual is secure and not overwhelmed. In contrast, in our modern districts, man is submerged in the colossal human swarm, his individuality overwhelmed, his personality negated, his essential dignity is lost in crowds without a sense of community (Schumacher, 1973).

e. Small dimensions of the quarter often create small united groups, which are face-to-face in a fairly full sense. These small units are usually characterized by their high efficacy in all functions. It is believed that through the activity of these small units or quarters that Chinese cities have been freed from flies (Festinger, 1950). In Japanese cities they have associations called Tonari-gumi
In the past every human had the same opportunities in his small world.

Now some people using means of transportation have the choice of all contacts whereas others have very limited ones.

FIG. 4.9
FIG. 4.10
made up of a small group of households. The newcomer is expected to call on the members of the Tonari-gumi he is about to join, and leave a small present at each house. The members of the households are expected to help one another when there are difficulties (Mann, 1954). The same concept was also realised in Europe and America. In America the Chicago Area Project, started in 1930, has been attempting to aid the development of independent indigenous groups of local residents to take the leadership and assume the responsibility of managing, financing and promoting a welfare programme in their quarter (Nordhoff, 1955).

Finally one can say that the small groups which were usually created by the small physical dimensions of the quarter are powerful agents of control; and they often act as a two-way avenue of communication up to the high authorities and down to every individual.

4.6.0 Source of Variety and Originality

It seems that the main source of the quarter's richness, variety and originality from the architectural and planning points of view were mainly due to their practical and simple way of looking at problems. In spite of the fact that housing aspects and problems are a mass-concern in the sense that it affects a large number of people as equal individuals but to them, it never meant that the population should be regarded as a mere mass, and to be treated accordingly. So it seems that they realised that different groups have different images of environmental quality. The outcome of such understanding was the endless variety of architectural design and details. Such variety was not only felt between different quarters but also within the one quarter.

4.7.0 Relationship between Physical and Social Structure

I mentioned earlier that the residential quarter used to embody non-residential buildings such as 'elSuq' or the bazaar, a school or schools and some small scale industries.

The following investigates firstly the philosophy behind the insistence of embodying such elements within the quarter; secondly a study of the quarter hoping to throw light on the philosophy from the physical and
social point of view; thirdly, what gains result from dividing the city into such small units or quarters?

a) The Quarter's School

It is obvious that the quarter sometimes has a hospital, a public bath, a hotel, but never dispenses with a school.

In spite of the fact that it is not easy to discover exactly what goal was in mind of those people it can be traced that they realised that education is based in the first stage on both family and school life. Thus with the school building within reach of home there is every chance for strong contact between parents and teachers. Also by such planning the school will seem to be more accepted by the children as a natural part of their existence; the same children playing together out of school hours, the building not being in a strange place. Furthermore, as I mentioned before, schools were attached to the mosque, so the three, home, school and mosque, were acting as one unit. Finally, such location made it easy and safe to be reached by children without help from their parents.

b) The Quarter's Suq and Light Industry

To our modern planners it may seem strange to site two contradictory functions within the same area, i.e. industrial and residential. To them it was not planned that way because of a shortage of land or because they did not know how to separate different functions. The reason seems far deeper than that.

Actually they may have realised that the integration between shopping spaces, workshops and residential elements would achieve the following goals:

a. It would bring the inhabitants into close intercourse because they would meet each other over the shopping basket.

b. It would make it easy for different social groups with different interests to contact each other.

c. Shops and workshops give a traditional flavour to the quarter and also can give some sort of personality to each of the quarters.
d. No difficulty for bringing fresh food at any time or from any shop because they were placed close to all houses. In this connection it has been found through a series of experiments that even birds are affected by shifting the position of feeding stations in relation to their living spaces. As the feeding station was placed closer and closer to their home range, they gained many advantages which they lacked when away from their home (Hall, 1969).

e. The same plan will imbue the inhabitants with a subconscious sense of living in an atmosphere of arts and crafts. This understanding and appreciation in turn leads to both the encouragement of local art and the raising of the general state of the inhabitants. In this connection Mumford (1961) explained the endless benefits which can be gained from the daily contact with local artistic crafts*.

4.8.0 Summary

Different elements of the quarter are mixed together; housing, shopping, workshops, all in the same area and sometimes in the same building. Many social, educational and psychological benefits can be achieved from such a mixture. I think that once these functions are separated, the quarter or even the city will disintegrate.

* He said:

"The constant education of the senses is the elemental groundwork of all higher forms of education. When it exists in daily life, a community may spare itself the burden of arranging courses in art appreciation, and when it does not exist, such efforts are largely banal and self-defeating, for they deal chiefly in currently fashionable cliches, not in the underlying realities."

He also mentioned that where such an environment is lacking, even the rational processes are half starved: verbal mastery, scientific accuracy, cannot make up for such sensory malnutrition. If this is the key, as Mme. Montessori long ago discovered, to the first stage of a child's education, it continues to be true even at later periods; for the city has more constant effect than the former school. Finally, he stated that, life flourishes in this dilation of the senses, Without, the beat of the pulse is slower, the tone of the muscles lower, the posture lacks confidence, the finer discriminations of the eye and the touch are lacking, perhaps the will to live is defeated. To starve the eye, the ear, the skin, the nose, is just as much to court death as to withhold food from the stomach. (Mumford, 1961).
The unity of the city was replaced by the cohesion of the district or the group while the aim is to protect the family from contamination and dispersal and to keep the authorities away from private life. Even the house itself bears the signs of such intentions. In this way, the social organisation was translated into a physical one.

The distribution of population within the city was governed by the principle of social, religion, manners, customs, rather than economic segregation.

The degree of identity was often indicated by the name of the quarter. Meanwhile identity and separated quarters meant clarification, rather than isolation. It was a matter of developing an identifiable character to neighbourhoods and making the whole comprehensible.

Small groups, small classes, small communities, framed the quarter's dimensions to human scale.

There were no guilds or any sort of formal administrative institutions but unwritten regulations and face-to-face discussions and solutions.

People can reasonably be expected to be well-disposed towards a habitat and community that they have chosen, as opposed to one which has been imposed upon them.

The organisation of the environment is a social act before it is a physical one. In other words the rules which guide the organisation of space are systematically linked to culture. Each culture creates a system of rules and habits which reflect ideals and creates a life, guiding behaviour and manners. These components affect the arrangement and separation of the physical objects of the environment. Thus the organic environment can be understood as resulting from a set of social rules different to those of western environments.

One can say that the physical components of all cities are the same - houses, streets, gathering, cult buildings, plants and so on. It is the nature of meaning social and culture principles of their organisation which differ, and these need to be analysed and not generalised. In this connection one can say that there tends to be great similarities.
within the Muslim culture than among different cultures. Thus the Muslim quarters all over the Muslim world bear many common features in terms of environmental physical organisation.
CHAPTER 5

ANALYTICAL STUDY OF THE ISLAMIC STREET
5.1.0 The Islamic Street

In studying the Islamic street we have to look from a wide angle and not from a close horizon. By doing so, we will find that all Islamic streets in the three cities under study are very similar in pattern and space configuration.

Jiddah and Baghdad still retain some short intervals of historical streets (Fig. 5.1), while in old Cairo one can feel the street atmosphere through the large remains of the successive Islamic periods. One of these remains, namely El Mu‘izz Li-Din Illah, is still in a reasonable condition.

El Mu‘izz used to be one of the most important arteries of old Cairo. It served, and still does as the most interacting traditional shopping street. It runs from Bab Al-Fiţüh, one of the city gates in the north, to Al-Sultan Al Muwayad mosque in the south (Fig. 5.2).

There are all kinds of shops selling such varied goods as antiques, handicrafts, men and women's wear, candles, books and traditional textiles. Inspite of the fact that El Mu‘izz is now about ten centuries old, it still reflects the contemporary flavour of its time. On either side one can see numerous narrow roads leading to residential houses. El Mu‘izz street is about 1.5 km long while its width varies from 4 m to 11 m. It is mainly characterised by immediate, tangible and personal sensations; even the lanes and cul-de-sacs contain a minutiæ of sites, sounds and smells.

5.2.0 Street Facade

The Islamic street seems to be designed in the first stage as a series of facades. These facades often reveal a particular sensitivity; but how are they actually sited from the designer's point of view? For example, some facades are fully in view while others are hidden away. Another question arises: which building facades have to be hidden and which have to be in full view? In the following investigation we will discover that there were no set rules, not only for facades but for any design element. The following study aims to bring to light the main design aspects and the kind of experience which characterised the Islamic street.
Suq-hamadat Street, El-Karkh, Baghdad.

El-Sharif Street, Jiddah.

El-Mu'izz Street, Cairo.

FIG. 5.1

FIG. 5.2
5.3.0 Street Perspective

Unified Perspective.

In spite of the fact that the buildings lining El Mu‘izz street are of different scales, proportions and contain a wide variety of ornaments and bay windows or mushrabiyahs, the whole aesthetic sense of the street perspective seems to be of one order. This consistent atmosphere is mostly achieved through the following devices.

5.4.0 Facade Unity

It is obvious that the designer put the main emphasis on the complete street perspective rather than the individual buildings. The close similarity between forms, building materials and even colour played an important part in unifying the street. Furthermore, the designer tried to find some relation between the building facade and the street floor. That relation is achieved by using stone paving, so the harmony or unity is created through the repetition of the same element (Danby, 1963). In other words one has the feeling that all parts of the street are of the same fabric. Consequently an intimate relationship between horizontal and vertical planes is strongly felt (Fig. 5.3).

Another unity between the street facades seems to be realised by placing minarets and domes in such a sensitive silhouette which gives a vertical pull in contrast to the common horizontal one of the street (Fig. 5.4). The street pattern also created unnoticeable gaps between facades which emphasizes its unity. Fig. 5.5 shows that the principle of continuity took place because the line of vision will tend to continue over the small spaces between the buildings. As a result the buildings lining the street are perceived as a continuous strip of building with gaps in it instead of series of separate buildings (Danby, 1963).

In spite of the fact that all buildings lining El Mu‘izz street represent many different centuries, each with its own personality and technology, they reflect only one sense as they were designed and built by one man and one hand. That sense is unity and homogeneity to a large extent even the very specialists in the history of Islamic architecture are not able to date many of them. For example, Creswell’s book, the Muslem Architecture
FIG. 5.5: Due to the small spaces between buildings the street perspective emphasizes the unity of the facade.
of Egypt (1952-59), is full of such predictions based on some particular ornament, arches, shapes or dome pattern. These are the only elements to support his proposals and not any of the fundamental parts of the design such as space treatment and articulation, or circulation lines.

Another strong relationship is strongly felt not only between the attached buildings but between the street's beginning, intermediate and its end. Fig. 5.6 shows that the Al-Hakim Mosque and the Mu' Ayad Mosque which represent the two ends of El Mu'izz street, were designed in such a manner that they are related to each other. That relationship is mainly due to the use of the same building materials, texture, colours, proportions, and the repetition of some architectural elements such as minarets and domes. As a result, the street's end justifies the beginning, and the beginning justifies the end. Furthermore, the intermediate buildings justify both the beginning and the end.

I believe that many lessons can be derived from the previous study to develop a form of language expressing the best aims of our time and environment and no other environment; until we reach that point our buildings, our streets and our cities will look heterogeneous.

5.5.0 Perspective Development

From my personal experience, when I walk along El Mu'izz street, I often have the feeling that the view usually develops as I move along and sometimes across it. Fig. 5.7 and 5.8 (from 1-12) illustrates the actual development of the view step by step from the Al-Hakim Mosque to the Mu' Ayad Mosque.

Such experience is what we may call the unfolding mystery. It is the sensation that as you proceed, more is revealed. It also can indicate that the designers realised that the best view is not always the full view. Such heady perspective suggests only and gives more chance to the mind to multiply the possibilities of perception; and thus expand the scope and richness of the suggested experience. It can also give the feeling of slow absorption. In this connection, Simonds (1961) said that:

"True beauty could be discovered only by one who mentally completed the incomplete."
Al-Hakim Mosque.

The Mu'Ayyad Mosque.
To the traditional people, each view was part of a panorama to be seen from any angle to give endless variety and attractive perspectives. Such perspectives as I said, often reveal themselves when one moves and catches glimpses of a mosque's minaret in sequential views, or it may be kept continuously in sight (Fig. 5.9). Either way, one never feels lost. During the tour the eye is occasionally caught up in an intricacy of details (Fig. 5.10), and the result often is a repose of the mind. This repose is wholly appropriate to the situation, which is a street for human beings, and not a flow of motor traffic.

In our own time, designers are rarely able to make our modern streets as interesting as old ones. Each building is only a separate portion of an endless street, consequently a total architectural effect is completely lost.

Historically, they also used to site different buildings at different angles and in lights which gave them a strong individual prominence, (Fig. 5.11).

In fact it is amazing to find how every new feature fits into the silent tune that vibrates in our mind. That silent tune becomes gradually rhythmic and alive; and the further we progress the more this tune seems to form itself into a distinct melody. When we arrive in a broader street we often feel as if more instruments have joined our melody; i.e. there is richer variety of forms, and features larger in scale like mosques and saints' tombs occasionally enter the picture at certain intervals, breaking the calm or stable sky line with strong vertical effect (Fig. 5.12).

We can come to the conclusion that, through planning and space design, each view can be deftly modulated as one moves from area to area. Each area will relate man to some new aspects until the complete panorama is revealed.

In short, human space might best be planned with few directly open views. For a heady view, like a heady drink, should be absorbed slowly.
FIG. 5.9: Traditional Street Perspective.
Different buildings are located in different angles and lights, old Cairo.

FIG. 5.11: Different buildings are located in different angles and lights, old Cairo.
First Stage: Bare Sky Line.

Second Stage: Narrow Street Sky Line.

Third Stage: The Main Street Sky Line.

FIG. 5.12: Old Cairo.
5.6.0 Street Orientation

To the Muslim designer, streets were like any other design element and were used with a flexibility which gave him a free hand to orientate his building according to the environmental demands. Despite the fact that the historical streets are often bent and curved, they usually keep a general straight direction (Fig. 5.13), and most paths were orientated in such a way as to reflect strong social contacts and relationships. They often merged at particular goals such as a mosque, saint's tomb or public bath. Climatically speaking, most of the main streets were orientated roughly towards SW which is usually considered the best orientation* for the hot climate of Cairo.

In contrast, most of our modern street patterns usually make it difficult to orientate them towards any goal. They cater primarily for motor cars rather than human beings.

5.7.0 Street Pattern

The plan of the Islamic street appears initially like a maze and is very confusing. It seems so to a stranger because he often cannot find his way easily through the winding streets, alleys and cul-de-sacs, but the situation is completely different to its inhabitants. To them, every street, every path, each corner is a well known feature. The whole pattern therefore, is not confusing but intimately pleasing when revealed by familiarity.

Actually, confusion to strangers seems to be one of the design goals. It may be strange, but if we realise that at the time, it was full of dangers and streets were the battle ground of attacks and counter-attacks. It was hand to hand fighting.

Matters being so, why should the enemy have straight and convenient roads along which to enter? In this connection it is interesting to note that Aristotle said that 'a straight street is impractical from the standpoint of defence'. Napoleon III also shared the same thought.

* In Cairo the cool breeze often comes from the North (see 2.1.11).
FIG. 5.13: Bent and curved streets but usually keep a general direction.
"He was soon aware of this fact, for he had much trouble with the frequent uprisings in Paris. In the mediaeval street system of that city his cannons were of little effect, and for this reason he had to cut straight streets in the urban body, producing in this manner a new type of protective street pattern for those means of warfare that he had at hand."

(taken from Matore, 1962)

But today because the methods of warfare have no relation with the street pattern - simply they consider those patterns confusing in a degrading sense.

Before leaving this point, I still have to mention some more features - of Islamic street pattern.

a. Unlike our modern planning, it is so rare to find any two main roads crossing at right angles, i.e. they are often staggered. The result is that one can easily find one's way since the crossing looks different from every approach.

b. The traditional street pattern usually gives the sense of containment and thus is more suitable for intimate grouping (Fig. 5.14).

c. The same pattern decreases the heat gain on external walls and reduces the areas of exposed surface of roads (Fig. 5.15).

d. From the economical point of view it is much better than the grid-iron pattern.

Street Reflection.

Another sense which can be felt in particular during religious festivals. In the very twisting and curving of the procession - people who participate could see themselves in advance, as a mirror, by observing the other parts of the march. Thus participant and spectator were one, as they can never be in a formal parade on any of our modern straight streets.

5.8.0 Straight and Winding Streets

It is urged that a street should be straight, as a straight distance between two points is the shortest.

But the Islamic planner seems to disagree with this obvious fact. He
FIG. 5.14: A Sense of Containment.
believed that firstly, nature, his main source of knowledge, is in conflict always with straight lines. Secondly, his long experience in the desert taught him that the natural movement of human beings is not a straight line but a slow curve, as anyone can observe if he looks back at his tracks (Fig. 5.16), so he used to avoid straight streets which he also thought of as disturbing to humanity. Many centuries later, it has been proved that long straight and seemingly endless streets or corridors are mentally disturbing (Osmond, 1960).

Furthermore, he also seems to realise that moving under our own power we are most conscious of distance. Thus he tried to reduce the apparent distance by many devices such as making the whole environment rich in experience and climatically comfortable. Such an environment will seem shorter than a bare and harsh one. Thus in old Cairo one can walk a long distance without being tired, while the same distance or even shorter through modern districts seems much longer (Parr, 1960). Another device is apparent when we follow most of the long arterial roads, we will realise that they usually run through resting places. These places are sometimes squares treated and designed in such a different way to stop the continuity of the street and produce some change in another order. There could also be a spiritual element like a mosque or saint's tomb or a physical resting space such as a small cafe (Fig. 5.17).

The same pattern helped the designer to a large extent to orientate buildings towards preferred directions (N) and the mosque's prayer niche towards Makkah, in Saudi Arabia. But sometimes the mosques and streets were in conflict. In such cases the designer used to dissolve the angle between them, the street direction and the external wall of the mosque, by changing the wall thickness. Finally, that does not mean that streets have to be irregular without obvious cause.

5.9.0 Street Design - Source of Dimensions

Streets usually present great problems when they are considered as traffic arteries. How wide should they be? Who should use them? When? and how? As for width, it seems that the Islamic designer realised that the best width will be driven from people using them and their common means of transportation; donkey, horse. Most of the side ways can afford the passage of at least two horsemen abreast while any of the
main streets such as El Mu'izz usually vary in width to afford the passage of between six to nine mounted men. It also shows that traffic from city gates to main mosques, bazaar and hotels was through a fairly wide thoroughfare. Meanwhile other paths that led to residential sectors were narrower and more irregular.

So it is obvious that there were essential differences between streets that served houses and those that carried noisy traffic. Such design can indicate that they realised the different role for streets to play.

Unfortunately, centuries past without serious understanding of that sort of separation from a human point of view.

