SPATIAL VULNERABILITY TO CRIME IN THE DESIGN OF HOUSING

By

ELENI TSOSKOUNOGLOU

Thesis submitted in fulfilment of the requirements for the Degree of Doctor of Philosophy from the University of London.

BARTLETT SCHOOL OF GRADUATE STUDIES
UNIVERSITY COLLEGE LONDON
1995
SPATIAL VULNERABILITY TO CRIME IN THE DESIGN OF HOUSING

ABSTRACT

There has been much debate over the last three decades on the relationship between design of housing and crime, dominated by Newman's 'defensible space' and Coleman's 'anti-disadvantagement scales'. Their approach has caused much confusion due to their failure to distinguish between social and spatial 'causes'. This thesis presents research conducted on the relationship between design of urban housing estates and spatial vulnerability to crime, addressing this important design issue, from both a theoretical and an empirical perspective. It examines the multi-disciplinary discourse on housing design guidance; design against crime and criminological insights on the spatial factors influencing the location of crime and selection of crime targets. It proposes a methodological framework applying the syntactic approach developed by Professor Bill Hillier and the former Unit of Architectural Studies at the Bartlett, University College London, through which the factors of spatial vulnerability can be identified and analysed in purely spatial and architectural terms. Based on a series of case studies on the locations of burgled dwellings in three London housing estates, the research identifies the two basic principles of vulnerability: accessibility and surveillability at the local level of articulation of space and the global level (of the spatial network as a whole), and the interrelationships between them, which ultimately determine the vulnerability of locations. Rather than condemning a list of block features, spatial layout is treated as a whole system, and the spatial factors of vulnerability are related to architectural choices at the various levels or stages of the design layout. Each estate design has its own individual set of combinations of spatial variables and constants in the layout and block/dwelling typology related to the parameters outlined above, which lead to a trade off between the likelihood of being seen or caught and the difficulty of getting in and out. Ultimately, visibility and accessibility are related to 'surveillability' in two forms: visual and social (active presence of people). However, it is not just visibility that is important, but also permeability (links via dwelling entrances), which allow direct active control over space (interception) The implications in terms of design for safer housing environments are, that simple recipes of good and bad design are highly questionable, since spatial configuration has to be examined as a whole. Thus understanding of the spatial principles and mechanisms of vulnerability as the intrinsic interrelationship between local and global factors, is the key to designing safer urban housing environments.
TO MY PARENTS
AKNOWLEDGEMENTS

This PhD thesis has been a marathon of growth and learning, during which many people have contributed to its coming to a successful end. My first acknowledgement goes to my supervisors, Professor Bill Hillier and Dr. Julienne Hanson without whom this PhD would have never happened; and to whom I owe a great portion of my current critical thinking about architecture, and scientific rigour.

I wish to thank Crime Prevention Officer Bob Knight (Holloway) and the Metropolitan Police for kind permission to use their data, and Jianming Xu, former researcher and colleague at the UAS, for permission to use some of his space use observations data on the Andover Estate.

Much gratitude and thanks is due to my many friends in Athens, Dortmund, and London, who have encouraged and supported me through the difficulties over the years: starting from my Co-editors from 9H, Evita and Dr John Peponis, Professor B McClean, Dr H Kaemmerling, in the early years, and more recently my good friends Akis Notaris, Tonia Noussia, Sofia Psarra and Nelly Marda, Dr Maartje Martens Tatsua Shibata and colleagues in the PhD Room, as well as the staff at the Bartlett School of Graduate Studies. A very special thanks goes to my friends in Dortmund Karin and Werner Lips, Gerhardt Ebrecht, and the architectural office Gustav Schulze & Partners. Finally I am greatly indebted to my brother Miltos, David Neustein, and Gabrielle Gnesbach for being there and helping me reach my goals, and Vanna Tsoskounoglou, for the mental programming and financial support, without which this thesis would have not been possible.
### TABLE OF CONTENTS

| ABSTRACT | i |
| AKNOWLEDGEMENTS | iv |
| TABLE OF CONTENTS | v |
| LIST OF FIGURES | xi |
| LIST OF TABLES |

### CHAPTER ONE: INTRODUCTION

1.0 The Research Problem.
1.1 Significance of the Problem in the Larger Context: The Vicious Circle Of Crime And Fear Of Crime.  
1.2 The Problem Context: Fragmented Approaches.  
1.3 The Approach Adopted By This Thesis.  
1.4 Research Aims.  
1.5 Research Design: Case Studies  
1.6 Original Contribution of the Thesis  
1.7 Summary of Argument and Outline of Chapters

### CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction  
2.1 Part One: Housing Design - The Architects' Perspective  
2.1.0 Introduction: Focus of Discussion- Design Guidance in context.  
2.1.1 Residential Typologies and Composition of the Residential Environment: global analytic approach.  
2.1.2 Seventies' Local Authority Design Guidance: The Experience of the GLC: part- analytic approach.  
2.1.3 Density and Built Form: global prescriptive approach  
2.1.4 Residential Layout and Access Networks: Roadform and Townscape: part-prescriptive approach  
2.1.5 Summary and Discussion.  
2.2 Part Two: The Link between Design of Housing and Crime: Crime Prevention Rationales and Design Guidelines  
2.2.1 Target hardening approach: Hardware rationale.  
2.2.2 Social Surveillance Approach: J.Jacobs'eyes on the street'.  
2.2.3 Social Engineering Approach:  
  - Applications of defensible space and their results.  
  - A Coleman: *Utopia on Trial* - Design Disadvantgement  
2.2.4 The Synergistic (Multi-agency) Approach.
## Part Three: Crime and Space: Environmental Criminology and the Situational Approach

### 2.3.1 The criminal/s and the environment: Spatial Patterns of criminal behaviour/ opportunity:
- Target Selection: Crime Templates.
- Criminals' Mobility and Spatial Behaviour Patterns.
- Crime-Occurrence Space.
- Good/ bad targets: The risk /payoff scale.

### 2.3.2 Burglary: Patterns of vulnerability/ risk:

**A. Spatial distribution of Burglary Offences**: Factors affecting Victimisation at the Global Scale:
- Local factors of Victimisation Burglary Risk.
- Environmental vulnerability.

**B. Burglary from Burglars' point of view**: Spatial Behaviour:
- Burglars' Profile: Age; Skill; Target Range; Type of work.
- Area- Distance Travelled.
- Planning - Target selection.

## Summary and Discussion

## CHAPTER THREE: METHODOLOGY:

### 3.0 Introduction

### 3.1 Theoretical and Methodological Framework.

#### 3.1.1 The Social Logic of Space:
A new Paradigm for the Study of Socio-spatial Phenomena; Key Concepts of the Syntactic Approach developed by the former Unit for Architectural Studies (UAS*).

#### 3.1.2 Patterns of space use and spatial configuration: Theory of Natural Movement

#### 3.1.3 Research on Pathology of modern Environments: Housing Estates.

#### 3.1.4 UAS* Research on Crime Patterns and Antisocial Behaviour.

### 3.2 Specific research aims.

### 3.3 Research Design: Case Studies

#### 3.3.1 Criteria of Selection of the Case studies.

#### 3.3.2 Data: Limitations of the study.

### 3.4 Detailed methodology of each case study.

#### 3.4.1 General architectural Description of the estate.

#### 3.4.2 Spatial Analysis: Syntactic Description of Spatial Structure; relationship to dwelling access; space use

#### 3.4.3 General Analysis of the Distribution of burgled Dwellings.

#### 3.4.4 Investigation of Design Factors influencing Burglary at the local level.

#### 3.4.5 Analysis of the relationship between Burglary risk and Integration as a Measure of Global Accessibility: Burgled / Nonburgled Dwelling Samples: Sample of burgled axial lines; Integration bands.

#### 3.4.6 Interrelationship between local and global factors.
CHAPTER FOUR: CASE STUDY 1: MARQUESS RD ESTATE:

4.1 Introduction: General Estate Profile.

4.1.1 Urban Context
4.1.2 Site Layout: Principles of the architectural Design.
4.1.3 Block/dwelling Typology and Access.
4.1.4 Dwelling Access: Pedestrian and Vehicular access.
4.1.5 Open spaces: Exposure and enclosure; Landscaping.
4.1.6 Experience of estate; Presence of people; Fear of crime.

4.2 Spatial Analysis of the Estate.

4.2.1 Spatial description of Axial Structure.
4.2.2 Pattern of Integration.
4.2.3 Pattern of Integration and Space Use.
4.2.4 Pattern of Constitution by Dwelling Entrances: Interface between Public and private space; Pattern of Constitution and Integration.

4.3 The Distribution of Burgled Locations.

4.3.0 General data on Burglary on the estate.
4.3.1 Observations on the pattern of Burglary locations.
4.3.2 General Breakdown of Burglary rates.

4.4 Investigation of Local Factors of Design influencing Burglary Risk

4.4.1 Number of Dwellings on an Access Line.
4.4.2 Unconstituted Access.
4.4.3 Enclosure/Exposure: Visual surveillance.
4.4.4 Dwelling access and Vehicular access.

4.5 Global Pattern of Vulnerability: Relationship between Degree of Integration and Burglary Risk.

4.5.1 Differences between burgled and nonburgled Dwellings.
4.5.2 Relationship between Burglary rates and Integration: Analysis of burgled Axial lines.
4.5.3 Breakdown by Integration Bands.
4.5.4 Summary of the Pattern of Vulnerability with respect to Global Accessibility.

4.6 Relationship between Local and Global Factors.

4.6.1 Number of Dwellings and Integration: burgled and nonburgled lines.
4.6.2 Relationship between Average Number of Dwellings/line and Degree of Integration of the Integration Bands.

4.7 Summary of Findings and Discussion.
CHAPTER FIVE: CASE STUDY 2: FERRIER ESTATE

5.1 Introduction: General Estate Profile.

5.1.1 The Estate in its Context.
5.1.2 Site Layout: Principles of the architectural Design.
5.1.3 Block formation: Block/dwelling Typology.
5.1.4 Dwelling Access: Pedestrian and Vehicular access.
5.1.5 Open spaces: Exposure/Enclosure and Landscaping.
5.1.6 Experience of estate.

5.2 Spatial Analysis of the Estate.

5.2.1 Spatial description of axial structure.
5.2.2 Pattern of Integration.
5.2.3 Pattern of Integration and Space Use.
5.2.4 Pattern of Constitution: Dwelling Access and Interface between public and private space; Pattern of Constitution and Integration.

5.3 The Distribution of Burgled Locations.

5.3.0 General data on Burglary on the Estate.
5.3.1 Observations on the Pattern of Burglary locations.
5.3.2 General Breakdown of Burglary rates.
5.3.3 Dwelling/Block Access Factors: Direct/Indirect Access and Dwelling Typology.

5.4 Investigation of Local Factors: Breakdown of Burglary rates by Local Variables of Dwelling Access.

5.4.1 Front/Back Access: Breakdown of Burglary rates by Dwelling Type.
5.4.2 Pattern of front and Back Vulnerability of dwellings East/West.
5.4.3 Enclosure/Exposure: Visibility of Access Faces.
5.4.4 Dwelling access and Vehicular access: Potential Surveillance.
5.4.5 Summary of Local Factors and their Influence on the Pattern of Vulnerability: First discussion.

5.5 Global Pattern of Vulnerability: Relationship between Burglary Risk and Degree of Integration.

5.5.1 Differences between mean Integration of burgled and nonburgled Dwelling samples.
5.5.2 Relationship between Burglary risk and Integration: Analysis of burgled Axial lines.
5.5.3 Analysis of Burglary rates by Integration Bands.
5.5.4 Summary of Pattern of Vulnerability with respect to Global Accessibility.

5.6 Interrelationship between Local and Global Factors.

5.6.1 Differences between East and West/Houses and Maisonettes in terms of Global accessibility (RRA).
5.6.2 Breakdown of Houses and Maisonettes by Enclosure/Exposure.
5.6.3 Integration and the Vehicular Surveillance Factor.
5.6.4 Summary.

5.7 Discussion and Conclusions: The Design of the Ferrier Estate and the Pattern of Vulnerability to Burglary.
CHAPTER SIX: CASE STUDY 3: ANDOVER ESTATE

6.1 Introduction: General Estate Profile.
   6.1.1 The Estate in its Context. 341
   6.1.2 Site Layout: Principles of the architectural design. 343
   6.1.3 Cluster formation and Block/Dwelling Typology. 346
   6.1.4 Dwelling Access: Pedestrian and Vehicular access. 347
   6.1.5 Open spaces: Exposure/Enclosure and Landscaping. 349
   6.1.6 Experience of estate; Fear of Crime. 350

6.2 Spatial Analysis of the Estate.
   6.2.1 Spatial description of axial structure. 351
   6.2.2 Pattern of Integration. 353
   6.2.3 Pattern of Movement and Space Use. 355
   6.2.4 Pattern of Constitution - Dwelling Access: Hierarchy between public and private space. 364

6.3 The Distribution of Burgled Locations.
   6.3.0 General data on Burglary on the estate. 367
   6.3.1 Observations on the Pattern of Burglary locations. 370
   6.3.2 General Breakdown of Burglary rates: Level and Type. 371
   6.3.3 Direct Access: Dwelling Typology and Burglary risk. 373

   6.4.1 Front-only versus Front/Back Access Vulnerability. 376
   6.4.2 Front and Back Access Vulnerability and Dwelling Type. 378
   6.4.3 Local degree of Exposure/Enclosure and Visual Surveillability of Dwelling Faces. 379
   6.4.4 Dwelling access and Vehicular Access. 385
   6.4.5 Summary and First discussion. 389

6.5 Global Pattern of Vulnerability: Relationship between Burglary Risk and Degree of Integration.
   6.5.1 Analysis of Integration of Burgled and Nonburgled Dwelling samples. 391
   6.5.2 Relationship between Burglary risk and Integration: Analysis of burgled Axial lines. 394
   6.5.3 Analysis of Burglary rates by Integration Bands 396
   6.5.4 Summary of Pattern of Vulnerability w. respect to Global Accessibility 400

6.6 Interrelationship between Local and Global Factors.
   6.6.1 Breakdown of Sample of Dwelling Faces (Mean Integration) by Front / Back Access and Dwelling Type. 403
   6.6.2 Breakdown of Dwelling Samples (Mean Integration) by Surveillability Categories. 404
   6.6.3 Breakdown of Dwelling Samples by Vehicular/Nonvehicular Access. 406
   6.6.4 Synthesis of the pattern of vulnerability: Analysis of the combination of local and global factors. 410
   6.6.5 Interrelationship between front and back dwelling faces. 413

6.7 Discussion and Conclusions: Design and the Pattern of Vulnerability to Burglary on the Andover Estate. 425
CHAPTER SEVEN: DISCUSSION AND CONCLUSIONS 438

7.0 Introduction. 438

7.1 Insights from the Review of the Discourse/Elaboration of the present Approach. 438

7.2 Case Studies on Spatial Vulnerability in Housing Design. 440
- Analysis of factors relating to visibility/accessibility: Design Variables. 443
- Patterns of vulnerability: Interrelationship between factors. 444

7.3 Principles; Patterns and Mechanisms of Spatial Vulnerability. 447

7.4 Relationship between Design Choices and Spatial Vulnerability. 449

7.5 Conclusions and Implications for Existing Approaches. 451

7.6 Issues For Further Research. 452

7.7 Implications For Design Against Crime And Housing Design Guidance. 454

7.8 Suggestions for Design Improvements on the Estates. 456

CHAPTER EIGHT: EPILOGUE 460

8.0 Guiding Principles for safety-conscious Public Housing Design. 460

BIBLIOGRAPHY 465

APPENDICES: 486

APPENDIX I: LARGER PROBLEM CONTEXT

A1.2. Fear of crime. 490
A1.3. Effects of Crime and Fear of crime. 494

APPENDIX II: ARCHITECTURAL DISCOURSE

AII.1 Creative process of Design 496
AII.2 Design Brief: 502
AII.3 Perception of the Environment: Perceptual approach: 505

APPENDIX IV: CASE STUDIES 508

A4. MARQUESS Rd ESTATE:
- Table A4.1: List of Burglaries on Marquess Rd Estate 509
- Articles in Local Press on Marquess Estate 510

A5. FERRIER ESTATE:
- Table A5.1: List of Burglaries on Ferrier Estate 512

A6. ANDOVER ESTATE:
- Table A6.1: List of Burglaries on Andover Estate 514
LIST OF FIGURES:

CHAPTER TWO: LITERATURE REVIEW

2.0 Scientific Perspectives on the Man-Environment Relationship. 18b
2.0.1 Perspectives of Enquiry into the Relationship between Man and the Environment in a Society with Crime. 19b
2.1 Basic approaches to Design Guidance. 22b
2.1.2 P. Evans: Relationship between Density; Building Height and Site factors. 39b
2.1.3 Martin and March: Case studies on site layouts and their building potential within same Density Figures. 40b
2.1.4 Network Types: In J. Mccluskey's 'Roadform And Townscape'. 42b
2.2 Crime Prevention: Individual; Community; and Crime Prevention Through Environmental Design. 49b
2.2.2 Oscar Newman's Defensible Space Variables. 59b
2.2.3 Alice Coleman's Design And Social Malaise Variables. 67b
2.2.4 Multi-Agency Crime Prevention Strategies. 76b
2.3 Criminological Approaches to Crime in the Environment. 81b
2.4 Literature Review Overview table of Variables linking Design and Crime. 121b

CHAPTER FOUR: MARQUESS ROAD ESTATE:

4.00 Photographic Impressions of the Marquess Rd Estate. 153-156
4.01 Plan of Estate in its Urban Context. 158
4.02 Plan of Site Layout of the Whole Estate Site (South and North sections) 159
4.03 Plan of Whole Upper Level ( Roof streets in North and South sections). 160
4.04a Plan of Marquess Rd Estate South: Ground level Plan. 161
4.04b Plan of Marquess Rd Estate South: Upper level Plan ('roof-streets'). 161
4.05a Plan of Marquess Rd Estate North: Ground level Plan. 162
4.05b Plan of Marquess Rd Estate North: Upper level Plan ('roof-streets') 163
4.06 Block and dwelling typology: Typical sections and dwelling plans 166
4.07 Marquess Rd Estate: Axial Map of Whole Ground Level in local context. 172b
4.8a Marquess Rd Estate All: Axial Map of Ground and Raised Ground Level. 172
4.8b Marquess Rd Estate All: Axial Map of Upper Level. 173b
LIST OF FIGURES:

4.9a Marquess Rd Estate South: Axial Map of Ground Level. 173
4.9b Marquess Rd Estate South: Axial Map of Upper Level. 174b
4.10a Marquess Rd Estate North: Axial Map of Ground Level. 174
4.10b Marquess Rd Estate North: Axial Map of Upper Level. 175b
4.11 Marquess Rd Estate: Pattern of Integration /Segregation:
Whole Estate in Large Urban Context. (MARQGlobal) 178
4.12 Marquess Rd Estate: Pattern of Integration /Segregation:
Estate on Its Own: Ground/Raised Ground And Upper Level (MARQ396). 179
4.13 A Marquess Rd Estate South Section: Pattern Of Integration /Segregation:
Ground /Raised Ground Level And Upper Level (MARQ178). 180
4.13 B Marquess Rd Estate South Section: Pattern of Integration/ Segregation:
Local Ground/Raised Ground Level System. (MARQ126) 182
4.14 A Marquess Rd Estate North Section: Pattern of Integration/ Segregation.
Ground /Raised Ground Level And Upper Level (MARQ224). 181
4.14 B Marquess Rd Estate North Section: Pattern of Integration/Segregation:
Local Ground/Raised Ground Level System. (MARQ163) 182
4.15 Marquess Rd Estate: Space Use: Correlations between Integration /Depth
and Number of Encounters. 186b
4.16a Marquess Rd Estate All: Pattern of Entrance locations:Ground (&R.G). 187b
4.16b Marquess Rd Estate All: Pattern of Entrance locations:Upper Level. 187
4.17a Marquess Rd Estate South: Ground/Raised Ground Level: Pattern of
Dwelling Entrances. 188b
4.17b Marquess Rd Estate South: Upper Level: Pattern of Dwelling Entrances. 188
4.18a Marquess Rd Estate North: Ground/Raised Ground Level: Pattern of
Dwelling Entrances. 189b
4.18b Marquess Rd Estate North: Upper Level: Pattern of Dwelling Entrances. 189
4.19* Marquess Rd Estate All: Pattern of 5% Integration in Local system
(MARQ396). 190b
4.19 Marquess Rd Estate All: Ground (&R.G) Pattern of Unconstituted Access
190
4.19*A Marquess Rd Estate South: Pattern of 10% Integration in Local system
(MARQ178). 191b
4.19 A Marquess Rd Estate South: Ground (&R.G) Pattern of Unconstituted Access
191
LIST OF FIGURES:

4.19*B Marquess Rd Estate North: Pattern of 10% Integration in Local system (MARQ224).


4.20 a Marquess Rd Estate All: Ground/raised Ground Level: Pattern of Burgled Locations.

4.20 b Marquess Rd Estate All: Upper Level: Pattern of Burgled Locations.

4.21 a Marquess Rd Estate South: Ground/Raised Ground Level: Pattern of Burgled Locations.

4.21 b Marquess Rd Estate South: Upper Level: Pattern of Burgled Locations.

4.22 a Marquess Rd Estate North: Ground/Raised Ground Level: Pattern of Burgled Locations.

4.22 b Marquess Rd Estate North: Upper Level: Pattern of Burgled Locations.

4.23 Frequency Distribution of Number of Dwellings per axial line

4.24 Relationship between Number of Dwellings/Axial Line and Burglary Rates in 1985; 86-87; 1985-87; for the Estate as a Whole and each Section separately.

4.25 Relationship between Number of Burglaries and Number of Dwellings/Axial Line in 1985; '86-87; 1985-87; for the Estate as a Whole and each Section separately.

4.26 Correlations between Burglary Rates and Mean Integration of axial lines for 1985 and 1985-87 burglary data respectively (I&II).

4.27 Ground and Raised Ground Level: Correlations between burglary rates and degree of Integration of axial lines for 1985 and 1985-87 burglary data respectively (I&II).

4.28 Raised Ground Level only: Correlations between burglary rates and degree of Integration of axial lines for 1985 and 1985-87 burglary data respectively (I&II).

4.29 Upper Level All: Correlations between burglary rates and degree of Integration of axial lines for 1985 and 1985-87 data respectively (I&II).

4.30 Upper Level: Correlations between burglary rates and degree of Integration of axial lines for South and North sections respectively (I&II).

4.31-33 South Section: Correlations between burglary rates in 1985; 1985-87; and degree of Integration of the Bands for the Estate as a Whole; Ground and Raised ground level; and the Upper level respectively.

4.34-36 North Section: Correlations between burglary rates in 1985; 1985-87; and degree of Integration of the Bands for the Estate as a Whole; Ground and Raised ground level; and the Upper level respectively.
LIST OF FIGURES:

4.37 Whole estate: Correlation between Number of Dwellings/Axial Line and Integration in the large spatial systems. 233
4.38 Ground and Raised ground level: Correlation between Number of Dwellings/Axial Line and Integration in the large spatial systems. 233
4.39 Upper level: Correlation between Number of Dwellings/Axial Line and Integration in the large spatial systems. 233
4.40-41 Correlations between Number of Dwellings/Axial line and degree of Integration for Ground Nonburgled and Burgled lines respectively. 234b
4.42-43 Correlations between Number of Dwellings/Axial line and degree of Integration for Upper Nonburgled and Burgled lines respectively. 235b
4.44-45 Correlations between Mean Number of Dwellings/Axial line and degree of Integration of the RRA Bands for South and North Sections respectively. 236b

CHAPTER FIVE: FERRIER ESTATE

5.00 Photographic Impressions of the Ferrier Estate. 250-254
5.01 Ferrier Estate: Map of Estate in Context Area. 256b
5.02 Ferrier Estate: Ground Level Plan. 258
5.03 Ferrier Estate: Deck Level Plan. 259
5.04 Ferrier Estate: Detail of site plan showing open courts and closed courtyards (squares). 261b
5.06A Ferrier Estate: Axial Map of Ground Level: Simple Spatial System. 265b
5.06B Ferrier Estate: Axial Map of Ground Level: Detailed Spatial System. 265
5.07 Ferrier Estate: Axial Map of Deck Level: (Simple &Detailed System). 266b
5.08 Ferrier Estate: Pattern of Integration: Simple Ground System LFER 130) 266
5.09 Ferrier Estate: Pattern of Integration: Simple Whole System Ground and Deck LFER 264). 269
5.10 Ferrier Estate: Pattern of Integration: Detailed Ground System (FER 268) 270
5.11 Ferrier Estate: Pattern of Integration: Detailed Whole System (Ground and Deck FER 400). 271
5.12 Ferrier Estate: Encounter Observations: Adult Patterns of Movement 272
5.13-I Ferrier Estate: Encounter Observations: Correlation Between Mean Rates of Mov. Adults & Integration in the Simple System 275b
LIST OF FIGURES:

5.13-II Ferrier Estate: Encounter Observations: Correlation Between Mean Rates of Static Adults & Integration in the Simple System 277b

5.14-I Ferrier Estate: Encounter Observations: Correlation Between Mean Rates of Children & Integration in the Simple System 277b

5.14-II Ferrier Estate: Encounter Observations: Correlation Between Mean Rates of Children & Relative Entropy in the Simple System 277

5.15-I Ferrier Estate: Encounter Observations: Correlation Between Mean Rates of Moving; Static; & Total Adults and Children Overall. 277

5.15-II Ferrier Estate: Encounter Observations: Correlation Between Mean Rates of Adults Versus Children At Ground Level (Excl.) 279b

5.16 A Ferrier Estate: Pattern of dwelling entrances: Simple Ground. 280b

5.16 B Ferrier Estate: Pattern of dwelling entrances: Detailed Ground. 280

5.17 Ferrier Estate: Pattern of dwelling entrances: Deck Level. 281b

5.18 A Ferrier Estate: Pattern of Front and Back Access: Simple Ground. 284b

5.18 B Ferrier Estate: Pattern of Front and Back Access: Detailed Ground. 284

5.19 A Ferrier Estate: Pattern of Unconstituted Access: Simple Ground. 285b


5.20 A Ferrier Estate: Pattern of 10% Top Integration: Simple Ground. 286b

5.20 B Ferrier Estate: Pattern of 10% Top Integration: Detailed Ground. 286

5.21 A Ferrier Estate: Pattern of burgled locations: Simple Ground. 287b

5.21 B Ferrier Estate: Pattern of burgled locations: Detailed Ground. 287

5.22 Ferrier Estate: Pattern of burgled locations: Deck Level 28b

5.23:I&II Correlation Between Burglary Risk & Mean Integration of Axial Lines (Front; Back; F-B; Deck: F-B-Indirect Access) in Simple/ Detailed Systems 30b

5.24 Correlation Between Burglary Risk & Mean Integration in RRA Bands (Front; Back; F B; Deck: F-B-Indirect Access) 31b

5.25:I&II Correlation Between Burglary Risk & Mean Integration of RRA Bands in Simple/ Detailed Systems respectively. 311b
LIST OF FIGURES:

CHAPTER SIX: ANDOVER ESTATE:

<table>
<thead>
<tr>
<th>Fig.</th>
<th>Description</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.00</td>
<td>Photographic Impressions of the Andover Estate</td>
<td>336-340</td>
</tr>
<tr>
<td>6.01</td>
<td>Andover Estate: Map of Estate in Context Area.</td>
<td>343b</td>
</tr>
<tr>
<td>6.02</td>
<td>Andover Estate: Ground Level Plan.</td>
<td>344</td>
</tr>
<tr>
<td>6.03</td>
<td>Andover Estate: Deck Level Plan.</td>
<td>345</td>
</tr>
<tr>
<td>6.04a/b</td>
<td>Andover Estate: Plan of Cluster (a); Block/ dwelling typology (b)</td>
<td>347/8b</td>
</tr>
<tr>
<td>6.05</td>
<td>Andover Estate: Axial Map of Estate embedded in Urban Context.</td>
<td>353b</td>
</tr>
<tr>
<td>6.06A</td>
<td>Andover Estate: Axial Map of Ground Level: Simple/Detailed Spatial System.</td>
<td>354b</td>
</tr>
<tr>
<td>6.08</td>
<td>Andover Estate: Pattern of Integration: Whole System in Context (including Tower Blocks ANDOV561).</td>
<td>356</td>
</tr>
<tr>
<td>6.08*</td>
<td>Andover Estate: Pattern of Integration. Whole System in urban Context (ANDOV552).</td>
<td>357</td>
</tr>
<tr>
<td>6.09</td>
<td>Andover Estate: Pattern of Integration: Simplified System in urban Context (Ground and Deck ANDOV368).</td>
<td>358</td>
</tr>
<tr>
<td>6.10</td>
<td>Andover Estate: Pattern of Integration: Ground Level in urban Context (ANDOV328).</td>
<td>359</td>
</tr>
<tr>
<td>6.11</td>
<td>Andover Estate: Pattern of Integration. Whole Estate on its own (ANDOV 429).</td>
<td>360</td>
</tr>
<tr>
<td>6.12</td>
<td>Andover Estate: Pattern of Integration. Ground Level on its own (ANDOV 205).</td>
<td>361</td>
</tr>
<tr>
<td>6.13</td>
<td>Andover Estate: Encounter Observations: Moving and Static Adult Patterns of Space Use.</td>
<td>364b</td>
</tr>
<tr>
<td>6.14</td>
<td>Andover Estate: Encounter Observations: Moving and Static Children's Pattern of Space Use</td>
<td>364</td>
</tr>
<tr>
<td>6.15</td>
<td>Andover Estate: Ground Level. Pattern of Dwelling Entrances</td>
<td>366b</td>
</tr>
<tr>
<td>6.16</td>
<td>Andover Estate: Deck Level: Pattern of Dwelling Entrances.</td>
<td>366</td>
</tr>
<tr>
<td>6.17</td>
<td>Andover Estate: Ground Level: Map of Unconstituted Access</td>
<td>367b</td>
</tr>
<tr>
<td>6.18</td>
<td>Andover Estate: Deck Level: Map of Unconstituted Segments.</td>
<td>368b</td>
</tr>
<tr>
<td>6.19</td>
<td>Andover Estate: Pattern of 10% Top Integration: in Simple System (whole)</td>
<td>369b</td>
</tr>
<tr>
<td>6.20</td>
<td>Andover Estate: Pattern of burgled locations: Ground Level.</td>
<td>369</td>
</tr>
</tbody>
</table>
LIST OF FIGURES:

6.21 Andover Estate: Pattern of burgled locations: Deck Level. 370b

6.22 A-C Andover Estate: Correlations between Burglary rates and degree of Integration of Axial lines: All ; Front ; Back Access (in Local and Global Spatial Systems of Reference). 395b

6.23: I&II Andover Estate- Integration Bands: Whole Estate:Correlations between Burglary rates and degree of Integration for estate on its own and embedded in context. 397b

6.24: I&II Andover Estate- Ground and Deck Level Integration Bands: Correlations between Burglary rates and degree of Integration for Ground level on its own (RRA205) and Deck Level RRA429/551. 398b

6.25 Andover Estate Integration Bands: Local Factors: Correlation between Average Rates for Local Factors and Mean RRA of Bands. 399b

6.26 Andover Estate Integration Bands: Local Factors: Correlation between Burglary rates and Local Factors in RRA Bands. 400b

6.27 Andover Estate: Interrelationship between Local and Global Factos: Differences in Degree of Integration between dwelling groups controlling for Front /Back; Vehicular / Nonvehicular Access / Surveillability/ Dwelling Type (Grand Overview). 415

CHAPTER SEVEN:

7.01 Layout Design & Typology of Dwelling Access: Global & Local Factors of Accessibility and Surveillability. 449b

7.02 Estate Design: Relationship between Design and Spatial Vulnerability. 451b

CHAPTER EIGHT

8.0 The link between Man Offender/Victim ; Community and the Built Environment / Design. 460b
LIST OF TABLES:

CHAPTER FOUR: MARQUESS ROAD ESTATE:

4.2.4a Marquess Rd Estate: Breakdown of Mean Number of dwellings per Axial line by Level of Access and by North / South Sections.

4.2.4b Marquess Rd Estate: Mean Number of Dwellings per Line: Differences between North and South Sections.

4.2.4c Marquess Rd Estate: Differences in Integration between South and North Sections w. r. to the global context, the local context and the estate alone.

4.3.2a Marquess Rd Estate: Breakdown of Burglary Rates by South & North Sections.

4.3.2b Marquess Rd Estate: Breakdown of Burglary Rates by Level of Access.

4.3.2c Marquess Rd Estate: Breakdown of Burglary Rates by Access Level for South And North Sections of the Estate.

4.3.2d Marquess Rd Estate: Raised Ground Level: Breakdown of Burglary Rates by Level and North/South Rates By South/North Sections of the Estate.

4.4.1a Marquess Rd Estate: T-tests on Differences between Burgled/Nonburgled Dwelling Samples: Mean Number of Dwellings per Axial Line: Ground/Raised Ground & Upper Levels.

4.4.1b Marquess Rd Estate: Number Of Dwellings Sharing An Axial Line: T-tests on Differences between Burgled/Non Dwellings: Total Data.

4.5.1 Marquess Rd Estate All: Integration (m. RRA): T-tests on Differences between Burgled / Non Dwellings in Whole Estate sample and each Level of Access separately.

4.5.1a Marquess Rd Estate South: Integration (m. RRA): T-tests on Differences between Burgled / Non Dwellings in South Overall and each Level separately.

4.5.1a Marquess Rd Estate North: Integration (m. RRA): T-tests on Differences between Burgled / Non Dwellings in North Overall and each Level separately.

4.5.3 Marquess Rd Estate: Integration Bands: Tabulated Data on RRA; Access and Burglaries/ burglary Rates Broken down by 2 % Integration Bands.
LIST OF TABLES:

CHAPTER FIVE: FERRIER ESTATE

5.2.2 Ferrier Estate: Mean RRA in Simple/Detailed Spatial Systems By Level.

5.2.3 Ferrier Estate: Observations on Movement and Space Use: (A: All Data; B: Average Rates).

5.3.1 Ferrier Estate: Breakdown of Burglary Rates by Access Levels.

5.3.2 Ferrier Estate: Breakdown Of Burglary Rates by Levels & East/West.

5.3.3 Ferrier Estate: Breakdown Of Burglary Rates by Level & Type Of Dwelling/Access.

5.4.1 Ferrier Estate: Breakdown Of Dwellings/ Burglaries By Dwelling Type.

5.4.2 Ferrier Estate: Breakdown Of Burglaries/- Rates By Front/Back ; Dwelling Type and East/West .

5.4.3 A Ferrier Estate: Breakdown of Ground Dwellings By Vis. Exposure Fr/B

5.4.3 B Ferrier Estate: Breakdown of Burglaries/Burglary Rates by 'visual Exposure/ Dwelling Type.

5.4.3 C Ferrier Estate: Burglaries in the 'Restricted View' Maisonette Subsample.

5.4.3 D Ferrier Estate: Breakdown by Front/Back Access Faces and Degree Of Enclosure/ Exposure (Excluding 'rest. View')

5.4.4 A Ferrier Estate: Breakdown of Dwelling Faces by Visual Surveillance Potential from Vehicular Routes

5.4.4 B Ferrier Estate: Breakdown of Burglaries & Burglary Rates by Front /Back Vehicular Surveillance & Dwelling Categories.

5.5.1 A Ferrier Estate: Differences Between Mean Integration of Burgled and Nonburgled Dwelling Samples.

5.5.1 B Ferrier Estate Ground Direct Access: Differences Between Front and Back Burgled Samples (Mean RRA).

5.5.3 Ferrier Estate: Breakdown by 20% Integration Band Data on RRA/ Burglary and Access/ Burglary rates (Ave F-B I Rate per Integration Band: For Whole, Ground and Deck separately.

5.6.1 A Ferrier Estate: Mean Integration: T-tests on Differences between: East /West Dwelling Samples.

5.6.1 B Ferrier Estate: RRA: T-tests on Difference between Houses and Maisonettes (E+W)
LIST OF TABLES:

CHAPTER SIX: ANDOVER

6.0.1 Andover Estate: Breakdown of Dwellings by Block/ Dwelling Type.

6.3.2 A Andover Estate: Breakdown of Burglary Rates by Access Level and Block Access Type

6.3.2 B Andover Estate: Breakdown of Burglary by Level in Tower Blocks

6.3.3 Andover Estate: Breakdown of Burglary Rates by Dwelling Type.

6.4.1 Andover Estate: Breakdown of Burglary Rates by Front/Back and Front Only Access.

6.4.2 Andover Estate: Breakdown of F/B Dwelling Faces by Dwelling Type.

6.4.3 A Andover Estate: Breakdown of Dwelling Faces/Burglaries by Degree of Visual Surveillability.

6.4.3 B Andover Estate: Breakdown of Dwelling Types by F/B Surveillability

6.4.4 A Andover Estate: Breakdown of Front/ Back Dwelling Faces by Vehicular / Nonvehicular Access.

6.4.4 B Andover Estate: Breakdown of Dwelling Faces by Dwelling Type and Front/Back Vehicular Access

6.4.4 C Andover Estate: Breakdown of Dwelling Faces/Burglaries by Surveillability and Vehicular Access.


6.5.1 A Andover Estate All: Differences in Mean RRA between Burgled/Nonburgled Dwelling Samples: Direct Access: Ground and Deck Level. (T-tests).

6.5.1 B Andover Estate All: Differences between Front and Back Ground Access; and Ground and Deck: T tests on Mean RRA in all Spatial Systems.

6.5.3 Andover Estate: Breakdown by 20% Integration Bands: Indexes on RRA/ Burglary and Access/ Burglary rates and Local Factors (Ave. Rates) per Integration Band: For Whole; Ground and Deck separately.

6.6.1 A Andover Estate: T-tests on Differences between Burgled/Nonburgled Dwelling Samples: Mean RRA of Front/Back Faces; Breakdown by Dwelling type.

6.6.2 Andover Estate: T-tests on Differences between Burgled/Nonburgled Dwelling Samples: Mean RRA of Front/Back Faces; Breakdown by Surveillability Categories.

xx
LIST OF TABLES:

6.6.2* Andover Estate: Interrelationship between Surveillability and Integration: Pattern of Burglary risk (Overview).

6.6.3 Andover Estate: T-tests on Differences between Burgled/Nonburgled Dwelling Samples: Mean RRA of Front/Back Faces; Breakdown by Vehicular/Nonvehicular Access -Ground Level.

6.6.3* Andover Estate: Interrelationship between Vehicular/Nonvehicular Access and Integration: Ground Level Pattern of Burglary risk (Overview).

6.6.4A Andover Estate Ground Level: Front and Back / Vehicular and Nonvehicular Access. Breakdown by Surveillability Categories and Dwelling Type (Overview).

6.6.5A Andover Estate: General Profile of Dwelling Type/Access/Surveillability: Overview of Front and Back Access Vulnerability by Dwelling Type.

6.6.5B Andover Estate: Burgled Dwellings Profile: Tabulated Data on the Sample of Ground Burglaries.

CHAPTER SEVEN: DISCUSSION AND CONCLUSIONS

7.2 A Overview of all Estates: Design Strategies & Layout Principles

7.2 B Overview of all Estates: Design Variables related to Accessibility & Surveillability.
The aim of this thesis is to add a gap in research and knowledge and raise the awareness of the potential vulnerability in housing design in the late twentieth century urban environments. Numerous built examples illustrate how vulnerability can arise, in spite of the designers' best intentions and architectural merit, particularly where innovation is not supported by informed consciousness.

This PhD thesis is based on empirical research in the form of three case studies on the design and spatial vulnerability of housing estates designed and built in the seventies. It also includes a multidisciplinary literature review covering three perspectives - the design, crime prevention, and criminological approaches - focusing on the key texts which inform the research on the design of the selected estates and assist in defining the research framework and the research questions.

The review of the design literature thus focuses on the texts guiding designs of housing estates mainly covering the late nineteen sixties, seventies and early eighties. It does not include recent official design guidance literature of the late eighties and nineties which has moved into these issues related to security in design and crime prevention, such as:

- the Department of the Environment (1993): Crime Prevention on Council Housing Estates; London; HMSO; prepared by the Safe Neighbourhoods Unit;

The above mentioned official guidance documents have tended to adopt the existing 'defensible space ideology, to a greater or lesser degree (for lack of any substantial alternative, target hardening (reviewed in Part II of the Literature Review) and other non-design measures such as community and management initiatives, placing emphasis on case evaluation of crime vulnerability. For reviews of this literature see: Charlotte Cook (1993 Crime and Design, MPhil Town Planning Thesis, Bartlett, UCL; and Emma Joy (1994 Design and Social Malaise: A Re-evaluation, MPhil Town Planning Thesis, Bartlett, UCL.


CHAPTER ONE: INTRODUCTION

1.0 The Research Problem

The relationship between the design of the built environment and crime is a problem that has caused much controversy over the last three decades amongst criminologists, architects and the authorities concerned with the problems of crime. There has been much discussion in recent years about the failure of 'modernist' housing estates to provide a safe environment for their inhabitants. Crime studies and official reports indicate that urban areas have generally suffered from a continuing rise in crime levels over the last decades, which in turn reflects the high social tensions and socio-economic changes that have taken place in society at large. Housing estates, built by the local authorities to house the socially and economically less privileged (and hence more vulnerable) sections of the population, tend to be particularly affected by these social changes of unemployment, social instability and the breakdown of the family structure, as well as by crime, the fear of crime and the effects thereof.

There are some housing estates that appear to have more than their fair share of crime and social problems\(^1\). These tend to be unpopular (hard to let) estates, and this has inevitably given rise to certain fundamental questions about the reasons which have contributed to this: Does architecture and planning have anything to do with crime on estates, or is it more a problem of housing management? Can architecture or the physical environment cause crime? How can you tell the effects of architecture from other long established social causes? In spite of the rise (and fall) of certain theories that have offered design solutions, these issues remain largely unresolved and are still surrounded by much theoretical confusion. This becomes apparent in the difficulty encountered in expressing what is being looked at in the relationship between housing design and crime. \textit{If the design of housing estates affect vulnerability to crime, how does it do so? Even more importantly, is there something the designers can do about it?}

This is the central question addressed by this thesis. It examines the relationship between design and crime: what makes a housing environment vulnerable to crime spatial terms; how the design and layout of housing schemes can contribute to 1

\(^1\) These are often highlighted in the local press See Appendix IV: local press cuttings on Marq Rd Estate and the Andover Estate, L B Islington and Ferrier Estate, as examples of media cover.
opportunities for crime; what design factors or spatial factors affect crime risk and how they work. It seeks to provide some answers that are useful from an architect's point of view.

1.1 **Significance of the Problem in the Larger Problem Context: The Vicious Circle of Crime and Fear of Crime:**

The relationship between design and crime is a problem, which falls in the grey area of overlap (or gap) between the disciplines of architecture and criminology. Research on the subject suffers the consequences of artificial boundaries between disciplines, such as methodological discrepancies and 'language' or communication problems, which require particular effort to overcome. Thus up to recently, this area of knowledge has been treated as relatively marginal by both sides, in spite of its importance, particularly when it comes to doing something about crime in concrete terms. For the administrators and policy makers in the government and local authorities, this area, however, offers new practical possibilities for dealing with crime prevention and improving the design of housing estates in terms of safety, and hence has always held attractive if not promising prospects.

Apart from providing homes for people, the design of housing estates shapes the environment in which they live and structures a significant portion of their daily lives. In some areas crime has a relatively strong presence in people's daily lives, and there is only so much that police authorities can do about it. The problem of crime is directly related to that of fear of crime, which itself cannot be ignored, since it often has the long term effect of eroding the fabric of a local community.

Thus the relationship between housing design and crime is a problem which ultimately has a direct bearing on the every day reality of those living on housing estates. The spatial dimension of the crime problem is one of many aspects, which are closely knit into a whole chain of problems related to crime, the fear of crime and the effects thereof. A number of studies have been conducted , which reveal the extent of crime and fear and the relationship between the two. The effects of fear of crime are much broader and sometimes more long-term, restricting the daily lives of people, particularly among the more vulnerable segments of the population - women, the elderly, ethnic minorities, the poor. These are also the social groups that are less able to defend themselves and seek compensation for damages, or other negative side
effects². (See Appendix I: Sections AI.1-3 on Crime, Fear of Crime and the Effects thereof).

The fear of crime is an even greater problem than crime itself. Studies have shown that it is usually justified by and strongly related to the extent of crime in the local area, though not necessarily in the immediate environment³. Research has shown that the physical environment is also directly related to perceptions of fear and vulnerability. Apart from particular features of the environment, for example dark corners, stairwells and elevators, subways, etc., high fear seems to correlate to dissatisfaction with the environment, and evidence of incivilities -vandalism, evidence of break-ins, etc. (Smith, 1986).

Furthermore, defensive behaviour patterns on the part of inhabitants (avoidance of going out at night, or at all; social isolation; distrust of neighbours and the social environment;) have an overall debilitating effect on the atmosphere and social life of estates. This in turn results in a vicious circle, increasing feelings of insecurity, vulnerability and dissatisfaction etc. ⁴.

Research evidence suggests that design measures aimed at decreasing crime vulnerability have in many cases had the positive spin-off effect of reducing the fear of crime, often without actually reducing crime itself in the long term⁵. Considering the problem from this point of view, designing with an awareness of the vulnerability to crime, and attempting to achieve urban residential environments, which discourage rather than create crime opportunity, cannot just be considered as a commendable option for architects. It is a professional responsibility.

---

2 Official Crime surveys (HMSO) and local crime surveys provide insight, see for example: T. Jones, B. Maclean, J. Young (1986) : The Islington Crime Survey.; other victim surveys in Britain are the Merseyside Crime Survey (see Kinsey, '84; S Smith '83, '84a). Also M Hough and P Mayhew (1985). 'Taking account of crime: Key findings from the British Crime Survey' 
Also: S Smith, op cit., '86;
1.2 The Problem Context: Fragmented Approaches

Crime takes place in the physical environment, the design and construction of which architects and planners are primarily involved in. Whereas crime is generally acknowledged as a serious social problem and is mainly addressed from a sociological perspective, (definition, causes and socio-environmental context), the physical perspective - the relationship between crime and the built environment and the influence of design on the location of crime has not been sufficiently addressed, particularly from the point of view of the architectural and planning professions.

- **Housing design: much experimentation and little feedback.**

There has been much experimentation in the design of post war public housing in Britain. London itself is a striking example of the variety of residential designs that have been built over the past decades. From the visionary futurist urban developments to 'romantic' neo-vernacular schemes, they include high-rise low-density estates; mixed developments; tower-blocks, slab-blocks, multilevel megastructures, with deck access, 'streets in the air', courtyard layouts. In the attempt to remedy the problems of visual monotony and unstructured open space, which characterise the housing estates of the 1950's and 1960's, architects attempted various reinterpretations of the 'traditional' urban or vernacular environments and their constituent elements (streets, squares, courtyards etc.)

By the late 1970's design policies shifted emphasis from ambitious large scale redevelopment to small scale, infill and integration with the urban context. However, all these represent a unique wealth of experience and experiment that needs to be tapped, if something is to be gained overall for the future.

With relatively few exceptions⁷, criticism and feedback has mainly come from outside the profession (Local government, sociologists, even HRH Prince Charles). Over the last decade, however, B. Hillier; J. Hanson and the former Unit for Architectural Studies (UAS*)⁸ - supported by extensive research conducted at the Bartlett School⁹, have launched a critique of design theories and approaches, arguing that there is a strong discrepancy between architects' aims and the achieved results -

6 The grouping of housing blocks around these elements, however, was based on principles of order that moved increasingly away from the traditional urban street layouts they replaced, introducing the principles of clustering and hierarchy (see GLC (1978) discussed in chapter 2).

7 Notably a number of critical essays in Teymur, Markus and Wolley 1988; see also Teymur (1988b) critique of the pathology of housing and the pathology/fragmentation of housing discourse.

8 From here on the former Unit for Architectural Studies at the Bartlett will be referred to as UAS*.

the reality of living there. Even more alarming is the fact that, estates which have been highly acclaimed by the architectural profession (with RIBA Gold Medals and other awards or distinctions)\textsuperscript{10} ended up being notoriously 'unpopular' - 'difficult', 'problem' or 'hard to let' estates - however the authorities wish to name them. These are the housing estates tenants often avoid, given a choice, and increasingly, only the most desperate or undesirable tenants will tend to land there. Design problems, social problems and high crime victimisation tend to go hand in hand in a 'spiral effect', while managing authorities are faced with higher costs due to high turnover (vacancies) and incivilities (vandalism and neglect). Studies of users' attitudes and experiences are providing important feedback\textsuperscript{11} on the 'social performance' of the designed environment, which appears to cast a different light on notions of architectural achievement. The discrepancy between lay perceptions and architects' assessments has yet to be confronted in earnest by the profession on the whole.

Beyond the formal, functional and constructional considerations, architects have had little awareness of real users' needs (J. Darke, 1983; 1984) and the actual social consequences of their designs. Whereas architectural discourse has mainly focused the design discussion on the outside shell; its formal ordering principles; construction and technology; function and 'meaning'; or the 'quality' of the resulting spaces; it has faced the problem of the 'social performance' of design with much scepticism and defensiveness.

In the architectural profession, the lacking interest in learning from experience by trial and error - an important part of experimentation - has not been consistent with its ambitions. The architect's involvement has fluctuated from the one extreme of architectural determinism - attempting to create social order through spatial order, designing community and changing people's behaviour through defensible space etc.- to the other extreme of the 'relative autonomy' of architecture and social reality, stripped to another system of visual images or 'signals' that express social 'meaning'\textsuperscript{12}.

\textsuperscript{10} For instance the Marquess Rd Estate, London Borough of Islington-Gold Medal 1980; The Pepys Estate, Deptford, L B Lewisham, Maiden Lane, L B Camden which have all been plagued with social problems, crime problems, high dissatisfaction, management problems, costly improvement programmes and extensive efforts on behalf of authorities, the tenants associations, police and other outside support agencies to make these estates more acceptable if not desirable to live in.

\textsuperscript{11} Local authorities are increasingly commissioning residents surveys on problem estates in order to target improvement strategies intervention. See, Hüller, Jones, Penn et al. (1989a ) and (1989b).

\textsuperscript{12} On the one hand, the 19th urban interventions and utopian schemes; Le Corbusier (1929; 1931; 1933); or CIAM' X / Team Ten ; A. Smithson (1965) etc. On the other, the reaction from sociologists as M. Webber (1964) and Broady (1966) who argued against architectural determinism and for "community without propinquity" ; and the Post-modernism movement in Architecture see C.Jencks (1985: 331); G Broadbent (1990); Colquhoun (1989: 246-470; P.Rowe (1993).
Despite the adventurous spirit of modern architecture, there has been a fundamental lack of research and feedback on the actual 'performance' of new housing designs; how new environments perform with respect to social interaction; the use and abuse of space; and crime vulnerability. This thesis attempts a step in this direction, to bridge the gap in the area of overlap between the disciplines of architecture (urban design) and criminology.

• **The link between design and crime.**

Whilst architecture basically ignores the problem of crime, as will be discussed in part one of the literature review, the link between crime and design or crime and space is actually also about the **link between man and the environment.** There are three basic rationales in the existing literature on design and crime, three approaches to the relationship between crime and the environment - and a fourth, involving the combination of the first three, which will be discussed in part two of the literature review:

1. **The 'target hardening' approach or hardware rationale:**
   This comprises the very basic, common sense rationale of restricting accessibility and increasing surveillability. It involves increasing the strength of the boundaries by securing control of the permeabilities (doors; windows) and employing detection and surveillance equipment, with **minimum assumptions** about behaviour or use of space. Research evidence both in the USA and Britain supports the claim that this approach has positive effects in reducing crime and makes a difference particularly with regard to low security thresholds and low target value, as is generally the case in housing estates.

2. **The Social Surveillance approach:**
   Jane Jacobs (1961) an architectural journalist in the early sixties was the first to actually link urban design to safety. Her highly influential book *The Death and Life of Great American Cities* launches an attack on the predominant post Corbusean planning practices and argues in favour of the traditional mixed neighbourhoods whose lively streets with a continuous, dense presence of people, create a 'self-policing environment'. The "eyes on the street " approach, with minimum assumptions about behaviour, involves the active presence of both inhabitants and strangers, as an efficient way of ensuring safety in the environment, that no police force can possibly replace. A further development of these ideas has also occurred in crime prevention based on 'community' developing programmes.
The Defensible Space - territorial engineering approach:
Oscar Newman's highly influential theory of 'Defensible Space' (Newman, 1972) published in the early seventies after extensive research, partly builds on J Jacobs' ideas (social surveillance) adding however the notion of human territoriality. This approach as will be discussed in more detail, is based on the assumption that design can stimulate the territorial behaviour of the residents over defined zones of control, which is enhanced by keeping strangers (viewed as potential offenders) out of the residential environment.

In spite of criticism for its theoretical and methodological shortcomings, 'Defensible Space' left a strong mark on the design of estates in the 1970s and early 1980s, contributing to the condemnation of high rise blocks in open space. As will be discussed in section 2.1, defensible space filtered into the design guidance literature on housing layout, in support of the notions of enclosure, the clustering of dwellings, and hierarchy of public to private spaces. Notions of good/safer design have mainly been associated with the need to identify people with spatially defined territories and keeping strangers out.

Newman's work also stimulated much criminological research providing the basis for the 'Crime Prevention Through Environmental Design' programme. Subsequent research on the results of demonstration programmes and experiments with 'defensible space', however, failed to provide concrete evidence for the validity of the territorial approach and its behavioural assumptions. In later work, Newman modified his approach to include the importance of social factors relating to community building, which define the conditions under which 'defensible space' can be implemented ('Community of Interest': Newman, 1980). The theoretical shortcomings, and the disillusionment with the failure of the results, caused the whole issue of design and crime to be discredited (P. Mayhew, 1979). Thus the Department of the Environment (DOE) in Britain shifted its emphasis to improving housing management as the solution for problems on estates. Still, 'defensible space' remains the only comprehensive attempt to fill the scientific gap.

---

13 For example B Hillier's (1973) critique of Oscar Newman 'In Defence of Space' argues that the statistics tend rather to prove the opposite of what he is actually arguing, i.e. that social factors are more important predictors of crime rates per block than design.

In the mid-eighties there was a new surge of interest on the subject of crime and design in Britain, following the publication of Alice Coleman's (1985/90) 'Utopia on Trial' which continues in O. Newman's footsteps. Coleman, a geographer, maintained a relationship between the design features of modernist blocks and various types of antisocial behaviour ranging from litter and graffiti to crime, and proposed a design disadvantagement scale that provided a guide to determining housing design faults and assessing improvements. Once again, Coleman's design prescriptions have been keenly received by local authorities and politicians, and put to practice.

The considerable volume of literature and studies related to Newman's and Coleman's work, both in the architectural and criminological discourses, will be presented in more detail in the second part of the literature review. Both Newman's and Coleman's scientific research faced serious criticism for their inherent methodological weaknesses, particularly with respect to the difficulty in distinguishing the effect of the design factors from the social factors. In recent years the emphasis has shifted to multi-strategy approaches, which it will be argued merely diffuse the issue.

It will be argued that the problem with research focusing on the relationship between architectural design and crime, to date has been twofold:

- On the one hand, based on the assumption, that the physical environment influences behaviour, both defensive and antisocial, (man- environment paradigm), the discussion on the subject of design and crime has been largely restricted to and obscured by a conceptual framework in essence suggesting that bad design causes crime.
- On the other hand it suffers from the limitations of its methodological approach making it very difficult to distinguish between social or physical factors influencing the variation in crime rates, due to its use of the building block as unit of analysis.

---

15 As will be discussed in the following chapter crime rates are calculated on a block basis and are correlated to social factors and design factors, while block size is not controlled for, and design features are often strongly interdependent
• Crime as a spatial phenomenon

It is generally accepted that crime is a social phenomenon, whose causes are rooted both in the structure of society and in the psychology of the individual. Although the criminological discourse has had difficulty in arriving at a comprehensive definition of crime, it is generally agreed that in practical terms crime is: a set of actions, which are forbidden by the law; an event which breaks with the rules of the dominant structure of society. The general notion of crime includes very different types of activities and offenders: from crimes against humanity; crimes against person, (murder; assault; rape;) and property crime, (burglary; car crime; purse snatching; vandalism). These involve very varied circumstances of motivation and physical conditions surrounding the actual occurrence.

Criminology is the branch of sociology, which traditionally investigated the problem of crime in society. Traditional criminological research has been mainly involved in understanding and explaining crime as a social phenomenon, looking for causes of crime in the social, economic and political structure of society, or in the individual psychological and biological makeup. It has focused on the relationship between crime and the environment that causes it, predominantly with respect to the influence of the social environment.

Crimes are, however, events which always take place in particular locations; and the occurrence of crime cannot be divorced from its spatial situation. In more recent years criminology and related fields have shown interest in the relationship between crime/criminals and the environment - social activity and its physical setting and the way it is perceived.

• Space in criminological research

The spatial dimension in the study of crime was first introduced in the 19th century by the early 'cartographic criminologists', who analysed differences in the spatial distribution of crimes and criminals in relation to variations in moral statistics. In the 1920's the social ecology approach, which was developed in the Chicago School of Sociology, was applied to criminological studies. The pioneering work of Shaw and Mackay involved the comparison of delinquency residence rates and area indices.

---

16 There is a large discussion about the definition of crime, this definition is generally accepted for reasons of clarity see for example 1 Marsh, 'Crime - Sociology in Focus', Longman Group Ltd, UK, 1986 pp 2-6
of social conditions against the backdrop of the city's physical geography (Burgess' zonal model of the city, Burgess; 1916). Areal and ecological studies of crime have since focused on the spatial distribution of criminal offences and criminals (offenders residence) at various scales of resolution: from the global level of states/countries (macro-spatial); interregional, intercity (meso-spatial); to the urban scale and neighbourhood scale (micro-spatial level of resolution).18

Research that followed in the wake of the Chicago School's ecological tradition focused on the social, cultural and environmental conditions associated with high criminal residence rates, criminogenic and crime prone areas, rather than on the study of the areal distributions of offences. The distinction between the two has often been vague if not confusing19. The large proportion of areal analyses of crime distribution, particularly of the 1960s, have been based on theoretically weak but increasingly sophisticated statistical methods which have correlated crime rates with characteristics of area units of analysis without necessarily contributing much to the understanding of crime, nor its relationship to space20. Thus the spatial dimension in most criminological studies has essentially been a stage or backdrop for the social. Space has been treated merely as a reference system for the social map rather than an independent factor influencing the occurrence of crime. "Space has been utilised as a medium in most human ecology, rather than as a variable with a potential effect of its own.." (Michelson, 1970).

Since the nineteen seventies, however, there has been increasing interest in the spatial dimension of crime triggered by Oscar Newman's 'Defensible Space', and C. Ray Jeffrey's21 work on the application of behaviourism and environmentalism to the control of crime. This work along with research focusing on crime specific studies of victimisation have contributed to the development of the field of 'environmental criminology' under Paul Brantingham and Patricia Brantingham22 to be reviewed in

---

19 For review see Brantingham P & Brantingham P, (1981: 24-26)
20 See critique of areal and ecological studies particularly of the '60s in: Smith Susan (1982).Crime, Space and Society: pp 6-9
21 C Ray Jeffery (1971), Crime Prevention Through Environmental Design, Sage Publications, Beverly Hills CA. Jeffery, a Professor of Criminology working independently of Newman, dealt with the problem of controlling criminal behaviour through reducing environmental opportunities from a more theoretical point of view than Newman.
22 Amongst numerous publications their main thesis is published in the two books they edited, with a collection of essays that comprise the aspects and perspectives of 'environmental criminology': Brantingham P & Brantingham P, (1981), Environmental Criminology, (op. cit. Environmental Criminology focuses on the occurrence of crime in its spatial dimension, and studies the patterns of crime as events in a particular location in space and time, sought out by the offender.
part three of the literature review. Contributions are made from urban geography; planning and environmental psychology; the shift of perspective moves from disciplinary boundaries to an interdisciplinary criminological relationship, and the shift of concern from the offender to the criminal event.

In parallel, a similar approach developed in Britain in the eighties, called the 'situational approach' to crime prevention, (R Clarke and D Cornish, 1980)\textsuperscript{23} which addressed the necessity to deal with crime at the practical level - the situation encouraging its occurrence. Within this context, research has attempted to analyse and understand spatial patterns of crime with respect to the 'spatial opportunity' for crime, offenders' mobility patterns and target selection processes (modelled as the construct of 'crime templates'), which will be reviewed in part three of chapter two. Increasing awareness of the need for more focused studies of crime patterns has lead to a number of studies: of street crime\textsuperscript{24}, residential crime\textsuperscript{25}, as well as a considerable body of literature on burglary\textsuperscript{26}, to which this thesis will give particular attention.

Studies of burglary patterns have addressed the relationship between man and the environment from two points of view: that of the offender (subjective criminal's spatial patterns) and that of the victim or victimised locations. In the attempt to define burglary risk at the micro-environmental level, research has on the whole increasingly focused on the offenders' spatial behaviour and target selection, rather than on the physical features of locations, due to the lack of rigorous methodological/descriptive tools of analysis. However, this research has identified the main 'environmental' factors influencing the risk of being burgled as: accessibility, surveillability, occupancy of dwellings and target value.

The first two factors have a direct relationship to spatial layout and design, though in too vague a form to be of use for the designer and there is still confusion

\textsuperscript{23} The HMSO has published a number of publications on this approach see for example: R Clarke and P Mayhew, (Eds) (1980) under the title of 'Designing out crime'; K Heal and G Laycock (Eds (1986) 'Situational Crime Prevention'. Also R V G Clarke, 'Situational Crime Prevention: theory and practice', in British Journal of Criminology. 20, pp 136-145*. This approach offers a more pragmatic contribution to the problem of tackling crime than merely studying the criminals and the social context of crime The main idea is, that one may then proceed to reduce opportunities in the environment and thus reduce 'opportunistic' crime, which includes the majority of crime committed on housing estates. Such strategies are target hardening, property marking, neighbourhood watch schemes and crime prevention through environmental design.

\textsuperscript{24} S Angel, (1968), Discouraging Crime through City Planning, Center for Planning and Development Research, Berkeley, CA


\textsuperscript{26} Notably H Scar, '73; P Brantingham '75. Waller and Okihiro, '78; Mike Maguire '82; D Walsh, '80; S Winchester and H Jackson, '82; R Clarke and Tim Hope, '84; T Bennett and R Wright, 84;
surrounding the often contradictory evidence on the way in which spatial factors affect crime, partly due to the controversy within the design against crime literature.

It will be argued that, whilst there continues to be a fundamental lack of systematic knowledge on the spatial patterns of crime vulnerability, the new developments in criminological discourse provide valuable insights into the physical factors (accessibility, surveillance etc.) affecting crime risk/opportunity. These provide a more suitable basis for the study of the spatial dimension of crime, and contribute to furthering the understanding of the actual relationship between crime and space beyond the concepts of "defensible space".

To sum up, four fundamental issues arise when confronting the problem of designing a safe (crime deterring) environment:

1. Lack of systematic feedback on the social performance of housing estates within the architectural profession and insufficient concern for the problem of crime and spatial vulnerability in the design of residential environments.

2. Theoretical and methodological limitations of the existing approaches to design and crime, as to how social and spatial causes can be separated.

3. Theoretical and methodological limitations of 'disciplinary' boundaries: the compartmentalisation of knowledge and research into distinct scientific fields, sociology, architecture, psychology etc. A complex reality is analysed in fragmented and weakly linked aspects. The zones of overlap between disciplines remain obscure, requiring particular effort to overcome the artificial scientific research boundaries. Hence...

4. Interdisciplinary confusion about the relationship between space and crime and the influence of the physical environment on the occurrence of crime.

1.3 **The approach adopted by this thesis.**

Design is the process by which space in the built environment is shaped. In order to investigate the relationship between design and crime, it is necessary to understand the link between space and crime, and keep in mind that space is a continuum, not a fragmented set of territorial or building features. Existing approaches to crime and design are restricted to and restricted by behavioural assumptions and the confusion surrounding the relationship between space and crime. They tend to obscure the problem rather than further its understanding. The relationship between crime and space is ultimately also the relationship between man/society and the environment.
It is in this grey area of overlap between man-oriented (social) and environment-oriented (architectural) studies that Hillier and Hanson (1984) and the approach developed at the former Unit for Architectural Studies contribute valuable insights and clues to the missing theoretical link. As will be discussed in chapter three, the UAS* 'syntactic' approach provides a descriptive language and methodological tools to study the hitherto elusive relationship between design, space and crime.

In order to understand the whole, one needs to understand the parts; in order to understand each part it is necessary to be aware of its relationship to the whole. It is necessary to step out of the existing framework (Defensible space) completely and start anew, back to the basics of observing reality. Whilst past research has been largely obstructed by fragmented perspectives, causal thinking and the 'man-environment paradigm'27, the 'situational approach' combined with the UAS* approach provide a fruitful basis for the methodological framework adopted in this thesis, which looks at both the local and global aspects of spatial configuration.

Crime is a spatial event and architecture and urban design is about shaping and ordering space through the physical structure. Extensive research at the Unit for Architectural Studies has shown that the built environment structures patterns of movement and use of space, and the interaction of the different categories of users. This it achieves through the ordering of walls and/or boundaries and openings or permeabilities i.e. the space enclosing/defining elements and space relating elements. Offenders also move within these spatial patterns. They use their experience of space and the patterns of space use to select their targets and calculate the potential risk of apprehension and/or spatial opportunities. As this thesis will argue, it is through its space-defining and space-relating properties, that the built environment influences, the location of crime and the spatial risk - the crime opportunity structure. This thesis adopts a situational approach, while attempting to establish a more rigorous spatial methodology using the UAS* theoretical and descriptive base.

For practical reasons, explained in the third chapter, the research in this thesis focuses on burglary, the most location specific recorded crime in the attempt to come to grips with the general mechanisms of spatial vulnerability to crime.

1.4 Research aims

The main aim of this thesis is to investigate the relationship between spatial vulnerability to crime and design choices in the layout of housing estates; to identify the mechanisms of spatial vulnerability; and translate the findings into design terms.

It is perhaps necessary to emphasise from the start, that this thesis does not attempt to address the issue of the causes of crime and whether or not bad design can have this effect. This is beyond the scope of the research and the particular interests of the author, whose ultimate aim is to provide feedback for architects on the performance of design choices as regards vulnerability to crime.

More specifically the research aims of this thesis are:

A. To examine the state of knowledge on housing design and crime and on the physical factors influencing crime opportunity and the selection of crime targets, thus outlining certain fundamental hypotheses to be elaborated or investigated.
B. To elaborate a methodological framework applying the UAS* methods of spatial analysis in order to identify the spatial factors which influence burglary risk and analyse the performance of design choices as regards vulnerability to crime in purely spatial and architectural terms.
C. To identify the interrelationship between local and global factors of design influencing burglary risk and the spatial dynamics of vulnerability with respect to burglary.
D. To draw some feedback in architectural terms for the design of safer housing.

1.5 Research Design: Case studies

The research is based on a series of case studies on the patterns of burglary locations in a range of different housing estates in London. Through the case studies the attempt is made to define the design variables and their combinations in each design, and analyse the mechanisms of spatial vulnerability influencing the location of victimised locations. The attempt is also made to combine in-depth exploratory research with sufficient breadth to provide insights on design choices. The case studies focus on the patterns of burglary locations in three large high crime estates: the Marquess Road and the Andover Estates in the London Borough of Islington, and the Ferrier Estate in the London Borough of Greenwich.
The criteria for the selection of the case studies include different types of housing design in estates with broadly similar socio-economic characteristics (ex-GLC/ with high crime problems), strongly dependent also on the availability of data from the police authorities. The research is specifically based on recorded burglary data supplied by the Metropolitan Police, burglary being the most location specific recorded crime.

1.6 **Original Contribution of the thesis**

The original contribution of the research thesis lies in:

a) The elaboration of a methodological framework for the analysis of design and patterns of crime at the microspatial level of resolution - applying the methods of spatial analysis developed by the Unit for Architectural Studies;

b) The provision of insights on the interrelationship between the local and global factors of design influencing vulnerability to burglary and the mechanisms of spatial vulnerability.

c) Feedback for architects on designing safer housing environments, in the light of the implications of the research findings.

1.7 **Summary of argument and outline of chapters**

This thesis will argue that spatial vulnerability is defined by the interrelationship between design factors related to 'accessibility' and 'surveillability' at both the local level, the characteristics of dwelling access faces and their immediate environment, but also at the global level, the overall spatial structure of the estate in its urban context. Surveillability is found to relate to visual exposure/visibility and social presence/ control. The general principles are, that reduced visual surveillability and segregation increase vulnerability, whilst high integration ('easy access') can also be highly vulnerable depending on local conditions (restricted surveillability, or unconstituted access). The pattern of vulnerability is determined by the **dynamic interrelationship** between the global and local factors, rather than local features only.

Jane Jacobs argues that the problem of vulnerability to crime, actually arises when the 'self -policing' environment fails. The research findings here suggest the mechanisms by which this happens. It can result from high degree of enclosure,
hierarchy between public and private space, insularity and segregation; when the physical environment is designed in a way that disperses spontaneous social interaction and the presence of people, particularly in high density environments. This creates physical vulnerability to crime rather than remedies it, and makes extra agencies and technology necessary to stimulate social control and prevent crime. It is argued that 'defensible space' related design ideas and the design disadvantagement scale need to be reconsidered in the light of the above.

This thesis is structured as follows:

**Chapter two:** reviews the state of knowledge related to design and crime in both architecture and criminology, focusing on the relationship between man and the environment from three different perspectives:

- the **architects perspective** - analysing the design guidance discourse on housing layout which basically ignores the aspect of crime vulnerability;
- the **society/ the victims' perspective** - the state of the debate on dealing with the problem of crime in the physical environment **design against crime discourse**;
- the **crime and the criminal's perspective** - reviewing the criminological insights on the relationship between space and crime, as well as focusing on patterns of residential burglary and the existing knowledge of environmental factors influencing burglary risk - target selection.

The aim of the literature review is to identify the limitations of previous research, as well as the research questions and the hypotheses to be further investigated, and to set up the framework for the research of this thesis.

**Chapter three:** presents the methodological framework adopted by this thesis, outlining some of the basic theoretical concepts and methodological tools, as well as the research context within which this thesis develops. It discusses the research design and the selection of case studies, the handling of the data and the specific methodology of analysis adopted by the case studies.

**Chapters four, five and six** deal respectively with the presentation of the case studies on Marquess Rd Estate; Ferrier Estate; and Andover Estate; covering:

- General description of estate design
- Spatial analysis of overall design / space use / pattern of dwelling access.
- Analysis of general access factors relating to block/dwelling typology: levels, type of access etc. and respective breakdown of burglary rates
• Identification of Local Factors influencing vulnerability in relation to dwelling faces (front and back; vehicular/pedestrian access; visual surveillability,)
• Analysis of global pattern of vulnerability (integration/segregation)
Interrelationship between local and global factors.

Chapter seven: summarises the research findings from the literature and case studies; discusses the emerging principles and mechanisms of vulnerability and draws the relationship between factors of vulnerability and design choices at the various stages of the design. It discusses the implications of the research in terms of existing approaches to crime and design and design guidance, and suggests issues for further research, as well as suggestions for improvements to the examined estates.

Chapter eight, explores the implications of the research in terms of general guiding principles for safer housing design.
FIGURE 20 : SCIENTIFIC PERSPECTIVES ON THE MAN-ENVIRONMENT RELATIONSHIP
CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction.

The aim of this chapter is to discuss the key issues that are relevant to the question of design and crime and draw out the basic information necessary to establish the research framework and define the research problem.

Figure 2.0 presents the breakdown of man-environment research disciplines classified by focus on man or physical environment at the level of the individual and the collective. The relationship between housing design and crime, or more generally, crime and the environment, falls somewhere in between, ultimately tied to the relationship between man and the environment. Every offence takes place in the environment at a specific time and place, while the abstract notion of 'man' splits into two: deviant man/woman - the offender; and the 'normal' law-abiding citizen - the potential victim. Architecture focuses on shaping the environment for man and society, basically ignoring the fact that crime is an aspect or by-product of this society, the latter being traditionally considered to be solely the domain of criminology. This disciplinary division (see Figure 2.0.1) does not really deal with the 'threat' posed by 'deviant man' to the individual member of society and his property - in the environment designed by architects and planners.

The literature review thus focuses on the relationship between man, the environment and the community, as seen from the three perspectives: 1. the architects - responsible for the design of the environment; 2. the 'authorities' - confronting the problem of crime in the environment in order to protect the victims; and 3. the perspective of the actual perpetrators of crime.

More specifically, this chapter is divided into three parts:

• The first part is concerned with housing design and layout principles from the architects' perspective. It examines the main factors influencing the design of housing and key issues addressing the relationship between man/community and environment, in design guidance of the nineteen-seventies and eighties.