5.10.0 Traffic Control

Problems occurred when donkeys and horses entered the picture, particularly during market days, which were held on two days and sometimes three days every week. Since streets were intimately related to caravanserais, and warehouses, it became a problem of whether to allow animals in, with the merchandise and drovers, or to keep them outside the city gates. The solution differed - in Mameluk, Cairo there were wikalas never far from the city gates, beyond them were animal places, (Boulad, 1911).

Later on, another solution was common to khans in both Cairo and Baghdad, in that case animals were stabled either below sleeping apartments or galleries, or around the courtyards of the khan (Gibb, 1932).

Furthermore, they tried to keep roads free from inhibiting donkeys or horses. That task was one of the Muhtasib' jobs. In this connection Al-Makrizy (1936) noted that El Muhtasib ' full force was felt in the street life and particularly during market days. He used to act as a strong regulator for all problems facing roads. He had direct contact with both public services and quarter's leaders.

Other duties of the Muhtasib were to check that streets were watered daily, that drinking water was available and all public fountains were working. Merchants could be fined for not keeping the street fronting of their shops well watered and clean, or could be held responsible for
repairing streets, even ordered to do so.

By such arrangements, well designed functionally and directly controlled administration, most traffic problems were solved. Finally, they also realised that from the street the general health can be maintained.

5.11.0 The Street as a Bazaar Space or Suq

It is a general phenomenon nowadays in all the old Islamic cities for the suq, or shopping place, to either spread in front of the main mosques or open a wedge or a square for itself nearby; one must not assign to these institutions the same values they have today, i.e. the dominance of the suq or the shopping place over the mosque.

Actually, it was the market that was occasional, while it was the mosque whose services were constant and regular (Martin, 1910). As with the original growth of the city the market settles close to the mosque because it is there that the inhabitants must come together.

a) The Bazaar’s Pattern.

It is apparent in all Muslem cities that the bazaar or suq of the old city is an irregular figure. That pattern is mainly due to the fact that the needs of the surrounding buildings came first and determined the disposition of other space.

b) Traditional Goal of the Bazaar.

When looking at the historical street as a shopping place we will find that it differs from ours. We do our best to make shopping easy and as quick as possible. That is nearly the only goal we aim to achieve from our designers. Historically, shopping spaces had two main purposes:

a. To make shopping easy and quick for those in a hurry.

b. For amusement to those who like to enjoy social entertainment.

So they realised that shopping is much more than a quick and efficient service. To them it was where people congregate, where they meet for conversation, and relax when they are tired.
5.12.0 Space Design of the Bazaar

a) External Space.

The designer seemed to realize that wide straight streets are less convenient as a shopping street. So his design gained many advantages from the traditional street pattern, such as:

They usually give strong sense of enclosure.

No trouble for crossing from any part.

They can give some sort of continuity for both sides and not act as a barrier between opposite shops like our modern ones.

The street perspective will appear more attractive and give better sites for greater numbers of shops than straight patterns (Fig. 5.18).

b) Internal Space.

Interior spaces of the traditional bazaar are characterised by a wide variety of shapes. That variety is mainly due to not only that they vary in the two dimensions but they usually have different heights, i.e. volumes are different from one shop to another.

These variations can be related to two assumptions:

a. Shop space remained after other demands had been satisfied, such as the upper storey, residential space, which used to gain the first share of importance.

b. They clearly distinguished between different shops according to the goods being sold in terms of volume. For example, the wekalah was conceived in a bigger proportion to cope with the greater size and amount of goods being sold in it, such as different crops.

The first assumption indicates that in the design stages priority was given to main elements other than shopping, while the second assumption reveals that the three dimensional form of each shop was related directly to the kind of goods for sale, function. Whatever their underlying theory of design, the historical bazaar still fares better than more modern ones, in the three cities.
FIG. 5.18: The traditional street pattern often gives better site for a greater number of shops than the modern straight pattern.
Furthermore, not only did they make direct communication between customer and materials for sale (Fig. 5.19) but also between the shop owner and his family which used to occupy the apartment above the shop. Such access reveals one of the human aspects of the design.

Theoretically, it is not preferable to place dwellings over shops because their different requirements will bring them into conflict. Practically, the designer managed to introduce privacy and calm (Fig. 5.20) for the residential apartment far away from the noise and bustle of both the shop downstairs and the street, by different orientation and natural devices for noise insulation.

5.13.0 Street Speed and Social Relationships

Referring to the earlier part of this chapter, concerning the traditional street pattern, it is apparent that buildings lining both sides of El Mu'izz street were able to interact with each other. So the whole quarter or quarters were able to function as a community. That is partly due to the reasonable width of the street which in turn dictated means of transportation speed, even until nowadays, and partly to the street pattern.

But if the street became wider and less curved, the result that houses on both sides will be at larger distances from each other, traffic speed will increase and the direct relation between the two sides will decrease.

Finally, if the road turns into a highway, the speed on it will be greater and access between both sides will be less. Thus houses on both sides will not interact any more, and there is no unity and very weak communication between the two.

We can draw a simple conclusion from this. Firstly, street dimensions were dictated by human speed and social relationship. Secondly, the new surgery practised by modern planners aiming to enlarge some streets' width to be more convenient for motor cars, will change and spoil the historical environment, i.e. traffic is not important; what is important

* Noise insulation will be explained under the house analyses (6.9.0).
Noise and Bustle of the Street.

Privacy and calm of the Residential Apartment.
is how people live. I believe that there is no gain in cutting a few minutes travelling time if the result is unsatisfactory environment in the end.

5.14.0 Street Speed and Perception

It has been maintained earlier that one can walk a long distance through the old city without being tired, while the same distance or even shorter in any modern district, particularly at Jiddah, usually seems longer. I have related that feeling mainly to the richness of the environmental design together with the comfort zone it creates.

Here I will try to find out the role played by the street design to maintain human speed. In other words the relation between street design and speed (Fig. 5.21).

The following features (derived from the historical street) seem to be the most apparent aspects for dictating and orientating the street design towards human speed and not for motor cars:

a. Street pattern is characterised by sudden changes and even its short straight intervals are slightly curved.

b. Structures lining both sides usually present irregular rhythms.

c. Its width is usually narrow, by our standards, and asymmetrical.

d. Buildings on both sides often have fine details and ornaments.

e. Most surfaces of the street envelope are rich of fine texture.

f. The traditional organic pattern created endless circulation lines.

g. The whole design proportions are strongly related to man.

Now can any of the main historical streets be used for motor traffic? I will assume, yes, but the result will be:

a. At driving speed, facades will appear too complex and chaotic.

b. The presence of fine details and texture to the moving observer will be most distressing.
Gradual curves and rhythm. Space Wide Symmetrical Simple Gradual Modulation
long views Buildings and, Small Complexity range

(New) Motor Car Street.

Sudden Irregular Narrow Asymmetrical Complex Sudden changes and
Change in Rhythm Space Buildings Complexity Range
Direction and shorter Views.

(Old) Pedestrian Street.

FIG. 5.21
c. The driver will definitely lose concentration.

d. The street's organic pattern will impede traffic velocity.

In spite of these fundamental problems our modern planners made successful efforts to permit all kinds of vehicles across the old city. Unfortunately that is the case in the three cities without exception. Such planners are not able to realise and understand until now that the Islamic city is a pedestrian way and pedestrian cities receive a very different input. It is fine grain, people can vary the rate, can look around and stop to observe detail, they are aware of the environment all around them in all sense modalities.

The natural result after that decision is that motor cars spoiled the whole environment and meanwhile they are not able to increase their speed beyond the pedestrian's rate (Fig. 5.22). Furthermore pedestrians became in great danger and have never been able to have undisturbed views of their historical city.

Now I have discussed two possibilities about the historical street, first enlarging its width, second allowing traffic through the old city. But as we have seen, both of these ideas are completely unacceptable. But what do we have to do now?

I think, firstly, we have to stop immediately this harmful surgery and secondly, we have to accept the old city as it is to accommodate the reality of our aspirations. Thirdly, many important lessons can be derived from what has been stated, to give some basis for future planning.

Quite apart from needs of safety, pollution and hence physical separation it is apparent that at high speed one needs distant views, simplicity and large scale while with a slow speed one needs small scale, intricacy and complexity. So, as speed increases, the task becomes more demanding, and concentration increases and several other things also happen.

In this connection Tunnard (1963) explains what will happen as a result:

a. "The point of concentration (or focus) recedes from 600 ft at 25 mph, to 2000 ft at 65 mph. As a result elements must become larger. Also while objects perpendicular to the road become prominent those parallel to it lose prominence."
b. "Peripheral vision diminishes so that while at 25 mph the horizontal angle is 100° it reduces to less than 40° at 60 mph. One result is 'tunnel vision' which may induce hypnosis and sleep. Side elements need to be quiet and subdued and perceived semi-consciously in the blurred field of peripheral vision, with the main features on the axis of vision and the point of concentration periodically moved laterally to maintain attention."

c. "Foreground detail begins to fade due to the rapid movement of close objects. The earliest point of clear view recedes from 30 ft at 40 mph, to 110 ft at 60 mph. At the same time detail beyond 1400 ft cannot be seen as it is too small, so that the range is between 110-1400 ft - and that is traversed in 15 seconds. Elaborate detail is thus both useless and undesirable."

d. "Space perception becomes impaired so that near objects are seen, get close and disappear very quickly. They thus tend to 'loom' which is extremely stressful and elements too close to the edge or overhead, and sudden curves should be avoided."

(p 82)

Thus elements along the road should provide information at an intermediate rate with gradual transitions - sudden contrasts of differing complexity are still needed; the transition among them should be gradual. There should be a smooth continuous succession of such areas with their intensity decreasing as speed increases. Generally, then, as speed increases the number of noticeable differences in the environment should reduce and the setbacks should also increase; as traffic intensity increases the perceptual complexity of the environment should be reduced (Pollock, 1960).

Nowadays the effects of speed and scale have been neglected, consequently many design decisions are often at the wrong levels of complexity with either excessive or inadequate levels of various purposes.

The nett result is that people are forced to ignore the environment which leads to less concern with its design. Similarly the neglect of the full range of various senses in the city leads to greatly impoverished environments and further loss of sensitivity (Langer, 1966).

At the scale of the city it is the existence of many levels of complexity which is important, and their appropriate relationship to the context. At that scale designers could modulate complexity levels to reflect the nature of areas and their activities, their importance in the urban hierarchy and the speed at which they will be perceived.
Summary

The foregoing chapter discusses the main design aspects and the kinds of experience which characterised the Islamic street.

It indicates that there was an intimate relationship between the vertical buildings and the horizontal street floor. Furthermore, a sensitive street silhouette was achieved by the contrast between the vertical minarets, domes and the common horizontal line of the street. The traditional street also reflects a sense of harmonious design as if all of its buildings were designed according to the same principles and during one era. This consistency could not have been achieved without traditions, nor without a sane and natural response to the local environment. The study reveals that the traditional designer put the main emphasis on the complete street facade rather than on the individual buildings.

Furthermore, the close similarity between forms, building materials, colour and texture played an important role in unifying the street perspective.

The site photographic survey shows that the end of El Mu'izz street justifies its beginning, the beginning justifies the end and the intermediate buildings justify both the beginning and the end. It also indicates that the street perspective usually develops as one moves along or across the street.

As for the street orientation, it has been found that inspite of the fact that the traditional streets are usually bent and curved they often keep a general objective direction. That direction satisfies both climatic and social requirements. In addition, the irregularity of the traditional street provides variations that create opportunities for enlivening the architecture of the individual buildings. Each section of the street is well composed around a focal point, creating a pleasant atmosphere and helping people to orientate themselves.

The last part of this chapter analyses the relationship between the street design and the speed of movement it allows. It discusses the main principles which made the Islamic street a pedestrian one, i.e. a street mainly designed to be travelled along slowly, encourage social contacts, as well as involving
the inhabitants directly in the surrounding environmental designs which are best seen from eye level. These principles are mainly its sudden changes, curves, its narrow width, endless circulation lines and conjunctions created by the street pattern and the fine details and texture of the surrounding buildings.
CHAPTER 6

ANALYTICAL STUDY OF THE TRADITIONAL ARAB HOUSE
6.1.0 Introduction

Dwelling place or house (Dar or Bayt), the two words are commonly used to designate a dwelling place.

Dar and Bayt, have, etymologically, quite different meanings. The first is a space surrounded by walls or buildings. The second is properly speaking the covered shelter where one may spend the night (Lewis, 1956). Another very common word for the house is 'sakan' or 'maskan' which is related to the word 'sakinah' which means peace and calm.

From the earliest Islamic times there had been a tendency to arrange the house around a central space. The first house which Islam offers for our consideration is that built by the prophet Muhammad at al-Medina, Saudi Arabia. It was a dwelling place for him and his family and also a meeting place for the social and religious activities of the believers. The main feature of the house is a courtyard surrounded by different spaces, such as bedrooms and living rooms. That layout seems to have had a powerful impact on the design of religious and secular buildings all over the Islamic world.

Unfortunately no houses remain from the earlier period of Islam, but there is surprisingly little difference between the oldest surviving houses (of the 13th and 14th centuries), Al-Fustat houses, and those built on traditional lines even as recently as the last century, the house of El-Sinari (Fig. 6.1). The reason for this apparent stagnation is not easy to find. However, one can relate this phenomenon partly to the social life and customs which remained constant from the beginning of Islam up to the fourth decade of the last century (as described by Lane, 1968) and partly to the suitability of this layout to its environment.

The following study bases itself upon the conclusion of Chapter 2 which, while indicating some differences amongst the traditional Arab houses in the three cities under study also shows considerable similarities in terms of architecture and planning concepts.

There were three main reasons for selecting the Sehemi house. First, common (low-income) traditional houses have disappeared due to the impermanence of this construction, leaving only certain more luxurious houses intact. Secondly, most of the latter houses have been inhabited and consequently modernised, the Sehemi house is somewhat unusual in that it has been neither inhabited recently nor modernised. In other words it still retains its original features.

Thirdly, all Cairane houses of the Turkish-Mameluk styles were very much
The House of El-Sinar
(Cairo - 19th century)

Islamic Houses - 13th Century
(Old Cairo-Al-Fustat)

The House of Keritliya
(Cairo - 17th century)

FIG. 6.1: 13th and 14th Century Houses (Fustat, Cairo)

The House of Zeinab Khatoun
(Cairo - 16th century)
6.2.0 Main Factors Influencing the Typical Arab House

The main factors that have produced the typical Arab house seem to be the outcome of three major influences, namely:

a. Environmental conditions – particularly climate.
b. Religion and social life.
c. The designer's techniques, namely, the structural expressions and space articulation*.

This part of the study will begin with explaining the different challenges resulting from the environmental conditions and the demands of religion and social life. The object of this part is firstly to explain the consequences which can occur if the design is poor in relation to the climate. Secondly, a study of the solutions of these problems will follow.

The main object of analysing those solutions is to bring to light the way of looking at the problems and the relationship between these design options. This part will be concluded with the descriptions of some site experiments which have been carried out in Cairo.

These experiments reveal the suitability of the traditional house design in terms of air temperature and acoustics. Finally, the above solutions will be arranged in an order which will begin with the planning solutions (devices) outside the house up to the fine details of the structure.

6.3.0 Study of the House Design from the Climatical Point of View

6.3.1 Physical Influences of Climate

Climate seems to be one of the most activating forces. When the Ancient Egyptians understood their climate they achieved the greatest civilisation of the world. In the study of history Toynbee (1933) puts forward the thesis that climate improvement following on the last ice age, led to migration and to attempts, in new habitats, to control the physical environment, through the development of crafts.

* Full description of the traditional Arab house in Section 2.1.14, 2.2.11 and 2.3.11, of Chapter 2.
Huntington (1924) goes much further than this and does not limit the role of climate to the provision of an initial challenge, but sees its periodic changes as a determining factor in the rise and fall of civilisation and in their achievement of eminence.

Many other writers such as Markham (1947) refer to temperature and humidity as factors which were most decisive for the effectiveness of civilisation. The Greek and Roman civilisations are also a good example to show that they achieved leadership by virtue of advances in the art of domestic buildings and planning.

Finally, with the intensive use of coal from the beginning of the 17th century, the nations of northern Europe moved into the lead of technological development.

So it is apparent that the nation which can keep its citizens, all its citizens, in ideal climatic conditions will have an opportunity to improve health, energy and culture.

Human Comfort.

As for human comfort, it is apparent that climate affects our capacity for mental and physical work. It also affects our capacity for enjoyment, rest and sleep. It is probable that an unsuitable climate can produce feelings of lassitude and depression, affecting not only individuals but whole communities. Climatic fatigue has even been suggested as one of the main causes for the slow progress of technological and economic development among some of the nations of the tropics and extreme north.

This does not mean that human beings can live happy and active lives only in an ideal and unchanging climate. On the contrary, changes appear to have a stimulating effect.

Human response to the thermal environment does not depend on air temperature alone. It has been established that air temperature, humidity, radiation and air movement all produce thermal effects and influence human comfort (Koenigsberger et al., 1973). In the context of human comfort in terms of climate the human comfort is an extremely subjective concept. Ideas of what is comfortable are bound to vary from person to person. Physiologists have
established comfort zones for a number of locations (Fig. 6.2). The published figures indicate that comfort zones can be expressed in terms of air temperature, related to humidity. The chart shows that it is possible to tolerate high temperatures provided that the relative humidity is low. It has also been established that air movement can influence human comfort, for example, if the air is moving, a somewhat higher air temperature can be acceptable (Sealey, 1979). Finally, the contrast between the internal and the external environmental conditions also plays an important part in achieving comfort.

It seems also that moving through different levels of air temperature can result in a powerful impact on the human body. Recent clinical research has been done at the University of Alexandria, Egypt (Nakhla, 1972). This reveals that exposure to different levels of heat load cause losses of body weight, rises in temperature, increases in respiratory and pulse rate. These changes run parallel with the levels of heat load. Metabolic effects also took place in the form of a minor rise in serum sodium, whole blood chloride as well as the total plasma proteins encountered at high levels of heat load.

### 6.3.2 Psychological Influences of Climate

One of the most important effects of a hot climate is its psychological discomfort. The most generally mentioned symptoms are lassitude, mental retardation, impairment of memory and of concentration, apathy, slackness, reduction in the sense of responsibility, conscious anxiety, tension and state of suspicion, (MacPherson, 1949).

But could climate alone be responsible for all these influences? Probably several non-climatic factors are at work here too.

### 6.4.0 Landscape Challenges

I think that the natural environment, the desert, in which the Arabs lived for many generations before settling in cities has also been a major influence on them; i.e. the scarcity of water, lack of plants and reference points, high glare and endless open space. As a result when they settled they used to close their houses to the outside and turn them into courtyards. These courtyards often embodied most of the missing
FIG. 6.2
aspects of the desert such as water, plants, and a sense on enclosure. As for the sense of enclosure some psychiatrists suggest that the endless open spaces are one of the major causes of agoraphobia, fear of huge open space, (Page, 1947). In this respect the traditional compact planning seems to be a reaction against the endless open spaces. Another solution can be found in Siwa Oasis, Egypt, where the whole city was a cluster of housing on a rocky hill, creating a sense of security and enclosure (Fig. 6.3).

6.5.0 Social and Religious Challenges

Arab hospitality and social customs require large spaces for meeting and entertainments. On the other hand religious demands require privacy and calm. Therefore the house has to accommodate these two contradictions.

The imagination of the ideal place or the paradise which is mentioned in the Qur'ān with its gardens and rivers was deeply rooted in Muslim minds.

The Qur'ān mentioned in direct terms the quality of the house for people when it says 'Masakin Tartadonaha' which means that the house in the first place has to be accepted by its inhabitants and not just occupied as a shelter. The term 'tartadonaha' (or to accept) in Arabic means convenient from all points of view.

6.6.0 Design Solutions

The following aims to show the reaction of the designer through a system of solutions and devices starting with planning devices followed by other devices within the house structure, both of them make up the system; looking at the devices individually is meaningless.

6.6.1 Planning Solutions

If we are going to study the courtyard concept in terms of climatic performance we are dealing by necessity with the neighbourhood planning through the following points:

a. By aligning buildings close to each other, natural shading will increase. As a result the heat gain on the exposed walls will
THE MARKET-PLACE IN THE TOWN OF SIWA.

Fig 6.3

GENERAL VIEW OF AGHURMI, SIWA OASIS.
The designer used to orientate the building in such a way that the summer apartments faced the northerly direction (the direction of the cool breeze, most of the year) (Fig. 6.4).

The same orientation together with the courtyard proportions in relation to the surrounding walls made the courtyard shady most of the day. So the courtyard can perform two main functions in this respect; firstly, during the day, it will be a cool and shady place for any function; secondly, during the night, cool air will tend to collect at ground level in layers within the courtyard, and flow into the surrounding rooms replacing the hotter air, cooling the floor, the walls and the furniture. This cooling effect can be felt in the traditional Arab house until a late hour of the day.

The surrounding surfaces both externally and internally are of light stone paving, cream coloured walls, and planted courtyards and gardens. The nature of such surfaces are low absorption capacity. Thus the surrounding surfaces seem to work in conjunction with the planning to mitigate the thermal discomfort.

From the above points it seems that the traditional designer was keen to create a positive relationship between the external environmental conditions and the interior of each house. Such a comprehensive relationship was the first stage towards improving the micro-climate.

Again, the designer never looked at the house alone in terms of improving its thermal conditions, but he also realised that the surrounding buildings and spaces can strongly help or impede the thermal conditions of each house. Thus, if we erected a new traditional house using the same building materials, the same proportions, and the same details but located it in a modern city environment, the result will not be the same.

* Olgyay found that the total daily heat transmission on the wall amounted to 40 Btu/ft² (227.1 W/m² °C) in the sun and 27 Btu/ft² (153.3 W/m² °C) in the shade. See Olgyay, A., Design with climate, Princetown, New Jersey, Princtown University Press, 1963.
The House of Zeinab Khatoun, Cairo.

FIG. 6.4: Summer Apartments facing the Direction of the Cool Breeze.
6.6.2 Other Solutions

a) Water.

The utilisation of water as a cooling medium in hot areas is as old as the Egyptian Pharaohs, who employed slaves to fan the air over large porous earthenware jars. On flowing past the jars, the air was exposed to a large wetted surface area, and was cooled by evaporation. The great buildings of Babylon and many palaces in Iraq were located on the Euphrates and the Tigris to obtain the cooling effect of the river surface. The Babylonians also erected splendid fountains and built pools inside their buildings.

Later on, Moslems used water not only for its symbolic or religious aspects but also for its cooling and humidifying effects. Nearly all Muslim structures are witness to the amazing widespread use of water for this purpose.

The traditional Arab house contained a fountain in the courtyard and two or three others inside the different reception halls on the ground and first floor (Fig. 6.5). Not only did the Arabs use water in the form of fountains but also in the shape of artificial cascades. The latter used to replace the fountain when the water pressure was not sufficient to make the water spout. The Salsabil, or a small cascade (Fig. 6.6), is made up of a marble plate, decorated with wavy carvings, suggesting wind and water, placed off the vertical wall in a niche opposite the place where the people sat (Fathy, 1970). So water trickles over the salsabil and then flows through a marble channel to the basin. Thus the salsabil may be seen as a fountain, head placed outside its basin to compensate for the lack of water pressure. This design shows great versatility and ingenuity which we might profitably study.

In Iraq they used water in a more sophisticated way, i.e. the underground tunnel system which is commonly called 'serdab'. The serdab, together with the wind catcher form the natural cooling system of the traditional Iraqi house.

Finally there was another method of using water for cooling. The courtyard, roofs and floors were washed down. This method was largely
FIG. 6.6: The Salsabil or Small Cascade, Museum of Islamic Art, Cairo.

FIG. 6.7: Traditional Fountain showing the Outlet Size.
used by poor people who could not afford fountains or salsabils. Experiments, carried out in Australia, have shown that this method can reduce the surface temperature by 45-55 °F, (Atkinson, 1954).

6.6.3 Efficiency and Economy of the Traditional Fountain and Salsabil

a) Efficiency.

I have enjoyed sitting behind fountains in many modern buildings but I never felt the same powerful effect as from the traditional ones. The reason may be related to the following:

a. The traditional spray pond is usually fed by water introduced from a well inside the house, through pipes buried under the ground about 35-50 cm below ground level.

b. It was often placed in a shaded place in the courtyard, and if such a place was not available, there are usually one or more trees to shade it, but it was never exposed to the direct rays of the sun.

From a. and b. it is apparent that the designer realised that the rate of heat loss from the moving air in contact with water, increases as the temperature difference between air and water increases. In the case of modern buildings with internal fountains the difference seems to be minimum because of the central air conditioning system. As a result the cooling effect is less and usually unrecognised.

It is also interesting to note that traditionally the spray or salsabil was in use but not still water pools which are more simple and economic. The reason may be that the great advantages of the fountain and salsabil were realised, which is indicated as follows:

a. They provide a greater volume of cool air due to the great vertical cross section of air permissible.

b. Fountains and salsabil provide greater contact between water and air because the time of contact between air and water is increased (Borrack, 1963).

c. The fountain probably adds to the well-being of the inhabitants,
the sound of water is known to bring relief long before a measurable reduction in air temperature can be recorded.

b) Economy.

During the second field trip to Cairo I made a comprehensive survey to measure the outlet size of nearly all the traditional fountains (152 fountains). I realised that the outlet diameter in all the cases is between 8 mm and 14 mm (Fig. 6.7).

Such large diameters will reduce the wastage of water simply because if the outlet diameter is fine the water will be carried away by wind (Borrack, 1963).

Finally, one can say that water was not only used as a cooling and humidifying medium but it was also used in an economic way.

6.6.4 Gardens and Planting

History tells us that the first signs of gardens appeared in Mesopotamia and Egypt. These gardens were designed for both pleasure and profit, (Amherts, 1888).

To the ancient Egyptians gardens and plants were of great importance and there was a God of gardens such as God Khem (Fig. 6.8). One of the best gardens was established by Queen Hatshepsut at Deir-el-Bahari, Egypt (Hyams, 1971). The ancient Egyptians made great use of plants. From different plants they obtained timber, wine and medicine as well as pleasant shade. As for residential areas, most paths were shaded by vine pergolas. Within the house the garden was one of the main design aspects. A good example can be seen (Fig. 6.9) from the ground plan of a villa at Thebes in the reign of Amenhotep III (1405-1378 BC). From it we get a fairly good idea of what a house garden was like at that time (Hyams, 1971). Its plan indicates that a vineyard with its several walks was dominant.

Later the Arabs continued to appreciate gardens and different kinds of planting in the same manner until the middle of this century people and governments became less concerned with these aspects.
FIG. 6.8: Khem, God of Gardens in Ancient Egypt.

FIG. 6.9: Egyptian Gentlemen's Villa, Thebes.
Finally, Muslim people used plants in domestic architecture in many shapes and locations such as:

a) The Roof Garden.

It was a general custom to plant different kinds of plants on the roof of the house. These plants seem to solve a great deal of the roof thermal problems mainly by creating shady areas. As a result, the proportion of radiation absorbed by the outer surface of the roof is reduced. Such a simple device makes it convenient to use rooms below the roof particularly during the afternoons.

Another advantage could be gained from the roof plants in that the roots of such plants preserve a certain amount of moisture which can help to keep the roof surface temperature down. Furthermore, irrigation or spraying of the roof garden can also help to reduce the heat flow through the roof. It has been found that if one inch of water is maintained over a roof the heat flow is only 35% and if the plants were only sprayed the figure will be 30% of the amount which would pass through a day roof of similar construction and thickness (Saini, 1970).

Nowadays, if we used the same system, we can gain another additional advantage. The preserved moisture in the plant's roots can help in prolonging the life-time of our concrete slabs by minimising cracks. This, of course, must be offset against the problems of extra loads and the roof insulation from leaking water.

b) The Courtyard Garden and the Back Garden.

The advantages which can be gained from the courtyard garden and the back garden such as that of the Sehemi House, can be summarised as follows:

a. Plants, shrubs and trees are of great value in helping to reduce dust particles; they act as a wind-break and arrest the flow of dust and sand into the interior (Derring, 1953).

b. They help in reducing noise by absorption (Brüel, 1951).

c. They can effect air flow by creating high and low pressure areas around the building (Saini, 1970), thus if they are carefully
sited and selected they can accelerate a beneficial air movement into the building.

d. Shrubs and trees cut out direct sun and glare from reflecting surfaces, creating a pleasant half light and allowing occasional glimpses of cool, dark blue sky.

c) Climbing Plants.

Climbing plants were commonly used in the traditional Arab house, e.g. Sehem house, particularly to cover western facades. So they created a valuable overhead cover and pleasant shade. Consequently a reduction of surface temperature can take place.

The above study reveals that people during previous centuries were keen to create green areas in every available space in the form of gardens, roof gardens, and as a screen over the building facade.

6.6.5 **Malkaf (Wind Catcher)**

The traditional architect designed the Malkaf mainly to ventilate different parts in the centre of the building. Such spaces cannot enjoy the cool breeze by any other means. Fig. 6.10 shows that the design of the space (A), dining area, is entirely dictated by the vertical circulation lines to and from the kitchen. Meanwhile the kitchen cannot be moved anywhere else because of its direct relationship to stores and the service entrance from one side and the reception hall (No. 3)** from the other (Fig. 6.11). This is the case at the Sehem house. In other houses it may ventilate other spaces such as the reception hall or any other living space. To complete the picture we have to answer the following questions: **How and when does the Malkaf work?**

Actually, the Malkaf's function is not dependent entirely on the wind's ability to force its way into the Malkaf's inlet, but it does depend mainly on the micro-climatic conditions.

* The Malkaf is a shaft rising over the rest of the buildings to catch the north cool breeze. It is usually a tower over neighbouring buildings to overcome any obstruction.

** Occasional meals were served in this reception hall from the kitchen.
FIG. 6.10: This shows the Vertical Relationship between the Kitchen and Dining Area. (The Schemi House)
FIG. 6.11: The Relationship between stairs, service entrance and the Kitchen.
During the heat of the day, a breeze will not enter the house even if the inlet of the Malkaf is opened* because the air temperature inside the house is lower than the outside air. The cooler interior is dense and has a higher pressure than the hotter, lighter exterior air. In the afternoon or evening, when the outside air falls below the interior air temperature, the interior will store cool air.

Thus the Malkaf only functions when it is needed and encourages only cool air into the interior.

Fig. 6.12 is a section of one of the reception halls which remains from the house of 'Moheb ell-dein' and illustrates how a raised section of the roof is employed as an air outlet. The roof is of light construction and heated up rapidly, thus heating the air underneath it. This warm air rises and escapes easily, leaving a low pressure area behind which induces more air movement, upward and outward (Fathy, 1970).

This is another example which teaches us that the Malkaf design, like any other device or solution, never depends upon one part, but it is only a part of a total system. That system can act when the different parts all work together.

Now let us trace the same device in some other countries. In Iraq they used the same method but in a more sophisticated manner. Each house had a wind catcher or Badgir covered by a piece of cloth and equipped with a wind vane which keeps the inlet of the Badgir perpendicular to the wind direction**. The caught wind comes down through the inlet to a deep well into which people pour water every morning. As the air comes out of the well it is directed to pass over a woven mat of absorbent reeds. The mat and the reeds will act as a filter for dust and will increase the evaporative surface (Fig. 6.13). Finally the cool air is distributed to different spaces of both the basement and the groundfloor (Al-Azzawi, 1969).

* Few Malkafs are glazed.

** The wind direction in most parts of Iraq is variable.
A Section of the Reception Hall

Ceiling of the darqu'ah

**FIG. 6.12:** The House of 'Hoheb ell-dein, Cairo.
Two Storey House


Single Storey House.
Unlike Egypt and Iraq traditional houses in Dubai often have two or more wind catchers. Dubai's climate is of the hot dry maritime type. In summer it is hot, the effect of high temperature being aggravated by high humidity, 80-90%, is unfavourable. Traditionally, people used the wind catcher or 'Badgir' to ameliorate the discomfort of the summer. The badgir is a masonry windtower and rises about 15 metres above the ground (Fig. 6.14). At least half the length of the windtower is an enclosed funnel to increase the velocity of the passing air. The windtower, descends vertically into a room beneath, terminating at just over two metres above the floor. The flow of air from the windtower is confined to the area immediately below the tower where cushions were usually placed and many functions took place, (Cles, Jackson, 1975).

Another example was recently established in Bareilly, India (Fig. 6.15). Instead of the Iraqi well, a tunnel of about 3 ft wide and 6 ft high by 50 ft long was excavated below ground level, running from a well to the basement beneath an existing hospital's X-ray department. The air is circulated by a medium sized suction fan running at slow speed (Saini, 1973).

Before leaving this point, it is interesting to note the difference between the above mentioned devices in terms of space design. The Arab Malkaf never dictates the space design of the building while the Indian tepee or the Cameroon cone do shape the ventilated space in a specific manner.

6.7.0 Internal Solutions - House Structure

In order to appreciate the complete traditional system for improving the environment, it is necessary not only to analyse the climate, the human reaction to it and the planning devices alone. It is of the same importance to realise how the traditional designer understood the thermal behaviour of the structure.

* This type of wind catcher, Badgir, was originally derived from Iran where they appeared in a variety of forms. Badgir is a Persian term meaning wind or air channel. In Irani Badgir a sensible cooling occurs when there is a change in air temperature without a change in humidity. Evaporative cooling occurs when there is a change in both temperature and humidity. This process plays an important role in the operation of the Badgir. For details see 'Passive cooling systems in Iranian Architecture', Scientific American, Feb. 1978.
FIG. 6.14: A Fifty Year Old House which belongs to a Merchant in the Bastakia Quarter of Dubai.
Underground Tunnel with moist walls can provide an efficient evaporative cooling system. Here the tunnel utilizes an existing well for additional cooling surface.

FIG. 6.15:
It is apparent that the roof is the most critical part of the whole structure. It receives the greatest amount of heat*. To mitigate that problem, the traditional designer seemed to rely on two main aspects. Firstly, shading and planting the most available parts of the roof in the form of trees and pergolas; secondly, on the materials of the roof itself. As for the roof materials, it was common to construct the roof as follows.

Most parts of the roof were of palm trunks covered by 5-8 cm mortar layer, lime, limestone gravel and sand, followed by a layer of mud, 8-10 cm and finally paved by stone tiles. So stone paving with its light colour** will reflect a great part of the solar radiation and the mud layer will delay the heat penetration through the roof.

Table 4 indicates some measurements carried out at Al-Sehemi house, Cairo, between 14.7.78 and 16.7.78. The main object of this experiment was to find out the surface temperature underneath the top roof in relation to the dry bulb temperature in different rooms of the second floor (Fig. 6.16).

<table>
<thead>
<tr>
<th>Day</th>
<th>Time of Day</th>
<th>Surface Temperature °C</th>
<th>Dry Bulb Temperature °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>14.7.78</td>
<td>1600 hrs.</td>
<td>29.5</td>
<td>29.5</td>
</tr>
<tr>
<td>15.7.78</td>
<td>1600 hrs.</td>
<td>29.0</td>
<td>29.2</td>
</tr>
<tr>
<td>16.7.78</td>
<td>1600 hrs.</td>
<td>29.2</td>
<td>29.5</td>
</tr>
</tbody>
</table>

Table 4

The experiment shows that in most of the measurements the difference between the surface temperature and the dry bulb is between 0.2 °C and 0.9 °C; a figure which is recommended by many scientists such as Saini, (1970).

* Danby noted that in an experiment made in Khartoum, Sudan, 'The flat roof receives only 26% less than the total of all four elevations', Build International (6), 1973, p 61.

** A whitewashed roof surface temperature can be 10 °C less than an unwhitewashed mud roof under the same conditions, Build International, 6, 1973, pp 63-4.
FIG. 6.16: Surface temperature measurements. The Sehemi House, Cairo.

Location of Measurements
In Jiddah and Baghdad roofs were of a similar construction, but in other parts of Iraq people used to place open crate reed constructions on the top roof. These reed crates were covered by whitewashed cloth and opened from the side facing the prevailing wind (Fig. 6.17). The main object of this device was to shade and ventilate the exposed surface continuously.

It is interesting to show another roof design commonly used in India. In some parts of India the following simple method of roof insulation is used: earthenware water vessels are turned upside down on the roof with each vessel touching the next one (Fig. 6.18). The water jugs with their long hollow stems may have a temperature differential between top and bottom of as much as 20 °F. As cool air tends to stay at the bottom of the stem, very little heat is admitted to the building itself, (Ehrendrantz, 1960).

6.7.2 Walls

It was a common phenomenon to construct the ground floor walls of limestone with variable thickness, 40–120 cm while the first floor walls used to be of brick, 10–15 cm. The idea of having both heavy and lightweight construction within the same house is mainly related to the load distribution but it can also indicate the following.

The designer seemed to understand that the limestone in such thicknesses would take a longtime to pass the heat received during the day-time. On the other hand the light walls of the first floor will cool down immediately after sunset and benefit from the night coolness. Thus the first floor was used for night functions, i.e. social and sleeping.

So one can say that there was some sort of convenient relationship between the time of using the space, day or night, and the structural thermal characteristics.

Before leaving this point I still have to mention that the first floor.

* It has been noted that a building with only 46 cm masonry walls and a well insulated roof has been known to possess a time lag of about 12 hours (c.f. Architecture Science Review, March, 1962, p 9).
FIG. 6.17: Roof Insulation, Iraq.

FIG. 6.18: Roof Insulation, India.
not only becomes cool at night because of its light construction but it can also benefit another cooling effect from being about 4-7 m above ground level. This phenomenon is known as 'temperature inversion'. As the height from the ground level increases the air temperature often decreases (Kolnigsberger, et al, 1973)(Fig. 6.19).

6.7.3 Windows

Generally speaking the window functions are firstly to permit light to penetrate the interior in such quantity and distribution that they satisfy the specific function inside the roof; secondly, to provide a view of the exterior as well as ventilation.