• The second part focuses on the relationship between design and crime and the various approaches to the link between man and environment with a view to protect the community from crime. It examines the body of research, the resulting

---

1 The fourth perspective, namely society and its view of criminality is beyond the scope of the thesis.
FIGURE 2.0.1: PERSPECTIVES OF ENQUIRY ON THE RELATIONSHIP BETWEEN MAN AND THE ENVIRONMENT IN A SOCIETY WITH CRIME.
crime prevention strategies and the specific design recommendations and guidelines for the improvement of housing security.

• The third part addresses the relationship between crime and space, as discussed in the criminological literature and the social sciences. It seeks out the insights that can be gained from environmental criminology and psychology on the relationship between crime/criminals and space and the situation of crime in the environment - in order to establish a theoretical basis for understanding the relationship between design, crime and the opportunity structure, and framing the present research thesis.

It is not the aim of this thesis to make an extensive presentation of the discourse in the above mentioned disciplines. The aim is to address the key texts that provide the background and set the scene for the present research, on the one hand, and to specify the research objectives and questions to be investigated, on the other.

2.1 Part One: Housing Design - The Architects' Perspective.

2.1.0 Introduction: Focus of Discussion: Design Guidance in Context.

The main issues around which the discussion on housing design revolves are housing form - building form and spatial order, and the accommodation of functional and social 'requirements', within and outside buildings. The review of the architectural literature on housing design attempts to establish two things: what are the key issues in the design of housing estates and to what extent they include considerations on security with respect to crime.

Certain points have to be made clear from the start about the scope of this review: Firstly: in the attempt to analyse the development of housing forms and critically evaluate the above issues, many approaches have been elaborated from a range of theoretical, historical, typological, perceptual/experiential, and normative

---

The planning of residential areas and public housing, intrinsically related to the history of town planning, is well documented in the literature. The historical roots go back to Mesopotamia, ancient Egypt, and the grid layouts of Greek and Roman Cities. (See for instance Lewis Mumford's (1961): *The City in History* , Secker and Warburg: London.) Later in Europe there are the organic towns of the middle ages, the Renaissance radial and circular plans of cities; the rapid expansion of cities in the industrial revolution, and the great 19th century planning interventions. There is a vast amount of historical material, since housing is the basis of town planning. For brief overview of the
perspectives, all of which have valuable insights to offer. Design and design ideas, ideologies and paradigms, do not occur in a vacuum. They are built on a foundation of previous ideas and the experience thereof; there is a continuous process of criticism, rejection and redefinition/rediscovery of the past - and this was never clearer than in the architecture of the eighties. It is therefore difficult to zoom in on the discussion of a particular period without an awareness of the context.

Secondly: Considering design as a creative process, the design of a housing scheme is influenced by various factors, external constraints of site and brief and the housing and planning authority; internal constraints of expertise of the designer; experience of existing solutions or examples; and design guidance (see relevant section in Appendix II.1). The development of a housing project is not solely an architectural task, since it involves decisions on social policy, urban policy, economics and management considerations, which are just as important factors in determining the final design product, as the expertise and creativity of the designer. Considering the continually changing trends and evolving ideas, design guidance and feedback becomes increasingly important for the architect, not only in the architectural schools, but beyond that in practice. Design guidance is not the only factor influencing design, yet it is the basis for discussion.

It is beyond the limits of this research thesis to attempt to map out the development of the above subject matter in order to examine, where and when, if at all, the issue of crime vulnerability comes in. Twenty years after the large scale institution and implementation of the ideas and urban vision of Modernism (Corbusier's Ville Radieuse) by the planning authorities, the nineteen-seventies mark a turning point, the beginning of a period of change and redefinition - a new paradigm. It is the time of reaction to the spatial and urban ideas of modernism, although the roots of this were clearly sown in the late fifties and sixties, when the seminal works of Gordon Cullen's (1960) *Townscape*; Kevin Lynch's (1961) *The Image of the City*; and Jane Jacobs' (1965) *The Death and Life of Great American Cities* appeared. The seventies
are the time, when 'urban space' and the 'past' are rediscovered in the works of Camillo Sitte and the Krier Brothers. It is also the time, when crime and design are first linked in a systematic way. The eighties really are a culmination of the developments of the seventies in housing design, but also the end of an era, since the production of public housing gradually comes to a halt.

Thus the review of the architectural discourse will selectively focus on design guidance in the nineteen seventies and eighties for residential design and public housing estates, acknowledging the need for an awareness of the issues raised above.

• **Design Guidance on Housing Layout:**

The design process comprises three stages: the formulation of the brief; the site layout design (down to a scale of 1:500 or 1:200) and the detailed designs of building blocks; dwelling units; etc. usually starting from a scale of 1:100; 1:50 and smaller. What is of concern here is the layout of housing, the arrangement of blocks in open space, rather than the interior and detailing of the dwelling.

Design guidance may be approached in two different modes:

• The *analytic* approach, where layouts are broken down into categories according to specific criteria and/or broken down into their components;

• The *prescriptive* approach, where principles of layout and formal order are proposed, on how to arrive at a formal composition.

Furthermore design guidance communicates knowledge at two levels:

• **Global Level:** focusing on the design concept as a whole. This is the case, for instance, with illustrated examples of layout solutions, usually selected on the basis of some preceding analytic framework; however minimal this may be (for example simply a chronological framework).

• **Local Level:** focusing on the parts - the residential environment is decomposed into its elements, mainly on the basis of functional criteria (buildings; access; parking; open spaces etc.) - allowing solutions to be discussed in depth.

---


Sitte's influence also through Raymond Unwin's (1919) Town Planning in Practice; T Fisher Unwin Ltd; London
FIGURE 2.1: BASIC APPROACHES TO DESIGN GUIDANCE.
Four basic approaches emerge out of the combinations of the above categories (see figure 2.1) - with different emphasis for different purposes, often found in combination within the same book. These are the following:

- **Global-analytic approach**: Design guides that analyse different types of layout options, offering a typology of design solutions. This typological approach is typically found in handbooks up to the nineteen-seventies (e.g. Kirschenmann and Muschalek (1980): *Residential Districts*; W Sega! (1953); F Gibberd (1953; 1967)).

- **Part-analytic approach**: Design guides that consider residential design as a series of interrelated tasks, a set of decisions to be made, in each case offering information or criteria, on the basis of which the problem can be solved. This rationalised trend means breaking down the design concept by specific criteria of functionality, effectiveness and 'character'. This for example is the type of discussion introduced by CIAM6, and Le Corbusier, though it became prevalent in the seventies (e.g. GLC's (1978) *Introduction to Housing Layout*; Essex Design guide (1973)).

- **Global prescriptive approach**: Design guides advising the designer on how to arrive at a solution - a 'design concept'. These maintain the wholeness of the design task and offer alternatives of layout solutions by pictorial documentation, since traditionally, communication of this kind of knowledge has been mostly non-discursive, while discourse, which is more of interest here, tends to be fairly limited. Such guidance publications, for instance, focus on fundamental aspects of the process: strategic considerations confronted usually in the design of the brief, which refer to the formulation of the global concept: e.g. guidance on density and building form: (see MoHLG (1962): Planning Bulletin 2: *Residential layouts-higher densities*; RIBA/IoH: (1983 and 1987); or even DoE (1981):HDD Occasional Paper 1/81: *Reducing Vandalism on Public Housing*).

- **Part-prescriptive approach**: Design guides that focus on how to solve aspects of the design problem, based on the analysis into parts, offering basic principles, quantitative rules and/or normative formulations on formal order. They focus on selective functional aspects of the residential environment, for instance:

---

6 Functional classification of the environment has been established since the CIAM Athens Charta (1933). Design guides generally embrace this elementary functional classification by necessity, in order to address each aspect and the relevant considerations in detail.

7 This approach is often combined with some form of analysis. Although the non-discursive level of design guidance has an important influence, it is really beyond the limits of this review.

• Orientation / aspect: (DoE (1971): *Sunlight and Daylight*);


A large proportion of the design guidance material is repetitive; prescriptive in quantitative terms (especially with respect to official design bulletins); and based on examples with minimum theory (nondiscursive). Thus, in the following pages the discussion will be targeted on certain key texts representative of each approach, also covering the principle issues in the design of housing layout. Although as mentioned earlier, many books adopt a combination of approaches to enhance their scope, the predominant tendency is considered, where the weight of each text lies.

The review focuses on: Kirschenmann and Muschalek’s (1980), *Residential districts* (global analytic) giving an overview of the typological approach of the post-war years up to the mid-seventies; contrasted against the GLC’s (1978): *Introduction to Housing Layout* (part-analytic), which epitomises the late seventies more 'compartmentalised' approach to housing estate design. Furthermore, two Cambridge University studies on issues of density and building form will be reviewed focusing on strategic concepts of housing layout (global prescriptive) and Jim McCluskey’s (1979)*Road Form and Townscape* dealing with the design of access networks (part-prescriptive approach).

---

8 Interior Layout is not dealt with in this thesis. The focus lies on housing layout.
2.1.1 **Residential Typologies and Composition of the Residential Environment (global analytic approach).**

Apart from the manifestos- and poetic exposition of ideas of the pioneers of the modern movement, and later of CIAM, guidance on designing housing up to the seventies is predominantly through listing examples and visual communication, (plans, drawings, views and photographs). Such are the books on housing up to the sixties and seventies, reviewing built examples, presenting pragmatic information, with minimum theoretical and critical content. The theoretical component is in presenting the key criteria of classification: by style, chronology, scale, density, country etc. For instance, in his book *Home and Environment*, Walter Segal (1948/53) presents a typology of layouts for different types and densities of housing area, and functional considerations for the layout. Frank Gibberd's (1953/67) *Town Design* also addresses aspects of urban space and the design of housing areas in terms of different typologies of housing form - such as "layouts with houses"; "layouts with flats"; "layouts with mixed developments" - dealing with standards of organising houses/ and apartment blocks into groups. In both cases the 'functional' considerations to do with distances between dwellings/blocks; orientation etc. do not include security issues, or surveillance.

A more comprehensive approach is presented in *Residential Areas* by J Kirschenmann and C Muschalek (English translation: 1980). This book starts with a socio-economic and historical perspective of housing, then focuses the discussion on typologies of the residential environment and its elements, comparing experiences across countries of Europe and North America. This text is a good example of the discussion on housing design issues- particularly within the 'modernist'- 'functional' tradition, and it is of interest to give a detailed presentation of the range of concerns. The approach comprises a series of classifications (typologies) on the basis of key characteristics (global factors) and elements thereof (local factors):

- **Size of the project:** Residential areas are first classified according to size, since this involves different levels of planning in terms of social facilities: schools, commercial, leisure etc. they need or can support based on the concept of the planned neighbourhood:

---


10 Borrowed from Clarence Perry's Neighbourhood unit plan for approx. 5000 inhabitants based on catchment area of a school, as centre of the neighbourhood; this structure and the hierarchical principle has been widely used in New Towns and Satellite towns.
• **A- districts** for over 5000 inhabitants with nursery/primary, secondary school and other cultural; commercial facilities etc.

• **B- districts**: for 1-5000 inhabitants with nursery and /or primary school.

• **C- districts**: up to 2000 inhabitants: usually characterised by lack of amenities.

The importance of the organisation of the physical environment and of social amenities as a place for, and generator of social interaction, is emphasised:

"The organisation of the physical environment is a co-determining factor for social relationships, for the living together of inhabitants within a district. The material conditions in the form of the home, the immediate surroundings and the residential district as a distinguishable physical area, affect the quality and quantity of social relationships in these places. Indeed, the more these physical areas become the means to social activities of the residents and the more they change as the result of the adoption by the residents, the more they should be regarded as a 'social area'. The place and the means of social exchange are also the amenities of the residential district, so that the social relationships of the residents become physically effective as the result of their position." (op.cit. p.57)

Residential environments are seen only in terms of the local community, with social interaction structured by the amenities.

• **Housing form**: Residential areas are further classified by housing form, based on the distinction between **single-family** housing units and **multi-family** housing units. In each country there are variations for example, in Britain there is the distinction between, house; terrace; and block of flats; maisonettes. Direct access and private open space in the layout it is argued plays an important role in allowing control by individual residents, enabling personal activity/hobbies and a process of identification of person with space. Hence, the changing, but also increasing value of private open space for leisure - garden or terrace.

Single-family house plan-forms vary according to their combinatorial properties: detached; semidetached; atrium houses; terraced houses. Advantages and disadvantages are discussed in each case. The latter form is the most economical in terms of house front; it can be extended on both sides- and is most flexible. Concentrations/densities can be modified by increasing number of storeys; reducing garden area. Terraced housing it is argued is one of the most suitable forms of housing development, allowing a large number of possible solutions, conditioned by type of access and parking.

---

11 French: *habitat collectif* versus *habitat individuel* or German: *Einfamilienhaus* and *Wohnhaus/Mehrfamilienhaus*. This distinction also involves the relationship between housing form and ground access; ownership or renting of property.
Multi-family house plan forms are distinguished by **height and access type**.

With respect to **height**:
- Up to 4-storeys: walk-up blocks; surveys suggest that these incur the lowest building costs.
- Over 4-storeys with lifts: height increases building and operating costs (emergency staircases; smoke traps; parapet heights).

The key element of building form in multi-family housing it is argued is **access type**:
- **Vertical access** from a staircase (widely used in Germany: combination types double triple -side which can be attached; quadruple suitable for corner or detached buildings).
- **Horizontal access** from a gallery or corridor external/internal. An important issue here is the relationship with natural lighting. The Team 10 group developed deck access as communal open space- attempting to recreate the sociospatial organisation of streets in the air. The main problem here is the link between upper levels and the ground network. The issue of visibility/surveillability is not considered.
- **Combination types**: involving both vertical and horizontal circulation.

Certain developments in design of the late sixties and seventies are outlined as "qualitative improvements" : mixed development; accommodating multiple dwelling types with larger dwellings at ground level for families etc. and the achievement of single-family house type access in multi-family house form (giving amongst others the example of the Marquess Rd Estate - one of the case studies in this thesis).

**The Residential building Structure and its elements:**

Residential building structure (Wohnungsbau), according to Kirschenmann and Muschalek, is related to "the range of tasks involved in planning of residential districts", which fall mostly within the scope of decisions taken by architects and planners. Housing construction; traffic and parking; footpaths and open spaces; amenities; and their "interrelationships" are the elements of the residential building structure. Although each partial system may have individual requirements and specifications that are relatively fixed, they all participate in the whole structure, which is subject to design. The interrelationship between elements and interdependence is emphasised. Although specialised requirements and planning authorities may each pose restrictions and limitations "...the mutual interdependence and interaction is brought to light in planning decisions, as a quality of the residential
district and of the immediate vicinity of the accommodation which can be planned" (op. cit. p.60).

**Density:** The measure of gross density is used as a means of comparing within and across the examples. Density is related to other building or site factors: the uses and site area ratios included in the gross density will vary, (for instance the percentage of area surface of roads etc.) with size of sites, as well as with urban location (context)\(^{12}\). Density is also strongly related to house type\(^{13}\). Some examples show that relatively high densities (120 dwells and 430inh/ha) can be achieved with low buildings and open spaces, though this is mainly possible, it is argued, by eliminating vehicular access and building over parking areas.

**Site factors:** relating to both the immediate and larger context. Location in larger/smaller area has an affect on amenities and transport. Other factors which influence site organisation and layout are: topography; vegetation; soil; orientation views; natural and artificial boundaries; possible type of access (the only mention of spatial accessibility); noise pollution; etc.

**Residential Layout design:** It is argued that the residential layout functions as a whole; "as a strictly analytic activity, it can barely be distinguished as an element, without at least dealing with the notions of open space and access". However, the authors find it necessary to deal with issues separately: apart from house form, there are considerations about layout forms; the geometrical arrangement and structural physical organisation. Layout forms are distinguished in geometric terms based on three types of layout principles: the point; the row; and the area:

- **Linear- or row type:** Straight rows; staggered; double rows; parallel rows in a cluster; are units of layout offering identical orientation and lighting conditions. The principles of layout in 1950-75 remained similar to the 1920-30s except for car allocation.

- **Courtyard-type, block-type:** The block here is characterised by the distinction between inside/ outside. Access can be from either, resulting in corresponding variation in orientation of dwelling. The differentiated nature of spaces: between public/private; loud/quiet; paved/ green, partly led to the rediscovery of the traditional urban block, "a reply to the lack of physical expression of the terraced construction." (op.cit. p.61)

---

\(^{12}\) For instance in inner London redevelopment areas densities of approximately 400 inh/ha (1ha=2.471 acres) can be expected compared to New Towns with around 150 inhabitants/ha).

\(^{13}\) The upper limits for single-family dev/ ments are 59dwels/ha (204inh/ha . For example one of the densest schemes Marquess Est. a mulufamily dev/ment achieves: 167 dwels or 480inh/ha. with a car ratio of 0.7 and parking facilties mainly underground.
- **Flat-reticular layouts**: low-rise ('carpet developments'); or multi-storey developments, which form a network because of the unlimited extension potential (eg. continuous courtyard layouts). The access network in carpet development, is predominantly pedestrian. In multi-level schemes junctions are crucial points since vertical access elements pose a number of organisational and architectural design problems.

- **Vertical organisational forms**: Le Corbusier's Unité d' Habitation is a model of vertical/sectional organisation of a town. Functional organisation by separation in layers is widely used in parking/accommodation/commercial uses. In the seventies, multi-level developments become increasingly complex.

- **Traffic and Parking**: Key considerations of housing layout.

**Vehicular access roads**: The type of access system, internal and external or tangential, depends on site size. External (peripheral) access is considered preferable, though in large projects internal access is inevitable and external access can only be provided for subsections of the district only. Critical points are the intersections with the pedestrian network; and the links of the pedestrian network with the neighbouring area. A combination of internal and external access is provided in a variation of the Radburn type layout with culs-de-sac, where roads and foot paths alternate with few intersections. The Radburn principle, the authors comment, has proved to be a most persistent influence over the past century. In recent years only has there been an attempt to integrate traffic. This, however, is not further elaborated.

**Parking**: open; covered; overground; individual; or collective garages, pallets or beneath decks; underground parking. Surveys have shown that underground parking is an optimum solution, it is argued, but the degree to which it can be applied is limited. "Like access, the arrangement, structure and form of parking is an inseparable part of the overall organisation".(p.62) Considerations with respect to parking are: cost; surface area; links with pedestrian networks, etc. Street parking is cheapest, but consumes open space, permitting, however, simple links with pedestrian paths. Car space ratios (or coefficients) place limits to achievable densities. Potential problems arise with multi-storey parking resulting in extra loads on road access system. The idea of segregating traffic by level is recommended: "Deck-access systems provide a logical answer to concentration" with pedestrians moved to first level and ground level left to vehicles. Basement garages are considered "ideal", because surface area is saved and noise eliminated. However it is

---

14 For example the top limit is 76 dwel/ha or 266inh/ha with a parking coefficient of 1.0.
mentioned that "the lack of functional and visual links between basement garages and the footpath network often has an adverse effect on the overall organisation of a residential district" (op.cit. p. 62).

Additional considerations are:

- Distance between car and home: - a matter of convenience
- Parking coefficient: As a planning value it is directly relevant to the standard of living (% of car ownership/ dwelling)\(^{15}\)

The traffic perspective, it is argued, is important and needs to be integrated in the residential plan, for safety reasons, since car-ownership is high. Recent developments mentioned involve the easing-up on road specifications - strict calculations of road lanes; traffic etc. - and on strong differentiation between pedestrian/vehicular surfaces- aiming at relative integration with use of soft landscaping techniques.

**Footpaths and Open Spaces:**

This includes all external spaces, paved or planted, including gardens, which can be used by inhabitants, except roads and parking. Quantitative guidelines vary and are considered to be of limited use. The arrangement of open spaces within districts and their integration into an overall system of open spaces is considered of great importance. Large, continuous green spaces in particular have a certain ecological and climatic importance for the town, though in dense urban developments green spaces are generally restricted to and identified with specific users.

**Footpaths:** In contrast to roads that must be safe and functional, the arrangement of open spaces and the pedestrian network play an important role for communication and social organisation, in addition to the functional. The hierarchy of access paths and collector paths linking to facilities and neighbouring areas "are indispensable factors in the web of material interrelationships affecting the living areas of the inhabitants of the district. The interdependence of the elements of the residential building structure is reflected particularly clearly in the continuity of the network of housing paths" (op.cit. p.63).

**Open spaces:** These usually include play areas for different age groups. If these are to really work as open spaces and play areas "classification, integration and superimposition" of the areas, it is stressed, are important for the social-

\(^{15}\) Overall steady increase over the years except for N America. Low: <1.0. Average: 1.0-1.5; High over 1.5.
organisational articulation of the inhabitants". Direct vicinity of the homes/entrances to play areas; visual and oral contact between kitchen and play area for small children; are important considerations. The critical point is, where private and public space meet. The degree of physical separation should be regarded in relationship to density, so that privacy is protected, without excluding the possibility of contact. However, how this can be achieved is not elaborated.

Finally with respect to social amenities specifications relating to size of the area and the need for them to be linked to the housing and the overall layout design are discussed.

This design guide offers an overview of the whole spectrum of layout options, and indicates, where special considerations apply. However, it does not really specify, how these solutions can be worked out, apart from offering a broad range of different built examples. Thus although it is more like an extensive menu rather than a prescription, it is informative, with a subtle presentation of generally prevalent design attitudes relating to modernist planning.

In spite of the thorough and extensive presentation of the issues involved in the design of housing (German authors), what is apparent is the complete lack of consideration for the issue of vulnerability to crime. Social considerations are emphasised with respect to the design of the pedestrian network and open spaces. However, crime is not seen as an issue, even though 'defensible space' (to be discussed later) had already made its appearance in designs in the UK. and the USA. This reflects the modernist perspective on housing design, which basically ignores this aspect of space.

With respect to access and open spaces, a part-analytic approach is adopted, considering the importance of these issues. It follows the tradition of the modern movement: Vehicular and pedestrian segregation is more or less taken for granted, although a softer approach is hinted at. A hierarchical notion of the access network is also built into the framework of the discussion; deck access and segregation of traffic by level are presented as innovative solutions. The issue of surveillance of spaces by people, or accessibility by potential criminals, are not included in the discussion - except for parking. Whilst surveillance of cars is an issue, underground car-parks are recommended elsewhere, as an optimum solution.

The global aspect of the spatial network is also mentioned, and important issues relating to the significance of the overall network in terms of social interaction are
raised; yet, little insight is offered, as to how this can be achieved. Looking at the case studies presented in the second half of the book, one notes that the majority of schemes are organised on the basis of the hierarchical principle with blocks grouped into subgroups or 'clusters'- particularly the more recent 'innovative designs' - a large portion of which are British schemes. Although the residential layout design is dealt with in an analytic mode, the importance of the overall interrelationship of the components is stressed (global analytic approach). However, there is no particular elaboration on how to deal with the global concept, prescription is minimal. In essence, the guide offers an overview, but little in-depth focus.

2.1.2 Seventies' Local Authority Design Guidance: The experience of the GLC: part- analytic approach.

In the seventies a number of local authorities across the country produced their own guidelines for the design of new housing areas. First the Essex Design Guide published in 1973, encouraged the adoption of housing forms to create local identity "of a character indigenous to Essex" and was hailed by the architectural press as a major breakthrough in design. Later the County of Cheshire published their guide Design Aid: Housing: Roads, however both these editions focused on suburban development (lower densities), on green-field sites, which formed the bulk of new housing development outside London at the time.

In the late seventies the architects department of the Greater London Council (GLC) published a series of guidebooks: "New Directions in Housing"; "Preferred Dwelling Plans" and most importantly "An Introduction to Housing Layout". These books epitomised the new trends in local authority housing design, which had developed since the late sixties in London and elsewhere. In "New

---

16 Essex County Council (1973): A Design Guide for Residential Areas. Essex. The guide demonstrates ways of applying standards set by regulations and specifications on road layouts, circulation, spacing of buildings, spatial proportions etc whilst achieving a kind of "townscape" emulating traditional towns and villages considered to be the british 'vernacular' style

17 Colquhoun and Fauset (1991: 178) quote an article in the Architects Journal Oct. '73, where it was even compared in significance to LeCorbusier's "Vers une Architecture". The article "SLOAP" in the Architectural Review Oct. '73 /No 920; characterises it a breakthrough, commending the fact that it puts townscape first, roads second and questions many assumptions.

18 Cheshire County Council: 'Design Aid: Housing: Roads'; published a second Edition in 1988, which modified the approach to include higher density development aiming at urban or village infill.

19 The GLC's Preferred Dwelling Plans illustrate the most successful interior dwelling layouts, offering a range of standardised solutions and thus allowing more time and consideration to go into the actual layout, the latter aspects of housing design are examined in detail in the third book of the series.
Directions in Housing" the failure of comprehensive redevelopment; high-rise; and some of the experimental construction solutions; is recognised. A "new image" is suggested, which involves smaller sites, rather than large scale destruction of the urban fabric. It recognises the importance of infill and rehabilitation of existing buildings, and of building in the context of the existing urban fabric: smaller scale; tight-knit housing schemes with high emphasis on low-rise (up to three-storey) complexes, with houses and gardens for families. The need to reintroduce the "human scale", "reverting to a more orthodox English tradition" is stressed. In reaction to the unstructured open spaces of the fifties' and sixties' estates, emphasis is placed on the structuring of spaces between buildings, considering the diverse functions and standard requirements that need to be accommodated, while addressing also the aesthetic and visual viewpoint with hard and soft landscaping. One of the authors, J. McCluskey, points out the need to learn - study the criteria of good housing and look at the design of the space between buildings, taking into consideration the response to types of space and users needs.20

"An Introduction to Housing Layout"21 is a guidebook which reflects the extensive experience of the GLC in housing design regarding the implementation of a broad range of policies and structural designs. It attempts to help architects design housing more in tune with the ultimate clients' ('users') needs, in tune with the new policy trends, already outlined in the New Directions in Housing22. The book is a simplified concise exposition of the predominant contemporary ideas in the design approach to layout and landscaping, providing practical criteria and guiding principles for successful solutions in the form of illustrated examples accompanying relatively sparse theoretical statements.

The aim is to contribute to an awareness of the elements of layout and of the design of open spaces, accommodating buildings, pedestrians and vehicles, down to the fine tuning of the landscaping. These are considered also in response to perception, attitudes and needs of the users. The theoretical framework is based on two fundamental concerns considered to be the key to a successful environment: the "need for privacy" and the "need for community", and the challenge is how to achieve them within the constraints of the design reality:

20 J McCluskey, in New Directions in Housing op.cit pp
22 Specifically see foreword (ibid. pp. 5): "Along with many other housing authorities the GLC now tries to provide the maximum number of houses with gardens"... acknowledging that: "Alongside the universal unpopularity of high-rise blocks, there is an urgent need to regenerate inner city areas, ...often using smaller sites than in the past, integrating new housing into existing urban developments and so enhancing a sense of community".
how privacy can be assured by means of density, distance and geometry; how community, on the other hand, is determined by the number of houses, their relationship to one another, and so forth" (GLC 1978: 7).

Guidance focuses on five basic aspects of layout, which architects deal with in the design process: • the initial phase of the project - on site and off-site considerations; • organisation of space; • access roads; • parking; • pedestrian movement.

1. **Initial considerations**: on the "delicate problem" of inserting new housing into the surrounding city fabric involve the constraints of the site and its context, apart from the normal requirements of density and planning. These include:

- **On-site considerations**: orientation; views from the site; pollutants such as noise; existing structures - buildings and vegetation (trees etc.). With respect to infill sites emphasis is added on maintaining "the continuity, scale, proportion and harmony of adjacent building", while examples are given of how, "within this framework the design can vary" (GLC : 1978: 10-15). Emphasis is also placed on defining open spaces in combining the new with the existing buildings and/or vegetation.

- **Off-site considerations**: are about integrating the new building into the old: considering the "character" of the surroundings, scale/proportions and spatial qualities of existing buildings and open space; existing views into the site, focal points; major footpaths or pedestrian movement patterns that may cross the site.

2. **Spatial Organisation**: illustrates general principles of organising buildings and the space around them. Open spaces are likened to *outdoor rooms* drawing attention to the principle of enclosure. Quoting E. Goldfinger:

> "The object of architecture is to fulfil a specific social function, i.e. to provide an ordered enclosure for human activities. The fact that one set of enclosures has a roof (a shelter or edifice), and that the other has not (a street or garden), is merely a difference of amount of enclosure and does not alter the nature of the enclosed space."

It is argued that spaces between buildings should be consciously designed to produce specific feelings within the user, making reference to Gordon Cullen's (1960) 'Townscape'. Degree of enclosure is analysed as well as elements, which define it (primary: building walls and mature trees;) and subdivide it (secondary elements: mainly to do with the landscaping; screen walls; vegetation change of levels etc.). The advantages of strong enclosure are said to be strong sense of place, of protection,

---

23 Quoted from E Goldfinger: *Urbanism and Spatial Order* in GLC: 1978; 22)
privacy, identity; easily defined territory providing surveillance, which may decrease vandalism and may increase social contact. Disadvantages are mainly to do with lack of contrast, if places are enclosed in the same way. In the case of secondary spaces within primary ones, enclosure is related to specific activities, in order to be justified. Enclosing elements contribute to the character of the space, soft enclosing elements such as trees creating a feeling of "naturalness, informality, life, season relaxation", in contrast to hard, strongly enclosing surfaces which contribute to feelings of "structure, urbanity, security/protection, warmth, order".

The authors present two basic types of enclosure as principles of layout: the courtyard (room-like, enclosed and static space) and the terrace (linear and open-ended - reinforcing movement). A third type of enclosure, the group of buildings in a "cluster", is introduced as a less "rigid" variation on the theme of the square. The square and cluster are considered to "promote social contact amongst neighbours" and "exclude outsiders". Finally a combination of the court/terrace principle is presented, as a series of interconnected rooms with different character.

Formal and behavioural ordering principles are introduced as qualitative considerations in relation to the formation of open spaces:

- **Scale and proportion**: These are the ways of defining the character (height/width) of the above types of space (linear and square-like) presenting examples of traditional terraces, mews, squares and contemporary environments.

- **Contrasting spaces**: A way of combining spaces, while recognising that continuity is also important. The principle of contrasting the quality of one space to the next, is used as a key to overcoming monotony of standardised spaces, with the same degree of enclosure and detailing. Based on examples from medieval towns, the technique of varying the character of the enclosed spaces, by varying the boundaries, the types of building structure, the detailing etc. is illustrated in contemporary estates. The desired psychological effect is to increase the "visual interest", "sense of anticipation", sense of progression through serial vision, and sense of identity to a specific area.

- **Territory**: The assumption is made that man is a territorial being, with "the instinctive urge ...to define the limits of his individual and group territory". This is considered important, in order "to give the residents a sense of personal pride and greater self esteem", to enable residents to exercise individuality in the way they
personalise 'their' territory, to allow some sense of ownership and encourage control and surveillance over their area. **Territorial definition** is thus recommended in designing housing estates, by creating a "hierarchical series of territories with easily recognisable boundaries" (p.54). This consists of marking entrances to the site by staggering buildings or bridging gaps, thus creating door-like spaces. Change of direction (turning corners) is the main principle of discouraging people from entering. Territories are classified in a **hierarchical sequence**: from **private** (the garden as the extension of the dwelling) to **public** (the street). The **principle of clustering**, where buildings and landscaping provide enclosure, is used to establish a strong sense of **territory of the group**. The idea of relating a small group of dwellings to a particular enclosed space is related to the idea of **defensible space**; residents will know their neighbours and identify strangers, thus providing surveillance over the spaces.

3. **Access**: Planning the vehicular access system is simply based on the notion of **hierarchy**, scaling down the width of roads and accordingly the permitted speeds, in relation to the amounts of traffic and destinations: from the district distributor, local distributor, access road, access to cluster. In this sense, the theoretical framework turns away from the traditional space and the small scale infill site, taking up the access principles of neighbourhood planning of the previous decades. Eight basic strategies are presented for serving residential areas of which one is the traditional grid, the others are hierarchical, with loops and culs-de-sac and varying degree of penetration of the site. These strategies, as well as the detailing, are discussed in greater depth in McCluskey's (1979) "Road Form and Townscape", reviewed in a later section.

4. **Parking**: Is considered an important influence on the quality of the residential areas. It can be either "mass" or "fragmented", in three possible locations: - 'in curtillage'; - 'on street'; or in grouped car parks (open or closed). The combination of these choices determines the relationship between car and dwelling. Mass parking has advantages of economy in space and cost, whilst releasing the rest of the area from such constraints of car access. This, however, also implies disadvantages of limited surveillance from dwellings, and longer distance from car to dwelling. Fragmented parking is more flexible, and overcomes the problems of mass parking, with the disadvantage of having cars dispersed throughout the housing area, and "enclosure of space more difficult to achieve". The detailing of the landscape can soften the impact of a parking lot. Finally dual use spaces, integrating parking with

---

The issues raised in the GLC Guide present a short summary of the latter, briskly scanning the issues of alignment; integration; detailing the edges; transition zones and defining clarity of use.
other uses i.e. with pedestrians are also considered in small scale, for most economical planning. Cars are generally considered as visually undesirable objects, as obtrusive and various screening techniques are suggested. The issue of surveillance is not really taken into consideration.

5. **Pedestrian Paths**: Pedestrian movement is considered to encompass, and be restricted by, the suggestions in the previous topics. The way in which people move is examined, as a key to better design. Type and quality of movement are considered with different emphasis for adults, children and old people, determined by the location (urban bounded, or open landscape); by site levels, contours and the purpose of the walk. This can be more straight -goal oriented or meandering according to focus of interest, or for other purposes as resting, socialising, viewing. The principle of "leading people on" is towards points of interest, pleasure, change, points of entry. The key to designing paths is again serial vision (series of constantly changing views), to "heighten interest" and "evoke emotions such as mystery, suspense, and anticipation" and provide a sense of movement. The terrace is contrasted to the medieval street, the "epitome of serial vision".

The GLC design guide breaks away from the earlier functional/typological approaches discussed in the previous section, in that it focuses on the elements of layout and introduces a formal approach to spatial organisation, based on the idea of "spatial enclosure". Open space is seen as "outdoor rooms" rather than free flowing space of the previous decades, a selective rediscovery of traditional urban space, borrowing from Gordon Cullen's art of 'townscape' and Camillo Sitte's art of town planning according to artistic principles. The concept of enclosure is strongly related to the rediscovery of the 'picturesque' tradition, and the romantic charm of the urban past, as Colin Rowe argues in *Collage City* (Rowe and Koetter: 1975), with a new consciousness provided by serial vision. There is clearly a return to the scale and typology of elements of traditional environments - scale and proportion of open space becomes important - only that these seem to relate to form and localised imagery, rather than spatial properties of traditional spatial systems.

Emphasis is placed on users' attitudes, while formal aspects of spatial configuration are introduced. Beyond the functional analysis, prescription is based on principles of: enclosure; clustering; territorial definition and hierarchy. These are seen as the way of creating a sense of identity; encouraging social interaction; social

---

25 Gordon Cullen's (1961) *Townscape* rediscovers the artistic principles of the picturesque of traditional English towns and villages (see Appendix), which Camillo Sitte (1909; 1919) elaborated in his seminal works, based on the study of urban space in medieval baroque European cities.
surveillance; and achieving privacy. The design of open spaces, the positioning of buildings, paths etc. is based on the way the environment is perceived. Selected emotional responses provide justification for this, without further substantiation or testing these assumptions out (see also review of G Cullen in Appendix AII.3). The problem is not the questioning of the validity of the supposed responses; the problem is the one-sidedness of the considerations: focusing only on positive responses of surprise, intimacy, security. The fear and insecurity that may be triggered in environments full of 'surprises' and 'anticipation', what may be lurking behind the corner with screened views, is not taken into consideration.

The discussion on vehicular access and parking follows the more pragmatic approach of functional - economical considerations; there is less of a break with the modernist tradition of traffic segregation. In contrast, functional considerations in the layout of pedestrian paths, are subjugated to the experiential. Long straight lines of sight and movement are generally seen as boring, and 'townscape' principles are employed to introduce more interest - the idea of serial vision, combined with the imagery of the medieval town or village. These principles, however, applied in a high-density, low-rise environment, ultimately result in short and broken views, which would reduce visual surveillance.

Vulnerability to crime is considered in terms of Oscar Newman's 'Defensible Space' theory. Security is related to the notions of defining territories; identifying people with space and surveillance through territorial behaviour, which will be discussed in the second part of the literature review. This approach, however, encourages the breaking down and localising of spatial structure rather than axial development of the configuration. The accompanying drawings and photographs, clearly illustrate, the resulting blocking of views in order to conceal the inside (of the estate; cluster etc.) from the outside.

The problem of the relationship between privacy and community is also dealt with through the notions of enclosure; territory; and hierarchy of public to private. Ideas about creating community through design have mainly been related to the idea of identifying inhabitants with space (at the level of the cluster) and encouraging control rather than spontaneous social interaction. The notion that enclosure enhances community is linked to notions of keeping strangers out. This however, does not deal with privacy within the enclosure. The techniques used to protect privacy are

---

26 Team 10 started developing hierarchical structures and design concepts to encourage social organisation in the sixties, in reaction to modernism's lack of local spatial articulation and differentiation. See Frampton (1982) for historical references or documentation on CIAM (1956).
therefore related to the fine-tuning and landscaping or techniques like single aspect dwelling layouts.

Although the GLC guide's approach is analytic, the analytic content is relatively shallow. Though users' needs are highlighted, it essentially considers only the intended positive outcomes, while, possible negative outcomes, when not all assumptions are fulfilled, are overlooked. Security is related to 'defensible space', territorial definition; enclosure, and privacy through reducing visibility, and keeping strangers out - without critical evaluation.

2.1.3 Density and built form: Global Prescriptive Approach

Though suggestions on how to design the overall layout, which neither the global-nor the part-analytic approach solve, are usually limited to pictorial presentation of examples, some official design guidance publications attempt to fill this gap27. Two issues appear to play a crucial role in the overall layout design: the relationship between density and building form; and the access network, although the one is a strategic concept that affects the global structure, and the other is a strategic concept, which has more effect on the local structure.

The brief for a housing project will contain some definition of the number of dwellings to be built on a site28, as well as some guidelines for the quality of the building and finishes. The Ministry of Housing and Local Government (MoHLG) in the 1950's and later the Department of the Environment (DOE) in the 1960's published a series of design guidance bulletins, specifically dealing with densities in residential areas, as well as housing layout 29. Measures of density are generally given as a ratio of the number of dwellings relative to standard area of land: dwellings

27 For review both central government and local authorities' publications, see for example: Evans (1973); Colquhoun and Fauset (1991).
28 According to Evans (1973): 'Housing Layout and Density' density information may originate from planning control, or may reflect a quantity surveyors' view of what can be built within the cost limits, "or it may, unusually, be the result of someone imagining the type of housing area that they would like to see created and setting the density accordingly"(pp.63).
Table 6 Densities at two points in the graph in Figure 27

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Density at 0 m²</th>
<th>Density at 100 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2.0</td>
<td>199</td>
<td>200</td>
</tr>
<tr>
<td>3.0</td>
<td>269</td>
<td>245</td>
</tr>
<tr>
<td>4.0</td>
<td>306</td>
<td>271</td>
</tr>
</tbody>
</table>

Figure 18 The equation for spacing between blocks

Figure 17 The three-dimensional form of the row

Figure 16 The equilibrium state is achieved by rearranging the blocks

Figure 2.1.2 P. EVANS: RELATIONSHIP BETWEEN DENSITY; BUILDING HEIGHT AND SITE FACTORS.
per hectare; or more accurately: number of people per hectare or bedspaces or number of habitable rooms. Guidelines are given on what are considered to be the ranges for high; medium and low densities, though thresholds are vague. However, there is no ideal density; the location of the site (urban/suburban or rural) usually determines the type of housing to be adopted, and the density. Pressure is exerted to increase density where land is short and/or expensive, in order to reduce proportionate land costs per dwelling unit. Thus the discussion on density is largely based on economic and geographic considerations.

Yet, the issue of cost - density is one of the main determinants of housing form. A number of research studies at Cambridge University have investigated the relationship between the geometry of built form and measures of density in the early seventies, notably by Leslie Martin and Lionel March (1972) published in 'Urban Space and Structures'; and Paul Evans (1973): 'Housing Layout and Density'.

Evans is concerned with the investigation of the theoretical relationships between measures of housing layout and the assessment of the sensitivity of the various measures of density to changes in the characteristics of built form, based on a study of eight theoretical layout types. The study shows that specifying densities and standards for a number of land uses (car parking in particular, play space etc.), place considerable restrictions on possible design solutions, forcing for instance the increase in building height. Conversely, within a specific density range specific alternative layout forms are possible (figure 2.1.2).

Lionel March and Leslie Martin (1972), carried out research on the relationship between geometry of built form and its performance in terms of density (amongst other things), in a study using mathematical models to compare courtyard, terraced (street) and pavilion (point block) housing layouts and their built potential. Using the same depth and height of buildings and a constant

---

30 See Appendix AII.2, section on interrelationship between built form and density specifications.
31 In 'Density of residential areas' (MoHLG, 1952): Principal factors governing the arrangement and hence density of houses are:
   a) type of house,( terraced, semidetached detached);
   b) garden size;
   c) Space required to ensure sufficient daylighting and sunlighting;
   d) space required for privacy;
   e) space required for access
   f) space required amongst the houses for trees, landscaping.
32 The study shows that floorspace density (m2/ha) and 'site space rates' may be the most useful for design purposes. Evans (1973:42-62) plots graphs of the relationship between floorspace density and site size; building depth; height and site shape for the various layouts.
33 'Built potential' was measured by ratio of floor area of the built form to the site area with increasing number of storeys.
FIGURE 2.1.3: MARTIN AND MARCH CASE STUDIES ON SITE LAYOUTS & THEIR BUILDING POTENTIAL WITH SAME DENSITY FIGURES.
distance between buildings, the analysis of the geometry of block layouts demonstrated, that courtyard layouts (two-dimensional extension) achieved higher densities: five times more accommodation than point blocks, and almost two times more than the linear block layout (one-dimensional extension). Conversely, if the same floor area were to be provided in each type of block layout, the tower would have to have five times the height of the courtyard layout, and 1.66 times the height of the terrace. The courtyard form was found to also allow for open spaces, which do not exist in the present urban form.

The above studies show two things:
1. That density measures and other site space specifications place considerable constraints on the range of possible layout solutions;
2. That similar densities can be achieved by different types of layout - building form (and building height) and that layout types do not all perform equally well to higher densities. For this reason for instance global analytic approaches (e.g. Kirschenmann and Muschalek, 1980; Gosling and Maitland, 1984), first classify on the basis of density, in their presentation of case study material or examples.

The main aim was to investigate alternatives to the prevalent high-rise block ideology. Considering housing demand and financial restrictions (cost per unit) which create pressure for higher densities in the formulation of the brief, designers clearly need to have a good understanding of density and housing layout, particularly the range of possibilities of low-rise/high density versus high-rise and mixed development.

The turn of the century's anti-urban ideology underlying the pursuit of lower densities in the first half of the century, was reversed in the latter third. Although higher densities, which are sustained in traditional street-based urban environments were not seen as a problem, there is no critical appraisal of the effect of high ground area coverage in high density layouts with low-rise building forms, which are generally acclaimed as better alternatives to high-rise. However, there has been no systematic analysis of high density/low-rise forms, beyond the simplified geometry level. Hillier (1988) in contrast argues, that the effect of housing design of the late seventies and eighties, which mainly involved such high-density/low- to medium rise design solutions, is a dramatic scaling down of open space, immediately identifiable in figure/ground maps of the respective areas. The lack of awareness

March and Martin (1972): A more accurate analysis of the central area of New York showed that with courtyard planning one would have required only seven storeys, compared to the average of 21 storeys, to accommodate the same amount of floor space.
of people; the axial breakdown and over-localisation of open space, is also partly attributed to this, as will be discussed in the next chapter.

Clearly the above studies use strong analysis to arrive at (weak) prescription, an approach, which is in stark contrast to other more artistic 'theories', such as G. Cullen's 'Townscape', which is highly prescriptive, yet weakly substantiated. The former, are less accessible to the broader architectural public, whilst the later is more easily adopted, through screening its ideological base. Overall, there is a great lack of awareness and guidance at the global level of layout. The key to successful residential areas is the relationship between local and global structure of space, Hillier (1988; 1991).

2.1.4 Residential Layout and Access Networks: Road Form and Townscape: part-prescriptive approach.

The system of access is another central factor in the design of housing layout, as is reflected in the number of guidance publications addressing the issue. Whilst most of the official bulletins mentioned earlier focus on specifications, Jim McCluskey's (1979) Road Form and Townscape is a handbook for the range of professionals dealing with the design of roads and the layout of road networks from a more comprehensive point of view. It attempts to integrate all aspects of road design, functional, effective and artistic, to arrive at a coherent whole and a unique environment to be enjoyed. Detailed consideration is given to 'townscape' (urban landscape) directly applying Gordon Cullen's (1961) approach.

McCluskey bases his approach on the concept of the access system as a network, which makes the movement of vehicles and pedestrians through the built environment possible. Networks have various forms and characteristics, and the awareness of their advantages and disadvantages assists the designer in selecting the appropriate type of access network for the specific design. As in the GLC (1978) guide discussed earlier, perception of the environment is used as the basis for understanding networks in terms of the concepts of place, path and domain found in Cullen's (1961)

35 Since J McCluskey is one of the contributors to the GLC guide published a year earlier, where as mentioned his ideas appear in summarised form. In this book McCluskey (1979) deals with the issues much more extensively and systematically.

36 The book provides guidance on materials, surfaces, specifications and detailing from a technical point of view see parts III and IV. It also provides design guidance on flowing alignments related to the planning of open roads, which are not dealt with here.

37 "To assist in the task of retaining and organising his experience of the environment the individual constructs for himself a mental image of his world. This mental image has certain basic elements
ACCESS NETWORKS: EIGHT BASIC STRATEGIES OF ROAD ACCESS

1. Simple Layout with buildings built round a central space (mixed use).

2. Layout with car parking adjacent to perimeter road round the housing area (residential area free of vehicles).

3. Layout with short culs-de-sacs penetrating the housing area; (typical Radburn Plan).

4. Layout with access roads with a system of culs-de-sacs (branching off them); as in the case above, traffic near dwellings minimum and speeds reduced through bends etc. Cars and vehicles can approach dwellings. Pedestrian paths may follow vehicles or may be completely separate.

5. Layout with access roads forming loops with or without culs-de-sacs. Again cars and services can approach the dwelling.

6. Layout in which a number of enclosed areas are connected in a series; for example a series of courts. There may be no through road, as for example with mews courts. There can be integration of vehicles and pedestrians dual use areas, where impact of roads on the residential environment is reduced through sensitive detailing and landscaping.

7. Layout consisting of a grid of interconnected areas through a system of interlinked laps. High accessibility, high integration of vehicles and pedestrians.

8. Layout consisting of a grid of interconnected roads - normal street grid. Achieves the minimum distance between car and dwelling. Though the residential environment may be dominated by car accessibility.

FIGURE 2.1.4: NETWORK TYPES: BASED ON J McCLUSKEY'S 'ROADFORM AND TOWNSCAPE.'
"Townscape", and similar to Kevin Lynch’s (1960) elements of mental maps in The Image of the City (App. AII.3), though no direct reference is made.

A place is defined as "a contained area which is known", with an inside and an outside, whilst a path is the route connecting places, with different spatial attributes attached to place (rest, static) and path (movement, linear). Each network is seen as a system of places and paths set in a particular domain. McCluskey outlines two fundamental ways of connecting a number of places: the radial pattern, and the serial pattern and their inherent characteristics/potential. In residential areas, the equivalent of a place may be a cluster of dwellings and the paths or routes connecting these, though the distinction between the two is not always obvious.

Other patterns result from combining the radial and serial patterns: the web pattern (eg. the ideal city plan); the branching pattern (as in a tree-like structure); and finally the grid-network (see figure 2.1.4). Patterns are characterised in terms of degree of interconnectedness and the number of paths meeting at each node; how easy it is to get from one space to another, and how much "equal coverage" these properties have over the whole area or network. Based on the above, McCluskey presents a typology of basic strategies of road access for residential layouts, as shown in figure 2.1.4, illustrated by built examples. Each network layout has its own specific potential related to: 1) degree of integration of vehicles; 2) problems of speed and safety; 3) clarity of use of spaces; 4) distance of car to dwelling; and 5) dwelling accessibility. Examples illustrate, how vehicular integration can be dealt with, through sensitive detailing, informal layout with soft landscaping, thus softening the impact of roads. McCluskey outlines the arguments and considerations involved in decisions at each stage of the layout design. The choice of network, it is argued, relates to both the problem of vehicular access and to the character of the residential layout, which demonstrates how important the choice of network is for the overall layout (global concept).

common to us all. Three of the most fundamental elements have been called place, path, and domain” (McCluskey: 1979: 12).

In the radial pattern, one central space is directly linked to all the other surrounding it, so that the distance between spaces is minimised overall. In the serial pattern spaces are linked in linear sequence, which affords the shortest total length of route, though getting from one place to another can be very arduous; furthermore the serial system is very sensitive to blockages. These difficulties are overcome in combined patterns. (op cit. pp.13-14) The serial system is desirable, when a path is required to pass from each place in turn - eg for delivery, or refuse vehicles - similar to the principle of a loop road. The radial pattern, on the other hand, is indicated, when there is a strong focal area.
Road alignment compares straight and curved roads, in terms of formal/ informal character and perceptual attributes. Straight roads are associated with higher speeds, therefore more "suitable for vehicular traffic", while more "intimidating for pedestrians". Visual interest it is argued increases with containment of the sides and when there is a focal point or closure at the end (enclosure). Curved alignments have the element of closure intrinsic, the advantage of ever changing views and protection against wind. Again, a typology of alignments is presented of both modern and traditional elements related to forms of residential layout, though the ordering principle is the type of alignment and the quality of outdoor space each creates.

Townscape alignment is considered in terms of form, based on the duality of place (static enclosed space) represented by the cluster; and route, (linear dynamic space) represented by the terrace. Guidance is given on how to deal with the articulation of the surfaces containing the road, and how to link the elements of both place and route, much like the concept of a beady ring (Hillier and Hanson, 1984), though this is mainly at the local level. Although importance is placed on linking spaces, often seen as part of a complex asymmetrical network, no global logic is offered in terms of experience and orientation. The emphasis is on applying townscape ideas towards more 'visually stimulating' road layout.

Road Form and Townscape provides guidance on how to design access spaces at two levels: A. at a strategic level - offering a typology of access networks, mainly focusing on vehicular access, a menu of options predominantly hierarchical and functional; - and B. at a more local level - suggesting ways of shaping, bounding, defining, and relating spaces, using Cullen's prescriptive approach in formal rather than quantitative terms, in contrast to official guides, which focus on measurements and specifications. Thus, the importance of the concept of a network system is emphasised for vehicular access, and principles of alignment and of enclosure are offered - which strongly differ from the traditional modernist approach to road layout - without, however, linking the localised approach to the global.

There is limited understanding of the global spatial dimension, apart from the two basic principles of connecting spaces. The importance of global links with the existing road networks and pedestrian networks is not really examined. The

39 He postulates that "... curved lines appear more relaxed and organic, and straight ones appear to have more tension". (op.cit. p.39)

40 As presented in a simplified way in the GIC (1978) handbook, the typology includes: loops, cul-de-sacs; squares, crescents, avenues, courts, mews, (and mews courts); finally lanes, alleys and village roads. McCuskey presents the rich range of options available to a designer from the past, which have successfully survived to date and provide good examples for new projects, beyond the sterile concepts of the 'modernist' era.
functional segregation of cars and pedestrians is still predominant, with only one out of eight cases involving the 'grid network' with integrated traffic. The fact that both vehicular access roads and the pedestrian network, together constitute a network of access is also not given sufficient attention. Neither is the lack of life and thinning out of people and activity in hierarchical and segregating patterns pointed out by Hillier et al. (1983; 1988) There is however the indication of a new trend for dual use spaces, with soft landscaping being the key to success and functional clarity. Emphasis is placed on visual perception - image and serial vision, but not surveillability. The intended comprehensive approach does not include, the issue of crime risk; safety is discussed with respect to vehicles, whilst crime/fear thereof does not appear to be related to access networks and road design.

2.1.5 Summary and Discussion.

Architectural discourse and design guidance on residential layout basically ignores the problem of vulnerability to crime up to the late seventies. Design is seen to structure wo-/man's existence in the social environment, and her/his relation to 'community', yet 'man' and 'society' are idealised benign notions - where crime does not really exist. Notions of Oscar Newman's 'defensible space' first filter through into the GLC's Introduction to Housing Layout, combined with notions of 'enclosure' and hierarchy as the basis of spatial organisation.

Design guidance addresses issues of housing layout - strategic considerations, functional organisation and spatial configuration - in four different approaches:

- The global-analytic (typological) approach, characteristic of guidance up to the seventies, as presented in Kirschenmann and Muschalek's Residential Districts, focuses on size, density, building and access form, to arrive at a classification of layout options or typologies, maintaining emphasis on the composition as a whole.

- The part-analytic approach: focusing on such elements of layout as site considerations; spatial organisation; access; parking; etc. as presented in the GLC's (1978) Introduction to Housing Layout. This is characteristic of the mid seventies and eighties, where a shift of focus from the global concept to the elements or functional aspects of the layout design takes place.

- The global prescriptive approach: traditionally based on illustrations of built examples (non-discursive guidance), prescription at the level of global principles at the discursive level is scarce, with few exceptions. Such are the Cambridge studies on density and built form, which based on simplified case studies,
attempt to analyse and prescribe optimum layout forms (eg. the courtyard block) addressing the global design concept in terms of the interrelationship between density measures and restrictions on form.

- The part-prescriptive approach: marks a shift from an analysis of design criteria to a more prescriptive approach discussing solutions to specific aspects of the layout in depth, as for example in J. McCluskey's 'Road Form and Townscape', dealing with the central problem of access in residential areas in detail.

In most cases design guidance books depending heavily on nondiscursive means, employ more than one approach. However the main emphasis tends to lie in one approach according to which the books is organised. Whereas elements of layout are discussed, Kirschenmann and Muschalek's Residential Districts, basically offers a menu of typologies. In contrast, GLC's Introduction to Housing Layout, analyses housing layout into its parts, dealing with spatial organisation, road access, pedestrian paths and parking separately. McCluskey's 'Road Form and Townscape', employs certain network principles and typologies of access, but mainly offers formal considerations on the design of access spaces using principles of townscape (part-prescriptive). In the part-analytic and -prescriptive approaches the functional compartmentalisation of information makes prescription easier, allowing greater depth and breadth. In contrast the attempts at global prescription have been difficult, suffering due to the simplification of the case studies on housing layouts.

In strategic (global) terms, there is a marked shift in the GLC's housing design policy: from high-rise to mixed development/low-rise -high density solutions; from large scale redevelopment to small scale infill schemes and integration into the existing urban context (mainly in formal terms). At the local level, space between buildings is given attention, rather than just the buildings themselves. Prescription on 'spatial organisation' is based on 'enclosure', and 'clustering' as key ordering principles at the local level, in reaction to modernism's obsession with "exposure" and free-flowing open space. Global order is based on hierarchy and repetition of the local, already introduced by earlier modernist planning ideology, as evident in 'Residential Districts'. The local principle of "enclosure" is considered to increase the potential for social interaction, sense of identity and territorial control and surveillance. It thus ultimately regulates the man-environment relationship all-round. Yet focusing on the parts the link with the whole is lost.

Similar ideas are reflected in McCluskey's guidelines on road form and townscape. In contrast to the 'objective' (functional/ pragmatic) considerations of the 'modernist' approaches, subjective criteria (visual perception); formal criteria (Cullen's art of
relationship'); and social considerations (increasing user-satisfaction) appear to be the basis of justification for prescription- with minimal scientific support. Pedestrian and vehicular segregation, however, continues to be treated, as in the modernist functional ideology, as the dominant solution to traffic in the seventies and eighties, though notions of mixed use are introduced.

In both the GLC's and McCluskey's work, the criteria of efficiency of design are based on subjective considerations attributed to the perception of space; users attitudes and needs; and the balance of privacy versus community in a dense environment; aiming at inhabitants' satisfaction. However, guidance in based on architects' perceptions of user's needs and attitudes with weak objective substantiation. This is also pointed out by Jane Darke, (1983); Alan Lipman, (1977) a.o. who have criticised architects' designs for lack of awareness and lack of objective information about users' needs and requirements. Darke argues that architects should be more self-critical of their assumptions about the users. In the reviewed literature only positive perceptions are included, whilst possible negative feelings such as fear are not considered.

Strongly influenced by Gordon Cullen's 'art of relationship', formal relationships are applied at the local scale, focusing on how to link a few spaces at a time rather than the intelligibility of the whole. In contrast, Kevin Lynch's(1960) research on perception of the environment in *The image of the City* (see Appendix II.4) could have provided a more appropriate theoretical basis. Lynch offers guidelines for a more balanced approach to urban design, with both local articulation and intelligibility of the whole. This is superficially addressed by McCluskey's network principles, however it is mainly Hillier and Hanson's work that has identified the problem of global intelligibility. Hillier and Hanson (1984) have pointed out that the axial dimension of space (long sight lines), which is strongly related to movement, is also developed in vernacular environments, based on a spatial logic, which directs movement to the centre (main squares) and facilitates orientation for visitors and inhabitants. While in the GLC's approach vernacular spatial characteristics are emulated visually, this important issue of long sight lines, for orientation and intelligibility is ignored.

In short, the above guidance discourse suffers from two fundamental weaknesses. There is a lack of understanding of the global level of spatial organisation; and naiveté about the users and social reality. Typologies of housing layout do not deal with the relationship between local and global order, neither does the GLC's over localised approach; simple typologies of access networks do not provide
insights into the network aspect of space. Apart from the oversimplified Cambridge density studies, there is insufficient prescription at the level of the 'global concept'. Furthermore, there is naiveté in dealing with the human subject/ object of design in relation to the built environment, as individuals and as a group. This stems from a benign view of society as law-abiding citizens, and a fundamental superficiality in the analysis of the users or community, focusing on intended positive outcomes (ideology), rather than possible outcomes, which science is all about.

Thus, buried in this context, the issue of safety is merely related to accidents (eg. vehicular traffic, fire regulations), rather than crime. Architecture assumes an idealistic, a-criminal notion of man in the residential environment. The issue of vulnerability to crime first surfaces in the GLC-guide, where 'Defensible space' is combined with the notions of enclosure and hierarchy, discouraging through-movement, and identifying people with space. By defining territorial boundaries, restricting views to indicate privacy, and creating a hierarchy of private to public space, strangers will be kept out, while surveillance by residents will be enhanced - one hopes. The problem of privacy is partly a disguise for hostility to strangers in public space - the notion of a street. There are certain ideological choices that are often screened in design guidance and are therefore often difficult to question\(^4^1\).

The relationship between public and private - between community and privacy - is thus combined with territoriality. Privacy is achieved by keeping outsiders out, community encouraged by identifying people with space, and encouraging social control by exclusion of others. Territoriality links the concept of enclosure to both notions of privacy and social surveillance. In practical terms, however, the above translates to restricting visibility, without blocking permeability, which seems to go against the more common-sense views about security and protection through blocking permeability, while increasing visibility and surveillance - to be discussed in the following section.

To conclude, there is a general lack of awareness in design guidance on the link between crime and the environment. In the focus on local articulation, the global concept of design is weakened. Integration, mainly considered in formal terms, is not properly understood from a spatial point of view. There is thus an urgent need for more critical and rigorous analysis: on the relationship between

---

\(^4^1\) This happened in the case of high rise, which was more of an 'ideological' or 'image-related' preference initially supported by the authorities, without a researched argument about high densities and high rise solutions. On the other hand, there is also an equally ideological reaction against high-rise, which has almost become an offensive term in the context of public-housing in Britain.
the local and global level of spatial organisation, and a more systematic questioning of ideas. Designers need feedback in order to meet the conflicting demands within the constraints of each project.

There is a need for more transparency in design theory and guidance, rather than design ideology. There is a need for greater awareness of the issues involved in the architects design choices, and a greater understanding of both the spatial and the human factors. A more systematic evaluation of the perception of the environment is necessary, including studies on fear of crime in the environment. There is a need for more social awareness and consideration of crime as an aspect of the man-environment link. There is need for more feedback and systematic research on the 'performance' of residential environments with respect to crime risk.
CRIME PREVENTION STRATEGIES

FIGURE 22: INDIVIDUAL, COMMUNITY CRIME PREVENTION AND CRIME PREVENTION THROUGH DESIGN.
2.2  Part Two: The link between design of housing and crime: Crime Prevention rationales and Design guidelines.

Whilst architecture can ignore the problem of crime, the authorities dealing with and managing the residential environment cannot; neither can the victims - the 'users'. Section 1.2 of the introduction outlined three basic 'rationales' or approaches to the link between design and crime: 1. Target hardening - hardware rationale; 2. Social surveillance - 'eyes on the street'; 3. Social engineering - defensible space; each based on specific assumptions, and each translating into design strategy and crime prevention strategy. All three combine in the 'Crime Prevention Through Environmental Design' (CPTED) strategy or crime prevention package, which constitutes the fourth approach: the synergistic approach. Although the four approaches overlap to some extent, each includes assumptions about the relationship between Man and the Environment to a greater or lesser degree, placing the emphasis on a specific concept of surveillance/ protection, towards the one (MAN) or the other side (ENVIRONMENT). Different emphasis is also placed on protection of the individual or the collective (see figure 2.2), and on substantiation through research and/or design guidance. The analytic and prescriptive content with respect to housing design, therefore varies.

In the following pages, the existing theoretical/methodological approaches will be examined- and the main ideas and recommendations for design will be presented on the basis of key texts in this field of overlap of the architectural and criminological discourse.

2.2.1 Target hardening approach: Hardware rationale

Target hardening deals with the basics of dwelling security with minimum assumptions about the man-environment (M-E) link. The principles are limiting accessibility and increasing surveillability, without particular assumptions about human behaviour. The approach focuses on the problem in a practical way, what can be done to increase security.

Andrew Jenkins (1983) 'Safe as Houses: A householder's guide to security' is a representative book on the basic common-sense approach to security with respect to crime. Basically it offers an extensive home security checklist, but also insights on
the principles of vulnerability: What to look for /what can be done: information and instructions, basically addressing the individual household.

General Rules:
• A house is as secure as its weakest point. It is no use having sophisticated door locks, when windows are weak or other routes of entry have been neglected (eg. bathroom; skylight; patio doors etc.)
• Every door and window, however small, is a potential access route.
• Thieves prefer to break-in at the back, where they won't be in full view. High walls or shrubbery making it difficult for them to get in, will probably discourage the potential burglar. Beware of drainpipes; porches, trees with overhanging branches etc., as ways to access out of sight entry points. (measures: anticlimb paint trimming plants/trees; lighting)
• The professional burglar will overcome most security measures when allowed cover and time, hence problem of concealed corners: recesses; bushes etc. even in relatively well lit areas!

Security measures are targeted on:
  i. Securing/locks: • All possible entry-points need to be secured;
  ii. Surveillance: • Visibility of entry points: -dark corners, vegetation.
  • Lighting;
  • Surveillance equipment (burglar alarms, movement detectors, visual surveillance technology etc.)

Whilst more of a practical handbook than a theoretical book, Jenkins offers the necessary insights in spatial vulnerability: access and surveillance. Access is blocked by securing the entry points, and surveillance is encouraged by ensuring visibility, and by extra help by surveillance equipment. It draws attention to making the most of security installations and being security minded; something for architects to bear in mind.

In recent years a number of similar guides to building security have appeared, for example Graham Underwoods' (1984) The security of Buildings, or Ralph Sinnott’s (1985) Safety and Security in Building Design, addressed to professionals and covering safety not only with respect to crime, but also with respect to other hazards in a buildings - accidents. Sinnott argues that "safety and security measures do not receive adequate consideration... until an accident occurs, security is breached and vandalism becomes rampant". Different types of buildings are dealt with: housing, commercial, schools etc., which require different levels of security measures, according to the degree of seriousness or value of the targets, and by
implication the degree of technical expertise and professionalism of the burglars. In housing and domestic properties, he maintains that crime is usually minor and opportunist, carried out by local delinquents and social inadequates, is generally petty and requires only basic security measures. The principles of security: surveillance (against burglary; vandalism etc.) and access control are discussed for the various types of building mentioned. Similar advice and information as Jenkins discussed above is offered, with a broader and more detailed range of technical information.

In the nineteen eighties emphasis was placed on high technology measures for housing security such as monitoring devices (CCTV etc.) and entry phone or entry control systems. The later control access to circulation space inside buildings, while the former increase the risk of a crime or criminal being observed (eg. GLC's (1982) A Design Guide for Phone Entry Systems). Though such access control and monitoring devices (including surveillance cameras) have been used on problem estates in need of improvement, particularly in high-rise blocks, studies have shown that these measures are not necessarily effective on their own (let alone cost-effective) unless they are supported by other forms of control as for instance doorkeepers/caretakers; security personnel (B. Poyner: 1982; Polytechnic of the South Bank and Institute of Housing :1982) or the concierge system (M Skilton, 1988). MET Police crime prevention officer Bob Knight points out, that entryphone systems are vulnerable to vandalism and criminal damage; they can be overcome by a simple peg in the door, or in some cases even by taking the doors off their hinges. The police have been advising on such issues, as well as liaising with architects and estate management on design and improvement projects, as well as advising the public on individual target hardening measures. In the last years, the police have come up with a security advice package, which if adopted by housebuilders will qualify housing developments with the Secured by Design logo. This is basically an initiative to encourage security conscious design, believed to improve marketability of properties. The police criteria are based on sources as: British Standards 8220: Security of Buildings Part 1: Dwellings guidance from the National House Building Council on "How the Security of New Homes can be improved" and the Police Architectural liaison manual of guidance. The security package covers security criteria in physical measures on securing front and back doors and window security (See appendix). Guidelines for estate design are also given: creating boundaries 'defensible space', securing boundaries and restricting access and through-routes; as well as "enhancing natural surveillance" through lighting and reducing hiding places for criminals, which actually belong in the next categories of Social Surveillance and Defensible Space.
on one of the estates in this study). In other words, these devices can only be effective, when basic security levels are installed (on communal as on private doors) and when the resident community is willing to participate. R. Zawiska (1985) argues that:

"...there is a proliferation of advice on security, and of local *ad-hoc* attempts to improve it. Most of these are too fragmented, superficial and often misguided. They misdirect attention and expenditure, create a false sense of security and thus become of little value, when they are needed most: during common types of intruders attacks."

This agrees with the findings of studies reviewed in *The Link between Crime and the Built Environment* by Murray, Motoyama and Rouse (1980) in the chapter on the 'hardware rationale'. With respect to security equipment their conclusion is, that, whilst alarms are effective deterrents in most cases, camera surveillance only works when the system ensures that something will be done with the images that the camera can provide (pp. 18-22). Improved lighting, another key measure in target hardening appears to be more important, not necessarily in terms of actual crime reduction, for it increases awareness/witnessing (and often also reporting) of crime, but strongly also reduces fear of crime.

Finally, Colin Ward's (1973) book on *Vandalism* offers specific design guidelines for preventing/reducing vandalism and criminal damage. In chapter 8: Alan Leather and Anthony Matthews (in Ward, 1973: 117-172) offer recommendations at the various scales of planning, linked to the need to achieve a more secure housing environment. The main points are the following:

**Overall planning:**
- As much surveillance of public spaces and circulation routes as possible.
- Garages should be located adjacent to dwellings or frequently used streets.
- Footpaths should follow natural lines, especially through green spaces.
- In culs-de-sac and streets with low traffic footpaths should be integrated with the street to increase surveillance.

---

47 Chapter 8 by A Leather and A Matthews "What the architect can do: a series of design guides" published in C Ward (1973) provides insights and design guidance based on the findings from a research study on vandalism in a wide variety of estates in and around Liverpool.
Detailed planning:
- Adequate natural and artificial lighting should be provided to all circulation areas inside buildings, particularly high-risk areas such as lobbies.
- Internal circulation spaces should be minimised in blocks of flats.
- Vertical circulation areas should be capable of surveillance at all levels.
- Meter cupboards and stores located in or near entrance lobbies should be avoided.
- Vulnerable trees and plants should be protected by prickly shrubs; More mature trees and shrubs should be planted in public spaces, more younger plants should be in private gardens.

Applied Finishes; Materials; Components and services:
- Target hardening measures should be applied such as textured surfaces rather than smooth surfaces, fine patterned surfaces, durable materials and hard surfaces, avoidance of large glass surfaces etc.
- Light fittings, pipes and wiring should be protected in recesses, and/or made inaccessible as possible.
- Walls and fences should be at least 2m high to prevent climbing; with vertical railings or timber palings rather than horizontal.

Finally, the environment - "the total effect of the surroundings" and factors conducive to vandalism.(p.165) are examined:
- Dilapidation: Run down environments attract vandalism. Thus buildings and their environment should be as well maintained as possible, and new building complexes should not be left with an unfinished appearance.
- Empty buildings. - Disused, empty buildings should be secured.
- Features of novel appearance: prestigious items or focal points attract vandalism, since vandals require their handiwork to be seen, with some risk for themselves.
- Privacy: This can be achieved in two ways. Either by barriers and subtle indications of intrusion into private domain; or by opening up private areas to public space, thus creating more and better supervision. The authors argue that invariably it is the second which works better in high-rise blocks.
- Character: Building complexes should be made as pleasant, interesting and varied as possible with use of best quality materials, which creates respect for the building.
- Effect of height and density: Certain planning implications of high-density living are related to intensive use of specific areas, where wear and tear becomes quickly prone to attack: such are circulation areas, particularly
when badly lit; refuse chutes; garages etc. These have been observed in high-rise environments, but equally apply to recent low-rise environments.

- **Zone of Responsibility:** The loss of community spirit of old neighbourhoods has not been replaced in newly designed attempts to recreate it, and apathy about the environment has often meant that no deterring actions are undertaken by residents. Thus the authors argue that designers should "plan so that people within a dwelling or building feel responsible for part of the public space outside".

The authors do not only focus on target hardening measures, but also emphasise the importance of surveillance, without really specifying the social and physical factors related to surveillance. A lot of these measures apply to common-sense, though some recommendations in the last section overlap with defensible space notions, which will be discussed later. Certain recommendations about protecting vegetation do not seem to take visibility and surveillability into consideration. The same applies to the high garden fences, where 2 metres are not sufficient to deter delinquents from climbing over.

Overall the basic security measures applied with consistency are not to be undervalued; the common sense approach seems to be sound, cost-effective and probably the most reliable. Target hardening, as police crime prevention officers argue, can cut down a large proportion of crime on housing estates, with low security standards in construction and fittings. Although there are limits to target hardening, in that given time and cover even the most secure targets will yield, particularly to the professional burglar, as will be discussed further in the last section of the literature review, the spatial principles of physical security reducing accessibility and increasing surveillability are particularly useful. The basic rules - tightly controlling access points, while maximising their visibility and the likelihood of intruders being apprehended - respond to the potential of the physical structure, at the same level as offenders do. This offers a promising framework for further research into the relationship between design and crime.
2.2.2 Social Surveillance Approach: "eyes on the street":

Jane Jacobs (1961) is the main propagator of a link between urban design and social surveillance without resorting to behaviourist assumptions about the relationship between man and the environment (e.g. territoriality). In her influential book "The Death and Life of Great American Cities", Jacobs argues that safety in city neighbourhoods depends largely on the use of its streets and sidewalks (pavements), just as the vitality of a city depends on the livelihood of its streets. There is a simple premise that a "well-used city street is a safe street. A deserted city street is apt to be unsafe." (p.44). Jacobs considers the city as the domain of strangers by definition (in contrast to O. Newman, as will be discussed later): "even residents who live near each other are strangers, and must be, due to the sheer number of people in small geographical compass." (p.40) What makes a city street equipped to handle strangers and to make an asset out of their presence, depends on three main qualities:

- **Clear demarcation** between public and private space - no blurred boundaries - so that "public space is unequivocally public".
- Presence of "eyes upon the street" belonging to the "natural proprietors" i.e. inhabitants of the street; buildings must be oriented towards the street not away from it, "to ensure the safety of both residents and strangers".
- **Continuous use** of the street (by strangers) .."both to add to the effective number of eyes on the street and to induce the people in the buildings along the street to watch the sidewalks in sufficient numbers".

Jacobs rejects lower densities, as for example in "pseudo suburbs", as a means to reduce crime: "thinning out a city does not ensure safety from crime and fear of crime". Nor do attempts to avoid unsafe city streets work by securing other local features such as interior courts and play areas. "No normal person can spend his life in an artificial haven, and this includes children." (p.44-45). Jacobs argues that there are four conditions that create the above type of qualities, which assure a healthy and safe neighbourhood. The key principle of liveliness is diversity, and the four conditions are means that contribute to this:

i. **Mixed uses**: local stores and public places attract use of the street by residents and strangers, drawing them even past places with no public attraction. Storekeepers and small businessmen have interest in securing peace and order themselves. Finally people attract more people, since people love watching activity rather than emptiness and obvious order and quiet.
ii. **Small Blocks**: more frequent intersections of streets. In contrast to the isolating effect of long blocks /street sections, shorter blocks with frequent interruptions by streets allow more opportunities for the segregated parallel flow of pedestrian traffic to meet and "come together into one stream". This also allows more choice of routes; higher interaction among the users of parallel streets; and provides more feasible locations for commerce on the intersecting (collector) streets. Jacobs rejects the notion that plentiful streets are wasteful (one of the tenets of orthodox planning stemming from the Garden City and Radiant City models see Appendix A II.1). On the contrary, small blocks are one of the key criteria of successful, socially and economically lively neighbourhoods: "This myth (of wasteful streets) is especially destructive, because it interferes intellectually with our ability to see one of the simplest, most unnecessary, and most easily corrected reasons for much stagnation and failure." (p.199). Jacobs clarifies that frequent streets are not an end in themselves but "means towards an end"- that is generating diversity and growth:

"Like mixtures of primary use, frequent streets are effective in helping to generate diversity only because of the way they perform. The means by which they work (attracting mixture of users along them) and the results they can help accomplish (the growth of diversity) are inextricably related." (Jacobs, 1961: 199)

iii. **Buildings of Mixed Age**: A mixture of older and newer buildings allows the mingling of living costs and uses and tastes. These are essential to establish the diversity and stability in residential populations and enterprises in a lively neighbourhood, especially some of the features of a neighbourhood that are economically less profitable.

iv. **Concentration**: dense concentration of people and the specialities they can support. High concentration of dwellings per acre does not mean overcrowding, although these terms are often confused. While the second has been widely condemned, and has lead to architectural proposals with super block arrangements, lower densities have not been proven to work outside suburbs and city peripheries. Convenience, i.e. the ability to sustain small non-competitive uses, which is a part of generating city liveliness depends on sufficient densities of dwellings to be financially sustainable.

Jacobs arguments are based on anecdotal evidence and personal observation; this, however, is done with a critical eye for observing reality directly, rather than projecting into reality the theoretically preconceived, as generally is the case with
modernism's urban design doctrines. Her arguments have been met with general agreement, due to the intuitive nature of her views and speculations, in stark contrast to extensive research programmes, which use elaborate statistics to substantiate theoretically weak propositions. The design guidance Jacobs provides is limited in practical terms, for it does not tell the designer, how to design housing. Furthermore her argument for smaller blocks needs to be considered with caution, since it lacks consideration for the global aspect of spatial organisation and its relationship to the local. Though perhaps understandable in the case of very large blocks (superblocks of modernist doctrines), increasing the number of intersections (local connectivity) at a small scale may in effect weaken the 'intelligibility' i.e. the intuitive understanding of the overall structure from the local (Hillier et al., 1993), and may diffuse movement rather than concentrate and strengthen the presence of people. Her main contribution is in raising awareness on the issue of social surveillance and the functions of street life (global level). The argument for mixed uses, higher densities and street networks are critical strategic considerations in the development phase of a project.

2.2.3 Social Engineering Approach: O Newman(1972); A Coleman(1985/90)

- Oscar Newman : Defensible Space:

Jacobs' ideas on social surveillance were developed in a different direction by Oscar Newman, the first to carry out systematic research on the link between design and crime and develop a theory of design to increase security. His work first published in 1972 under the title Defensible Space, was to become one of the most influential texts of the nineteen seventies and beyond, in architecture and environmental criminology. The defensible space model was developed as a result of the research carried out by Newman on crime in public housing in five boroughs of New York at N.Y. University on a project for Security Design in Urban Residential Areas. The unique opportunity was provided by the fact that location specific crime data was recorded by the housing authority's own police force, which allowed the analysis of vulnerable design features in and around buildings.

Newman blames the architecture of New York's public housing projects (typically consisting of high rise blocks; with double loaded internal corridors and scissors staircases; planted in stretches of open unused grounds) for the high rate of crime
and apathy, which characterised it: "...the new physical form of the urban environment is possibly the most cogent ally the criminal has in his victimisation of society." (Newman, 1973: 2). Newman proposes a theory of design, which can do something about it.

**Theoretical Model:** 'Defensible Space' is a (residential) spatial environment, which encourages inhabitants to assume responsibility and control for the maintenance and protection of their home environment, by employing a range of mechanisms by which this can achieved:

"Defensible space is a model for residential environments which inhibits crime by creating the physical expression of a social fabric that defends itself. All the different elements which combine to make a defensible space have a common goal - an environment in which latent territoriality and sense of community in the inhabitants can be translated into responsibility for ensuring a safe, productive, and well-maintained living space. ..... 'Defensible space' is a surrogate term for the range of mechanisms - real and symbolic barriers, strongly defined areas of influence, and improved opportunities for surveillance - that combine to bring an environment under the control of its residents." (op. cit. p. 3)

The theory claims that defensible space techniques can encourage surveillance and engagement of the residents in controlling and defending their environment, thus reducing and discouraging crime. Defensible space mechanisms are related to four aspects or capacities of physical design, which are claimed to contribute to the creation of secure environments acting individually or in concert (op. cit., pages 8-9; 50):

1. **Territorial definition**: Subdivision of the residential structure into perceived zones of residents' territorial control.
2. **Surveillance**: provision of surveillance opportunities for residents and their agents, by the positioning of windows, entrance lobbies etc.
3. **Image**: design of buildings to avoid uniqueness and isolation and avoid stigma of public housing.
4. **Juxtaposition with safe areas**: enhancement of safety by geographical location near sympathetic environments - "safe zones".

**Research Method:** The proof for Newman's theory is based on two methods: multi-variate statistical analysis of detailed block crime data, and a comparison of "coupled projects". Multi-variate statistical analysis was carried out on locational crime data (for different types of crime) for a sample of over 4000 blocks of N.Y. Public Housing Authority. Block crime rates for type and location of crime were related to various design features of the blocks, as well as a limited number of social
DEFENSIBLE SPACE APPROACH:

A. Physical variables

- **Project characteristics:** size of project; density measures: coverage and Floor-area ratio; site characteristics in relation to position of buildings on the site with respect to: access paths; subdivision and use of open space; and relationship to the street.

- **Building characteristics:** number of apartments: per entrance; per corridor; per block; height, number of tenants per elevator; semi-public vestibules; average dwelling size.

- **Surveillance:** positioning of entrances in relation to street; relation of apartments to corridors; number of windows facing entrance and grounds; visibility of elevator from street; visual access by police motorists or pedestrians.

B. Social variables:

- **Individual household characteristics:** population profile; education, income and occupation characteristics;

- **Population/community characteristics:** Transience- turnover rates; community facilities;

- **Transport and journey to work:** links to public transport, distance from centre, car ownership etc

C. Crime Variables:

- **Type of crime:** (robbery; burglary; mischief; loitering and lingering)

- **Location of crime in:**
  - public areas: (sidewalk; path; parkinglot);
  - semipublic areas (commercial and community facilities, roof; grounds)
  - semiprivate areas (elevator, lobby, stairwell)
  - shared private areas (hallway and apartment vestibule)

- **Time of day/ year:**

- **Age Race of Victim/complainant.

FIGURE 2.2.2: Newman's Defensible Space Variables
variables. The in-depth analysis focused on a sample of 100 projects (each consisting of uniform building types). The variables that were investigated were of three groups physical, block and social variables\textsuperscript{49} (see figure 2.2.2). In the first stage the attempt was made to establish significant relationships between design features and crime rates, while also examining other social variables which characterised the blocks. The discussion of the findings of the multi-variate analysis is relatively obscured, however, the support for Newman's main findings could be summarised as follows:

- Though height alone and size of project alone do not increase crime, the combination of height over six-storeys and size over 1000 dwelling units seem to affect a significant increase in crime rates (p.28) Both of these it is claimed contribute to anonymity, isolation, apathy, lack of identity with surroundings etc.
- The large majority of crimes (79\%) takes place in the buildings proper, compared to only 21\% on the grounds around buildings. This he argues is due to the fact that building interiors that are public in that they are accessible by anyone, yet screened from view are most vulnerable.
- Mean felony rates increased dramatically with height from 8.8/1000 inhabitants in 3-storey buildings; 12/1000 inhabitants. in 6-7 storey buildings to 20.2/1000 inhabitants. in buildings with 13 storeys and over\textsuperscript{50}.
- More specifically, the proportion of crime in interior public spaces - 95\% of which is muggings - was found to increase with height (from 17.2\%; to 40\%; to 55\%; in buildings of 3-storeys; 6-7 storeys; and 13-storey and over, respectively). The majority of crimes were committed in elevators, where no surveillance is possible (10\% in 6-7 storeys and 22.6\% in 13 storeys and over).
- The entrance position with respect to the street was also found to have an impact on crime rates, particularly lobby and elevator crime. Newman claims that "When lobby crime and elevator muggings in housing projects whose building entries face the street were compared with those whose building entries face the interior grounds, the differences were found to be significant" (op. cit. p.25) however the actual statistics do not really provide sufficient proof (p.85).

The effect of social variables on the crime rates is not really discussed, although Newman admits that over 50\% of apprehendees lived on the estates. However, in

\textsuperscript{49} For details on methodological issues see Newman (1973): pages 230-234.
\textsuperscript{50} The reason for the levelling off over 13 storeys was attributed to the fact that burglary was four times more likely to occur at ground level and two times more likely on the top level, so that increased height dropped the proportion of burglaries in a block overall. Robberies in interior public spaces (elevators, lobbies, stairwells) were found to increase consistently with height (op.cit. p.28-33)
order to isolate the social factors, Newman compares two paired housing projects in the second stage, Brownsville and VanDyke. These, it is claimed, are the only two suitably matched with almost identical social characteristics, location, density etc., differing only in terms of their physical design characteristics: Brownsville consisting mainly of 6-storey blocks with some 3-storey wings; and VanDyke mainly 13-14 storey tower blocks removed from the street, with large open spaces between them. VanDyke had 50% more crime and 3 times higher robbery rates than Brownsville.

This comparison provides the main proof for Newman's arguments, since Brownsville appears to incorporate a lot of the defensible space characteristics. VanDyke's design is, what Newman considers the epitome of bad design: high-rise towers with doubled loaded corridors, double scissors fire stairs, and entrances away from the street on open grounds. Brownsville's lower crime rates are thus attributed to the lower height; lower number of dwelling units per entrance, better arrangement of indoor circulation space; positioning of entrances to face the street; subdivision of grounds around blocks into identifiable zones; overall better surveillance possibilities. Newman also attributes the better qualities of community life, less anonymity, higher use of internal and external spaces and higher resident satisfaction to these design measures, which in turn also have an effect on crime rates.

Newman identifies the following principles as being the main catalysts of high crime:

- **Anonymity**: caused by large project/block size; number of dwellings per entrance; height over six storeys; uncontrolled open grounds; stigmatised public image.
- **Lack of territorial definition**: no perceived zones of influence between public and private.
- **Lack of surveillance**: type of corridor; position of entrance with respect to street; windows overlooking spaces/entrances.
- **Escape routes**: number of exits; inter accessible lifts/staircases; scissors staircase design.

On the basis of Newman's theory a series of recommendations for the design of housing estates, related to the four "capacities" of space are made, which are lightly expanded in Newman and Johnston (1976) *Design Guidelines for Creating Defensible Space*. In design terms these can be summarised in the following:

1. **Territoriality**:
• Defining boundaries; to identify zones of control with the use of real and symbolic barriers, both inside buildings and on the grounds around buildings;
• Creating a hierarchy of spaces from public to private;
• Clustering of spaces into groups - community/identity; Making an estate into identifiable enclaves;
• Reducing number of units per entrance and per corridor, so that residents will recognise each other and identify intruders;
• Keeping strangers out, by limiting access via physical and symbolic boundaries, and thus making them identifiable.

2. Surveillance:
• Positioning of windows to overlook entrances and grounds; Blind ends of buildings should be avoided.
• Front entrances should be facing street.
• All common internal spaces of the buildings should preferably be visible/surveillable from the street, and overlooked by windows.
• Fire escape stairs should be located on the outside and/or be glassed where possible; fire escape doors should face the same side of the building, unauthorised access should be restricted, general access should be restricted to the front.

3. Estate and Building Image:
• Avoid building forms and layout designs which make projects stand out and easily stigmatised: whether due to interruptions in circulation, closing off streets; or due to size height material and amenities.

4. Urban Locale:
• Avoid juxtaposition with unsafe areas, eg parks or particular institutions where teenagers hang out etc.;

The main contribution of Newman's work is in drawing attention to the relationship between design and vulnerability to crime, though unfortunately this is confounded by the issue of territorial behaviour, and thus limited in two ways:
• The statistical evidence to support the claim, that design features can create crime risk, is very weak, due to fundamental shortcomings of the methodology; superficial handling of data; and unnecessarily flawed statistics.
• The theoretical foundations and the support for the behavioural claims of the theory are even weaker (Hillier: 1973).
The main methodological problem is that social variables are not controlled for, as has been generally pointed out by a number of criminologists (Bottoms, 1974; Mawby, 1977; Mayhew, 1979; Poyner, 1982; a. o.). As Hillier (1973) argues, Newman's methodology fails to distinguish between the effects of social and physical variables on crime rates. The offender rates on each project/block are not taken into consideration, as Mawby (1977) points out, and this is particularly a problem in the paired comparison of Brownsville and Vandyke. The theory fails to consider the possibility, that the perpetrators of crime live on the estate. The validity of the paired comparison, wherein the main body of proof for the theory supposedly lies, has also been questioned by Hillier, Bottoms, and others. There are subtle differences in homogeneity and income class background, underneath the so-called "identical social characteristics", and doubts have been raised as to the reasons for selection of the two projects\(^{51}\).

Indeed, with this type of methodology it is very difficult to distinguish social and spatial causes, the problem really is with the block as a unit of analysis. There is a strong overlap of design features (for instance, height and number of dwellings per entrance are strongly interrelated as variables), as well as frequent combinations with specific types of staircase design/fire exits and other specific design characteristics in the prevalent 'typical' tower block design, the role of which in creating vulnerability cannot really be distinguished, or have not been systematically researched. Thus, only general conclusions can be drawn about high-rise buildings, or specific combinations of tower block designs and muggings. However, the fundamental mechanisms of space vulnerability are confused, as is also the role of specific design features to vulnerability. The level of spatial analysis is too crude to provide meaningful results.

Another problem is the handling of different types of crime, which appear to relate to different vulnerability patterns, as one. For instance, burglary decreases in larger/higher blocks, since it is the ground level that is particularly vulnerable, while robbery and elevator crime clearly increase with the characteristics of higher blocks. Finally in terms of research design and defining the factors influencing crime Newman tends to attribute lack of use of space and indifference, as well as crime, to

---

\(^{51}\) Newman later attempted to remedy some of these shortcomings with respect to the assessment of the influence of social factors along with design factors in Newman and Franck (1981) *Factors Influencing Crime and Instability in Urban Housing Developments*; and in Newman (1980) *Community of Interest*. Here he modifies and expands the defensible space approach to incorporate social policy and managerial measures to encourage social cohesion and homogeneity. He thus argues that high-rise blocks can be safe, if the right type of social/age group (eg pensioners or students) are employed, coupled with manpowered and other surveillance techniques.
non defensible space design, whilst there may well be the case that the behaviours are cause of their own right rather than an effect of design.

With respect to its theoretical foundation, *Defensible Space* adds to the concept of social surveillance a *behavioural link*- territoriality, and in this sense differs from Jacob's (1961) notion of social surveillance, which is provided by strangers and inhabitants- "eyes on the street" rather than merely windows facing the street. It is constructed on the assumption that man is a territorial animal - a behaviourist view based on studies of particular primitive societies and animal groups - which gained ground in the nineteen sixties\(^{52}\), coupled with the all pervasive belief in architectural theory, that the environment influences social behaviour and therefore can be manipulated for a targeted effect on attitudes of control over space. This rather simplistic causal view of the relationship between man and his environment, which has been the philosophical basis of architectural utopias and institutional building since the eighteenth century, and crude notions of architectural determinism have been strongly attacked from many sides, notably by Hillier and Leaman (1973) in their critique of the man/environment paradigm; Alan Lipman (1969) a.o.

Even more weight than the philosophical arguments carries the argument based on concrete results. Other research studies have tested out defensible space hypotheses (discussed in section 2.3) and several experimental projects employing defensible space, or designed to test it out, failed to produce real support for the theory\(^{53}\). The majority of studies and implementation experiments have been carried out in North America (USA); detailed reviews can be found in Murray, Motoyama, and Rouse (1980: 50-62); B Poyner (1983: 10-27); R Taylor and S Gottfredson (1986: 398-412), and other sources. In Britain, a study of defensible space and vandalism on housing estates, conducted by Andrew Sturman and Sheena Wilson (1976) (see also Wilson, 1978) found that *child densities* were more significant predictors of vandalism than physical factors. They granted benefit of the doubt for Defensible Space, as a design improvement strategy. Similarly discouraging research results were found by Mayhew, Clarke , Hough and Winchester (1980) in "Natural

---


\(^{53}\) Generally these were designed to include range of techniques /rationales (multi-agency approach); therefore, it was impossible to pinpoint the performance of defensible space versus simple target hardening or social surveillance rationales (Murray, Motoyama & Rouse, 1980: 52-61 ).
Surveillance and Vandalism to Telephone Kiosks. In the article "Defensible Space: the Current Status of a Crime Prevention Theory" Pat Mayhew (1979) concludes on a rather pessimistic note: "Defensible space solutions, even if they benefit those who enjoy their protection, may do little overall to reduce the overall levels of crime. Those committing residential crime will for a long time have plenty of other opportunities for offending presented by poorly designed houses and a public who (thankfully) do not have to make security their sole concern."

- **Applications of defensible space and their results:**

  The main spin-off from Newman's work is the Crime Prevention Through Environmental Design (CPTED) programme of "demonstration projects", set out to investigate the effect of the environmental design approach in various settings (commercial; schools; housing etc.) combined with other crime prevention strategies. Wallis and Ford (1980) conclude, that results have been mixed, for instance the Minneapolis residential project, where defensible space was employed had disappointing results. The Hartford Neighbourhood Crime Prevention Project, perhaps the best researched and designed experiment, where behavioural hypotheses of defensible space were tested against other approaches, had positive results in reduction of fear, though not crime as such.

  This experimental project was carried out in North and South Asylum Hill, in Hartford Connecticut between 1974-76, and monitored evaluated over consecutive years 1977 and 1979 (see Fowler and Mangione, 1979; 1982). Defensible space improvements were carried out and streets were closed off in one part, creating culs-de-sac, narrowing entrances etc., whilst in other parts different crime prevention approaches (community based and police activities) were implemented. Whilst

---

54 Reported in R.V.G. Clarke and P. Mayhew (1980) *Designing out Crime* London; HMSO. Such results have led to the adoption of a multi-agency approach - co-ordinating crime prevention efforts - which will be discussed in the next section.

55 Wallis and Ford (1980) report on this programme in *Crime Prevention Through Environmental Design: An Operational Handbook*, which will be reviewed in the following section.

56 The experiment found that in one year after the implementation of the physical measures crime and fear of crime dropped though not drastically, however as Murray, Motoyama and Rouse (1980: 54) argue this was not to do with changes in the street pattern, since "the impact on traffic and pedestrian activity were so small, that they could have not been an important factor in the drop of crime". Physical changes were not found to have any effect on social cohesion or on residents control of space and motivation to intervene. Thus results failed to support the community building hypothesis of defensible space. What they did find however was that some changes in more people watching out for each others properties, and greater ease of identifying strangers. Two years later in the second evaluation, fear of crime was found to have dropped substantially, while paradoxically crime levels had risen again. Feedback from other prevention programmes was even more unpromising, since all initiatives seemed to wear off and interest and involvement slacked.
initially some reduction in crime and changes in attitude were observed, no changes in community-building and social cohesion were found. A second evaluation later found that crime had returned to its old levels (as in other crime prevention programmes), however the positive drop in fear of crime remained57.

Another application of Newman's theory involves closing and privatising streets, as for example the project of a relatively wealthy neighbourhood on the periphery of St Louis, reported by Newman (Newman & Wayne, 1974; Newman, 1980). It was carried out in 1974 with some reported success in reducing crime and fear of crime, improving the neighbourhood's feeling and developing a homogeneous neighbourhood - what Newman (1980) calls a community of interest. Similar ideas are argued by Appleyard (1981) and Barry Poyner (1983: 15-24) who, in Design Against Crime, supports street closures and separation of areas from commercial uses, as one way of increasing security of residential areas.

The concept of street closures, however, goes against Jane Jacobs' notion of social surveillance. Turning the city into 'enclaves' or 'turfs' is not a viable urban strategy on a global scale. Clearly there is strong confusion and contradiction on the issue of street traffic. Some studies have shown that traffic does not make a difference (e.g. T Repetto: 1974). Schlomo Angel (1969) found, that most incidence of crime in Oakland was related to either too low or too high levels of traffic, concluding that there is a "critical intensity zone", such that the "right amount" of crime is deterrent to crime (providing enough witnesses, but not so many that no one will intervene). Luedtke and Associates (1970) analysed 289 crimes in Detroit and found that light or sporadic traffic was related to 2/3 of victimised sites, 80% had a low vehicular traffic. Brill (1977) found especially heavy traffic in areas with higher concentration of crime, but also found evidence of the opposite effect. Thus pedestrian traffic seems to relate to crime risk both, where the number of pedestrians is too low, and where it is especially high (where youth gangs also mostly hang out). It also depends on who they are, not just how many. Finally Hillier, Penn et al. (1992) report that crime in Barnsbury was found to be lower in the more integrated residential streets with relatively more traffic (excluding the busy commercial roads)58. Overall the results point to a need for great caution with street closures and other radical measures, since they can involve more risks than a cure.

Murray et al. (1980: 59-61) sum up the evidence of studies on the relationship between crime and the built environment, and with respect to the defensible space

57 See Fowler and Mangione, 1982; also review in R Taylor and S Gottfredson, 1986:408-12.
theory, and conclude that findings to date have been full of inconsistencies but that "the Crime/Built Environment link is real". However, .." no study has been able to associate physical changes with behavioural change". They further conclude, that there is a need for sustained and combined efforts, and that physical design changes might have more long-term effects on fear of crime and on crime. In crime prevention strategy, however, the defensible space measures against crime were considered inadequate and incorporated into a multi-agency approach (also argued by Newman(1980) in his later work Community of Interest and by the Home Office Research and Planning Unit 's 'situational approach' (Kevin Heal and Gloria Laycock, 1986).

- **A Coleman : Utopia on Trial - Design Disadvantagement Scale:**

Coleman (1985/90) brought the issue of design and crime back on the agenda in the mid-eighties with the publication of Utopia on Trial a fierce attack on modernist housing estates of the sixties and seventies. The book is based on an extensive study of the relationship between design and social malaise in public housing estates, in the Boroughs of Southwark and Tower Hamlets (and Blackbird Leys, Oxford), which covered a sample of 4099 blocks.

Coleman's argument is that the design of the estates affects the breakdown of social norms, symptoms of which are the signs of: litter; graffiti; vandalism; damage; urine and faeces, often to be found in the communal areas. This is also related to breakdown of respect for private property; marital breakdown, (mental illness); indifference, aggression and delinquency. Coleman adopts Jane Jacobs' and Oscar Newman's theoretical ideas, which are blended in without apparent contradiction (op. cit. p.14). Her theory is, that three unifying principles advanced by Newman explain how crime is easy to commit, and difficult to prevent: anonymity, lack of surveillance and the presence of alternative routes.

**Anonymity** is attributed to low density (Jacobs); size of the estate/ block; number of dwellings per entrance; height; and the "degree to which grounds and common parts of the building are shared and defended by different households". Coleman refers to Jacobs' view that there should be a clear distinction between public and private property, but then defines it according to Newman's ideas about hierarchy, in a "sequence from private space through semi-private and semi-public to public, with increasing anonymity as the degree of sharing widens."

Under the principle of surveillance, Coleman combines Newman's notions (related to
COLEMAN'S DESIGN DISADVANTAGEMENT SCALE:

Design variables tested for disadvantagement score:

- **Size variables:**
  - Dwellings per block*
  - Dwellings per entrance*
  - Storeys per block*
  - Storeys per dwelling
  (*identified by Newman)

- **Circulation variables:**
  - Overhead walkways
  - Interconnecting exits*
  - Vertical routes (lifts and stairs)*
  - Corridor type*

- **Entrance characteristics:**
  - Entrance position*
  - Entrance type
  - Blocks raised above stilts
  - Blocks raised above garages

- **Features of Grounds:**
  - Spatial organisation*
  - Blocks in site
  - Access points (on site perimeter)
  - Play areas

- **Social Malaise Variables:**
  - Litter
  - Graffiti
  - Vandalism
  - Urine
  - Faeces
  - Children in care

**FIGURE 2.2.3  DESIGN AND SOCIAL MALAISE VARIABLES**
variables of corridor type; entrance position; etc.) with Jacobs' "eyes on the street". Finally Coleman highlights the principle of "alternative escape routes", which is given higher emphasis than in Defensible Space, and related to variables as number of inter-accessible lifts and staircases number of exits etc.

The issue of territoriality is latent: mentioned, but not made into a key issue in this study. It is used as an argument against tenement blocks and public housing, since these forms fail to provide the space for the "territorial imperative" and the need to mark one's individuality. Coleman preempts her critics by redefining architectural determinism as architectural probabilism, the notion that architecture is likely to influence behaviour, or what degrees of environmental influence are revealed by factual evidence - which sounds like another definition of a statistical correlation.

Methodology: Coleman adopts Newman's methodological approach, based on the analysis of features of the block in relation to social malaise indices of the block. The indices are litter, graffiti, vandalism, urine, faeces and number of children in care. However, Newman's design variables are further expanded and refined to measure the larger variety of features of block designs, which appear in the sample of 4099 blocks. The variables are related to size; circulation; entrance features; and features of the ground design; the sixteen in total design variables are ordered into a design disadvantagement scale (see figure 2.2.3), on the basis of which blocks can be rated. Social variables including density of children, found by Wilson (1978; 1980) to affect vandalism, are not investigated. The study also compares design features of the pre-planning era to post war public housing; and makes recommendations for design improvement guidelines.

Data: First hand data was collected from direct observations (urine faeces, litter, graffiti, vandalism) but not rated. Children in care data was obtained from Social Services statistics (only in Southwark). About 225 interviews were carried out with varied tenants for their opinions on the design problems. Finally, crime rates for burglary; theft; robbery; bodily harm; juvenile arrests; sexual harassment; and criminal damage in 729 blocks (part of Southwark) were obtained at a later stage from the Metropolitan Police, analysed, and added to the second edition (Coleman, 1990: 171-3). For each design variable the design disadvantagement score is plotted against

Coleman (1985) claims that socio-economic information was gathered in order to examine, whether such factors were having an effect. However, no systematic analysis is carried out, since social census data (by enumeration districts) was not available on a block basis, therefore statistics were not available. Other data was not necessarily reliable (wife battering etc).
the proportion of blocks with this feature. Findings are presented in trend lines for each index of social malaise.

Presented as a case for prosecution, the main evidence and findings from the cross-examination are the following:

- **Ringleaders of antisocial design** are considered to be: *size* (measured as: the number of dwellings per entrance; number of dwellings per block); *height* (number of storeys); *overhead walkways*; and *spatial organisation*. The last two, though less powerful, it is claimed, .."lead from behind, since they increase the effect of other suspects" (p.80). If overhead walkways are removed, the numbers of dwellings per entrance; of vertical routes and interconnecting exits; are also reduced simultaneously.

- Trend lines appear to follow the same ascending order: starting from the mildest form litter; graffiti; damage; children in care; urine; faeces. Coleman argues that a certain degree of disadvantagement is necessary to break a social taboo.

- For the seven types of crime, numbers of blocks correlated against the design disadvantagement score showed that crime occurrence of all types consistently increase with higher disadvantagement.

On the basis of the above Coleman's conclusions are that design disadvantagement - size and height, which increase anonymity; the degree of sharing of territory; as well as escape routes and lack of clear territorial control - are responsible for the high incidence of malaise symptoms and breakdown of social norms. From this Coleman derives a general condemnation for large scale public housing: "Bad design does not determine anything, but it increases the odds against which people have to struggle to maintain civilised standards ", and they lose (p.83) - arguing that the ideal form of housing for bringing up children is the private house with garden (semi-detached; terraces). Coleman condemns 'confused open spaces'; low densities; and communal play; arguing that they attract and bread vandalism, litter and anti-social behaviour, and suggests they should be either public, or private. With respect to road layout Coleman argues against the culs-de-sac layout (they are not safer anyway), and the wasting of space for access by segregated traffic ways. She argues in favour of traditional streets (Jacob's arguments), while accepting the need to maximise control and reduce through-routes on residential estates, which are not public space.
Guidelines: Coleman offers specific design recommendations to improve surveillance and control accessibility, corrective and preventive measures to assist the improvement of housing designs\textsuperscript{60}. These include:

- Demolishing overhead walkways.
- The site on which a block stands should be clearly bounded, with one point of access. Where entrance and exit necessary - both should face same side.
- Abolishing "confused space" by assigning to blocks (semi-public) or by building more housing with gardens. (infill - semi-private)
- Rear grounds with high walls; Front grounds with prickly shrubs to allow surveillance; 3-5 m. deep. Entrances with gates (symbolic).
- Play areas to be removed; included in single block -sites; or made public.
- Recommended Height: 2-3-storey or 4-storey walk-up blocks. Can be achieved by lopping off top storeys in high-rise blocks, if necessary.
- Reduction of block size by vertical partitioning (max. 12 dwellings/block).
- Vertical and horizontal partitioning (max. 6-10 dwellings per entrance).
- Number of dwellings served by corridor restricted to 4-6 dwellings.
- Each block or vertical section should have one staircase (lift when necessary, but both inter-visible)
- Ideally one emergency exit. If two are necessary for fire regulations, one at the front, and the other opening onto the inaccessible back.
- No stilts or garages at ground level; partial replacement with dwellings for visual surveillance.
- Positioning of entrance to face street for good surveillance. If necessary redesign estate roads to create 'public street' characteristics. Blocks should be set back: 4-5 metres frontage with waist-high walls and one gateway.
- Ground floor flats should have separate entrances and gardens. Communal entrances with glazed doors, visible from at least some ground flats.
- One-storey flats better than maisonettes. Mixed flats and maisonettes (to lower child densities to 17% of adults) to be avoided.
- Traditional British streetscape (terraces) recommended: Continuous frontage; waist-high walls with gates.

Utopia on Trial was received with enthusiasm from policy makers and government (Bailey, 1988), and granted wide publicity by the media, for it offers a

\textsuperscript{60} Proposals for improvement of housing estates were made in conjunction with the Design Improvement Controlled Experiment (DICE) set up by the DoE. A widely publicised case study is the Mozart Estate; L.B. Westminster, where proposals include knocking down all overhead walkways. Theses were analysed by Hillier & Penn (1986), who criticise the design proposals for lack of understanding of how space works. Knocking down the main link between the two parts of the estate by overhead walkway, would increase segregation and break down the already weak links of the two sides.
positive approach to visibly doing something about housing and living conditions. It
tries to prove, how badly designed environments affect the quality of life and the
social environment, encouraging anti-social behaviour. Though there appears to be
some truth in all this, things are not necessarily the way they are expressed here. As
with Newman's *Defensible Space*, Coleman's research has been met with much
criticism from sociological and architectural quarters. On the one hand, for grave
methodological weaknesses: shoddy statistics; lack of consideration of social
variables; dubious measurements of the indices of malaise; (eg. Hillier, 1986/1988;
Hope, 1986; ), and for ideological bias, on the other: anti-modernist; anti-public
housing; conservative views; arrogance and architectural determinism (Hillier,

A detailed discussion of the limitations Coleman's methodology is carried out by
Hillier (1986) as well as a critique of the implications of the design recommendations.
Hillier argues that Coleman has scientifically proved nothing, mainly due to the way
the measurements and statistical trendlines have been conducted61. Other intervening
variables have not been considered; for example, allocation policies can effect
concentration of 'problem families' on the least popular estates, often those
comprising large megastructures. Another problem, one may add here, is handling
the data without controlling for management practices, such as cleaning, maintenance
etc.62. The whole argument about social malaise indexes can be overturned, due to
lack of consideration of the factor of maintenance/cleaning and insufficient caretaking
(M. Roberts, 1988 ). Ultimately, what the trendlines show is, that blocks with
social malaise symptoms (inevitably most of the larger ones), tend to have 'bad'
design features, whose disadvantagement scores increase with size. However, the
design disadvantagement indices are by definition based on the characteristics of
large block structures, along with surveillance etc.

The inherent problem - the failure to distinguish social causes from spatial factors - is
due to the block as a unit of analysis. Correlations found to be highly significant
are, as Hillier points out, very low. The percentages of old age pensioners and child
densities seem to be at least equally good, if not better, predictors of malaise than

---

61 Although admittedly litter, graffiti, faeces etc. are difficult to measure, Coleman abandons any
attempt to consider the extent/degree to which malaise is present. Noting only presence or not of
such incidents, she condemns larger blocks where the higher numbers of users will most likely
include some people who do this purposefully or by accident. The same applies to the misleading
presentation of the relationship between children in care and design disadvantagement, based again on
examining blocks with children in care, without calculating rates thereof.

62 Surely, the time between last cleaning/maintenance work and observation should be taken into
consideration.
design features. With respect to crime, the 'findings' are even more dubious, for three reasons:

1. The same criticism, which Hillier (1986:40) makes with respect to children in care, applies also to Coleman's (1990:172) analysis of crime. Crime is not examined in terms of victimisation rates per block; the sample of blocks, which have incidents of a crime (anything over 1 incident in a year) are examined with respect to their design disadvantagement scores. Inevitably, the findings will be biased against large blocks, repeated in the suspiciously recurring trendlines, while size/population is not controlled for.

2. Research has shown that crimes have different target selection /risk patterns. It is careless to argue, that design disadvantagement features encourage crime based on such gross data analysis, and such a mixed bag of predominantly overlapping design features. Strangely, the features that do not relate to the large size/height cluster (eg. those relating to surveillance), do not feature prominently in the findings. The reasons cannot be attributed to specific features embedded in the disadvantagement score, but to the methodology. This approach confuses rather than clarifies the relationship between design and crime victimisation.

3. Finally, theoretically the link between crime and design disadvantagement remains unclear. Assumptions, conjectures and conclusions are relatively confused. The hypothesis to be tested is, that 'bad' design features increase the probability of social malaise symptoms (litter and so on). Three unifying principles of vulnerability (based on Newman's research) are used to define these 'bad' design indices: anonymity (due to size); surveillance; and escape routes; which specify the relationship between design and malaise. The conclusions are that anti-social behaviour and attitudes, assumed to relate to the breakdown of social norms and lack of territorial control, are the effect of bad design, although evidence is provided on the relationship between traces of anti-social behaviour (malaise) and design disadvantagement (both badly measured as such), which could be explained by the three unifying spatial principles. The link between the traces of anti-social behaviour (litter etc.) and breakdown of social norms; insufficient territoriality etc.; and the link between design disadvantagement and breakdown of norms/territorial attitudes, are

---

63 Even Newman (1973) noted that burglary and robbery have different vulnerability patterns, with respect to height of buildings. Burglary risk, for instance could be discouraged by buildings on stilts, whilst height would overall decrease the rate per block, since the ground level is generally the most vulnerable and most accessible. This will be discussed in the next part.
neither properly justified as assumptions, nor directly investigated. The notion of probabilism, rather than determinism, does not really clarify what the link is\textsuperscript{64}.

Coleman seems to encourage further confusion, by glossing over contradictory approaches to social surveillance. This is inherent in a contradiction in Coleman's proposed recommendations: encouraging public street characteristics, yet excluding strangers off housing estates; blending Jacobs' notion of street surveillance and Hillier's research on street systems and space use- on the one hand, with territorial ideas relating to Oscar Newman's defensible space, on the other. Estate grounds are not treated by Coleman as public space, but bounded and attached to blocks. On a small scale this is not a problem\textsuperscript{65}. Similarly, the argument for fewer dwellings per entrance and one vertical circulation core, seems to make a lot of sense, since it reduces anonymity, damage, noise and the wear and tear of highly used spaces. However, in large scale housing developments this would probably result in a cross between a prison and a fortified ghetto. Hillier (1986) questions the spatial logic of territorialising estates, partitioning buildings and cutting off spatial links (walkways) indiscriminately, arguing that this is more of the same problem that caused the disease in the first place - increasing segregation and under-use of space\textsuperscript{66}.

The significance of the global aspect in spatial networks is overlooked in Coleman's design disadvantagement score. Whilst internal circulation spaces clearly should not be public spaces - they are 'corporate' functional spaces of the building, for use/interaction of residents, and possible visitors - external circulation spaces not necessarily part of the block, cannot be removed from the public network without drastically thinning out use, interaction and opportunities for surveillance/control. On the contrary they need to be more integrated into a street system to rehumanise them and provide surveillance (Hillier, 1986; 1988). Ultimately both Newman's and Coleman's ideas, relate to hostility to the public realm and to strangers, that are central to Jacobs' thesis on the role of urban streets.

\textsuperscript{64} If what Coleman is trying to say is, that design disadvantagement features increase the probability of social malaise and crime, since social norms and territorial behaviour break down in disadvantaged blocks with all the above symptoms, then there is still a major piece of research needed to actually substantiate the particular statements of the theory. One would have to try to show that breakdown of social norms (whose?) increases risk of burglary, assault, mugging, etc.

\textsuperscript{65} Jacobs argues in favour of a clear relationship between public and private space and Hillier, a more direct relationship. In this case the restriction of access to circulation space in the block, with proper access control, does not give cause to contradiction.

\textsuperscript{66} Indiscriminate knocking down of walkways without considering their spatial contribution in the overall network of the estate, could reduce presence of people, contradicting the aim for more street-like systems. See also critique of the Mozart Estate modifications (Hillier & Penn, 1986).
Coleman, is criticised for social ideas and political attitudes in *Utopia on Trial*, which seem to embody rather extreme conservative views, that the best council housing is no council housing at all, while evading key aspects of late twentieth century housing reality, the socio-economic and political problems over and above design and management. The fact that large scale redevelopment in the twentieth century has often failed, due to lack of insights into spatial and social networks, cannot be equated with the general failure of social ideals and utopian schemes. Such political oratory only serves to confound the issues her critique of design is trying to address. Ultimately what *Utopia on Trial*, offers, is something politically convenient with a cloak of scientificity, which echoes part of people's distaste for aspects of modernist housing design, and dissatisfaction with living conditions.

There may well be a relationship between the symptoms of "social malaise" and the built environment, in spite of doubts about the approach. However, like Newman, Coleman's approach must be treated with great caution with respect to crime and design. The results of implementation of her work for improving security have been presented in a positive light, though not substantiated by proper research (Coleman: 1986 and 1988; Rock : 1988), while considerable scepticism has also been expressed by those working with such schemes (R. Cowan, 1988). The design recommendations are common sense in principle (against anonymity; lack of surveillance; multiple escape routes). However, they are still not fine-tuned enough to actually work for different designs, and can become themselves problematic, if applied without the necessary awareness of the uniqueness of each estate, in relation to local and global aspects of spatial networks.

---

67 Some of Coleman's projects have been monitored by the Safe Neighbourhoods Unit and have reported positive results without specific evidence (see Coleman: '86. AJ 6. Aug.). However it is common for improvement initiatives to show positive results in the initial phases, while after the novelty and enthusiasm wears off, the estates slide back to the old levels of crime etc. Paul Rock (1988: 106) reports from an interview with Coleman in 1986: "For instance, the removal of walkways in the Lisson Grove Estate was held to have halved the crime rate. It was maintained that graffiti, litter and the fear of crime virtually vanished when walls were installed around blocks of flats on the Brandon Estate in Southwark. Not a single burglary was reported for two years after the bottom floors of blocks on the Lea View Estate in Hackney were turned into houses with backs and fronts becoming 'a normal street'."
2.2.4 The Synergistic (Multi-agency) Approach:

This approach was first developed by the US National Institute of Justice in consortium with the Westinghouse National Issues Center, in a series of experimental projects under the Crime Prevention Through Environmental Design programme (Wallis and Ford: 1980). The main aim of CPTED is to reduce crime and fear of crime in a target setting, by reducing 'criminal opportunity', and "fostering positive social interaction among the legitimate users", with the emphasis on prevention rather than apprehension. It considers crime opportunity as a set of criteria, the offender's weigh up when choosing a target, related to the effort and risk against the potential payoff. Environmental factors perceived by offenders as creating opportunity for crime, are largely the same as those which trigger fear and feelings of insecurity in the users and potential victims, however, the equation is not always straightforward. The "opportunity hypothesis" which underlies the approach, draws on insights from criminological research on the dimensions of opportunity from the criminal's point of view, which will be discussed in the third part of the literature review.

The principle means by which CPTED sets out to achieve its aim, is by modifying the physical features of the setting (ranging from Newman's defensible space mechanisms to simple street lighting) as well as social programmes, managerial approaches and law enforcement efforts. The basic argument is that physical modifications can have far greater impact, when designed and implemented with the active support of the community. The mechanisms by which risk of detection and apprehension is increased are:

- **Movement Control**: limiting access, use of streets /paths/ corridors to "their legitimate users"; using real and symbolic barriers; doormen/guards, and hardware: locks; gates etc.

- **Surveillance**: formal (police; private guards); surveillance technology (CCTV); or informal: social control by residents. Surveillance can be enhanced by architectural and site design: positioning of windows; design and positioning of entrances towards the street, etc.

- **Activity support**: Surveillance cannot be guaranteed by architectural design, therefore community building activities is encouraged, so that the

68 Partly discussed in the previous section, the CPTED programme was influenced by the work of O. Newman (1972), J. Jacobs (1961), E. Wood (1961), and S. Angel (1968).

69 Drawing on Schlomo Angel's (1968) work on street crimes, it involves research into distance offenders travel/offenders mobility; Ease of movement/access; land uses; time etc. According the opportunity hypothesis, perceived risk and effort to commit a crime should be increased, while number of available targets and value/payoff should be decreased.
legitimate users can get to know themselves and proprietary feelings and behaviour can be encouraged.

- **Motivational reinforcement:** Surveillance is not effective, when there is no willingness to intervene. Motivation is encouraged through activities and management techniques that alter the scale of impersonal environments; economic incentives (insurance premiums for those who adopt particular measures); education and training.

The above are incorporated in this cross-disciplinary approach through:

- **Physical measures:** movement control (closing off streets to through traffic); surveillance (improved lighting, windows etc.); activity support (laundries, seating areas, play areas); and motivation reinforcement through increased pride in public housing-better design; Target hardening.
- **Social programmes:** house-watch; block-watch, "whistle-stop" etc.
- **Management:** changes in administration; building codes; allocation policies etc.
- **Law Enforcement:** Changes in policing methods; private security guards;

Basically the physical measures combine Newman's approach with target hardening. Measures such as lighting, have been shown to contribute greatly to the reduction of fear, if not reduction in crime itself (Tien et al. 1979, reviewed in Poyner:1983; Murray et al., 1980; Lea, Jones, Woodhouse and Young, 1987). The programme failed in its management, precisely due to the diversity of its tactics and richness of ideas. Not that the ideas were necessarily faulty, however, in monitoring and evaluating the results, it was very difficult to discern, what did achieve results and what did not. As Poyner points out (1983: 11) "Undoubtedly, many of these tactics can contribute to a reduction in crime in the appropriate setting, but when they are bundled together in the same demonstration project, it is almost impossible to decide whose tactics are the most effective and which should be applied elsewhere".

In Britain this multi-agency policy is adopted in the situational approach to crime, (to be discussed in the next section), and in the most recent publication by IoH/RIBA (1989) on *Safety and Security in Housing Design: A Guide for Action*. This guide focuses on how to improve security in housing estates, particularly focusing on the design and remodelling aspects, but also incorporating a wider range of non-physical measures, whose contribution to the success of the whole is emphasised.
SYNERGISTIC APPROACH TO SECURITY IN HOUSING DESIGN:

The multi-agency package includes some or all of the following:

- **Target Hardening:** Better locks; stronger doors; entry phone systems;
- **Target removal:** Cashless shops; regular transport;
- **Formal surveillance:** CCTV, beat policing, security guards, caretakers;
- **Natural surveillance:** Neighbourhood Watch; regular pedestrian traffic;
- **Environmental Design:** Remodelling blocks and estate layouts, improved lighting;
- **Environmental Management:** Improving management of services and facilities;
- **Diversionary Schemes for Young people:** play and youth clubs;
- **Community Support:** Financial and administrative support for community organisations.

(Source: IoH and RIBA: 1989)

FIGURE 2.2.4 MULTI-AGENCY CRIME PREVENTION STRATEGIES
The range of preventive measures mentioned (see Figure 2.2.4), includes improving the quality of social and recreational provisions for children and young people, home beat policing, transport services, street lighting, support for community organisations. Management policies for public housing with respect to allocation; repairs; voids, tenant participation, neighbourhood disputes etc., need to be considered in the light of their effect on security, as well as the role of management staff, caretakers, concierges etc. Tenants and agencies should always be involved in the process. Safety and security, it is argued, is linked with the quality of life on an estate, and assessing crime problems accurately is crucial in order to identify an appropriate package of measures.

The guide focuses on the role of the architect and on the physical security and design requirements of different types of housing. A series of six case studies, illustrates how different problems are addressed in different ways. The case studies cover a broad range:

- **Basic security improvements**: to a house in a suburban estate; a small private culs-de-sac scheme (new build); and a tenement block co-op scheme in Glasgow. Improvements focus on basic target hardening measures (secure locks, windows, frames; burglar alarms; time switches;) and looking out for neighbours.

- **Extensive layout improvements** to two lower density suburban estates of the sixties, outside Liverpool (Radburn type) and in Wirral (garden city/mixed development). Layout modifications include: reducing pedestrian paths and eliminating back access; concentrating access to roads and culs-de-sac; turning round dwellings (back to front) to face other dwelling fronts; intensifying use and surveillance on the culs-de-sac where access is concentrated; adding buildings at the top of culs-de-sac; relocating garages; adding new terraces on open disused communal green stretches; building up the central area of Woodchurch estate in Wirral; improving and refurbishing tower blocks, in combination with surveillance / caretakers; and new allocation polices to exclude difficult tenants.

- **Extensive remodelling** of a 'streets in the air' scheme, Chalk Hill Estate in Brent, London (a deck access estate with minimal surveillability, which also had the most serious crime problems). Security improvements were phased into two stages:
  a. general improvements and target hardening (steel doors; entry phone systems) blocking the interconnections between blocks at each level, partitioning buildings.
  b. in the second stage (limited to four blocks with intensive tenant involvement), walkways were demolished, and access limited to one vertical circulation core; an expensive CCTV surveillance system was installed with additional concierge. Whilst
first phase results were not good, since the entryphone system was often out of order, wedged open or easily tampered with, in the second phase, crime and vandalism were practically eliminated. Home beat policing was also employed.

Based on the evaluation of the success of implementation of the physical and non-physical measures and the results thereof, the following 'lessons' are learned:

- tenants need to be consulted and involved, otherwise effort and money can be wasted; entryphone systems alone do not necessarily work.
- security measures not only have to be installed, but also used properly.
- when the layout is problematic, efforts need to be concentrated on restructuring the environment: to reduce accessibility by potential criminals; avoid screening, for criminals given time will work their way through any security installations;
- security installations need to be reviewed as part of a programme of regular maintenance and being prepared to make adjustments;
- physical security design need to be combined with back-up services from the landlord; police; youth services; voluntary organisations and residents.

The guide's main conclusion is that there is no set of golden rules to be applied in all cases: "Each site calls for a specific set of actions based on an assessment of its vulnerability" (op. cit. p. 45). The physical measures include the state of the art in design against crime: combining A Coleman's recommendations (discussed in section 2.2.3) and Poyner and Webb's (1991) recommendations for low-rise suburban estates. A global view of the efforts required is presented, providing insights on the management involvement necessary; the funding schemes and policy options; and how the concert of agencies can, and in many cases needs to be involved in order to achieve successful results. The guide is well written and broadly informative, though clearly more theoretical insights and detailed design guidance would be required for the practising architect.

The authors strongly emphasise the need for more security awareness from the point of view of designers, and the profession as a whole; however, the main problem with the multi-agency approach is that it shifts the emphasis away from the relationship

---

70 Based on a study of crime in suburban housing areas, Barry Poyner and Barry Webb's (1991) Crimefree Housing makes design recommendations for improving the suburban estates layouts. Though it focuses on low-rise/low-density areas and does not address urban housing schemes, the principles of increasing security (reducing accessibility and increasing surveillability) are reinterpreted for this purpose. These include: intensifying use and surveillance of roads (culs-de-sac) for access; turning houses round to face each other; reducing access; removing houses from busy streets; eliminating paths at the back of houses. The study distinguishes between pedestrian and vehicular access in the case of burglary, since burglars with vehicles, can carry heavier and bulkier goods, whilst on foot, they necessarily would have to carry light stuff: cash, credit cards, jewellery etc. Findings suggest that vehicular access creates risk.
between crime and space and crime and design, to a series of combined tactics, without necessarily being able to discern the performance of each.

**Summing up**, the synergistic approach is a result of the effort and limited results of the social engineering approach. As mentioned earlier, the main outcome of Newman's (and later Coleman's) work is the awareness that physical design does have a role to play in crime prevention, in conjunction with other agencies: the community; the police; and in housing estates - the management. The reasons for lack of results in design improvements are diffused and the roots of the problems obscured. The relationship between crime and design is unresolved, and remains unclear in the minds of the administrators, policy makers, and architects. One of the key reasons is the continuing influence and confusion about 'defensible space'.

Considering the four approaches with respect to analytic and prescriptive emphasis, one finds that:

- **Target hardening** is strong on analysis, based on criminological insights about restricting accessibility and increasing surveillance; strong on prescription, based on common-sense; but also sophisticated where necessary in terms of advice on security practices.
- **The Social Surveillance approach** (Jacobs) is in some ways strong on analysis (due to significance of observations), yet weak on prescription. It is vague, on how to achieve a lively healthy street life and neighbourhood, and lacks global view.
- **The Social Engineering approach**, based on notions of territoriality and the capacity of design to manipulate behaviour, is weak on analysis, yet strong on prescription, hence the appeal to the authorities in spite of obvious weaknesses.
- **Finally**, the synergistic approach is weak in both analysis and disorienting in prescription. Although well documented in parts, the multi-strategy approach offers a range of measures with little systematic understanding, yet is overly specific. This is due to the overall fuzzy connections between the range of strategies, and the inability to monitor what is responsible for what effect. The actual link between the environment and crime remains unclear.

Each approach appears to have its advantages and disadvantages. With target hardening one really cannot go wrong, minimum assumptions are built in apart from the basic principles of vulnerability: **accessibility and surveillability**. Basic security is indispensable for every individual household's shell. However, once this attitude is extended beyond the individual dwelling boundary to that of the building block, there is the danger in giving a false sense of security depending on technology etc., which is actually relatively fragile unless there are **people** - committed tenants.
or staff - who will make sure the access control systems are really effective. This in effect brings us to the premise of the social surveillance approach. The main problem here, however, is how does one design 'streets' which are lively with people who will care about their environment? This is all very well in traditional neighbourhoods, but what about the new areas without established community ties? Defensible space addresses this question, but provides a theoretically dubious answer. Behaviourism has long been abandoned. With defensible space, the notion of access control is stretched further to encompass a whole estate, yet there appears to be an increasing conflict, between the need for presence of people, as Jacobs argues, and the need to be able to maintain supervision - surveillance through access 'control'. Without the behaviourist assumption (that environment has an effect on human behaviour in a predictable way), 'defensible space' appears to crumble. Although the problems of anonymity due to the problems of the large scale; the importance of surveillance; and the importance of normal street life - presence of people - are identified, 'defensible space' theory and prescriptions clearly fail to provide the answers, advocating solutions that are often contradictory to the principles of protection. The controversy, whether accessibility - more people/traffic and 'strangers' - encourage vulnerability (Newman) or safety (Jacobs), remains unresolved.

Finally, in reaction to the above, the synergistic approach, as a last resort for authorities under increasing social pressure to tackle the problem of victimisation, spreads the responsibility and diffuses the problem. A more responsible view would be to acknowledge the lack of systematic knowledge on the relationship between housing design and crime and press for more rigorous research to provide insights on the design of less vulnerable environments.
2.3 Crime and Space: Environmental Criminology/ Situational approach:

The third part of the literature review, looks at the relationship between crime and space as viewed from the criminological point of view. This basically involves the relationship between man and the environment from the victims' and the criminal's perspective. In the attempt to understand the relationship between crime and design, i.e. understand what spatial vulnerability involves, the review seeks out the insights gained through the developments in environmental criminology in the eighties, which appear to make way for a new paradigm. The new approach to the problem of crime focuses on the crime event - the place and situation of crime - rather than the social political and environmental causes. Apart from the obvious advantages this approach offers for crime control and prevention from a policy point of view, this approach is a more fruitful perspective from which to study the relationship between design and crime.

Paul and Patricia Brantingham (1981: 7-8) name space the fourth dimension of crime "a discrete location in time and space at which the other dimensions intersect and a criminal event occurs". Environmental Criminology deals with the study of crime from this last perspective. This includes the study of physical characteristics of the crime sites, offenders movement patterns in relation to their targets; perceptual processes that lead to the selection of crime targets/sites, all of which are related to the built environment in important ways.

In parallel to the above, the situational approach to crime prevention in Britain developed at the Home Office Research and Planning Unit, similarly focuses on the situational (physical and social environmental) factors, which affect the selection of crime targets and opportunities for crime. In Designing Out Crime edited by R.V.G. Clarke and P. Mayhew (1980), a series of studies presents the issues with which situational crime prevention is concerned:

- highly specific forms of crime;
- the manipulation (by management or design) of the immediate environment in which crimes occur, in a systematic and permanent way as far as possible;

Ohlin et al. (1971) introduced theoretical concepts in an article on crime opportunity and the situational perspective. See Bennett and Wright (1984) who give a detailed account of the development of the approach.
ENVIRONMENTAL CRIMINOLOGY AND
THE SITUATIONAL APPROACH

Victims

Victimisation of individual households
(Maguire; Walsh; Winchester & Jackson)

Patterns of risk:
Areal distribution of burglaries
(Repetto; Scarr; Waller & Okihiro)

Part
(Local)

Target Selection
Criminal's mobility; activity/awareness space
Burglars modus operandi
(Bennett and Wright; Maguire; Repetto)

Whole
(Global)

Distribution of Criminal's residence;
Collective awareness space
Criminal's activity maps
(Brantingham & Brantingham: 'Crime Temp ates')

Criminal

Figure 2.3: Criminological Approaches to Crime in the Environment.
• the reduction of crime opportunities, as these are perceived by potential offenders.

In spite of the differences in emphasis and origin of these approaches, the first more theoretical, the second more practical and policy oriented, both have a common denominator, they examine:

• criminals' spatial patterns: the target selection process as an aspect of the man-environment link from the criminals' point of view (subjective patterns);
• spatial patterns of victimisation: studying specific crime locations in the environment and the characteristics of the victims (objective patterns).

Furthermore, the patterns of crime risk (or vulnerability) arise from a relationship between man and the environment at the level of the individual, and at the level of the collective; which also relates to a local and global view of vulnerability.

Criminological studies can thus be seen to adopt one or more of the following approaches (see figure 2.3):

A. Focusing on the large scale: the 'objective' result of the collective criminals' spatial behaviour/activity and victimisation patterns (global factors):
• collective offenders patterns: examining patterns of activity; location of criminal residences; crime templates (target selection process / criteria);
• collective offence patterns: distribution and global factors of victimisation; victims/offence characteristics studied on a global scale;

B. Focusing on the small scale: the specific offender/offence/victim:
• the individual offender: criminals' spatial behaviour: perceptions; movement in space; target selection, mode of operating;
• the individual victim/offence: the characteristics of specific offences; victims and victimised locations;

Within the umbrella of environmental criminology, studies of criminal mobility patterns, perception of the environment, as well as the target selection process, shed light on the principles of the patterning process, particularly adding valuable insights on the aggregated criminal's perspective, as to what clues to look for when examining vulnerability, based on the perpetrators' view of the environment. With respect to the

72 In the introduction to Designing out Crime by Hough, Clarke and Mayhew (1980: 5-10) the measures presented include. * Target hardening; * Target removal; * Removing the means to crime; * Reducing the pay-off; * Formal Surveillance: * Natural surveillance; * Surveillance by employees; * Environmental Management;

73 Environmental Criminology draws on other fields such as: behavioural geography - using for example Golledge and Rushdon's (1976) theory about perceived components of environments in their introduction to Spatial Choice and Spatial Behavior; also environmental psychology; architecture and planning - eg. Kevin Lynch's (1961) mental maps.
global spatial distribution of offenders and offences, the areal studies of crime have considered the spatial dimension more as a geographical backdrop for the projection of socio-economic factors (particularly in traditional criminological research). Although crime patterns at the global scale tend to be abstracted from physical factors, the spatial element becomes increasingly real, when one starts to deal with crime specific studies at a more local level. Studies of specific types of crime, burglary in particular, which is the most location specific crime, have shed considerable light on both local and global spatial perspectives. Burglary has been the object of a number of focused studies on the mechanisms of victimisation and vulnerability including environmental risk, and on the target selection and burglar's mode of operation.

Thus part three of the literature review is divided into two sections:
1. The first section will deal with the more theoretical insights of environmental criminology: basic concepts and principles of criminals' spatial behaviour-mobility; target selection and opportunity. It covers the relationship between individual criminals and the collective criminals' patterns as well as the relationship between the space of the latter to the victims' space.
2. The second section will focus on the specifics of spatial vulnerability with respect to burglary, seen from three perspectives/approaches:
   i. The global patterns of burglary: investigating the areal distribution of burglary offences;
   ii. The local patterns of burglary victimisation: characteristics of victimised households;
   iii. The burglars criteria of vulnerability derived from interviews with convicted offenders (on site selection/ mode of operation).

2.3.1 The Criminal/s and the Environment: Spatial Patterns of criminal behaviour/ opportunity

The concept of crime opportunity was used in the CPTED programme (Wallis and Ford, 1980) discussed in the previous section. In the situational approach, Hough, Clarke and Mayhew (1980, 5) adopt a broader notion of opportunity relating the concept to two things: the material conditions in which a potential offender is able to commit the crime (and the inducement); and an element of chance: "criminal opportunities exist not only where the material conditions are present, but where benefits can be gained at low risk". Chance however is a subjective assessment, provided by objective conditions. In order to understand opportunity, one needs to understand the offender's perception thereof.
Target Selection: Crime Templates:

Brantingham and Brantingham (1978: 105-118) propose a basic model of target selection, which examines the process of searching out a target or victim as a sequence or series of spatial decisions, in which the objective environment is perceived (recognised) and evaluated by the offender. This involves the following propositions:

• Given the motivation to offend (which differs in terms of sources, strength and character), the actual commission of the offence is the "end result of a multi-staged decision process, which seeks out and identifies, within the general environment a target or victim positioned in time and place".

• The environment "emits signals or cues" about its physical, spatial cultural, legal and psychological characteristics.

• The person motivated to commit a crime uses cues (learned through experience or through social transmission) from the environment to locate and identify targets or victims.

• As experience increases the criteria, the person motivated to offend learns, which individual cues and clusters of cues are associated with good or with bad targets. These cues, in clusters or sequences, can be considered to form a template, which is used in target selection. This may be conscious or unconscious patterning of criteria; however, once established this becomes relatively fixed and influences future behaviour, generally self reinforcing over time.

• Theoretically, multiple crime templates could be constructed for different targets or individuals. However, due to the fact that the spatial and temporal distribution of offenders and targets/victims is clustered or patterned, on the one hand, and the fact that human environmental perception and space use/movement have universal properties, between individuals crime templates have common properties, which can be identified.

Brantingham and Brantingham (1981, 1984) further add to the notion of 'crime templates' - as a model for target selection involving the patterning of perceptions of environmental opportunity - more spatially specific concepts of offenders' behaviour: - mobility; - distance perception, 'activity space'/ "awareness space"; and cognitive maps linked to Kevin Lynch's (1961) mental maps of city. The theory can be summarised as follows:

74 For more detailed discussion and references to studies see Brantingham and Brantingham (1984: 338-44) 'Patterns in Crime'.
Criminals Mobility and Spatial Behaviour Patterns:

Brantingham and Brantingham (1981: 27-54; and 1984 : 344-58) argue that the selection of targets and crime occurrence is highly patterned at the micro-environmental level of a city. Potential offenders do not scan the whole city indiscriminately for targets, but focus on areas within their more restricted "awareness space". Empirical evidence in criminology suggests that most offenders commit their offence close to home, though both "close" and "home" varies by offence, city and individual, as well as the means of transport. The distance-decay model in human spatial behaviour is well established, and can be observed with respect to the patterning of offences for almost all types of crime.75 The reasons for the reduction of activity with increased distance is the result of biased spatial knowledge, and the natural process of starting a search near one's base. This is slightly countered/balanced against the risk of being recognised/ risk of apprehension, so that the immediate space around the criminal's home base is too risky (Turner, 1969).

The distance decay model is modified by two main issues, which relate to the perception of distance and the construction of criminal's mental maps of the city:

- **Distance Perception:** Patterns of movement away from the home base depend also on the perception of distance, not only the actual distance. Research has shown although there is a relationship between the two, the distance perceived is different to actual distance. The issue is rather complicated. Distance perception is distorted - influenced by subjective factors particularly familiarity (Lee: 1970; Briggs: 1973). Real distance poses problems for measurement, since it can be defined either as "shortest-line" distance or "travel route" distance, and generally both have been used in research to date. Finally, other criteria such as: time (a three-mile walk seems much longer than a three-mile drive; Straight routes seem shorter than the same distance with many turns (Sadalla and Staplin 1980 a and b). D. Stea (1969) summarises the factors which affect distance perception as follows:
  - Relative attractiveness of origins and destinations;
  - Number/type of barriers separating points (from which distance is measured);
  - Familiarity with routes;

---

• Actual geographic distance;
• Attractiveness of routes;

The distance decay model has to be modified to accommodate the above criteria, therefore it is mainly the perceived distance that counts.

• Activity space - Awareness Space: Criminals' mobility is not necessarily restricted to the area around the residential base, but is structured around activities, which take place in time and space. Studies have shown that various groups of people have relatively regular activity patterns, in how and where they spend their time, and how much (Chapin and Brail: 1974). Thus a criminal will spend most of his/her time on normal activities: shopping; entertainment, home; neighbourhood; and school for young criminals. Activity space is therefore made up of the locations that the individual uses most frequently, which obviously will include areas familiar due to other interests; family; business - shopping and work; hobbies etc.

Furthermore, Brantingham and Brantingham argue that people's knowledge of a city is greater than their habitual paths and frequent destinations. People's awareness of areas is extended around these paths and destinations. It depends on the mode of transport, which allows more detail - if on foot; and less detail - if on public transport or motor vehicle (Lynch and Rivkin 1959; Lynch; 1960). Awareness of space, perception of the city and memory is also affected by the actual physical arrangement (Appleyard; 1969). Research suggests that urban locations stand out and are remembered when they are highly visible; have high intensity of use; and are located at breakpoints with other land uses.

• Crime-Occurrence Space:

To sum up the above, Brantingham and Brantingham (1984:349-55) argue that criminals' spatial behaviour is predictably limited by their awareness space, based on their activity space (which is also restricted). Their search for targets falls within this awareness space, and decreases in intensity as distance increases from their normal activity space. Criminals residences and criminal mobility tend to cluster around the same areas. Aggregating criminals spatial behaviour/ awareness spaces gives a pattern of probable distribution of offences.

76 Appleyard; (1969) in a study 'Why Buildings Are Known' rated buildings with respect to Form intensity; Visibility; Use significance - finding that buildings best known or remembered had much movement, unique in contour shape size, surfaces: ie. High visibility; Use intensity and singularity of use make buildings more memorable.
This is further affected by the distribution of opportunities in urban space - "opportunity space" (eg. near commercial areas; around low income public housing etc.)\textsuperscript{77}. The shape of the overall pattern then depends on the concentration of housing, shopping; entertainment and work locations. The intersection between criminals' awareness space and opportunity space is, where the critical areas of crime occurrence are. Research into the patterning of property crimes provides support for the above model\textsuperscript{78}.

* **Good/ bad targets: The risk /payoff scale:**

In the search for suitable targets in the offender's awareness area, not all potential targets are equally "good". The evaluation is at least based on the assessment of what risk is involved, or the difficulty of actually succeeding. As discussed later, in the case of burglary this means how easy it is to get in unobserved and get out without being caught. A further risk is the probability of being apprehended by the occupier of the dwelling (in robberies the probability of someone interfering etc.). The risk assessment has to be weighed against the likely pay-off, in the case of burglary, what goods might be stolen, the value of the target, since not all goods in a house are worth stealing or convenient to carry.

\textsuperscript{77} Brantingham and Brantingham's (1981) Environmental Criminology amplifies the a model of target selection first presented in (1978) with a model of how, the distribution of opportunities for criminal acts, as well as observation on offenders' and non-offenders spatial behaviour, actually affects the patterning of crime.

\textsuperscript{78} Morris's (1957) study of Croydon found that delinquents committed their crimes close to home or near the central shopping area. A similar finding was reported by Rengert (1975). Thomas Reppetto (1974) in his study of residential burglary in Boston, found in interviews with burglars that the majority committed their offences in neighbourhoods they knew from experience rather than the expensive neighbourhoods they did not know, although the rewards (target value) would be higher. Funk (1969) in a study of burglary locations in a German city found that out-of-town burglars tended to commit burglaries near major highways, in areas that would be in the limited awareness space of non-residents. Luedike (1970) in a study of robbery and burglary in Detroit found a mild diffusion pattern of crime reaching 1-2 blocks into residential areas adjacent to shopping and entertainment centres or strip commercial and industrial areas. Another study on burglary in the suburbs of Philadelphia by Rengert and Wasilchik (1980) found similar correspondence between travel paths and crime locations. Rengert found that few burglars strayed far beyond their normal travel paths, and when they did it was usually along an extension of the usual travel path, or just beyond the usual destination point.
Motivation versus Opportunity: Issue of Displacement;

In spite of the valuable insights offered by the situational approach to reducing crime through reducing crime opportunity, there has been disagreement about the limitations of the implementation policies due to the problem of displacement (Repetto, 1976). Thus it is argued that situational prevention does not actually solve the problem of crime it merely shifts it around, since criminals will simply select other targets, in other areas, or divert to other types of crime. Opportunities will be sought elsewhere, therefore no real reduction in crime will result. Hough, Clarke and Mayhew (1980:10-12) argue that displacement is not an "all or none phenomenon"; there is a portion of opportunistic, spur of the moment crime that can be eliminated particularly the kind of unplanned, petty crime carried out by non-'professionals', and youths on housing estates 79.

Studies have shown that the problem of displacement has been overestimated (See also B Poyner, 1980a and 1986; D Cornish and R Clarke, 1986). Trevor Bennett (1986) investigated the validity of the theoretical assumptions of the situational approach80 in a study which found, that whilst the motivation to offend is seldom influenced by physical situational factors - it is frequently influenced by social, cultural and economical - the decision to commit a specific offence, is influenced by physical opportunities; however, some displacement is to be expected81.

---

79 Hough et al. (1980:10-12) argues that dispositional factors (the notion that criminals have a fixed intention to break the law), are distorting or misrepresenting the situation; based on stereotypes of criminals whose raison d'etre is to break the law.

80 In the research study carried out by Bennett and Wright (1984) based on series of in depth interviews with convicted burglars in relation to burglary two basic assumptions were tested:

• That the decision to commit a crime is made in response to immediate circumstances and the immediate situation in which the offence is contemplated - which also includes the physical environment.

• That motivation to offend is not constant nor beyond control, but depends on the cost/rewards calculation rather than general criminal disposition or nature.

The study showed that the vast majority of offenders decided to offend before the target had been selected (which partly refutes the idea of "opportunistic crime" as spur of the moment crime precipitated by the opportunity given). This implies that the term situational factor can be defined to include a wide range of conditions, which might influence the decision to offend, physical or nonphysical, synchronous to the contemplated offence but also prior to that social cultural and economical. The decision to offend is ambiguous, as it is rarely the result of one decision, but involves many decisions between the original motivation to offend and the final decision to commit an offence against a particular target.

81 This lends support to the argument that situational prevention at that level can be effective in reducing opportunities to commit, but not in reducing motivation. The study also found that motivation to offend is capable of being suppressed or deferred; displacement can be observed in most cases in type; place or time.
Having dealt with the theoretical framework of vulnerability, one can begin to look at the specific problem of burglary, in many senses the most suitable type of crime for the study of environmental factors affecting vulnerability - victimisation risk and target selection. Burglary is a property crime related to land-uses - residential or non-residential e.g. against commercial; educational establishments. etc., though this thesis focuses on residential burglary only. Mike Maguire (1982: 6) defines the term 'Burglary in a Dwelling', a subcategory of 'burglary' or 'housebreaking', as an offence defined under Section 9 of the Theft Act 1968, which covers all forms of illegal entry into buildings with intent to steal or to commit other named offences such as bodily harm unlawful damage, rape a.o.

A considerable body of research has accumulated since the nineteen seventies, on the patterning of burglary offences. In N. America there have been:

- Large scale descriptive studies: such as Harry Scarr's (1973) study Patterns of Burglary, in three adjacent counties including Washington DC.; and Thomas Repetto's (1974) Residential Crime, study of burglary and robbery patterns in Boston;
- Policy-oriented studies: such as I. Waller and N. Okihiro's (1978) Burglary: The Victim and the Public, focusing on victimisation patterns in Toronto, Canada.
- Spatially focused studies on burglary patterns: such as Brantingham & Brantingham, 1975 study of burglary and urban block form in Talahassee ; and Barbara Brown (1985) study of environmental/territorial cues and burglary risk in suburban houses in Salt Lake City.

In Britain, a number of relatively smaller scale studies were published in the nineteen-eighties:

- Descriptive studies of burglary and burglars: e.g. Dermot Walsh's (1980) Break-ins: Burglary from Private Houses in rural Exeter; Mike Maguire's (1982) Burglary in a Dwelling (with T Bennett) in the Thames Valley area.
Although the majority of research studies employ a combination of approaches, there are differences in emphasis: a) focusing on patterns of burglary: at the large scale, and shifting increasingly to the local scale of situational characteristics of victimised households; and b) focusing on feedback from the burglars' perspective. The North American studies, particularly Repetto's study of burglary patterns in Boston and Waller and Okihiro's study of burglary victimisation in Toronto tend to be large scale and have an urban focus, in contrast to the British studies, dealing with smaller scale urban, suburban and rural burglary patterns. Maguire's study based on official crime statistics; reported burglaries in the Thames Valley area; and interviews with victimised households and with burglars is considered the most comprehensive. Winchester and Jackson (1982) probe more into dwelling vulnerability issues in their study of victimisation patterns, including factors of access and surveillability, in predominantly rural areas of Kent.

Comparing and combining all perspectives offers a more complete picture of burglary, with insights which thankfully overlap to a large degree, though not without discrepancies.

A. **Spatial distribution of burglary offences: Factors affecting victimisation at the global scale:**

The spatial distribution of burglaries varies across rural, suburban and urban areas, as well as within urban areas. All studies agree that burglary is mainly an urban problem. (Brantingham and Brantingham, 1981 and 1984; Scarr, 73; Maguire, 1982; a.o.). Generally speaking areal studies of burglary have given support to the well-known Chicago-Model (Shaw and McKay, 1969) of decreasing crime rates.

---

82 Focusing on a representative sample of 39 out of 824 police reporting areas (coinciding with Boston's Standard Metropolitan Statistical Area units), Repetto studies the relationship between burglary and robbery patterns and key social variables (race; income; house type). Furthermore he examines the behaviour patterns of criminals and the characteristics of victimised households based on both a household/victim survey and interviews with 97 burglars.

83 Waller and Okihiro's (1978) study is based on a random sample of burgled dwellings from police records (5428 burglaries in 1971 in Metropolitan Toronto), combined with 1971 census data; and victim interviews (reverse record checks) 67% of sample = 1665 interviews. Also intensive sample consisting of 116 victims and 309 nonvictim questioned about fear of crime, attitudes etc.

84 Maguire's study focuses on three subareas: Rural: Banbury and surrounding villages; urban: Reading; and wealthy commuter belt 'Gerards Cross'. Police data for a year (1975) were used to analyse burglary incidents, from which samples of victimised and nonvictim households were drawn; followed up by (322) interviews with victims; and 40 interviews with convicted burglars.