However, in the case of ventilation, the control of glare that results from the brightness of the exterior light, the provision of privacy, the control of sound transmission, dust, and house flies contradict each other. For example, it is difficult to provide privacy as well as allowing the passage of air, and if you allow the passage of air it is rather difficult to control dust, house flies and glare.

Thus the window design in such environments is very critical. The traditional Arab designer found the answer to the majority of these challenges in the Mashrabiyyah - a wooden lattice screen. More specifically it is formed of miniature turned bobbins, with square knobs at the intersection which are also rounded at all corners. The bobbins themselves are so varied in design that no general rule or description can be given.

But how did the Mushrabiyyah manage to cope with these challenges?

a. The mushrabiyyah provides a baffle between the interior and the exterior - so the brightness outside is broken up by the area presented by the lattice, which provides an area of darkness.

b. The turned bobbins together with the rounded intersections of the knobs will fade off the light and accelerate the passage of air.

c. The circular fluting of the vertical, horizontal and diagonal members of the Mushrabiyyah can break up the dazzle of the exterior.
d. The designer tried to make the Mushrabiyyah face plants and green surfaces, aiming to reduce the reflected light and hence increase the quality of vision from the interior.

e. The Mushrabiyyah reduces the solar radiation reaching the interior.

Thus when exterior conditions are visually unpleasant, the Mushrabiyyah protects the eye; with comfortable light outside it generates more ability to focus upon the exterior.

Window and Privacy.

The design of the Mushrabiyyah can ensure privacy through the following stages:

Firstly, when looking towards the mushrabiyyah from the outside, the solid areas will be bright and the gaps in between will be dark thus preventing a view of the interior.

Secondly, spaces between the vertical and horizontal members vary from very finely spaced up to eye-level and increase gradually towards the top of the window (Fig. 6.20). Such a device not only ensures privacy but also permits a pleasant view of the dark blue sky.

Window and House Flies.

The solid area presented by the screen will reduce the intensity of illumination inside the room, as a result the different colours of the interior will appear less attractive to house flies.

Window and Solar Radiation.

The following devices seem to note that the designer realised the relationship between the window location and the sun movement.

The ratio between solid and void of the east and west facades is far less than the north and south facades (Table 5) and (Fig. 6.21).
FIG. 6.20: Spaces between the Mushrabiyyah members increase gradually towards the top of the window.
FIG. 6.21: The Ratio between solid and void (windows) of the different facades, The Sehemi House.
Table 5: The ratio between solid and void of the different facades, The Sehemi House.

<table>
<thead>
<tr>
<th>Location</th>
<th>Solid Area/m²</th>
<th>Void Area/m²</th>
<th>Ratio between solid &amp; Void</th>
</tr>
</thead>
<tbody>
<tr>
<td>E facade</td>
<td>225.00</td>
<td>43.00</td>
<td>19.10 %</td>
</tr>
<tr>
<td>W facade</td>
<td>283.30</td>
<td>54.90</td>
<td>19.20 %</td>
</tr>
<tr>
<td>S facade</td>
<td>153.50</td>
<td>93.01</td>
<td>60.00 %</td>
</tr>
<tr>
<td>N facade</td>
<td>140.20</td>
<td>62.00</td>
<td>44.20 %</td>
</tr>
</tbody>
</table>

So not only the mushrabiyyah pattern varies from the eye level to the top level of the same window, or from the ground floor to the first floor, but the window size decreases as the facade is directly exposed to the sun.

The final conclusion to be derived from what is mentioned above is that the traditional designer managed to design the window in relation to the movement of the sun and social demands.

A new example of using the mushrabiyyah outside Arab countries is applied by the Austrian architect Oscar Niemeyer in his country house (Fig. 6.22). The land is hot and humid so the circulation of air is an essential factor for comfort. He therefore covered the whole opening, facing the prevailing wind, by mushrabiyyahs in the same manner as the traditional Arab house, (such as the house of Jamal-el-Din al-Dhabi, 16th century – Fig. 6.23) narrowing the lattice at the bottom and enlarging them at the top.

Now let us have a glance at modern ways of looking at the window.

It is apparent that modern designers create many thermal problems by imitating building facades from different environments. Such facades are generally characterised by large glass windows. These windows may be reasonable in temperate zones, but would be unbearable in a hot arid climate. When such glass windows are exposed to direct sun for about
FIG. 6.22: A modern example of using the Mushrabiyyah outside the Arab countries, by Oscar Niemeyer, Brazil.

FIG. 6.23: Mushrabiyyah of the house of Jamal-el-Din Al-Dhabi, Cairo.
five to eight hours daily the interior will be unbearable*, and if any sort of mechanical cooling aids are used their task will be very difficult and uneconomical.

It was realised that glass has little insulation value. To solve this problem the whole facade was covered by vertical or horizontal shading devices and often both together (egg-crate). The main object in such a case is to shade windows and create beautiful patterns regardless of shadow angles. By so doing the incoming heat may be reduced but the exterior view, when looking from the interior, could well be spoiled.

In this connection it is interesting to note that the inhabitants of many Egyptian oases realised the importance of windows. Fig. 6.3 shows how windows are shaped and located to mitigate the environmental conditions of Siwa Oasis.

6.7.4 Quantity of Illumination through the Mushrabiyyah

The main element that influences the lighting quality and quantity in the traditional Arab house is the mushrabiyyah.

During the second field trip I measured the quantity of natural light in reception hall No. 3 of the Sehemi house. It has three light sources: first, one window facing the courtyard; second, two windows facing the entrance hall; third, a lantern. The experiment was carried out on 3.8.78 at noon. The illumination level was on average 86 lux with a maximum of 128 lux in the centre, underneath the lantern (Fig. 6.24). The experiment reveals that the illumination level is insufficient for fine tasks. Meanwhile it is unfair to make such measurements because the mushrabiyyahs are now obstructed by dust and the surrounding surfaces have been changed in terms of colour. Regarding the latter, many plants have been pulled out and some areas of the courtyard have been tiled. This would naturally affect the interior measurements.

* It has been noted that a glass wall 3 m² admits about 2000 k-cal/N when exposed to direct sun rays (c.f. Fathy, H., 'The Arab house in the Urban Setting', p 6).
In spite of the fact that there are few investigations made to show the influence of the flooring material on barefoot persons, we are still able to trace such influences through an experiment which was performed in Denmark. The experiment indicates that:

"At a floor temperature of 20 °C there will be 84% dissatisfied after 10 min occupancy of a concrete floor, while a wooden floor there will be only 25% after the same period. A concrete floor of 24 °C will cause just as many dissatisfied (approximately 35%) as will a wooden floor of 18 °C after 10 min occupancy."

(Olessen, 1977)

This experiment illustrates well the important role played by surface materials on barefoot comfort*.

* It should be noted that differences may exist between Danish subjects and Egyptians in terms of the temperature levels they will tolerate.
6.8.0 Thermal Site Experiments

There has been a growing recognition of the suitability of traditional design and planning concepts to their environment. The previous study was mainly a theoretical exposition. In this part I am attempting to apply a technical study using equipment borrowed from the University of Newcastle upon Tyne, Great Britain, and the Building Research Centre, Cairo.

This study is concerned with the following three aspects:

a. Comparison between the traditional and the modern neighbourhoods in terms of air temperature to show the effect of the compact planning.

b. Comparison between air temperature on the roof of the Sehemi house and in the courtyard of the same house, to show the influence of the courtyard concept.

c. Comparison between two rooms, of the same orientation, in the traditional Sehemi house, and a modern house in terms of air temperature.

The aim of the third experiment is to bring into light the different thermal performances of the light and heavy constructions.

To carry out the above study two houses of two different environmental styles were selected (Figs. 6.25 and 6.26). The traditional case, i.e. compact planning and narrow winding streets, is represented by the Sehemi house while the modern case is represented by one of the common modern houses sited in a modern neighbourhood, i.e. characterised by wide straight streets covered by asphalt, Doky - No. 32, Ramadan Street, Cairo.

Instruments.

Six hygrographs were used to measure air temperature at six test locations. Each hygrograph was placed in a Stevenson's screen. All of the hygrographs were individually calibrated before and after the experiment.

Each hygrograph was supposed to record air temperature throughout the
The Schemi House

The Modern House, Doky, Cairo.

FIG. 6.25

FIG. 6.26
24 hours and to run continuously to cover the whole week. Unfortunately one or two of the instruments failed to work either because somebody had moved them or because of some technical deficiency. But I managed to collect charts covering about two weeks of each month for each location during the same period.

Organisation.

Six test locations were chosen to cover the required field of study (Fig. 6.27). These locations were as follows:

Locations A was on the roof of the Sehemi house which will represent the air temperature of the traditional micro-climate.

Location B was at the open courtyard of the Sehemi house.

Location C was at the reception hall No. 1 of the Sehemi house.

Location D was at reception hall No. 3 of the Sehemi house.

Location E was on the roof of the Modern house (the height of the modern and the traditional house is nearly the same).

Location F was a room of the same Modern house similar in orientation to reception hall No. 3 of the Sehemi house.

Data.

The above experiments started on Friday, 15th July, 1978 and lasted until Monday, 12th September, 1978.

I was keen to carry out these experiments during the climatically most critical months (July until mid-September).

While it is a well established fact that humidity is an important factor governing human comfort, the humidity conditions of Cairo seem to remain fairly constant*. Initially the intention was to record the relative

* During the period of the experiments the relative humidity was found to vary between 40% and 50%.
The Modern House, Doky, Cairo.

Groundfloor, Sehemi House.

Roof Floor, The Sehemi House.

First Floor, Sehemi House.
humidity within the house. Unfortunately due to malfunction of the hyrograph, used the data obtained was severely limited.

Results.

We have to bear in mind that results of the experiments excludes the influences of some important cooling devices such as the Malkaf, wind catcher, and fountains. In addition a great deal of the surroundings have been changed, such as many planted courtyards have become slums. The final results can be summarised as follows.

6.8.1 Comparison between the Traditional and the Modern Micro-climates

The micro-climate study reveals that air temperature in the modern district is usually lower than in the traditional one in the early morning (from 0200 to 0600 or 0700 hrs) and in the late afternoon (from 1800 to 2400 hrs). Charts 6.10 and 6.11 show that during the above mentioned periods the modern district is cooler than the traditional one by 1 °C to 4 °C. This cooling effect may be due to the fact that the modern district is less heat retentive due to the quick release of heat stored in the buildings. A reverse situation took place over the rest of the day (about 8 hours). During the period from 0800 to 1800 hrs a remarkable reduction occurred in the traditional case. The maximum of this reduction is about 5 °C to 6 °C which was recorded between 1000 and 1400 to 1600 hrs. This apparent difference in air temperature between the traditional and the modern district is mainly due to the surfaces being less exposed to sun and to the bright surfaces* in the traditional district. In contrast, the modern district is surrounded by sun most of the day and gains another heat load from the asphalt paving and traffic.

Finally in Charts 6.10 and 6.11, already referred to, it will be observed that the peak of the air temperature in the traditional district occurred about one hour later than in the modern district from the 22nd to the 26th August. This time lag may be due to the fact that the masonry surfaces of the traditional district take longer time to reradiate the heat than the light construction of the modern district.

* The reflected solar radiation of the traditional roof (cream limestone) is about 60% while the modern roof (dark grey concrete tiles) is about 35% (Landsberg, 1947).
6.8.2 Comparison between Air Temperature on the Roof and in the Courtyard of the Schum House

This comparison aims to show the effect of the courtyard concept on air temperature.

Charts 6.1 to 6.14 show that the courtyard air temperature is lower than the air temperature on the roof during a period of 10 to 12 hours a day. It is also apparent that the courtyard is cooler than the roof by a maximum of 4 °C to 7 °C. This peak usually lasts about four hours (from 1200 to 1600 hrs). This air temperature reduction took place in the courtyard mainly because of the following process.

When the courtyard air temperature rises the air within the courtyard will be less dense than that of the surrounding narrow streets. As a result, a convection process between the courtyard will be replaced by a denser, cooler, air moving from the street through the house. In this respect the narrow streets will act as a store for cool air. And in the same way the courtyard will replace the hotter air of the surrounding rooms. Thus, a cooling system between the street, the courtyard, and the rooms surrounding the courtyard will take place as the air temperature rises to any of them.

6.8.3 Comparison between a Modern and a Traditional Room in Terms of Air Temperature

Theoretically the heavy weight construction of the traditional house is supposed to be cooler than the lightweight construction of the modern house during the day-time and hotter at night. Practically all the experiments (Charts 6.10 and 6.11) reveal the following different results:

a. Generally speaking in the traditional room, for example, reception hall No. 3, the air temperature is cooler than in the modern one during the 24 hours.

b. During the early morning the traditional room is cooler by 1 °C to 3 °C than the modern room.

c. From mid-day to midnight the traditional room is still cooler by 1 °C to 3 °C than the modern room.

This unexpected result indicates that there are other aspects in action.

* Copy of Original charts in Appendix
Air temperature on the roof of the Sehemi house
- Court-yard air temperature
- Reception hall No. 3
- Reception hall No. 1

Air temperature on the roof of the Modern house
Air temperature at a room of the same Modern house

CHART 6.1
CHART 6.2
19.7.78

TEMPERATURE °C

TIME OF DAY

20.7.78

TEMPERATURE °C

TIME OF DAY

CHART 6.3
CHART 6.4
CHART 6.5
CHART 6.6
16.8.78

TEMPERATURE °C

TIME OF DAY

17.8.78

TEMPERATURE °C

TIME OF DAY

CHART 6.8
CHART 6.9.
324

10.9.78

TIME OF DAY

TEMPERATURE 'C'

20 22 24 26 28 30 32 34 36 38 40 42 44

CHART 6.12

11.9.78

TIME OF DAY

TEMPERATURE 'C'

20 22 24 26 28 30 32 34 36 38 40 42 44
Chart 6.13

Two temperature graphs are shown:

1. **12.9.78**
   - Chart showing temperature in degrees Celsius (°C) from 0 to 24 hours of the day.
   - The graph shows two curves: one solid and one dashed.
   - The solid curve peaks around 14:00-16:00, while the dashed curve peaks around 10:00.
   - The temperature range is from 20°C to 44°C.

2. **13.9.78**
   - Similar to 12.9.78, showing temperature over 24 hours.
   - The solid curve peaks around 14:00, and the dashed curve peaks around 10:00.
   - The temperature range is from 20°C to 44°C.

The charts suggest a daily pattern in temperature variation.
CHART 6.14
In fact it is not easy to determine those aspects on the role played by each of them precisely.

Meanwhile I believe that the most important role for achieving this cooling effect in the late afternoon is played by the courtyard.

6.8.4 **Summary**

The previous site experiments reveal the following:

a. The traditional compact planning is far better than the modern planning in terms of air temperature.

b. The courtyard concept is the principal design aspect of the traditional neighbourhood and the house. As we saw, the courtyard of the Sehemi house created a cooler micro-climate within the neighbourhood's micro-climate. In this connection, not only the courtyard created a pleasant and cool open space but it also works as a temperature regulator for the surrounding rooms.

c. There is a strong thermal relationship between the traditional house and its surroundings on one hand between the courtyard and the street and on the other hand between the courtyard and the surrounding rooms.

Thus we can finally say that the traditional design is more suitable than the modern design as far as the air temperature is concerned. This can only happen if the traditional principles are applied as a system and not separately.

It should be noted that measurements were taken when the fountains were not working. Further comprehensive study with the fountains in operation is needed.

6.9.0 **Acoustical Site Experiments**

Generally speaking, hearing is one of man's most important communication channels, perhaps only second to vision. But whilst the eyes can be shut when there is too much light or unwanted scenery to view, the ears are open throughout life to wanted and unwanted sounds (Koenigsberger, 1973).
In warm climates the problem is greater because a great part of life goes on out of doors, where noise control is not easy to achieve.

The following study aims to examine theoretically and practically the traditional Arab house in terms of sound control and room acoustics.

Sound Control.

Sound waves, outdoors, travel from their source in a continuously extending spherical wave front, rapidly attenuating as the distance from the source increases. Thus the best defence against noise sources is to put as great a distance as possible between the source and the building to be protected. This reduction in noise level can be calculated to be 6 dB*(Parken, 1969), every time the distance from the source is doubled (Fig. 6.28).

So the nature of sound decay contradicts the compact planning where the distances between the house and the street (noise source) are minimum. As a result the traditional solutions for the outside noise were concentrated within the house. That is because the designer cannot afford to locate the house away from the street or site the local industries outside the neighbourhood. His solution for the outside noise control could be summarised as follows.

Planning.

a) Neighbourhood Planning.

The traditional organic planning may control the spread of noise. Furthermore, the cul-de-sacs seem to form a very useful aid to planning for quiet, so often a portion of cul-de-sac was occupied by inhabitants working at the same time of day.

b) The House Planning.

The traditional house planning is obviously governed by a whole series

* Sound Pressure Level is expressed in terms of a decibel (dB) scale. It is useful to remember that because of the logarithmic basis of the scale an increase of 10 dB roughly corresponds to a doubling of loudness, e.g. 80 dB of noise is twice as loud as 70 dB.
of factors other than noise. Meanwhile it seems that noise aspects were taken into account. Fig. 6.29 shows that external noises are reduced by placing rooms which are not noise-sensitive, on the side of the house nearest to the noise source (the street). Thus those unimportant rooms, in terms of noise level, will provide screening and protection to the more critical spaces. In terms of efficiency those unimportant rooms will act as a barrier in the most effective way because they are too near to the noise source, the street. In the same way the courtyard is separated by building mass from the street and from the neighbouring courts.

c) Fenestration.

Windows and doors, particularly external doors, are the weakest points in terms of noise insulation. That is because the most common way in which sound is transmitted is air. Thus continuous air paths in houses in the form of windows and doors are the greatest trouble spots.

Windows: The traditional Arab house usually exhibits the minimum number of small windows facing the street. Meanwhile the majority of windows often face the inner courtyard.

So in spite of the fact that the arrangement and the design of the traditional windows are governed by many aspects such as privacy, lighting and thermal comfort, the same window design is rather favourable from the point of view of external noise exclusion.

Doors: It is interesting to note that the traditional entrance design is very much like what we call in acoustic terms 'the sound lock'* (Parken, 1969)(Fig. 6.30). This design is also convenient for a person can close one door before opening another.

6.10.0 Measurements of the Street Noise Level inside some Traditional Houses.

This experiment aims to trace the street noise level in different locations inside the traditional house. To this object three traditional

* A sound lock is a sound reducing lobby formed between two doors.
FIG. 6.29: Shaded areas are rooms which are not noise-sensitive.
FIG. 6.30: The Sound Lock.
In Cairo, were chosen. The experiment was done on three successive days using a sound level meter (Model 2203 - Brüel and Kjær, Copenhagen).

a) The First House - The Sehemi House.

Fig. 6.31 shows the noise level in the street outside the house and the recorded measurements inside the different spaces of the house. It also shows the amount of reduction in terms of noise level which took place in the house.