85 Winchester and Jackson (1982) focus on four adjacent subdivisions within the Kent police area (Maidstone, Tonbridge, Malling and Sevenoaks) with 920 recorded burglaries equivalent to burglary risk of 1/99 well below average for England and Wales of 1/65 in 1979. The research is based on a general survey of a random sample of households, an intensive sample comparing a random sample of 309 non-victim, with a random sample of 116 victimised households.
from the city-centres to the suburbs particularly in the American context (Waller and Okihiro, 1978; Repetto, 1974;) with some discrepancies. Repetto finds that few central areas are exceptions with low burglary rates: either areas with luxury apartment blocks with high security; or in the case of North-End, areas with strong community and homogeneity (described by J Jacobs, 1961). In the British studies however this pattern is disrupted, as for instance in Sheffield (Baldwin and Bottoms, 1976, Mawby, 1979), by the existence of council estates with high crime problems on the periphery of cities86.

In the ecological tradition of research (Shaw and Mackay 1942/69), high crime has been associated with specific socio-economic and environmental characteristics of central urban areas: low income; multi-racial mix; high youth population; unemployment; housing type; and overcrowding. These have been seen as 'criminogenic' ecological factors, population characteristics that measure deprivation, poverty, transience, high mobility and social disorganisation - found in deprived areas of the inner city. However, there has been considerable confusion in ecological studies and areal studies between factors which relate to high rates of offenders and high rates of offences in the urban environment, due to the spatial overlap of the two perspectives87.

More specifically, global factors affecting the burglary rates of an area have been identified as:
- **Affluence/Deprivation**: at the extremes of income and class scales; mainly socio-economic characteristics of deprivation, but also of affluence/high target value88.

86 Studies in Sheffield (Baldwin and Bottoms, 1976, Mawby, 1979) found that social class and tenure type are the most important factors associated with the variation crime rates. The highest burglary rates were found in an area where 70% of population lived in privately-rented housing. Council estates - particularly a pre-war estate to the north of the city with a local reputation as a 'problem area' were also prominent, although there was considerable variation among them. Middle-class suburban housing suffered less crime.

87 Even in the work of Shaw and Mackay (1969), there is an underlying assumption that descriptive characteristics of areas with high proportions of resident offenders described both the areas where crime control measures should be undertaken and the individuals who were likely to commit crimes. This is termed as ecological fallacy, see: Brantingham and Brantingham, 1981:17-18.

88 Repetto finds (1974: 34-44) that burglary rates increase with the percentage of non-white population and the percentage of population under 18; and decrease with median income of an area, except at the extremes of the income scale- the affluent suburban and poor predominantly non-white areas where it increases again. Burglary rates correlated strongly with those of surrounding areas. He also found some correlation between percentage of multi-unit housing structures (excluding luxury apartment blocks) and high burglary rates. The strongest correlations were between burglary risk and race (probably influenced by covariance with % youth population and income), and surrounding burglary rates - an indication of geographic location - or socio-economic continuity. Waller and Okihiro find that high percentage of male population over 15, and single, is the best predictor of high burglary rates, as are the percentage of households with lodgers and the percentage of unemployed. While high percentage of owner occupation and single detached dwellings relate to
• High racial mix; and high youth population; (often combine)
• Adjacency: proximity to high crime areas.
• Tenure type (type of housing): Baldwin and Bottoms (1976) find this the strongest predictor of burglary rates in their study of Sheffield.

Maguire (1982), argues that urban areas have higher crime rates than suburban and rural areas, unless the household is very wealthy, and is within reasonable reach of a large urban area (eg. Gerrards Cross, part of the 'stockbroker belt' around London has a burglary rate higher than the London average); or unless these are high problem estates on the periphery of cities\(^8^9\). It is both who you are and where you live that counts. Those living near council estates or poorer housing areas are more at risk, especially near the town centre. Pockets of particularly affluent middle class housing on the outskirts of towns also often have high burglary rates (eg. Ascot, Sunningdale).

Within urban/suburban area units, differences are often concealed. At the global level of analysis, apart from the urban factor (density of coexistence of criminals and potential victims) and the 'neighbours' factor, the spatial distribution is merely a projection of socio-economic population variables. Space is seen as a geographical reference system, devoid of real physical properties.

• Local factors of Victimisation- Burglary Risk:

In the attempt to describe victimisation/ risk patterns, at an increasingly specific ie. local level of analysis, the methodology is forced to abandon 'areas' as units of analysis and switches the individual blocks and to the individual household\(^9^0\). Thus factors associated with burglary risk are seen from the individual victims perspective at an increasingly local level. At this level, inevitably the dwelling location becomes important, space comes into the map.

---
\(^8^9\) Ample support for this is found in the literature. North American studies, (Cohen and Cantor 1981; Waller and Okihoro 1978) have suggested the highest concentrations of burglary are in or close to socially disadvantaged housing areas. Baldwin and Bottoms (1976) in Sheffield found most burglary in run-down poor private rented areas with terraced housing, and some council estates. Tuck and Southgate (1981) in Manchester found far higher burglary rates in council flats to the north of a particular subdivision, than terraced housing to the south.

\(^9^0\) In most studies an intensive sample of households is selected and first hand data collected via surveys.

91
In the studies by Repetto (1974), Waller and Okihiro (1978) and Maguire (1982) etc., variations in burglary risk of households/areas have been related to:

- **affluence**: income / target value: risk increasing with target value but also with low income - at the extremes of the income scale;
- **geographical location**: close relationship to burglary rates of neighbouring areas - risk increasing by juxtaposition to high crime areas;
- **occupancy patterns**: length of time a dwelling is left empty;
- **environmental 'vulnerability'**: neighbourhood, physical location and housing design features

However, there is some confusion with respect to the relative weight of social and spatial factors affecting the patterns of risk as well as between global and local factors. Findings for example on the relationship between burglary rates and income/social class (affluence) and have been relatively contradictory: since risk increases with income - high target value; it decreases with increasing median income of an area, increasing at the extremes of the income scale. There is an interrelationship between factors and a certain trade-off between them.

Repetto (1974) finds that, whilst the distribution of burglary rates is affected by the relationship between income, geographic location and 'vulnerability'; the relative weight of these factors, varies depending on the type of area: offenders generally tend to select the most affluent targets within an area, however, in the poorer areas 'environmental vulnerability', which will be discussed in the following paragraphs, is the key factor influencing burglary risk. Similarly, Waller and Okihiro (1978: 63) find that the way individual targets are chosen varies by type of area/and location: In the poorer areas of Toronto, the only significant factor distinguishing victim from non-victim households is the length of time the house is normally left empty every week (occupancy). In the areas away from these poor areas, the most significant predictor is household income.

The argument here is, that in poorer areas where burglars usually live, burglaries tend to be more local and 'opportunistic'- indiscriminate according to the investigated social criteria. In middle class areas (and suburbs) more discriminating offenders seek out the most promising targets in terms of rewards.

---

91 See brief review in Maguire (1982: 19-21).
92 A complex environmental factor including degree of access; visibility, occupancy, social cohesion etc. which will be discussed in detail in the following pages.
Environmental vulnerability:

Influenced by O. Newman’s work, several studies attempt to investigate the 'opportunistic' burglary risk factors by incorporating notions of the defensible space theory on access and surveillance, which reflect 'environmental risk' or physical vulnerability. Security precautions, (including the care taken in locking up), and the precise physical siting of the dwelling: the physical characteristics of the dwelling and its location, are also taken into consideration. This subsection examines the research findings of some key studies (Repetto, 1974; Waller and Okihiro, 1978; Winchester and Jackson, 1982; Bennett and Wright, 1981; 1984).

i. **Thomas Repetto** (1974): first examines the relationship between predominant housing type and burglary rates and finds that areas with a high proportion of large multi-unit structures (excl. luxury apartment blocks) are more vulnerable. However as the author notes, research was "implied by the lack of a meaningful housing variable". In the household survey (and an intensive sample of victimised and non-victim households) Repetto examines five ‘opportunity factors’ defined partly from Newman’s hypotheses.

- Access or physical vulnerability: No clear pattern emerged from Repetto’s analysis of the relationship between pedestrian and vehicular traffic of an area unit (3 basic scales each) and crime rates, though due to the methodological limitations the differences between housing forms were not controlled or measured. (Only in areas with luxury high-rise/high security buildings was a relationship found). Repetto notes a contradiction in the data, which also exists in the crime and design literature: Some areas with mixed uses and heavy street use (notably North End, with a strong community of low-middle class Italians, described by Jacobs, 1961)- manifested low crime rates, while other areas with heavy street use, containing a mixture of cultural, academic and commercial facilities and mixed transient populations manifested the highest rates.

94 Repetto, (1974:42). This he suggests offers some support to Newman’s proposition that anonymity increases crime vulnerability. The variable used - proportion of dwelling units in buildings of more than 10 dwellings in an area is, however, too crude.

95 The first three are also dealt with at the level of building blocks within areas - victimisation of individual structures.

96 Although Ludike, Angel, and Newman agree that under trafficked interior grounds of housing projects are hazardous because they lack the informal surveillance of regular users, there is a contradiction between Angel (1969), who argues that pedestrian should be encouraged to traverse the grounds (in agreement with J Jacob’s approach), and Newman who maintains that overly accessible grounds will attract criminal elements and therefore pedestrians should be routed around border streets (Repetto, 1974: p.45).
- **Social Cohesion**\(^{97}\): Burglary risk was found to be inversely related to social cohesion though not significantly.

- **Occupancy**\(^{98}\): Areas with low occupancy had high rates, while medium and high occupancy areas showed much lower crime rates, though rates for individual areas within these categories varied (statistical significance not proven).

- **Visibility**: The impact of lighting is difficult to assess\(^{99}\), since residential crimes are by definition low-visibility crimes. Burglary however, as Repetto argues, mainly occurs at daytime- making the lighting issue irrelevant. Lighting should not be separated from other visibility obstructions; sharp shadows can also provide cover: “Overall the influence on visibility of such physical characteristics as landscaping, alleys, parking lots etc. appeared more critical in relation to residential crime than did the influence of lighting per se” (ibid. p.50). Although the relationship between these characteristics and burglary rates was found to vary considerably among the reporting area-units (RAs), most of the RAs with many dwelling entrances made unobservable by vacant lots, alley ways, shrubs or other obstructions, tended to display higher burglary rates and most of the RAs where portals could be easily seen, displayed low rates. Although these indications tend to confirm visibility’s role, measures on the basis of the area unit were again too crude, making it difficult to get significant correlations.

- **Police protection**: Patrolling is found to be of little actual effectiveness against residential crime. (1% burglaries discovered by police; 4% cleared up).

Studying victimisation at the level of individual buildings Repetto reports:

- **Door security**: Overall door security standards were low (8% only with recommended standards), but he also finds evidence of a negative relationship between door security and burglary rates, particularly in middle to high crime areas. That, he suggests, may indicate it is an effective deterrent in areas with mainly young unskilled burglars (op.cit. p. 68).

- **Access Factors**: Repetto found that in high crime areas, the presence of accessible windows had a strong effect on a dwelling's vulnerability, though this was not consistent in lower and middle crime areas. Furthermore he found a strong connection between burglary incidence and number of access doors to a multi-unit building (block). He notes that small multi-unit blocks are more vulnerable than other

---

\(^{97}\) Scores from a household survey with questions designed to establish local ties and attitudes (p.47-48) was used to measure social cohesion.

\(^{98}\) Measured in 3-scales: - high where over 60% of dwellings are unoccupied during day; - low: where over 60% of dwellings occupied; - medium: in between.

\(^{99}\) Repetto notes that although lighting is commonly assumed to constitute a major deterrent to crime, few studies have documented this assumption in much detail. (ibid., p.50)
types of housing since they combine the security disadvantages of both single family homes (multi-sided access) and large multi-unit buildings (nonvisible doors to dwelling units) (op.cit. p. 66-67)

- **Detection factors**: Considering doors as more 'inaccessible' and windows more easy but 'detectable', and the trade-off between the two, Repetto finds that in 172 surveyed cases with both options, 61% of burglaries are through doors and 39% through windows. He also finds that corner sites are more vulnerable (Repetto, 1974; 69).

Overall, Repetto finds no direct support for the defensible space approach, but strong indications that **accessibility and visibility**, along with **occupancy patterns**, do play a role. He points out the need for more in depth research, as well as the need for finer methodological tools, his research being hampered by the crudeness of his measurements in area units.

**ii** Waller and Okihiro (1978: 56-64): arrive at rather similar conclusions, although with different emphasis:
- **Social cohesion** was found to play a positive role in areas with houses, whilst a negative relationship was found with respect to apartments, therefore no clear relationship;
- **Occupancy** of dwellings (number of hours left empty per week), on the other hand, significantly distinguished victims and nonvictims for houses and apartments;
- **Surveillability**: victimised houses were found significantly less surveillable than nonvictimised houses.
- Increased security precautions only marginally distinguished victims from nonvictims; carelessness did not appear to play a role.
- **Corner sites** of houses did not seem to be more vulnerable, more important was **adjacency to 'public' land**.

---

100 In their study based on 116 interviews with burgled households in Toronto, against an equivalent sample of non victimised households Irvin Waller and Norman Okihiro tested out the defensible space factors. Social cohesion (measured as length/permanency of residence; local ties/friendship; willingness to intervene) was found to have a mild positive effect with respect to lower risk for houses, but not in the case of apartments.

101 Houses (only) were surveyed, and given a surveillability score from 1 to 4 (excellent surveillability) by interviewers taking into account the visibility of each accessible side, obstructions; distance to next residence and to the road etc. Difficult to supervise was determined as 2.5 or less. 59% of victimised houses were found to be 'difficult to supervise' compared to 36% of the non-victimised samples, with a score of less than 2.5. Surveillance became important only for dwellings which had scores above the threshold level of 2 on the scale (Waller and Okihiro, 1978: 56-57).
They conclude: "...our findings tend to reject the hypotheses of defensible space and accept those of Jacobs. A mixed block is less likely to have a victim ..". They also find the presence of doormen, as well as dwelling location on upper levels of high-rise blocks, relate to less risk (op.cit. p.60) and argue that this may well relate to the lower vulnerability of mixed blocks.

In short, Waller and Okihiro find that surveillability; the rate of occupancy; and inaccessibility of a dwelling; play the most significant role in reducing victimisation risk.

iii Stuart Winchester and Hilary Jackson's (1982): research study based on the Kent area focuses on situational factors in relation to burglary prevention102: 1. Target hardening (levels of security and burglary victimisation); 2. Vulnerability in the physical environment and occupancy patterns. Dwelling vulnerability is examined with respect to four factors identified as important in previous studies: - security (the extent to which a house is left insecure); - the reward value; - occupancy; and the characteristics of the site and location of the dwelling (environmental risk defined as accessibility and surveillability).

Site surveys included a number of specific measures related to: a. Access: ease of getting onto property; surrounding land use; degree of access from the front to the back of the house; type of road; proximity to nearest major road. b. Surveillance: proximity of house to other houses; opportunities for surveillance from these, visibility of the house from public areas; distance from the road; and road type.

Although the study area is not representative of the country - more typical of 'stockbroker' commuter belt around London, therefore strongly biased towards the more lucrative, rural burglary type with high target value- the findings provide significant insights with respect to the determinants of burglary victimisation:

- Types of houses: Detached houses were found to be the most vulnerable types of houses, whilst the semi-detached or short terraces were less

---

102 Study design: Analysis of security levels from random sample of households (general sample - 491 dw. (0.5% of all households) of which 6% had been burgled at least once in past (not same year). In second stage, the general sample was compared to 434 households victimised in 8.5 months in 1979 (reported to police). Households were surveyed on site, to measure environmental risk, with interviews to measure occupancy and security; and given rateable value (reward value) from valuation tables as Baldwin and Bottoms. The study concentrated on houses 458 general/ 413 victim households(excluding small proportion of flats!).
vulnerable; the least vulnerable were the long terraces\textsuperscript{103}. This agrees with findings in other British studies, notably M. Maguire (1982)\textsuperscript{104}.

- **Access and surveillance of houses**\textsuperscript{105}: The most important features distinguishing victim from nonvictim houses were found to be:
  - Set at a distance from nearest house (so that gardens are not overlooked);
  - Set at a distance from road (thus obscured from public view through the garden vegetation);
  - Majority of sides not visible from public areas;
  - Access from front to the back;

Location on a major road did not seem to be important, whilst location on a village lane did feature as important. This contradicts findings in other studies, notably, D Walsh, (1980) who finds, that middle class housing, located on or near main roads, is more likely to be burgled than similar housing, which is less directly accessible by passers-by. The features that did distinguish victim from nonvictim households, clearly reflected the two main factors of access and surveillability. Houses with high environmental risk scores had much higher burglary rates than those with lower scores.

Other victimisation risk factors:
- **Occupancy**: Victimised households were more likely to be left empty during the day, for several evenings or for over two weeks in the year\textsuperscript{106}. “Quite probably, the extent to which a house is left empty is important, not because a burglar analyses the patterns of absence of particular householders, but because it increases the chances that a burglar, who selects the house as a target for other reasons, will find it empty.” (p.17). However, the authors caution that biases are possible, due to the geographical clustering of burglaries, contributing to the ‘occupancy effect’.

\textsuperscript{103} The breakdown of victimised houses is: 50% detached (compared to 15% in gen sample); 31% semi-detached or short terrace (comp. 66%); Bungalow 16% (comp. 11%) Long terrace 1% comp. to 5% in gen. sample (Winchester and Jackson, 1982: 14).

\textsuperscript{104} Mike Maguire (1982: ) compares samples of victim versus non-victim households in the Thames Valley area and finds that detached houses are more vulnerable than semi-detached or terraced houses.

\textsuperscript{105} Based on environmental risk index (score 0 to 14) (p.39): Environmental risk was measured as an index of accessibility and surveillability, calculated on the basis of presence of each of the following criteria (access and surveillance variables): • Situation in country; • Isolated; • In a location with less than 5 other houses; • Road type: major town road or village lane; • Set at distance from access road; • location on nearest major road; • Housing plot not adjacent to gardens of other houses; • housing plot adjacent to private open space; • Access at both sides of house front to back; • Not overlooked at front by other houses; • Majority of sides of house not visible from public areas; • Set at a distance from nearest house; • Road frontage obscured from roadside.

\textsuperscript{106} Winchester and Jackson note that: “The most striking characteristic of burglary is that it usually takes place in houses, which have been left unoccupied. Of all the burglaries analysed, 80% took place in dwellings, where there was nobody in the house at the time.” while 26% of burglaries occurred when people where away on holiday. (op. cit. p.16)
Potential Reward (p.18-9): Target value (expected value of goods)\textsuperscript{107} was found to influence risk of victimisation, confirming results of previous studies. The authors note that, reporting rates are probably much higher (for insurance) in cases of more serious offences (high rateable value households), in contrast to a stronger proportion of non-reporting in cases of low value loss.

Security: was not found to play an important role with respect to risk. Victimised houses were not found at least equally well secured as nonvictim households (ibid.: 19-21); results from the general households survey in the Kent area, suggested that particularly during the daytime period, most houses have low security. Even where they were installed, security measures were often not properly used\textsuperscript{108}. Due to the clustering bias, insufficient conclusions could be drawn about the effect of security measures within high crime areas, though there were indications that burglar alarms have some effect. In the case of local authority housing, 50% of entries were made through an insecure window, compared to 18% of all other burglaries in the sample. In this case, basic precautions might be sufficient to reduce risk in council housing, where burglaries are predominantly low value, relatively low environmental risk\textsuperscript{109}.

Finally considering the relative importance of factors determining burglary risk, the authors found that \textbf{environmental risk} was the most important discriminating factor, followed by occupancy rates, and potential reward, while security did not seem to play a role here\textsuperscript{110}. The authors conclude that in the Kent study, two types of housing are most at risk: the large high rateable value detached house in the country, distant from other houses, not easily visible from public space and frequently left unoccupied; and the high rateable value house in town; frequently

\textsuperscript{107} A similar approach to that used by Baldwin and Bottoms (1976), was used: victim and general households samples were divided into two groups with high or low rateable value. Though a rough estimate, the results show that 69% of victims households were of high rateable value, compared to only 48% of such households in the general sample.

\textsuperscript{108} Winchester and Jackson found that 22% of general households sample admitted to leaving at least one window or door insecure, on the last occasion they had left the house empty. Similarly 22% of victim households, burgled during the daytime when everybody was out, admitted to leaving a door or window insecure. Only 7% of households pose a real obstacle to potential break-in (ibid., p.22-23)

\textsuperscript{109} Others also agree that on housing estates, crime is of a minor/opportunistic nature, carried out by local delinquents and social inadequates, generally petty, and requires only basic security measures.(eg. R Sisnot, 1985; Maguire, 1982).

\textsuperscript{110} Statistical technique of discriminant analysis was used, combining a set of variables in such a way as to produce the best discrimination between two or more groups. However due to the fact that the environmental risk index was designed on the basis of those physical variables that were most likely to effect vulnerability, the importance of the index is bound to be maximised; this however does not mean that for other types of housing, environmental risk factors would be less important.
left unoccupied; often on a busy through road, but with a fairly large private garden, so that the house is not easily seen from public areas and overlooked by neighbours.

Although numbers of victim households were considered too small to allow very detailed statistical analysis, and the authors caution about high error margins and biases in the results, the findings present strong evidence that physical environmental factors affect victimisation risk. There is considerable overlap in the 14 variables of the index - tailored to single family housing forms - which makes the quantification of 'environmental risk' rather biased, yet the evidence highlights the main principles of environmental risk. However, methodologically a much more carefully designed analysis of environmental factors, and more detailed measurement in each point would be necessary to clarify the principles of spatial vulnerability, in a broader sample of housing forms.

The above results (supported by findings from interviews with burglars eg. Maguire, 1982; Bennett and Wright, 1981/84; which will be discussed later) appear to contradict the earlier argument made by Repetto and Waller & Okihiro, that target value is the most important factor of risk in wealthier areas. Cultural differences may, be playing a role here, as well as the different types of physical and social environment. Clearly environmental risk is an important factor irrespective of area type, even in the most lucrative burglary locations.

Summing up, looking at the characteristics of victimisation of individual dwellings, environmental factors become increasingly important, over and above target value and other global factors. At the local level, the most important determinants of vulnerability to burglary are occupancy patterns; and the spatial features of surveillance and accessibility, irrespective of area type. The importance of 'social cohesion' is somewhat unclear, probably due to the difficulty of measurement. Security measures are generally found to be less important, though basic security is important in high crime areas, particularly in the case of housing estates, where opportunistic burglaries by unskilled youths are predominant.

Some difficulties arise in directly comparing findings of N. American and British studies, partly related to differences in culture, socio-economic structure and physical structure - urban setting. Whilst the American studies have focused on urban patterns, British studies predominantly focus on rural, suburban and smaller scale urban areas. Furthermore the studies of environmental risk here mainly deal with detached and semi-detached housing (Winchester and Jackson in particular), and avoid investigating physical factors in denser areas with complex building forms such as
council estates, although these are often highly vulnerable in environmental-physical terms. The reviewed vulnerability features are thus biased towards houses, whilst limited information is provided in terms of 'environmental risk' in the design and layout of housing estates. Overall, it becomes increasingly difficult for criminologists to deal with complex physical layout, since the issues of access and surveillability become increasingly difficult to measure. Clearly finer and more rigorous spatial methodology is necessary.

B. Burglary from Burglars' point of view:

Burglars Spatial behaviour and Target Selection:

While studies of victims in the environment have been limited by criminological research methodology, a different approach focusing on direct information from the source: the burglars themselves, offers valuable information on the criteria of vulnerability, at the micro-spatial level of analysis, the level at which burglars' and victims' spatial reality is structured. Drawing from the findings of key studies (Repetto 1974; Waller & Okihiro 1978; Maguire 1982; Bennett and Wright 1981/84), this subsection deals with: the characteristics of the burglar population; type of target area/goods they prefer; how far they travel; modus operandi of burglars; what burglars say about what targets they select and why.

It should be noted that research based on statistics and interviews with known burglars on their practices and preferences in target selection, is hamstrung by the 'dark figure problem', since only a portion of burglars get caught - the least successful ones. Police clear-up rates are very low, rarely above 30%, in large areas as low as 10%, and have been going down. Thus information is gathered both

---

111 As Maguire (1982: 32) points out, an area of the town of Banbury, comprising less than 40% of the Banbury's total number of households, of which 75% is council dwellings (including most of the town's council estates), was found to have over half the burglaries of the total burglaries in the town. See also Mike Hough and Pat Mayhew (1985): Taking Account of Crime: Key findings from the 1984 British Crime Survey.

112 According to NACRO; the clear up rate in 1983 was 28%. In 5 out of 6 cases the identity of burglar is unknown. Maguire maintains that it is a small number of burglars that commit a large number of crimes, and that probably the majority are known to the police, and have been convicted at one time or another. It is not unusual for persistent burglars to commit a high number of break-ins in a short period of time; Levels of recidivism are very high (p.23). Professional criminals do not necessarily 'specialise' as is often taken for granted. They are not either professional or amateurs; the majority of frequent offenders are 'middle range'. Status and success are not to do with type of crime, but from the way one goes about it. More experienced burglars improve, and keep on changing modus operandi. One sign of a good thief is his ability to respond both changing markets and new opportunities (Letkemann, 1973: 32-36).
from official records and surveys of victimised households, and from interviews with convicted burglars.

- **Burglars' Profile: Age; Skill; Target Range; Type of work.**

Statistics in Britain and North America agree that the offenders are predominantly **young males**, the large majority under twenty five; and mostly juveniles. NACRO (undated) reports that (in 1984) only 3% of convicted burglars and only 6% of cautioned burglars were females; 69% of convicted and cautioned burglars were young offenders under 21; 39% were juveniles under 17. The latter are often just going through a delinquent phase, whilst the older ones tend to be persistent offenders. Recidivism is high amongst young adult and adult burglars (Maguire, 1982: 23-24).

T. Repetto classified the sample of convicted burglars he interviewed in Boston, by age, race and drug use. Although the results are biased towards semi-skilled, persistent offenders, he found strong differences within the burglar population, with respect to age, race and skills/professionalism and hence target selection. Repetto found that as a rule, burglars are not well educated; have limited non-criminal skills; and avoid travelling more than one hour from their home to a target (about half the interviewees, particularly the younger and non-white groups). These were also more likely to operate on foot close to their own neighbourhoods. Older burglars were likely to make use of a car (private or stolen) some were willing to travel further afield (Repetto, 1974: 18).

Burglars tend to live in large cities, which offer anonymity. Maguire (1982: 166-7) describes the burglars' profile as follows: "According to data on known offenders, on the whole, burglars operate relatively close to home. They come mainly from deprived urban areas, while the majority of offences for which they are convicted occur within 2 miles of where they live". The older and more experienced professional burglars travel to areas relatively further away, yet close to the main traffic routes - whilst avoiding areas they do not know well. These are also most probably harder to catch.

---

113 Repetto (1974: 16) found that out of 97 interviewees, 51% were between 18 and 25, with 21% under 18 and 25% over 25; however, there is probably a strong bias in the sample of burglars.

114 Waller and Okihiro (1978:23) suggest that burglars committing residential burglary, were on average even younger than those involved in non-residential burglary and were possibly on the first rung of a potential criminal career.
Maguire's findings, in close agreement with Repetto's findings from interviews with burglars in Boston, are summarised as follows: “Within the poorest council-housing estates, which generally suffer high rates of victimisation, our analysis of both detected and undetected offences has indicated that burglary is often an even more local affair, the houses attacked being previously known to the offender/s in a considerable portion of cases. Children in particular who are known to commit many of the least serious burglaries, rarely travel outside their own immediate area to steal.” (op. cit. p.167)

**Type and value of stolen Property:** Burglaries differ strongly with respect to the type and value of the stolen property. This in turn relates to the type of target house/area; degree of planning/skill; and mode of transport involved:

According to Maguire (1982: 17), burglary can be a highly lucrative profession\(^{115}\), however, the majority of cases still remain fairly low target value. Burglary in housing estates is mainly petty with average loss under £25 (in 1979). The median for England and Wales in 1979 stood at £50, with 63% of recorded cases involving loss under £100; 25% -32% involving loss under £5. Items most frequently stolen are: cash (45% of cases); electrical goods (17%); jewellery and silver (14%); and cigarettes, alcohol and food (13%), though cash thefts were far higher in the poorer areas (including a high amount of meter break-ins) and council estates \(^{116}\). It was also found that burglars either tended to steal cash only (33%) or to select a variety of items. Cleaning out apartments by loading everything into a van was found relatively rare. Differences were noted between burglars' age/skill groups. Cash, jewellery, credit cards are the most sought after and easiest target goods, portable stereos and TVs have some immediate value for young delinquents. More professional burglars will go for high value items, silverware, jewellery, paintings, antiques, which he would be able to dispose of through 'fences'.

The kind of goods a burglar goes for, depends on the level of professionalism and contacts for selling stolen goods. In Britain, Maguire argues that without reliable

---

\(^{115}\) Maguire points out that the overall increase in recorded burglaries in the '70s mainly relate to lucrative burglaries where valuable property such as antiques, silver and jewellery were stolen. In 1975 37% of burglaries in London area involved stolen goods over £1,000. Middle range burglaries: involving televisions, stereos, less valuable silverware or jewellery: with an average value between £100-500 pounds. also increased due to growth of second hand markets. There is clearly a relationship between type (and social class) of area and average value of stolen property as well as type of stolen goods.

\(^{116}\) The proportion of cash thefts varied between the study areas: In Reading 51% compared to 23% in Gerards Cross; while jewellery thefts varied from 9% in Banbury to 54% in Gerards Cross. A major source of cash are the gas and electrical meters (just under 20% of burglaries in Thames Valley in 1975) (Maguire; op. cit. p.16-18)
receivers burglars often concentrate on cash. Working class areas (including council housing) offer good opportunities here, since people are likely to keep money stashed in various places (especially before prepayment meters were removed from council dwellings). In the past, those looking for electrical items (TVs stereos etc.) headed for what they described as ‘better class’ areas, however, as pointed out in the interviews, nowadays houses in all areas have such goods.

- **Mode of transport:** A car allows you to carry heavier and bulkier goods; on the whole, the wealthier houses were approached by car rather than on foot. However one burglar admitted he always preferred going on foot: for reasons of flexibility and easier escape, and avoiding being identified through number plates. Barry Poyner (1991) also differentiates between two types of burglary, involving burglars with motor vehicles and burglars on foot, on the basis of the potential value and type of stolen goods they can run away with. Hence burglars on foot can only carry light stuff, mainly cash and jewellery; etc. Escape vehicles allow the theft of larger and bulkier commodities, including furniture; large electrical goods and hi-fi equipment etc.

- **Area- Distance Travelled and Modus Operandi:**

  The type of area selected also relates to potential target value, weighed against risk of being recognised/caught: It is either the local neighbourhood, where they know their way round or where they will not be conspicuous, but where the reward will probably be less, or a higher value target which requires more skills and caution (Repetto, 1974: ). Maguire also found that younger, non-professional burglars feel more comfortable in familiar situations, knowing either the layouts of streets (important for escape), or the interior layout of dwellings, where people keep things etc., although they did not usually burgle houses in the immediate vicinity (‘you don’t shit on your own doorstep’). Distance also depends on mode of transport (discussed in the following paragraphs). It was not usually necessary to walk more than a mile or so to find what they considered a suitable area. (Maguire, 1982: p.83)

**Modus operandi:** Official records on victim households also provide important information on the mode of operation of burglars, in terms of place/ mode of entry and time of day:

a. **Mode of entry:** North American studies agree that the majority of entries is committed through the door, especially with respect to apartments, whilst the British studies find rear windows more vulnerable.
• Repetto (1974: ) notes that even in cases of houses where there is a window or another entry option, 61% of burglaries are through doors and 39% through a window. First floor entry is preferred since burglars would be less conspicuous than at ground level, also allowing the option of using a window, should the door prove impregnable. Younger burglars are more likely to operate with at least one accomplice - as a look -out man. Break-ins were found to be 80% semi-skilled, employing cruder methods of entry (e.g. avoiding lock picking, but by prising the door, using pass-keys/forcing lock)\textsuperscript{117}. Entry time: on average 5 min/door and 3 min/window, whilst the maximum they would allow is: approximately 10 minutes on a door and 5 minutes on a window - where they felt more exposed.

• Waller and Okihiro (1978) agree with Repetto, that the majority of burglaries are committed through the door (51%) and less frequently through the window (41%) - other routes are uncommon. Three-fifths ($3/5$) of the window entries are from the back, usually first floor (w.r.t. single family housing) or basement; $3/5$ of cases involved breaking or otherwise forcing the window (p.26-7). They also found that security measures were usually not taken in dwellings: only 25% of victimisation cases involved forcing the door or breaking the door, and only 13% required more sophisticated planning or lock picking.

• In the British studies the pattern appears to be different. Findings with respect to both victimised dwellings in Kent (Winchester and Jackson, 1982) and the Thames Valley area (Maguire, 1982) found again windows and doors as the main point of entry, only the emphasis is on rear windows. However, certain differences appear between the two studies\textsuperscript{118}. Maguire finds that after the rear window, the front door - is second most likely point of entry, though with a much lower rate (48% compared to 20% respectively), whilst in the Kent sample it is clearly the back that is vulnerable, widow and rear door second (49% and 21% respectively). Maguire finds that in nearly one third of all recorded cases, glass is broken, and to a similar extent that entry is through doors/windows left insecure. Break-ins are

\textsuperscript{117} This may well be related to the bias in the sample since unskilled burglaries involving methods like forcing door breaking window glass) are more common in real world than in sample. Less than 25% carried a weapon; and the majority consistently used a screwdriver, or crowbar. Tools used to open doors rather than windows.

\textsuperscript{118} Burglaries in both the Kent sample and Thames Valley were predominantly through the rear window (49% compared to 48% in Maguire’s Thames Valley data); whilst front windows were rarely used (9% compared to 7% respectively); nor side windows (11% compared to 6%). Rear doors (21% compared to 16%) were found to be more likely than front doors (7% comp. to 20%) in the Kent sample, while the opposite is the case in Thames Valley; finally side doors only (3% comp. 2%).

104
generally simple matters. "Few burglars carry tools any more sophisticated than a long screwdriver, jemmy or steel comb" (Maguire, 1982: 166).

However, both studies deal with predominantly suburban / rural housing or smaller scale urban ie. low-rise/ low- density housing. The breakdown of rates may differ strongly in the case of higher density council housing/flats) particularly since there are not so many ground flats ( with back windows). Back windows, and the back appear to be most vulnerable points of entry - mainly due to their restricted surveillability, which explains why in other cases it could also be the front doors. The above, however, suggests that window and door security also have some role to play, in combination with surveillability, as Repetto has suggested. The differences between the two British studies as well as with the predominantly urban N. American studies, attributable to the different biases in housing types/ areas, suggest that housing types should be investigated in more detail. In this case, the findings of the American studies, which include a larger proportion of urban housing and public housing, are probably more indicative here.

b. Temporal patterns: There is agreement between the majority of studies both in Britain and the USA that burglary is carried predominantly during the day, at times when people are out:

- Repetto (1974: 17-8) reports that 92% of burglars avoided occupied dwellings. In the fewer case, where the dwellings were occupied, 50% of the residents were sleeping (night-time burglaries). This closely relates with a preference to work during the day rather than at night (mainly between 6 am-12 noon), when people are out at work or shopping etc., usually on weekdays. However, in housing projects and suburban areas there was also a tendency for burglary to occur at night-time and on weekends. (Probably to avoid being seen perhaps on the estates or weekends when people are away ); other studies also confirm that burglary is predominantly a weekday/ daytime phenomenon, eg Scarr (1973:32).

- In British studies there is agreement with respect to time of day: there is clearly a preference for daytime burglaries in both Kent and Thames Valley areas119. Only a fifth occurred overnight (Winchester and Jackson, 1982:32).

---

119 Daytime 6 am-6pm: 38% Kent 47% Thames Valley; Evening 6-12pm: 17% compared to 14%; Overnight 12-6pm: 20% compared to 17%; unknown 25% Kent; compared 22% Thames Valley.
Waller and Okihiro's (1978) findings in Toronto, however, contradict findings of the other American and the British studies: Weekend burglaries were found to be as frequent as weekdays, which the authors attribute to different occupancy patterns and some seasonal variation. Furthermore, the majority of burglaries (65% in the victim survey) appeared to be committed between 5 pm and 7 am, late afternoon-night, i.e. in the dark during most of the year. Although seasons and occupancy patterns are predominantly used to explain the fluctuation in the rates, visibility factors, which may also be playing a role, are not really discussed.

However, what this does suggest, is that, ultimately, both daylight and night-time burglaries depend on specific criteria of occupancy-patterns and surveillability risk. In most cases, the criterion is the same, the risk of being seen, versus the risk of being apprehended. And in principle the same applies to the dilemma between front door or back window: the criterion is accessibility versus surveillability.

**Planning - Target selection:**

Both Maguire and Repetto note that the majority of burglaries involve a minimum level of 'planning', particularly in the case of adult burglars. Repetto found this was the case for 75% of the burglars he interviewed. In all studies, interviewees are generally shown a slide sequence or photographs of different types of housing and asked to select the type similar to that in which they most frequently operated and to cite reasons for their selection.

**Type of housing - area; reasons for selecting targets:**

Repetto (1974) found strong differences between age; race and drug use groups in the range of housing target types selected by the interviewees in Boston:

- Over 25's went for more lucrative single-family housing targets and avoided public housing due to low profits;

---

120 Strong discrepancies were noted by the authors between police records and victim survey results.
121 At least in the sense of the offender having set out from his home or cafe or public house with the intention of burgling a house rather than a spontaneous reaction to a specific opportunity that presented itself, while the burglar was out for another purpose. As an interviewee pointed out: "burglars usually get in through back windows, which are out of sight of the street" - therefore, it can hardly be the sight of the insecure entry point which sparks off the idea to break-in." (Maguire, 1982: 81-82)
122 Range of housing types shown in a slide sequence involved: single family house; Multi-family house; Housing project; Old brick apartment building; Row house; Luxury apartment (for detailed results see Repetto, 1974: 16)
• 18-25 year olds predominantly selected **single-family or small multi-family houses** (higher value).
• The under-18's operated mainly in **multi-family or public housing**, avoiding police and security patrols.

With respect to **reasons for selecting targets**, Repetto (1974:17-18) found that the most important factor seemed to be:

- **Ease of access** (overall 44%; for under 18's 52%);
- **Affluence** (41% mainly for older burglars);
- **Isolated neighbourhood** (21% - again mainly older, whites).

Under 18's avoided isolated neighbourhoods, preferring **ease of access**, being inconspicuous and selecting areas with few patrols, (29% of under-18's) or where neighbours did not know each other (24% resp.). Non whites and drug users paid somewhat more attention to avoid police patrols. Most experienced burglars were least affected by security measures. Generally whites and non-whites tended to stick to neighbourhoods of same racial dominance.

Maguire's (1982) interviews with burglars in Reading/Banbury revealed:

The most vulnerable type is the **single-family house** (35%), with the small multifamily second (28%), and the public housing project third (19%). Least vulnerable were the luxury high rise (4%); and row houses (6%).

This agrees also with findings of Winchester and Jackson and D. Walsh.

According to Maguire, reasons given for selecting targets in the chosen area are:

- **Occupancy**: The primary concern for the large majority of burglars is to select an unoccupied dwelling. This applies mainly for **daytime burglaries**, whereas it was not necessarily a consideration for night-time burglary.
- **Target value**: 'Richest looking house' - for those going for jewellery etc.
- **Escape routes**: mentioned as important considerations by several interviewees: Culs-de-sac, for example, were generally avoided, whereas corner properties and those with alleys at the side or back offered better choice of escape.

---

123 In Maguire's (1982: 60-5) study interviewees were asked to select from the following types of housing: • A public housing project; • A group of row houses; • A group of small multi-family houses (three or four deckers); • A group of large multi-unit older brick apartment buildings; • A group of luxury high-rise apartment buildings; • A group of single-family houses.

124 People are usually fast asleep, and even if they do wake up, they are still half asleep; the burglars would be gone - usually having secured escape route at the back -first)
"Where to leave the car," if used: "We used to look at whether there was a driveway, where it was, how long it was, where we could park the car, all these are important." (quoted in Maguire, 1982: 85)

Surveillability: The degree of cover offered by walls, trees, shrubbery or other buildings was a further consideration often mentioned in the interviews; there is clearly a greater risk entering a house in full view of neighbour's windows. On the other hand in town centres and housing estates, such cover is not always sufficient. Other burglars took the view that a bold approach was preferable to 'trying to sneak in', since the latter was more likely to arouse suspicion. Thus some would confidently walk into the garden and around the back as if they were a regular visitor, or resident. "Paradoxically, ..., the more pedestrians in the area, the less 'visible' such an act becomes. People do not expect burglaries to take place in broad daylight in full view of passers-by and therefore disregard what they see". One well known burglar was said to take that to the extreme and kick -in the weak front doors of poorer housing like that. (ibid. p.86)

Security measures: Burglar Alarms/ dogs: most interviewees claimed to avoid houses with alarms, unless these were preplanned burglaries with a known high target value. Similarly, most offenders would avoid houses if they saw or heard dogs, particularly at night, though if necessary, silencing a dog presented no real problem for them, just an extra hassle.

Almost the last factor burglars mentioned, if at all, was the actual ease of breaking in. Most assumed there was rarely a house they could not get in, however, some types of security were considered a nuisance, (eg, aluminium framed windows more difficult than wooden ones; mortice deadlocks often known as 'Chubb' locks; etc.) since they required more time and effort than others to breach. As in the case of dogs, these often 'tipped the balance' against selecting the specific target, sending the offender elsewhere.

One needs to keep in mind, that the interviewee sample was biased towards older and more professional burglars. However, Maguire notes that information on target selection acquired through interviews, tended to be consistent with impressions formed from visiting sites of crimes in the study areas. Victimised dwellings mainly houses with back alleys, situated near or on main roads, near the ends of streets, and those surrounded by cover in from of walls, shrubbery etc. appeared to be particularly vulnerable.

Finally the study by Trevor Bennett and Richard Wright (1984) "Burglars on Burglary" examines burglars' choice of targets, and tests out some of the assumptions of specific crime prevention approaches (target hardening; community
crime prevention schemes; and home beat policing; defensible space) in order to find out whether offenders' perceptions concurred with these beliefs. Although the material on which the interviews were based was simplified in terms of spatial cues (comprising a detached house; a terraced house and a semi-detached house, with limited information about surroundings apart from the front/side view), the findings provide specific clues on the factors influencing vulnerability to burglary:

- **Signs of occupancy**: Of the dwelling by its inhabitants were found to be the strongest deterrent.

- **Security hardware**: Whilst security hardware (locks etc.) were not found to be particularly influential determinants in the final decision to break-in, burglary alarms (detection hardware) were avoided by a large majority of offenders.

- **Community based crime prevention initiatives** (neighbourhood- and block-watch schemes): Burglars most frequently said that they tried to avoid being seen by the neighbours, rather than people further away. They seemed less concerned about passers-by or police patrols arguing instead that "...it was necessary only to wait until the people had passed before approaching the target" (op.cit. : pp. 50).

- **Physical environment and design factors**: Offenders preferred detached houses, semidetached second, and least of all the terraced house; which confirms previous findings. They:
  - Generally avoided choosing houses that abutted busy roads;
  - Showed concern about the level of surveillability, particularly about being overlooked by other buildings in proximity;
  - Considered terraced housing more risky, due to proximity of neighbours ("probably nosy") and proximity to the street.

One of the most important factors mentioned by burglars was found to be the amount of cover surrounding a dwelling, avoiding open areas: "open plan estates were often cited as being too risky because of the increased chance of being seen entering the property". Another key factor was found to be the availability of rear access. Burglars often mentioned they preferred to enter from the back, since the risk of being seen was smaller. Windows and doors were assessed in terms of how

---

125 Trevor Bennett and Richard Wright (1984) carried out interviews with convicted burglars: Using photographic material; a videotape; and both structures and semi-structured interviews. Offenders were asked to assess suitability of a specific target; given a choice of three (detached; semi-detached and terraced houses) and asked to explain their reasoning and criteria of target selection. The fact that the burglars were mainly convicted, older and more experienced may pose a bias in the results. Furthermore it must be kept in mind the targets were not council housing, therefore perhaps conditions both social and physical were not directly comparable.
secure/resistant they would be to forced entry. Burglars rarely mentioned area access; pedestrian movements or traffic flow; social cohesion; citizen or police patrols; police response times; as important factors influencing their final decision.

The study concludes that in the multi-staged process of target selection, the final decision to offend is mainly influenced by cues relating to the risk of getting caught. Cues relating to the ease of access (getting in) and potential rewards were less prevalent. The most important risk factors concerned "surveillability", "signs of occupancy" and "presence of neighbours". The authors conclude that defensible space has distracted attention from the actual locational factors: "The focus of crime prevention through environmental design on factors relating to surveillability and territoriality has perhaps drawn the attention away from environmental factors associated with the immediate situation of potential targets." (op cit. pp 50).

To sum up, the above findings expose the type and breadth of considerations involved in the spatial dimension of the target selection process. Spatial vulnerability, from the burglars point of view is clearly related to. relatively easy access, preferably from the back, with some visual cover, avoiding being seen by neighbours. However, results cannot be simply generalised, due to biases in the research towards single family houses and predominantly 'older' and more experienced offenders. Furthermore presellected target area options used in interviews, are biased towards victimisation of higher value targets in low density housing. Thus there is lack of research on environmental vulnerability in public housing estates, where the physical and social conditions (neighbours presence and willingness to intervene) might differ.

The significance of dwelling occupancy, is perhaps overemphasised as the dominant consideration in target selection. Burglars with a specific target in mind, need merely wait till the dwelling is left by its inhabitants Housing form needs also to be taken into consideration, in more systematic way, as well as spatial configuration. For instance, terraced housing is avoided due to proximity to the street and surveillance from neighbours. However, as will be discussed in the next chapter, the structure of interaction and awareness of people (neighbours) strongly relates to the structure of environment. Thus the question of 'social cohesion', could be reformulated, as to the degree of awareness of neighbours, and probability of knowing them well enough to intervene with some chance of succeeding.

Age, skill, and degree of professionalism, are strongly related to the type of area/type of housing/type and value of targets that burglars chose, the older more experienced placing emphasis on target value and less on distance and detection risks, while
inexperienced juveniles predominantly select their targets in their own local area on the basis of accessibility (easy targets). The final decision to commit a specific burglary is found to be almost entirely spatial: factors relating to the risk of being seen and risk of being caught i.e. surveillability/ cover; occupancy and awareness of neighbours and to a lesser degree 'ease of access'. This has mainly been interpreted in terms of how easy it is to get in, rather than how accessible is the target. Mode and time of entry (daytime rather than night-time; rear window versus front door), are intrinsically about surveillability and detection. The awareness of neighbours is also a spatial factor.

Accessibility, a crucial factor, remains surrounded by some confusion. Access considerations (avoiding terraces for being close to the street; and avoiding houses abutting busy roads) relate to the exact siting of a dwelling, the distance travelled/mode of transport; criminals mobility and awareness/target area; and escape routes. There is some confusion about busy streets and traffic as a risk factor or not (Walsh; Winchester & Jackson); ever since Jacobs and Newman. This surfaces in the studies of both victimised dwellings and burglar's interviews with some support for both versions, (eg. Repetto). More rigorous research is necessary here.

Finally, the spatial insights gained through the interviews with burglars confirm findings of victim surveys. The victims' vulnerability factors, strongly overlap with the criminals' target selection factors, confirming the reliability of the 'situation' approach. Criminological research has exposed weaknesses of 'defensible space' and has shown this to be a dead end.
2.4 **Summary and Discussion.**

The relationship between housing design and vulnerability to crime revolves around the relationship between man (potential victim and perpetrator); the community; and the environment. It involves the interaction between two fundamental dichotomies: **Man / Environment** and **Society / Crime.** The **M/E** relationship, both normal and deviant, at the individual and collective level, is observable at a local and a global scale. This literature review has attempted to bring together the discourse on the above, from three basic perspectives:

- The **Architect's perspective**, focusing on the design guidance on housing layout, which deals with the relationship between the **individual/community** and the **Environment** ('normal' **M-E** relationship in the space of the collective).

- The **Responsible Authorities' view or Crime Prevention perspective**, which deals with crime and the environment, the **M-E** relationship from the point of view of Society as potential victims against the potential offender.

- The **criminological perspective**, which deals with the **M-E relationship** from the point of view of Crime: the **Criminal** and the **Victim**, at the individual and the collective; the local and global spatial perspectives.

**Mainstream architectural discourse** has largely ignored the link between the built environment which it shapes, and the spatial dimension of crime, based on an idealised notion of man and community, where crime, a social problem, is considered **marginal** to the problems of design. Due to the fragmentation of disciplines, architectural design guidance on housing estates focuses on functional and formal principles with minimum systematic feedback on its social reality and users requirements. This is left to other disciplines, particularly since the failures of planned housing and urban developments.

Design guidance is elaborated at four levels, basically relating to **analytic and prescriptive approaches** to layout at the **local and global level of the design.** The earlier modernist design guides place emphasis on the residential environment as a whole - offering typologies and illustrated examples (**global** analytic and **prescriptive level**). In the seventies there is an increasing shift to the **local**: focusing on functional elements of the layout (block layout; vehicular and pedestrian access; open spaces; parking etc.) in the attempt to improve design guidance at both **analytic** and **prescriptive level.**
In reaction to modernism's' free-flowing space, the principles of enclosure and clustering and hierarchy of public to private becomes the basis of housing design at the local level - also seen as the key to the relationship between privacy and community - while the principle of hierarchy and repetition, already introduced by modernism, remains the basis of global organisation. The principles of enclosure and boundary detailing are combined with Oscar Newman's notions of defensible space, whilst the perceptual approach, which focuses on users' needs and perceptions, is used to justify guidance principles. Overall, however, there is a fundamental lack of 'scientific' analysis to support prescription.

Another important problem, particularly for large housing projects, the localisation and functional breakdown of layout, signifies loss of the global perspective. The loss of balance between the local and global approaches is mainly due to the lack of rigorous analysis and prescription at the level of global concepts. Limited to typological analyses or non-discursive prescription, only few studies, for instance on density and building form attempt to address the global concepts more systematically. Therefore the discursive dimension in design guidance is focused on the parts, rather than global concepts.

Oscar Newman's 'defensible space' is the first and only theory about the link between crime and design, which appears to have influenced mainstream design guidance, and is yet to be replaced. In defensible space terms, the relationship between man - the environment, and crime is addressed through territorial zoning, identifying people with space, and keeping strangers out. This also resolves the 'key' relationship between the individual's privacy and the need for a sense of community. In practical terms, there is emphasis on discouraging through-movement, by consistently breaking views, and restricting visibility. Thus, the seventies design approach as represented in the GLC Handbook, encourages reducing visibility and limiting accessibility, without actually blocking it physically. This is actually the opposite to basic principles of security, established in the other fields of discourse.

In the discourse on Crime and Design, there are strong contradictions here between crime prevention approaches, only one of which is defensible space. There are three basic rationales about how to protect society from the criminal in the environment, with different layers of assumptions, with respect to the M-E paradigm. The four resulting crime prevention strategies, which place different emphasis on the relationships between M-E versus the Individual and the collective and also have differences in relation to analytic and prescriptive content.
• **Target hardening** is the "back to the basics" approach, which deals with the relationship between crime and design with respect to the security of the individual dwelling: securing the potential victim in its immediate physical environment, with locks; entry systems; surveillance; lighting etc. This has been extended in the case of housing estates to the level of individual buildings or parts thereof, and improving lighting etc. It is based on the common-sense principles of **minimising access (blocking entry routes)** and **maximising surveillability and detection**, principles established and strongly supported in criminological literature, without assumptions about the man - environment relation. It has a sound analytic basis, and a strong prescriptive emphasis, with relatively systematic feedback.

• **The social surveillance approach**, Jacob's 'eyes on the street', is based on the idea of a strong community linked to a 'healthy' street life. This self-controlling environment controls crime in an informal way - based on a natural balance between the collective and the individual, inhabitants and passers-by, which contribute to the continuous presence of adults and children in the public space. The focus shifts from the individual dwelling boundaries to the **spatial community**, enhanced through the structure of the environment. Healthy levels of social activity are achieved through diversity, higher densities, mixed uses and frequent street interconnections. Though prescription is relatively weak (at the global spatial level), the analytic content based on sharp observation, remains free of behavioural assumptions about the M/E link.

• **The Social Engineering ('defensible space') approach** propagated by O Newman's and subsequently Alice Coleman, builds into the 'social surveillance' approach, a behavioural link between man and the environment based on the notion of territoriality. It relates crime vulnerability to lack of territorial demarcations; anonymity; lack of surveillance and image. Defensible space is based on the idea, that the manipulation of the environment can **encourage defensible behaviour** at the level of the individual and the collective, that the environment can trigger defensive instincts. It can also **encourage surveillance** through the positioning of windows and doors and change the image that signifies vulnerability. Finally by juxtaposition with safe neighbourhoods, the crime levels can also be reduced. A whole string of assumptions is made with little to support the claims, apart from the last principle of juxtaposition, which is supported by criminological studies.

Although ideas about surveillance are influenced by J. Jacobs, the essence of the defensible space theory **contradicts** a fundamental principle of Jacobs approach, the role of lively streets and accessibility to strangers. While restricting access to strangers (eg. through projects with street closures), to encourage the development of
social identity/cohesion; reduce anonymity and increase the possibility of criminals being recognised and intercepted, Newman propagates the exact opposite to Jacobs who sees the role of strangers as an important element of safe streets through the continuity of adult presence. Newman's and Coleman's thesis rests on a fundamental hostility to the notion of strangers, ultimately to the notion of a street environment. The stranger is identified with the potential criminal. This assumption however, totally discounts the evidence that offenders are likely to be local residents of the project too, not strangers.

In spite of their extensive research, Newman and Coleman fail to clarify the relationship between crime and design of the environment in 'scientific' terms, while theoretically confusing the link even further. Their methodological approach has been limited by the difficulty of distinguishing social and spatial causes of crime/vandalism, mainly due to the block as the unit of analysis. Beyond the list of architectural features of blocks, there is a fundamental lack of rigorous descriptive tools, that allow analysis and quantification of spatial factors. There is a high degree of overlap of design variables, while ignoring space as a continuous network. This lack of analytic and descriptive tools at the global level in a sense relates to the limitations of architectural approaches, i.e. fail to consider the importance of the global dimension, and failing to recognise society as a coexistence of criminals and victims.

While being weak in analytic terms, the approach is over prescriptive. Newman and Coleman provide a perhaps justified critique of anonymity of large-scale projects, as a cause of vulnerability, and rightly point out specific features of high rise/point blocks; large-scale underused pedestrian deck access and overhead walkways; and lack of physical surveillance opportunities. However surveillance, mainly seen in passive terms-windows and position of entrances, which has been shown to be ineffective- whilst active surveillance is based on the assumption of territorial behaviour-the man-environment paradigm. The effect of territorial design on increasing the willingness to intervene, however has not been supported by results from subsequent experimental projects either. This does not appear to have influenced the widespread appeal of defensible space, precisely because of its prescriptive content, and even more importantly, for lack of an alternative. The positive outcome has been that it has triggered positive developments in criminology, which finally begin to address the spatial nature of crime.

- **The synergistic approach**, which is merely the compilation of all approaches into a mixed bag of community, physical and managerial measures, has inevitably
been resorted to in reaction to the ambivalent results of the other approaches, particularly defensible space. It is thus both theoretically unresolved and relatively disorienting in prescriptive terms, offering however, a range of options with high flexibility. Thus although likely to succeed on a short term basis, this approach evades the problems of the debate on design and crime, by throwing everything in: target-hardening, entryphones; doormen; surveillance equipment; improved lighting; knocking down overhead walkways; private gardens; managerial improvements; social incentives; allocation policies; community developing programmes; child and youth provisions; home beat policing; etc. However, it is difficult to discern what works and what does not; and what happens when some of these measures must be cut down. Recognising that defensible space has not really been the answer to the problem, the problem still remains, how do architecture and urban design relate to crime vulnerability, and what can be done about it (an analytic and prescriptive problem).

Developments in the criminological discourse provide valuable insights on the relationship between design/ environment and crime, and a more sophisticated approach to analysing crime vulnerability (in the attempt to tackle the problem of crime, without attempting to change society). Environmental criminology and the situational approach contribute to the debate by moving away from the traditional ecological perspective of criminality and its social/environmental causes (man-environment paradigm), to a crime specific, and more spatial view of crime (Man/Environment link), from the victims' and the criminal's point of view. It considers vulnerability at the actual level of the event of crime in time and place, and shifts focus to the individuals and then back to the collective. Thus environmental criminology and the situational approach, analyse four basic aspects of the man/environment link:

- the criminal's target selection process; and its reverse - the study of the individual victims situation (local level);
- 'crime occurrence' as the overlap of the collective patterns of criminals awareness/activity space, and the patterns of opportunity (distribution of potential victims/targets) at the level of the collective (global level).

Target selection is a conscious and unconscious decision making process, by which the potential criminal weighs up the factors surrounding the target/victim (physical, social, environmental), as well as the effort and the value of the payoff (based on 'crime templates'. The final decision to commit depends on the risk and
effort versus pay-off equation. Brantingham & Brantingham argue that target selection is related to mobility patterns based on interests/home-base, which form the basis of criminal's activity/awareness space. Like all men's/women's spatial behaviour this is highly patterned, limited by (perceived) distance - gradually decreasing away from the home base etc. Thus the criminals' M/E link is viewed as a complex form of spatial behaviour, in which movement patterns depend on underlying spatial mobility biases, knowledge, and experience; and the patterning of offences, as a match between their subjective spatial awareness and the objective distribution of opportunities.

Environmental criminology investigates patterns of crime occurrence in objective terms on a large scale (victimisation risk based on area units), whilst at the micro-spatial level of analysis it shifts from 'objective space' to 'subjective space' as perceived by the criminal. The analysis of victims characteristics at the micro--level is impeded by the lack of objective descriptive tools.

The above theoretical formulations are supported by studies of specific types of crime, residential burglary in particular, which is the most location specific property crime, which is investigated from three perspectives: the global burglary occurrence patterns, looking at global factors influencing victimisation; from the point of view of local burglary patterns - the patterns of victimisation, and the point of view of burglars' mode of operation, spatial behaviour and target selection criteria.

At the global level, burglary rates (risk) have been associated with dense inner city areas generally decreasing away from the centre in suburban and rural areas. Two different types of area form the exception: high crime housing estates in peripheral locations; and affluent pockets of suburban and rural housing near or easily accessible from urban areas. There appears to be some relationship between density and high crime - different to the relationship between overcrowding and high crime pinpointed in the Chicago Model: simply the density of coexistence; both potential offenders and potential targets/victims. Global factors that affect high crime, are mainly socio-economic area characteristics (income/class; social disorganisation; housing tenure type) and spatial only in the sense of geographic juxtaposition to high crime areas.

However, a considerable body of accumulated research, shows that victimisation risk at the local level of the individual household is strongly related to environmental factors of accessibility and surveillance, defined by the physical siting of the
dwelling, as well as with *occupancy patterns* (dwelling being left empty for longer periods during the week), and *target value*, the relative weight being different according to the type of area:

- **Income/affluence**, appears to increase burglary risk at the two extremes of the scale, in the one case due to the high target value, and at the low income extreme, in combination with other social factors of deprivation and social breakdown, due to the crime prone neighbourhood. Occupancy patterns affect the time of entry.

- **Access and accessibility**, involves both location within an area with respect to (eg. ground floor; corner sites, near main roads); but also specific conditions of entry - door/window.

- **Surveillance and surveillability**, appear to involve three things: visibility (potential of being seen); *presence of people* (neighbours; passers-by; doormen); and willingness to intervene. The latter is least predictable in housing estates, however with respect to relatively long-standing neighbourhoods, neighbours can be generally counted on to a large degree. Neighbourhood watch schemes attempt to establish this, though reports suggest that they often do not work on the problem estates, and are more likely to work in middle class areas.

The 'environmental factors' are particularly important, in council housing where target value is low - relatively equal across households.

- **Lack of basic security precautions in dwellings**; High security levels have not been found to play a significant role in more affluent types of housing, however in high crime areas, including public housing estates, this is not the case due to very low levels of security. Improved security here could have a significant effect, due to the lack of even basic security standards, and the more 'opportunistic' nature of crime.

- **Dwelling Occupancy**; is an important criterion (with respect to the final decision to commit), since burglars generally seek out unoccupied dwellings, avoiding physical confrontation; (if 'disturbed' they are most likely to merely escape). Hence, burglary is most likely to occur in the daytime: 4/5 burglaries occur during the daytime or evening, when the dwelling is unoccupied.

There is strong bias in the research on type of housing targets, and therefore findings cannot always necessarily be generalised. For example, the predominant mode of entry in British studies was found to be rear window entries; however in housing estates this would probably not apply, as is the case in American urban studies, which note a higher proportion of front doors. Either way, mode of entry is related to
the choice between less surveillability (eg at the back of a house) weighed against accessibility/ ease of entry. Whereas accessibility in the sense of ease of entry is not so important for experienced burglars/higher target housing forms, in housing estates on the contrary, the predominant criterion probably is ease of access.

The majority of burglaries (and other crime) on public housing estates with often high rates of victimisation and predominantly low target value, is committed by young, mostly unskilled aspiring delinquents. Burglary here is very much a local problem, and any attempt to tackle it should be based upon an understanding of local conditions and relationships. This shows that 'defensible space' is by definition flawed in this case, in that it considers the threat to be from strangers from outside. Elsewhere, in other types of housing, burglaries are much more likely to be the work of 'outsiders.'

At the local (micro-spatial) level, research has shown that the physical environmental factors become increasingly important, particularly accessibility and surveillability, though all studies so far suffer from the lack of descriptive tools and suitable variables at the level of the micro-environment. Methodological limitations have been the greatest stumbling block in the analysis of burglary vulnerability from a spatial point of view. Considering the difficulties of research to date on the 'environmental' dimension of risk, particularly investigating building form and siting, the principles and mechanisms of spatial vulnerability clearly need to be further investigated in a more rigorous framework. The micro-environment is the level at which architects operate, and therefore it is also necessary to investigate the designer's choices/ process of decision making as well as local and global configuration of designs within this vulnerability framework.

To date, the design and crime approach influenced by Newman and Coleman has been handicapped by its methodological and theoretical limitations. While being highly prescriptive, it has mainly added to the confusion on the relationship between design and crime, by the notions that the environment can manipulate territorial or defensive behaviour, or cause criminality. In policy terms, the more promising approaches have proven to be the more common sense ones: target hardening; and social surveillance, which avoid expensive experiments based on social engineering. In the defensible space approach, there is inherent confusion and contradiction about social surveillance. The central concepts of territorial zoning, hierarchically clustered layouts and keeping strangers out, involve a contradiction with the notion of an environment made safe by healthy street life interaction and continuous presence of people. On large housing projects, the surveillance potential
generally drops dramatically, and proposed remedies are in danger of only exacerbating the problem. Furthermore, there is a major problem with the consequences of reproduction of such housing designs at the larger scale, transforming the urban street pattern into a series of territorially demarcated zones and design cities made of 'turfs'.

Lack of in depth research with rigorous methodological tools and a suitable conceptual model on the relationship between man and the environment, has impeded the development of knowledge and guidelines for the design of safer environment. Lack of awareness of the global aspect of space is a most crucial element in all approaches, including design guidance. Design improvement failures have resulted in a shift of emphasis to other crime prevention approaches, without however solving the problem of the relationship between design and vulnerability. Physical measures should not be competing with the non-physical. Designer's need to 'detoxify' defensible space out of the design system, need to change round this fundamental idea of 'strangers' being the main threat.

Beyond 'defensible space', awareness of spatial vulnerability to crime is lacking in the design guidance on housing layout at all levels. There is a need to make the design process more transparent at each stage of the design, in terms of the local and global decisions, which need to be evaluated in vulnerability terms as well as the usual range of criteria (efficiency, economy, aesthetics and users needs). The problem of privacy and community identified as one of the key issues in the design of housing, is particularly important in high density low-rise solutions, with respect to the local-global relation.

There is clearly a link between crime and design, in the sense that both victims and offenders use, move and are seen in the built environment. Architects need to take on more responsibility for the efficiency of their designs in terms of security. In spite of security technology, there appears to be no substitute for the presence of people. Since defensible space, there is even greater confusion about dealing with the issue in design terms, beyond the target hardening of the dwelling. The question is, how does one target harden the layout, and improve surveillability in an effective way.

Summing up, the literature review identified certain key issues in the link between design and crime. Figure 2.4 presents in a synoptic diagram the variables relating to crime vulnerability discussed in the reviewed texts from the three perspectives. It presents by author/text, the factors which have been dealt with and have been
considered as significant\(^{126}\) (marked with a X), and those which have been dealt with and discounted, or have not been considered as significant (marked with a *). Blanks signify that a factor has not been considered at all. The variables are related to: area characteristics (density and location); physical characteristics of the built environment (building form or type; territorial definition); accessibility factors (including vehicular access and traffic; back access and corner or peripheral location; and security measures) and physical surveillability factors (placement of windows; visibility and lighting; as well as surveillance technology/detection systems) social surveillance (formal and informal); social factors including the residential 'community'; characteristics of the individual households and management factors (allocation policies incentives etc.); occupancy of dwellings as well as area socio-economic factors; (racial mix; age groups etc.) target value - land uses; and criminals' spatial behaviour (mobility; awareness space).

Each discipline covers a specific range of variables and ignores others, though in the architectural discourse, one observes, there is a serious gap in knowledge at the point, where the disciplines meet: on the issue of vulnerability to crime at the micro-environmental level, which is the level of design. Clearly factors of importance are: location, building form and building type; accessibility physical security/target hardening and surveillance - visual links through windows and visibility- and social surveillance. These are generally acknowledged as important; however, these factors are still relatively vague and not really linked into a systematic theoretical framework - apart from defensible space. Some issues appear to be controversial as for example the issue of vehicular traffic and the issue of safe streets (including the role of inhabitants and strangers). In the crime and design and crime prevention discourse, which overall covers a broad range of physical (access and surveillance) factors, there is discrepancy between approaches to social surveillance, which are not sufficiently linked into the physical side - apart from defensible space's 'territorial definition' factor - nor take into consideration the criminal's spatial perspective. The criminological discourse covers a broader perspective, predominantly focusing on area and social characteristics, and shows awareness of, and confusion on the physical factors. Discrepancies arise in the findings on issues of accessibility and social surveillance. Certain factors such as defensible space measures and surveillance technology, which are generally adopted by most of the crime prevention manuals, are predominantly discounted by criminologists.

\(^{126}\) Considered to be playing a significant role - though not necessarily found significant in the statistical sense, since methodological limitations may be affecting the findings - the accuracy of the measurement and the meaning of results.
There is a lack of understanding of both the global (e.g. density and location/context; anonymity) and the local spatial dimension (accessibility), more specifically:

- a lack of awareness in the criminological discourse, on the relation between spatial factors of vulnerability such as accessibility and surveillance and the local and global structure of the built environment, (beyond simplistic housing typologies).

- a lack of awareness in the architectural discourse on the relationship between design strategies and choices at the local and global level and the embodiment/reproduction of these aspects of spatial vulnerability.

The reasons for this are twofold:

- Methodological problems, particularly the lack of descriptive tools for spatial configuration at the micro-spatial level - the level of design. This is due to lack of spatial and architectural analytic tools and the limitations of area and "housing variables" on the criminological side; and due to the difficulty of distinguishing social and physical factors (seen as causes of high crime), due to the block as unit of analysis (in Newman's and Coleman's approach). Furthermore, in both cases there is a lack of understanding of the local and global aspects of spatial configuration (ie. that space is a continuous network), also found lacking in the architectural design guidance on housing layout.

- Even more importantly, the roots of the problem can be traced to a continuing confusion created by the defensible space approach, which has distracted the discourse in both disciplines, from the real issues concerning spatial vulnerability. This confusion already existed in traditional crime research of the ecological school, as has been partly identified in later environmental criminology. Criminologists and architectural researchers have been looking for environmental 'causes' of high crime - the ultimate cause of this conceptual confusion. This has been created by the "invisible framework" through which the problem of the relation between man and environment has been perceived, based on the assumption of a 'causal' effect of the environment on human behaviour. The inherent paradigmatic limitations, as Hillier and Leaman, (1973) have argued, have been the main stumbling block in environmental research in the past. Environmental criminology and the situational approach attempt to overcome this by introducing and analysing concepts such as spatial opportunity and the target selection process, related

---

To quote Hillier and Leaman (1973: 507) in their article "The man-environment paradigm and its paradoxes": "A paradigm is any structure of ideas, scientific and philosophical, that we take for granted in order to do research. Because we must take some such structure for granted, paradigmatic ideas tend to become invisible."
to the occurrence of crime at a specific location. However, on the designers' side, there has been no attempt to replace defensible space. Whilst criminological research has identified the general principles of spatial vulnerability, accessibility and surveillance, considerable contradiction and confusion remains, particularly with respect to accessibility/traffic and crime risk.

There is still a need for more focused research at the level of the micro-environment, in order to establish a rigorous analytic basis for design guidance. It is here that this thesis attempts to contribute. The central research problem can thus be specified in the following terms:

- How do physical factors related to accessibility and surveillability, affect spatial vulnerability to burglary in housing estates?
- How do the principles of spatial vulnerability, relate to the design strategies and design choices in housing layout?
CHAPTER THREE: RESEARCH METHODOLOGY: 
THEORETICAL AND METHODOLOGICAL APPROACH.

3.0 Introduction:

The literature review in Chapter two established that, whilst architecture largely ignores the issue of spatial vulnerability to crime, attempts to address the issue have failed through theoretical and methodological shortcomings. An important limitation, apart from the paradigmatic limitations of causal thinking, was found to be the lack of descriptive tools to analyse spatial configuration so as to make the study of design vulnerability across different types of housing projects, housing 'types' and areas possible. A further stumbling block was found to be the interrelationship and overlap of a number of factors related to burglary rates/risk, particularly a problem, where physical factors and social factors are related to a housing- or building- block as a unit of analysis.1 The methodological limitations and the crudeness of measurement, make it difficult to distinguish the effects of the one from the other and discern the relative importance of each.

A clear need for more focused research was identified, using the insights gained from criminological research, on the main factors influencing environmental vulnerability: accessibility and surveillance; a need for more rigorous spatial methodology that deals with description of spatial structure at the level of the occurrence /event- beyond the list of block features. This is where 'Space Syntax' comes in.

This chapter deals with the research design and methodology of this thesis in three parts:
1. It presents the theoretical and methodological framework, which is adopted and further elaborated in this thesis, discussing some of the key concepts of Hillier and Hanson's (1984) 'Social Logic of Space' and the UAS' syntactic methods and relevant research;
2. It identifies the specific research objectives; and explains the research design;
3. It outlines how the case studies are to be carried out in the specific methodological approach.

---

1 These have only partly been dealt with by increasingly sophisticated statistical methods of multiple regression analysis. These however, have up to now also suffered due to the crudeness of the physical variables, - overlapping block features, or features of houses; and measurement scales.
3.1 **Theoretical and Methodological Framework.**

This research study basically adopts a 'situational' approach. It views crime as a spatial event, or a spatial phenomenon, since as any other social phenomenon it has a spatial dimension. (Brantingham and Brantingham 1981; 1984).

The problem facing the study of spatial vulnerability in housing design is:

1. How to describe spatial environments and housing layout beyond the building features and investigate design variables in rigorous terms with respect to both local and global levels of spatial organisation.
2. How to overcome the problem of distinguishing between spatial factors and social causes of high crime occurrence.

This thesis, as will be argued in the following paragraphs, resolves these issues:

A. By employing the UAS method of syntactic analysis (see B. Hillier et al '83; Hillier and Hanson '84; Hillier '88) and the theoretical and methodological tools it has developed for a rigorous and systematic description of different types of spatial structure. Syntactic spatial analysis, based on techniques of abstract representation of the system of spaces in the form of axial diagrams and convex maps, and quantitative measurements of their properties, can be applied to examine the spatial dynamics of vulnerability with respect to burglary, in two ways: a. by plotting locations of burglary offences on the maps of the spatial structure; and b. by describing the spatial factors that characterise victimised dwellings at the micro-spatial level: the level at which target selection of the individual dwelling and its location actually takes place.

B. In the previous chapter, target selection was found to be based on weighing the individual aspects of a dwelling target, weighing the ease or difficulty of getting in; being seen or heard; recognised or confronted; (and the potential reward, though on housing estates this is probably mostly not a major consideration). Thus physical characteristics of vulnerability cannot merely be analysed at the level of the area unit or block. It is necessary to zoom in at the micro-spatial level of resolution and investigate the burglary patterns in 'objective terms' at a scale that can provide accurate observations and analysis at the level of target selection i.e. of the individual dwelling in the spatial-physical context of the housing estate and its context.

The UAS approach provides a basis for spatial description and analysis at that level, on which to proceed. As will be discussed later in more detail, this evades the
problem of calculating burglary risk per block, where multiple physical and social factors overlap, and allows the investigation of spatial/architectural features of the targets in purely spatial terms, without intervening social variables. Though biases due to other factors are possible, eg. security hardware; target value etc., there is no reason to believe that these will be spatially systematic so as to create a spatial bias within the context of the housing estate, where overall security levels are similar (or were at the time of the study) and target value also relatively restricted in range. It is most likely that these other factors will only add more randomness to diffuse the results of analysis ie. create more randomness in spatial terms, but not totally distort the findings.

3.1.1 'The Social Logic of Space': A new paradigm for the study of socio-spatial phenomena: key concepts of the UAS approach:

Hillier and Hanson (1984; 1987), argue that a key problem in research on wo/man - and the environment is paradigmatic, in the way spatial and social phenomena are seen in totally separate, mutually exclusive terms. However, societies realise themselves and order themselves in space, while spatial organisation, determined by the ordering of boundaries and permeabilities bears social and cultural information and is a key to reproducing society, structure social relations and embody culture in most societies to a greater or lesser degree. There are inherent abstract properties of spatial configuration in spatial relations which, it is argued are the key to understanding the 'logic of space'. It is this inherent logic in the nature of spatial relations that societies use in spatial organisation to structure interfaces between social groups and reproduce cultural forms and social rules/codes.

The Social Logic of Space is the beginning of a theory of the society-space relation, which has advanced over the years, based on empirical research (analysis; description; and use observation) across an impressive variety of spatial forms of settlements and buildings, both of which are about the ordering of space, in which we move and interact. The main concepts and methodological tools are described in Hillier et al. (1983) "Space Syntax" as well as Hillier and Hanson (1984), however, for those less familiar with the theory, some of the key concepts of relevance here, are summarised in the following paragraphs:

- The theory introduces the concept of two primary spatial units: the open and the closed/bounded cell. Through the ordering of boundaries and permeabilities a system of spaces is defined as well as a set of relationships between spaces. The
basic concepts of an open or a bounded space are important in social terms: they spatialise control, and define social categories eg. inhabitants (who have power and control over bounded primary cells); visitors (with temporary rights of access) and strangers who just pass outside.

- The spatial configuration realises the interface between inhabitants and strangers (in all combinations, and in analogy within buildings) and can thus embed social rules. The nature of the spatial relations can be captured, i.e. represented and measured, in abstract mathematical terms: The primary spatial relations are:
  • symmetry and asymmetry in local terms i.e. between 2-3 spaces; and
  • distributedness (shallow -equalised) and nondistributedness (sequence like) for larger systems of spaces - i.e. more of a global property (see Hillier and Hanson 1984: 146-155). Thus spatial configuration orders and reproduces social solidarities in spatial terms, embedding social information into the structure.

There is a fundamental difference between closed and open cells in terms of the growth of each into a open or closed system of spaces: buildings and settlements.

- **Buildings**: involve the internal subdivision and elaboration of closed cells. They are clearly more deterministic in the structuring of social-spatial relations, than the configuration of open space (eg. network of streets and public space), which is continuous and less deterministic. In contrast

- In **settlement forms**, (urban space; residential environments etc.) the ordering of open space is related to the collective exteriors of buildings (primary cells), and other systems of boundaries, both hard and soft. Urban space puts back together and mixes all the different social groups in which society divides itself based on social rules; gender; age, occupation etc.: 'transpatial solidarities' (which are not spatially defined), as well as 'spatial solidarities', which are defined by locatedness (with varying investment in spatial boundaries).

Thus the ordering of space has a multiplicity of social 'functions', ways in which it realises society, structures social interaction and creates social realities. In this sense architecture and urban design are about spatial events and not merely 'function' and 'representation', as is generally taken for granted in architectural discourse.

Space syntax focuses on two fundamental aspects of spatial configuration which appear to capture different levels of spatial organisation:

- Convexity, the two dimensional extension (fatness) of space defined by the positioning buildings, their boundaries and entrances, which relates to local order. Convex spaces, by definition spaces where all points are visible by all other points, are about local presence and awareness of a specific location.
Axiality, linear extension, analogous in a sense to lines of sight, that link convex spaces and relate the local structure to the global structure of space. By its nature, axial organisation represents the most economical description of the global structure, and is thus more related to movement across space, and orientation through lines of sight in the larger system.

Space is by definition a continuous network, though it is structured in ways particular to each society. The concepts of local and global are also fundamental, in that they capture two levels of order. Spatial organisation at the local level, is related to a space and its immediate neighbours, without taking the rest of the network into account. In contrast, taking the whole system or network of spaces, addresses the global organisation of space.

A new sociospatial paradigm:

In contrast to the causal 'Man-Environment paradigm', Hillier and Leaman (1973) propose a model of the man-environment relation (influenced by Piaget and Saussurian linguistics) based on wo/man's ability to 'read' the abstract logic of space ("description retrieval"). This involves an interactive process of perception/cognition and constructive learning by experience as the basis for a new 'man-environment' paradigm. Space is not only 'read' by using and moving in the spatial environment, but structured for social purposes - constituting spatial behaviour.

Humans thus create mental constructs on which they base their further movement, manipulation and assimilation of experience. This framework bears similarities with the model of target selection (discussed in chapter 3), where criminals basically construct 'templates' of good and bad targets through experience, and constructively use these in order to select further targets. It can be argued that this 'reading' of the relatively simple relational properties of spatial configurations is the way people learn to use space, and criminals use space for their purposes too. A 'reading' of the spatial properties of the built environment, building up experience and skill, is likely to be part of the criminal's 'crime-templates' construction. It is on this basis, one may argue, that the environment affects spatial behaviour (and vice-versa).

This paradigm thus can overcome the distinction between objective/subjective space patterns as investigated in criminological research. It provides a useful framework to

---

2 Hillier and Hanson (1984) argue this in more structural cognitive terms as the 'reality sandwich', in that the objective reality -abstract logic of space which lies in the nature of spatial relations combined in an active learning process based wo/man's subjective ability to recognise and constructively use these and thus construct and shape an objective reality to fit social needs. This is an attempt to establish the fundaments of a new paradigm (Hillier and Hanson, 1984; 1987).
study patterns of victimisation and criminal behaviour - both perspectives at once, describing space so as to capture the physical properties perceived by the criminal as opportunity or risk; and map spatial configuration at the level at which it is used to move and access a dwelling. However, there is more empirical work to substantiate this kind of perspective on man-space.

- **Empirical Research: Methodology**

Over years of empirical cross-cultural research, the UAS, based on the above has developed methods of analysis known as 'Space syntax' which include:

- Systems of representing or mapping spatial configuration (convex and axial maps on which spatial information can be plotted);
- Systems of 'measurement' of the abstract properties on the basis of the system of spatial relationships eg. Depth; Connectivity; Integration; etc.;
- Methods of observing space use/abuse and movement;
- Ways of correlating spatial/configurational properties with observable spatial manifestations of human behaviour patterns and of social interaction/organisation, using relatively simple statistical procedures (correlation; simple regression; tests of difference).

Within the extensive body of research, there are certain basic themes which have developed empirically and theoretically that are relevant to the context of this study:

- Studies of space use, and the theory of natural movement;
- Studies of the pathology of modern environments compared to traditional urban space; Critique of modern design theories and of the sociology of space;
- Studies of patterns of crime.
3.1.2 Patterns of space use and spatial configuration: Theory of natural movement.

Hillier et al. (1987) argue that the architecture of the environment affects the patterning of 'spatial life' in that the spatial layout, influences the pattern of space use and movement. Based on extensive case studies of different types (spatial form and size), research findings suggest that 'degree of Integration', and 'intelligibility' are key properties of urban layouts, and that the pattern of pedestrian movement is determined to a large extent by the pattern of Integration. The natural movement 'phenomenon' - the statistical distribution of individual journeys (from A to B) - was found to be a product of the morphological logic of urban grids, the key rationale behind it. Syntactic analysis of the local and global structure of the urban grid, is combined with simple techniques of observing space use and movement, as explained in a paper presenting the findings of a large research programme on "Natural Movement: or Configuration and Attraction in Urban pedestrian Movement" (Hillier et al., 1993). This paper, based on the study of a large area of London around King's Cross, the city of London and a south London Estate, presents evidence of "a configurational paradigm", which contradicts the existing theories of pedestrian and vehicular movement based on "attractors" or flows to and from buildings shops etc. It argues that "the configuration of the grid itself is the main generator or regulator of pedestrian movement", and that shops etc. might equalise or boost/multiply this effect. Natural movement, is defined as the proportion of pedestrian movement generated by the urban grid; though not always the largest proportion it is the most pervasive. Urban grids are thus structured to create a kind of "probabilistic encounter field", which as Hillier et al. (1987) argue has important social implications.

The configurational correlates of natural movement are found to be the degree of Integration, a key measure of global properties of urban grids, which found to be the most important predictor of movement (particularly with respect in the large context area). Axes with concentrations of shops deviate from the pattern, they tend to 'overperform' due to the 'magnet' effect.

---

3 Intelligibility, measured as correlation between connectivity (local property and the integration value of the same line (a global property) is shown to be a key of the spatial structure of towns, which is often missing in modern layouts.

4 Usually shops are located to take advantage of the opportunities offered by the basic pattern of natural movement (= proportion of movement generated by the urban street configuration (grid); though not always the largest proportion of movement in urban spaces, it is the most pervasive). Urban grids seem to be structured so as to create by generation and channelling of movement, a kind of probabilistic field of encounter or avoidance.
Whilst integration values are strong predictors of natural movement in traditional street-based urban areas, e.g., Barnsbury village in London, in housing estates, this predictability breaks down. Housing estates 'underperform'; they are often found to have very low levels of movement, also explained by the configuration. For example in the case of Maiden Lane, one of the estates examined in the study: movement concentrates on the periphery (easiest way/ fewer axial steps) and drops dramatically with increasing depth (negative correlation of r = .793, p < .0001). A mean of .27 persons per hundred metres or per minute (phm/min), and an average line length of 50m would mean that "a pedestrian would be out of visual contact for about 88% of the time" (Hillier et al., 1993:52). In contrast, in traditional urban residential streets (with average encounter rates of 2.27 pm/min coupled to mean length of 300m) one is virtually in constant visual contact with others, usually several in the same street.

As observed in Marquess Rd Estate, many housing estates have lower average rates of encounters at midday, than even quiet residential areas at midnight. Coupled with the scaling down of space, which is also a typical characteristic of housing estates, one begins to understand the extreme sense of isolation, which people often report in modern housing estates, especially those whose lives are restricted to their home and neighbourhood. The rapid fall-off of movement rates with depth is a very common phenomenon in housing estates not really related to density (see for example Marquess Rd Estate). "Spatial configuration freezes out all natural movement from the estates" (op. cit. p.51). However, the reduction in scale and multiplicity of paths etc. also thins out movement and even further reduces awareness: this is another aspect of configuration apart from the pattern of integration.
3.1.3 Pathology of modern environments: housing estates:

Hillier and Hanson (1984; 1987) argue that architectural ideas typically relate spatial concepts with social values. In his paper 'Against Enclosure', Hillier (1988) argues that this is the case in housing design with the small relatively well bounded community, forming an identifiable social and spatial unit: "Enclosure has become the basis for a methodology of layout design, where local enclosures are either repeated or transformed to form a larger group, a 'hierarchy of enclosures'. Enclosure, repetition and hierarchy are the fundamental principles of modern designs, often proposed to remedy past errors".

Hillier (1988: 64) argues that "enclosure is not the answer to the urban problem, but the problem itself". Using syntactic methods of analysis on the example of the traditional town of Apt, shows how a collection of idiosyncratic forms can form a coherent system, forming a 'deformed grid' of irregular spaces, both with respect to their one-dimensional axial organisation (lines of sight) and their two-dimensional convexity. Hillier argues that intelligibility of the global from the local, and continuous use characterise urban space of the past. In contrast, modern environments characterised by morphological repetition- similarity of their parts and predominantly localised reference points - strongly lack this kind of intelligibility. Hillier identifies two important properties of traditional urban space which are lost in modern environments:

- All convex spaces are related to building entrances, so that there is continuity of control of spaces by entrances, a principle which provides a relative continuity of potential surveillance. Again this is systematically violated in modern environments, where the clustering and hierarchy principles systematically separate movement from dwelling entrances.
- Convex spaces are linked through lines of sight (axial organisation) to each other and to the overall global system of space. This way of operating at two scales is the single most important property of the deformed grid type of urban space.

In the "Architecture of Community", Hanson and Hillier (1987) offer a critique of territorial design theories and neighbourhood theories, which attempt to create a correspondence between spatial zones and social groups and see territoriality and/or the basic need for privacy as the fundamental link between man and the environment. They argue that the correspondence model is only one way of creating spatial order, whilst offering examples such as Wilmott and Young's (1962) study of Bethnal Green, where social groups are not only dependent on space, but there are other agencies/social rules that define solidarities across space, for example kinship; membership to professional groups etc. Whereas in the correspondence model, there is a need for identity through strict rules of exclusion and strong physical boundaries, while space becomes deterministic and the spatial interface highly structured, in the noncorrespondence model, space creates a more open system, mixing different groups and bringing them together, creating a more probabilistic encounter field, which is associated with 'liveliness and robustness of some of the traditional communities' street life. Thus Hanson and Hillier argue for "structured non-correspondence", which it is argued can create the kind of 'robustness' associated with traditional neighbourhoods.
Integrating cores, the most important semi-grid of top integrators, which form the heart of a system\(^6\), are the mechanisms through which towns generate contact, and the type of core shapes determine how, and what kind of pattern of contact is generated. On housing estates, again, there is often no well structured core (eg. see Marquess Estate, the most integrating lines are on the periphery). Another important characteristic of modern housing estates is generally a drastic reduction of spatial scale (compared to that of context); and the increase in spatial complexity - number of spaces/lines; lack of integrating structure.

Investment in axial organisation is an important property of traditional urban systems: allowing the simultaneous participation in both local and global structure. Both the intelligibility of the large scale, above the observer’s immediate awareness, and the intelligibility of the smaller scale potentially below the observer’s level of awareness, are maintained by what appears to be a principle of sufficient axially.

Hillier criticises modern housing designs for lost properties of the traditional street based residential urban environments. The loss of intelligibility, the dramatic drop in encounter rates, to the extent that Marquess estate has a lower encounter rate at midday than Barnsbury at midnight, claiming that "in terms of their natural encounter field, people on these estates live in a kind of perpetual night". (p.77) Other less obvious properties are also lost, eg. the copresence of adults and children breaks down. While in traditional environments children and adults are in a constant natural interface with each other, in many estates this correlation breaks down.

Another of the long-term effects of these ‘lost properties’ is potentially a vulnerability to crime. Mentioning the work carried out by the present author, on crime on housing estates and in the traditional area of Barnsbury, London (as part of this PhD thesis) Hillier argues that burglary risk rises with the degree of segregation (also clearly the case in Barnsbury). The properties which have been identified in general as key properties of urban space - integration and continuous relationship to building entrances - are both critically bound up with the pattern of burglary vulnerability. Hillier notes that the results cast fundamental doubt on the whole concept of defensible space, at least in so far as the elimination of natural movement and encounter within housing estates will increase safety. Hillier criticises the defensible space approach in that it has influenced people to think that strangers are in principle dangerous. On the contrary, the natural presence of people may be the primary means

\(^6\) In Apt it is shaped like a deformed wheel, however different towns or areas have different shapes of cores. The encounter field is the natural pattern of background space use and movement created by the urban pattern of space and the distribution of buildings within it.
by which space in policed naturally, as Jacobs has argued. When natural movement is eliminated, it is more likely that people will behave more territorially, question the presence of strangers. The spaces that are devoid of people are often also associated with feelings of insecurity, while the presence of people generally increases the sense of security.

3.1.4 UAS Research on Crime patterns and Antisocial behaviour:

A study of the 'Spatial Pattern of Crime on Studley Estate' in Stockwell, London, was carried out based on data from a questionnaire survey into residents attitudes and experiences of crime. It attempts a rigorous investigation on the extent to which vulnerability to different kinds of crime is related to spatial design. The case study is carried out in three stages:

1. Analysis of the spatial layout of the estate. Due to the complex structure of pedestrian paths in spite of the openness of the layout, encounter observations showed that movement is biased towards the periphery and the edges/entrances of the estate, and encounter rates fall with increasing depth. Internal spaces were found to be more dominated by children whose numbers do not fall towards the centre, as adult rates do. Both Integration (with respect to the large context) and depth were found to correlate well with the pattern of movement. Children exploited spaces rarely used by adults, and the analysis showed how 'natural surveillance', the interface between adults and children, breaks down.

2. Stage two of the analysis involves the mapping of crime; perceptions and other indexes onto the spatial pattern - transcribing the questionnaire information onto the spatial maps, which allowed the investigation of relationships between pattern of fear and crime and spatial layout. This revealed that almost all spaces are feared by at least some residents, particularly in the more segregated parts of the estate. The study found a strong bias of avoidance towards segregated locations, which were poorly

---

7 It should be noted that the analysis of the authors case studies based on police data had started in 1986, and results had already been reported by Hillier (1988). This study was based on victim survey carried out by the Harris Research Centre for the Crime Prevention Unit of the Home Office. Advantages and disadvantages/reliability of victim surveys are discussed at a later point compared to police reported data Overall response rate not mentioned in report!

8 Using UAS methods of quantifying spatial properties and indexing the axial representation of the spatial structure with measures of local and global configurational properties (based on various spatial reference systems) see Hillier et al (1989:)

9 On average one is out of contact with others about 60% of the time ( mean encounter rate of .638phm; one is likely to pass another adult about every 1.5 minutes with an average space length of 65m) - milder than in other estates eg. Maiden Lane.

10 Integration with respect to the estate embedded in its context found to be the best predictor (in system 3 radius one kilometre context excl. estates: r=.752 p=.0001). Depth also found to correlate with encounter rates (logarithmic correlation).
used by adults and much frequented by children. (A strong correlation was found between avoidance and densities of children, as well as a highly significant yet moderate correlation between avoidance and segregation).

This "neat picture of avoidance" is confirmed and contradicted by the actual pattern of crime locations. A concentration of crimes (assault and theft from person) was found around the tube station in the east corner of the estate, but also in two central back areas - relatively segregated yet easily accessible from the outside of the estate, which were also hot spots for assault. No simple pattern of vulnerability could be traced, since crime risk was related to both segregation and to 'easy access' from the outside. Corners seemed to also feature often in victimisation. A correlation between rate of assault relative to length of line and segregation was found, though this may have been related to the correlation between length and segregation. A strong negative correlation was also found between assault rates (relative to length) and the presence of children. In contrast, car crime was found to be predominantly in the internal routes of the estate, with min. incidents on the peripheral roads (again densities of car crime relative to length; in this case more reasonable, since length = number of parked cars).

Clearly more research is necessary to clarify these questions, though the weighting of robbery/assault relative to length may be a problem; (should be relative to opportunities; i.e. encounter rates)! The findings, however, indicate a trade-off between more integrated spaces ('easy access') with enough potential victims, and the advantages of segregated spaces.

Burglary and attempted burglary were by far the most common crime on the estate 11:

- **Ground dwellings**: 4.5 times more at risk than upper level burglaries. For blocks with internal access the rate was found to be double that of blocks with direct entrances (30%, and 18% of respondents respectively).
- **Upper levels**: blocks with internal access had a lower rate (6%) than blocks with direct upper access at 8%.
- **Overall rates** for direct and indirect access blocks were found about the same (9-10%) equally vulnerable.

---

11 Rates were measured as number of reported burglary/number of respondents. Burglary rates were correlated against Integration. However calculating crime rates; for example even burglary rates is a little more difficult depending on the response rate, however, there is not reason to believe there was a spatial bias to responding. Victimised households are probably more likely to have responded.
For ground level burglaries, the mean integration rate of burgled dwellings (assigning each dwelling the integration value of the line from which it is accessed) was found to be significantly more segregated than the mean for nonburgled dwellings. This was stronger in cases of dwellings with direct access, rather than the indirect access ground dwellings, where the burgled were only marginally more segregated (significance not proven). At the upper levels, the pattern was reversed: burgled dwellings were found to be more integrated than nonburgled; though again this is stronger in the case of direct access compared to indirect access.

The above findings suggest that the pattern of burglary is spatially influenced by the interaction of both local and global factors, the local factors being direct/indirect access and global being the pattern of integration. Hillier et al. conclude that overall, the spatial design of the estate makes integrated dwellings more vulnerable than the more segregated dwellings (which agrees with notions of 'easy access'). This is explained as a result of the concentration of the most vulnerable type of blocks ie. those with concealed ground entrances, on more integrated locations.

However, there is a slight problem with the reliability of results with respect to spatial bias; There is not enough information about the total dwelling breakdown as well as the detailed breakdown of respondents and non respondents (at least in the case of burgled/ nonburgled households). If the proportion of non-respondents is high: it would have to be checked, whether the sample of respondents is representative of the overall sample, and that no spatial biases occurred (for example against upper levels etc.; victimised households are probably more likely to have responded in the first place). What the study did manage to show for the first time, was that the reversal of the pattern of vulnerability with respect to integration depends on internal and external block access type.

Two more recent studies, which were conducted by the UAS on the patterns of crime and spatial vulnerability to crime include:

A study of pedestrian behaviour and movement in the Kings Cross Area, part of an appraisal of two alternative schemes for the Kings Cross Terminal development project (Hillier, Penn and Stonor, 1992). Illicit activities in front of the station (north pavement) were observed as part of the study of space use and movement by passengers, passers by, prostitutes and 'others' (pimps, drug pushers and homeless). Given further visual cover by the boundary between the concourse and

---

"The Kings Cross Project" study found that prostitutes and 'others' far outnumbered the numbers of men and women that were stationary, rather than moving through. The presence of 'anti-social'
the forecourt, illicit activity is concentrated on the highly integrated forecourt space, which local 'social activity' leaves vacant directly in front of the station. 'Antisocial' and illicit activity is attracted to and takes advantage of the high flow of people, and also given cover by them. In contrast, it is argued, normal 'social' activity, defined as the product of locally generated movement (in contrast to globally generated by 'magnets') depends on high integration, both for movement and for static use, the combination of which provides its own natural policing and surveillance.

Finally another major study on 'Crime and Security in Hospitals' compares crime and security at the Pinderfields Hospital building complex, with Greenwich Hospital and the Royal Devon and Exeter (Penn et al., 1994). Though not directly relevant to the study of residential burglary patterns, certain interesting findings shed light on the mechanisms and dynamics of vulnerability, particularly on the interrelationship between local and global properties.

Based on the UAS report on Crime and Security at Pinderfields (Penn et al. 1993) which investigated the patterns of crime; fear of crime and avoidance behaviour amongst staff in relationship to spatial configuration, this study attempts to further test the Pinderfields findings in other hospital designs. The study was based on a questionnaire survey and using the latest UAS methods of configurational analysis of the spatial and visual properties of the buildings.

Findings from questionnaire showed differences between the hospitals: while theft was far higher at Pinderfields, attacks were far higher at Greenwich and slightly less at Exeter. Car crime accounted for about 50% of theft. Car parks were particularly feared, in all cases, particularly prevalent in Exeter (55%). Nurses (the largest group of activity was overshadowed and disguised by the high rates of movement of people to and from the station, to a large degree a result of the transpatial 'magnet' of the King's Cross Station.

Questionnaire investigated experience of crime, reporting or not; locations; awareness and fear of crime; carried out in all three hospitals, though the later study of Greenwich District Hospital and Royal Devon and Exeter Hospital crime data were not located accurately enough to benefit the analysis (Penn et al. 1994: 9-12).

The study compares the findings from the questionnaire, of the three studies in relationship to the hospital designs in spatial terms, employing the latest computer-based UAS methods of configurational analysis, focusing on measures of global integration; local integration; and control. Spatial analysis was supported by observations of space use, as it had shown in the Pinderfields study, that space and activity in a hospital are closely related, and that certain types of activity act as a deterrent to crime. Observations were carried out on eleven categories of staff (nurses, doctors, admin, etc.) and inhabitants were noted and analysed, with respect to five categories of activity in order to identify use patterns of the building for different categories of 'inhabitants' and 'visitors'. On this basis, crime and avoidance patterns were related to spatial use patterns and compared across the three hospital designs, as far as possible.

Crime problems were found to be higher at Pinderfields particularly theft (74% victimisation among respondents) was much higher than in the other two hospitals (15% at Greenwich and 11% at Exeter), while reporting rates were particularly low. Greenwich was found to have the highest rate of attacks (17%) while Pinderfields had the lowest rate of 7%.
of staff) were found to be the most highly victimised, proportionally much higher than other staff categories. Awareness of crime was higher at Pinderfields and Greenwich compared to Exeter (74%; 73% and 55% respectively). Women were more aware, in all cases. Perceptions of the location of crime depended on the area of work for each person (more awareness); however, carparks, which are also highly used spaces were also generally perceived as unsafe. All major concentrations of crime were found to be registering in the staff’s perception of vulnerability: carparks; outpatients; Accident and Emergency. At Greenwich, the psychiatric ward also registered high.

The main findings include the following:

• The analysis found a significant relationship between the location of crime and the degree to which that location is visible from building entrances. Car parks at Exeter were particularly vulnerable, since on the whole they are not visible from the building entrances.

• Overall, a pattern of separation of static activity and high rates of movement was found in all three hospitals, largely depending on the way that the large scale circulation structure is generally removed from functional departments.

High crime was related to:
• lack of static presence of people-as movement and static activity are separated in the majority of spaces through the design of the hospital;
• limited visibility from entrances (majority of crime in carparks);
• highly integrated spaces with high rates of movement and low static presence, often spaces easily accessible from the outside,
• In many cases high concentration of crime (theft) is explained by the presence of locker-rooms (and carparks).

The pattern of spatial vulnerability was found to relate to the lack of surveillance and to the pattern of integration (circulation and access). The study concludes that "the spatial design of hospitals and the patterns of movement and activity the designs generated, are strongly related to the location of reported incidents. This suggests that

---

16 In both Greenwich and Exeter, the pattern of contact between static people (co-presence; waiting) and movement showed a strong split: all areas of waiting are removed from the main movement spaces (apart from transition) i.e. high number of patients / low movement, whereas corridor spaces have overwhelming amount of through movement outnumbering the static presence of patients. A strong correlation was found between static presence and 'control' values (excluding high circulation's spaces).
spatial design will form an important policy tool at the disposal of management in the fight against crime” (op.cit. 5).

This most recent study confirms the idea that there is an interrelationship between local and global factors (Hillier et al. ‘89) as well as findings from other studies. The study finds no straightforward correlation between integration/ segregation and vulnerability to theft for instance. Static surveillance (waiting space) is a key aspect of safety; whilst integration can under certain conditions create vulnerability, due to the high degree of movement, without surveillance. This once again confirms criminological findings that surveillance is important combined with accessibility in the pattern of vulnerability to crime. It also confirms that the spatial pattern of crime is related to the overlap of the spatial pattern of offenders and the spatial distribution of potential targets (Brantingham and Brantingham, 1984). The concentration of crime in car parks and locker rooms is strongly related to the predictable presence of targets. However, the actual distribution (locations) of crime is affected by restricted surveillability/ visibility from entrances (car parks); and spaces which have high through movement, i.e. are globally integrated and easily accessible from the outside, but low rates of static use - i.e. tend to be less well connected locally to the substructure of the hospitals. This is analogous to the findings on concentrations of antisocial behaviour outside Kings Cross Station.

Thus UAS research shows, there is an interrelationship between local and global factors, which needs to be further investigated and specified in terms of housing design.
3.2 **Specific research aims:**

This thesis focuses on the most location specific crime of residential burglary. It started at a time when this subject had not yet been approached within the UAS in the mid eighties, and therefore has had a relatively exploratory nature, whilst applying space syntax, taking on a more architectural emphasis as the territory began to crystallise.

The aim of this research thesis is to study the patterns of spatial vulnerability in relation to the architectural variables in the design and layout of housing estates. The hypothesis, as established in criminological research, is that access/accessibility and surveillance/surveillability are the principle factors of vulnerability of dwelling location with respect to burglary (to be further tested). Furthermore, although at a somewhat later stage, the findings on Studley Estate (Hillier et al. 1991) demonstrated that the interrelationship between local and global factors needed further investigating.

Dwelling occupancy and target value, non-architectural variables found to affect risk in more affluent areas, were not included in the scope of this study. They may be increasing 'randomness' of the spatial patterns, but there is no reason to believe that they would be creating spatial biases in the pattern of locations. Target value is generally low on housing estates overall and dwelling occupancy is not spatially structured, so that they are, just as the socio-economic variables of households, considered to be more or less constant on the estate - not intervening variables.

Within the context of the above, the **research objectives of this thesis are defined as follows:**

1. To study patterns of burgled dwelling locations in a number of different housing designs.
2. To elaborate a research methodology, based on the application of syntactic methods as outlined above, which can identify the spatial/design variables that relate to burglary risk (including accessibility and surveillance), and measure these where possible in quantitative terms.
3. To describe the mechanisms of spatial vulnerability at both the local and global level of spatial configuration and design, as well as the interrelationship between the two levels.
4. To translate these back into design terms and provide feedback on design strategy and choices, with respect to spatial vulnerability.
The ultimate aim is to relate spatial vulnerability back to design strategy and provide insights for architects and necessary feedback on the design guidance on housing layout.

3.3 Research Design: Case Studies:

The research is based on a series of case studies. In order to establish which factors have an effect on burglary risk in terms of design (block layout, access features etc.) and spatial configuration - (global structure); and establish patterns of interrelationships between local and global factors; both breadth and depth of research is required, considering the lack of relevant work in the specific field. Thus although initially the idea was to attempt a broader study with a larger number of cases, it became apparent that more exploratory in depth analysis was required in order to come to grips with the variety of local factors related to design 'variables' influencing victimisation risk- and the interrelationships between them - the mechanisms of spatial vulnerability, defined in each case on the basis of the individuality of each estate design.

Thus the research is based on three extensive case studies of burgled locations in public housing estates in London, focusing on both qualitative and quantitative analysis. Each case study is both exploratory, since it seeks to identify the variables which relate to spatial vulnerability at the local level and their interrelationship with the global, and aims at quantitative rigour, applying statistical methods and established methods of spatial analysis in a new context. The study focuses purely on burglary in public housing estates, as the most location specific crime, in police reported data. The possibility of carrying out an independent survey in order to collect first hand victimisation data was considered totally beyond the limits of this PhD. The study therefore is based on police reported data.
3.3.1 Criteria of selection of the case studies:

- **Sufficient cases of reported burglary in a year:**
The first criterion was that the estate be a high crime estate, in order to have enough cases of burglary in a year, and in order for it to be of interest for the authority being approached for data. This also meant that the estates tended to be of relatively large size, in terms of number of households/population; though not necessarily in terms of area.

- **Range of design features: variations on theme:**
The second most important criterion was a relatively broad range of designs, so that a variety of housing design approaches, i.e., design variables could be investigated, yet not so different as to make generalisations impossible. The estates were selected to be mixed developments from the same period - medium- to low-rise, higher density estates, designed and built in the early to mid seventies - each presenting a variation to the theme of 'streets and courtyards' concepts re-interpreting more traditional elements of urban spatial organisation:

  - **The Marquess Road Estate**, London Borough of Islington, ex- GLC: typical of the 'neo-vernacular' approach; inner city; high density - low- to medium-rise; informal 'organic' layout; insular in spite of inner city location.
  - **The Andover Estate**, London Borough of Islington, ex- GLC: mixed development; predominantly low- medium -rise; high density; relatively integrated; inner city location, typical of GLC design guide approach.
  - **The Ferrier Estate**, in Blackheath, London Borough of Greenwich; suburban location; mixed development; medium- to low-rise, medium- to low-density; geometric; courtyard-based open layout.

- **Different type of area and relationship to urban context:**
  - The Ferrier estate is in a suburban context and highly segregated location; the other two in inner city locations; not very far from each other, yet in totally different types of areas; one mixed, with high proportion of commercial uses in the area; the other more residential and segregated on one side.

- **Similar socio-economic population features: age of 'community' and similar allocation policies: average target value:**
The cases are all ex-GLC housing estates built in the early to mid seventies.

---

17 There is probably a relationship between the probability of it being a problem estate and size.
They are all considered as 'hard to let' estates at the time of the research; their socio-economic population features are in many ways comparable: eg. high proportion of ethnic minorities; high unemployment; high proportion of single parent families etc. This means that 'criminogenic' characteristics and levels of 'social disorganisation' are sufficiently **comparable** from a sociological point of view, as is the **average dwelling target value**. It was considered important that the local 'communities' were of more or less a similar age; that differences in average length of stay were not too great and similar allocation policies had been applied, particularly the fact that all ex-GLC which transferred to the local authorities (Labour run local councils) in 1982.

- **Availability of Police Data:**
  A most important criterion was naturally, the possibility of acquiring data from the Metropolitan Police Authority. In the mid- to late eighties this was a big problem, due to the confidentiality of police data. One years' data on locations of burglaries was obtained from the Islington police areas, and Greenwich police authorities.

- **Finally** it should be noted that an important criterion of selection was the **avoidance of estates with predominantly high-rise and slab-block forms** in contrast to the American studies. The author's interest lay in investigating beyond block features the local and global properties of layout, therefore aiming at sufficient variation in terms of degree of integration etc. of dwellings, which involves direct access rather than indirect block access forms. Hence the interest in predominantly low- to medium-rise forms, rather than high-rise, which does not allow internal differentiation with respect to accessibility in syntactic terms.

### 3.3.2 Data: Limitations of the study:

Research studies focusing on crime locations are confronted with two kinds of limitations:

**A. Data:** difficulty of acquiring location specific confidential data, based on reported residential burglary incidents (here: one year's data only with small number of cases).

**B. Layering of different factors:** the complexity of interrelationships of factors (relating to the distribution of targets and/or "opportunities" for burglars - and the different distribution of offenders, and the overlap of the above) places limitations on the fragmentation of data in the analysis and on the statistical analysis (lower significance levels of tests of difference (T-Tests) and of correlations).\(^{17}\)

\(^{17}\) Overlapping factors (eg. target hardening, carelessness; n n occupancy etc) will inevitably be adding randomness to the spatial patterns of vulnerability, though there is no reason to believe that systematic biases occur. This means that the results of statistical analyses (significance levels of Tests of difference between samples or correlations) will be weakened, they will not be distorted. However, due to the small number of burglaries and the overlapping of factors, certain limitations occur in the statistical analysis of factors affecting burglary risk, particularly in the case of the Ferrer Estate (see chapter 5: p.313 where the issue of weak statistical significance levels is discussed in footnote 31). For this reason the significance levels between p=.05 and p=.10 are treated as statistically probably significant; between p=.01 and p=.05 as significant, and below that as highly significant etc. as usual.
• Reported; Recorded and actual crime occurrences:

A. There are two possibilities, to acquire data on burglary locations: the official police records and an independent survey aiming at victim reports. Both types of data are faced with limitations. Most studies depend on police data, which suffer from the 'dark figure of crime' problem. A significant portion of crime goes unreported, thus police records do not reflect actual numbers of crime, since recorded crime is a portion of reported crime, and that is only a fraction of the actual crime that takes place. Maguire (1982: 13) sums the problem up as follows:

"The overall message from research into the relationships between police-recorded and victim-defined burglary is that the official statistics represent somewhere between one-quarter and one-half of all cases in which residents think or know they have been burgled.... Whatever their numbers, unrecorded burglaries as a group are markedly less serious in terms of loss or damage than recorded burglaries, and a high proportion of unrecorded cases are 'walk-ins' and unsuccessful attempts at entry."

NACRO's (undated) bulletin on burglary estimates reported burglaries in 1983 were about 68% (48% recorded) of the total estimated crime; while the Islington Crime Survey in 1985 (Jones, Maclean and Young, 1986) found reporting rates in the area of Islington to be over 70%, which suggests that burglary has one of the highest reporting rates compared to other types of crime (due to insurance claims). A number of studies, as for instance the above, direct their attention at the public directly, and a generation of victim studies has evolved, which however are also not free of high error margins (due to inaccurate answers, and memory of potential victims etc.). Keeping the above in mind in dealing with the research design, police data is considered reliable enough, particularly combined with additional information from primary sources (eg. interviews etc.), it still provides a good basis for research (Maguire, 1982).

---

18 On the one hand reporting of burglary incidents depends mainly on victims or their neighbours; few crimes are confessed by arrested offenders; therefore a considerable portion - according to victim surveys - goes unreported. On the other hand not all crimes that are reported are recorded. The police decide whether to record a reported crime, whether the offence is genuine; therefore a portion of reported crimes gets 'no-crime'. Studies have focused on the reliability of police data show considerable variation in their estimates of the proportion of actual crime they police records represent (McCabe and Sutcliffe, 1978; Sparks et al., 1977; Bottomley and Coleman, 1980). More important is the failure of the public to report, especially if they are not insured, due to triviality of damage and to lacking faith in the police being able to do anything about it (Jones Maclean and Young, 1986).

19 The majority of studies (Scarr; Repetto; Walsh, Maguire, follow a multilevel investigation, starting with a profile of burglary based on police records in a specific area attempting to pinpoint factors which appear to correlate with differential burglary rates household characteristics such as socio-
In the case of the present study, there is even less of a problem for, despite the thinning out of data, there is no reason to believe that the reported data is spatially biased. As this thesis focuses on the patterns of spatial vulnerability, not the causes of crime, and investigates factors relating to the vulnerability of target locations, the factors will apply irrespective of the amount of data. As long as the data is not too thin, so that patterns are unclear, the pattern of spatial vulnerability on each estate based on target selection criteria, will be relatively unaffected - irrespective of the fact that some actual burglary occurrences have not been recorded.

3.4 Detailed methodology of each case study:

The methodology is the same in each case study. The order of presentation of the case studies is based on order of complexity: starting with the Marquess Rd Estate study, which has the smallest number of local variables (most factors are relatively constant) and focuses predominantly on the global factor of accessibility; followed by the Ferrier Estate, with relatively few combinations of local factors; and finally the Andover Estate, which presents a large variety of local factors of accessibility and surveillability. Each case study consists of six stages, as follows:

3.4.1 Introduction: General architectural description of the estate:

Stage one, involves a conventional description of the housing estates design, seen mainly from the architects' perspective which includes:

- **General Profile** (location; size; construction; dwelling and population composition)
- **Urban Context** (up to scale 1: 2000);
- **Site layout**: general strategy of design (decisions at scale 1: 500 including vehicular access; pedestrian access; parking overall principles of layout/ morphology location of facilities);

---

economic indices and urban/suburban location aggregated at the level of a geographical area unit-usually census tracts or police subdivisions. A more detailed analysis of characteristics of victimised households is carried out through a survey based on interviews, selecting a random sample of victim households from police records and comparing that against a control sample of random non-victim households (information about socio-economic characteristics; behavioural patterns and attitudes as well as dwelling characteristics). Further information on burglary is acquired through interviews with convicted burglars, questioned on their preferences, method of operation target selection criteria etc.
• Block configuration and Typologies of access (scale 1:200 to 1:100 including block/dwelling typology: in relation to dwelling Access; front and back faces etc.);
• Open spaces: Pedestrian network; and open spaces; landscaping;
• Experience of the estate: Impressions of estate and observations of space use; fear of crime; presence of incivilities etc.

3.4.2 Spatial Analysis: Syntactic description of spatial structure: 
Relationship to dwelling access: space use.

The UAS methods of syntactic analysis (see Hillier et al '83; Hillier and Hanson '84;), are applied to provide a systematic description of the spatial configuration of the housing estate, based on:

- **Spatial Organisation**: Abstract representation of the system of spaces in the form of axial diagrams, which best capture the global structure (related to the pattern of access and movement). Large convex spaces are seen in relation to the axial organisation. The axial map is used as the basis on which to 'plot' design information and locations of burglary.

- **Pattern of Integration**: Quantitative measurement of spatial properties of the configuration, particularly focusing on Integration, the measure of the degree to which each space is linked to all others in the system. UAS research has established that, 'Integration' (RRA) is one of the most important syntactic parameters, measuring the relationship of each axial line to the axial structure as a whole (Hillier and Hanson '84, Hillier '88, Hillier et al '89). Reciprocal RRA is the numerical index of the degree of integration of an axial line in the global axial structure. The location of the most integrating lines, the way they are related to each other (the shape of the 'top integration core'), as well as the location and distribution

---

20 Calculated on the UNIX and later Macintosh NEWWAVE programme (matrix input) based on the Formula defined in Hillier and Hanson (1984: 108; 113) \[ RRA = \frac{2(MD - I)}{(k-2)D_{ik}} \] where: 
\( MD \) is mean depth i.e., mean depth of a space from all other spaces; \( k \) the total number of spaces; and \( D_{ik} \) the diamond value for \( k \) spaces, dividing by which is the means of relativising Relative Assymetry for size, arriving at Real Relative Assymetry. The higher the RRA the less integrated the space; or as an average, the less integrated the system as a whole. RRA measures global property of Integration within a defined system of spaces. Apart from step Depth (from the outside, other local measures (e.g., Connectivity, Control, Local Integration) and Choice, originally investigated have been set aside, since Integration is the most meaningful measure in terms of defining space use, along with depth. The importance of Integration for the description of spatial structure is amplified by its relation to space use.
of the most segregated lines, are central characteristics of how a spatial system works—especially with respect to the location of facilities and building or dwelling entrances. The average RRA for a whole spatial system (or a part thereof) is an index of the degree to which a system is integrated. The pattern of Integration/ segregation is examined: with respect to the estate on its own, and with respect to the estate embedded in its context at various scales.

• **Pattern of dwelling Access: Interface between public and private:** The location of front and back dwelling access spaces is analysed in order to establish a picture of the pattern of constitution by dwelling entrances and the pattern of front and back dwelling access with respect to the pattern of integration and the configuration overall. The aim here is to analyse the interface between public and private space, and its relationship to the global structure.

• **Pattern of Space Use:** As UAS research has shown, Integration can predict to a large extent the pattern of use and movement in urban systems (Hillier et al., '87; '88), though not necessarily to the same degree in housing estates. Although levels of natural presence of adults and children are an important consideration in the spatial analysis, it is beyond the scope of this thesis to attempt a detailed investigation in this aspect. In the context of the present research thesis, encounter observation data for all three case studies are used from studies carried out by the UAS, or as part of another PhD research thesis, (as will be discussed in each case separately), and are then analysed by the author, in order to provide insights on the way the spatial structure works. Using simple statistical analysis techniques (correlations/scattergrams) the relationship between counts of moving; static adults and children and syntactic properties of the observed spaces (degree of integration) is analysed as well as the degree of predictability of space use.

---

21 Except for the Ferrer Estate which is in a highly segregated location.
22 The UAS has developed methods of observing space use and movement in terms of different age groups/ gender etc. to establish average levels of use and patterns of use. Average counts per space observed (spread over all periods of the day and all kinds of weather) are then correlated to configurational properties, in this case focusing on degree of Integration (See Hillier et al. 1986a; Hillier et al. 1989b 'Maiden Lane Report'; Hillier et al. 1989a 'Study of Kings Cross'; Hillier et al., 1993).
3.4.3 **General analysis of the distribution of burgled dwellings:**

- **Visual inspection:** of concentrations of burgled locations plotted on maps in order to identify regularities other visible patterns.

- **Breakdown of burglary rates by general access criteria:**
  There are certain global access factors, which are relevant across building types and morphology, which may or may not apply in each case. The dwellings are broken down by general access categories, which are examined with respect to their frequencies and rates of burglary. Although, general access factors are mainly block characteristics, they are also incorporated into the dwelling typology, by definition closely linked to the typology of the blocks.

**General Access factors:**
- **Direct/Indirect access:** depending on the type of block access: Direct access is from paths that are open and visible without intervening access restrictions or entrance controls to blocks. Indirect access is, when access is from an internal circulation system in a block, which is separated from the main network of public paths etc. and controlled by an entrance, is therefore not directly accessible to the public.
- **Ground/above ground:** (deck/upper levels)
- **Single-front/front and back access:** single- or double-sided access.

3.4.4 **Investigation of design variables: factors influencing spatial Vulnerability at the local level:**

The aim here is to identify the design variables related to the block/building morphology which relate to differences in vulnerability. In each estate, the design varies in specific ways and at specific levels and not in others. For this reason in each estate, the design variables are differently defined and combined. This involves an analysis of the dwelling typology with respect to the characteristics of dwelling access and the identification of the local variables, which appear to affect burglary risk. Therefore burglary risk (rates), calculated with respect to dwelling types (or front and back dwelling faces, where there are front and back access possibilities) are broken down by local criteria of access and surveillance:
- **Front or Back access:** with or without garden/terrace; garden door etc. With respect to back access it is important to make a distinction to the front,
whether a back door is used on a regular basis as an alternative entrance by the residents and neighbours or not.

- Vehicular/ nonvehicular access;
- Degree of Exposure/ Enclosure; and /or
- Surveillability/ visibility of access front;

3.4.5 **Analysis of the relationship between Burglary risk and Global Accessibility (Global vulnerability).**

Due to the importance of Integration with respect to access and with respect to the pattern of movement, this section focuses on the degree of Integration as the measure of global accessibility. As a quantitative global measure it is a particularly useful tool for analysing locational factors influencing the 'distribution' of crime in two ways:

a. Indexing locations of burgled dwellings with an integration value of the line from which the dwelling is accessed. Where there is front and back access, each dwelling is given an index on the basis of its front access line, as well as its back access line. A front/back average access index is calculated (where applicable).

b. Calculating burglary rates per line: dividing the number of burglaries from that line by the number of access fronts on that line (number of opportunities) front and back taken separately and together.

In order to investigate the effect of the global configuration on the location of burglary in a more rigorous way, three perspectives are investigated:

1. **Differences between average degree of Integration of burgled and nonburgled dwelling samples;**
2. **Behaviour of burglary risk with respect to the degree of Integration of axial lines; and**
3. **Relationship between burglary risk and degree of Integration calculated in terms of Integration bands.**

- **Differences between burgled and nonburgled samples of dwellings with respect to degree of global integration (RRA):** Dwellings are indexed with spatial (syntactic) parameters measuring characteristics of the axial lines from which the dwellings are accessed. These are calculated with respect to both simple and detailed spatial systems of mapping, for the estate on its own and in its global context, where applicable and with differing emphasis in each case study. The dwellings are then broken into samples of burgled and nonburgled dwellings - by direct/indirect access; and all levels separately and together.
On the ground level, both front and back access lines are taken into account.
The statistical means and standard deviations are used to describe the central tendency
and measure the degree of variation of the spatial variables for the burgled and
nonburgled samples of dwellings. These are then compared and tested (using two-
tailed Student's t-tests) in order to establish whether the differences between the
burgled and nonburgled samples of dwellings in terms of the selected spatial variables
(degree of Integration) are statistically significant. (The null hypothesis would be
that there is no difference between the two samples with respect to these parameters).

- **Burglary risk and Integration: Sample of axial lines from which
burglaries are committed:**

This stage of the analysis only deals with the characteristics of the sample of burgled lines in the attempt to further understand the degree to which, and the way in which, Integration has a predictable effect on burglary rates. Burglary rates are calculated for each line and correlated to the syntactic parameters in the various spatial systems. Burglaries are ascribed to the exact axial lines (accessing the front or the back), from which illegal entry was committed. Front access and back access are recorded separately, since conditions of entry are often radically different, and then looked at together (i.e. total potential access from each line) so that it is possible to identify possible differences according to mode of entry. Due to the limitations of the size of the sample, however, it is usually practical to concentrate on composite burglary rates.

---

23 Indirect access comprises dwellings at upper levels only, due to absence of ground indirect in all three case studies.

24 The standard 5% significance level is used, however due to the limitations of the data, the possible significance at a 10% level was also taken into consideration. Since the size of the burgled sample is generally very small compared to the size of the non burgled sample, statistical significances cannot easily be proven for subsamples of the already limited total number. The results in most cases can only be treated as indicative, and the lower significance levels determined through the t-tests, however, can used as some guide for the interpretation of our results. Furthermore, they could be used to determine the conditions under which we might get significant results: necessary sample size; confidence intervals for the values of the difference.

25 It should be noted that the differences in mapping also affected the calculations of the number of front and back dwellings per line and consequently also the burglary rates.
• Analysis of Burglary risk by Integration bands:
  Breakdown of sample of constituted lines into RRA bands:

The previous section ignores the 'behaviour' of lines, where no burglaries occurred. Thus, in order to overcome both the problem of zero burglary lines, as well as the problem of standardisation of dwelling numbers, the idea of 'integration bands'\(^\text{26}\) is introduced. The sample of constituted lines is broken down into five equal Integration bands (comprising of 20% of the constituted lines in rank order in each band). The sum of burglaries in each band is divided by the total number of dwellings in the band to produce an average burglary rate for each band. The rates are again calculated as mentioned earlier: Front, Back, and total access. These are then correlated to the average RRA value for each band.

3.4.6 Interrelationship between local and global factors:

This last stage of the analysis examines how Integration, the measure of global accessibility, which has been looked at only on its own with only basic global distinctions such as front/ back/ direct indirect, performs in relationship to the local factors in order to establish the pattern of vulnerability:

The samples of burgled and nonburgled dwellings are broken down once again by local criteria identified in the previous sections (again looking at dwelling faces where burglars have a choice, since one side may be vulnerable, whereas the other face may not be). The breakdown of burgled samples is followed by tests of difference, as before, in order to establish the extent to which the difference, if at all, in terms of degree of integration of the two samples, is likely to be significant, or whether the result is due to chance. The dwelling samples are broken down in steps by the following procedure:

• Individual local factors which comprise larger categories of dwelling faces: vehicular/nonvehicular; surveillance categories; dwelling type etc.
• Combinations of local factors: increasingly focusing on the individuality of dwelling vulnerability.

\(^{26}\) Integration bands were first employed in the UAS/GFW Pilot Project on Problem housing in Britain and Germany in the analysis of social contacts. See Hillier, Kuehne et al. 1987.
Finally, where necessary, the front/back faces are put back together again since ultimately both front and back faces are related to one target, and that may have some significance.

Although clearly the fragmentation of the data poses problems, it is thus possible to identify the interaction and interdependency between local and global factors (second order correlations) and identify the mechanisms of vulnerability, at both local and global level.

Thus, whilst in identifying the spatial variables and their 'performance', this thesis applies existing methods of analysis (syntactic analysis and relatively simple statistical techniques of analysis; simple parametric correlations etc.27), the innovative content of the methodology is twofold. Firstly, no study to date has been able to specify local and global accessibility and surveillability factors in such detail allowing more rigorous statistical analysis. Secondly, and more importantly, it is in the last stage (the second order correlations) that this thesis breaks new ground, methodologically speaking. In the identification of the 'performance' of global accessibility (Integration) in relation to the combinations of local factors, it links visibility and permeability/access factors. Through the correlation between Integration and the pattern of space use (movement and space occupancy)28, it attempts to link social surveillance to spatial structure, beyond the notion of territorial control.

---

27 It should be noted that the statistical analyses, correlations and T-tests are carried out on the Apple Macintosh Statview programme, which is a standard statistics package for scientific analysis.

28 In relation to the natural presence of people - as discussed in Hillier et al, (1993) (section 3.1.2).
CHAPTER FOUR: CASE STUDY 1
MARQUESS ROAD ESTATE: SOUTH AND NORTH.
London Borough of Islington
Location: Essex Road; St Pauls Road;
Built by GLC 1968-76
FIGURE 4.00 A: GENERAL IMPRESSIONS OF MARQUESS RD ESTATE:
(Clockwise from top): Boundary to street; Main vehicular entrance on North side; Multilayered layout with sunken ground for vehicular access; ground and raised ground and roof level pedestrian access (modified in recent improvements).
FIGURE 4.00 B: GENERAL IMPRESSIONS OF MARQUESS RD ESTATE: Neo vernacular housing scheme, high degree of enclosure and local articulation with brick landscaping. Cars parking (illegally) in access spaces despite tightness.
Figure 4.00 C: General Impressions of Marquis Rd Estate:

(Left): Blind passages linking ground raised ground spaces and the upper levels;

(Right): Raised ground level.
FIGURE 400 D - GENERAL IMPRESSIONS OF MARQUESS RD ESTATE: Roof level and Raised Ground periphery
CHAPTER FOUR: CASE STUDY 1
MARQUESS ROAD ESTATE: SOUTH AND NORTH.
London Borough of Islington
Location: Essex Road; St Pauls Road;
Built by GLC 1968-76

High density; low-medium rise; 'neovernacular';
Construction brickwork;
Size: 985 dwelling units;
Population: approximately 3,400 inhabitants.

4.1 Introduction: General Estate Profile

The Marquess Road Estate is a highly controversial public housing scheme, one of the key examples of 'neovernacular' housing design in London. It was commissioned and built by the Greater London Council in the late nineteen-sixties to mid-seventies, as part of a comprehensive redevelopment project on a site with older council housing. The design by Architects Darboume and Darke was awarded a Gold Medal by the RIBA in 1980. The design attempts to solve the problem of building in the city with high densities, without resorting to the highrise block structure.

The new housing development of the seventies comprises 985 dwelling units (developed in two parts with 611 and 375 dwelling units each), housing a population of approximately 3,400, on an area of approximately 7.1 hectares, which gives a density of about 140 dwellings/or 480 residents/per hectar. Population data were not available from the local authority at the time of this study, however, the design brief and design solution include:

- 60% 4/5-person dwellings
- 40% 1/2-person dwellings.

Approximately:
- 84% of dwellings are in 4-5-storey buildings
- 16% of dwellings are in 2-3-storey buildings ¹.

The description and analysis focus on the design of the estate in the mid 80's, when the burglaries under study took place, although modifications have since been carried out.

¹ J Kirschenmann, C Muschalek, 1980; "Residential Districts", New York, Watson Guptill Publications; (first Published in 1977, Stuttgart, Deutsche Verlagsanstalt GmbH; pp.76-77
4.1.1 Urban Context

Situated in the West Canonbury Ward, London Borough of Islington, the Marquess Road Estate is built on a large redevelopment site at the junction of Essex Road and St. Paul's Road. Figure 4.01 presents the plan of the estate in its urban context, a highly mixed residential area.

The redevelopment site is bounded to the south east by Essex Road, a relatively major traffic route linking the area to the north of the estate (NE Islington and Hackney) to south Upper Street and the Angel. Essex Road has some shops and commercial facilities, directly opposite the estate. St. Paul's Road, the estate's boundary to the north, is part of another important through-route, which links Highbury Corner to the east of London (Hackney); there are no commercial facilities here.

To the west of the estate site runs the New River canal, which acts as a boundary between the public housing area and the gentrified traditional area of Canonbury with Georgian semi-detached villas and renovated terraced housing. To the south the estate is bounded by Arran Walk and Ashby Grove, which is closed off at the junction with Essex Rd, serving as vehicular access only for the Marquess Rd Estate and Sickert Court, a neighbouring fifties' housing estate on the north side of Essex road.

The area on the opposite side of Essex Rd to the south east comprises a mixture of council housing schemes and terraced housing. To the north, on the other side of St. Paul's Rd is also a relatively mixed area with sixties council housing estates (Mildmay ward to the NE) and the spacious streets with late eighteenth and nineteenth century terraces and semidetached villas in Highbury.

The redevelopment site itself contains chunks of older fabric. At the heart of the redevelopment scheme is an older council housing scheme, renovated and extended in the nineteen fifties, which is embedded in stretches of green. On the north tip of the site, near the junction of St. Paul's and Essex roads, is St. Paul's church, the vicarage and existing residential buildings. An unbuilt school site behind these and a small park with mature trees, act as a boundary to the newer development. On the south west tip, a fragment of the older urban structure including a pub and some residential buildings have also been excluded from the redevelopment.

---

4.1.2 Site Layout: Principles of the architectural design.

The aim of the design is to create a high density, visually stimulating and varied environment, inspired by the 'informal' - nongeometric- structure and the atmosphere of a traditional urban village environment, virtually free of car traffic. Figure 4.02 presents the map of the estate in the redevelopment site and figure 4.03 presents the respective upper level (roof) plan. The older fifties' blocks and local social facilities embracing the park, create a 'soft green centre' for the estate site. The fifties' housing scheme (two-storey walk-up blocks and two six-storey blocks in a relatively open layout), has been excluded from this study, due to their different design and layout. This green centre effectively cuts the seventies' housing development into two almost completely separate parts, one residential area off Essex Rd (Marquess Rd South) with 611 dwellings (figures 4.04a and 4.04b) and another off St. Paul's Rd (Marquess RD North) with 374 dwelling units (figures 4.05a and 4.05b).

Although the layout varies between the two sections, the design of the two residential areas is similar in terms of architectural principles and building typologies. In both sections, the design scheme creates a tight, dense, mixed block-type environment, based on an informal layout, generally described as 'neovernacular' (Hillier et al. 1983). Four- to five-storey buildings, stepped in facade and in plan, form a closely knit complex interlinking at the top access level. The low-rise blocks mix in between. At fourth floor level above ground, there is a 'roof-street' system, which bridges the spaces between the blocks. The 'roof-streets' are linked so as to form a relatively continuous system in each estate section. Overall, the site plan does not follow straight lines and regular geometric shapes, imitating traditional urban villages, which have grown 'organically' over time (as described in GLC; 1978). Buildings are juxtaposed so as to form narrow winding lanes and relatively wider open spaces reminiscent of village greens or urban squares.

Vehicular traffic on the estate is restricted to minimum. The ground level of the estate is almost entirely designed for pedestrian traffic with no vehicular route through the estate linking the two parts in the original design. Vehicular access is restricted to garage access and emergency access. The main garages are located on the periphery under five-storey blocks of dwellings, building a barrier to the surrounding streets.

---

3 See article in AR 9/1974;
4 This has been blocked off and compartmentalised in more recent design improvements.
5 Ironically, the Marquess Rd Estate was named after Marquess Road which it eliminated - save for two transformed segments: one at the top edge by St Paul's church, that loops back on to Essex Rd, and one at the heart of the estate, which is the axis linking the two parts of the estate.
6 This has also been modified in recent years, so that a vehicular patrol route, which winds round the central area eventually links the two parts.
There are also partly covered sunken car parks towards the interior of each section estate, with vehicular access passing under the raised ground pedestrian access level. The peripheral blocks facing the streets around the estate, have high blind walls to the street; the dwellings facing outwards, are accessed via stairs and ramps one level above ground. Thus the scheme has a fortress-like appearance to the street from the outside. On Essex Rd and St. Paul's Rd, near the junction, there are also two isolated blocks filling in gaps between pre-existing buildings, that are relatively cut off from the rest of the estate (see north section figure 4.05a). Here again there are no ground level entrances facing the street, only at the level above.

The main entrances to the estate from Essex Rd and St. Paul's Rd are for vehicular access to the garages. These entrances generally allow limited views into the estate, which inevitably discourages strangers passing through the estate. There are other entrances at the internal edges of each estate section (north and south sections) that are pedestrian only (but also function as emergency access). The estate is somewhat more permeable to the south west boundary road (Arran Walk and Ashby Grove), while, in effect closing off through traffic (vehicular and as will be discussed later pedestrian) for about 400m on Essex Rd, south of the junction with St Paul's Rd and about 350m along the later.

Thus, the estate is an introverted 'neovernacular' scheme, bounding rather than merging with the surrounding urban fabric, a result of the fortress-like peripheral structure. The estate layout is totally different to the traditional street layout it replaced in scale and complexity, creating an 'island' in the existing street pattern.

---

7 This has been partly modified in recent years, by the juxtaposition of a steel, tube-like structure for commercial and other uses, on the south section of Essex Road, which camouflages the blind walls of the original structure.
• 1 Private garden; 2 Roof street; 3 Underground garage; 4 Footpath; 5 Playground; 6 Residential courtyard

FIGURE 4.06: BLOCK DWELLING TYPOLOGY: TYPICAL SECTIONS & DWELLING PLANS.
4.1.3 Block/dwelling Typology and Access:

Figure 4.06 presents typical sections through the estate’s south section and characteristics of the block/dwelling typology: in plan and section. There are two types of block: the medium-rise (4-5 storeys) and the low-rise (2-3 storeys). Blocks of each type are similar in their architecture, i.e. in design principles, though never identical. The dwellings are mainly 'scissor' maisonettes with front gardens or terraces at ground and raised ground level, with some flats at roof (upper) level only. There is no standardisation in the length of the block, the number of dwellings in a block, nor in the block formations (see plans in figures 4.04-4.05), though there is standardisation of dwelling types and combinations as well as in the vertical organisation (in section) of these two basic block types.

i. Four- to five-storey blocks: (figure 4.06; bottom right)

- The lower level dwellings, accessed at ground and raised ground level (over the garages and vehicular access), are 2- and 3-bedroom (4- and 5-person) maisonettes interwoven at alternate levels (see respective plans), so that the entrances of the complementary maisonettes are always on alternate sides of the block and on different levels/routes.

- At the top (fourth) level there are 1-bedroom flats and maisonettes directly accessed from 'roof-streets', which run down the middle with entrances on both sides, with no intervening front terraces, as on the lower levels. A high proportion of flats are allocated for elderly households.

ii. Two- to three-storey blocks: (figure 4.06; bottom left)

- There is a relatively restricted number of smaller, shorter, detached blocks filling in the spaces between the larger medium-rise blocks (housing 16% of dwellings in total). They consist of single rows of 5-person maisonettes, which have sunken recessed entrance niches on the one side and gardens, but no access, at the raised level at the back. On the half of the second and third floor, there are 2-person maisonettes accessed from the top level, with front terraces on the roof.

---

8 J Kirschenmann, C Muschalek, (1980) praise the Marquess Rd Estate block design as an interesting example of innovative layout where the usual modernist block form is overcome and the advantages of direct access from the public network-usually reserved for single-housing forms are achieved in multifamily high density housing.
4.1.4 Dwelling Access: Pedestrian and Vehicular access:

Dwelling access is generally pedestrian-only, due to the minimisation of vehicular traffic and almost complete spatial separation of pedestrian movement and vehicular access to garages. There is only one entrance route, Sheppey Walk, used for parking and garage access, which has dwelling entrances directly off it. However, this appears to be the exception to the rule.

Dwellings all have front access only in this estate, the backs of dwellings are never exposed at ground level/raised ground level, with the exception of some ground maisonettes of the low-rise blocks, which have back gardens. Dwellings are always accessed directly from open public space at three interlinked levels:

1. **Ground level** (figure 4.02): comprises a system of narrow lanes and paths in the interior of the estate and along the New River edge, with no dwellings on the outer periphery. (Figures 4.04a and 4.05a present the ground level plans in more detail for the south and north sections respectively). Dwellings at ground level have front gardens with high brick walls to ensure privacy in a dense environment, which restrict the view of dwelling access at ground level.

2. **Raised ground level** (see the ground floor plans): This is really an elevated extension of the ground level, over the garages on the periphery of the estate and taking advantage of the sloping site, accesses dwellings of the scissor maisonette design, at one level above ground. The transition from ground level to raised ground level on the interior of each section is achieved rather smoothly via ramps. On the periphery, it is frequently linked to the ground by stairs and/or ramps accessible directly both from the outside and from the inside. In Marquess Rd South, the raised ground is mainly on the outer and inner periphery. In Marquess Rd North a large portion of its central area is raised above the main vehicular access route, and thus overall a larger proportion of the interior is raised above ground. Dwellings at this level also have front terraces, as at ground level.

3. **Upper level** (figure 4.03): Two-person maisonettes and flats, as mentioned earlier, are accessed directly from the walkways 'roof-streets', which link the blocks in each section, forming a relatively continuous system of access at the fourth level above ground (see figures 4.04b and 4.05b for Marquess Rd South and North respectively). The result is a rather pleasant and intimate environment, with doors directly off the open space, almost totally inconspicuous from the ground level.
The upper level is linked by lifts and narrow staircases generally tucked away in obscure corners, screened from view. There are also long ramps linking the upper level to the ground.

The upper level is different to the other two levels, both in terms of the lack of distance (buffer) between public and private space, and in terms of its higher degree of linearity, particularly in Marquess Rd South, as will be discussed in more detail in the next section. Through the stepped form of the buildings and slight changes in height, due to the sloping landscape, or simply by widening the walkway at regular intervals, there is also an attempt to break down the upper level into courtyard spaces shared by a small group. The visual lines however cross through these spaces. The upper level is publicly accessible in the original design, though in recent years this has been compartmentalised and restricted from public access (resident controlled).

4.1.5 Open spaces: Degree of exposure and Enclosure: Landscaping.

At ground level, open space in the interior of each residential section is broken down and highly enclosed by the clustering of buildings. Furthermore, open spaces are further articulated in terms of 'activities', with strongly defined demarcations by brick landscaping. In addition to this, front gardens or terraces have high brick walls, which restrict visibility and surveillance of both the private space from the public space and vice versa. Due to the high density of building, open space is strongly bounded and broken down, at a relatively constant degree of enclosure within each residential section overall. Views are generally restricted, within the estate, due to the winding nature of the majority of lanes or paths. While in one part of the estate one is hardly aware of the existence of the other section. At ground level the two sections are totally visually screened from each other.

At the upper level, the atmosphere changes. There is a lower degree of enclosure, due to the different ratio of height to width of spaces, which approximates 1:1; the frequent open courtyards, and the large spaces between the blocks at roof-level. Visibility, however, is still restricted to the local axial space or string of spaces, since the dwellings screen the roof-streets from outside view almost continuously.

Thus, with respect to the quality of the visual relationship between dwelling entrances and public spaces there are sharp differences between ground and upper level. At ground level almost all dwellings have front garden walls screening their entrances from the public path and restricting their visibility. A small group of dwellings in the
lower blocks have entrances in little niches, a few steps below the pedestrian path level, and gardens at the other side, on part with the ground level (Gulland Walk and part of Caldy Walk in Marquess Rd South). Overall conditions of visual exposure of dwelling entrances are fairly constant at ground level, raised ground and at the upper level.

4.1.6 Experience of the estate; Presence of people; Fear of crime.

Through-traffic on the estate, is deterred not only for cars, but effectively also for pedestrians, and the entrances to the estate tend to be rather 'uninviting', not allowing views into the estate. The Marquess is an environment, where people somehow 'disappear'. One is aware of people near the entrances to the estate, on the fringes, and as one moves increasingly deeper into the estate the awareness of people diminishes, inspite of the high density of the dwellings (the 'urban desert effect')9, as will be discussed later. Due to the multiple interwoven levels of access, with mostly concealed vertical links, and the short views, the layout of the estate is disorienting as a whole. With few exceptions staircases and lifts linking the ground level to the upper level are in relatively inconspicuous locations, off passages or dark corners. It is often difficult to discern, how to get from A to B beyond the immediate environment, or predict, on descending from a point at the upper level, where one will emerge at ground level.

Considerable signs of criminal damage and vandalism can be observed on the estate, though surface materials outdoors and in lifts and staircases, are target hardened. The vehicular access and emergency access routes are congested with parked cars, which are stationed wherever possible except in the garages, mainly due to the impossibility of surveillance in the designated car parks. Garages are relatively dark and deserted spaces, with signs of fire, vandalism and destruction, abandoned cars and dumped junk, which even with individually locked garage spaces, would be highly unpromising spaces to use. High crime, theft, muggings, etc. and problems with car vandalism and car theft, deter inhabitants from using the garages.

Problems with crime and fear of crime on the estate have been regularly highlighted in the local press10. Many people encountered during visits and observation rounds, carried out by the author on the estate, expressed strong dissatisfaction with the

9 See for example Hillier, Hanson et al. 'Space Syntax, A Different Urban Perspective' in Architects Journal, 30 November '83
10 The Islington Gazette and Islington Chronicle have had regular features over the years.
estate. Police authorities were also critical of the estate design, since the estate is very difficult to police on foot, and vehicular patrols were highly limited, making the estate unpolicable (in the original design), due to the complexity of access routes.

On the basis of observations from the author's visits to the estate, going through many of the passages with no signs of occupancy/occupants trigger feelings of insecurity for many people. Sudden encounters with people can be frightening for both parties. The narrow staircases are perhaps the most frightening spaces, knowing that no one can see or hear, what happens there. Gates have been installed, in recent years, though they are mostly left unlocked; people seem to prefer the lifts to the staircases. Catching someone, trying to make a quick escape, would be very difficult, especially before modifications.

Since the mid-eighties several improvement projects, involving changes to the original design, have already been implemented, incorporating advice by the police. Thus, the upper level has been blocked off into controlled zones with locked gates and intercoms, making walking across the estate at the upper level impossible. Emergency access has been opened up to allow some vehicular traffic, though this is largely restricted by the width of the lanes and the parked cars. Evidently these changes have not solved the problems of the design of the estate.

Early in 1993 press reports announced plans to convert the estate into "six or seven mini-estates", the aim being to "get rid of all the nooks and crannies and make the estate a safer and more friendly place to live". The same article reports: "Unrestricted access to the estate .. has led to women living in constant fear of attack when they walk along its through-roads, .. burglary and vandalism are rife in the area." This is hardly surprising. Tenants are aware that the design is problematic, yet cannot explain how.

In the following section the spatial structure of the estate will be examined in a more rigorous way using the analytic methods of Space Syntax.

---

11 According to informal interviews with inhabitants, during the first years mail wasn't delivered for months, doctors could not reach their patients etc.
12 Views expressed during discussions with Crime Prevention Officer and Architectural Liaison Officer Robert Knight who facilitated this study. A Joint research programme Involving Islington Council, the Metropolitan Police and the Department of Criminology of Middlesex University (Polytechnic at the time) has also tackled the problem of crime as part of an investigation for improvement of the estate. Article in the Islington Chronicle, December 2, 1992; "Crime stoppers"; p. 1
4.2  **Spatial Analysis of the Estate**

The south part of the Marquess Road Estate has been studied extensively by the UAS over the past years and presented in several publications by the UAS (see Hillier and Hanson, 1984:128-31; Hillier et al., 1983), illustrating the difference between 'neovernacular' and the real traditional environment, and highlighting the problems of this type of design from a spatial point of view. This case study examines the whole estate, on its own and embedded in its urban context; due to the relative autonomy of the south and north sections, it looks at them separately as well.

More specifically, based on the UAS* syntactic methods of spatial description, the spatial structure of the Marquess Road Estate is analysed as follows:

- Whole estate in large urban context (radius of over a mile)  MARQLARG
- Whole estate in immediate context (radius of 0.75km)  MARQ496
- Whole estate on its own :
  - Ground only:  MARQ287
  - Marquess Road South: - Ground + Deck :  MARQ178
  - Ground only:  MARQ126
  - Marquess Road North: - Ground + Deck :  MARQ224
  - Ground only:  MARQ167

The objective is to investigate how the pattern of Integration works on the estate with respect to different spatial systems of reference, from the estate in the large context to the local spatial residential environment of each section - and at what level it correlates best with the spatial pattern of burglary, as will be discussed in section 5.

---

14 See for example, Hillier and Hanson, 'The Social Logic of Space', Cambridge University Press, 1984; Hillier et al. 'Space Syntax, A Different Urban Perspective' in Architects Journal, 30 November '83 Hillier et al., 'Spatial Configuration and Use Density at the Urban Level', Final report on research project funded by the SERC, UAS 1986 , unpublished. The North part of the estate has not yet been properly analysed by the UAS to date.
FIGURE 4.07: MARQUESS RD ESTATE : AXIAL MAP OF WHOLE GROUND IN URBAN CONTEXT
FIGURE 4.8 b: MARQUESS RD ESTATE ALL: AXIAL MAP OF UPPER LEVEL
FIGURE 4.9a: MARQUESS RD ESTATE SOUTH: AXIAL MAP OF GROUND/RAISED GROUND LEVEL
FIGURE 4.9 b: MARQUESS RD ESTATE SOUTH: AXIAL MAP OF UPPER LEVEL
FIGURE 4.10a: MARQUESS RD ESTATE NORTH: AXIAL MAP OF WHOLE GROUND AND RAISED GROUND LEVEL
4.2.1 Spatial description of axial structure.

Figure 4.07 presents the axial map of the estate embedded in its urban context. The estate is easily recognisable from its context, due to the striking reduction in scale and complexity of the spatial configuration, the density and short length of axial lines. The density of axial lines for the whole development site is 34.74 lines per hectare, in the residential sections alone. For instance in Marquess Rd South, the ratio rises to 43 lines/ha approximately (178 axial lines/4.14 hectares). Compared to an average of 16-17 axial lines per 25 hectares or approximately 0.6 axial lines/ha. (based a cross selection of neighbouring areas). One notes a phenomenal increase of axial line density of over seventy times! The average length of internal axial lines in the south part is 42m, compared to the average 275m in an area of traditional street layout to the south-east (excluding main axes of traffic). This is approximately 15% only of the average axial line length of the neighbouring residential streets.

Figure 4.08a presents the axial map of the whole estate on its own, ground and raised ground level, while figure 4.08b presents the map of the respective upper level. The south and north residential sections are clearly distinguishable, as dense concentrations of short axial lines, separated by the green areas in the middle, which are recognisable by their somewhat sparser axial structure.

The axial links between the two parts are not direct; it takes about 5-6 axial steps or changes of path direction to get from the middle of the south section to the middle of the north section. Getting from one edge of the estate to the other is about 10 axial steps. Thus cutting diagonally through the estate involves a minimum of five changes of direction (from the middle of the section of Essex Rd to the middle of the section of St Pauls Rd), whereas on the periphery it involves only two. Fragments of the former street line of Marquess Rd are recognisable, starting off Essex Rd by St. Paul's church, then as one of the longest lines linking the two parts, across the central area, emerging again as the peripheral Arran Walk at the south end.