The above measurements reveal that as reception hall No. 3 and 4 are the most favourable rooms in terms of privacy they also exhibit a convenient reduction in noise level. For example, the average noise level in reception hall No. 3 was 36 dB when the street noise level was about 68 dB. That means that 36 dB out of 68 dB was received in reception hall No. 3.

b) The Second House.

The second case study was the Keritliya house, Cairo. Fig. 6.32 shows that the Faskiya or the fountain reception hall received 42 dB out of 56 dB and the Harim or women's reception hall received 38 dB out of 56 dB. The above figures indicate that the Keritliya house is poorer than the Sehemi house in terms of noise insulation.

c) The Third House.

The third case study was the Musapher Khana house. Fig. 6.33 shows that the men's reception hall was less than the street, in terms of noise level, by 38 dB.

d) Comparison between the Three Houses in Terms of Noise Level.

If we make a comparison between the three houses in terms of the recorded noise level we will realise that the first and the third houses are quieter than the second house, the Keritliya. The reason may be due to the fact that a great deal of modernisation took place around the Keritliya house. Thus we can say that the noise level within the house is also influenced by the surrounding narrow streets and the neighbourhood design as a whole.
FIG. 6.31

Measurements (in dB) of the Street Noise Level inside some Traditional Houses, Cairo.

FIG. 6.32: The Keritliya House.

FIG. 6.33: Part of the Musapher Khana House.
Finally, the same result can support the previous study which emphasizes that the traditional concept of design is one system, i.e. if the system breaks down the individual components which make it effective also break down.

**Study of the Efficiency of the Mushrabiyyah in Terms of Sound Insulation**

The following experiment aims to measure the amount of sound insulation achieved by the Mushrabiyyah. The experiment had been carried out in two receptions halls of two different houses.

**Equipment.**

The following equipment (Fig. 6.34) was used to measure the noise level in front of and beyond the Mushrabiyyah in each case:

a. Sound level meter, model 2203 - Brueland Kjaer, Denmark.

b. Selective amplifier, model 2706 - Brueland Kjaer, Denmark,

c. Two loudspeakers.

**Arrangement.**

An artificial noise was generated and the sound pressure level was measured in front of and beyond the Mushrabiyyah of the reception hall No. 4, Sehami house (Fig. 6.35). In the same way the sound pressure level was measured at the Musapher Khana house (Fig. 6.36), in the men's reception hall; in the second case the measurements were done three times. The first two measurements were to find the influence of the Mushrabiyyah on sound insulation and the third one was carried out after closing the glass*.

**Results.**

Chart 6.15 shows the Mushrabiyyah insulation at different frequencies. The same chart reveals that the Mushrabiyyah is poor in terms of sound

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* Originally the Mushrabiyyahs were not glazed. However, modernisation has resulted in glazing being employed in some houses like the Musapher Khana house and Keritliya.
FIG. 6.34: Equipment used for the acoustical field measurements.
FIG. 6.35: The Sehemi house reception hall No. 4.
Location of measuring sound pressure levels.

FIG. 6.36: The Musapher Khana house, men's reception hall.
CHART 6.15: The efficiency of the unglazed Mushrabiyyah in terms of sound insulation, R.H. No. 4, The Sehemi House.

<table>
<thead>
<tr>
<th>Frequency (c/s)</th>
<th>S.P.L. at (A)</th>
<th>S.P.L. at (B)</th>
<th>Difference A - B</th>
</tr>
</thead>
<tbody>
<tr>
<td>315</td>
<td>68.9</td>
<td>65.8</td>
<td>3.1</td>
</tr>
<tr>
<td>400</td>
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<td>68.5</td>
<td>67.2</td>
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<td>73.3</td>
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</tr>
<tr>
<td>800</td>
<td>66.6</td>
<td>62.4</td>
<td>4.2</td>
</tr>
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<td>71.6</td>
<td>65.8</td>
<td>6.0</td>
</tr>
<tr>
<td>1250</td>
<td>72.5</td>
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<td>67.7</td>
<td>6.9</td>
</tr>
<tr>
<td>3150</td>
<td>75.5</td>
<td>66.3</td>
<td>7.2</td>
</tr>
</tbody>
</table>
6.12.0 Study of the Traditional House in Terms of Room Acoustics

In designing rooms for various purposes, such as the traditional reception halls, the architect will mostly encounter acoustic problems associated with enclosed spaces. The propagation and behaviour of sound waves in enclosed spaces are more complex than in the open air. When sound waves strike the enclosures of a room, a certain portion of their energy will be reflected, absorbed, dispersed, diffracted or transmitted into adjacent spaces, depending on the acoustic characteristics of the enclosures.

In theory it is possible to study the path of the waves during the entire time of their travel over distances. During this time they will have been reflected from various room surfaces many times, the number depending on the size of the room.

In practice the task of plotting the path of the waves beyond the first one or two reflections is too complicated to attempt and in any case what happens to the wave path after they have been reflected once or twice is not of great importance.

The Influence of the Room Size, Volume.

Because sound travels at a fixed speed, the greater the volume the less often will waves meet absorbing surfaces and the more will be the time of delay. This basic relationship was first put into a quantitative form by Sabine. The Sabine formula states that the time required for the sound to decay by 60 dB is the reverberation time, (Parken, 1969). In brief, it is necessary that reverberation time should not be too long or too short.

So it is the general aim in acoustic design to provide a certain amount of reverberation (an optimum reverberation time) to ensure that this value is roughly constant over the whole audible range of frequencies and that each decay takes place at a reasonably steady rate without excessive fluctuations. Thus I will examine the traditional reception halls in
CHART 6.16: Comparison between sound insulation of glazed and unglazed Mushrabiyyah, men's reception hall, Musapher Khana House.

S. P. L. (0) Average sound pressure level outside.
S. P. L. (I) Average sound pressure level inside (windows closed)
S. P. L. (2) Average sound pressure level inside (windows open)

<table>
<thead>
<tr>
<th>Frequency (c/s)</th>
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<th>S. P. L. (I)</th>
<th>S. P. L. (2)</th>
<th>S. P. L. (0-1)</th>
<th>S. P. L. (0-2)</th>
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</thead>
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</tr>
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<td>73.6</td>
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</tr>
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</tr>
<tr>
<td>1000</td>
<td>92.2</td>
<td>71.2</td>
<td>81.2</td>
<td>21.0</td>
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</tr>
<tr>
<td>1250</td>
<td>93.0</td>
<td>70.8</td>
<td>81.6</td>
<td>22.2</td>
<td>11.4</td>
</tr>
<tr>
<td>1600</td>
<td>91.5</td>
<td>69.1</td>
<td>79.8</td>
<td>23.4</td>
<td>11.7</td>
</tr>
<tr>
<td>2000</td>
<td>81.0</td>
<td>69.9</td>
<td>72.2</td>
<td>21.1</td>
<td>8.8</td>
</tr>
<tr>
<td>2500</td>
<td>86.1</td>
<td>61.6</td>
<td>73.9</td>
<td>25.9</td>
<td>12.2</td>
</tr>
<tr>
<td>3150</td>
<td>83.8</td>
<td>62.2</td>
<td>73.0</td>
<td>21.6</td>
<td>10.6</td>
</tr>
</tbody>
</table>
6.13.0 Measurements of the Reverberation Time of some Traditional Reception Halls

Problems.

Large rooms like the traditional reception halls usually present some problems in terms of reverberation time and echo. For example, when the reflected rays arrive at a point, having travelled more than 15.5 to 18.5 m further than the direct distance to this point, this may give rise to echoes. Another type of echo sometimes occurs between pairs of plain parallel surfaces. This is known as flutter echo and can often be observed if an impulsive sound such as a hand clap is produced. This phenomenon happens because sound waves are reflected as light from a mirror. Their angle of reflection equals the angle of incidence. They can of course go on doing this indefinitely (Parkin, 1969).

Solutions.

As for the echo, which often occurs between pairs of plain parallel walls Fig. 6.37 shows that in reception hall No. 3, the Sehemi house, walls (a) and (b) are not parallel but widen towards the end. This divergence can help to stop such echo.

As for the reverberation time, five different reception halls were examined. This part of the site experiment aims to show the reverberation time of each of these reception halls in relation to the optimum or the ideal recommended reverberation time corresponding to the volume of each room (Parkin, 1969). Figs. 6.38 to 6.41 indicate the volumes of the rooms and the surface materials found there.

Results.

The five reception halls under examination reveal that their architectural design is favourable to their functions in terms of room acoustics.

In figures, they are all within the ideal limits of the optimum reverberation time corresponding to the volume of each of them (Charts 6.17 to 6.21).

* The optimum reverberation does not necessarily appear for all room geometrics. For example, in rooms where there are either sound concentrations (domes) or where one room dimension is very different to the other two.
FIG. 6.37: Plan of reception hall No. 3, the Se hemi house,
FIG. 6.38: The Sehemi house, reception hall No. 1.

Section A-A

Room volume = 510 m³

Section B-B
FIG. 6.39: The Keritliya house, Al-Faskia reception hall.
FIG. 6.40: The Keritliya house, the Harim reception hall.
FIG. 6.41: The Musapher Khana house, men's reception hall.
### Measured Reverberation Time

**Optimum Reverberation Time**

![Chart 6.17: Measurements of the Reverberation time, the Sehemh house, reception hall No. 1.](image)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Reverberation T (sec)</th>
<th>Optimum T (sec)</th>
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</thead>
<tbody>
<tr>
<td>315</td>
<td>0.57</td>
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</tr>
<tr>
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</tr>
<tr>
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</tr>
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<tr>
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</tr>
<tr>
<td>3150</td>
<td>0.75</td>
<td>0.82</td>
</tr>
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</table>
CHART 6.18: Measurements of the reverberation time, the Keritliya house, the Harim reception hall.

<table>
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<tr>
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<th>( T ) orange</th>
</tr>
</thead>
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</tr>
<tr>
<td>400</td>
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</tr>
<tr>
<td>630</td>
<td>0.62 0.75 0.69 0.58 0.65 0.60</td>
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<td>800</td>
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<tr>
<td>1000</td>
<td>0.76 0.76 0.79 0.75 0.76 0.70</td>
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<td>1250</td>
<td>0.75 0.70 0.70 0.70 0.70 0.73</td>
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</tr>
<tr>
<td>1600</td>
<td>0.69 0.67 0.69 0.75 0.66 0.69</td>
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<td>0.59</td>
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CHART 6.19: Measurements of the reverberation time, the Keritliya house, Al-Faskia reception hall.

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<td>500</td>
<td>630</td>
<td>800</td>
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<td>1250</td>
<td>1600</td>
<td>2000</td>
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</tr>
<tr>
<td><strong>T</strong></td>
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<tr>
<td><strong>T</strong> opt</td>
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<td>1.03</td>
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<td>1.00</td>
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<td>1.01</td>
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</tbody>
</table>

- **Measured Reverberation Time**
- **Optimum Reverberation Time**
CHART 6.20: Measurements of the reverberation times, the Musapher Khana house, men's reception hall.

<table>
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<th>( T ) Opt.</th>
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<td>1.08 1.10 1.00 1.10 1.12 1.12</td>
<td>1.08</td>
</tr>
<tr>
<td>3150</td>
<td>1.00 1.07 1.10 1.00 1.06 1.05</td>
<td>1.04</td>
</tr>
</tbody>
</table>
CHART 6.21: Measurements of the reverberation time, Zinab Khartoun house, Cairo, main reception hall, groundfloor

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Reverberation Time 'T'</th>
<th>'T' Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>315</td>
<td>1.20 1.20 1.14 1.30 0.90 1.00</td>
<td>1.12</td>
</tr>
<tr>
<td>400</td>
<td>1.10 1.05 1.18 1.05 1.10 1.08</td>
<td>1.09</td>
</tr>
<tr>
<td>500</td>
<td>1.20 1.14 1.05 1.05 0.97 1.00</td>
<td>1.06</td>
</tr>
<tr>
<td>630</td>
<td>0.82 1.24 1.06 1.26 1.28 1.20</td>
<td>1.13</td>
</tr>
<tr>
<td>800</td>
<td>1.11 1.27 1.20 1.70 1.08 1.30</td>
<td>1.19</td>
</tr>
<tr>
<td>1000</td>
<td>1.12 1.13 1.10 1.13 1.20 1.05</td>
<td>1.12</td>
</tr>
<tr>
<td>1250</td>
<td>1.05 1.00 1.28 1.00 1.12 1.05</td>
<td>1.08</td>
</tr>
<tr>
<td>1600</td>
<td>1.10 0.93 1.18 1.00 1.02 1.02</td>
<td>1.04</td>
</tr>
<tr>
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<td>0.93 1.12 1.10 0.95 0.96 1.13</td>
<td>1.03</td>
</tr>
<tr>
<td>2500</td>
<td>1.16 1.12 0.97 1.08 1.12 0.98</td>
<td>1.07</td>
</tr>
<tr>
<td>3150</td>
<td>0.99 1.03 0.93 1.05 1.00 0.97</td>
<td>0.99</td>
</tr>
</tbody>
</table>
As for the slight differences between the measured and the ideal reverberation time in each case, this reasonable variation, as experts described* it, is directly related to the absence of both the reception hall occupants and some finishing materials, carpets; so the absorption values of the reception hall are less than when it was occupied and fully furnished. As a result, the measured reverberation time is slightly higher in each case than the ideal one.

6.14.0 The Noise of Footsteps

There is another sort of noise which is usually generated from footsteps. Footsteps are carried through the structure of the building with little attenuation. Thus a travel of sound waves between the upper floor or floors will be felt in any of the ground floor, (Parken, 1969).

The traditional designer overcame such problems when he made the important reception halls, in terms of quiet, rise to the full height of the house, which resulted in there not being any traffic above the space.

6.15.0 Summary

The great suitability of the traditional Arab house in terms of noise insulation and the good quality of the reception halls from the point of view of reverberation time may be due to one of the following hypotheses:

a. The traditional designer attempted to design the house with a good knowledge of noise and sound characteristics in mind.

b. The designer may have attempted to solve the question of privacy, thermal and social problems whereas the acoustic problems have been solved accidentally.

c. The unglazed Mushrabiyyah is poor in terms of sound insulation.

In all cases the traditional Arab house bears good noise insulation and ideal hearing standard inside the reception hall.

* Dr. T.J. Wiltshire, Lecturer, Building Science Department, University of Newcastle upon Tyne.
The second factor, after climate, that has produced the typical Arab
house is partly social and partly religious. Their impacts were not
only felt inside the house but solutions started outside the residential
house, i.e. neighbourhood planning.

Here again we encounter the same philosophy of the designer, i.e. the
way of looking at the problem from a wide angle and producing the most
available devices to act as one system towards the solution of the
problem.

The problem facing the designer in this respect is that the Qur'ān
encourages to a great extent both maximum social intercourse and maximum
privacy at the same time. Maximum social intercourse is mentioned in
direct ordered terms. The Qur'ān orders the Muslim to keep close con-
tacts with his family, neighbours and friends.

Meanwhile maximum privacy is required according to the following words
from the Qur'ān, which show the necessity under which a Muslim'eh (the
female of Muslim) has to conceal whatever is attractive in her personal
attire from all men, except certain relations:

"And speak unto the believing women, that they restrain their eyes,
and preserve their modesty, and discover not their ornaments, except
what (necessarily) appeareth thereof. And let them throw their
veils over their bosoms, and not show their ornaments, unless to
their husbands or their fathers, or their husbands' fathers, or their
sons, or their husbands' sons, or their brothers, or their brothers'
sons, or their sisters' sons, or their women."

There is also another stage of segregation in pre-Islamic custom, still
practised now. That deals with the separation of sexes not only during
their lifetime but also after death. In the family vaults one side is
set apart for men, the other for women, between them is the entrance of
the tomb (Lane, 1968).

Architecturally speaking the traditional designer had to balance the
two contradictions; this means that the design must facilitate and
encourage maximum social contacts as well as maintaining privacy, parti-
cularly for the Harim, women.
That task became more difficult because of the absence of any sort of social clubs, reasonable coffeehouses, or private offices to discuss business affairs.

So the private house had to accommodate many other functions. The first part of the following study will mainly deal with the different stages of achieving privacy, while the second part will be concerned with the influences of social intercourse on the house.

6.17.0 Different Degrees of Privacy

In speaking about privacy it would seem appropriate to define the different stages of privacy starting from the territories up to the residential house. The main object of this investigation is to indicate the designer's line of approaching the problem and then bringing to light the different devices used to achieve the solution.

6.17.1 First Degree of Privacy

This stage is concerned with the seclusion of the territories from the whole region; we give the Islamic Ribat as an example. The Ribat is a fortified stronghold mainly for soldiers, to provide them with special services. An example is the Ribat-El-Sultan Einal built during the 13th century (Fig. 6.42).

The Ribat's design is mainly characterised by a courtyard surrounded by different spaces. Its inward orientation together with its location which used to be on the boundaries of the city helped to ensure both seclusion and privacy (Planhol, 1959).

6.17.2 Second Degree of Privacy

The second degree of privacy is apparent from the physical separation of one neighbourhood, or quarter, from the other – each with its own elected leader and its private doorway. In the round city of Baghdad (Fig. 6.43) the space between the outer and inner walls was divided into different neighbourhoods, each with its own paths and private gate. The population of each quarter was either of the same tribe, trade or profession.
l. c. courtyard ME main entrance
c. cell SE secondary ent.
v. vault G. guards.

FIG. 6.42: Ribat El-Sultan Einal (13th C.)

FIG. 6.43: Baghdad, The Round City of Al-Mansur.
6.17.3 Third Degree of Privacy

Not only Muslim people designed private quarters or divided the city into different quarters but within the one quarter there was some sort of sub-division, i.e. the Atfa or cul-de-sac.

The cul-de-sac used to be occupied by five or six families who have a strong relationship or in many cases it was occupied by one large family.

Up to this stage we can realise that the quarters or the different units of the quarters which are mainly based on homogeneity and strong social contacts between its members can help in many ways to achieve privacy.

In this connection there is an old traditional saying, 'Build your house in such a way to give sun and view - but do not take sun and view from your neighbour'.

6.17.4 Fourth Degree of Privacy

This stage is mainly concerned with planning and architectural design.

Planing Devices.

By planning manipulation the designer started to ensure privacy to the house through the following steps:

a. Grouping the different spaces used by men on the ground floor which were seldom entered by females.

b. Devoting the first floor to the females and no stranger was allowed to enter it. Even stairs leading to those floors are hidden away from any male visitors (Fig. 6.44).

c. Most houses used to embody more than one courtyard. The back courtyard or the garden was mainly used by females and children in order to ensure privacy and calm for the different spaces surrounding the main courtyard.

d. Reception halls on the ground floor were sited according to their function, i.e. casual meetings with strangers used to take place at any room near the main entrance - and as the visitor's relationship
FIG. 6.44: Stairs leading to females floor are often hidden away from strangers.

Zinab-Katoun House, Cairo.

Koch Kadam House, Cairo.

The Sehemi House, Cairo.
with the family increased he was allowed to penetrate further into
the house and be received at the nearest reception hall to the
doorway (Fig. 6.44).

e. In spite of the fact that the kitchen and food stores are on the
ground floor (men's floor) it is designed in such a way that
nobody can see or hear the Harim while women are in or moving to
and from the kitchen.

f. The Harim living area on the first floor is located on a specific
site and designed in such a way as to enable women to view the
courtyard and the back garden without being seen. (see Fig. 2.28)

Thus it is apparent that the designer started his solution by planning
devices which can be traced horizontally starting from the quarters and
vertically inside the dwelling.

6.18.0 The House Design in Terms of Privacy

a) The Entrance Design

In nearly all traditional Arab houses, and particularly in Cairo, the
entrance space is designed to ensure privacy to the interior even when
the door is open.

Figs. 6.45 to 6.48 illustrate the staggered entrance being turned in
one or two sharp bends, any attempt of inquisitive eyes to see into the
interior is prevented. Furthermore, if any stranger entered the main
doorway while the courtyard is occupied by the Harim – the length of the
entrance corridor will take him at least the same period of time as the
Harim to escape to the nearest staircase.

Actually the staggered entrance is not entirely a Muslim innovation but
it was commonly known in ancient Egypt where two examples dating from
the 6th - 12th dynasties are known. The first is the mud-brick fortress
of Kom-al-Ahmar, on the left bank of the Nile (Fig. 6.45); the second
is Shunet Az-Zebib (Creswell, 1952)(Fig. 6.46).

Meanwhile the earliest staggered entrance in Islam was of the City of
Baghdad (Fig. 6.47). Later on it had been used during the Fatimid period
FIG. 6.45: Kom-al-Ahmar

FIG. 6.46: Shunet Az-Zebib

FIG. 6.47: The earliest staggered entrance in Islam, 8th Century.

Zenab-Khatoun house
El-Sinari house
El-Keritliya house

Koch-Kadam house
The Sehemi house
The Musapher Khana house

FIG. 6.48: The staggered entrance, Mameluk and Turkish periods, Cairo.
Finally, it became very common in residential architecture during the Mameluk and the Turkish periods (Samih, 1970)(Fig. 6.48).

b) Opening Design.

It is obvious that windows are the most critical items which affect privacy, vision, and natural ventilation. For example, if we made them large, for ventilation and vision, the result would be to the cost of privacy, and so on.

The following devices will explain how the designer accommodated the three contradictions without hindering any other functions.

Non-existence of windows towards the street, or locating them to such a height that even a man on a camel cannot look into the interior (Fig. 6.49).

They were so planned that none of them look into any other house, nor can the courtyard or any space be seen by any neighbours even from their roofs.

Screening all windows and bays of the upper floor in such a manner that the Harim can view the life in the street, ceremonies, and festivals in the court without being observed.

Designing the window-screen in such a way that it can help the passage of air from the top openings while concealing the viewer up to eye level (see 6.7.3 for more details).

Finally, from one point only, it is possible to look into these courts and gardens, and that is from the top of the mosque's minaret (Fig. 1.1). It is interesting to note that it is for this reason alone that the office of the Hu'adhin came to be the prerogative of blind men (Makrizy, 1853).
The Qur'ān demands great social contacts together with people's hospitality which are the first part of the physical influence. The second seems to be the Muslim family size which used to embody three or four generations within one house.

Thus on the one hand, how did the house accommodate the great social activities of the visitors, and on the other how was it able to accommodate such a big family?

The answer aims to show the physical influences of both the social activities and family size in terms of areas:

a. The covered living area for different social functions on the ground floor of the Sehemi house is about 430 m² which represents 39.93% of the total floor built area.

b. The open space for summer ceremonies and religious festivals, court and garden, is 990 m², which is about 47.95% of the total house area.

c. The living areas for the Harim and the summer terrace, are about 225 m² which represents 52.13% of the actual* first floor area.

d. The service area, kitchen and stores, is about 178 m². The above facts reflect the great and direct influences of the social activities on the house design in terms of area. As for the impact of the Muslim family size on the house design, there are two main devices which seem to solve or at least mitigate the problem.

The house plan can easily accept many additions of new members without spoiling the whole design in terms of function or aesthetics.

There were no rooms furnished as bedrooms in the western sense of the word. The bed simply consisted of a mattress, resting on one of the

* Actual area in this respect means the available used area, because some reception halls of the ground floor (No. 1 and 3 of the Sehemi house) usually rise to the whole height of the house.
palm stick frames or crates and was placed in a recess during the day time, thus allowing the room to be used as a parlour. So one can say that the furniture design made it possible to use all spaces of the house during the night as bedrooms. As a result the house was capable of accommodating the Muslim family. So it seems that the great advantage of social contacts, particularly between different generations, were realised. Such contacts* are apt to engender a curious sense of depth and life cycle. It also increases the meaning of the actual human and social objects of our heritage.

Finally, we can say that the whole system, starting from the neighbourhood up to the smallest space inside the house, reflects the social patterns of the people within the Muslim family. It also illustrates the designer's reaction to these demands and his ability to express them in terms of planning and architectural design.

Thus one can say that both the neighbourhood planning and the house design reflect the family's social life and habits at the time.

Now let us look at our modern house trying to find out what social aspects it has to tell. Definitely it has not any in most cases. Sometimes it only reflects style and good appearance which cannot solve any problems of family life. It also seems strange to orientate the house in such an environment towards the street as a showpiece displayed to the public. Even our interior living areas, through the use of large glass window walls, have been opened to the public.

All this deterioration takes place at a time when we are in greater need of privacy than at any other time. Our urgent need for privacy nowadays is partly due to the invasion of modern technical equipment (radio, television, telephone) and partly to the relatively smaller spaces we now occupy, in addition to the lighter building construction we commonly use.

* In this connection, Alexander Leighton has declared:

"For optimal development, the person must, especially in the formative years, interact with a fair cross section of people so that suitable balances of sentiment patterns can be achieved. If the opportunity for developing a variety of these relationships is limited ... damaging consequences to the personality may occur."

Translations of Bartlett Society, Vol. 3 196405, p 124.
6.20.1 Structural Expression

One of the main characteristic features of the traditional Arab house is the apparent structural expression both internally and externally.

As for the interior the best example may be found in the ceiling construction. It is supported by timber beams, in a reasonable cross-section. These beams are supported at the end by elongated corbels ending in perfect stalactite patterns (Fig. 6.50). Nothing is hidden away - everything is openly expressed; there is no insincere work and also there is no confusion. One has the feeling that each detail of each corner is within the main framework of the whole and not conceived as an additional part. Even the circulation pattern, furniture and ornaments are simple and objective.

In traditional buildings natural building materials were used whose strength everyone knew from experience (e.g. wood, stone), and when we look at the masonry construction we are immediately satisfied that it is able to do the job it has to do. Good examples are the corbels which carry the projecting upper floor of the traditional Arab house. These stone corbels give a sense of security (Fig. 6.51). Not only did the traditional designer choose the convenient building materials to support these projecting upper storeys but he also inclined them slightly upwards to give increased strength (Fig. 6.52).

It is worth remembering that if an observer is to feel the security and integrity of a building, by an understanding of such things as the distribution of visual weight and the relation between load and carrier, then these should be simple and apparent.

6.20.2 Forms and Meanings

As for the different forms in relation to what they may reveal, the traditional architect used to introduce some popular and meaningful forms to his design. The most common of these forms are the arch and the dome. To the Arabs the dome suggests the sky and gives a sense of loftiness and direction towards the sky. In the same way the arch may
FIG. 6.50 Each Detail of Each Corner is within the Main Framework of the Whole.
FIG. 6.51 Sketch Showing the Apparent Structural Expression.
FIG. 6.52 The Corbels are often inclined slightly upwards to increase strength.
also draw the attention upwards to the heavens. In this respect it may also resemble the Arab horse shoe.

Another interesting aspect can be found in the use of convex forms rather than concave ones. These convex forms can be found dominating the main outline of the external bay windows (Fig. 6.53). The same convex form appears again in the shaping of the different parts of the mushrabiyyah (Fig. 6.54).

Finally, if we looked at all the above forms from a wide angle we will realise that all of them are common in the use of convex lines (Fig. 6.55).

So it seems that the traditional architect was familiar with the convex shape because it represents a natural shape. In common experience most things – the human body, rocks, clouds, hills and the like – are largely convex in shape. On the other hand they are softer and have a better tactile quality and can give the sense of expansion.

6.20.3 Function and Form in Terms of Facade Design

As I mentioned earlier, the house used to be orientated inwards to fulfil many functions. This inward orientation made the courtyard the main focal point of the house.

This fact was directly reflected by the house facades in the form of contrast between the internal and external facades.

Thus one can say that as the functions were concentrated inside the house, namely in the courtyard, the facades lining the courtyard exhibit the most luxurious treatment in contrast to the exterior facade, so the form of facades and their design was mainly guided and controlled by the amount of functions behind them. In other words, because the actual life in the traditional house was indoors the beauty of the facades was indoors towards the inhabitants and not for the passers by.

6.20.4 Function and Form in Terms of Plan Design

In spite of the fact that the ground floor of the traditional Arab house
FIG. 6.53
A Traditional Bay Window
used to embody reception halls only, each of these reception halls had a specific function, such as business affairs, religious seminars, casual meetings and social entertainments. Even the first floor, which was used mainly by women, has many other different functions such as, a dining hall, and servants' apartment. Thus the activities within the house were variable. Such variety in function made the house appear asymmetrical in terms of plan and volume.

As a result the house expresses and translates the different functions in an honest way. By doing so the designer seems to understand that a symmetrical design must express a symmetrical function. In this connection it seems painful to discover an important function balance against its form. It is also disturbing to find a plan controlled beyond workability in order to balance an area of dissimilar functions.

Again because the house functions were not the same house design appears asymmetrical in form. Each space was designed with a full regard of its functional qualities and demands. Even circulation patterns became more free and views appeared in maximum variety. Each object may be seen and enjoyed for itself and its relationship to other elements and to the whole rather than for its prescribed patterns, i.e. laws of symmetry.

In the traditional house we feel that we are not led step by step along or through a rigid composition. We are, rather, set free to explore and discover its beauty. All of these advantages were achieved when the functions were honestly translated into forms.

The main difficulty which used to arise from the asymmetrical forms is how to balance them visually, but it seems that the traditional designer was capable of achieving balance between equal and unequal masses (Fig. 6.56 and 6.57).

But was the traditional designer familiar with symmetry? Actually, the traditional designer introduced symmetrical plans and forms only when the functions beyond these forms were the same. The mosque plan and facades are a good example to illustrate that the symmetrical plan and facades appeared as a result of the symmetrical function or the one function which is prayer. Another example can be found in the mushrabiyyah of the residential house. The mushrabiyyah exhibits sophisticated patterns
assembled in a symmetrical pattern.

Finally, it seems that there is another reason for designing the traditional Arab house in an asymmetrical manner. That is the arrangement of some enclosed spaces was usually on different levels. Some reception halls rise to the whole height of the house (Fig. 6.58). Others, such as Maqu'ad (Fig. 6.59) forms mezzanine storeys. Thus one frequently has to ascend or descend several steps in going from one space to the next or even sometimes within the same space, namely the qu'ah.

The reason for having different floor levels may be due to climatic proportional or psychological reasons. Having a step or two within the same reception hall, leading from the central part to the Iwans, may be related to the idea of reserving the topmost Iwan of the reception hall for the owner of the house and those of high rank. The same idea was common in the Mosque's minbar where the Imam, usually a layman who gave the weekly sermon, stands on the topmost step but one leaving the post of honour to the most worthy, i.e. Mohammed the prophet himself.

Thus the various levels which played a main role in achieving many functions were in turn reflected by the house design in terms of asymmetrical forms.

6.21.0 Space Design

6.21.1 Internal Space Design

We cannot lay down fixed rules for proportions of space as architecturally correct. The value of space, as a whole is affected first and foremost no doubt by actual dimensions but it is also affected by many other aspects such as; social, climatic and psychological aspects.

As for the traditional Arab house the need for big interiors seems to be part functional, to accommodate the family, consisting of three or more generations, and partly emotional to achieve a sense of awe and grandeur, or it may be due to the fact that people realised that small spaces will create a sense of overcrowding*. As a result they may feel

* There is widespread evidence to show that overcrowding in small dwellings causes psychological and social damage. For further information see William C. Loring 'Housing Characteristics and Social Disorganisation', Social Problems, January 1956.
FIG. 6.58
Main reception halls often rise to the whole height of the house.

FIG. 6.59
The Maqu'ad usually forms a mezzanine storey.
cramped and everything will seem to be too near everything else and privacy will be impossible.

The need for big reception halls also seems to be the result of the great number who used to occupy them. For example, the whole family used to gather in one of them for social entertainment, or many times a great number of the householder's friends and colleagues used to assemble in one of them. As a result the reception hall had to be big enough on the one hand to accommodate these numbers and on the other hand to create the convenient atmosphere for conversation, i.e. if the reception hall is not big enough the people will feel too close, hence it will generate the feeling that they are on top of you - as a result sharp focus is lost.

Thus big spaces seem to be the answer to the Muslem family's needs both physically and psychologically. Meanwhile, big spaces, namely the different reception halls, can generate other problems such as:

a. Big space usually appears monumental rather than residential and gives the sense of overwhelming space.

b. Rooms with large surfaces almost never have any personal character.

If we are going to examine the interior spaces of the traditional Arab house we will be mainly dealing with the reception hall. These reception halls were used as bedrooms, dining room, and for various social activities. Actually, the volume of the reception hall may be vast and overwhelming to a person who enters or wanders through it. This feeling is felt particularly if the reception hall is not furnished and not occupied in the same way it used to be. This particular point can indicate that the traditional space can only be satisfied by the presence of the people for whom it was conceived. This was my personal feeling when I invited twenty of my friends to represent the approximate number of the original inhabitants and refurnished the reception hall with its original furniture. This can indicate that there was some sort of relationship between the space design and the furniture proportions. In this connection one may presume that the 'furniture' was also the work of the architect and not of the upholsterer.
As for the monumental and overwhelming scale of the reception hall itself, the designer was keen to introduce many elements of a human scale, to act as a reference point, such as the window screen pattern, floor tiles, and steps between the different parts of the reception hall. Consequently one will relate oneself to the scale or such elements and feel relaxed.

The Personalisation of the Huge Reception Hall.

The personal sense was greatly needed to be felt within any of the reception halls because of the nature of its use. It used to accommodate great numbers of people for purposes of business discussion and entertainment. In both cases they needed different spaces in order not to interfere with each other. The same different activities can take place when the family gather in the reception hall. Each group of a similar age want to play or speak without interference from the other groups. That means that in both cases, the family or the friends can be together even when they are doing different things.

The traditional designer seemed to find the solution by introducing a personal sense to each group within the one space of the reception hall, in the shape of the qu'ah* (reception hall).

The design of the reception halls in Figs. 6.60 to 6.62b appears to break down the vast space into three main personal volumes. The same pattern of the reception hall seems to fulfil another sense of social space and personal space as follows.

With the Muslim large family it is obviously not possible to give each person a room of his own. In fact it is not even desirable to do so - especially in an oriental community where people are uncomfortable when isolated. Thus the reception hall pattern makes it possible for the inhabitants to sleep on mattresses placed in these Iwans**. By doing

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* See glossary.

** The traditional bed consisted of mattress resting on one of the palm stick frames or crates. During the day-time these beds were stored in the different recesses of the reception hall, thus allowing the reception hall to be used for other functions. For more information on this subject, see Lane, 1968.
FIG. 6.60 Different activities can take place when the family gather in the reception hall.
FIG. 6.61 Each group, of similar age or sex, can speak or play without interference from the other groups.
Reception Hall No. 1

Reception Hall No. 2

Traditional Reception Hall

FIG. 6.62a

Reception Hall No. 3
FIG. 6.62b: A general sense of the traditional reception hall.
so, each group had a reasonable amount of privacy, and a feeling of security. As for small children they would have the feeling that they are sleeping in the presence of others.

6.22.0 Personal Sense in Terms of Wall Treatment

In fact walls have the greatest visual impact. Since either moving about or seated within the hall, we are normally face to face with the walls. So we may assume that such standing surfaces present the greatest design possibilities. In our case the problem is how to reduce the area of the large walls visually to a reasonable size and interesting interior perspectives. In this respect the designer's solution was focused on two main aspects; firstly, the wall shaping and secondly, the surface treatment.

Wall Shaping.

The designer made great use of the thick masonry walls surrounding these reception halls. He created different patterns of niches, shelves and recesses where special things such as vases, books, gifts and other collections were placed (Fig. 6.63). The final result of this device is the breakdown of the continuous walls by features of great interest.

Surface Treatment.

In this study I will mention briefly the common traditional ways of surface treatments.

Surface treatments were mainly applied in the form of woodwork and mosaics and marble ornament. As a religious impact it was impious to exhibit the image of man or any animate creature. Thus it happened that in the house as in the mosque the chief skill of the artist was expended upon the decoration of the structure by mosaics and tiles on the wall, painting the ceiling, panelling and carving the doors and designing the stained glass windows (Bourgoin, 1873). The main object of the above-mentioned surface treatments is likely to throw the plainness of the big walls and ceiling into greater prominence.

6.22.1 Surface Decoration in Terms of Woodwork

The traditional Arab house often exhibits a great deal of ornamented
woodwork in the form of ceilings, doors, cupboards, carved lattice windows (mushrabiyah) and kūfy* inscriptions lining the reception halls and over the doors.

a) Mushrabiyah Design in Terms of Surface Decoration.

The essential feature of the mushrabiyah is a series of oval turned balls connected together by turned links, which fit into holes in the balls.

It is in the arrangement and number of these links where the variety of design lies. Sometimes the balls are supported by four links or arms forming a cross, sometimes by six or eight, like a star, and the distance between the balls may be extended. Fig. 6.64 shows the fine interlacing forms of a lamp suspended in a lattice.

At other times an Arabic inscription is formed by the skilful arrangement of the lattice. Figs 6.65 to 6.68 show the varying designs of the mushrabiyah in which no two patterns are alike.

b) Wall Cupboards and Doors.

Panellings are often seen in the doors and the wall-cupboards. These cupboards consist of a central cupboard with double doors, surrounded by little arches, recesses for pottery and other ornaments. As for the room doors, they exhibit the same principles. Fig. 6.69 show the panels are arranged in a sort of L-shaped pattern or in a hexagonal figure with a central star, or, with a cross.

c) Ceiling.

There is another manner of treating wood; this can be seen in the ceilings of the reception halls. The ceiling often presents the most beautiful and elaborate surface decoration.

The ceiling beams are often coated by canvas saturated with plaster and

* The ancient character of Arabic writing is called Kūfy or Kufic, and the ancient copies of the Qur'ān are written in Kufic style. (Dictionary of Islam by Hughes, T.P., London, W.H. Allen & Co. 1885).
FIG. 6.64: A fine interlacing form of a lamp suspended in a lattice.
FIG. 6.67
decorated in colours, generally red and blue, with gold and white. The
deep hollows between the beams are divided into small coffers and
similarly coated and painted. The whole effect of this kind of ceiling
is exceedingly rich (Fig. 6.70).