The axial links from the periphery to the interior of each residential section are short, axial penetration from the outside is very weak, considering the size of the urban site as a whole. Thus views into the estate are generally short, except for the boundary paths

---

15 This is a common phenomenon characteristic of many estates, as has been identified by UAS research, noted particularly in the context of what effect this has on the pattern of movement and use of space, compared to traditional street layouts. See: Hillier et al., 'Spatial Configuration and Use Density at the Urban Level', Final report on a research project funded by the SERC, UAS, 1986, unpublished.
along the New River Canal and on the internal edges to the green core. The two exceptions of long axial lines (or sight-lines) into the residential areas, are vehicular access routes: In the south section is Sheppey Walk, at the end of Ashby Grove, parallel to Essex Rd, (the longest interior axial line ). In Marquess Rd North, it is the central vehicular entrance route off St Pauls Rd, which runs through (and under) the heart of that section, creating a 'backbone' for the spatial layout, which is lacking in Marquess Rd South. This main axis is blocked by the older portions of the estate at the centre of the site, from meeting Clephane Road, another main axis, on the internal boundary of Marquess Rd South.(linking the central green parts to Essex Rd )

Looking at the north and south parts separately, one notes strong differences in spatial configuration: Figures 4.9a and 4.9b present the ground and upper level axial maps of Marquess Rd South; Figures 4.10a and 4.10b present the ground and upper level axial maps for the Marquess Rd North section respectively.

Ground/ raised ground level:
There are no obvious similarities in the axial structure of the north and south sections, apart from the fact that the raised ground level runs parallel to the boundary lines (overlooking the surrounding streets) directly linked to the outside via ramps and stairs ; but 2-3 axial steps deep. In the south part, there are few raised ground lines in the interior areas. The north section, in contrast, has a substantial part, which is at raised ground level in the middle area, bridging over the vehicular access route and the garage entrances, and forming asymmetrical sequences of spaces up to 5-6 axial steps deep from the outside.

At the upper level there are two separate subsystems in the south and the north, which are also spatially different:
The south upper level subsystem comprises a large number of relatively long axial lines partly forming an orthogonal grid-like system. The north upper level is not griddy; it is characterised by sequences of shorter zigzagging axial lines. In both cases the upper levels have frequent links to the ground level (not visually obvious), forming deep rings (the average depth is about 4-5 axial steps, but reaches up to a depth of 7-8 axial steps from the outside).
FIGURE 4.11: MARQUESS RD ESTATE: PATTERN OF INTEGRATION /SEGREGATION:

WHOLE ESTATE IN LARGE URBAN CONTEXT (MARQ GLOBAL)
FIGURE 4.12: MARQUESS RD ESTATE: PATTERN OF INTEGRATION /SEGREGATION:
ESTATE ON ITS OWN: GROUND/RAISED GROUND AND UPPER LEVEL (MARQ396).
FIGURE 4.13 A: MARQUESS RD ESTATE SOUTH SECTION: PATTERN OF INTEGRATION GROUND /RAISED GROUND LEVEL AND UPPER LEVEL (MARQ178).
FIGURE 4.14 B: MARQUESS RD ESTATE NORTH SECTION: LOCAL GROUND/RAISED GROUND LEVEL SYSTEM. (MARQ163)

FIGURE 4.13 B: MARQUESS RD ESTATE SOUTH SECTION: LOCAL GROUND/RAISED GROUND LEVEL SYSTEM. (MARQ 126)
4.2.2 **Pattern of Integration.**

Figure 4.11 shows the pattern of Integration for the whole estate embedded in its large urban context (over 1400 axial spaces). Predictably, the most integrating lines (red) are on the periphery of the estate: - Essex Rd, St. Paul's Rd; Ashby Grove (on the south boundary off Essex Rd). Main integrating lines within the estate site, fall in the second most integrated band (yellow); these are: Clephane Rd, (the link between Essex road the central green area); the main vehicular entrances off St Pauls Road, Essex Rd and Sheppey Walk off Ashby Grove; the link between the two sections (what is left of the former Marquess Rd) and Islay Walk along the New River Canal. The interior of the estate is overall very segregated - colours green in the middle RRA range, light blue in the second most segregated band, and dark blue in the most segregated band.

One notices that in the south section green predominates, at ground level, while in the north section, blue predominates. Similarly at the upper level, which tends to be almost exclusively blue, there is more dark blue in the north than in the south subsystem. The most segregated parts are clearly at the upper levels on both sides, however one also notices that embedded in the large context, the south ground system is less segregated than the north ground and raised ground.

Figure 4.12 presents the pattern of Integration for the estate as a whole (on its own). The main integrators are again the boundaries (St. Paul's Rd, Essex Rd,) the inner boundary axes (Clephane Rd) the central unconstituted links between the two sections (fragment of former Marquess Rd) linking to the main Central vehicular access Rd off St Pauls Rd in the north section. The spatial structure of Marquess Rd North appears to be better integrated with the central area and with St Pauls Rd, though the main integrating line is unconstituted and cut off from the highly segregated raised ground sections above it. Whereas in Marquess Rd South the heart is segregated - there are fewer integrating lines (second most integrated band-yellow): on the outer boundaries; the vehicular access routes in the interior sections (including Sheppey Walk); and Caldy Walk, parallel to Islay Walk. The majority of lines in the interior of Marquess Rd South are in the middle range (green), whereas in Marquess Rd North there is both green and blue, related to the segregated internal raised ground section. Part of the raised ground periphery in both sections is also segregated. The upper level, as in the large system, is highly segregated, with a higher proportion of dark blue in the north subsystem.
Looking at the north and south sections on their own, the above mentioned differences still hold. Figures 4.13 A and 4.14A show the pattern of integration/segregation for each of the two sections on their own. One observes:

i. Marquess Rd South:
The main integrating lines remain rather peripheral, there is little penetration of main integrators into the heart of the estate\textsuperscript{16}. There is a substantial proportion of the ground level, which is in the second most integrated band (yellow), and in the middle range (green) especially the raised ground sections on the periphery. The raised ground sections near Clephane Rd and off Arran Walk are the most segregated parts of the ground system. At the upper level, Upper Caldy Walk, parallel to the Canal, and certain sections which are more axially broken through the stepped form and changes of level (also at the north edge of Upper Gulland Walk) are the most segregated.

ii. Marquess Rd North:
The south section is more integrated internally and with respect to St. Paul's Rd via the main vehicular access route. Thus there is a grid of top integrating lines, which forms the 'backbone' of the spatial structure, which then links to a relatively small number of lines in the second band (yellow), and middle range. There is a predominance of the middle range (green lines) and some segregated lines at the edges and at the raised ground centre, as already noted in Figure 4.12. However, there is an integrated core, in contrast to Marquess Rd South, and the upper level is more highly segregated (light and dark blue).

Finally, figures 4.13B and 4.14B present the south and north sections' ground level systems analysed each separately on their own. The pattern of Integration is similar to that described in the preceding paragraphs for each section alone, though the differences between more integrated and segregated spaces at ground level alone are illustrated more clearly:

i. Marquess Rd South: the peripheral top integrating lines remain unchanged though pulled stronger towards Essex Rd; the middle range takes over the central part and the area towards the Canal, including Islay walk. The raised ground level moves into the two most segregated bands.

ii. Marquess Rd North: the integrating core is cut down, though the vehicular access 'backbone' remains; there is a predominance of the middle range (green lines) and some highly segregated lines (blue) at the edges (including the isolated Bute Walk and Scuba Walk), and at the raised ground centre, as already noted in Figure 4.12.

\textsuperscript{16} As mentioned above, the main integrating lines on the boundaries Essex Rd, Ashby Grove, Arran Walk, the vehicular entrance off Essex Rd and Sheppey walk and the parallel line to Ashby grove linking Sheppey Wk to Arran Wk.
Summing up, there are differences between south and north in terms of the pattern of integration/segregation, though for each part there is a relative shift of emphasis depending on the context of the spatial reference system. Embedded in its context it is clear that the estate is highly segregated overall, particularly, the north part, and both upper level subsystems. With respect to the estate (all) on its own, the integrating structure relates to the central zone and its links to the high peripheral integrators (main roads), including the main central vehicular route and its links at the north section. Looking at each part on its own, it becomes apparent, that in the south section, the main integrating lines are on the periphery or parallel to it, while in the north section there is a integrating core (related to vehicular access) that links towards the centre. At the same time, there is a highly segregated raised ground level sitting over the integrating spine of the north section, which also claims large portions of the respective centre. In the south section, the raised ground periphery is the most segregated portion of the ground level with respect to the section on its own (particularly ground level only). It is interesting to note that the peripheral raised ground sections of the south (and north) are actually not very segregated with respect to the estate as a whole, or embedded in the context (middle range), but they are segregated with respect to the local spatial configuration.

4.2.3 Pattern of Integration and Space Use.

Observations on space use (pedestrian movement) were carried out in the south part of the estate in a study conducted by the UAS for the SERC on the relationship between spatial configuration and use density\textsuperscript{17}. Numbers of moving people were counted as encountered by observers (researchers) moving at about a speed of 1 minute per 100 metres. Encounter rates were calculated per 100 metres or per minute (phmm) for a route taking in a careful selection of axial lines at the ground level, including the outside boundary, and the raised ground ('mezzanine') level.

Mean encounter rates for the interior spaces were found to be very low: overall .687 persons per hundred metres for the raised ground alone they fall to .474 persons per hundred metres. The mean encounter rates rose sharply to 2 to 2.5 persons per hundred metres on the outside boundary spaces and the entry spaces into the estate. The study found that on the Marquess (South) the correlation between degree of integration of an axial line and the likelihood of encountering people breaks down, as was also found to

\textsuperscript{17} Hillier et al., 'Spatial Configuration and Use Density at the Urban Level', Final report on research project funded by the SERC, UAS,1986, unpublished. pp 33-34
FIGURE 4.15: MARQUES RD ESTATE: ENCOUNTER RATES PLOTTED AGAINST INTEGRATION AND STEP DEPTH FROM THE BOUNDARY

Reproduced from Hillier et al. (undated: Spatial Configuration and Use Density at the Urban Level, UAS)
be the case on several other estates that were studied. What the study found was that movement tended to increase sharply on the integrated peripheral lines, while the interior lines underperformed.

The observed 'peripheralisation' of movement, or displacement of movement, where possible, to the exterior of the estate, means that in the interior the number of people is critically low. Coupled with the fact that the sight-lines are short, the effect is "the urban desert" with hardly anybody co-present in the same space or line of sight at the same time as oneself at most times of the day.

**Figure 4.15 (scattergrams A&B) shows the relationship between Ave. Encounter rates and degree of Integration. There is a correlation with Integration with respect to the large system, while with respect to the estate section on its own, the correlation breaks down. This effect, however, as such, is quite predictable. The conclusion from the UAS study was that "... we have less of a systematic relation between spatial configuration and encounters, and more of a systematic deformation of this relation. This deformation arises from the underperformance of internal routes and the overperformance of parallel external routes, producing a fundamental split in the correlation between integration and encounter rates". The study found that encounter rates in the interior are more predictable from axial step depth from the outside (Fig 4.19 C.). Similar results are reported in other case studies of estates (e.g. Maiden Lane and Studley Park estates mentioned in chapter 3).

In other words, what is predictable in Marquess Estate (south) is the lack of people in the segregated areas and the higher presence of people on the edges and near the entrances. The deeper one is (the higher the number of changes in direction of the route), the less likely one is to encounter people. Thus in the interior of the estates one is predictably out of visual contact with others about 80% of the time. Hillier calls this the "perpetual night" syndrome.\(^2\)

---

\(^2\) Hillier (1988: 77) claims that the daytime encounter field in many estates including Marquess Rd Estate turns out to be like nighttime in ordinary urban streets eg Barnsbury.
FIGURE 4.16b: MARQUESS RD ESTATE ALL: UPPER LEVEL PATTERN OF DWELLING ENTRANCES
FIGURE 4.17 b: MARQUESS RD ESTATE SOUTH: UPPER LEVEL PATTERN OF DWELLING ENTRANCES
FIGURE 4.18b: MARQUESS RD ESTATE NORTH: UPPER LEVEL PATTERN OF DWELLING ENTRANCES
FIGURE 4.19*: MARQUESS RD ESTATE ALL: AXIAL MAP OF 5% TOP INTEGRATED SPACES (MARQ396)
FIGURE 4.19: MARQUESS RD ESTATE ALL: GROUND/RAISED GROUND LEVEL PATTERN OF UNCONSTITUTED ACCESS
FIGURE 4.19* A: MARQUESS RD ESTATE SOUTH: AXIAL MAP OF 10% TOP INTEGRATED SPACES (MARQ178)
FIGURE 4.19A: MARQUESS RD ESTATE SOUTH: GROUND/RAISED GROUND LEVEL PATTERN OF UNCONSTITUTED ACCESS
FIGURE 4.19B: MARQUESS RD ESTATE NORTH: GROUND/RAISED GROUND LEVEL PATTERN OF UNCONSTITUTED ACCESS
4.2.4 Pattern of Constitution by Dwelling Entrances: Interface between public and private space.

Figures 4.16 a & b present the axial maps of the ground and upper level of the estate as a whole, showing the location of entrances on axial lines or segments thereof. Figures 4.17 a&b and 4.18 a&b present the equivalent pattern of entrances for the south and north sections separately. One may observe the following:

- The Marquess Estate is unconstituted to the main streets surrounding the estate. (except for Islay Walk (Marquess Rd South), and Walney Walk (Marquess Rd North) on the estate's boundary parallel to the New River canal).

- The axial links to the outside as a rule are unconstituted, with the exception of Sheppey walk parallel to Essex Rd in Marquess Rd South, and a short segment of Transey Walk behind St Pauls Church at the North corner of the estate. The peripheral dwellings overlooking the main boundary axes are at raised ground level, two or three axial steps deep.

- The majority of spaces with dwelling entrances are relatively deep from the outside: They are mainly 2-3 axial steps deep at ground and raised ground level in Marquess Rd South; and 3-4 axial steps deep at ground, and 5-6 steps deep in the interior raised ground level in Marquess Rd North.

- In the interior of both sections the ground level is relatively continuously constituted; however, the axial lines linking the south and north sections, are unconstituted.

- Constituted segments tend to coincide with almost the whole length of the line, so that the degree or density of constitution of axial lines is high. The number of dwellings per line varies considerably, since there is no standardisation of the layout in this respect.

- At the upper level, (figures 4.16b; 4.17b and 4.18b) axial spaces tend to be densely constituted, almost continuously related to, and controlled by, dwelling entrances directly opening onto them. The south has a higher degree of linearity at the upper level, whereas the North upper level has a relatively high degree of axial breakdown, which also breaks the continuity of constitution. Overall, however, at the upper level, which forms deep rings and is highly segregated, the degree of constitution is high.
<table>
<thead>
<tr>
<th></th>
<th>MARQUESS RD SOUTH</th>
<th>MARQUESS RD NORTH</th>
<th>MARQUESS RD ESTATE ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GROUND LEVEL</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>7.81</td>
<td>6.17</td>
<td>7.3</td>
</tr>
<tr>
<td>S.D.</td>
<td>6.64</td>
<td>3.47</td>
<td>5.8</td>
</tr>
<tr>
<td>Range</td>
<td>(1.27)</td>
<td>(1-13)</td>
<td>(1-27)</td>
</tr>
<tr>
<td><strong>RAISED GROUND</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>5.81</td>
<td>5.8</td>
<td>5.81</td>
</tr>
<tr>
<td>S.D.</td>
<td>4.4</td>
<td>5.81</td>
<td>5.16</td>
</tr>
<tr>
<td>Range</td>
<td>(2.20)</td>
<td>(1-28)</td>
<td>(1.28)</td>
</tr>
<tr>
<td><strong>GROUND &amp; RG</strong></td>
<td>376 dwell's/52 lines</td>
<td>227 dwell's/37 lines</td>
<td>603 dwell's/89 lines</td>
</tr>
<tr>
<td>Mean</td>
<td>7.321</td>
<td>5.974</td>
<td>6.7</td>
</tr>
<tr>
<td>S.D.</td>
<td>6.073</td>
<td>4.79</td>
<td>5.574</td>
</tr>
<tr>
<td>Range</td>
<td>(1-27)</td>
<td>(1-28)</td>
<td>(1.28)</td>
</tr>
<tr>
<td><strong>UPPER LEVEL</strong></td>
<td>235 dwell's/24 lines</td>
<td>147 dwell's/30 lines</td>
<td>382 dwell's/54 lines</td>
</tr>
<tr>
<td>Mean</td>
<td>9.792</td>
<td>4.9</td>
<td>7.074</td>
</tr>
<tr>
<td>S.D.</td>
<td>9.578</td>
<td>3.951</td>
<td>7.374</td>
</tr>
<tr>
<td>Range</td>
<td>(1-37)</td>
<td>(1-16)</td>
<td>(1.37)</td>
</tr>
<tr>
<td><strong>WHOLE TOTAL</strong></td>
<td>611 dwell's/76 lines</td>
<td>374 dwell's/67 lines</td>
<td>985 dwell's/143 lines</td>
</tr>
<tr>
<td>Mean</td>
<td>8.039</td>
<td>5.5</td>
<td>6.84</td>
</tr>
<tr>
<td>S.D.</td>
<td>7.393</td>
<td>4.44</td>
<td>6.286</td>
</tr>
<tr>
<td>Range</td>
<td>(1.37)</td>
<td>(1-28)</td>
<td>(1.37)</td>
</tr>
</tbody>
</table>
Table 4.2.4a presents the mean number of dwellings on an axial line, at ground, raised ground and upper levels and overall for each section separately and for the estate as a whole. In the south section, the average number of dwellings per line is overall almost 1.5 times higher than in the north (8.04 compared to 5.5 dwellings/line respectively). This is particularly at the upper level, where the average is over double the average in the north (9.8 compared to 4.9 dwellings/line respectively)\textsuperscript{19}. One also notes that whereas in the south, the mean number of dwellings at the upper level is higher than at ground, in the north section, the mean number of dwellings at the upper level is lower. In both sections mean number of dwellings for the raised ground level is equal to 5.81 dwellings/line, lower than the mean for the ground level in the north and the south.

Clearly there are differences in length/density of constitution between the North and South sections and between access levels with respect to the mean number of dwelling entrances on an axial line (also length/size and the density of constitution of the axial structure).

**Pattern of Constitution and Integration:**

Figures 4.19; 419 A and 4.19B presents the pattern of unconstituted axial lines and segments that have no dwelling accessed off them for the whole, the south and north sections respectively. Figures 4.19*; 4.19*A and 4.19*B on the other hand, present the respective pattern of 5% and 10% top integrated lines (discussed in previous section). Comparing two patterns in the respective figures one notes, that the two coincide to a large degree; the majority of the 10% integrating spaces are unconstituted. This includes the integrating core of Marquess Rd North and the lines around the green areas separating the two sections. There are only few exceptions particularly Sheppey Wk in the south\textsuperscript{20}.

Table 4.2.4b presents the differences between south and north sections with respect to degree of integration of the constituted lines: in the large (global) system, the local context and the estate as a whole on its own. The south constituted system (ground and upper levels) is highly significantly more integrated than the north with respect to the in the global system. However, the north overall appears to be marginally more integrated then the south at the local level, though the difference is not significant.

\textsuperscript{19} As will be discussed in section 4.4.1 this difference at upper level is statistically highly significant.
\textsuperscript{20} The exceptions are, once again, Sheppey Walk and Islay Walk in Marquess Rd South, and Rona Walk towards the estate centre and Handa Walk the long parallel axes to St Pauls Rd in Marquess Rd North.
MARQUESS RD ESTATE: T-TESTS ON DIFFERENCES BETWEEN SOUTH AND NORTH; MEAN INTEGRATION IN GLOBAL AND LOCAL SYSTEMS.

WHOLE ESTATE IN GLOBAL CONTEXT:

Unpaired t-Test \(X_1: \bar{S}_{11}: \text{RRA} \): GL

<table>
<thead>
<tr>
<th>DF</th>
<th>Unpaired t Value</th>
<th>Pr b (2 tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>142</td>
<td>-4.226</td>
<td>0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH</td>
<td>76</td>
<td>963</td>
<td>193</td>
<td>0.22</td>
</tr>
<tr>
<td>NORTH</td>
<td>68</td>
<td>1103</td>
<td>205</td>
<td>0.25</td>
</tr>
</tbody>
</table>

WHOLE ESTATE IN LOCAL CONTEXT:

Unpaired t-Test \(X_1: \bar{S}_{12}: \text{RRA} \): 492

<table>
<thead>
<tr>
<th>DF</th>
<th>Unpaired t Value</th>
<th>Prob (2 tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>142</td>
<td>1.221</td>
<td>0.24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH</td>
<td>76</td>
<td>1013</td>
<td>217</td>
<td>0.25</td>
</tr>
<tr>
<td>NORTH</td>
<td>68</td>
<td>159</td>
<td>231</td>
<td>0.28</td>
</tr>
</tbody>
</table>

WHOLE ESTATE ON ITS OWN:

Unpaired t-Test \(X_1: \bar{S}_{13}: \text{RRA} \): MARQ 96

<table>
<thead>
<tr>
<th>DF</th>
<th>Unpaired t Value</th>
<th>Pr b 2 tail</th>
</tr>
</thead>
<tbody>
<tr>
<td>142</td>
<td>1.017</td>
<td>0.311</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH</td>
<td>76</td>
<td>1074</td>
<td>227</td>
<td>0.26</td>
</tr>
<tr>
<td>North</td>
<td>68</td>
<td>1113</td>
<td>238</td>
<td>0.29</td>
</tr>
</tbody>
</table>

TABLE 4.2.4 b: DIFFERENCES BETWEEN SOUTH AND NORTH SECTIONS: MEAN INTEGRATION (RRA).
Summing up: Through sharp scaling down of open spaces and axial lines, and discontinuity with the existing street structure the Marquess Rd Estate forms a break with its urban context. The access structure of Marquess Estate forms as a whole is very complex consisting of several interwoven layers of spaces organised at three access levels with relatively distinct characteristics. It is overall a very deep spatial system with respect to the outside forming sequences of spaces, particularly at the upper and raised ground level, thus increasing the overall degree of segregation.

The estate comprises two largely separate sections in the south and the north, segregated from each other by a series of unconstituted lines, which also form the integrating 'core' of the estate on its own. The most integrating lines of the estate are mainly on the periphery of the estate and along the unconstituted inner green area. It is overall highly segregated from its surroundings particularly the upper level and the raised ground level, particularly in the north section. The south raised ground section, is relatively better integrated into the large system (context). There are no dwellings interfacing the street at ground level, and there is no dwelling access on the main vehicular access routes to garages (with few exceptions). Dwellings in the south are overall significantly more segregated than in the north, though in terms of global integration in the large context, the south dwelling sample is marginally more segregated. Axial links from the integrated boundary into the interior residential parts are generally weak. Pedestrian movement does not correlate well with the pattern of integration (estate on its own); the most integrated axes have considerable pedestrian traffic, while in the interior numbers of encounters dwindle with increasing depth, though this pattern is predictable.

Overall both parts are characterised by a pattern of unconstituted integration. Dwelling entrances are found with increasing depth from the outside; constitution becomes denser and more continuous with increasing global segregation. The upper level comprises two separate, highly segregated subsystems, forming deep rings with the ground level, with unconstituted links to the ground. The two sections are spatially quite different, the south is overall more integrated to the outside than the north, and the average length of constituted segments (number of dwelling entrances per line) is overall higher in the south, particularly at the upper level.
4.3. **The Distribution of burgled locations.**

4.3.0 **General data on Burglary on the Estate.**

In the nineteen eighties, the Marquess Rd Estate had one of the highest crime problems in the Borough of Islington, with a high rate of burglary, but also a particularly high rate of motor vehicle crime - taking place in the garage spaces - and muggings. Recorded data on the exact locations of burglaries on the Marquess Estate were obtained from the Metropolitan Police for the period of the year from January '85 to January '86 (A' Period) and for a subsequent period of approximately a three quarter year, from January to March 1986 and then September '86 to March '87 (B' period).

The second period data is not directly comparable to the first. On the one hand, it is discontinuous, and on the other hand, policing practices were intensified in order to counteract the high crime wave of the previous year. At the upper level, an experimental crime prevention scheme, was implemented in collaboration with Islington Council, with gates and intercoms partitioning off Upper Caldy Walk, and Upper Bardsey Walk. This was later to be generally put into effect at the upper level. However, the second period data acts as a 'booster' to the '85-'86 burglary data, for in spite of incongruities of nonspatial conditions, there are valuable insights to be gained.

The effect of the above changes on the numbers of burglaries, or in terms of the avoidance of particular locations in the second period, does not invalidate the study of spatial vulnerability of the recorded burgled locations. In each year, only a fraction of vulnerable locations - potential targets- is actually burgled, while a number of nonspatial factors are not being controlled, which in effect introduces more randomness in the locational data. The first year data is analysed separately from the second and then put together for several reasons: a) consistency with the other case studies; b) because, with the limitations of the data in mind, it is interesting to compare the second period data to the first period data, and whatever differences in burglary patterns may be observed.

In the first period (1985-86) a total of 74 burglaries out of 985 dwellings was recorded by the police. This is equivalent to a burglary rate of 7.51%, about 1.5 times higher than the average of about 5-6 % for Inner London at the time.

---

21 The effects these changes may have created in terms burglary locations relates to: a) police patrols may put off potential burglars, from attempting to break -in in areas most likely to be patrolled; b) there is often a displacement of burglaries to locations that are considered good targets, but less risky; although generally over time research experiments have shown that 'projects' effectiveness wears off.
In the second period (1986-87) the reported number of burglaries for the estate overall fell to 27 incidents in nine months, which projected onto a period of twelve months, would be equivalent to a burglary rate of 3.65% (estimated). This is half the burglary rate of the previous year.

In the first year the rate of burglary is well above average; there is a clear drop in burglary rate in the second period. It is beyond the scope of this study to assess this drop in real terms, in relation to the implementation of crime reduction measures. The missing months, between April and August 1986, may also be affecting the numbers of burglaries, since it has been observed, that during summer there is a natural seasonal increase of burglaries. The question, however, that really is of interest here is, where do burglaries occur, and in what way does the design of the estate affect this.

4.3.1 Observations on the pattern of burglary locations.

Locations of burgled dwellings are plotted on the plan of the estate, and then on the axial maps (see following pages): in figures 4.02 - 4.05, the red dots indicate burglaries of the A' period ('85-'86) and the white dots of the B' period ('86-'87). Similarly burgled locations are plotted on the axial maps. Figures 4.20 a & b; 4.21 a & b; and 4.22 a & b; present the pattern of burgled locations for the whole estate (a- for ground/raised ground and b- for upper level); the south and north sections respectively. Black dots (and dark grey at raised ground level) represent burgled locations in the first year data (1985), whilst the light dots represent locations burgled in the second period (1986-87). (This also applies to the axial maps 4.08- 4.10 (a& b); and fig. 4.19).

Clearly the large majority of burglaries takes place at ground and raised ground level, and a particularly high proportion is at the raised ground periphery in the south section and the raised ground centre of the north section. The number of burglaries on the upper level is much lower. There also seems to be a higher proportion in the south section, rather than the north. More specifically one may observe the following:

The calculation for the burglary rate is: 27/985 x4/3 = 3.65%

197
A. First year data 1985-86 (red/ black dots):

1. **Ground level**:

   i. Marquess Rd South:
   
   Burglaries in the south section tend to be located:
   
   • on the edges (Islay Walk, Oransey walk, raised ground);
   
   • on the raised ground section on the outside boundary (Skomer Walk, Cardigan Walk, Oransey Walk);
   
   • near the entrances to the estate interior (Sheppey Walk);
   
   • Few burglaries are located in the interior (Gulland Walk).

   ii. Marquess Rd North:
   
   Burglaries on the north side ground level tend to occur:
   
   • on the raised ground sections in the middle (Lismore Walk, Mull Walk, and Handa Walk)
   
   • on the raised ground sections on the periphery (Crowlin Walk, Shuna Walk)
   
   • on the edges of the scheme Scarba Walk, Ramsey Walk and Rona Walk, and Walney Walk on the New River.

2. **Upper level**:

   i. Marquess Rd South:
   
   Burglaries seem to be located mainly near staircases with three exceptions, two of which are in segregated niches, with restricted visual surveillability.

   ii. Marquess Rd North:
   
   Similar to the south upper level, one finds burglaries just off the staircases or very segregated niches.

B. Second period data: 1986-87:

In the second period burglaries seem to confirm the pattern described for the first year burgled locations. In the south section, they are located either on the raised ground, at the entrances, off the edges, and only two in the middle. The description for first year burgled locations in the north section also covers the second period data. At the upper level burglaries are again mainly near staircases, often near the same locations as in the first year period. There are a number of multiple victimisations overall, which seem to actually confirm the idea that, the best predictor of whether you are going to be burgled is, whether you have been burgled before.

In short, the observable features of vulnerable locations in both South and North sections involve, at ground level, the edges; the raised ground level periphery in the south and segregated interior in the north; and proximity to the staircases at the upper.

---

23 This has been found to be the case in the Islington Crime Survey see T Jones, B Maclean, and J Young, 'The Islington Crime Survey', London, Gower, 1986;
DISTRIBUTION OF BURGLED LOCATIONS: IN SOUTH AND NORTH ESTATE SECTIONS:

<table>
<thead>
<tr>
<th>MARQUESS RD ESTATE</th>
<th>TOT DWELS</th>
<th>BURGLS '85-'86</th>
<th>ESTIM. '85-'87</th>
<th>%</th>
<th>% estim.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH</td>
<td>611</td>
<td>55</td>
<td>16</td>
<td>71</td>
<td>9.00%</td>
<td>6.25%</td>
</tr>
<tr>
<td>NORTH</td>
<td>374</td>
<td>19</td>
<td>11</td>
<td>30</td>
<td>5.08%</td>
<td>4.5%</td>
</tr>
<tr>
<td>WHOLE</td>
<td>985</td>
<td>74</td>
<td>27</td>
<td>101</td>
<td>7.51%</td>
<td>5.58%</td>
</tr>
</tbody>
</table>

TABLE 4.3.2a: BREAKDOWN OF BURGLARY RATES ON MARQUESS RD ESTATE BY SOUTH & NORTH SECTIONS.
4.3.2 **General Breakdown of Burglary rates.**

This section examines the general distribution of burglary locations. Apart from level of access, the characteristics of access are relatively constant across building types:

- On the Marquess Rd Estate, there are no buildings with internal or controlled access (indirect access), there is only **direct access** from the network of open public paths.
- There is very limited variation with respect to dwelling/block typology. There are only **maisonettes** at ground level; at the upper level the majority is maisonettes, with only few flats.

Burglary rates are thus broken down by south and north sections and by level of access:

- **Breakdown by South and North sections of the estate.**

Considering the fact, that the two sections of the estate are spatially relatively independent, similar in terms of block design and configurational principles, but different in spatial structure, the first issue to be examined is, how the two sections of the estate fare in terms of burglary separately. **Table 4.3.2a** presents the breakdown of burglary rates by south/north:

**A. First period 1985:**

i. In Marquess Rd South the number of recorded burglaries is 55 out of 611 dwellings, equivalent to a burglary rate of 9.00%.

ii. In Marquess Rd North the number of recorded burglaries for the same period is only 19 out of 374 dwellings giving a burglary rate of 5.08%.

**B. Second period 1986-87:**

i. In Marquess Rd South the recorded number of burglaries falls to 16/611 dwellings giving an estimated burglary rate of 3.49%.

ii. In Marquess Rd North the recorded number of burglaries falls to 11/374 dwellings equivalent to an estimated burglary rate 3.92%.

Clearly there is a sharp difference in the number of burglaries between south and north sections; the rate in the south in 1985 is nearly double the rate in the north section; the

---

24 This type of access is found in the usual slab or tower block. Indirect access comes up in the other case studies.

1 Hillier (1988: 77) claims that the daytime encounter field in many estates including Marquess Rd Estate turns out to be like nightime in ordinary urban streets eg Barnsbury.
DISTRIBUTION OF BURGLED LOCATIONS: IN SOUTH AND NORTH ESTATE SECTIONS:

<table>
<thead>
<tr>
<th>MARQUESS RD ESTATE</th>
<th>No. of Access Lines</th>
<th>TOT DWELS</th>
<th>'85-'86 BURGLS</th>
<th>'86-'87 BURGLS</th>
<th>'85-'87 BURGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUND (285)</td>
<td>89</td>
<td>603</td>
<td>58</td>
<td>18</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9.62%</td>
<td>3.98%</td>
<td>6.8%</td>
</tr>
<tr>
<td>UPPER</td>
<td>54</td>
<td>382</td>
<td>16</td>
<td>9</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4.19%</td>
<td>3.14%</td>
<td>3.67%</td>
</tr>
<tr>
<td>TOTAL (396)</td>
<td>143</td>
<td>985</td>
<td>74</td>
<td>27</td>
<td>101</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>7.51%</td>
<td>3.65%</td>
<td>5.58%</td>
</tr>
</tbody>
</table>

**Table 4.3.2b:** BREAKDOWN OF BURGLARY RATES ON MARQUESS RD ESTATF BY LEVEL OF ACCESS.
problem of burglary seems to affect the south section more strongly. The north section appears about average for inner London in terms of burglary victimisation.

In the second period there appears to be a drop in the number of burglaries in both sections. However, the drop is more dramatic in the south section, from 9% to 3.5%, which is a reduction by almost two thirds of the first period rate. In the north section there is a slight reduction of about 23%. However, as noted earlier, what is of interest in this study is, where do these burglaries occur.

- **Breakdown by Access Levels (South / North)**

Considerable spatial differences have been identified between the levels of access, on the one hand with respect to conditions of integration and depth, on the other with respect to conditions of visual surveillability: relative exposure of dwelling entrances at the upper level, though screened from view from the ground, in contrast to the restricted view of dwelling entrances at ground level. Differences have been identified between south and north parts of the estate with respect to the pattern of integration/segregation; the raised ground level; Number of dwellings/axial line (see tables 4.2.4 a on (b)).

Table 4.3.2b presents the numbers and rates of burglary with respect to ground level, raised ground and upper level, for the estate as a whole:

**A. First period 1985:**

With 58/603 burglaries, equivalent to a burglary rate of 9.62% at ground level, compared to 16/382 (4.19%) burglaries at the upper level, the ground level appears to be over twice as vulnerable as the upper.

**B. Second period 1986-87:**

At ground level there is a sharp drop in burglaries in the second data period to 18/603 burglaries which is equivalent to about 3.98% in a year, whereas at the upper level, there is a much milder drop to 9/382, equivalent to 3.14% in the period of a year. The difference between ground and upper level burglary risk diminishes in the second period.

There are strong differences between burglary rates broken down by levels of access in the first period data (1985) and the second (1986-87 three quarter year period projected to a year). The clearly more vulnerable ground level (9% victimisation), appears to improve dramatically in the second period; the sharp drop in burglaries by about half in
DISTRIBUTION OF BURGLED LOCATIONS: BY ACCESS LEVELS IN SOUTH AND NORTH ESTATE SECTIONS:

<table>
<thead>
<tr>
<th>MARQUESS RD ESTATE</th>
<th>No. of Access</th>
<th>TOT DWELS</th>
<th>BURGLS '85-'86</th>
<th>BURGLS '86-'87</th>
<th>BURGLS '85-'87</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH GROUND</td>
<td>Lines</td>
<td></td>
<td>%</td>
<td>% estum.</td>
<td>%</td>
</tr>
<tr>
<td>(126 lines incl. RG)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UPPER</td>
<td>52</td>
<td>376</td>
<td>44</td>
<td>11</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11.70%</td>
<td>3.90%</td>
<td>7.80%</td>
</tr>
<tr>
<td>ALL (178)</td>
<td>76</td>
<td>611</td>
<td>55</td>
<td>16</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>9.00%</td>
<td>3.49%</td>
<td>6.25%</td>
</tr>
</tbody>
</table>

| NORTHERN GROUND     | 37            | 227       | 14             | 7              | 21             |
| (163 lines incl. RG )|              |           | 6.17%          | 4.11%          | 5.14%          |
| UPPER               | 30            | 147       | 5              | 4              | 9              |
|                     |               |           | 3.4%           | 3.63%          | 3.52%          |
| ALL (224)           | 67            | 374       | 19             | 11             | 30             |
|                     |               |           | 5.08%          | 3.92%          | 4.5%           |

| TOTAL (396)         | 143           | 985       | 74             | 27             | 101            |
|                     |               |           | 7.51%          | 3.65%          | 5.58%          |

TABLE 4.3.2c: BREAKDOWN OF BURGLARY RATES BY ACCESS LEVEL FOR SOUTH AND NORTH SECTIONS OF THE ESTATE.
the period '86-'87 for the estate overall, appears to have affected the ground/raised ground level far more than the upper.

The average in the second period appears well below the average burglary rate for London. The increased policing and crime prevention initiatives, appear to have affected an approximately 60% drop in the level burglary at ground level, whereas at the upper level there is only a 20% drop.

Table 4.3.2c presents the breakdown of burglary rates by level of access for the south and north parts separately:

**A. First period 1985:**

i. Marquess Rd South has a burglary rate of 44/376 = 11.70% at ground level, which is twice as high as the burglary rate of 11/235 = 4.68% at the upper level.

ii. Marquess Rd North has a burglary rate of 14/227 = 6.17% at ground level, just under double that of the upper level: 5/147 = 3.4%

**B. Second period 1986-87:**

i. Marquess Rd South has a burglary rate of 11/376 equivalent to 3.90% in a year at ground level, which is about 37% higher than the burglary rate of 5/235 equivalent to 2.84% at the upper level.

ii. Marquess Rd North has a burglary rate of 7/227 equivalent to 4.11% in a year at ground level, just slightly higher than that of the upper level: 5/147 equivalent to 3.63% in a year.

The strong difference between ground and upper level in the first data period holds for each part separately, although there is a marked difference in the performance of the South and the North sections of the Marquess Rd Estate. Marquess Rd South has a particularly high rate of burglary at ground level in the first period (11.7%), nearly double that of Marquess Rd North (6.17%). In the second period the drop at ground level again is more dramatic in Marquess Rd South, where it falls to about the same rate as in Marquess Rd North (approximately 4%). On the upper level in the north section there is no change in the burglary rate in the second data period, whereas in the south there is a drop of about 40% to a burglary rate of less than 3%.

Clearly, it is the ground level (inclusive of raised ground) that is particularly vulnerable, though the problem mainly affects the south part of the estate in the first period and diminishes in the second period, to just below 4%, marginally less even than the respective north ground burglary rate. The question is what happens at ground level in the first period that accounts for the exaggerated vulnerability at ground level, and since the raised ground sections have not been examined separately up to now, the next step is to investigate the ground/raised ground level in more detail.
DISTRIBUTION OF BURGLED LOCATIONS: AT THE RAISED GROUND LEVEL OF SOUTH AND NORTH ESTATE SECTIONS:

<table>
<thead>
<tr>
<th>RAISED GROUND LEVEL:</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MARQUESS RD ESTATE</td>
<td>TOT DWELS</td>
<td>'85-'86 BURGLS</td>
<td>'86-'87 BURGLS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>% est.</td>
</tr>
<tr>
<td>SOUTH</td>
<td>98</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20.50%</td>
<td>7.17%</td>
</tr>
<tr>
<td>NORTH</td>
<td>116</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.9%</td>
<td>5.75%</td>
</tr>
<tr>
<td>WHOLE</td>
<td>214</td>
<td>28</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13.08%</td>
<td>6.23%</td>
</tr>
</tbody>
</table>

TAB. 4.3.2d: RAISED GROUND LEVEL: BREAKDOWN OF BURGLARY RATES BY SOUTH NORTH SECTIONS OF THE ESTATE
Table 4.3.2d presents the breakdown of burglary rates for Marquess Rd South and North focusing on the raised ground level on its own.

A. First period 1985:

i. At raised ground level, Marquess Rd South has a burglary rate of \( \frac{20}{93} = 21.50\% \), which is nearly three times higher than the average for the estate in this period.

ii. In Marquess Rd North the burglary rate of \( \frac{8}{116} = 6.9\% \) at raised ground level, is only marginally higher than the ground level, below the average 7.5% for the estate. In the whole system, the raised ground burglary rate in the first period averages 13.4%.

B. Second period 1986-87:

i. Marquess Rd South has a burglary rate of \( \frac{5}{93} \) equivalent to 7.17% in a year at which is almost one third of the rate of the first period.

ii. Marquess Rd North has a burglary rate of \( \frac{5}{116} \) equivalent to 5.75% in a year at raised ground level, 20% less than that of the previous year.

In the second period there is an overall drop in the rate of burglary to an estimated 6.38%, less than half the equivalent rate in the first period for the estate as a whole.

The above demonstrates that the raised ground level is the most vulnerable part of the ground level (and the estate overall). The burglary rate in the south section (mainly located on the periphery) reaches a striking level of 21.5%, about double the average for the ground/raised ground level, consistently over both data periods. For the rest of the ground level in Marquess Rd South the burglary rate in 1985 is still high at 8.5%, and in the North it falls to \( \frac{6}{111} = 5.4\% \), still higher than the respective upper level. It is only slightly more vulnerable than the rest of the ground level in terms of burglary, and is also only mildly affected in the second data period.

Summing up the general profile of burglary vulnerability, one finds that the visually less surveillable ground level is more vulnerable than the upper level, particularly at the raised ground level. The south section, somewhat more segregated at the local level yet less segregated in the global, is more vulnerable than the north (mainly in the first data period). The peripheral raised ground level in Marquess Rd South is the most vulnerable part of the estate, though the raised ground in the north section is also the most vulnerable part (of the north half).

The raised ground level in Marquess Rd South, is highly segregated from the rest of the estate for the estate on its own, but directly accessible via unconstituted links from the highly integrated boundary axes, and thus also relatively better integrated in the global context. In the north section, the raised ground level covers a considerable
portion of the central area, is therefore more segregated though not always accessible via unconstituted routes.

The ground level, exclusive of the raised ground, still maintains a high burglary rate in the south, though the north section it falls somewhat below the average for the estate, but still markedly more than the upper level. At the upper level, vulnerability is about half that of the ground/raised ground average The south is slightly more vulnerable in 1985, but in the second period the upper north level becomes more vulnerable. The sharp drop of burglary rate affects the ground and raised ground consistently more than the upper level in the second period data. In the most highly segregated upper level of the North section, there is no drop in the second period at all.

The exact reasons for this drop in burglary rates in the second period cannot be properly tackled in the context of this study, for information is inadequate. However, one may assume that the modified policing practices in response to the alarming rates of burglary (and other crime prevention initiatives such as the instalment of gates at some point in time at a particular section of the upper level), most probably have affected the burglary rates in the second period, particularly at ground level.

Focusing on the issues that have been raised above, the following sections attempt to explain the differences in burglary risk between levels of access, and between the south and north sections in more detail.
MARQUESSE RD ESTATE: NUMBER OF DWELLINGS ON AN ACCESS LINE

WHOLE ESTATE:

SOUTH SECTION:

NORTH SECTION:

FIGURE 4.23: FREQUENCY DISTRIBUTION OF NUMBER OF DWELLINGS /LINE FOR THE ESTATE AS A WHOLE AND EACH SECTION SEPARATELY.

(* NOTE: COUNT SCALE CHANGES IN EACH SCATTERGRAM *)
4.4 Investigation of local factors of design influencing burglary risk.

As discussed in chapter 3, the spatial criteria, which affect burglary risk of a dwelling location or 'target selection' from the burglar's point of view, have been identified as accessibility and surveillability, and avoiding the risk of getting caught. In this section the attempt is made to identify the design factors related to the above, which influence the pattern of burgled locations. This involves pinpointing the design variables (local factors), which make a difference in the breakdown of burglary rates, whose variation, in other words, appears to influence vulnerability to burglary. The factors under consideration are:

- Number of dwellings accessed from an axial line;
- Unconstituted access;
- Enclosure/exposure and visual surveillability;
- Dwelling access and vehicular access.

4.4.1 Number of Dwellings on an Access Line.

As a result of the geometrical 'informality' of the Marquess Rd Estate design, the blocks have irregular lengths, at all access levels (in contrast to the large majority of housing designs, there is no standardisation of the number of dwellings per block/per level.

Figure 4.23 illustrates the frequency distribution of the variable: number of dwellings per axial space. (for the whole and each section separately, all levels). It illustrates, how both the range and frequencies vary at each level and in each section. As already discussed in section 4.2.4 (Table 4.2.4 a) the mean number of dwellings varies between ground and upper level, and between south and north sections. The mean number of dwellings per line is higher in the south than in the north (overall 8.04 dwellings per line compared to 5.5 dwellings per line respectively) and particularly high at the upper level south. which has almost twice the average of the north upper level.

Table 4.4.1a presents the significance of these differences, based on Student's T -tests conducted on the differences between the sections with respect to the average
MARQUESS RD ESTATE: T-TESTS ON DIFFERENCES BETWEEN SOUTH AND NORTH; MEAN NUMBER OF DWELLINGS PER AXIAL LINE:

GROUND AND RAISED GROUND LEVEL:

Unpaired t-Test \( X_1 : N \) vs \( Y_1 : \) No of Dwells

<table>
<thead>
<tr>
<th>DF</th>
<th>Unpaired t Value</th>
<th>Prob (2 tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>88</td>
<td>1.058</td>
<td>0.2932</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH</td>
<td>52</td>
<td>7.231</td>
<td>6.073</td>
<td>842</td>
</tr>
<tr>
<td>NORTH</td>
<td>38</td>
<td>5.974</td>
<td>4.79</td>
<td>777</td>
</tr>
</tbody>
</table>

UPPER LEVEL:

Unpaired t-Test \( X_1 : N \) vs \( Y_1 : \) No of Dwells

<table>
<thead>
<tr>
<th>DF</th>
<th>Unpaired t Value</th>
<th>Prob (2 tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>2.544</td>
<td>0.14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH</td>
<td>24</td>
<td>9.792</td>
<td>9.578</td>
<td>1.955</td>
</tr>
<tr>
<td>NORTH</td>
<td>30</td>
<td>4.9</td>
<td>3.951</td>
<td>721</td>
</tr>
</tbody>
</table>

WHOLE SECTIONS:

Unpaired t-Test \( X_1 : N \) vs \( Y_1 : \) No of Dwells

<table>
<thead>
<tr>
<th>DF</th>
<th>Unpaired t Value</th>
<th>Prob (2 tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>142</td>
<td>2.462</td>
<td>0.015</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>Std Dev</th>
<th>Std Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOUTH</td>
<td>76</td>
<td>8.039</td>
<td>7.393</td>
<td>848</td>
</tr>
<tr>
<td>NORTH</td>
<td>68</td>
<td>5.5</td>
<td>4.44</td>
<td>538</td>
</tr>
</tbody>
</table>

TABLE 4.41a: MEAN NUMBER OF DWELLINGS AXIAL LINE: GROUND & UPPER LEVELS
FIGURE 4.24: RELATIONSHIP BETWEEN NUMBER OF DWELLINGS/INF AND BURGLARY RISK IN 1985; '86-'7; 1985-'7; FOR THE ESTATE AS A WHOLE AND EACH SECTION SEPARATELY.
MARQUESS RD ESTATE: BURGLARIES AND NUMBER OF DWELLINGS ON A LINE

WHOLE ESTATE:

GROUND & RAISED GROUND LEVEL:

UPPER LEVEL:

Correlation
R 40
p < .001

Correlation
R 54
p < .001

Correlation
R 6
p < .01

FIGURE 4.25:
RELATIONSHIP BETWEEN NUMBER OF BURGLARIES AND NUMBER OF DWELLINGS (LINE IN 1985/86-7; 1985-7; FOR THE ESTATE AS A WHOLE AND EACH LEVEL SEPARATELY.)
number of dwellings per line. At ground (and raised ground) level the difference between south and north samples is not statistically significant (p=.29). At the upper level and as for the sections as a whole (all levels), the differences between south and north are highly significant in statistical terms (p=.015). In other words the discrepancy between the two sections in terms of the length/density of constituted segments captures a real difference in their spatial constitution. The question is, does this have any effect on relative vulnerability?

Considering the breakdown of burglary rates by access level for the whole and each section separately presented in Table 4.3.2c and 4.3.2d (pages 178-8), one may observe that the south has almost 1.5 times the burglary rate of the north, while it has a higher mean of dwellings/line at both ground and upper level. The upper level in the south has a higher mean of dwellings per axial line, whereas the burglary rate is less than half the ground rate. The upper level in the north has a lower mean, while once again the burglary rate falls substantially. The raised ground level in both cases has a relatively lower mean, while the burglary rates are highest compared to the other levels in each section. There is no apparent consistent relationship between overall burglary rates and mean number of dwellings as presented above.

However, the number of dwellings on a line is directly involved in the calculation of burglary rates of an access line, there is a functional relationship between burglary rates and number of dwellings on a line. Could there be perhaps more to it than that? One might argue that, if burglaries were spatially random, 1 out of 11 dwellings would be burgled, so that lines with more dwellings would be more at risk., which does not seem to be the case here.

Figure 4.24 presents the scattergrams of the relationship between number of dwellings per line and burglary rates of lines (log) in 1985; '86-87; and 1985-87; for the whole and the south and north sections separately. The correlations are for instance, with respect to the whole estate:

1985: R=.697; p = .0001; '86-87: R=.753; p = .0001; 1985-87: R = .642; p=.0001;

Clearly there is a strong and highly significant negative relationship overall, part of which could be explained by the fact that, there is only one burglary on a line in the vast majority of cases (those are the spaces on the parabolic curve). This correlation is clearly stronger in the north section where there are fewer cases of victimisation. However, this does not rule out an independent relationship between burglary risk and

Burglary rates are calculated as number of burglaries divided by number of dwellings on an axial line.
MARQUESS RD ESTATE: T-TESTS ON DIFFERENCES BETWEEN BURGLED AND NONBURGLED DWELLINGS: NUMBER OF DWELLINGS SHARING LINE:

1985: BURGLARY DATA

<table>
<thead>
<tr>
<th>Gr. up</th>
<th>Count</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURGLED</td>
<td>74</td>
<td>12.041</td>
<td>9.089</td>
<td>1.57</td>
</tr>
<tr>
<td>NONBURGLED</td>
<td>911</td>
<td>12.643</td>
<td>9.671</td>
<td>3.2</td>
</tr>
</tbody>
</table>

PERIOD 1986-7 BURGLARY DATA:

<table>
<thead>
<tr>
<th>Gr. up</th>
<th>Count</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURGLED</td>
<td>27</td>
<td>9.889</td>
<td>9.99</td>
<td>1.751</td>
</tr>
<tr>
<td>NONBURGLED</td>
<td>959</td>
<td>12.669</td>
<td>9.629</td>
<td>3.11</td>
</tr>
</tbody>
</table>

WHOIF PERIOD: BURGLARY DATA 1985-7:

<table>
<thead>
<tr>
<th>Group</th>
<th>Count</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURGLED</td>
<td>101</td>
<td>11.485</td>
<td>9.085</td>
<td>9.04</td>
</tr>
<tr>
<td>NONBURGLED</td>
<td>891</td>
<td>12.671</td>
<td>9.664</td>
<td>3.24</td>
</tr>
</tbody>
</table>

TABLE 4.41b: DIFFERENCES BETWEEN BURGLED / NON DWELLINGS: NUMBER OF DWELLINGS SHARING AN AXIAL LINE.
the number of dwellings sharing an access line. This will be discussed further in the
last section of this analysis.

**Figure 4.25** shows the relationship between number of burglaries and number of
dwellings on a line. Here there is no correlation, overall. However, this could be due
to the fact that, the data is simply too little (in most cases only one burglary on a line),
and it is probably necessary to look at several years of data before coming to a valid
conclusion.

To conclude, the analysis in this section compares victimised dwellings to nonvictims
of burglary with respect to the numbers of direct neighbours they have; using Student’s
T-Test on the samples of burgled and nonburgled dwellings. **Table 4.4.1b** presents
the significance of the results in terms of number of dwellings sharing an axial line, in
the data for 1985; ’86-87; and 1985-87. In the first set (1985) there is no clear
difference, burgled dwellings appear to have marginally less neighbours than
nonburgled dwellings overall. In the second period, ’86-87, there is a difference
between burgled and nonburgled dwellings (a mean of 9.889 dwellings/line for the
burgled sample versus 12.669 for the nonburgled), but significance is not proven
(p=.139). More data would be necessary to establish this. In the total period, the case
remains that **burgled dwellings have fewer neighbours**, however, the statistical
significance of the difference weakens (p=.24). Thus, the hypothesis that the
number of neighbouring dwellings does make a difference to burglary risk or not, is
not substantial. More crime data is necessary.

**Summing up**, the number of dwellings on a line is a variable in the Marquess Rd
estate, which may have an effect on burglary risk. Evidence suggests, that the higher
number of neighbours sharing an access line may **reduce risk** of being burgled -that
you are safer with more neighbours, rather than few neighbours. Although this is not
proven, due to the limited data available for this study, it is necessary to keep this as an
independent factor in mind.
4.4.2 **Unconstituted Access.**

One of the key spatial characteristics of the Marquess Rd Estate, as has already been discussed in section 4.2.4, involves **unconstituted integration**, on the periphery of the estate and in relation to vehicular access. In section 4.3.1 it was noted that burgled dwellings on the ground and raised ground level appear to be located near the edges of each section, just off the unconstituted and integrating lines. On the upper level burgled dwellings are more evenly distributed, often near staircases. Studying the maps of unconstituted access in figures 4.19 (whole) and 4.19 A & B (for Marquess Rd South and Marquess Rd North respectively), one may observe the following:

- 50 out of 55 ground and raised ground level burglaries in the south are on the first axial line with dwellings accessible from the outside via unconstituted routes. In the north section, 21/21 ground/raised ground burgled dwellings can be reached by unconstituted access routes. The above suggests that 93% of the burglaries in one and three quarter years have **unconstituted access**, and are accessible from the outside without having to pass by spaces 'controlled' by dwelling entrances.
- B. Hillier (1988:80) calculates mean burglary rates for "first lines with entrances from the outside" and for "protected lines" (with neighbouring constituted access) separately, and finds a powerful difference of 21% burglary rate for unconstituted access versus 2% for constituted25*.

Unconstituted access appears to be a major factor of burglary vulnerability here. It makes sense from a burglar's point of view, since, where there are no doors/windows, there is **less likelihood of being seen** - one of the main criteria of a 'good' target.

4.4.3 **Enclosure/Exposure :Visual surveillance.**

Conditions of visual surveillance appear to be invariably **restricted** on the Marquess Rd Estate as mentioned earlier in the general description (section 4.1.5). Open space is generally highly enclosed and restricted, this is a property, which is relatively constant in the residential zones of the estate overall, due to the high density of building. Furthermore there are high garden walls, which restrict the visibility of the dwelling entrances at the local level. Burglaries are located in the relatively more open spaces (squares), as well as in the narrow lanes. There is no observable avoidance of squares or 'greens', which it could have been attributable to a broader visibility field (had there been no garden walls to restrict the view of the dwelling). At the upper level, visual surveillance conditions are locally **ess restricted**, but again relatively constant. Thus visual surveillability both at the global and at the local level can be considered as a **constant relative to each access level**, in this estate design.

---

4.4.4 Dwelling access and Vehicular access.

Vehicular access rarely combines with dwelling access due to the minimisation of vehicular traffic on the estate. Access to the designated parking spaces is strongly segregated from the pedestrian network of open spaces, usually by different levels with few exceptions. However, on the basis of exceptions to the rule, one cannot make assumptions about the effect of vehicular access on the overall pattern of vulnerability. Thus, in the design of the Marquess Rd Estate, the factor vehicular access, can also be considered a nonvariable.

Summing up: the factors in the design of the Marquess Rd Estate, which may affect vulnerability to burglary in terms of accessibility and surveillability at the local level are restricted to a few main variable factors:

- the number of dwellings on an axial line (number of neighbours) and
- unconstituted access.

- Visual surveillability is relatively constant at each access level: both locally, in terms of the visibility of dwelling access points and in terms of the general degree of enclosure. It is generally restricted at ground level, and to a lesser degree at deck level, though locally allowing the direct view of entrances.
- Vehicular access is negligible, since it is generally restricted to minimum, and relatively separate from dwelling access, and thus is a nonvariable factor in this case.

Unconstituted access is perhaps the key factor of accessibility/surveillability on the Marquess, which varies amongst dwelling locations/access lines, and which appears to have a strong relationship to vulnerability. In this case, it appears to be the predominant local vulnerability factor, since it combines easy access with minimum risk of being recognised. Furthermore, the access levels and the relative differences in surveillability also appear to affect burglary risk. The high degree of enclosure and restricted visibility of ground entrances may also contribute to the high degree of vulnerability at ground level and particularly the lack of surveillability of the raised ground level.

---

For example, Sheppey Walk in the south section, one of the most integrating spaces directly off Ashby Grove). There are 4 burglaries out of 27 on this line, which is equivalent to a burglary rate of approx. 15% however, it is also only one axial step deep with unconstituted access off one of the most integrating boundary lines. (discussed in section 4.4.1.)
4.5. **Global Pattern of vulnerability: Relationship between Degree of Integration and Burglary risk.**

In the attempt to further investigate vulnerability in relation to dwellings' accessibility from the spatial network as a whole system, this section focuses on analysing the effect of integration/segregation on the burglary risk of dwelling locations, using the degree of Integration (RRA) of a space from which a dwelling is accessed, as the key measure of accessibility, based on different spatial scales of reference. As mentioned in chapter three, the analysis investigates the relationship between burglary risk and accessibility at the global level, from three perspectives:

1. comparing burgled and nonburgled dwelling samples;
2. analysing the relationship between burglary rates and degree of Integration of lines, from which burglaries are committed;
3. analysing the above relationship with respect to Integration bands.

Since local factors of surveillability (and accessibility), as discussed in the previous section, tend to vary between levels of access and between sections, the attempt is made to control variables as far as possible, albeit weakening the data in terms of quantity. This is achieved by breaking down the overall samples by south and north sections and by ground and upper levels, into subsamples, where potentially interfering factors can be minimised. This section will show that it is mainly segregation, rather than integration that increases burglary risk on the estate.

4.5.1 **Differences between Burgled and Nonburgled Dwellings in terms of Integration.**

In order to investigate the relationship between accessibility of a dwelling and vulnerability to burglary the dwellings are given indexes of Integration with respect to all spatial systems of reference, as defined earlier in section 4.2.0 (from global to local). Dwelling samples are broken down into burgled and nonburgled groups, as well as by level of access and south/north sections. Mean RRA values are calculated for each category and subcategories and are compared using T-tests are in order to establish the degree to which observed differences between the burgled and nonburgled samples are statistically significant, i.e. signify real differences.
## WHOLE SAMPLES

<table>
<thead>
<tr>
<th>RRA SPATIAL SYSTEM</th>
<th>PERIOD '85</th>
<th>PERIOD 86-87</th>
<th>PERIOD '85-87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prob</td>
<td>Prob</td>
<td>Prob</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>N-911</td>
<td>n 27</td>
<td>N-959</td>
</tr>
<tr>
<td>Mean</td>
<td>0.938</td>
<td>0.99</td>
<td>0.03</td>
</tr>
<tr>
<td>Large ext</td>
<td>0.138</td>
<td>0.135</td>
<td>0.066</td>
</tr>
<tr>
<td>RRA GLOB</td>
<td>0.96</td>
<td>1</td>
<td>0.114</td>
</tr>
<tr>
<td>Mean</td>
<td>1.056</td>
<td>0.985</td>
<td>0.066</td>
</tr>
<tr>
<td>Large ext</td>
<td>0.235</td>
<td>0.196</td>
<td>0.201</td>
</tr>
<tr>
<td>MARQ492 St Dev</td>
<td>0.8</td>
<td>0.214</td>
<td>0.208</td>
</tr>
<tr>
<td>Local context</td>
<td>0.969</td>
<td>0.968</td>
<td>0.989</td>
</tr>
<tr>
<td>MARQ396 St Dev</td>
<td>0.919</td>
<td>1.057</td>
<td>0.074</td>
</tr>
<tr>
<td>Estate alone</td>
<td>0.268</td>
<td>0.22</td>
<td>0.215</td>
</tr>
</tbody>
</table>

## GROUND - RAISED GROUND LEVEL

<table>
<thead>
<tr>
<th>RRA SPATIAL SYSTEM</th>
<th>PERIOD '85</th>
<th>PERIOD 86-87</th>
<th>PERIOD '85-87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prob</td>
<td>Prob</td>
<td>Prob</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>N-545</td>
<td>n 18</td>
<td>N-585</td>
</tr>
<tr>
<td>Mean</td>
<td>0.882</td>
<td>0.879</td>
<td>0.897</td>
</tr>
<tr>
<td>Large ext</td>
<td>0.138</td>
<td>0.135</td>
<td>0.0868</td>
</tr>
<tr>
<td>RRA GLOB</td>
<td>0.898</td>
<td>0.872</td>
<td>0.223</td>
</tr>
<tr>
<td>Mean</td>
<td>1.053</td>
<td>0.978</td>
<td>0.094</td>
</tr>
<tr>
<td>Local context</td>
<td>0.969</td>
<td>0.965</td>
<td>0.989</td>
</tr>
<tr>
<td>MARQ492 St Dev</td>
<td>0.135</td>
<td>0.154</td>
<td>0.234</td>
</tr>
<tr>
<td>Estate alone</td>
<td>0.956</td>
<td>0.925</td>
<td>0.005</td>
</tr>
</tbody>
</table>

## UPPER LEVEL

<table>
<thead>
<tr>
<th>RRA SPATIAL SYSTEM</th>
<th>PERIOD '85</th>
<th>PERIOD 86-87</th>
<th>PERIOD '85-87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Prob</td>
<td>Prob</td>
<td>Prob</td>
</tr>
<tr>
<td>n</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>N-366</td>
<td>n 9</td>
<td>N-374</td>
</tr>
<tr>
<td>Mean</td>
<td>1.143</td>
<td>1.155</td>
<td>0.767</td>
</tr>
<tr>
<td>Large ext</td>
<td>0.165</td>
<td>0.159</td>
<td>0.217</td>
</tr>
<tr>
<td>RRA GLOB</td>
<td>1.185</td>
<td>1.191</td>
<td>0.853</td>
</tr>
<tr>
<td>Mean</td>
<td>1.128</td>
<td>1.153</td>
<td>0.115</td>
</tr>
<tr>
<td>Local context</td>
<td>0.196</td>
<td>0.132</td>
<td>0.187</td>
</tr>
<tr>
<td>MARQ492 St Dev</td>
<td>0.137</td>
<td>0.135</td>
<td>0.122</td>
</tr>
<tr>
<td>Estate alone</td>
<td>1.248</td>
<td>1.254</td>
<td>0.859</td>
</tr>
</tbody>
</table>

### Table 4.5.1: Whole Estate: Dwellings All Together and Each Level Separately
Whole estate: (South and North sections).

Table 4.5.1 presents the means and standard deviations of burgled and nonburgled dwelling samples, and the statistical significance of the difference (based on t-tests), for the estate as a whole. Differences between burgled/nonburgled dwellings are analysed separately for the data period of 1985; 1986-87 (three-quarter year), and altogether from 1985-87. The data is analysed for the whole estate (all levels), and then by access levels separately. One observes the following:

Whole, ground and upper levels together:

i. **In the 1985 data:** the overall sample of burgled dwellings appears to be more integrated than the sample of nonburgled dwellings. The difference is significant in the global system only:
   \[
   \text{MARQGL: } \text{Burgl. M.RRA} = .938 \quad \text{NonBurgl. M.RRA} = .990 \quad p = .03
   \]

ii. **In the 1986-87 data:** this reverses and we find that burgled dwellings are more segregated than the nonburgled average, the difference is probably significant:
   \[
   \text{MARQGL: } \text{Burgl. M.RRA} = 1.056 \quad \text{NonBurgl. M.RRA} = .985 \quad p = .066
   \]

iii. **Overall, in the 1985-87 data,** the burgled sample is slightly more integrated, though statistical significance is weak:
   \[
   \text{MARQGL: } \text{Burgl. M.RRA} = .968 \quad \text{NonBurgl. M.RRA} = .989 \quad p = .31
   \]

The overall pattern is unclear, since the two data periods show different overall trends. In all cases, however, degree of Integration in the global system presents the sharpest differences between burgled and nonburgled dwelling samples.

Looking at ground/raised ground and upper levels separately for the estate as a whole:

Ground/raised ground All:

i. **In the 1985 data:** burgled dwellings are more segregated than nonburgled (estate on its own and in its local context), but statistical significance is not proven. With respect to the global system, the difference diminishes.
   For instance for the estate alone:
   \[
   \text{MARQ396: } \text{Burgl. M.RRA} = .956 \quad \text{NonBurgl. M.RRA} = .925 \quad p = .18
   \]
   whereas in the global system:
   \[
   \text{MARQGL: } \text{Burgl. M.RRA} = .882 \quad \text{NonBurgl. M.RRA} = .879 \quad p = .897
   \]

ii. **In the 1986-87 data:** the burgled sample is again more segregated than the nonburgled, in all spatial systems, and the difference is statistically highly significant. For the estate on its own and in the global system:
   \[
   \text{MARQ396: } \text{Burgl. M.RRA} = 1.036 \quad \text{NonBurgl. M.RRA} = .924 \quad p = .0005
   \]
   \[
   \text{MARQGL: } \text{Burgl. M.RRA} = .965 \quad \text{NonBurgl. M.RRA} = .877 \quad p = .0007
   \]

iii. **Overall, in the 1985-87 data,** burgled dwellings are more segregated and the difference is statistically significant for both the estate on its own, and embedded in its immediate context. In the global system significance weakens.
   \[
   \text{MARQ396: } \text{Burgl. M.RRA} = .972 \quad \text{NonBurgl. M.RRA} = .923 \quad p = .017
   \]
   \[
   \text{MARQGL: } \text{Burgl. M.RRA} = .899 \quad \text{NonBurgl. M.RRA} = .878 \quad p = .19
   \]
Thus, at ground/raised ground level, burgled dwellings are more segregated than nonburgled dwellings, particularly with respect to the estate on its own and in its immediate context, in all data periods.

- **Upper level All:**
  
i. **In the 1985 data:** there appears to be no clear difference between mean integration of the burgled sample and the nonburgled sample (burgled dwellings are marginally more integrated). For instance:
  
  
  ii. **In the 1986-87 data:** burgled upper dwellings are clearly more segregated, though this is not proven statistically:
  
  
  iii. **Overall in the 1985-87 data:** the trend at the upper level is not clear, burgled dwellings seem to be more segregated, but the significance is weak:
  

The pattern that emerges from the analysis of dwelling samples for the estate as a whole (ground and upper levels) appears to be diffused in the 1985 data period (and consequently in the total 1985-87 period), probably due to the different trends for ground and upper levels separately. Overall, burgled dwellings appear to be more integrated than nonburgled; this is significant in the global system, in spite of the fact that this is not the case at ground level, nor is it quite clear at the upper level. At the highly vulnerable and relatively more integrated ground level, burgled dwellings appear to be more segregated than the nonburgled, with the exception of the large global system, where the difference is marginal. This may have something to do with the most vulnerable raised ground periphery, which is more integrated in the global system compared to the local. At the upper level there is again no clear difference, the burgled dwellings are only marginally more integrated.