6.22.2 Surface Decoration in Terms of Mosaic and Marble

Among the modes of decorating the different parts of the reception halls
of the traditional house is the mosaic work. The mosaic work is a com-
bination of small pieces of hard substances of different colours, to
form a pattern for a wall or a pavement.

The most familiar mosaic work in Cairo houses is a dado about 1.2 m
high running along the wall of the principal room or rooms. It consists
of upright slabs of marble of different colours and different widths.
These slabs are often arranged to form a series of rectangular panels,
divided and framed by narrower bands. A more usual mode of varying the
monotony of the tall slabs was by introducing between them a border of
tesselated work, made of small coloured cubes of marble mixed with red
pottery or blue enamel, and frequently with mother-of-pearl (Priss
d'Avennes, 1878).

Fig. 6.71 shows three panels, enclosed in borders. The central panel
is bordered with white and black marble, and with geometrical edging
of mother-of-pearl filled in with red pottery and yellow marble. The
side panels are of streaked red marble within similar borders, and the
whole is enclosed within a rim of greenstone. This triple panel was
common in rich houses.

As for the floors, the most common application is to the central part
of the reception hall (durqu'ah) which faces the entrance (Fig. 6.72).

The floors are generally composed entirely of marble of larger size
than the delicate pieces that are included in wall mosaics.

The floor mosaics are often arranged in geometrical patterns within
the space of about 30 cm square. Each square is made separately, and
the pieces are set in a composition of lime and clay, impervious to
water. In this connection Wild (Crace, 1886) stated:
FIG. 6.71: A triple panel of one of the niche houses, Cairo

FIG. 6.72: Floor tiles of the central part of the reception hall (durqu'ah).
"No drawings were as a rule made beforehand, but the mosaic was constructed out of the artist's head as he arranged it on the ground."

(p 12)

So the traditional designer spared no effort to break down the huge surfaces of the reception hall into fine patterns. In addition, it also shows that he used to apply the most elaborate decoration to the ceiling and not to walls because there is sufficient distance not to trouble the eyes.

6.23.0 External Space Design – The Courtyard

The traditional Arab house is dominated by a central open space, or courtyard. Nearly all circulation lines away from and into the adjoining spaces are through the courtyard. Thus it acts as a main reference space.

Whatever functions the courtyard has it is the only part through which the inhabitants can relate themselves to nature. In short it was the most usable space and hence the most important part of the house. As a result if the courtyard is not conceived in a very sensitive way, both the interior and exterior atmosphere will be spoiled.

As a matter of fact the design of the courtyard in terms of proportions is very critical. For example, if the courtyard proportions are very big the resulting feeling may be agoraphobia (fear of wide open spaces) and gives no sense of enclosure, and if they are too small, a feeling of claustrophobia, (fear of closed places and a sense of being in a well) may result.

From my personal experience I usually feel that the traditional Arab courtyard is convenient and pleasing. But could the proportions alone be responsible for achieving such a pleasing atmosphere? It seems that there are other aspects in action such as the shaping of the skyline and the quality of the courtyard envelope in terms of solid and void.

6.23.1 The Courtyard Proportions

There is no fixed proportions for the traditional Arab courtyard.
Meanwhile, we can determine roughly the results of a recent survey carried out in old Cairo (Ibrahim, 1967). This survey mentions that the courtyard proportions in the traditional Arab buildings vary between 1:1 or 1:2 to 3:4 in plan and 1:2 in elevation of the narrower side. In the Sehemi house, Cairo, I found that the ratio between the courtyard's width to length to height is 1:2:1.5 respectively (Fig. 6.73). That does not mean that if we erected a courtyard house in the same proportions of the Sehemi house the final space atmosphere will be the same, because of the following other factors:

a) Skyline.

The inner skyline of the Sehemi house (Fig. 6.74) appears very simple and beautiful. It is made of different room heights, of the top floor. As a result these different heights act as a tool to break down the continuity of the inner courtyard envelope. The final result is a varying and pleasant sky framing.

In this connection I think that the inner envelope was mainly shaped by different heights to expose some windows to the sun during the winter and conceal others, or reducing the height of the facade facing the north direction in order to allow the breeze to ventilate a great part of the courtyard (Fig. 6.75) or these different heights may be the result of some later additional rooms.

In all cases we realise that the pleasant skyline of the inner envelope is the outcome of functional aspects. Thus if the main object of the design is to enable the different functions to take place the aesthetic aspects will be generated automatically.

b) Projections.

It was common to leave some projections jutting out from different levels of the facades surrounding the inner courtyard. These projections exhibit a great variety in both length and width. They increase the sense of enclosure and create pleasant areas of light and shade. Furthermore, they divide the surrounding facades horizontally and thus reduce the effect of their height (Fig. 6.76).
FIG. 6.73: The courtyard's proportions, the Sehemi house.
FIG. 6.1: The inner skyline of the Seshal House.
East and West facades, the Sehemi house.

South and North facades, The Sehemi house.

FIG. 6.75: Facades lining the courtyard often of different height.
Different projections are often jutting out from different levels increasing shade and the sense of enclosure and reducing the effect of the facade height.
c) Solid- and Voids.

The traditional designer tried to reduce the rigidity of the inner envelope by opening voids as large as possible in the form of recesses and windows (Fig. 6.77).

d) Sense of Scale.

The designer was keen to introduce some sort of reference scale to the courtyard. This scale is felt from the unplastered walls lining the courtyard. Each layer is about 0.30 m in height and 0.60 m in width.

Thus to achieve a pleasant atmosphere in the most important part of the house, i.e. the open inner space, the designer relied on the following aspects:

a. Reasonable courtyard proportions.
b. A sensitive configuration of the inner envelope skyline.
c. Breaking down the rigidity of the inner envelope in different ways such as by projections, recesses, and voids.

Finally, we feel that we can discover a technique of recognising the different devices but we cannot regulate their development.

6.24.0 Relationship between Internal and External Spaces

The main problem facing the traditional designer to achieve interaction between the interior, i.e. the different spaces facing the courtyard, and the exterior, i.e. the courtyard, seems to be the solid wall defining the spaces, i.e. the masonry construction does not lend itself to extension between the inside and the outside.

Since the inside is different in terms of space quality and quantity, the plane of change (the wall) becomes the most effective part to achieve the required relationship between the two spaces.

a) Horizontal Interaction.

The traditional designer found the answer to establish a direct relationship between the interior and the exterior, in the mushrabiyyah.
FIG. 6.77: Maximum voids to reduce the rigidity of the inner envelope.
The mushrabiyyah appears in many parts of the wall lining the courtyard (Fig. 6.77). By doing so the designer aimed to reduce the enclosure's separation. The final sense is an interplay between solids and voids and a direct contact and space continuity is strongly felt. Another advantage from the visual continuation between the inside and the outside, is that the big reception halls will appear relatively smaller in relation to the biggest space of the courtyard*.

b) Vertical Interaction.

The designer seems to realise that the dome of the sky is a dominant landscape element of infinite change and beauty. Because a vertical view to the sky is neither sufficient nor comfortable, he tried to bring this panorama into a more convenient angle of vision. Thus he erected the pool fountain in the open courtyard as a device to reflect the sky and thus increasing the third dimension. This indicates that the designer did his best to establish strong relationships between the interior spaces and the courtyard.

As for the external space between the different houses there is no trace of an effort to establish such a relationship. Meanwhile there is an interesting example in which the owners of two houses establish a bridge to connect the two houses. This happened when the two owners married. They expressed the new relationship not only by the marriage but also in terms of space interaction to allow wives to visit (Fig. 6.78).

6.24.1 Intermediate Spaces between the Interior and Exterior

a) Space Design between the House and the Street.

In the way we get from one space to the other, we seem to be influenced both physically and psychologically. While people are on the street, they adopt a mask of 'street character'. When they come into the house they naturally want to change their behaviour and settle down into a more relaxed mood, but it seems likely that they cannot do this, unless there is a transition from one space to the other, which may help them

* A component space in a composite space is mainly characterised by the greater space, the courtyard space.
FIG. 6.78: A bridge connecting two houses, Amna Bent Salem and the Keritliya house.
to lose the street atmosphere, Lynch, 1960. Figs. 6.44 and 6.48 show some of the traditional Arab intermediate spaces where direction, level, light and the amount of enclosure are changed. Furthermore, the entrance is designed in such a way as to take long enough to get through. Here the time factor appears to give us a chance to forget the scale of the previous space, the court or the street. The same time will enable the eye to adjust itself to the new intensity of light, because of the sharp contrast between the inside and the outside. In this connection I would like to emphasise that it is very difficult for the eye to adjust itself quickly to sudden changes. For example, when we move from the bright sunlight of our new wide streets (of the order of 10,000 foot candle) to deep shade into the house (of the order of 0.01 foot candle) a great stress is taking place on our eyes because of the sudden change.

b) Spaces Design between the Courtyard and the Interior.

Figs. 6.31 to 6.33 show the design of the different spaces between the courtyard and the interior. It indicates that one very seldom enters any of the reception halls directly, i.e. without passing through the staggered entrance. This staggered entrance resembles the main features of the doorway entrance but in a simpler way. This simplicity may be due to the fact that the degree of change inside the house is less than that between the house and the street in terms of light and space proportions.

6.25.0 The Philosophy of the House

The philosophy of the traditional house design can be summarised as follows.

6.25.1 Relationship between Devices

To the traditional designer, a knowledge of structure was a tool by itself and leads nowhere, a knowledge of climate was a tool by itself, and lead nowhere, a knowledge of the physical and spiritual demands of the inhabitants were tools by themselves and led nowhere. All of these tools are small parts of the total solution. Meanwhile the way of assembling and accommodating the different tools in relation to each other and to the whole was the most effective course of action.
In this connection Darby (1963) said:

"through the process of design the formation of each part should be referred to the other parts and the design as a whole. Each step should be related carefully to the building as a whole and to each and every detail of the building."

(p 5)

The obvious result of such an approach is that each device and each element of the design will be shaped to solve as many problems as possible. Furthermore, if this unity has been established between the different elements, the result will not only be a functional design but also a beautiful one. In other words, the aesthetic aspects will be created automatically when the designer accommodates the different devices.

The Marsabiyyah pattern for example, exhibits the influence of many aspects such as, privacy, lighting, vision, ventilation, and space integration. All of those aspects were moulded together to introduce the Marsabiyyah pattern.

Again if the traditional designer's main goal was to make a beautiful screen this screen will never be able to handle the above mentioned aspects simultaneously.

Finally we can say that the traditional designer was like the juggler who has to keep all the balls in the air, he cannot afford to devote time to any of them at the expense of the others.

6.25.2 Relationship between the Architect and the Planner

As previously mentioned the design philosophy was mainly concerned with achieving a concord and flexible relationship between the different devices. Simultaneously the natural result of such interaction between problems inside and outside the building is a conflict between the architect and the planner. The question naturally arises here; where does the planner stop and the architect begin?

The answer lies in team work, unwritten regulations, and strong friendly ties between the team. Thus they were able to solve complex problems and act immediately in a friendly way and not formally. One of the best achievements of such a relationship between the architect and the planner
is the house design. It is apparent from the house analysis that it was designed from the outside in as well as from the inside out at the same time. As a result the scale of the street became easy to determine by both traffic considerations and the building height rather than being an uncontrollable sum of streets.

On the scale of the city, the same team was capable of achieving another valuable aspect in terms of space distribution. A glance at Fig. 6.25 will show that the courtyard concept created a satisfying balance of mass and void. In other words the distribution of open spaces seems to be balanced by a satisfying amount of solids.

6.25.3 Relationship between Man and his House

One of the most important results of the house analyses is that the house used to develop in response to the dominating needs of its inhabitants. The quality and quantity of space seems to be convenient to the large Muslim family size. Even furniture design seems to be flexible enough to make it possible that any room can be used for different functions. Meanwhile the quality of the space was shaped mainly to accommodate both the inhabitants' imagination and the environmental requirements.

Thus, it can be said that the traditional designer spared no effort to develop the main object of each part of the house to serve man in the first place. As a result man was represented in his house in terms of scale, proportions, social life and his lifestyle.

And because the lifestyle of each individual is unique, i.e. each man is different from any other man in terms of personal style, which makes him the individual he is, the traditional houses exhibit a great variety of personal character and locality.
CHAPTER 7

CONCLUSIONS
In considering recommendations it is useful to follow the pattern of earlier chapters that is the city, the quarter, the street and the house.

In order to illustrate them I shall contrast the advantages of traditional buildings with their modern equivalents. Finally, attention is given to government plans for conservation, and some of the problems encountered.

7.1.0 The City

The most characteristic feature of the Islamic Arab city down to the 19th century can be summarised as follows.

a. The Islamic city lays the foundation for a physical hierarchy governing the location of the different elements of the city. For example, the city central space is often occupied by the mosque and in its immediate neighbourhood comes the bazaar (suq), inns (khans), and the public bath (Hammam), so Islam seems to influence the physical pattern of the city (3.4.0 - 3.8.0).

b. The Islamic city is a collection of quarters, each with its homogeneous population formed out of common ties of religion, occupation, families or origin, but never according to levels of income. Such social harmony perhaps encouraged the inhabitants to introduce personal and social privacy through unwritten regulation (3.6.0, 4.2.0, 4.5.0).

c. As the city grew, quarters also increased but never dissolved into the city mass (3.6.0, 3.12.0).

d. The traditional Arab people seemed to insist on the compact planning for environmental psychological and economical reasons (3.12.0, 3.13.0, 4.5.0, 3.4.0, 3.10.0).

Regarding the former I believe that the tradition of compact planning is a possible solution to our contemporary problems because:

i. It helps to achieve an active association between the inhabitants i.e. because the physical dimension of the compact planning is on a smaller scale than many other types of planning; so every
nec...ary institution, every friend or relative, can be within easy walking distance. Consequently direct and easy communication between people can increase without undue loss of energy and time (3.14.0).

ii. The same compact planning can help in reducing the cost of all kinds of services, public and private transport as well as reducing noise and pollution (3.14.0).

iii. From the climatic point of view, the compact planning gives a better chance for buildings to protect each other from the heat of the sun and also shades pedestrian paths which in turn reduces glare (6.6.1).

Thus by applying the compact planning principles it will be much easier to create a positive relationship between the external and the internal environments.

Unfortunately nowadays it seems that in modern Arab cities the valuable concepts of traditional planning are ignored and the garden city pattern and western planning, based on the idea of wide streets and free standing lay-outs are applied. Such designs often give better opportunities of contact to those who can afford private motor vehicles, i.e. the minority of the inhabitants of Egypt (one private car to every 220 inhabitants). In this connection, technology has produced many devices to aid human needs and activities such as, the deep freeze instead of daily fresh food, record players and telephone instead of personal contacts, air-conditioning equipment instead of natural solutions. Now most activities are inspired by television, rather than by active participation. The most important fact is that there is little need nowadays to leave one's home for any purpose whatsoever. This seems to me the first stage of the deterioration.

7.2.0 The Quarter

The most important element of the Islamic city is the quarter. The quarter is a homogeneous unit with respect to religion, national origin and occupation. Furthermore the organisation of the market was used to keep merchants and artisans of the different quarters together. As a
result informal ties and unwritten regulations were created spontaneously (1.1.6, 4.2.0-4.5.0).

As for the physical dimension of the quarter this study shows that there was an equilibrium between the horizontal extension of the city as a whole and the means of transportation at the time. It has also been found that when the different elements of the quarter are mixed together, i.e. housing, schools, bazaars, mosques and workshops, many useful social educational and psychological values can be achieved (1.7.0). The study also reveals that the organisation of the environment is a social act before it is a physical one. Consequently when people select their habitat and community they tend to personalise it, that is to give it some personal character. This tends not to happen when the habitat is imposed upon them, (4.6.0-4.8.0).

A further advantage of the quarter or settlement and the social intimacy that it encourages is that people are more inclined to co-operate with one another. Without such co-operation one man cannot build his house but ten men can build ten houses with relative ease.

In contrast the modern concept of planning tends to overlook these factors. The new settlements attached to land reclamation schemes provide good illustrations of the social and physical problems that are created by such oversights.

a) The New Settlements.

Some of the new settlements in Egypt were inhabited by a combination of ex-prisoners and nomadic labourers. As the groups presumably have little in common it seems unrealistic to expect them to interact healthily. At the very least one could anticipate problems of a social and psychological nature. Other new settlements were populated entirely with farmers. In this connection it proved better to create some sort of diversity of occupational groups to ensure the provision of the services required to maintain an acceptable standard of living, i.e. if there are no plumbers, there will be no sanitation.

Now if we are going to establish new settlements we have to remember how traditional people achieved social harmony. In our modern case such
hemony can be created by choosing the immigrants of every new village from a corresponding over-populated one and resettling them in quarters based on well-balanced interests. In this way if the immigrants are to lose their attachment to their place, they would not be deprived of their attachment to their community, and would still benefit from the traditional system of co-operation in satisfying those needs which demand collective efforts. As a result they would take roots more easily in the new place.


Whether by design or accident the new settlements are often based on the idea of locating the residential units far from the community facilities, schools, clinic, bazaar, market and so on.

In this respect the traditional quarter concept of design seems ideal and provides a more acceptable approach in terms of new settlements, both at the beginning and when the settlement grows into a big town.

Beginnings of the New Settlements.

It has been shown in a previous chapter that when the different elements of the quarter were together, i.e. houses, schools, bazaars, mosques and workshops, many beneficial educational and psychological values resulted and people became much closer to the area (4.7.0 a) and b)). This can only happen if we realise that the organisation of the environment is a social act before it is a physical one.

When the Settlement Grows.

The study also reveals that a settlement which consists of homogeneous areas, or quarters, can more successfully incorporate new and growing quarters, than can an undifferentiated one. In other words a village or a city composed of a series of quarters could easily embrace new quarters without destroying them, and grow differently from a more uniform settlement where such quarters would have little chance of survival, i.e. as the town grows, quarters increase, but never dissolve into a mass and lose their identity.

7.3.0 The Street

From the material discussed in Chapter 5.1.0 it is apparent that the
The traditional concept of street design holds a number of advantages:

a. There is an intimate relationship between the vertical, buildings and the horizontal street floor, in terms of using common building materials (stone, and sensitive proportions which usually give a strong sense of enclosure (5.4.0).

b. The traditional street reflects a strong sense of harmonious design as if all its buildings were designed to the same principles and during one era. This consistency is the outcome of traditions and natural response to the local environment (5.4.0). In addition, the street facade shows the apparent structural expressions. Nothing is hidden away - everything is honestly expressed, there is no insincere work and also there is no confusion (6.20.1).

c. The traditional street is usually bent and curved but tends to be well-directed in terms of climate and social requirements. In addition, its irregularity creates opportunities for enlivening the architecture of the individual building. Furthermore the street pattern creates a great variety of subtle perspectives (5.6.0 and 5.7.0).

d. Each section of the street is usually well-composed around a focal point, creating a pleasant atmosphere and helping people to orientate themselves (3.5.2).

e. The Islamic street is a pedestrian street in the first instance. It is mainly designed to be travelled along slowly, encouraging social contacts, as well as involving the inhabitants directly in the surrounding environmental design which are best seen from eye level. Its sudden changes, curves, narrow width, endless circulation lines, fine architectural details and texture emphasize the same fact, i.e. human or pedestrian street (5.13.0 and 5.14.0).