In the second data period (1986-87), the overall pattern is more consistent: Vulnerability to burglary increases with segregation at all levels. The differences between burgled and nonburgled dwellings become very highly significant in the second period at ground level (in spite of the lower number of burglaries), thus the risk with segregation appears consistent in both data periods. In contrast to the whole, differences between burgled and nonburgled samples become sharper with respect to the estate on its own, or in its local context, rather than in the large global context. At the upper level there is a clear increase of vulnerability with segregation in the second period, whereas in the first, there is no clear difference. The discrepancy between the first period (1985) and the second period (1986-87) diffuses the results in the total 1985-87 period.
### South Section All Levels:

<table>
<thead>
<tr>
<th>SPATIAL SYSTEM</th>
<th>PERIOD '85</th>
<th>PERIOD '86-87</th>
<th>PERIOD 85-87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BURGL NONB</td>
<td>BURGL NONB</td>
<td>BURGL NONB</td>
</tr>
<tr>
<td>RRA GLOB</td>
<td>n=55</td>
<td>n=16</td>
<td>n=71</td>
</tr>
<tr>
<td>Large context</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>0.902</td>
<td>0.943</td>
<td>0.117</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.57</td>
<td>0.207</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>0.951</td>
<td>0.165</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.156</td>
<td>0.237</td>
</tr>
<tr>
<td>MARQ396</td>
<td>Mean</td>
<td>1.01</td>
<td>0.192</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.172</td>
<td>0.25</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>0.945</td>
<td>0.027</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.202</td>
<td>0.296</td>
</tr>
<tr>
<td>SOUTHa ne</td>
<td>Mean</td>
<td>0.951</td>
<td>0.165</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.156</td>
<td>0.237</td>
</tr>
</tbody>
</table>

#### GROUND + RAISED GROUND LEVEL SOUTH

<table>
<thead>
<tr>
<th>SPATIAL SYSTEM</th>
<th>PERIOD '85</th>
<th>PERIOD '86-87</th>
<th>PERIOD 85-87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BURGL NONB</td>
<td>BURGL NONB</td>
<td>BURGL NONB</td>
</tr>
<tr>
<td>RRA GLOB</td>
<td>n=44</td>
<td>n=11</td>
<td>n=55</td>
</tr>
<tr>
<td>Large context</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>0.86</td>
<td>0.966</td>
<td>0.003</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.137</td>
<td>0.22</td>
</tr>
<tr>
<td>MARQ492</td>
<td>Mean</td>
<td>0.959</td>
<td>0.238</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.139</td>
<td>0.281</td>
</tr>
<tr>
<td>MARQ396</td>
<td>Mean</td>
<td>0.954</td>
<td>0.255</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.183</td>
<td>0.338</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>0.875</td>
<td>0.181</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.207</td>
<td>0.372</td>
</tr>
</tbody>
</table>

#### Upper Level

<table>
<thead>
<tr>
<th>SPATIAL SYSTEM</th>
<th>PERIOD '85</th>
<th>PERIOD '86-87</th>
<th>PERIOD 85-87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BURGL NONB</td>
<td>BURGL NONB</td>
<td>BURGL NONB</td>
</tr>
<tr>
<td>RRA GLOB</td>
<td>n=11</td>
<td>n=5</td>
<td>n=16</td>
</tr>
<tr>
<td>Large context</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>1.072</td>
<td>1.149</td>
<td>1.212</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.11</td>
<td>0.11</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>1.149</td>
<td>1.28</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.01</td>
<td>0.14</td>
</tr>
<tr>
<td>MARQ178</td>
<td>Mean</td>
<td>1.24</td>
<td>1.24</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.181</td>
<td>0.18</td>
</tr>
</tbody>
</table>

---

**Table F 1.51a: South: Dwellings All Together and Each Level Separately**
Apart from the differences between ground, raised ground and upper levels in terms of degree of exposure/surveillability, in sections 4.2.2; 4.2.4; and 4.3.2; it was argued that south and north sections are relatively independent spatially; the south is more vulnerable and more integrated than the north, and they have distinct differences in terms of their spatial structure. In the attempt to further clarify the discrepancies between the estate as a whole and the access levels separately, as well as the discrepancies between first and second period results noted above, the analysis examines how south and north sections perform separately.

a. **Marquess Rd South**

Table 4.5.1a presents the mean integration rates of the sample of burgled and nonburgled dwellings for the periods as above for the south part of the estate on its own and the results of the t-tests on the significance of the differences:

- **Whole South (Ground and Upper levels):**
  
  i. In the 1985 data: the overall sample of burgled dwellings appears to be more integrated than the nonburgled sample in the south (as is the case for the whole estate). The difference in terms of Integration is strongest and statistically significant with respect to the south spatial system on its own (MARQ178). With respect to integration in the large urban context the difference between the sample is strong, but statistically not proven in conventional terms. Thus:


  ii. In the 1986-87 data: the burgled sample is strongly more segregated than the nonburgled sample. Again as before, the more significant results are with respect to the south on its own.


  iii. Overall, in the 1985-87 data, the balance weighs in favour of Integration, since in 1985 there are far more burglaries than in 1986-87 (55 compared to 16). But statistical significance of the results is weak as is also the difference. With respect to the spatial system of the south alone, the difference between burgled and nonburgled dwellings is practically 'balanced out':


Clearly there appear to be two conflicting trends in operation in the first and second data periods in Marquess Rd South. Looking at ground and upper levels separately, the following may be observed:

- **Ground and raised ground level South**:

  i. In the 1985 data: ground burgled dwellings are more segregated, the difference is strongest with respect to the south ground system on its own (MARQ126)
### Table 4.5.1b. North. Dwellings All Together and Each Level Separately

#### North Section All Levels

<table>
<thead>
<tr>
<th>Spatial System</th>
<th>Period '85</th>
<th>Period '86-87</th>
<th>Period '85-87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Burgl Nonb</td>
<td>Burgl Nonb</td>
<td>Burgl Nonb</td>
</tr>
<tr>
<td>RRA GLOB</td>
<td>n=9</td>
<td>n=11</td>
<td>n=10</td>
</tr>
<tr>
<td>Large Context</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>1.043</td>
<td>1.065</td>
<td>1.062</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.203</td>
<td>0.264</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>0.984</td>
<td>1.013</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.22</td>
<td>0.22</td>
</tr>
<tr>
<td>MARQ492</td>
<td>Mean</td>
<td>0.952</td>
<td>0.936</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>Local Context</td>
<td>Mean</td>
<td>1.041</td>
<td>1.065</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.154</td>
<td>0.154</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>1.085</td>
<td>0.869</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.131</td>
<td>0.131</td>
</tr>
<tr>
<td>MARQ396</td>
<td>Mean</td>
<td>0.944</td>
<td>0.923</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.145</td>
<td>0.145</td>
</tr>
<tr>
<td>Estate Context</td>
<td>Mean</td>
<td>0.886</td>
<td>0.85</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.175</td>
<td>0.175</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>0.865</td>
<td>0.83</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.189</td>
<td>0.189</td>
</tr>
<tr>
<td>MARQ224</td>
<td>Mean</td>
<td>1.299</td>
<td>1.258</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.166</td>
<td>0.156</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>1.263</td>
<td>1.229</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.17</td>
<td>0.33</td>
</tr>
<tr>
<td>MARQ396</td>
<td>Mean</td>
<td>1.31</td>
<td>1.279</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.172</td>
<td>0.139</td>
</tr>
<tr>
<td>Estate Context</td>
<td>Mean</td>
<td>1.273</td>
<td>1.214</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.277</td>
<td>0.15</td>
</tr>
</tbody>
</table>

#### Ground + Raised Ground Level North

<table>
<thead>
<tr>
<th>Spatial System</th>
<th>Period '85</th>
<th>Period '86-87</th>
<th>Period '85-87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Burgl Nonb</td>
<td>Burgl Nonb</td>
<td>Burgl Nonb</td>
</tr>
<tr>
<td>RRA GLOB</td>
<td>n=4</td>
<td>n=7</td>
<td>n=10</td>
</tr>
<tr>
<td>Large Context</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>0.952</td>
<td>0.936</td>
<td>0.936</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.12</td>
<td>0.145</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>0.885</td>
<td>0.879</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.131</td>
<td>0.171</td>
</tr>
<tr>
<td>MARQ492</td>
<td>Mean</td>
<td>0.944</td>
<td>0.946</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.154</td>
<td>0.185</td>
</tr>
<tr>
<td>Local Context</td>
<td>Mean</td>
<td>0.886</td>
<td>0.873</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.175</td>
<td>0.136</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>0.944</td>
<td>0.946</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.154</td>
<td>0.185</td>
</tr>
<tr>
<td>MARQ396</td>
<td>Mean</td>
<td>1.299</td>
<td>1.408</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.166</td>
<td>0.151</td>
</tr>
<tr>
<td>Estate Context</td>
<td>Mean</td>
<td>1.263</td>
<td>1.376</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.17</td>
<td>0.196</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>1.31</td>
<td>1.424</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.172</td>
<td>0.21</td>
</tr>
<tr>
<td>MARQ396</td>
<td>Mean</td>
<td>1.273</td>
<td>1.518</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.277</td>
<td>0.259</td>
</tr>
</tbody>
</table>

#### Upper Level

<table>
<thead>
<tr>
<th>Spatial System</th>
<th>Period '85</th>
<th>Period '86-87</th>
<th>Period '85-87</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Burgl Nonb</td>
<td>Burgl Nonb</td>
<td>Burgl Nonb</td>
</tr>
<tr>
<td>RRA GLOB</td>
<td>n=5</td>
<td>n=4</td>
<td>n=9</td>
</tr>
<tr>
<td>Large Context</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td></td>
<td>1.299</td>
<td>1.408</td>
<td>1.347</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.166</td>
<td>0.151</td>
</tr>
<tr>
<td>RRA</td>
<td>Mean</td>
<td>1.263</td>
<td>1.376</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.17</td>
<td>0.196</td>
</tr>
<tr>
<td>MARQ492</td>
<td>Mean</td>
<td>1.31</td>
<td>1.424</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.172</td>
<td>0.21</td>
</tr>
<tr>
<td>Local Context</td>
<td>Mean</td>
<td>1.273</td>
<td>1.518</td>
</tr>
<tr>
<td></td>
<td>St Dev</td>
<td>0.277</td>
<td>0.259</td>
</tr>
</tbody>
</table>

#### Table 4.5.2. North. Dwellings All Together and Each Level Separately
and weakest with respect to the estate in the large urban context. Statistical significance is not proven:

MARQ126: Burgl. M.RRA=.875  NonBurgl. M.RRA=.828  p= .18

ii. In the 1986-87 data: the difference in terms of segregation of the burgled sample increases and becomes highly statistically significant in all spatial systems of reference:

MARQ126: Burgl. M.RRA=1.063  NonBurgl. M.RRA=.826  p=.0004

iii. Overall in the 1985-87 data: the burgled sample shows a clear and significant difference in degree of segregation compared to the nonburgled, in all spatial systems. Again, significance is very high with respect to the south section on its own (MARQ178 and MARQ126):


• Upper level South:

i/i. In the 1985 and 1986-87 data, there is no significant difference between the mean Integration rate of burgled and nonburgled dwelling samples. The number of burglaries (11 and 5 respectively) is relatively low. In 1985 the burgled dwellings appear to be slightly more integrated, whereas in the second period, they are more segregated.

iii. Overall in the 1985-87 data, the difference balances out slightly in favour of integration. As before, the differences are stronger in the local system:


b. Marquess Rd North:

Table 4.5.1b presents the differences with respect to global integration between the samples of burgled/nonburgled dwellings for the north section of the estate, as already discussed for the south. Here one observes the following:

• North Whole:

i. In the 1985 data: there is no difference between burgled/nonburgled dwelling samples in terms of degree of integration with respect to the north system on its own (MARQ224):

MARQ224: Burgl. M.RRA=1.00  NonBurgl. M.RRA=.999  p= .985

MARQGL: Burgl. M.RRA=1.043  NonBurgl. M.RRA=1.065  p= .64

ii. In the 1986-87 data: the burgled sample appears to be more segregated than the nonburgled. The difference is not statistically proven, but especially with respect to the north local system it is close to "probably significant".


iii. Overall in the 1985-87 data: there is no clear difference between burgled and nonburgled dwelling samples with respect to Integration, in both global and local spatial systems. This is the result of balancing out different trends.

Looking at performance for different levels separately:

• Ground and raised ground level North:
i-iii. **In all data periods:** 1985; and '86-87; and the total 1985-87 period: the burgled sample appears to be marginally more segregated than the nonburgled sample, but the significance is very low, in all spatial systems of reference. For instance in 1985-87:

**MARQ224:**
- Burgl. M.RRA = .873
- NonBurgl. M.RRA = .85
- p = .616

**Upper level North:**

- **In all data periods,** burgled dwellings are more segregated than nonburgled. This applies to all spatial systems of reference, though as in Marquess Rd South, the north system on its own (MARQ224) shows the strongest and most highly significant results in 1986-87, and in the total period, where for instance:

**MARQ224:**
- Burgl. M.RRA = 1.382
- NonBurgl. M.RRA = 1.21
- p = .0001

**MARQGL:**
- Burgl. M.RRA = 1.347
- NonBurgl. M.RRA = 1.255
- p = .034

From the analysis of the sections separately, one observes discrepancies between south and north sections, particularly in the 1985 data period.

- **In the south section:** vulnerability overall appears to increase with integration (results are statistically significant with respect to the local system MARQ178), however there are conflicting subtrends. Whilst ground level vulnerability tends to relate to segregation; at the upper level there is no clear difference, with vulnerability marginally in favour of integration; in both cases however the results are not statistically significant. The different performance of axial lines at raised ground and upper levels in the global system, probably also has something to do with this shift from vulnerability due to segregation in the local system, to relative integration in the global.

- **In the north section:** the overall pattern is diffused, there is no clear difference between burgled and nonburgled dwellings samples overall; however, at both ground and upper levels vulnerability relates to segregation, particularly at the upper level, in contrast to the south.

These discrepancies however, have to be considered also in relation to the distribution of risk: actual rate of burglary at each level of each section:

In the south section in 1985, the more integrated ground level is about 2.5 times more highly burgled than the segregated upper level (11.70% compared to 4.68% respectively). Thus in the overall sample of burgled dwellings (ground and upper) the mean Integration value is inevitably determined by the high rate of ground burglaries 4:1, compared to the lower rate of ground to upper level dwelling totals of 3:2 (44 ground/11 upper level burglaries out of 376/227 ground/upper level dwellings), which are more integrated than the upper level burglaries.

In the second period, there is a sharp drop of burglary rate, particularly at ground level, and the ratio of ground to upper level burglaries is just over 2:1 (11 ground/5 upper). In the second period, the ground level burglaries are considerably more segregated than
in the first. The relatively higher degree of Integration of the overall south sample could thus be simply explained by the higher proportion of ground to upper level dwellings in the burgled sample—compared to the nonburgled in the 1985 data.

In the north section, there is a much lower burglary rate at ground level, and the ratio of ground over upper level burglaries is under 3:1 (14/5 ground and upper level burglaries out of 227/147 dwellings) in the first period, and 7/4 burglaries in the second. Thus the observed predominance of the ground level burgled dwellings is milder here, so that in the overall north sample, the results are merely diffused. Not only does the gap between ground and upper level risk decrease in the second period, but also burgled dwellings at upper level become even more segregated, which accounts for the clear trend for risk to increase with segregation in '86-87.

In the second period (1986-87), as is the case for the estate as a whole, the trend for burgled dwellings to be more segregated is consistent in both sections, at each level separately (with highly significant differences at ground level/north and at the upper level/north). Thus in the first period, the different patterns of vulnerability, that disappear in the second, are due to the higher proportion of ground burglary (south).

As a result of the different performance of south and north sections, and the discrepancies between ground and upper levels, the pattern for the estate as a whole is diffused (particularly the upper level, whilst at ground level vulnerability relates to segregation in both sections). The overall difference between burgled and nonburgled dwellings balances out in favour of integration, due to the relative weight of the ground level. The pattern observed in the whole estate, is also predominantly influenced by the south section, which has a higher number of dwellings and a higher burglary rate (9.00% in the south versus 5.08% in the north in 1985, see Table 4.3.2c):

However, in spite of the fact that segregation increases burglary risk at ground level, there does seem to be a limit. Segregation is not the only criterion\(^\text{27}\), increasing depth from the outside, both in axial steps and in literal distance, seems to also play a role. At the upper level, which is significantly more segregated than the ground and raised ground levels, burgled locations are predominantly near staircases. There appears to be a certain trade-off between the benefits of segregation and the difficulty of getting there and getting away. Whilst the upper level is more segregated, it is clearly much less vulnerable—burglary rates are about half the rates of the ground level. Thus it appears that segregation stops becoming more vulnerable above a certain range, and risk drops to a different niveau\(^\text{28}\).

---

\(^{27}\) It has already been noted that the ground and upper levels of the Marquess Rd Estate differ in terms of degree of openness and surveillability.

\(^{28}\) Note difference in the performance of the local and global spatial systems: local systems measure stronger and statistically significant differences at ground level, whilst for the whole estate: it is the
FIGURE 4.26 1 & II  CORRELATION BETWEEN BURGLARY RISK & MEAN INTEGRATION OF AXIAL LINES
4.5.2 Analysis of burgled axial lines: Relationship between Burglary Risk and Integration.

This section concentrates on the relationship between burglary risk and RRA from the point of view of the axial spaces, from which burglaries are committed. Correlations between Integration rates (RRA) and burglary rates of axial lines are examined separately for the first period (1985) data, and for the whole period (1985-7) data. In the second period the number of burgled lines is too restricted, to merit examination separately. In the following pages it will be shown, that there is a systematic positive correlation between burglary risk and segregation (RRA) of axial spaces.

• Whole estate: ground and upper levels

Figure 4.26: scattergrams A, B, and C, present the correlations between burglary rates and degree of Integration for the 1985 and 1985-87 (columns I & II) burglary data respectively, calculated in the various spatial systems of analysis, starting from the most global MARQGL (scattergram A); followed by the estate in the local context MARQ492 (B); down to the estate on its own MARQ396 (C). For the estate as a whole, all levels together, there appears to be no correlation between degree of Integration and burglary rates, in both data periods.

Looking at the south and north sections separately, all levels together, one observes:

• Marquess Rd South: There is no correlation between Integration and burglary rates (see scattergrams 4.26 I:D and II:D);

• Marquess Rd North: There is a weak correlation of R=.469 and p=.057 in 1985, which improves to R=.518; p=.01 (moderate but significant) in the whole data period '85-87 (see scattergrams in figures 4.26 I:E and II:E respectively).

In the north section, burglary rates appear to increase with segregation of the axial lines, for the rest of the estate the relationship is diffused. South and north sections differ here; the south section does not seem to function as a whole, in the same way as perhaps the north does. It is necessary to examine the whole and each section by levels of access separately.

• Ground and raised ground level:

• As a Whole (S & N):

Figures 4.27 I & II; scattergrams A-C: present the correlations between burglary rates and Integration in the full range of spatial systems described above for
FIGURE 4.27: CORRELATION BETWEEN BURGLARY RISK & MEAN RRA OF LINES (excl. Caddy Wk 90 / Ramsey Wk 20)
the ground and raised ground level of the whole estate in the 1985 and 1985-87 data periods respectively.

1. First period (1985): there is a significant correlation between burglary risk and segregation in almost all systems:
   - RRA in: MARQ492: $R = .639; p = .0002$, very highly significant.
   - MARQ396: $R = .633; p = .0002$, very highly significant.

   With respect to the estate in its context (scattergram 4.27 I B); and the estate on its own (4.27 I C) there is a strong correlation between burglary rates and degree of segregation:

ii. 1985-87 data period: the correlations deteriorate compared to the 1985 data, however, there is still a reasonably strong correlation with segregation, for instance with respect to RRA in the small context:
   - MARQ492: $R = .514; p = .0016$, statistically very highly significant.

Looking at the ground/raised ground level on its own for the south and north separately, one notes strong differences between the two sections:

- Marquess Rd South (Scattergrams 4.27 I & II; D:F):
  i. 1985 period: Scattergram D in Figure 4.27 I shows the correlation between burglary rates and RRA for the south section on its own (MARQ178) The scatter is rather untidy at the most segregated end, which as will be shown later, relates to the raised ground section. Taking out one of the spaces with a burglary rate of 1/1 dwelling (Caldy WalK No.90), we get a correlation with segregation of $R = .607$ with a significance of $p = .006$ (very highly significant). The correlation is equally strong ($R = .594; p = .007$) with respect to the south ground system on its own MARQ126, as shown in scattergram 4.27 I F though scatters are rather messy.

ii. 1985-87 data period: the correlation remains, though not quite as strong as above as shown in figure 4.27 II, scattergrams D and F for spatial systems MARQ178 and MARQ126 (ground only) respectively. The correlation with segregation is about the same at: $R = .577; p = .0077$, very highly significant.

In both data periods, the predominant trend is for burglary rates to increase with segregation. On closer examination of the scatters, however, one notices that there appears to be a string of spaces at the most segregated end, forming a second trend, where burglary rates do not increase but marginally decrease with segregation. This trend is also noticeable at the segregated end in the 1985 scattergrams 4.27 I D and F. This is related to the raised ground level, as will be shown in the following paragraphs. The raised ground periphery is where the highest number of burglaries tend to occur in the south section.

The scattergrams in figure 4.27 I and II show the correlations excluding two spaces "outliers" which distort, by having: a burglary rate of 1/1 in the case of Caldy Walk 90 in the south section and excluding Ramsey Walk 20 off the integrating core in the north section, with a burglary rate of 1/2 which tends to strongly underperform.

The south and north section were also analysed with respect to the global systems, however, the local systems presented stronger correlations, thus in the following presentation the analysis focuses on the local south and north spatial systems.
MARQUESS RD ESTATE: RAISED GROUND ONLY: BURGLARY RATES AND DEGREE OF INTEGRATION

COLUMN I: 1985 BURGLARY DATA

Scattergram A
Correlation
R = 0.4
p = 0.222

Scattergram B
Correlation
R = 0.259
p = 0.56

Scattergram C
Correlation
R = 0.508
p = 1

Scattergram D
Correlation
R = 0.258
p = 0.6

Scattergram E
Correlation
R = 0.868
p = 0.57

Scattergram F
Correlation
R = 0.26
p = 0.68

Scattergram G
Correlation
R = 0.928
p = 0.23

COLUMN II: 1985-7 BURGLARY DATA

Scattergram A
Correlation
R = 0.388
p = 0.153

Scattergram B
Correlation
R = 0.514
p = 0.05

Scattergram C
Correlation
R = 0.473
p = 0.075

Scattergram D
Correlation
R = 0.312
p = 0.496

Scattergram E
Correlation
R = 0.795
p = 0.018

Scattergram F
Correlation
R = 0.304
p = 0.50

Scattergram G
Correlation
R = 0.836
p = 0.0056

FIGURE 428 III: CORRELATION BETWEEN BURGLARY RISK & MEAN RRA OF LINES
• **Marques Rd North (Scattergrams 4.27 I&II; E:G):**

i. In the 1985 period: the number of burglaries is rather small (only ten burgled spaces) and the correlation with segregation is not statistically significant in MARQ224 (north all) as shown in figure 4.27 I scattergram E. This however improves and becomes significant in MARQ163 (north ground only), though untidy: 
   \[ R = 0.661 \text{ with } p = 0.037; \text{ (see figure 4.27 I scattergram G)} \]

ii. In the period 1985-87: the correlations between burglary rates and segregation become slightly weaker compared to 1985, (see figure 4.27 II G (MARQ224), and see figure 22 G (MARQ163): The correlation is statistically significant:
   \[ R = 0.534 \text{ with a significance of } p = 0.049. \]

   At the segregated end again one notices a cluster of spaces that runs practically vertically and weakens the correlation, which also appears to relate to the vulnerable subgroup of the raised ground spaces. However, even though the correlation is thus weakened in statistical terms, there is still a clear trend for burglary risk to increase with segregation, as is in the south.

In both sections of the estate **vulnerability to burglary at ground level increases with segregation** and the evidence shows that the correlations are significant in statistical terms. Between 50 and 60% of the variation in burglary rates is accounted for by Integration; the relationship is more predictable with respect to the local spatial system in particular. However, at the most segregated end of the range in the south section (and in the north section), which coincides with the raised ground level, burglary rates follow the opposite trend (with integration). In order to further clarify this, the highly vulnerable raised ground level is examined on its own.

• **Raised Ground Level:**

**Figures 4.28: I & II**

**present the correlations between burglary risk and degree of Integration in all systems of reference for the Raised ground level in the 1985 and 1985-87 data periods respectively:**

• **As a whole**: burglary risk increases with segregation for the estate embedded in its local context (MARQ492) with a correlation of:
   \[ R = 0.559; p = 0.056 \text{ in 1985 (scattergram 4.28 I B) and } R = 0.514; p = 0.049 \text{ in 1985-87 (scattergram 4.28 II B). There is a reasonably strong correlation which is just about statistically significant.} \]

• In the **south section** on its own: the correlation breaks down, as shown in scattergrams 4.28 I D and II D with respect to MARQ178, and as shown in scattergrams 4.28 I F and 4.28 II F with respect to MARQ126 (ground only). One notes that in all cases there are two trends: in the more integrated spaces burglary risk increases with segregation, then it reaches a peak, from which point burglary risk decreases with segregation. The latter has already been noted earlier, in the scattergrams for the whole ground and raised ground level (4.27 I D and F and 4.27 II D and F).

1 Excluding one space, Ramsey Walk 20 off the integrating core, with a burglary rate of 1/2 which tends to strongly underperform.
FIG 4 29 I & II : CORRELATION BETWEEN BURGLARY RISK & MEAN INTEGRATION OF AXIAL LINES
• In the north section: there is a strong correlation between burglary risk and segregation in both data periods, compare scattergrams 4.28 I/E and G; and II/E and G. The correlation is stronger for the ground system only MARQ163: R = .928; p = .023 in 1985 (I F) and R = .836; p = .0096, highly significant in 1985-87 (II F).

The above suggests, that the two sections differ at raised ground level, though the overall risk pattern increases with segregation. In Marquess Rd South, where the peripheral raised ground level, is segregated with respect to the local system, but accessible from the highly integrated boundary and less segregated in the global context; risk appears to first increase with segregation, but then reverses from a particular point onwards, with burglary rates decreasing with segregation. At the raised ground level in Marquess Rd North, which is deeper in contrast to the south covering a large portion of its central area, burglary risk consistently increases with segregation. The performance of the raised ground level in the global system may account for the discrepancies between local and global systems of reference at ground level, observed in the earlier section.

To sum up, at the ground and raised ground level the overall trend is for burglary risk to increase with segregation, for the whole and for each section separately. However, at the peripheral raised ground level in the south, which is highly segregated with respect to the local spatial system though relatively more integrated in the global, this trend reverses after a particular threshold of segregation. This partly explains the different performance of local and global systems.

• Upper Level:

Figures 4.29: I & II present the correlation between burglary rates in 1985 and in the whole 1985-87 period, and RRA in the large context (scattergrams A); in the small context (scattergrams B); in the estate whole on its own (scattergrams C); and in the local south and north systems (scattergrams D and E) respectively.

• Upper Whole Estate:

In spite of the relatively low number of burgled spaces at the upper level the correlations between burglary rates and segregation are very powerful. The best correlation appears with respect to the global system, though the correlation remains strong and significant in the small context, and for the estate on its own. In the global context the correlation is: R = .855; p = .0002; very highly significant in 1985
MARQUESS RD ESTATE. UPPER LEVEL ONLY: BURGLARY RATES AND DEGREE OF INTEGRATION

COLUMN I: SOUTH SECTION

COLUMN II: NORTH SECTION

Scattergram A
Correlation
R = 0.746
p = 0.024

Scattergram B
Correlation
R = 0.664
p = 0.051

Scattergram C
Correlation
R = 0.548
p = 0.126

FIGURE 4.30 (SOUTH & NORTH: CORRELATION BETWEEN BURGLARY RISK & MEAN INTEGRATION OF AXIAL LINES
Looking at the south and north sections separately in the respective local systems the number of burgled access lines weakens:

- **Upper Level South:**

  In Marquess Rd South there is a very powerful correlation between burglary risk and segregation, which is very highly significant in both data periods: Taking out one space (Upper Caldy Walk which underperforms with a burglary rate of 1/35), for the period 1985 the correlation goes up to $R = .952$ with $p = .0003$ (in MARQ178; figure 4.29 I D), whilst the correlation between burglary rates for 1985-87 slightly drops to $R = .863$ $p = .006$, see figure 4.29 II D.

- **Upper Level North:**

  With respect to the north section on its own MARQ224 (scattergrams 4.29 I E, and 4.29 II E), the correlation with segregation is weaker than in the south, due to the limited number of spaces, particularly in the first period. In the 1985-87 period the correlation improves to: $R = .742$, with $p = .091$ (probably significant).

  However, calculated with respect to the estate in the large context, and in the local context, as shown in the scattergrams A; B; and C in figure 4.30, the correlations for Marquess Rd North 1985-87 data improve dramatically: (scattergram 4.30 B) in system MARQ492: $R = .944$ $p = .0046$ (very highly significant)

Overall at upper level, the pattern of burglary risk relates to segregation, particularly with respect to the global system with powerful and highly significant correlations between burglary rates and degree of segregation of the lines. Considering the fact that at the upper surveillance factors are relatively stable, the above results suggest that 80-90% of the variation in burglary rates at upper level is explained by degree of segregation alone, without even taking into account other factors, such as the specific location of staircases.

**Summing up**, this subsection has shown that, there is a statistically significant relationship between burglary rates and degree of Integration of axial lines, with burglary risk generally increasing with segregation. Although with respect to the spatial system as a whole, ground and upper levels, (where local factors are not controlled), the pattern of vulnerability is diffused, when local differences between access levels and between south and north sections are controlled, strong correlations are found between degree of Integration/segregation and burglary rates for the ground /raised ground level and the upper levels separately:
• Significant correlations with segregation are found at ground level: with respect to the spatial system as a whole, embedded in the global system, and on its own; and for the South and North sections separately, in the local ground system in particular. These showed that over 60% of the variation in burglary rates is predicted or explained by degree of integration, with risk increasing with segregation.

• At the highly vulnerable raised ground section, in the south section (over 20% burglary rate), there is a peak or threshold with respect to degree of segregation in the local system, from which point onwards burglary risk does not increase with segregation any further, and actually falls (why go any deeper? perhaps even thieves cannot find their way there). The segregated raised ground section, combines unconstituted access, a number of axial steps (changes of direction) deep yet not distant from the integrated boundary. In the north section the majority of raised ground spaces are in the deep interior, they remain increasingly vulnerable with segregation.

• Finally, at the upper level, there is a strong and very highly significant correlation between burglary rates and segregation: with respect to the whole system in the large and in the small context; and with respect to the south section alone. In the north section alone, the data is very weak (only five burglaries in 1985 - though in the 1985-87 data period there also appears to be a correlation, particularly with respect to the global system). The trend here seems to be as with the upper level overall, with risk increasing with segregation particularly in the global system.

Whereas in the more vulnerable south section, the pattern differs somewhat between access levels, with the peripheral south raised ground level differing in that risk starts decreasing with segregation from a point onwards, with respect to Marquess Rd North the pattern seems to function for the levels separately and the section on its own as a whole. The question arises here, however, which will be dealt with later (section 4.6), regarding the extent to which, the number of dwellings per line may be affecting the relationship between burglary rates and Integration.
## Marques Road Estate Integration Bands Data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>South Section</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground Upper Level</td>
<td>Marq17</td>
<td>75 County Lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 10% Seg Lines 8</td>
<td>1.633</td>
<td>1.498</td>
<td>41</td>
<td>4</td>
<td>1</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Top 20% Seg Lines 15</td>
<td>1.633</td>
<td>1.428</td>
<td>96</td>
<td>8</td>
<td>1</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>20-40% Seg Lines 15</td>
<td>1.297</td>
<td>1.162</td>
<td>70</td>
<td>14</td>
<td>10</td>
<td>15</td>
<td>4</td>
</tr>
<tr>
<td>Mid20% Lines 15</td>
<td>1.083</td>
<td>0.961</td>
<td>16</td>
<td>22</td>
<td>18</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>40-20% Int Lines 15</td>
<td>0.89</td>
<td>0.84</td>
<td>86</td>
<td>11</td>
<td>10</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>Bot20% Int Lines 15</td>
<td>0.789</td>
<td>0.734</td>
<td>196</td>
<td>16</td>
<td>13</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Bot10% Int Lines 8</td>
<td>0.56</td>
<td>0.697</td>
<td>121</td>
<td>13</td>
<td>10</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Ground Level/Marq126</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 20% Seg Lines 10</td>
<td>1.588</td>
<td>1.32</td>
<td>46</td>
<td>15</td>
<td>10</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>20-40% Seg Lines 10</td>
<td>1.148</td>
<td>0.969</td>
<td>39</td>
<td>8</td>
<td>6</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Mid20% Lines 10</td>
<td>0.891</td>
<td>0.863</td>
<td>68</td>
<td>13</td>
<td>12</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>40-70% Int Lines 11</td>
<td>0.842</td>
<td>0.792</td>
<td>127</td>
<td>9</td>
<td>9</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>Bot20% Int Lines 10</td>
<td>0.801</td>
<td>0.718</td>
<td>112</td>
<td>1</td>
<td>7</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Upper Level Marq178</td>
<td>75 RR&amp;Band@6 Lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 25% Seg Lines</td>
<td>1.633</td>
<td>1.495</td>
<td>31</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>25-40% Seg Lines</td>
<td>1.369</td>
<td>1.289</td>
<td>63</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>25-60% Int Lines</td>
<td>37</td>
<td>11</td>
<td>27</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Bot. 25% Int Lines</td>
<td>1.083</td>
<td>1.008</td>
<td>112</td>
<td>11</td>
<td>7</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>North Section</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground Upper Level North</td>
<td>Marq224</td>
<td>67 County Lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 10% Seg Lines 7</td>
<td>742</td>
<td>1.486</td>
<td>22</td>
<td>3</td>
<td>1</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Top 20% Seg Lines 15</td>
<td>1.742</td>
<td>1.4</td>
<td>41</td>
<td>6</td>
<td>2</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td>Mid20% Lines 15</td>
<td>1.27</td>
<td>1.201</td>
<td>91</td>
<td>2</td>
<td>2</td>
<td>14</td>
<td>2</td>
</tr>
<tr>
<td>40-20% Int Lines 15</td>
<td>1.35</td>
<td>1.062</td>
<td>65</td>
<td>10</td>
<td>8</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td>Bot20% Int Lines 15</td>
<td>0.992</td>
<td>0.81</td>
<td>71</td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Bot10% Int Lines 7</td>
<td>0.78</td>
<td>0.15</td>
<td>106</td>
<td>7</td>
<td>6</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Ground Level North</td>
<td>Marq016</td>
<td>67 County Lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 20% Seg Lines 8</td>
<td>1.384</td>
<td>1.61</td>
<td>38</td>
<td>5</td>
<td>4</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>20-40% Seg Lines 7</td>
<td>1.029</td>
<td>0.959</td>
<td>32</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Mid20% Lines 7</td>
<td>0.905</td>
<td>0.80</td>
<td>39</td>
<td>3</td>
<td>-</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>40-20% Int Lines 7</td>
<td>0.68</td>
<td>0.43</td>
<td>37</td>
<td>4</td>
<td>3</td>
<td>7</td>
<td>4</td>
</tr>
<tr>
<td>Bot20% Int Lines 8</td>
<td>0.691</td>
<td>0.649</td>
<td>81</td>
<td>5</td>
<td>4</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Upper Level North</td>
<td>Marq224</td>
<td>30 County Lines</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 20% Seg Lines 8</td>
<td>1.742</td>
<td>1.497</td>
<td>12</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>20-40% Seg Lines 6</td>
<td>1.322</td>
<td>1.298</td>
<td>19</td>
<td>3</td>
<td>1</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Mid 20%</td>
<td>1.253</td>
<td>1.227</td>
<td>53</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>20-40% Int Lines</td>
<td>1.19</td>
<td>1.168</td>
<td>34</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Bot 20% Int Lines 6</td>
<td>1</td>
<td>1.05</td>
<td>29</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4.53 Tabulated Data on Integration Bands for South and North Marques Who: Sections and Each Level Separately
4.5.3 **Relationship between burglary rates and Integration:**

**Breakdown by RRA Bands.**

This subsection attempts to further clarify the relationship between burglary rates and integration/segregation by eliminating the problem of number of dwellings per line, as well as the problem of zero burglary lines. The approach here is from the point of view of Integration bands. The data from the period 1986-87 on its own is not sufficient to merit separate analysis. Each section is examined as a whole, then by ground and upper levels separately.

Considering the differences between south and north sections, in terms of average level of Integration; burglary rates; and number of dwellings on an axial line, the analysis of integration bands deals with the south and north sections of the estate separately. **Table 4.5.3** presents the tabulated data for the Integration Band in the various spatial systems of reference.

---

a. **Marquess Rd South:**

- **Whole South system: Ground and upper levels (MARQ178):**

  There are 75 constituted lines broken into 5 bands consisting of 15 lines each (see table 4.5.3). **Scattergrams I and II of figure 4.31** present the relationship between average burglary rates and mean RRA of the bands with respect to the whole south system: The correlation between burglary rates and segregation disappears:

  - i. 1985- data: \( R = .424 \) \( p = .477 \)
  - ii. 1985-87 data: \( R = .036 \) \( p = .95 \)

Looking at the scatters one notices that, whereas in the first four bands there is a clear increase in burglary rates, a sharp drop follows in the fifth and most segregated band. The top two segregated bands, relate to the upper level, and it appears that burglary rates increase with segregation to a point where they peak, then drop sharply. This pattern becomes clearer, looking at ground and upper levels separately.

- **Ground level South:**

  The south ground system consists of 51 constituted lines; 10 lines in each band: **Scattergrams I and II in figure 4.32** show the relationship between mean RRA of the Integration bands (in the ground system MARQ126) and burglary rates in 1985 and 1985-87 respectively. Rates increase with segregation. There is a strong correlation in the first data period, which further improves and becomes statistically highly significant in the whole data period:

  - i. 1985 period data: \( R = .853 \) \( p = .065 \) (probably significant);
  - ii. 1985-87 period data: \( R = .946 \) \( p = .015 \) (statistically significant).

---

32 The sample of constituted lines in rank order of degree of Integration is broken down into 5 bands, each consisting of a 20% section of the whole sample of lines. Averages are calculated for each band: Mean RRA, and Ave. Burglary rates (sum of burglaries/sum of dwellings) for the data in periods: 1985 and 1985-87.

---

228
MARQUESS RD ESTATE: BURGLARY RISK AND INTEGRATION BANDS
SOUTH SECTION

WHOLE SECTION:

GROUND & RAISED GROUND LEVEL:

All Levels
Correlation
R: 474
p: 477

Ground Level
Correlation
R: 851
p: 0.05

Upper Level
Correlation
R: 80
p: 0.05

AveBURGRATE 85

AveBURGRATE 85

AveBURGRATE 85

FIGURE 4.31

FIGURE 4.32

FIGURE 4.33

• **Upper Level South:**

This consists of 24 constituted lines, which are broken down into 4 RRA bands (6 lines each) see table 4.5.3. The data is too thin and the number of lines in each band is too small for five bands. Scattergrams 1 and 2 in figure 4.33 present the relationship between mean RRA of the bands (in MARQ178) and the respective burglary rates in 1985 and 1985-87:

i. In the 1985 data: there is a negative correlation $R = .80; p = .200$ with low statistical significance. Burglary risk decreases with segregation in the first three (relatively more integrated) bands, and remains stable in the fourth and most segregated band.

ii. In the 1985-87 data: the correlation disappears: $R = .374 \ p = .626$. Looking at the scatter, one notices that there is a negative trend in the first three bands, burglary risk decreases with segregation, as in the scattergram above, but there is an increase again in the burglary rate in the most segregated band.

Whilst at ground level the risk calculated per RRA band increases with segregation, at the upper level, the trend goes the other way decreasing with segregation, though the correlation is weak particularly in the overall period. The results should be treated with caution; as the sample of burgled lines is restricted and the number of burglaries small. It is clear from looking at the upper level, why the correlation between burglary rates and Integration does not work in the 'whole' system as one consistent pattern, since the trends for the ground and upper level global vulnerability diverge.

b. **Marquess Rd North**

• **Whole system North (MARQ224):**

There are 67 constituted lines in 5 bands (13/14 lines in each) (see table 4.5.3). Scattergrams I and II, in figure 4.34, show the correlation between burglary rates and degree of Integration/segregation for the whole (ground and upper levels) north section. Similarly to the south section, there is no correlation for the whole:

i. 1985 data: $R = .028 \ p = .964$

ii. 1985-87 data: $R = .349 \ p = .565$

In examining the respective scattergrams one notices that the second most segregated band strongly 'underperforms'. It has very few burglaries (2 out of 91). This band includes mainly upper level lines (no burglaries) and a few raised ground lines with burglaries.

• **Ground level North (MARQ163):**

There are 37 constituted lines in 5 bands of 7/8 spaces each (see table 4.5.3). Scattergrams I and II in figure 4.35: Once again one observes a strong correlation between Mean RRA values (segregation) and Ave. Burglary rates:

i. 1985 data: $R = .934 \ p = .066$ (probably significant)

ii. 1985-87 data: $R = .85 \ p = .068$

Though powerful, the scatter is not quite tidy and the correlation is not quite statistically significant, though it is nearly significant, and is slightly weaker for the total data period.
MARQUESS RD EST. VIE BURGLARY RISK AND INTEGRATION BANDS
NORTH SECTION

WHOLE SECTION:

GROUND & RAISED GROUND LEVEL:

UPPER LEVEL:

FIGURE 4.34

FIGURE 4.35

FIGURE 4.36

Upper level North (MARQ224):

There are 30 constituted lines in 5 RRA bands with 6 lines each (see table 4.5.3). Scattergrams I and II in figure 4.36: Though again the data is limited in number of burglaries and sample of lines, in contrast to the upper level of Marquess Rd South, there is a correlation here with segregation, which appears to be strong and probably significant in period 1985-6, which in the 1985-87 period data becomes highly significant:

i. 1985 data: $R = .911 \ p = .089$ (probably significant)

ii. 1985-87 data: $R = .987 \ p = .01$ (statistically highly significant)

In the north section, there appears to be a correlation between Mean RRA and Ave. Burglary Rates of the bands, with risk increasing with segregation, at the upper level as at the ground level. When both levels are added together in the whole system, the correlation disappears, as is the case in the south section. This is probably related to the way in which the burgled lines are distributed in the integration bands.

Summing up: Although the analysis of the integration bands shows statistically weak correlations, the pattern of vulnerability with respect to global accessibility generally confirms the trend identified in previous subsections. Whilst risk generally increases with segregation, there appears to be a threshold at the most segregated end, beyond which the trend reverses. At the relatively more integrated ground level, there is a strong correlation between burglary risk and degree of segregation of the RRA Bands in both south and north sections of the estate, for both data periods. At the more segregated upper levels, the two sections appear to differ, though the data is rather weak to draw firm conclusions. In Marquess Rd South, the correlation weakens and goes the other way with integration, particularly in the 1985 data period; in the 1985-897 data the trend reverses at the most segregated end (increasing with segregation in the top segregated band). In Marquess Rd North, risk increases with segregation - consistent with the ground level trend; the statistical correlation becomes significant in the total data period. Taking both ground and upper levels together in each section the correlation between burglary rates and Integration disappears with respect to the Integration bands. This suggests there are discontinuities between the two levels, or simply that the two levels do not simply blend into a whole, due to differences in local conditions (local factors not controlled).

---

33 There may be a problem in grouping lines into bands, without regard to the level they are on. For the levels do differ as systems: their mean RRA values and their RRA ranges differ greatly; they are quite cut off from each other and the range of other factors such as visibility; depth from the outside and unconstituted access is also different.
4.5.4 **Summary of the Pattern of Vulnerability with respect to Global Accessibility:**

Examined from all three perspectives - burgled/nonburgled dwelling samples; axial lines; integration bands, the main finding from the analysis of vulnerability at the level of global accessibility - Integration - is that burglary risk *increases with segregation* at the local level, yet not necessarily at the global. There are discrepancies between ground; upper level and the whole in the findings at all stages, partly due to the local differences between levels and sections, and differences in distribution of burglaries respectively.

Considering the estate as one whole spatial system, the pattern of risk is confusing, and often contradictory to the findings for each level and section separately: Looking at the differences between the whole samples of burgled and nonburgled dwellings one finds that burgled dwellings are overall more *integrated* (in contrast to each level separately where this is not the case), since the higher proportion of ground burglaries biases the mean Integration value of the whole sample of burgled dwellings in favour of integration. Looking at the relationship between burglary rates and degree of Integration of burgled axial lines or of Integration bands for the whole spatial system, one finds no correlation. Whereas at ground and at the upper level in the south and north sections strong correlations are to be found between burglary rates and segregation, the overall pattern is diffused. Since differences between levels in terms of both varying factors, or differing ranges thereof, are not being controlled, it is clearly necessary to control other factors as far as possible. On the Marquess Rd Estate, as discussed in section 4, apart from number of dwellings per access line, other local factors (e.g. surveillability) are also strongly related to the levels of access, and the south/north division.

**At ground level** burglary risk increases with segregation, in both data periods:

- Burgled dwellings are more segregated than nonburgled (this becomes highly significant in the second period, overall and in the south in particular).
- Correlations between burglary rates and degree of segregation (RRA) of axial lines are strong and very highly significant, for the whole ground and the sections separately (slightly weaker in Marquess Rd North).
- Correlations between burglary rates and RRA of the Integration bands are also strong and significant in the South; probably significant in the North; in the overall data correlations improve.
At the upper level the data is weak, (proportionally to ground and with respect to each period on its own), therefore results have to be treated with caution. Furthermore there are rather puzzling differences between south and north sections. In the north section the upper level follows the same pattern as at ground level, whilst in the south there is no clear pattern with respect to Integration:

- Burgled dwellings in the south upper level are somewhat more integrated than the nonburgled though the difference is not significant statistically, while in the north they are significantly more segregated;
- With respect to axial lines from which burglaries are committed, burglary rates show a powerful and highly significant positive correlation with RRA (segregation) in the south, while in the north the correlation follows the same trend, but is not significant.
- With respect to integration bands, burglary rates appear to have a negative correlation with RRA in the south, which then disappears in the total data period, while in the north there is a strong correlation with segregation, which is significant in the total data.

Thus at the upper level, the pattern of risk is not as clear as at ground: burglary risk appears to increase with integration and with segregation (clearly the case in the second data period). This could be explained in the south, as a threshold passed which segregation does not necessarily increase risk further (clearly illustrated in the analysis of the integration bands), as is also the case with respect to the peripheral raised ground level in the south, though there are differences and the question then arises, why this does not also apply to the north section.

A second explanation may relate to the differences between south and north upper level, pertaining to the average number of dwellings per axial line, which is almost double in the south than in the north; and related to the degree of Integration, which is significantly higher in the south than in the north. Thus in the most integrated band of the south upper level, there is an average of 19 dwellings per line, this obviously has an impact on the length of sightlines - the degree of surveillability of the upper level in the south compared to that of the north. This question of the relationship between the number of dwellings on an axial line and its degree of integration is dealt with in the following, final section of the analysis of burglary risk.

\[\text{The latter is highly segregated with respect to the local system, but directly accessible from the integrating boundary and therefore less segregated in the global system, which does not apply to the upper level.}\]
Figure 4.40: Ground Non-Buried Lines: Correlation Between No. of Dwellings Line & Integration.

Figure 4.41: Ground Buried Lines: Correlation Between No. of Dwellings Line & Integration.
4.6 Relationship between local and global factors: Number of Dwellings per axial line and Degree of Integration.

Apart from the degree of Integration/ segregation, each axial line is also characterised by the number of dwelling entrances on the line, a local variable on the Marquess Rd Estate, which has a direct bearing on the calculation of burglary rates per line\(^{35}\). As discussed in section 5.4.1, (figures 4.23 and 4.24), this has to be considered as an independent factor in the pattern of vulnerability. This section therefore examines how the local factor, mean Number of Dwellings on a line, performs with respect to the degree of Integration, looking at both the sample of burgled lines and integration bands.

It has been noted that, the more integrated lines often tend to be longer and better connected lines, than the shorter lines. Often in one year there is not much more than one burglary on a line, in which case the burglary rate is merely the reciprocal of the number of dwellings per line\(^{36}\) (as discussed earlier, see fig.4.25). In the case of the Marquess Rd Estate, the question is whether integrated lines have a higher number of dwellings than the more segregated lines, and, whether this is affecting the correlation between burglary rates and segregation. It will be argued that, whilst there is a relationship between number of dwellings on a line and burglary rates, this is not necessarily creating the correlation between burglary risk and segregation.

4.6.1 Sample of burgled and nonburgled lines:

The scattergrams A; B; and C in figures 4.37; 4.38 and 4.39 illustrate the relationship between degree of Integration (RRA) and number of dwellings per line: in the global context MARQGL (scattergrams A), the local context MARQ492 (B).

\(^{35}\) For example, one burglary out of two dwellings on a line, equal to a burglary rate of 1/2, is inevitably going to be five times higher than a burglary rate of 1/10 dwellings, irrespective of integration/segregation of the line.

\(^{36}\) A strong and statistically highly significant correlation is found between decreasing number of dwellings and higher burglary rates partly due to the limited number of burglaries in a year. It is clearly stronger in the north for this reason:

- For the whole, there is a correlation of \( R = .697; p=.0001 \) (very highly significant in 1985, decreasing slightly to \( R=.642 \) in 1985-87 see scattergrams in fig 4.24).
- The correlation is particularly strong at the upper level: \( R=.805 \ p=.0005 \) in 1985 and \( R=.698 \ p=.004 \) for 1985-87 (see scattergrams 30 a and b).
- On the ground level the correlations are somewhat weaker: \( R=.567 \ p=.0009 \) in 1985; \( R=.541 \ p=.0005 \) in 1985-87 (see scattergrams 29 a and b).

The parabolic curves clearly visible in the 1985/7 data indicate that burglary rates are equal the reciprocal of the number of dwellings times one burglary, two or in rare instances more burglaries.
MARQUES RD ESTATE: DWELLINGS LINE AND DEGREE OF INTEGRATION

**Figure 4.42**: Upper Nonburgled: Correlation Between No. of Dwellings Line & Integration

**Figure 4.43a**: Upper Burgled Lines (All): Correlation Between No. of Dwellings Line & Integration

**Figure 4.43b**: Correlation Between No. of Dwellings Line & Integration: (*EXCL.*)

**Upper Nonburgled Lines:**

*Scattergram A*
- $R^2 = 0.14$, $p < 0.05$
- $y = b + mx$

*Scattergram B*
- $R^2 = 0.08$, $p < 0.05$
- $y = b + mx$

*Scattergram C*
- $R^2 = 0.05$, $p < 0.05$
- $y = b + mx$

*Scattergram D*
- $R^2 = 0.31$, $p < 0.01$
- $y = b + mx$

**Upper Burgled Lines (All):**

*Scattergram A*
- $R^2 = 0.76$, $p < 0.001$
- $y = b + mx$

*Scattergram B*
- $R^2 = 0.68$, $p < 0.001$
- $y = b + mx$

*Scattergram C*
- $R^2 = 0.91$, $p < 0.001$
- $y = b + mx$

*Scattergram D*
- $R^2 = 0.90$, $p < 0.001$
- $y = b + mx$

**Upper Burgled Lines (Excl. >24 Dwellings):**

*Scattergram A*
- $R^2 = 0.80$, $p < 0.001$
- $y = b + mx$

*Scattergram B*
- $R^2 = 0.81$, $p < 0.001$
- $y = b + mx$

*Scattergram C*
- $R^2 = 0.81$, $p < 0.001$
- $y = b + mx$

*Scattergram D*
- $R^2 = 0.80$, $p < 0.001$
- $y = b + mx$
and the estate on its own MARQ396 (C). These are repeated for the whole estate (Fig. 4.37); the ground/raised ground level (Fig. 4.38) and the upper level (Fig. 4.39) respectively: in both the 1985 (column I) and 1985/7 (column II) data periods:

One notices that there is no correlation between degree of Integration (RRA) and number of dwellings per line:

At best, as is the case at ground level (fig. 4.38), the relationship is weak: for example in the large context: MARQGL: R=.366 p=.0004, and for the estate on its own: MARQ396: R=.317 p = .002.

It is worth noting that at ground level, the relationship between burglary rates and number of dwellings /line is weakest. In contrast, with respect to the whole and the upper level, where there is no correlation between RRA and number of dwellings/line, the relationship between burglary rates and number of dwellings /line is strongest.

Investigating this a step further, one may look at the relationship between number of dwellings/line and degree of Integration at the ground and upper levels separately for the burgled and nonburgied axial lines separately:

Figures 4.40 and 4.41 present the correlation between number of dwellings and degree of Integration in the global context MARQGL (scattergrams A), the estate on its own MARQ396 (scattergrams B); the South on its own MARQ178 (scattergrams C) and the North on its own MARQ224 (scattergrams D) for the ground level sample of nonburgled and burgled axial lines respectively:

Again one finds that in both burgled and nonburgied samples of lines there is no correlation or weak correlations (e.g., for Marquess South MARQ178: R=.444 p = .039) between number of dwellings and degree of integration of a line.

Looking at the equivalent scattergrams (A, B, C, D) for the upper level in figures 4.42, and 4.43 a and b (the latter excluding two very long lines with over 24 dwellings which hence have very low burglary rates) one observes that at the upper level, there is a discrepancy between burgled and nonburgled samples. Whilst in the nonburgled sample (fig. 4.42) there is no correlation, in the burgled sample there appears to be a strong correlation (see figures 4.43 a and b) between numbers of dwellings and integration, particularly with respect to the estate as a whole in the global context (scattergrams A: correlation of R=.763 p=.0009 very highly significant). This improves slightly when the two very long lines in the south upper level are excluded (fig. 4.43b) to R=.8; p = .0001.

It becomes apparent that this correlation at the upper level is actually created by the south upper level system (scattergram C), where the correlation becomes R=.939 with p=.002 (highly significant), whilst in the north upper level system (with relatively few burgled lines), this correlation does not hold.

The above suggests the following:
MARQUES RD ESTATE: MEAN DWELLINGS LINE IN THE INTEGRATION BANDS

SOUTH SECTION:

1. \( y = -6.965x + 14.57 \); \( r^2 = 0.25 \)
   - All Levels
   - Correlation
   - \( R = 0.525 \)
   - \( p = 0.064 \)
   - MeanNo DWELisas

2. \( y = 11.96x - 10.491 \); \( r^2 = 0.517 \)
   - Ground Level
   - Correlation
   - \( R = 0.757 \)
   - \( p = 0.07 \)
   - MeanNo DWELisas

3. \( y = 18.63x + 32.541 \); \( r^2 = 0.648 \)
   - Upper Level
   - Correlation
   - \( R = 0.607 \)
   - \( p = 0.09 \)
   - MeanNo DWELisas

NORTH SECTION:

1. \( y = -7.768x + 10.903 \); \( r^2 = 0.463 \)
   - All Levels
   - Correlation
   - \( R = 0.695 \)
   - \( p = 0.04 \)
   - MeanNo DWELisas

2. \( y = 7.955x + 12.952 \); \( r^2 = 0.479 \)
   - Ground Level
   - Correlation
   - \( R = 0.692 \)
   - \( p = 0.04 \)
   - MeanNo DWELisas

3. \( y = 8.97x + 16.121 \); \( r^2 = 0.597 \)
   - Upper Level
   - Correlation
   - \( R = 0.554 \)
   - \( p = 0.07 \)
   - MeanNo DWELisas

FIGURE 4.44: SOUTH: CORRELATION BETWEEN M. NUMBER OF DWELLINGS LINE & INTEGRATION IN THE RRA BANDS

FIGURE 4.45: NORTH: CORRELATION BETWEEN M. NUMBER OF DWELLINGS LINE & INTEGRATION IN THE RRA BANDS
At ground level and for the constituted sample of axial lines of the estate as a whole there is no correlation between number of dwellings per line and degree of Integration. In contrast, at the upper level there appears to be a strong and highly significant correlation between the number of dwellings and degree of integration of the line, particularly strong in the upper south section. Since the number of dwellings per line is strongly related to the burglary rates, this suggests that the powerful correlation between burglary rates and degree of Integration at the upper level is clearly also related to the correlation with number of dwellings per line. However, since the nonburgled sample of lines does not have such a correlation, it is most likely that there is a particular reason for those lines to be burgled. One could argue that, the trade-off between Integration and number of dwellings on an access line is the key.

Clearly further research is necessary, however, this is beyond the limits of the present study.

4.6.2 Relationship between Average Number of Dwellings/line and Degree of Integration of the bands.

Concluding the analysis of the performance of the local variable number of dwelling per line, this subsection enquires into the relationship between Mean Number of Dwellings/line and Mean RRA of and the Integration Bands.

a. Marquess Rd South:

Scattergrams i, ii, and iii, in figure 4.44 present the correlations for the whole system, the ground level and the upper level (MARQ178/126). There is no clear correlation between the two variables, though there is a trend for number of dwellings /line to decrease with segregation. More specifically:

- **Whole South:**
The correlation between mean number of dwellings and RRA is strong but not statistically significant $R= .757$ $p=.14$. The average number of entrances on a line decreases with the degree of segregation of each band.

- **Ground Level South:**
At ground level the mean number of dwellings per line in each band tends to decrease with segregation though again the correlation is not significant ($R=.779; p=.12$). (No such trend is found with the sum of Burglaries).

- **Upper Level South:**
Here the Average number of dwellings per line is higher than at ground level, but the correlation between mean number of dwellings per line and degree of integration of the bands is weak: $R= .607; p=.39$ (not significant).
b. Marquess Rd North:

Scattergrams i, ii, and iii, in figure 4.45 present the correlations between mean number of dwellings per line and degree of Integration for the bands (MARQ224/163). The general trend is for the number of dwellings on a line to decrease with segregation, but there is no significant correlation:

- **Whole North**: The correlation between Mean Number of Dwellings and Mean RRA values in MARQ224 for the ground and upper level together is nonsignificant: \( R = 0.695; p = 0.193 \) The scatter is untidy, though the trend shows mean number of dwellings decreasing with segregation.

- **Ground Level North**: The Mean Number of Dwellings does not correlate strongly with Mean RRA of the bands: \( R = 0.658; p = 0.23 \) (not statistically significant)

- **Upper Level North**: The middle band appears to overperform, otherwise the mean number of dwellings/line is low; the correlation breaks down: \( R = 0.554; p = 0.33 \)

In short, although there is a general trend for mean number of dwellings on a line to decrease with segregation, in both parts of the estate and at all levels, the two variables have no systematic correlation, as has been found in the case of burglary rates.

Summing up, there appears to be a strong correlation between burglary rates and number of dwellings (as discussed in section 4.4.1), which can be attributed to two possible reasons:

- The obvious reason is that there is usually only one or two burgled dwellings on a line (i.e. not enough burglaries in the limited data), therefore, burglary rates are functions of the reciprocal of the number of dwellings on the line.
- However, as discussed earlier in section 4.2.4, it may also be the case that, where there are more dwellings on a line, there is less burglary risk - an indication that burglaries are not totally random, since burglary rates would then be the same, irrespective of the number of dwellings (no correlation).

Although overall there is no correlation between number of dwellings per line and degree of integration/segregation of the line, at the upper level there appears to be a strong correlation between the two, particularly due to the performance of the south
upper level. At ground level, there is only a very weak correlation between burglary rates and number of dwellings per line, which is clearly not creating the correlation between burglary rates and degree of segregation established in the previous section. Whilst there is a general trend for more segregated lines to have smaller numbers of dwellings, as the analysis of the integration bands shows, there is clearly no significant correlation between burglary rates and degree of integration/seggregation of the bands. If anything, it is probably the reverse that is true; i.e. that the correlation between burglary risk and degree of seggregation of a line is creating the correlation between burglary rates and number of dwellings, mainly manifested at the upper level.

However, there is also probably a particular trade-off, between the risk due to seggregation, and the number of dwellings/neighbours on a line. Earlier evidence suggests that the number of neighbours one has, has an effect on burglary risk, increasing the chances of apprehension. Thus it may well be both factors that need to be taken into account: risk increasing with seggregation, weighed against the number of neighbours sharing an access line. This, one may argue, gains more importance at the upper level, due to the 'intimacy' between access path and front doors and the relatively high local surveillability, thus explaining the particular phenomenon of the correlation between dwellings/line and Integration at the upper south section.

Thus one may conclude from the above, that there is a genuine correlation between burglary rates and seggregation. The correlation between burglary rates and number of dwellings is likely to be either: a) a result (artefact) of the relationship between risk and segregation, or b) an independent factor to be weighed against the former. Though more data is necessary to clarify this, considering the circumstances overall, it is more plausible that the second is the case. In other words, that there is a trade-off between the difficulty of accessing the more segregated locations, which have less neighbours for the burglar to worry about, and the ease of access of a longer and relatively more integrated line (where this is the case), which however means more neighbours and a higher risk of being apprehended.
4.7. **Summary of findings and Discussion:**

Having completed the analysis, which identified the spatial factors influencing vulnerability of burgled dwelling locations on the estate and the pattern of spatial vulnerability, one can begin to think about the design of the estate in more critical terms, and attempt to link the insights on vulnerability factors back to the design concepts and choices.

**A. General Design Strategy: General burglary profile.**

The Marquess Rd is a very high density, medium to low-rise development, with two quite distinct residential sections divided by a green 'core' with older buildings, communal facilities and open spaces. Though different in terms of spatial configuration, both the north section off St Paul's Rd and the south section off Essex Road, are similar in design principles/typology of blocks' appearance. The design of the housing scheme attempts to achieve **urban village type characteristics in multiple layers**, avoiding rigid geometric layouts that are typical of the modern movement in architecture. The informal and rather complex spatial layout with blocks ordered so as to form narrow lanes and squares or greens, avoids standardisation in plan, based on a simple block/dwelling typology, which is standardised in section. Buildings are interlinked at the top level by the 'roof' system bridging over them:

Through a system of access paths, interwoven and interlinked through ramps, stairs and lifts, dwellings are accessed directly at three different levels (ground; raised ground and upper). Thus the design achieves **row-house type characteristics** for all dwellings, with direct access from the path network, in most cases with small front gardens/terraces (at ground and raised ground level). **Vehicular traffic** is almost completely excluded from the estate, restricted to emergency and garage access, and segregated from the pedestrian system of access by separate levels (hence the raised ground sections of the pedestrian access network). Garages are located mainly on the periphery building barriers to the street at ground level or in lower ground car parks in the interior.

The forced 'intimacy' which is created by the high density of the built environment is counteracted by **visual screening**, i.e. broken and restricted views. There is little emphasis on linearity and geometricity, the usual expression of the design rationalism of planned settlements, and which is considered to be one of the main culprits of the visual and spatial monotony and lack of liveliness of these architectural forms.
Although this achievement has been largely praised by the architectural establishment, and there is little about the design that contradicts Oscar Newman's or Alice Coleman's guidelines (no large multi-storey blocks, no high number of dwellings per blocks/entrance), this design appears to have created a highly vulnerable environment to crime.

Reported police data on burglary locations on the estate in 1985 and the 3/4 year period in 1986-87 show a very high rate of burglary in the year 1985 of about 74/985 = 7.41% overall, well over the average for London of 5-6%. In the second period there is a sharp drop to under half the rate estimated (i.e. projected from 3/4 to one year) at approximately 3.65%, attributable to the implementation of crime prevention initiatives with escalation of policing. Considering the distribution of burglaries between south/north sections the study found:

- The south section of the estate is clearly more vulnerable than the north. In the first period it is almost twice as vulnerable (55/611 = 9.00% in the south compared to 19/474 = 5.09% in the north section). In the second period, the difference disappears; the rate in the south drops sharply to approx. 3.5%, about the same as the rate of 3.9% in the north section. For the overall data period the south remains about 1.5 times more vulnerable - 6.25% compared to 4.5% in the north section. However the spatial vulnerability on the estate shows strong differences by level of access and by north south division, which prompted the further analysis of access and surveillability factors.

B. Block/dwelling typology and General access factors.

In both 4-5 storey blocks and 2-3 storey blocks the block structure is based on the principle of interlocking 'scissors maisonettes', which accommodate 4 and 5 persons dwellings and 2-person dwellings at the top (roof level). This allows access to the blocks from both sides, but at different levels (ground and raised ground). The length of blocks varies (as does the number of dwellings per access space); their forms are stepped in plan and elevation to achieve variation of the proportions of open spaces at ground level (width and shape) which leads to a high degree of convex and axial breakdown. The blocks are standardised in section, rather than in plan, which means that:

- All dwellings have direct front (only) access (no lobbies/corridors or galleries etc.); maisonettes are generally interwoven back to back so that there are no exposed backs as a rule. Dwelling access is organised in three levels: Ground and raised ground and upper (roof) level.
• The access network is almost entirely pedestrian; there is minimal overlap between dwelling access and vehicular access even at ground level.

• The ground and raised ground merge relatively smoothly without discontinuity. The raised ground differs between south and north sections, due to the different layout plan and location of garages. Whereas in the south section, the raised ground is basically outward facing on the periphery of the estate, in the north section there is a substantial part of the interior which is also raised ground, as well as the periphery.

• The upper level system of 'roof-streets' forms separate systems in each section, forming deep rings with the ground/raised ground. These are formed by serially interlinking 'courtyard' type spaces, which function as communal open space, since the 'street' aspect is more related to the sectional proportions of the open space, (width/height), rather than its relational properties (axiality; inter-connectedness of the network system), which generally characterises traditional street networks.

The description and analysis, identified the following constants and local variable factors related to accessibility and surveillability:

C. Layout design: Local Factors relating to dwelling Accessibility and Surveillability:

Since there is only direct front access from a system of pedestrian paths, both these access factors are constant. What varies is the access level:

• At ground and raised ground level: dwellings have front gardens or terraces, which create 'buffers' between the private dwelling entrances and the public path network.

• At the upper level the interface between public and private is totally immediate (no front terraces), compensated in terms of 'privacy' purely by the fact that the roof level is strongly segregated and visually screened from the ground, as a whole, thus not as public in character.

• Factors influencing visual surveillability:
High building density, and high ground coverage result in an overall high degree of enclosure over the estate interior; nonvehicular access is a constant at ground and upper levels; local conditions of dwelling access and factors of local visual surveillability remain relatively constant at each level:
Ground level: coupled with the overall high degree of spatial enclosure; in the interior of the residential parts; the high brick walls of the front gardens restrict visibility of dwelling entrances further.

Raised ground: there is hardly any visual surveillance from ground level and from other buildings, due to the width of the roads and the distance from other buildings. In the south section the raised ground is almost entirely peripheral. In the north section the interior portion borders with open spaces (inner green core).

Upper level: at the overall visually segregated roof level, the relative openness allows direct view of entrances, but again visual surveillability is localised and restricted.

Thus although the design of the Marquess Rd Estate appears complex in terms of spatial organisation with a high degree of enclosure overall, the local conditions of accessibility and visual surveillability are relatively constant and vary by level of access.

From the general breakdown of burglary rates by levels of access, the ground level is found to be over two times more vulnerable than the upper (58/603 = 9.62% compared to 16/382 = 4.19% respectively) and this holds for both sections:

- Looking at the distribution of burglaries by north/south and by levels, one finds it is the ground level in the south that is particularly vulnerable (11.7% in '85), almost twice the respective ground rate (6.17%) in the north.
- The most striking results, however, come from the raised ground level alone, which in 1985 reaches a burglary rate of 21.4%, three times above the average for the estate in that year. In the north, the raised ground is also more vulnerable than the ground per se, but not as in the south. This could be related to the fact that, in the north section, a substantial portion of the raised ground covers the central area., rather than the peripheral blocks.

In the second period with increased security measures, the rates drop, particularly at ground level and raised ground (by about two thirds in the south raised ground section), however, the raised ground continues to be the most vulnerable level on both sides of the estate. The difference between ground and upper levels diminishes to 3.89% (half the 1985 ground burglary rate) and 3.14% (3/4 of the upper level burglary rate in 1985). At the north upper level section, however, the burglary rate does not drop in second period, but rises marginally above that in the south (2.84% in the south compared to 3.63% in the north in '86-87); the numbers however, are so low, it is difficult to draw conclusions. Overall (for 1985-87) the ground level averages
out at a burglary rate of 6.8%, approximately double the rate of 3.67% at the upper level.

The question is, how can one explain the differences in spatial vulnerability between access levels and between south and north - in relationship to design factors, which affect access and surveillability. Although there is little variation in terms of local conditions of visual surveillability and accessibility, with the exception of the number of dwellings per access line, the more globally defined factor related to the location of dwelling entrances within the overall spatial network, however, does vary, i.e. the degree of global accessibility of a dwelling.

D. Global Accessibility: Spatial Configuration: Pattern of Integration / Pattern of Constitution:

The spatial analysis of the estate, showed, there is a very high reduction in scale of the axial structure and a high degree of complexity in the spatial organisation, which however lacks an internal integrating structure within each residential part. The reduction in scale means, that axial lines are short and broken, the axial structure approaches the convex structure resulting in short broken views. The axial breakdown, the lacking integrating structure and the short views make the estate disorienting and lacking in intelligibility (and difficult for strangers to find their way around). The concealed vertical circulation makes movement between ground and the upper level even more confusing.

Overall the estate is strongly segregated from its urban context; axial views from the outside into the estate are limited ; the scheme is deep from the outside (average depth at ground level is about 2.5 , whilst at the upper level it is about 4.5. The analysis based on different spatial systems (and scales) of reference, shows that the peripheral raised ground section is more integrated with respect to the urban context, yet more segregated with respect to the local system and the estate on its own. The upper levels are clearly the most segregated, forming deep rings with the ground The north section appears to be more segregated than the south at all levels, particularly the deeper sequences in the interior ( north section) of the estate.

The most integrating lines tend to be on the periphery of the residential areas, the boundary street axes and the internal boundary lines traversing the green core, which link the two sections together; in the north, one of the top integrators is the main vehicular access route that cuts through the heart of the section. The pattern of top
integration thus includes the majority of vehicular and emergency access spaces and is removed from dwelling access. Encounter studies have shown that the pattern of movement tends to predictably over-perform at the integrated periphery and under-perform with increasing depth, towards the constituted interior. Thus the segregated spaces, where the dwelling entrances tend to be, are usually void of human presence.

In short, the layout is characterised by strong segregation from its context; a high degree of axial breakdown; deep rings and by unconstituted integration, depleting the spaces, which carry most pedestrian movement, from potential social control through windows and doors. These spatial characteristics appear to play an important role in terms of the vulnerability to burglary:

- **Unconstituted access** was found to strongly affect the probability of being burgled. Approximately 95% of burglaries at ground/raised ground level, were committed on the first line with dwelling entrances, entering from the outside. Unconstituted access means no doors or windows overlooking spaces, thus reducing the natural surveillance potential and the likelihood of being seen or recognised.

- **Number of dwellings on an axial line** (number of neighbours sharing an access space) is another variable factor (at all levels), which also differs between north and south sections and between ground and upper levels: Axial spaces with higher number of burglaries were found to have lower burglary rates. It could be that the more neighbours you have, the higher the degree of 'control' of spaces by entrances, the less you are at risk. This is particularly strong at the upper level. Since the number of dwellings per line relates to the degree of integration/segregation of a line, the correlation between number of neighbours and burglary risk is partly attributable to the correlation between risk and degree of segregation of an access line - but only for the burgled sample of lines! More data is necessary here.

- **Location of staircases:** At the upper level, the majority of burgled locations were found to be directly adjacent to, or around the corner, from the staircases/lifts, the majority being one or two doors away, opposite or on the first axial line away from staircases. Increasing depth from the outside, both in axial steps and in literal distance, seems to play a role. There appears to be a certain trade-off between the benefits of segregation and the difficulty of getting there and getting away. The longer constituted axial lines in the south may have discouraged longer journeys past dwelling entrances.
Considering, the vulnerability with respect to global accessibility of dwellings, the pattern of risk appears to increase with segregation at a local level, yet also relative integration with respect to the global context. In the second period, vulnerability with segregation increases, though the burglary rates fall. The ground level is considerably more vulnerable than the more segregated upper level and this is also found in the comparison of the overall samples of burgled and nonburgled dwellings. The most vulnerable section of the estate, which is the south raised ground periphery, which is less relatively integrated in the global context, yet segregated with respect to the local systems, as noted earlier, has the highest rate of victimisation over 20%.

Whilst burgled dwellings as a whole are more integrated than nonburgled dwellings (statistically significant difference in the global systems of reference), at ground level (as a whole and for each section separately), the trend is clearly for burgled dwellings to be more segregated than the nonburgled. The same pattern arises looking at the sample of burgled axial lines, and the integration bands. However, at the highly vulnerable south raised ground section, there is a threshold, from which point the pattern reverses, and risk starts decreasing with segregation at the most segregated end.

At the upper level there is a powerful correlation between burglary rates and degree of segregation of the access lines, though the two sections differ slightly. Burgled dwellings in the south are about the same or marginally more integrated than the nonburgled, whilst they are more segregated than nonburgled in the north. However, burglary rates of axial lines clearly correlate with the degree of segregation of the line in the south as well as with the number of dwellings on a line; though the correlation disappears with respect to the integration bands, i.e. the most segregated spaces at the upper level have less burglaries. This suggests that, at some point, there is a trade-off between segregation and depth, which balances out the difficulty of getting there and escaping from there. In the north upper level section, there is a very powerful correlation between burglary risk and degree of segregation of the bands, whilst with respect to burgled axial lines the correlation is weak, as is also the correlation between number of dwellings/line and burglary rates in the north due to the very limited number of burglaries.

There is a strong correlation between burglary rates and number of dwellings on the line, overall and at the upper level in particular, since there is usually only one dwelling on a line anyway, in some cases two etc. and the burglary rate always contains the reciprocal of the number of dwellings. However, from the investigation of the
correlation between number of dwellings on a line and degree of segregation, it becomes apparent that, this correlation holds for burgled lines only, particularly at the upper level (south), while in the rest of the sample of nonburgled lines this correlation does not exist.

There is thus a trade-off between degree of segregation and number of dwelling on an axial line, which is clearer in the south, due to the stronger axiality of the system and the higher number and range of dwellings sharing an access line. As with the raised ground section, at the upper level it becomes apparent that segregation at the most segregated end of the scale stops being as vulnerable, other factors also are taken into account, for instance the number of neighbours one has (and possibly the length of the axial line (sight line), where no other visual cover is provided. Furthermore as noted earlier, proximity to the staircases and vertical links is another important local criterion justifying the location of over half the burglaries in the south upper level, and almost all the burglaries in the north.

Partly as a result of the diverging trends and the discontinuities between levels, when taking the ground and upper level system as a whole, the correlations between burglary rates and degree of integration/segregation get diffused, in both sections. The two access levels differ considerably both with respect to degree of Integration, but also with respect to local factors, (depth; mean axial length/ density of constitution; average number of dwellings on a line); the systematic correlation between burglary risk and Integration/segregation breaks down. Thus from a methodological point of view, it is necessary to look at levels separately, where local factors are more controlled, in principle it merely indicates that the pattern of vulnerability depends on the interaction of local and global factors, therefore neither the former nor the latter should be viewed in isolation.

The pattern of vulnerability with increasing segregation, is stronger in the second data period. Correlations between burglary rates and degree of segregation of axial lines from which they are accessed were found to be consistent at all levels, though stronger at the upper level. Segregated spaces have predictably less people, limiting the likelihood of being seen or apprehended. This is probably the reason why, in the second period with increased police presence and activation, segregation offers 'safer' targets for burglars.

37 In the second period data, differences between burgled and nonburgled dwellings increase in the direction of segregation. Although there is a strong fall in burglary rates, particularly at ground level, which is more integrated than the upper, there seems to be a strong pull towards more segregated locations.
The strong differences in terms of vulnerability between levels can be attributed to the fact that different levels of access, relate to specific ranges of accessibility in terms of integration/segregation and depth, and visual surveillability. Thus the most vulnerable raised ground level (particularly in the south) combines:
• high degree of segregation in the local system, while relatively integrated in the global;
• unconstituted access directly from the highly integrated and unconstituted boundary streets
• limited visual surveillance: relating to restricted visibility from the street and absence of other neighbouring buildings overlooking access paths;
• relative discontinuity of constituted spaces and control by dwelling entrances;
• In the north interior raised ground section; there is a high degree of segregation; discontinuity of control by dwelling entrances; small numbers of dwellings sharing an access space hence often minimum numbers of neighbours; and high axial depth. with predictably minimum presence or movement of people.

The also highly vulnerable ground level combines:
• high degree of segregation and depth;
• limited degree of surveillability (overall high degree of enclosure and limited views and restricted view of doors);
• unconstituted integration and access;

The less vulnerable upper level combines:
• Highest degree of segregation; and high axial depth from the outside;
• Multiple and unsurveillable (obscured) vertical links - similar to unconstituted access;
• Greater linearity (higher average number of dwellings on a line) in the south; but also segregated shorter broken axial sequences;
• Locally higher degree of exposure of dwelling entrances; but overall limited global surveillability. However, also abundance of dark corners and visual cover for burglars.

Thus, in design terms, the pattern of vulnerability on the Marquess Rd Estate is created by:

• Restricted visual surveillability: relating to both:
  * the overall high degree of physical enclosure due to high building density (high axial breakdown, scaling down of the axial / convex structure);
  * locally, screening view of the entrances to dwellings in the attempt to achieve privacy through high garden walls.
• Extensive brick landscaping and the highly broken down open spaces restrict surveillance potential overall, reducing the visibility field both from a distance and from nearby. The high brick garden walls not only restrict visibility of the entrances, but offer good cover once a burglar has passed over the walls. The fact that windows from the upper levels overlook spaces does not seem to have a deterrent effect.

• Lack of integration of the interior residential parts, which results in "the urban desert effect" weakening the natural surveillance potential from continuous mixed presence of people: Due to the lack of an integrating structure in the interior to channel pedestrian movement and encourage a healthy presence of people, levels of natural policing are very low. The defensible space argument, that keeping strangers out discourages crime, is proven here not to be the case. In contrast it is more likely to be causing vulnerability.

• Unconstituted Integration and unconstituted access: another key factor of vulnerability in the design of the Marquess Rd Estate seems to relate to the fact that there are no dwellings at the entrances to the estate and on the ground periphery - unconstituted boundaries to the street. This introverted design in effect creates a no-mans land, which seems to guarantee to potential offenders that they will neither be seen nor recognised. The external boundary and transition spaces are deprived of the natural informal social control provided by the existence of doors and windows, with residents presence 'policing' these spaces.