In contrast, nowadays, we cover the horizontal surfaces of our cities by black asphalt hoping for homogeneity, but the result is usually more heterogeneity. Furthermore, such a desert of asphalt and buildings, from the micro-climatic point of view often make the city hot. As for the street harmony it seems that we are not able to make our modern streets as interesting as old ones. Each building is only a separate
portion of endless wide streets. Consequently the architectural effect is weakened. In addition, the modern street pattern, wide straight streets usually make it difficult to orientate buildings towards any goal such as the prevailing cool breeze. Because of the great similarity and lack of reference points it is easy to become disorientated.

As the modern street seems designed mainly for vehicles and transport and not for the majority of the populace, it lacks the organic irregularity and character of the traditional street and loses the human scale.

The study on pages 261-265 suggested that the traditional street is a pedestrian one and seemed to act efficiently during the last centuries. However, it is very difficult to apply such principles to the modern street which has to deal with the car. This means that the traditional street pattern is only valid if we are designing a pedestrian residential area. In such a case the modern streets can serve the residential area from the outside and not pass through it. However a problem arises when the inhabitants of the residential area acquire cars and naturally wish to park them as near to their houses as possible. The consequences of this, in addition to increasing the transport convenience of the residents, will be greater pollution and noise, and danger to pedestrians from the traffic. To achieve a balance between the resulting conveniences and inconveniences requires careful analysis; in fact further study is required of this critical problem.

7.4.0 The House

If we are really keen to improve the whole environment we have to remember that no part of man's environment affects his health and well-being more directly than the house in which he seeks comfort and dignity. The home environment helps very much to shape his life and attitudes. Nevertheless the wider setting in which the house is located, the neighbourhood, is of the same importance. Thus, when designing and planning houses, we have to come to think not just of the individual dwelling but also of the juxtaposition of the whole neighbourhood simultaneously in terms of climate, social, functional and aesthetic aspects.

In this connection the traditional Arab house may be a good example to emphasize the positive inter-relationship between the different components of the neighbourhood and the vision of the whole within which single parts have meaning.

It is interesting to note that the traditional Arab courtyard house seems to be the ideal solution for our contemporary problems for the following reasons:
a. The courtyard concept can act as a key for shaping the whole neighbourhood in terms of healthy compact planning (Chapter 6).

b. The courtyard can help in determining the proportion of the surrounding streets, i.e. we can create some sort of relationship between the courtyard and the street proportions (6.23.2).

c. The courtyard concept of design can achieve densities similar to high-rise buildings under the current regulations which limit the built-up areas to 50% of the total land.

d. Because of its flexibility it can easily respond affirmatively to the erection of any additional parts as the family grows (6.20.0).

e. The courtyard house provides a safe play-ground for children under the direct supervision of the family.

f. Recent social survey data, referred to below, has shown that the courtyard house is probably more relevant to the Muslem tradition and the family social life than any other type of arrangement.

g. The courtyard house when well designed in relation to the neighbourhood, can act as a temperature regulator, as the site experiment showed (6.6.1, 6.8.2, 6.8.3). In addition, it gives a better chance to the designer to site rooms which are not noise-sensitive nearest to the noise source, the street (6.9.0b).

h. The introverted courtyard turns its back on the dust, glare and noise and creates a sense of residential environment.

i. The courtyard plants, shrubs and trees are of a great value in helping to reduce dust, noise and glare (6.6.4b).

Thus whatever the courtyard concept, which its infinite possibilities for variation can provide, it is still the most satisfactory answer to a great number of our modern design problems. Interesting support for this argument has recently been given in Egypt by survey work undertaken to establish people's housing requirements. This revealed that approximately 86% of those questioned, aged between 25 and 55, favoured the traditional, integrated design, of the Social Research Centre, Cairo, Egypt, June 1977.
Public Housing In Egypt.

It is worth observing that housing projects are often carried out by the Ministry of housing in Cairo as well as other urban centres of Egypt. These projects aim to improve conditions and to help reduce the slums. However, they have proved unsatisfactory for the reasons given below.

The Main Problems of Modern Public Housing.

a. Great neglect of social factors concerning privacy and the way of life.

b. There is no relation between the family size and the house in terms of areas, 30-40 m² for a family of six to eight persons. So man is not represented in his habitation. Such houses, to a great extent, are shaped and designed in response to the dominance of economics and industry. Economy, then, forces the architect to use smaller floor spaces and to reduce ceiling heights, factors which tend to increase discomfort particularly in hot countries. In contrast, the traditional designers seemed to realise that man is 98% liquid thus he cannot be compressed. This fact is well illustrated in each part of any traditional Arab house.

c. Lack of any individuality whatsoever due to the type of housing unit that is used all over the country regardless of the different environment and climate. This uniformity seems to happen mainly because the architect is faced with the unrealistic and impersonal job of designing a thousand houses at one time. As a consequence, rather than attempting to establish the requirements of the thousand whom he must shelter, he often is obliged to design one house and repeat it a thousand times, denying creativity to himself and humanity to the inhabitants (Fathy, 1979). Generally speaking the housing problems are mass problems in the sense that they concern a large number of people as equal individuals. This does not mean that the population must or should be regarded as a mere mass of people, and treated accordingly as far as the house design is concerned. Traditionally, the specific nature of the occupants participation and choices used to reflect some sets of rules and values which gave personality and locality to the whole environment. The same rules seem to affect the way people interact, how they use and structure
space according to their changing needs and symbolic meanings.

d. Housing projects have followed the trend of separating different land uses, the result has been very dreary, monotonous and characterless.

e. Most of the housing lay-out is based on the free standing concept and multi-storey flats, as a result each house is at the mercy of the street noise, solar radiation and pollution. In addition, such concepts of design increase the contrast between the internal and the external environments creating many other problems.

In this respect we have to realise that space distribution in terms of open and enclosed spaces and the relation between the two are the key to failure or success. The major problems of our modern houses and their conspicuous failure seem to be in both the distribution of space and the conflict between the great number of specialised people involved in design. This specialisation in our century has made us lose sight of the harmony of the overall plan organisation.

Practical illustration of these problems, overall plan organisation, are easily given. For example, when concentration intensifies, in the capital and big cities, and land value increases, we build tall structures in order to maintain land values, regardless of the fact that modern Cairo was built to house 2 million inhabitants - it now has about 8 million using the same utilities installed 70 to 100 years ago. So we often look from a very limited viewpoint and hence store our problems without solving them. Also, large sums of money are spent every year to build thousands of low-income houses in the over-crowded cities. This could be interpreted as a high price to pay for potential slums. Furthermore nearly all of the new houses are erected on the most fertile land, while a great deal of money is spent on land reclamation in the desert!

Returning to the main point concerning the problems of public housing I would like to say that economics might be the reason for most of the previous points. But economics could not be taken, for example, as an excuse for using one or two unified designs all over the country. Economics could not be taken as an excuse for designs that fail to look from a wide viewpoint, we will find that the final conclusion is the
same, in terms of money, if we considered the loss in production, the medical treatment, and the crime rate of the public housing inhabitants.

Finally, it is worth repeating that the designer should be accustomed to dealing in terms of "wholes" and considering parts and details in relation to the whole. By so doing we will be able to create places which we can love and care to stay in and not to escape from.
APPENDIX I

THERMAL SITE EXPERIMENTS.

DATA CHARTS
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<th>Temperature in °C</th>
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**Note:** The table shows daily temperature and relative humidity readings from 4.8.78 to 8.8.78.
APPENDIX II

THE PROTECTION OF OLD CAIRO
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Old Cairo embodies more than 500 Islamic monuments, ranging from the seventh to the twentieth centuries. Nearly every form of Islamic architecture is represented: military architecture, beautiful mosques, schools, caravanserais, public baths, houses and palaces.

These historical buildings are the remains of Cairo's successive mediaeval cities ranging in age from over 1,000 to less than 100 years, nearly all of which are in a dangerously dilapidated condition.

Since 1880, in which year the Comité de Conservation de Monuments de L'Art Arab was founded, over 100 monuments have disappeared completely. Those that have suffered most have probably been the houses and palaces, whose relatively light construction of wood, stucco and mud brick, makes them easy victims.

Mediaeval Cairo has reached the stage where nothing short of a massive intervention can halt the acceleration process of disintegration. What then has happened to make the situation so critical? Bergne (1978) pointed out that the most important factors encouraging the disintegration are as follows:

a. Population density in old Cairo region is one of the highest in the whole of Cairo (60,000 to 97,000 per km²). As a result of such high density, in relation to the available buildings in the old city, people have occupied most of the historical buildings. In addition the uncontrolled accumulation of rubbish over long periods against the walls of monuments has led to collapse under this weight or from corrosion caused by the salts the rubbish contains.

b. The frequent bursting of sewers has also added corrosive salts to the ground-water of the area.

c. Vandalism, encouraged by lack of recreational facilities and most of the essential services.
It is now apparent that these problems have resulted from, on the one hand, the centralization of people and on the other from human occupation of most of the historical buildings. To this may be added the fact that the area is poorly maintained.

But which bodies are interested in the problem of the old city? It seems that the Comité de la Conservation de Monuments de l'Art Arab was the first authority responsible for the old city. It registered and surveyed most of the Islamic monuments in Cairo (Figs. A and B). Later on the responsibilities of the Comité was transferred to the Department of Antiquities in the Ministry of Culture. This department has been less effective mainly because of shortage of funds. Furthermore, the successive directors of the Department of Antiquities have been specialists in Pharaonic archaeology and history. As a result the Pharaonic monuments were usually maintained at the expense of Islamic monuments.

In 1969 the Greater Cairo Planning Commission conducted a number of preliminary surveys. Unfortunately the implementation of the Committee's recommendations were frustrated by financial constraints. After 1973 extensive preliminary work in the field of upgrading housing and community life in Cairo has been undertaken by U.S.A.I.D. in conjunction with the Egyptian Ministry of housing, reconstruction and planning. This included recommendations for renewing the water and sewage system, setting up services, rebuilding derelict structures and constructing new houses on vacant land.

Likewise, the World bank is currently drawing up some projects to improve the situation in old Cairo.

Finally, the Department of Antiquities has successfully interested several European Countries such as Poland and the Federal Republic of Germany in restoring some monuments. In this connection it ought to be mentioned that some Egyptian individuals such as Professor Hassan Fathy have spared no effort in persuading designers and policy makers to save the historical buildings of old Cairo. He lives in one of the traditional houses, 4 Darb-El-Labana, near the citadel and used to make all of his official meetings in his house to make people aware of the beauty and the suitability of the traditional house.
Both the numbers of the monuments, and the numbers and letters of the sections of the map correspond with those of the Map of Cairo showing Mohammedan monuments, Survey of Egypt, 1950 (enclosed in K. A. C. Creswell, The Muslim architecture of Egypt, i, Oxford 1952), and the Index of Mohammedan monuments in Cairo, Survey of Egypt, 1951.

FIG. A
It is to be hoped that Cairo will succeed in reversing the decline of the mediaeval core. On the financial side, perhaps Saudi Arabia and other oil-States can support such valuable Islamic buildings. Meanwhile the Egyptian Government can convert some khans, inns, into hotels, particularly those which are accessible to motorised traffic. The Citadel itself, which commands a fine view over the city to the Pyramids, can be used partly as a museum and partly as a big hotel. If any additional structures are needed the design would have to be very carefully harmonised with the surroundings, such projects can be a potential source of income.

But, in the last instance, it must be for the Cairanes themselves to recognise the treasures of their city as the most essential foundation of the future.
GLOSSARY

AMIR
A noble in the feudal society of mediaeval Cairo.

ARABS
In modern usage a term applied to the Arabic-speaking peoples who at present occupy the area extending from Iraq to Morocco. The term, therefore, is a linguistic rather than an ethnic one.

BA'B
A gateway or door-way (Bāb as-sīrr = secret entrance to a house).

BAWWAB
The doorkeeper of a house or mosque.

BAYT
A house (Bayt alQādi = the Qādi's house). Arabic term for house.

BADGIR
Badgir - Iraq, Malkaf - Egypt, all indicate the wind catcher of the traditional buildings.

DIKKAH
A tribune or raised structure in the sanctuary of a mosque from which certain parts of the service are said. A settee in a house.

DIWAN
A long low seat or settee, used for reclining in houses.

DURQU'AH
The central portion of the mandarah or reception hall in a Cairane house.

FAWWARAH
The domed structure over the ablution basin in the centre of the courtyard of a mosque.

FISQIYYAH
A fountain in the court of a house, usually sunk in the tiled or mosaic floor.

GHURFAH
An elevated room or niche.

HANAMM
A public bath; a bathroom in a private house.

HANAFIYYAH
A fountain or basin for ablutions in a mosque.

HARAM
Sacred enclosure (e.g. the Haram ash-Sharif at Jerusalem).

HARAMLIK
Females' apartments - traditional Arab house.

HARIM
The family apartments of a Muhammadan house, as opposed to the public reception rooms; hence, the women's quarters.

HILJRAH
'The migration', i.e. the migration of Muhammad from Mecca to Medina in AD 622, from which date the Muhammadan calendar is reckoned.

HOSH
The inner courtyard of a house.

IMAM
A leader of Muhammadan public worship, often officially attached to a mosque.

JAMI'
A congregational mosque, consisting of a central court surrounded by covered porticoes or colonnades ('liwānat).

KA'BARAH
The celebrated Muhammadan shrine at Mecca.

KHAMSTIN
'Forty'; the forty-days' wind or sandstorm that sweeps over Egypt in the late spring.
KHAN
An inn or lodging for travellers, consisting of a central courtyard where merchants transacted their business, surrounded by stables for camels and other beasts on the ground floor, and by galleried lodgings for travellers on the upper floor, an arrangement resembling that of the old English coaching inns.

KHAZNAH
A recess for a bed in a house.

KUFY
The ancient character of Arabic writing are called Küfî or Kufic, and the ancient copies of the Qur'ân are written in Kufic style (c.f. Dictionary of Islam by Hughes, T.P. London, W.H. Allen & Co., 1885).

KURSI
A table, generally a low polygonal table often richly inlaid, a rest for the large copy of the Qur'ân used in a mosque; nowadays, a chair.

LIWAN
(plural Liwanat). One of the shaded porticoes or colonnades flanking the courtyard of a mosque; the principal liwan occupied the side nearest to Mecca and formed the sanctuary.

MABKHARAH
A small tower or pinnacle on a mosque, not used like a minaret for summoning the faithful to prayer.

MADRASAH
A collegiate mosque, usually cruciform in plan in Cairo.

MALQAP
A roof ventilator or wind catcher, conducting the cool north wind down into the interior of an Egyptian house.

MAMELUK
An important personage in the feudal society of mediaeval Cairo.

MAMRAQ
A lantern-cupola in the ceiling of the durqu'ah.

MANARA
A minaret; the tower of a mosque, with a gallery from which the mu'adhdhin chants the call to prayer.

MANDARAH
The finest reception hall of a Cairane house.

MAQ'AD
An open loggia or belvedere in a Cairane house.

MÄRISTÄN
A hospital for sick people.

MASJID
'A place of prostration'.

MASTABA
A bench or seat by the doorway of a house, for the use of the bawwâb.

MIHRÄB
The niche in the centre of the sanctuary wall of every mosque denoting the qiblah or orientation towards Mecca, the point towards which Muhammadans incline themselves when praying.

MIMBAR
The pulpit in a mosque.

MU'ADHDHIN
The official of a mosque whose duty it is to summon the faithful to prayer at stated hours by chanting from the gallery of the minaret. From the fact that his position commanded the jealously secluded interiors and private apartments of the Cairo house, a blind man was usually selected for this office.
MUFTI

A Muhammadan jurist who issues authoritative decisions on points of Islamic law.

MUHTASIB

Unlike the Qadi (judge) he could investigate without written complaints, though he could not enter private homes to investigate a suspected offence. Indeed, on the whole, his role is purely external, related to the actions and misdemeanours of the inhabitants in his public role. For the best picture of the Muhtasib role as overseer of the social and economic life of the city see Ibn al-Ukhuwwa, Ma'ālim al-Qurba ft Ahkām al-Ḥisba, ed. R. Levy, London, 1938.

MUSRABIYYAH

Turned lattice work, usually of a highly ornamental character, used in Cairo houses to admit subdued light and fresh air without destroying the privacy of the interior.

QU'AH

A great hall or saloon of a Cairo house.

QADI

A Muhammadan judge.

QAL'AH

A fortress, citadel.

QAMARIYYAH

A pierced window of stone or stucco.

QARAFAH

The Eastern Cemetery at Cairo, commonly known as 'The Tombs of the Caliphs'.

QASR

A castle, palace.

QIBLAH

The direction of Mecca.

QUBBAH

A dome; hence, a domed tomb or mosque.

QUR'AN

The sacred book of Islam.

QU'AH

Reception hall – the qu'ah used to have a central area called the dorqu'ah and two or more iwans leading off it. The floor of the central part is set one step lower than that of the iwans, and the ceiling of the central part is raised high above the rest of the house.

RAB'

A block of tenement houses.

ROSHAN

A small projecting niche in musrabiyyah windows, in which porous water jars can be kept cool.

SABIL

A small and usually ornamental building containing a public fountain.

SAHN

The central open court of a mosque or a house.

SAHMLIK

Males' apartments – traditional Arab house.

SAQIYAH

A water-wheel, usually turned by a donkey or a buffalo.

SHAMSIYYAH

A pierced window of stone or stucco. See Qamariyyah.
**SHIAHS** | One of the sects of Islam, especially devoted to 'Ali, son-in-law of Muhammad.
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**SHİŞH** | Lattice work formed of fretted strips of wood, used in the towns of the Egyptian Delta, and not constructed of turned bobbins like mushrabiyyah.
**SIDILLAH** | A recess for a diwan or settee.
**SUFFAH** | A sideboard, usually of marble or stone with an arcaded front, in a Cairane dwelling house.
**TAKHTABOSH** | A room or alcove, usually open on one side towards the hosh or court, in a Cairane dwelling house.
**TAKIYYAH** | A convent of dervishes.
**ULAMA** | Men of religion and letters in general, or men who study in the Azhar University, Egypt.
**WAKÄLAB** | Large building, tenement house; also another name for a khan.
**WAQF** | A charitable trust, or religious endowment.
**ZAWIYAH** | (Lit. a corner), a small mosque, tomb of a saint.
**ZAYYÄT** | The official of a mosque whose duty it is to attend to the lamps.
**ZIYÄDA** | An open space between the walls of a mosque and an outer enclosing wall or enceinte.
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