• Through the elimination of vehicular traffic on the estate and segregating the garages from view, potential surveillance from cars and their drivers, as well as from patrolling police cars is also eliminated.

• Hierarchy and segregation of constituted access spaces: partly as a result of the axial breakdown and elaboration of the spatial structure, increases vulnerability particularly at ground level. At the upper level, which is very deep and highly segregated vulnerability is much lower than at ground. While the spatial articulation attempts to break down open spaces into more identifiable, increasingly "private" in notion spaces, the result is a reduction in the numbers of dwelling entrances sharing the access space and a reduction (in the name of privacy) in those potentially controlling or looking out for each other.
Summing up, the spatial factors involved in creating burglary risk on the Marquess Rd Estate are: the overall high density/coverage and high degree of enclosure; the restricted visual surveillability, due to the local detailing/landscaping and axial breakdown coupled with high degree of segregation, which also relates to the limited presence of neighbours and people in general; unconstituted access with limited surveillability combined with relative integration; less axial depth from the outside; yet segregated in the local system; which becomes highly vulnerable. The factors of global accessibility, visibility and surveillability clearly operate synchronously; therefore it is always the interrelationship and combination of factors, which determines the patterns of vulnerability. In all cases there is a trade-off between ease of access - and risk of being seen or apprehended.  

Although it is beyond the scope of this study to explain the reasons why the differences between first and second year vulnerability trends affect the south section more than the north, the ground level more than the upper; These differences could be explained perhaps by the extra policing in the second period, which would involve the main routes, with vehicular patrols where possible, in other words the shallower and more integrated parts. This would discourage opportunistic crime in areas that are patrolled (overall reduction in burglary rates), and shift or displace crime to the less conspicuous, less frequented and more segregated portions of the estate. Evidently this shift would affect the ground level, more than the upper level. This would also explain, why in the second period there is an increase rather than a fall in the number of burglaries at the north upper level. Since policing, (especially by police vehicles possible, which is more likely in the north section) focuses on the ground level, the results suggest, that at the time, at least, the increased police patrolling had an effect. There may have been some displacement of burglaries from the ground to the raised ground and upper level in the north section.
CHAPTER FIVE: CASE STUDY TWO

THE FERRIER ESTATE

London Borough of Greenwich.

Location: Kidbrooke Park Rd, Blackheath

Built by GLC 1968-72
FIGURE 5.00 A: GENERAL IMPRESSIONS OF FERIER ESTATE: From Top left: View of Estate from Kidbrook Park Rd: 11-storey tower blocks. Five storey maisonette blocks: interlinked at deck levels with outward facing back gardens. Staircases at the ends of each block. Long axial views through maisonette courts. Bridge between Maisonette Courts and Towerblocks (recently blocked).
GLRE 500 B  GENERAL IMRESSIONS OF HIRIER ESTATE:  
Top left: Telemann Square, the estate centre, view 
aards Kidbrook Station.  
Top right: Long Axial Viws and relatively high degree of openness overall.  
Bottom Right: Pedestrian subway 
king the two estate sides.  
Top right: View from the ground level in front of a tower block entrance.
FIGURE 5.00 C: GENERAL IMPRESSIONS OF LEARDER ESTATE: TYPOLOGY of spaces. From Top Right (clockwise): Vehicular access with high degree of openness and long views; Green courts (bottom left); Enclosed maisonette courts (bottom right) after improvements; Closed underground car parks removed from centre and replaced by playspace and on-street parking.
FIGURE 5.00 D: GENERAL IMPRESSIONS OF FURR ESTATE: TYPOLOGY of spaces. From Top Right (clockwise):
ENCLOSED court with ground entrances under arcade; former recessed zones, now with front gardens after improvements.
OPEN: Open green court - with row houses. RESTRICTED VIEW backs of maisonettes (bottom left and right).
Figure 5.00 E: General Impressions of Feriér Estate. Details of spaces: From top right clockwise: Improved entrance to corner staircase of maisonette block. Edge of the estate with grass buffer to the main road. Recessed entrance zones after improvements. Detail of staircase linking to maisonette blocks: blocked views into interior of court.
CHAPTER FIVE: CASE STUDY TWO
THE FERRIER ESTATE
London Borough of Greenwich.
Location: Kidbrooke Park Rd, Blackheath
Built by GLC 1968-72

Mixed Development; low density
Concrete prefab system
Size: 1908 dwelling units;
Population: approximately 6,000 inhabitants;

5.1 Introduction: General Estate Profile.

The Ferrier Estate is located in Blackheath, a relatively affluent suburban residential area on the south eastern outskirts of London, off the A2, one of the major motorway routes linking London to the South-East. It was designed and built by the Greater London Council in the late sixties and early seventies. The construction (concrete prefab) started with the west half in 1967-68 followed by the east half in 1969-70 and was completed by 1972. The management of the estate was transferred to the London Borough of Greenwich in 1980 1.

The Ferrier is a medium to low density mixed development comprising approximately 1900 dwelling units with a population of about 6,000 adults and children. Precise population data for the estate only was not available, but the 1981 census data for the ward, which includes the Ferrier and a small part of neighbouring housing (total population 7350 people, and a total 2757 households), provides a rough population profile. There is a relatively high proportion of children and young adults - about a quarter of the population was under sixteen years old and 44% of the population under 25 years of age2. Approximately 12% is over retirement age (60/65 years old for men and women respectively with women about double the number of men. Overall, over 51 % of the population is female, and just under 49% male. The population was

---

1 This was part of the general transfer of GLC estates to the local authorities.
2 Breakdown by age groups: aged 0-4 years 7.6%; 5-15 years about 18%; 16-24 years about 18%; with more or less equal numbers of girls and boys. Obviously since 1981 the population has grown older and changed. On the other hand judging from the rest of the households excluding the Ferrier estate:1350 inhabitants in 850 households, we have an average of 1.6 persons per household compared to 3.16 persons per household for the Ferrier respectively. This means that the above percentages under-represent the percentage of children on the estate at the time.

255
predominantly 'white' up the mid-eighties, and the proportion of ethnic minorities was low. In the late eighties a considerable number of Vietnamese families were taken in, who remained socially rather isolated, whereas the older non white residents seemed to have largely integrated. Finally, the proportion of unemployment for the estate was high at about 20% at the time of the UAS/GFW research study (1989), which is comparable on all estates in the present study.

A mixed development comprising 30% high-rise, 53% medium-rise and 11.3% low-rise housing, and 5.67% Old Age Pensioners blocks, the Ferrier is one of the largest estates in the Borough of Greenwich. More specifically there are:

- 18 blocks of two-storey houses (216 houses)
- 36 blocks of five-storey blocks of maisonettes with ground and deck access (1008 maisonettes);
- 11 eleven-storey tower blocks (572 flats) and
- 9 two-storey old age pensioners (OAP) blocks (108 flats).

The estate also contains a local centre with commercial and community facilities grouped together round Telemann Square at the north east tip near Kidbrooke Station (British Rail).

5.1.1 The Estate in its Context

Figure 5.01 presents the map of the estate in its local area. The estate is divided into two almost separate halves by Kidbrooke Park Rd (A 2213), a major through route with considerable traffic from and to Blackheath, linking also to the motor way junction to the north of the estate. At the south end Kidbrooke Park Rd feeds into the boundary loop road to both the east and west sides of the estate: Tudway Rd and Weigall Rd leading to Moorehead way respectively. The boundary roads Tudway Rd and Moorehead Way join up under Kidbrooke Park Road at the north end near Kidbrooke Station. There is another pedestrian only underpass towards the centre of the estate.

The estate is directly adjacent to Kidbrooke Station (which provides the area with a rapid rail link to Waterloo Station and the city centre); it is bounded to the north by the railway lines. Built on the site of a former airfield, it is surrounded by large stretches of green to the south (Sutcliffe Park) and to the east, where there is also a sports centre.

To the west the estate borders with a low rise residential project also mainly council owned, though there are no vehicular cross road links. With the exception of Weigall
Rd (south west border) the existing road layout to the west is blocked off. To the east there is no direct vehicular link to the residential area beyond the green space. A sports centre is located here accessed by the boundary loop road that surrounds the estate.

The Ferrier appears to be strongly segregated physically from its surrounding area forming a distinct island in the suburban context. This effect is amplified by its modernist concrete architecture, which presents a striking contrast to the character of the surroundings, the predominantly post-war semi-detached housing and large Victorian houses along Kidbrooke Park Rd, the main thoroughfare. Apart from Kidbrooke Park Rd which cuts the estate in two halves, it only links locally to the existing low-rise residential area to the west.

5.1.2 Site Layout: Principles of architectural design.

Figures 5.02 and 5.03 present the site plan of the estate at ground level and the deck level plan. The layout design is based on the repetition of courtyards or squares in an orthogonal grid - with alternating 'closed' courts formed by interlinked five-storey blocks, and open green courts bounded by rows of houses and the backs of the higher blocks. Eleven-storey tower blocks, five on the east side and four on the west, are scattered over the estate between the courts as are the twelve OAP blocks. In the original design it was possible to walk right across the estate halves at deck level. This however was changed in the last few years after a proposal by Alice Coleman who carried out a study of the estate\(^3\), so that half the overhead walkways were blocked off and each tower block now links to one court at a time only. (These were only retained because the tower blocks have the necessary lifts for elderly people or mothers with prams etc.).

The estate halves are similar in architectural design principles and building typology, but different in the actual configuration. The layout is overall open, griddy and strongly geometrical.

---

\(^3\) Alice Coleman and the Land Use Research Unit at King's College conducted a study of the Ferrier Estate commissioned by Greenwich Council in 1987. The "Design Disadvantage Report" focuses on block characteristics, counting the number of defects in her well known disadvantage score. Proposed remedies mainly focused on controlling access to upper level such as blocking off overhead walkways as far as possible and introducing access control in tower blocks, and increasing densities by building row houses on the open stretches of green.
Vehicular and Pedestrian Traffic: Parking: Vehicular and pedestrian traffic are largely separated. Vehicular traffic is restricted to access in a typical 'Radburn' style of layout with no through-routes. The peripheral road on which traffic is concentrated loops under Kidbrooke Park Road feeding off it at the south end of the elevated section (and off Weigal Rd). The boundary loop road feeds into the estate at regular intervals. Vehicular access is based on a system of culs-de-sac feeding off the peripheral road (Tudway Rd and Moorehead Way). These in turn loop into the 'closed' courts, at the centre of which are semi-underground garages. There is limited on-street parking in proximity to dwelling entrances.

There is an orthogonal grid of pedestrian paths that run through the estate halves, north-south and east-west, with smaller paths and lanes cutting round and across the green spaces and play areas. This leaves the majority of open green spaces for pedestrians only with a large chunk of green recreation space at what would be the heart of the estate on both sides. The two halves are weakly linked (via the pedestrian underpass to the estate centre Telemannn Square, and the boundary roads).

Facilities: The estate centre, Telemannn Square, is where all the commercial and main social facilities for the estate community are located on the north tip of the east half of the estate, approximating the geographical centre in relation to the whole. It lies just off Kidbrooke Park Road near Kidbrooke Station and connects to the west half via the vehicular and pedestrian underpasses. The local centre includes a bank, a pub, a medical centre, a community hall, the 'Horizon' centre for socio-cultural activities and adult education etc. The Neighbourhood office, the old people's home and the local social services office are also situated close to the centre. Furthermore, the estate has two primary schools and two senior citizens clubs, one of each on each side. (Part of the facilities are meant to serve a larger area).
FIGURE 5.04: FERRIER ESTATE: DETAIL OF SITE PLAN SHOWING OPEN COURTS AND CLOSED COURTYARDS (SQUARES).
5.1.3 Block formation: Block/dwelling typology:

The building types and the block formations are standardised on the Ferrier, as is often the case with prefabricated construction. Apart from the eleven tower blocks and the twelve OAP blocks, the layout comprises two basic types of building blocks: row houses (two-storey) and maisonette blocks (five-storey accessed at ground and second level above ground). These are standardised in form and length and grouped around open spaces/courts as will be discussed further on.

- **Tower blocks:** have eleven storeys with five flats per floor grouped round a closed central lobby space. At deck access level the tower blocks link to the neighbouring maisonette court, where there are only two flats and more communal spaces. There are no dwellings at ground level. The vertical circulation cores are isolated from the lobby spaces via glass partitions and doors. At the time of the study, although there were doors at ground level, which 'control' access to the block, these were not locked, since the system of intercoms had not been installed yet.

- **Old Age Pensioners (OAP) blocks:** The nine two-storey blocks with 12 flats for elderly people each are scattered over the estate, predominantly towards the edges. Access to these blocks are via tightly controlled entrances (locked doors) with intercoms. These blocks seem to work well with a close knit management and community structure and active participation in keeping up security. These blocks have basically been excluded from the study for they are a special housing category as will be discussed later.

Figure 5.04 presents a typical grouping of building blocks into the 'closed' courts and the 'open' green courts:

- **'Closed' maisonette courts:** comprise of four- five-storey blocks of maisonettes grouped around a square shaped court with an underground car park at the centre. The tightly knit blocks are interlinked via access decks overlooking the interior of the court and staircases at the four corners. At ground level dwelling entrances flank the squares on three sides, with back gardens facing the outside, while one side of the square dwelling entrances face outwards, with the respective back terraces facing the interior. Each 'maisonette court' links at deck level to a tower block via an overhead walkway for the use of lifts.
• **Open courts:** Rectangular grassed areas (often with playgrounds) are flanked by two-storey row houses on two or three sides and by the exterior (back) faces of maisonette blocks to one side.

### 5.1.4 Dwelling Access: Pedestrian and Vehicular:

Dwellings are accessed at ground level, deck level and upper levels of the Tower blocks. At the upper levels and at deck level dwellings have only one access front, at ground level almost all dwellings (excluding the OAP blocks which have designated communal gardens) have both **front and back** access via gardens. The large majority of dwellings are **directly** accessible from the system of paths and open spaces:

**Ground Level (see fig. 5.02):**

- **Houses:** Houses are all directly accessible from two sides/faces with short front gardens and larger back gardens. As a rule the front entrances of one row face the back gardens of the other. In some cases they are accessed from the vehicular access roads, however the majority is accessible via pedestrian paths.

- **Maisonettes:** At ground level, as is the case with houses, maisonettes also have two access sides. In some cases the outward facing maisonettes open onto the vehicular access roads. In the court interiors the vehicles are parked on the road rather than in the designated garages. Although there is vehicular access, there is no vehicular traffic.

Dwelling access at ground level can be both via **vehicular** and **pedestrian only** routes. Unlike other estates, a considerable proportion of houses and in a small minority of ground level maisonettes have their back gardens directly opening onto the boundary roads. On Tudway Rd on the east side there are garden entrances, which are often used as main entrances, but on the west side the back gardens face the road, but don't actually open onto it, distanced from the road by stretches of grass.

At ground level all dwellings have both **front and back access directly** off the network of public open spaces, **pedestrian and vehicular**, where to a large extent one is continuously in the presence of dwellings.

**Deck level** (fig. 5.03): Decks access the upper levels of the maisonette blocks organised around the courtyards, thus forming clusters linked to the ground by a large number of staircases and overlooking the central space. All dwellings (maisonettes) are directly accessible via the public open network.
Upper levels (Tower blocks): In contrast to deck access the flats at upper levels in tower blocks are accessed via closed i.e. internal access spaces (indirect access) in this case in the form of lobbies off the vertical circulation core.

5.1.5 Open spaces: Exposure/Enclosure and Landscaping.

The Ferrier Estate is characterised by a high degree of open space resulting from the relatively low density/low coverage and high proportion of medium to low-rise buildings with ample green spaces in between. Kidbrooke Park road, which would have been the spine of the estate, is embedded in large open stretches of grass, forming relatively hilly landscape on the east side.

The pedestrian paths and particularly the vehicular routes on the estate allow long views through the estate, facilitating orientation within the estate and intelligibility of the layout. However, the strong building uniformity does create a degree of confusion for the visitor with respect to their exact location.

The gardens have low fences allowing visual contact between the dwellings and the outside, so that there is a relatively continuous relationship to dwellings (front and/or back) for the main clusters of blocks east and west. At the edges i.e. the boundary roads and near the large green areas off Kidbrooke Park Road the dense relationship to dwelling entrances (front and back) and the 'social control' this affords weakens considerably. However, the long views and openness of the layout, particularly as seen from outside the estate and from the vehicular access routes, along with the relatively minimal landscaping allow good visual surveillance. The exception to this are the closed maisonette courts, which are surveillable only from the inside, both at ground level and with restricted views from the decks.

5.1.6 Experience of the estate:

The area around Telemannn Square, the health centre and Kidbrooke Station behind it, seem to attract considerable pedestrian movement and there is presence of people through the day. Tenants complained, however, that at night it was often the 'wrong sort' that gathered at the pub and created disturbances. The rest of the estate is more quiet, yet the openness of the layout allows much higher awareness of people than the other densely structured estates studied in this thesis.
There are considerable numbers of children about the estate (especially after school) and smaller children can often be seen playing in the courts not far from supervision by adults. Older children are often to be seen on the large central stretch of green on the east side, where there is also a youth centre. The landscape is hilly not flat, so that views from the grounds and the main road of the housing beyond are partly obscured. Otherwise, as is often the case elsewhere, these central communal grounds are used more by dogs than by adults.

The decks are only used for access to dwellings and tend to be unoccupied except for particular times of the day, when people generally leave for work or go shopping, or come back home from work etc. The staircases feeding the decks are isolated from the dwellings and screened from sight.

Encounters with people in the staircases often cause unease and fear. This was often observed during visits to the estate in the reactions of women in particular, when encountered in the staircases. It was also mentioned in many interviews with tenants and key personnel (conducted as part of the UAS/GFW Anglo German project4). Three rapes had taken place in staircases in the mid eighties (the last couple of years before the anglo-german study), so the feelings of insecurity are obviously not unfounded. In the tower blocks, the staircases are completely insulated from the lobbies and dwellings entrances and are strongly avoided by the tenants.

---

FIGURE 5.06B: FERRIER ESTATE: AXIAL MAP OF GROUND LEVEL: DETAILED SPATIAL SYSTEM

AXIAL LINES:
- DET. GROUND LEVEL
- STAIRCASES
- TOWER BLOCKS
- GROUND BURGLARIES
Figure 5.07: Ferrier Estate: Axial Map of Deck Level (Simple and Detailed System)
5.2. **Spatial Analysis of the Estate.**

Whilst the design of the Ferrier is based on the repetition of a geometric order of 'enclosed' squares and 'open' courts, the spatial layout is still different in each estate half. It is thus interesting to investigate the configurational characteristics of the estate - the way the spatial pattern is structured as a whole, and compare the differences in the configuration of the two halves.

Based on the UAS syntactic model of spatial description and analysis, the pattern of open spaces of the Ferrier Estate is analysed in two ways at ground level:

A) a simplified axial representation taking only the hard boundary walls into consideration and ignoring the finer articulation of open space through 'soft' boundaries and landscaping (figure 5.06A);

B) a detailed axial representation of the structure of paths and open spaces as defined by landscaping and all types of boundaries (figure 5.06B).

This is necessary, because the two spatial representations attempt to capture two different experiences of the ground level spatial structure. The former is more in tune with the relatively unstructured open space, which the pedestrian sees and experiences as a whole, while walking about at ground level. The latter takes into account the intended path arrangements and fine tuning, which actually dictate pedestrian movement on the estate. At deck level there is no ambivalence in terms of spatial description, since there are clear-cut boundaries (walls) defining the spaces.

The estate is analysed on its own since physically it is an extremely segregated location due to the railway lines and motorway, and the stretches of green (practically no direct urban context). However, in both simple and detailed spatial systems the estate is analysed by levels of access:

- **ground only**: ignoring vertical axes-staircases; tower blocks and the upper level-decks;
- **the whole system**: ground plus deck level with vertical links i.e. all of publicly accessible space.

More specifically:

---

5 See section in Methodology; Chapter three. Soft boundaries are those that attempt to discourage a particular movement (access), or define territorial control as advocated by Oscar Newman's 'Defensible Space' design guidelines, but are not prohibitive. They tend to be fences, low walls, symbolic barriers, vegetation; landscaping.

6 The structure of open space on the Ferrier is equally developed in the convex and axial dimension. This often causes difficulties in the mapping where the path structure is not defined by hard boundaries.
Simple map:

<table>
<thead>
<tr>
<th>Ground only</th>
<th>Detailed map</th>
</tr>
</thead>
<tbody>
<tr>
<td>LFER131 -basic ground</td>
<td>LFER268</td>
</tr>
<tr>
<td>LFER210 -ground +vertical axes</td>
<td></td>
</tr>
</tbody>
</table>


Whole system

| LFER264 -whole    | LFER410 |

In each case the number suffix refers to the number of spaces in the spatial system. Quantitative spatial measures are calculated by computer on the basis of the above spatial systems of reference. However, the analysis as mentioned before particularly focuses on a measure of Integration which has been found to affect to the natural pattern of movement in traditional urban systems.

5.2.1 Description of Axial Structure:

In the simple map there are about half the number of axial lines than in the detailed map: for example, in the ground detailed system there is a total of 264 axial lines, whereas in the basic ground map there are only 131 axial lines (compare figures 5.06A and 5.06B respectively). In the whole detailed system we have 410 axial lines overall, as opposed to a total of 264 in the whole simple system. Since the axial representation of the upper level is identical for both simple and detailed systems, we have the same number of lines at deck level (there are some differences with respect to the links to the ground system). Tower blocks and staircases in both systems are simplified to one vertical axis.

The ground simple map (figure 5.06A) gives a clear illustration of the overall griddyness (symmetrical and distributed) of the spatial structure and shallowness from the outside. One can cross each half of the system from south to north in about one or two axial steps. There is a strong emphasis on long axes running right through the estate in the north-south direction, which tend to connect the east side from Tudway road to the centre. On north end of the east half, where the estate centre and Old peoples Home are located the long axes are cut off, whereas on the west half the axes tend to run right through. The major north south running axial lines have an average length of 300 metres.

---

7 It should be noted that the axial maps are representations of pedestrian access. The pattern of vehicular traffic (figure 5.02), comprising of a boundary road feeding a system of cul-de-sacs, is quite different: hierarchical, segregated and nondistributed.

8 It should be noted here, that the links between Weigal road and the major north-south axes were not quite intended - a stretch grass actually the north west axes from Weigal road, though clearly it does not stop pedestrian movement judging by the tracks in the ground.
The axial lines in the east-west direction are shorter and tend to run from the boundary roads inwards. They are generally blocked by the elevated section of Kidbrooke Park road; there are only few links between the east and west halves of the estate - the main pedestrian underpass near the estate centre and the boundary roads. It takes at least 5 axial steps (5 changes of direction) to get from the east edge of the estate to the west or vice-versa. On the west half the east-west axes are longer and tend to link the west side via the underpasses to the estate centre on the other side of the main road.

In the detailed map (figure 5.06B) the high degree of spatial elaboration is evident in the high degree of local axial breakdown (numerous short axial lines). This is particularly the case in the articulation of the courtyard space of the maisonette courts: with recessed entrance zones; subdivided into the sunken garage access; and the piazza/play area over the garage roof. Green courts on the other hand have pedestrian paths around and across them. Overall the detailed representation gives an indication of the high investment in the landscaping and spatial articulation in terms of movement and use whilst the average line length in the simple ground system is about 133 metres, in the detailed it is considerably less, and the average length of the major north-south axes as mentioned before is about 300 metres.

Figure 5.07 represents the axial map of the deck level showing strings of interconnected decks linking to tower blocks and staircases, the vertical axes linking to the ground. The deck system is fragmented with many links to the ground level, thus forming a large number of deep rings. Axial lines at deck level are as a rule 4 to 6 axial steps deep from the outside. The many links allow one to move about in the larger system through the deck system, coming up from one side and coming out at a totally different point or even a choice of different exits.

In the following paragraphs two key aspects of the axial structure will be discussed: the pattern of integration and space use and the pattern of constitution by dwelling entrances - in other words the way movement is structured and the location of lines from which dwellings are accessed with respect to the spatial system as a whole.
FIGURE 5.08: FERRIER ESTATE: PATTERN OF INTEGRATION:
SIMPLE GROUND SYSTEM (L.FER 130)
FIGURE 5.10  FERRIER ESTATE: PATTERN OF INTEGRATION:
DETAILED GROUND SYSTEM (FER 268)
5.2.2 Pattern of Integration:

Figures 5.08 to 5.11 present the pattern of Integration/segregation on the Ferrier Estate, colour coded according to degree of Integration within the range of values: red (10% top integration) yellow; green; light blue and dark blue (25% most segregated spaces) based on the simple ground; simple whole, detailed ground and detailed whole spatial systems respectively:

- In the simple ground axial system (figure 5.08) the top integrated band includes the east-west pedestrian underpass and the tangents to Telemannn Square; Kidbrooke Park Rd; the vehicular underpass near Kidbrooke Station linking Tudway Rd to Moorehead Way; some major north-south pedestrian axes on the east side of the estate and a major east/west axes on the west side; Weigall Rd and the south section of Tudway Rd. The most segregated lines appear to be short lines behind Telemannn Square linking to the health centre; the access routes to Kidbrooke Station, and a series of ramps linking to the health centre. The most segregated lines on the estate tend to be the minor axial lines scattered all over the estate around the staircases or linking the courtyards, particularly in the south east (Romero Square and Cambert Way) and the north west (Dando Crescent and Gallus Square). The west half appears to be overall spatially more segregated than the east half.

- In the simple whole system (LFER264-figure 5.09) the top integrated lines are the same as above plus one of the north/south axes on the west half of the estate that link to the pedestrian underpass. The majority of long axial lines, both north/south and east west fall in the second band (yellow) and the shorter lines (local links and links between courts are predominantly middle to relatively segregated in similar order as above. At deck level the links tend to be light blue (second most segregated band) and the access lines tend to be dark blue, i.e. the most segregated band.

- In the detailed ground map (figure 5.10), the most integrated band takes in the south boundary axes, the major through route; the south tangent of the shopping centre which links east to west via the underpass; the majority of north-south axes and the boundary axes north of the shopping centre near Kidbrooke station and the vehicular underpass. Again some of the main east-west axes on the west half link into the integration core, thus creating a grid on the west side that links well to the centre and to the south. On the east half of the estate the east-west axes are less integrated, apart from those linking to the east side and to the main road; the main integrators are
## FERRIER ESTATE: OVERALL DEGREE OF INTEGRATION

<table>
<thead>
<tr>
<th></th>
<th>GROUND</th>
<th>UPPER</th>
<th>WHOLE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Simple</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA:</td>
<td>.734/.748</td>
<td>1.019</td>
<td>.803</td>
</tr>
<tr>
<td>(No. of Spaces)</td>
<td>(210)</td>
<td>(54)</td>
<td>(264)</td>
</tr>
<tr>
<td><strong>Detailed:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA:</td>
<td>.638/.687</td>
<td>1.013</td>
<td>.745</td>
</tr>
<tr>
<td>(No. of Spaces)</td>
<td>(267)</td>
<td>(73)</td>
<td>(410)</td>
</tr>
</tbody>
</table>

**CONSTITUTED LINES ONLY:**

<table>
<thead>
<tr>
<th></th>
<th>GROUND</th>
<th>UPPER</th>
<th>WHOLE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Simple</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA:</td>
<td>.68/.65</td>
<td>.987</td>
<td>.801</td>
</tr>
<tr>
<td>(No. of Spaces)</td>
<td>(53)</td>
<td>(36)</td>
<td>(100)</td>
</tr>
<tr>
<td><strong>Detailed:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA:</td>
<td>.617/.642</td>
<td>.953</td>
<td>.754</td>
</tr>
<tr>
<td>(No. of Spaces)</td>
<td>(84)</td>
<td>(47)</td>
<td>(142)</td>
</tr>
</tbody>
</table>

**TABLE 5.2.2 : FERRIER ESTATE : MEAN RRA OF SPATIAL SYSTEMS**
clearly north south links to the centre and the one vehicular access route off Kidbrooke Park road. In the detailed ground system the most segregated lines tend to include the shorter axial lines in the 'squares' where the dwelling entrances are, and over the garage roof play spaces in the middle. The most segregated areas are, same as in the simple system, away from the centre towards the south east and north-west edges. They tend to include the elevated garage roofs in the maisonette courts and the covered spaces around them.

- Looking at the detailed whole system (figure 5.11), again the top integrated band is same as in the detailed ground system described above. The axes which represent the detailed spatial articulation and landscaping fall predominantly in the middle band (green); there are very few ground lines that fall in the most segregated bands. Segregation is concentrated on the deck level as is the case in the simple whole system. The majority of access lines at deck level fall in the most segregated band in both simple and detailed spatial systems.

Comparing the simple and detailed systems we note that in the detailed map, the top three integrating lines are Kidbrooke Park Rd (the main route through the estate) and the south boundary axes, whereas in the simpler system the top integrators relate more to the centre of the estate (round Telemannn Square). In both detailed and simple systems the integration core takes in some of the boundary axes and a number of major ground level pedestrian and vehicular access lines, albeit with different rank order in the two systems.

Table 5.2.2 presents the Mean RRA values for the Ferrier for the different levels separately and for the whole.

The upper level is substantially more segregated than the ground in both systems of representation, though the difference between levels in the simple system is not as pronounced as in the detailed. Constituted lines are more integrated than the overall sample of axial lines, and the difference is less pronounced in the detailed.

Summing up, in both systems of mapping the ground level is very gridlike (symmetrical and distributed) with long axial lines running through the two estate halves linking the interior to the periphery - the boundary roads. This makes the ground level as a whole 'shallow' from the outside particularly in the simple system (one or two steps from the outside) The axial breakdown in the closed courts adds one or two steps of depth to the system with respect to dwelling access.
A MEAN STATİC ADULTS
• MEAN CHILDREN
Each Dot represents one person per 10 minutes walk (Average encounter rate x 10)

FIGURE 5.12: FERRIER ESTATE: ENCOUNTER OBSERVATIONS PLOTTED ON ROUTE MAP
The two approaches to mapping the axial structure of the estate at ground level give different representations of the articulation of spaces at ground level, in terms of the degree of local investment in elaborating the interface between private domains and public space, as well as the functional articulation of open spaces. This evidently adds depth to the spatial system, particularly to the spaces related to dwelling entrances, as will be discussed later on.

Finally, Telemann Square and the estate centre, although not directly part of the integration core yet encompassed by it, works to a reasonable extent with the spatial pattern of Integration linking the two sides of the estate. Thus despite the separation of the two estate halves by Kidbrooke Park road, the spatial configuration probably still contributes to its potential success as a local centre.

5.2.3 Pattern of Integration and Space Use:

In the attempt to understand the patterns of movement and space use on the estate, encounter observations on the Ferrier Estate were carried out as part of the Anglo-German Project based on the methodology developed by the UAS. A sample of 33 axial segments (see figure 5.12), covering the whole range of Integration values, were observed 20 times each by moving observers over all hours of the day from 8am to 8pm. Figure 5.12 presents the observed routes on the estate with the average rates of moving and static (stationary) adults per 100 metres (or per minute normal walking time) and mean rates of children (calculated separately see table 5.2.3 A and B) and plotted onto the route map. The observed rates of adult movement on the estate, reflect the bulk of the natural everyday presence of people going about their daily business.

Table 5.2.3B gives the overall averages of moving and static men, women, adults and children at ground level; ground excluding the boundary roads; the deck level; and the whole excluding and including the boundary lines. One may observe the following:

- The overall average rate of moving adults (whole) was found to be 0.777 persons per hundred metres or per minute walking time (phmm), which is reasonably high for an estate compared to other estates including the Marquess Rd Estate.

The analysis of space use discussed here has been carried out independently by the author. The observation techniques and method of analysis of space use are explained in several recent publications by the UAS, notably:

Hillier et al. "The other side of the Tracks, Study of King's Cross Development Area", London '88;
Hillier et al., "Crime Patterns on Studley Estate", London '89;
Hillier, Xu Jianming, et al., "Space use and abuse on the Stockwell Park Estate: implications for design", London '89;
<table>
<thead>
<tr>
<th>OHR</th>
<th>UT</th>
<th>Ax N x D</th>
<th>RockRA 00</th>
<th>RockRA 204</th>
<th>LENGTH</th>
<th>M MEN</th>
<th>MOV WOM</th>
<th>TAM MEN</th>
<th>STAT WOM</th>
<th>CHILD</th>
<th>R Obs LENGTH</th>
<th>m MOV MEN</th>
<th>m MOV WOMEN</th>
<th>m MOV ADULT</th>
<th>m STAT MEN</th>
<th>m STAT WOMEN</th>
<th>m STAT ADULT</th>
<th>mean CHILDREN</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>1803</td>
<td>1790</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2205</td>
<td>1377</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>23</td>
<td>2235</td>
<td>13885</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>2235</td>
<td>1385</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2235</td>
<td>13695</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>32</td>
<td>2235</td>
<td>13825</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2235</td>
<td>1359</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>2235</td>
<td>1365</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>53</td>
<td>2235</td>
<td>13563</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>2235</td>
<td>13752</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>2235</td>
<td>20334</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>2235</td>
<td>20334</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>2235</td>
<td>15025</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>2235</td>
<td>1750</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>2235</td>
<td>1536</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2235</td>
<td>18744</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2235</td>
<td>19295</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2235</td>
<td>19295</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2235</td>
<td>19295</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2235</td>
<td>19295</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2235</td>
<td>19295</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>15786</td>
<td>10688</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>16209</td>
<td>13406</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>18</td>
<td>1054</td>
<td>1276</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>1146</td>
<td>1385</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>1081</td>
<td>13681</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>1542</td>
<td>10003</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>3033</td>
<td>9457</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>374</td>
<td>8920</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>16200</td>
<td>14001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>16200</td>
<td>14001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>16200</td>
<td>14001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>16200</td>
<td>14001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>16200</td>
<td>14001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### LEVEL

- **GROUND ALL**
  - **.398**
  - **.419**
  - **.816**
  - **.246**
  - **.169**
  - **.415**
  - **.605**

- **GR. excl. BOUNDARY**
  - **.355**
  - **.371**
  - **.726**
  - **.249**
  - **.153**
  - **.402**
  - **.617**

- **UPPER LEVEL**
  - **.298**
  - **.268**
  - **.565**
  - **.089**
  - **.130**
  - **.219**
  - **.220**

- **WHOLE excl. BOUND.**
  - **.342**
  - **.331**
  - **.673**
  - **.224**
  - **.157**
  - **.381**
  - **.507**

- **WHOLE inclusive**
  - **.380**
  - **.391**
  - **.777**
  - **.218**
  - **.162**
  - **.379**
  - **.535**
• The average for the estate interior (excl. boundary) falls to 0.673 phmm, as is usually the case in most estates, though this is still good for an estate considering the dramatic drop in densities observed in other cases (for example: 0.162 phmm in Elm Village or even 0.568 phmm on the Bemerton - see Hillier et al, '88). The boundary road attracts a far greater number of people than the estate interior, particularly the section near Kidbrooke station. The observed axial segment, which links to Kidbrooke station, was found to have a rate of over 3 persons per minute (table 5.2.3A) - comparable to the levels of movement in traditional urban systems (eg Barnsbury with 2.6 phmm).

• The overall average rate of static adults is over half that of moving adults (.379 phmm), and the mean number of children (.535 phmm) is about 30% less than moving adults - much less than the equivalent drop in child rates in urban systems, but much more reasonable than the two or three times higher numbers of children in relation to adults, observed on some estates.

Looking at ground and deck levels separately:

• The average rate of moving adults breaks down to 0.816phmm for the ground level including the boundary line and somewhat less, 0.726 phmm, for the ground level (excluding boundary road). The rate drops further at deck level: 0.565 phmm. One notes that there is a sharp fall in the levels of adult movement at deck level, though the drop is sharper for children. (see table 5.2.3B).

• The mean encounter rate for static adults is: 0.402 phmm at ground level (excluding boundary road), and just over half that, 0.219 phmm, at deck level.

• The mean number of children at ground level is 0.605phmm; only marginally less than the rate of 0.617 for the ground level excluding the boundary. At deck level this drops to 0.22 phmm, about a third of the ground rate.

The average encounter rates for each category were plotted against degree of Integration, in order to establish whether the pattern of integration had any systematic effect on the movement and use patterns. Figure 5.13 I (scattergrams i; ii; and iii) illustrate the relationship between Integration and the mean rate of Moving Adults.
I. MOVING ADULTS:

![Graph](image1)

**All Observed**

- **Space vs. GR vs. Deck**
- Correlation
  - R: 0.376
  - p: 0.044

**Log x vs. MOV AD**

![Graph](image2)

**All Ground Spaces**

- Correlation
  - R: 0.496
  - p: 0.0099

**Log x vs. MOV AD**

![Graph](image3)

**All Ground Spaces excl. Telemann sq. (71)**

- Correlation
  - R: 0.68
  - p: 0.0002

**Log x vs. MOV AD**

![Graph](image4)

II. STATIC ADULTS:

![Graph](image5)

**All Observed**

- **Space vs. GR vs. Deck**
- Correlation
  - R: 0.681
  - p: 0.0016

**Log x vs. STAT AD**

![Graph](image6)

**All Ground Spaces**

- Correlation
  - R: 0.664
  - p: 0.0076

**Log x vs. STAT AD**

![Graph](image7)

**All Ground Spaces excl. Telemann sq. (71)**

- Correlation
  - R: 0.712
  - p: 0.0014

**Log x vs. STAT AD**

![Graph](image8)

**Figure 5.11**: Correlation between mean rates of moving adults & integration in the simplified system.

**Figure 5.13**: Correlation between mean rates of static adults & integration in the simplified system.
I. CORRELATION WITH INTEGRATION:

(i)

\[ y = 43x + 121, r^2 = 1 \]

Correlation:
- R: 0.177
- p: 0.073

O mean CHILDREN

(ii)

\[ y = 0.28x + 55, r^2 = 0.943 \]

Correlation:
- R: 0.014
- p: 0.995

O mean CHILDREN

(iii)

\[ y = 48x + 245, r^2 = 17 \]

Correlation:
- R: 0.412
- p: 0.023

O mean CHILDREN

FIGURE 5.14-I: CORRELATION BETWEEN MEAN RATES OF CHILDREN & INTEGRATION IN THE SIMPLE SYSTEM

II. CORRELATION WITH RELATIVE ENTROPY

(i)

\[ y = 1.107x + 1.202, r^2 = 0.099 \]

Correlation:
- R: 0.314
- p: 0.075

O mean CHILDREN

(ii)

\[ y = 0.419x + 0.65, r^2 = 0.31 \]

Correlation:
- R: 0.38

O mean CHILDREN

(iii)

\[ y = 1.404x + 1.321, r^2 = 212 \]

Correlation:
- R: 0.461
- p: 0.01

O mean CHILDREN

FIGURE 5.14-II: CORRELATION BETWEEN MEAN RATES OF CHILDREN & RELATIVE ENTROPY IN THE SIMPLE SYSTEM
for the ground and deck; ground only and for the ground excluding the boundary road and Telemannn Square (interior residential only):

The latter (scattergram iii) shows a strong correlation between adult movement and degree of Integration on the estate interior: $R = .68$ with a very high statistical significance of $p = .0002^{11}$. This suggests that the more integrating axial lines on the estate interior predictably attract more people. Though slightly lower than the average for urban systems, this agrees with the findings in other studies conducted by the UAS$^{12}$.

Integration is not only the best predictor of pedestrian movement, but also best predictor of where 'static' adults$^{13}$ are likely to be found (see scattergrams in figure 5.13 II). The correlation between Integration and Mean Static. Adults at ground level, (scattergram ii) is $R = .664$ with a significance of $p = .002$ and improves to $R = .712$ $p = .0014$ excluding Telemannn Square which overperforms (scattergram iii)$^{14}$. This is marginally higher even than the correlation for moving adults (the detailed system performed slightly better than the simple here). In other words people tend to hang about the more integrating spaces, where there is most movement.

Figures 5.14 I & II present the correlation between mean rates of children and Integration / Relative Entropy (REL.HP264) in the simple system respectively. With respect to children's use patterns, as on most estates, no significant correlations were found between mean children encounter rates and Integration. At best the correlation for ground level excluding functional attractors (Telemannn Square and the School) reaches R=.412 ; $p=.023$ (significant but relatively weak). Relative Point Depth Entropy (a measure of the degree of entropy (randomness) in the spatial system) shows a slightly better correlation of $R = .461$ with a statistical significance of $p = .014$ with the mean rates of children (see scattergram II iii). This suggests that children tend to use space more randomly.

---

11 The drop in encounter levels, as well as the increased level of movement due to the Telemann Square and the boundary road near Kidbrook Station is clearly visible in figure 5.13 I (i) showing Adult moving encounter rates against Integration for the whole system. The correlation here diminishes.


13 The term 'static' people denotes adults not passing by but hanging about or engaged in some activity on their own or engaged with others during the length of time the observer took to walk through the observed space.

14 The commercial centre at Telemann functions also as a 'magnet', which slightly distorts the pattern of space use, though it is relatively well integrated into the estate structure. The effect of this space is shown in comparing Figures 5.13 I & II scattergrams (ii) and (iii).
FERRIER ESTATE: PATTERN OF SPACE USE: COPRESENCE OF ADULTS AND CHILDREN

I GROUND & DECK LEVELS.

I (i) Correlation between mean children and adult movement.

II GROUND LEVEL ONLY.

II (i) Correlation between mean children and adult movement.

FIGURE 5.15 I: CORRELATION BETWEEN MEAN RATES OF MOV; STATIC; & TOTAL ADULTS AND CHILDREN OVERALL.

FIGURE 5.15 II: CORRELATION BETWEEN MEAN RATES OF ADULTS VS. CHILDREN AT GROUND LEVEL (FACE)
Figure 5.15 presents the scattergrams plotting the relationship between children's space use against moving adults, static adults and total mean adult space use. (Each circle, square or triangle represent an observed space). The scattergrams show that there is a moderate divide between the pattern of use of adults and children at ground level- as is the case in traditional urban systems. There is less tendency for children to avoid spaces with moving adults, a phenomenon often observed on housing estates (Hillier et al '89). Thus there are some differences in adults' and children's' use patterns, but on the whole there is a reasonably good interface.

To sum up: patterns of moving and static adults tend to relate well with the pattern of integration on the estate, whilst children are less predictable. Translated into common experience this means, that whilst walking on the ground level one would expect an almost continuous, though weak in many parts, presence of people. Considering the length of the major access lines (long lines of sight), the awareness of people is even stronger. At deck level on the other hand, one would experience a sharp drop in the numbers of encounters, particularly in terms of children and static adults. This confirms the general observations made earlier on about the decks lacking presence of people. Coupled with visual segregation, also mentioned before, this may mean that the deck level lacks an adequate presence of people for informal surveillance.

Although average encounter rates on the estate are lower than in an urban area, they are reasonably good for an estate, but drop considerably at deck level. Encounter rates are higher on the boundary road behind Telemann Square due to Kidbrooke Station and commercial facilities which attract and generate a lot of pedestrian movement. Whilst adult patterns of movement and static space use tend to follow the pattern of Integration, children's patterns tend to be less predictable; they play more randomly all over the estate. Comparing the pattern of movement and space use on the Ferrier with other studies carried out by the UAS in traditional urban systems, one finds similarities in the patterns in traditional urban residential space, though one still finds the characteristics shared by all estates, though to a milder degree. The estate centre works as a focus of movement and interaction, however, the estate overall does not quite overcome the intrinsic problem of 'dormitory' estates with too sparse levels of space use.
Wingfield Primary School

Kidbrook Park Station

Old Peoples Home

Holy Family Catholic Primary School

Estate-Office

Youth Centre

AXIAL LINES:
- GROUND LEVEL
- STAIRCASES
- TOWER BLOCKS
- DWELLING ENTRANCES

FIGURE 5.16 A: FERRIER ESTATE: PATTERN OF DWELLING ENTRANCES: SIMPLE GROUND
FIGURE 5.16 B: FERRIER ESTATE: PATTERN OF DWELLING ENTRANCES: DETAILED GROUND
AXIAL LINES:
- DECK LEVEL
* STAIRCASES
% TOWER BLOCKS
♦ DWELLING ENTRANCES

FIGURE 5.17: FERRIER ESTATE: PATTERN OF DWELLING ENTRANCES: DECK LEVEL
5.2.4 **Pattern of Constitution : Dwelling Access and the Interface between public and private space.**

The critical question of concern here is, how do dwelling entrances fit into the global structure of the estate and the pattern of Integration. **Figures 5.16 A and B** present the pattern of dwelling entrances in the simple and detailed ground axial maps; and **figure 5.17** for the deck access level respectively. As noted earlier in section 5.1.4, all ground dwellings on the Ferrier are accessible from the back gardens as well as the front. Although back gardens are not usually treated as constituting spaces in syntactic analysis (as is the case in the Andover case study), in the case of the Ferrier Estate, for a stranger, front and back gardens are often hardly distinguishable, with respect the fronts of houses, since garden fences are low on both sides and there are garden doors. It is therefore necessary to take both aspects into consideration: front access with potentially more direct or 'active' control and back access with perhaps more 'passive' control i.e. visual surveillance. Furthermore, due to the extensive length of the major axes\(^{15}\), it is necessary to take constituted segments rather than simply constituted lines into consideration, as an indication of the extent to which lines are constituted or in a sense 'controlled' by dwellings.

**Figures 5.18 A and B** present the axial segments which are directly related to dwelling access faces, front (dark thick lines) or back (light thick lines)- in the simple and detailed axial representations of the estate. Furthermore, focusing on the overall pattern of constituted and unconstituted access **figures 5.19 A and B** representing (in black thick lines) the unconstituted access lines\(^{16}\), and the pattern of constituted lines (thin lines) including front and back access. Comparing the simple and detailed maps one may observe the following:

The main aspects of the pattern of constitution on the Ferrier are:

- **Unconstituted boundary axes** including Kidbrooke Park Rd, and an unconstituted area at the heart of the estate around Telemannn Square.

---

\(^{15}\) The average line length in the simple ground system is about 133 metres, and in the detailed it is about 84 metres, (under two thirds) whilst the average length of the major north-south axes as mentioned before is about 300 metres.

\(^{16}\) Where the length of an axial line is much longer than the length of constituted segment/s thereof, it is necessary to consider the extent to which the line is constituted and examine the pattern of constituted segments as well as that of the axial lines.
• Relatively continuous constitution over the rest of the estate at ground level, with open spaces in continuous relation to dwellings, whether that is front entrances or back gardens/doors, with minor unconstituted transition spaces in between.

However, the simple and detailed axial maps, tend to give rather different representations of the pattern of constitution 17::

• In the simple axial system which ignores the fine-tuning related to dwelling access, while emphasising the overall integrating structure of the ground level, dwellings are directly related to (constituting) the main integrating lines, both front entrances and back gardens. Figure 5.18 A, illustrates the pattern of front and back access, which largely overlap with the long axial lines. Almost all lines, including the most integrating lines, have access to dwellings - excluding only the boundary lines and the estate centre.

• In the detailed map (figure 5.18 B) the major pedestrian axes are unconstituted, and only relate to back access.(see also 5.19B) Ground maisonette entrances in the courts are removed from the main pedestrian axes, leaving the long integrating axes predominantly unconstituted apart from back access segments. Front access is generally removed from these integrators by the detailed spatial articulation of the maisonette courts.

• Furthermore, whilst in the simple system both front and back access are ascribed to a single line (one convex space), in the detailed system the paths accessing back access is separated from the front access lines in the green courts.

• The front access segments tend to be clustered together in the 'maisonette courts', which form visually and partly spatially segregated enclaves (this is clearer in the detailed system figure 5.18 B). Apart from this, front constitution is discontinuous.

• By adding back access segments to the discontinuous front access pattern - on the long integrating axes, as well as on the shorter axial lines - the overall effect is a predominant continuity of control, illustrated by the thin lines in figure 5.19A in contrast to figure 5.19B which show the predominance of unconstituted lines (with back access segments in some cases ).

Finally, the deck level is characterised by discontinuity and by strings of constituted lines with unconstituted links to the ground level and to the tower blocks. Compared to the ground level where dwellings tend to be relatively shallow, the deck access lines are very deep..

17 This, as will be discussed later, has an effect on the calculation of burglary rates per line.

282
With respect to the unconstituted boundaries, the Ferrier is similar to the majority of urban estates of the sixties and seventies. In this case there are rows of back gardens/back entrances (some of which are used as entrances) on the south and west boundary axes (Tudway Rd). The Ferrier however, has no built context, it is almost entirely segregated from its wider surroundings by stretches of green and the railway lines. This may explain perhaps, why there are dwelling entrances on the major pedestrian/vehicular routes of the estate including some of the main integrating axes (unlike most other estates e.g. Marquess, Andover etc.).

The constituted lines are shallow from the outside, never more than two axial steps from the boundary lines in the simple system, yet one or two steps deeper on average in the detailed. Thus, in terms of its axially, its nonhierachical treatment of constituted spaces and its relative continuity of control by front/back entrances, the Ferrier has some elements similar to those of an urban grid structure (see fig. 5.19A).

In traditional urban systems, however, there is a clear distinction between front and back, since back is totally removed from public space. In the Ferrier estate as is often the case in many other estates, there is no such clear distinction between front and back. Front entrances are where people predictably go in and come out, and in this way there is 'potential' control of public space. Back gardens are in most cases not used by the inhabitants as entrances and the likelihood of their providing an effective form of 'surveillance' is perhaps more restricted.

Finally one may conclude that the detailed map reflects the designers intentions more accurately and their subtle mechanisms of distancing; the simple map relates more to the level of the basic experience of space.
FIGURE 5.18 A: FERRIER ESTATE: PATTERN OF FRONT AND BACK ACCESS: SIMPLE GROUND
AXIAL LINES:
- UNCONSTITUTED
- CONSTITUTED
- BACK ACCESS SEGM.

BURGLARIES
- GROUND LEVEL >>

FIGURE 5.19 A: FERRIER ESTATE: PATTERN OF UNCONSTITUTED ACCESS: SIMPLE GROUND
FIGURE 5.19 B: FERRIER ESTATE: PATTERN OF UNCONSTITUTED ACCESS: DETAILED GROUND
FIGURE 5.20 A: FERRIER ESTATE: PATTERN OF TOP INTEGRATION: SIMPLE GROUND
FIGURE 5.20B: FERRIER ESTATE: PATTERN OF TOP INTEGRATION: DETAILED GROUND
FIGURE 5.21 A: FERIER ESTATE: PATTERN OF BURGLED LOCATIONS: SIMPLE GROUND
FIGURE 5.21 B: FERRIER ESTATE: PATTERN OF BURGLED LOCATIONS: DETAILED GROUND
AXIAL LINES:
- DECK LEVEL
- STAIRCASES
- TOWER BLOCKS
- DWELLING ENTRANCES
- BURGLARIES

FIGURE 5.22: FERRIER ESTATE: PATTERN OF BURGLED LOCATIONS: DECK LEVEL
5.3  The Distribution of burglary locations.

5.3.0  General Data on Burglary on the estate:

The Ferrier Estate has a bad name in the area and has regularly been exposed to unfavourable publicity; even the police considered it as one of the worst estates in their area in terms of crime. From the UAS/GfW survey\(^\text{18}\) it became apparent that fear of crime was pervasive on the estate, though the relatively few experiences reported by tenants tended to be about assault, mugging and harassment, rather than burglary.

Detailed data on locations of burglary were obtained from the Greenwich Metropolitan Police Division for the period of September 1987 to September 1988 (one year). The list of burglaries is to be found in Appendix IV Table A 5.1.

When the actual reported crime figures were examined, the rate of burglaries on the estate was found to be surprisingly low.

The total number of reported burglaries in the above mentioned period of 1987-88 was in 56 dwellings out of 1908 dwellings, which gives us a burglary rate of 2.94% for the estate as a whole.

The Ferrier crime data partly overlap with a period of extra policing in an attempt to crackdown on drugs traffic on the estate. This is likely to have had some effect on the number of burglaries during that period. However, despite the particular circumstances, and differences perhaps between police practices in the different boroughs, the Ferrier estate's burglary record can still be considered well below average. It is less than half the average for London overall (approx. 6% in the mid eighties\(^\text{19}\)).


\(^{19}\) See chapter 2; section on burglary patterns pp

Estimated actual burglary rates on the basis of victim/household surveys: from both the second sweep of the 1984 crime survey and from local crime surveys eg Islington Crime survey 1985 agree at about 12.5% for inner city areas. The reported and recorded rates would be much less at about 50% of the actual. That is about 6% The earlier PSI study of victimisation in London found the rate of households that had been burgled at about 6% in 1981. Considering the rising trends measured in other studies eg Poyner and Webb (1991) it is likely that the average 6% may well have risen even further by 1987/88.
5.3.1 Observations on the Pattern of Burgled Locations:

What is more of interest here is, where these burglaries occurred. The red dots in figures 5.02 and 5.03 show the exact locations of burgled dwellings plotted on the ground and deck level plans of the estate. Figures 5.21 A and B and 5.22 present the pattern of burgled locations on the axial maps for ground and deck level. Burglaries appear to be scattered all over the estate without particular concentrations. The eastern part of the estate has a somewhat higher number of burglaries (particularly in the tower blocks). This coincides with the fact that the east side of the estate is considered by the tenants as the rougher side.

Location of burglaries in relation to the pattern of Integration and the pattern of constitution:

From visual inspection only, it is difficult to discern any particular pattern in the locations of burglaries. However, with respect to the pattern of Integration and the pattern of constituted/unconstituted axial lines and segments (see figures 5.18; A & B; 5.19 A & B; 5.20 A & B), certain interesting observations can be made:

* There are no burglaries on the boundary axial lines even though there are back gardens, nor are there any on access roads feeding off them - with one exception.

* There are burglaries on main integrating axial lines, though they tend to be from the back, or near corners of blocks at intersections with more segregated lines. Three out of the nine back burglaries are off axial lines where surveillance possibilities are limited by the local morphology of the landscaping (green mound). The others tend to be close to the boundary road.

* All the burgled dwellings are accessible from the outside (unconstituted boundary road and Kidbrooke Park Rd) via unconstituted routes - not counting back gardens as constituting spaces.

* Finally, there is a relatively higher number of burglaries in corner dwellings at the deck level (near staircases): 4/20 i.e. 1/5 dwellings compared to an approx 1/8

---

20 Interviews (part of the UAS/Gfw survey) with the tenants revealed that the east half was considered by the residents as the 'rougher' side and hence less desirable as a place to live, with higher social problems and more crime. Several tenants in the UAS-GFW survey mentioned they had requested a transfer to the West side.
FERRIER ESTATE: GENERAL BREAKDOWN OF BURGLED DWELLINGS

<table>
<thead>
<tr>
<th>Level Description</th>
<th>Burglaries</th>
<th>Dwellings</th>
<th>Burglary Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Level</td>
<td>20</td>
<td>720</td>
<td>2.78%</td>
</tr>
<tr>
<td>Deck Level</td>
<td>20</td>
<td>616</td>
<td>3.24%</td>
</tr>
<tr>
<td>Upper Levels (Tower Blocks)</td>
<td>16</td>
<td>572</td>
<td>2.93%</td>
</tr>
<tr>
<td>Total</td>
<td>56</td>
<td>1908</td>
<td>2.94%</td>
</tr>
</tbody>
</table>

TABLE 5.3.2 A: BREAKDOWN OF BURGLARY RATES BY ACCESS LEVELS.
At ground level this does not seem to be the case: 4/20 burgled dwellings at corners compared to a statistical probability of 1/6.

- There are burglaries off the main integrating axes, but no burglaries on the boundary roads, a fact which could be related to the extra surveillance provided by vehicular traffic.

- There is a strong discrepancy between simple and detailed maps. Burglaries are allocated on the main integrating lines in the simple system. In the detailed axial map they are mostly on the short lines one step off the main line. This captures two rather different views about burgled locations, which will be discussed further on.

As far as unconstituted access of burgled locations is concerned, one should add that this is also the case for the majority of ground dwellings on the Ferrier. This is still worth noting, since in other case studies, as for example on the Marquess Estate, where this was not the case, unconstituted access played an important role.

5.3.2 Access Levels and type of Block Access:

The analysis first investigates, how burglaries are distributed with respect to the different access levels separately. Burglary rates are calculated for the ground level, the deck access level (first level above ground) and for the tower blocks (indirect, controlled public access) separately, see Table 5.3.2 A:

The deck level has a marginally higher rate of burglary than the average for the estate; the tower blocks seem to have a rate which is the same as the overall average for the estate, whereas the ground level seems to have a lower than average rate. Even in proportional terms rather than the actual numbers the differences between the levels in terms of burglary rates do not reveal any significant differences. This is a rather surprising result since as mentioned earlier, research to date generally agrees that burglary levels are highest at ground level.

---

21 Each square has four decks with 18+18+18+12 dwellings of which 8 are corner dwellings: 8/66 = .121
If each dwelling had an equal chance of being burgled, then only one out of eight burgled dwellings would have been a corner one.

22 This is discussed by B Hillier in "Against Enclosure" published in T Marcus, T Wooley, N Teymour editors, "Rehumanising Housing", Butterworths, '88
<table>
<thead>
<tr>
<th></th>
<th>Burglaries</th>
<th>Dwellings</th>
<th>Burglary Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EAST SIDE:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROUND LEVEL</td>
<td>11</td>
<td>348</td>
<td>3.20%</td>
</tr>
<tr>
<td>DECK LEVEL</td>
<td>12</td>
<td>286</td>
<td>4.20%</td>
</tr>
<tr>
<td>UPPER LEVELS</td>
<td>11</td>
<td>312</td>
<td>3.50%</td>
</tr>
<tr>
<td>(TOWER BLOCKS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAST ALL.</td>
<td>34</td>
<td>946</td>
<td>3.60%</td>
</tr>
<tr>
<td><strong>WEST SIDE:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROUND LEVEL</td>
<td>9</td>
<td>372</td>
<td>2.40%</td>
</tr>
<tr>
<td>DECK LEVEL</td>
<td>8</td>
<td>330</td>
<td>2.40%</td>
</tr>
<tr>
<td>UPPER LEVELS</td>
<td>5</td>
<td>260</td>
<td>1.90%</td>
</tr>
<tr>
<td>(TOWER BLOCKS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WEST ALL.</td>
<td>22</td>
<td>962</td>
<td>2.30%</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td>56</td>
<td>1908</td>
<td>2.94%</td>
</tr>
</tbody>
</table>

**Table 5.3.2 B: Breakdown of Burglary Rates by Levels & East-West.**
Breakdown of burglary rates by East-West sections:

Since the two halves of the estate are relatively separate, the question arises, whether there are differences between the two sides and how the access levels perform in each separately. Table 5.3.2B presents the breakdown of burglaries/dwellings and burglary rates for the east and west halves separately with respect to levels and type of access. The following may be observed:

- On the east side of the estate 34 dwellings out of a total of 946 dwellings have been burgled, whereas on the west half there are only 22 burgled dwellings out of a total of 962 dwelling units (3.6% compared with 2.3% respectively). The east half has an about 1.5 times higher burglary rate than the west.

- At all levels, the east side has proportionally higher rates than the west, with deck access and tower blocks about double in the east than in the west. The tower blocks have the lowest rate on the west half, whereas they are between ground and deck level rates in the east half. The deck level has the highest rate of burglary on the east side, but is about the same as at ground level in the west half. At ground level the difference is still proportionally higher, though not quite like the upper levels.

However, the access levels alone do not necessarily mean very much, without taking into consideration the differences between them in terms of factors relating to the access possibilities of dwellings and of blocks:

5.3.3 Dwelling/Block Access Factors: Direct/Indirect Access and Dwelling types.

Dwelling and block typology on the Ferrier is relatively simple—restricted to few basic combinations with respect to access possibilities to the individual dwelling unit. Depending on the type of dwelling/block dwellings are accessed directly; or through a system of circulation spaces controlled by block entrances (as discussed already in section 5.1.4) the following categories appear to vary:

1. Ground level: the majority of dwellings (houses and maisonettes) are directly accessible from the network of paths and open spaces (direct access). They have two 'faces': a 'front' with the official entrance and a 'back', which gives onto the garden/terrace also accessible from the open path system. This means that there are two ways of breaking in from the front and from the back (f/b access).
### Table 5.3.3k Breakdown of Burglary Rates by Level and Type of Dwelling/Access

<table>
<thead>
<tr>
<th>Ground Level: Direct Access</th>
<th>Burglaries</th>
<th>Dwellings</th>
<th>Burglary Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Row Houses: F/B</td>
<td>4</td>
<td>216</td>
<td>1.85%</td>
</tr>
<tr>
<td>Maisonettes: F/B</td>
<td>16</td>
<td>396</td>
<td>4.04%</td>
</tr>
<tr>
<td><strong>Total F/B Direct:</strong></td>
<td><strong>20</strong></td>
<td><strong>612</strong></td>
<td><strong>3.27%</strong></td>
</tr>
<tr>
<td>OAP Blocks (Contr)</td>
<td>0</td>
<td>108</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Deck Level: Direct Access</th>
<th>Burglaries</th>
<th>Dwellings</th>
<th>Burglary Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maisonettes (F-Only)</td>
<td>20</td>
<td>616</td>
<td>3.25%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Upper Levels: (Indirect Access):</th>
<th>Burglaries</th>
<th>Dwellings</th>
<th>Burglary Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flats (Tower Blocks):</td>
<td>16</td>
<td>572</td>
<td>2.80%</td>
</tr>
<tr>
<td>Front (Deck/Up) All:</td>
<td>36</td>
<td>1188</td>
<td>3.03%</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td><strong>56</strong></td>
<td><strong>1908</strong></td>
<td><strong>2.94%</strong></td>
</tr>
</tbody>
</table>
2. Deck level: the dwellings are directly accessible from the extension of the ground public path network, the decks (direct access); but there is only one way of getting in via the front only (f access).23

3. Tower-blocks: the dwellings are accessible through block entrances and vertical circulation spaces separated by doors from the public space (indirect access).

4. The OAP blocks have locked entrances controlled by intercoms, different to the ground entrances to the tower blocks which are not locked and open to anyone wishing to walk in.

Table 5.3.3 A presents the breakdown of burglary rates can thus be calculated by dwelling/ and block access/ type. The vulnerability in terms of the general access factors is summarised in the table below:

<table>
<thead>
<tr>
<th>Access Type</th>
<th>Dwellings</th>
<th>Burglaries</th>
<th>Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front/back Access (Direct)</td>
<td>20</td>
<td>612</td>
<td>3.27%</td>
</tr>
<tr>
<td>Front only Access (Direct)</td>
<td>20</td>
<td>616</td>
<td>3.25%</td>
</tr>
<tr>
<td>Direct Access (total)</td>
<td>40</td>
<td>1228</td>
<td>3.26%</td>
</tr>
<tr>
<td>Indirect Access</td>
<td>16</td>
<td>572</td>
<td>2.80%</td>
</tr>
<tr>
<td>Overall estate average</td>
<td></td>
<td></td>
<td>2.94%</td>
</tr>
</tbody>
</table>

Table 5.3.3 B: General breakdown of burglary rates by Direct/Indirect & front/back.

As absolute values the differences between the burglary rates per category tend to be rather small, since the burglary rate is very low anyhow. However, considering these in relation to one-another or as deviations from the mean, there are some marked differences that allow certain tentative observations to be made:

- **Direct access** overall is marginally more vulnerable than indirect access: 3.26% (houses and maisonettes) compared to 2.80% (tower-blocks).
- Direct access is equally vulnerable at ground and at deck level: 3.27% (ground level houses and maisonettes); 3.25% (deck maisonettes) respectively, in spite of the fact that ground direct access has front and back access possibilities.
- No burglaries occur in the tightly controlled OAP blocks 0.0%), which clearly are successfully managed with respect to maintaining security.

23 The other possibility of breaking in via the roof was not taken into consideration - it only occurred once in our sample.
Looking at vulnerability with respect to dwelling/ block access types one finds:

- The most vulnerable type of dwelling category is the **ground maisonette** (front/back direct access) at 4.04%, about 40% above the average burglary rate for the estate overall- with the deck maisonette second (front direct).
- Row houses, however, which also have front/back access, seem to be much less vulnerable with a rate of 1.85%- under half the average for ground maiso"ettes.

In short, there are **no clear differences** in vulnerability to burglary between ground and above ground levels and between direct and indirect access, as has been found in Marquess Rd Estate and other case studies (Hillier et al 1990). The findings from the general analysis of burglary data are rather surprising, particularly due to the low proportion of burglary at ground level. Even after taking out the OAP blocks with locked indirect access, the ground level fares about the same as deck level. Also surprising is the fact that direct access is equally vulnerable to indirect access at the upper levels, the latter being only marginally safer compared to deck access, and compared to ground direct access.

Stronger differences in burglary risk, in contrast, appear between east and west estate halves at all access levels (with east burglary rates nearly twice those of the west); as well as between houses and maiso"ettes at ground level, although both have front and back direct access. Ground level maiso"ettes have over twice the burglary rate of the row houses (4.04% compared to 1.85%). The OAP blocks with no recorded burglaries, present a good example of tight-knit management and spatial control. In this sense, however, they are not directly comparable with the other categories of dwellings.

The main question that arises from the above is, what spatial factors could be contributing to the low rate of burglary at ground level. Could this have something to do with the differences between houses and maiso"ettes, and differences between east and west halves? The following sections focus on the **ground level burglaries** in terms of the above.
FERRIER ESTATE: DWELLING COMPOSITION

**GROUND LEVEL:**

<table>
<thead>
<tr>
<th></th>
<th>HOUSES</th>
<th>MAISONETTES</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>EAST</td>
<td>132</td>
<td>156</td>
<td>288</td>
</tr>
<tr>
<td></td>
<td>45.83%</td>
<td>54.17%</td>
<td>100%</td>
</tr>
<tr>
<td>BURGLARIES</td>
<td>2</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>1.51%</td>
<td>5.77%</td>
<td>3.82%</td>
</tr>
<tr>
<td>WEST</td>
<td>84</td>
<td>240</td>
<td>324</td>
</tr>
<tr>
<td></td>
<td>25.93%</td>
<td>74.07%</td>
<td>100%</td>
</tr>
<tr>
<td>BURGLARIES</td>
<td>2</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>2.38%</td>
<td>2.92%</td>
<td>2.78%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>216</td>
<td>396</td>
<td>612</td>
</tr>
<tr>
<td>BURGLARIES</td>
<td>4</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>1.85%</td>
<td>4.04%</td>
<td>3.27%</td>
</tr>
</tbody>
</table>

**TABLE 5.4.1 : BREAKDOWN OF DWELLINGS/ BURGLARIES BY DWELLING TYPE**

**MODE OF ENTRY: FRONT/BACK BURGLARIES:**

<table>
<thead>
<tr>
<th></th>
<th>HOUSES</th>
<th>MAISONETTES</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT</td>
<td>BACK</td>
<td>FRONT</td>
<td>BACK</td>
</tr>
<tr>
<td>EAST</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>BURGLARIES</td>
<td>0.76%</td>
<td>0.76%</td>
<td>1.92%</td>
</tr>
<tr>
<td>WEST</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>BURGLARIES</td>
<td>1.19%</td>
<td>1.19%</td>
<td>2.5%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>BURGLARIES</td>
<td>0.92%</td>
<td>0.92%</td>
<td>2.27%</td>
</tr>
</tbody>
</table>

**TABLE 5.4.2 : BREAKDOWN OF BURGLARIES/- RATES BY FRONT BACK ; DWELLING TYPE AND EAST/WEST.**
5.4 Investigation of Local Factors: Breakdown of Burglary rates by Local Variables of Dwelling Access.

5.4.1 Front/Back access: Dwelling composition:

In the previous section it was established that at ground level all dwellings (excluding the OAP blocks) have direct access from two faces: front and back. (Front-only direct access is only at deck level). Focusing on the dwelling composition of the ground level, Table 5.4.1 presents the breakdown of dwellings and burglaries in east and west halves of the estate by dwelling type (houses and maisonettes). There appear to be some interesting differences between east and west in terms of dwelling composition and burglary risk:

• For the estate overall the number of ground maisonettes is almost double the number of houses. However the proportion of houses to maisonettes is significantly different in the two estate halves:
  - In both halves the proportion of maisonettes is higher. However, in the west half of the Ferrier the proportion of maisonettes is about 75% (about three times the number of houses);
  - On the other hand, though lower than the % of maisonettes, the proportion of houses in the east half (45%) is about double the proportion of houses in the west (only 25%).

Looking at the number of burglaries, clearly maisonettes are two to three times more vulnerable in the west and east halves of the estate respectively. Maisonettes in the east are the most vulnerable category, considerably more vulnerable than maisonettes in the west half. The houses, on the other hand, in the west half are over 1.5 times more vulnerable than in the east.

5.4.2 Pattern of Front and Back Vulnerability of dwellings East/West:

Of the 20 ground level burglaries closer inspection of the data reveals that 11 were committed from the front and 9 from the back. Since all dwellings at ground level have front and back access, the question is whether there is a difference in terms of vulnerability. Table 5.4.2 presents the detailed breakdown of burglaries by mode of access; front or back; dwelling type and east/west. The following differences between east and west burglary patterns can be observed:
The east maisonettes appear to have more burglaries from the back. The west maisonettes are mainly burgled from the front.

There are no differences between east and west, front and back vulnerability in the sample of houses (one of each in east and west), though the rates are higher in the west. The low number of burglaries allows little scope for analysis, though the fact, that the number of burglaries is low as such, is important.

**Differences between Front and Back by Dwelling type:**

The differences between houses and maisonettes (apart from the obvious interior layout differences which do not affect their external vulnerability) are spatial, locational, and differences in terms of visibility field. The attempt is made here to explore 'qualitative' spatial differences with respect to dwelling access. (These are partly also explored through the differentiation between detailed and simple systems of spatial analysis, which will be discussed later).

- **Surveillance from inside (dwelling boundary openings):**

This relates to the existence and location of windows/doors in the dwelling boundary, with respect to 'potential surveillance' from dwellings. Houses and Maisonettes in the Ferrier differ only in terms of the front boundary wall: maisonettes have doors only and a narrow non-transparent glazed panel; Houses have doors and windows. Thus there are no windows overlooking the courts which access the maisonettes.

The question arises, whether these differences have an effect on the pattern of burglary. It is thus necessary to investigate differences in patterns of vulnerability within same dwelling types as well as across them.

However, there is a further factor which directly relates to the above, concerning the security of the boundary openings. Within the context of this study it is extremely difficult to control such variables (factor of accidental opportunity: window left open, door insecure or unlocked etc.). It could be noted that accidental opportunity adds randomness to the pattern of spatial vulnerability, and would account for lower levels of significance in the statistical analysis.

---

24 The only question to be considered with respect to dwelling type is the vulnerability of the 'perforated boundary'. In this case one would need to examine whether the level of security, and available openings/entry options (doors and/or windows) are involved with respect to burglary opportunity affects.
FERRIER ESTATE: TYPOLGY OF F B DWELLING FACES

FRONT

(VEHICULAR/ NONVEH) (NONVEHICULAR)

outward facing inner court
maisonettes maisonnees

houses

houses

inner court
maisonettes

outward facing
maisonettes

Enclosed/Restricted view*

(inner court maisonnees
on eastern edge *)

(VEHICULAR/ NONVEH) (NONVEHICULAR)

BACK

FIGUR U 5.26: PATTERN OF FRONT BACK EXPOSURE IN DWELLING TYPOLGY
In the following subsections the differences between dwelling types are further investigated in terms of local conditions of access.

5.4.3 Exposure / Enclosure: Visibility of Access Faces:

Maisonettes and houses differ in terms of external visibility or 'surveillability' i.e. with respect to the degree of exposure of the dwelling facade. Obviously the overall layout, the density of buildings on the site, the degree of overlooking (supervision) from neighbouring buildings play an important role here. Furthermore, building form and the articulation of the facades, as well as details of the landscaping may also restrict the range of the visibility field.

In the case of the Ferrier characterised by its uniformity, openness and lack of visually obtrusive landscaping or strong enclosure in the courts. There, are thus basic distinctions between categories of 'exposure' / 'enclosure' with respect to front and back access (see overview in figure 5.26), defined here as follows:

a) **Front access:**

- Houses are more 'exposed' in terms of their visual field of surveillance, both front and back: They are accessible from open, (convex rather than axial) spaces with a higher degree of visibility/surveillability from the main axes of pedestrian or in many cases vehicular traffic, or from the surrounding houses and maisonettes. There usually is a difference between front and back, one side is generally more quiet and screened off, and the other more busy, though this alternates between front and back

- Maisonettes, on the other hand tend to break into two groups with very different access conditions in relation to exposure/enclosure and 'visibility', both front and back:
  i- **Inner court or 'enclosed' Maisonettes:** Three quarters of the maisonettes are accessed from within the courts formed by the interlinked blocks. They are screened from the outside but also from the deck level above. The entrances to the innercourt maisonettes are recessed, opening onto a covered 'arcaded' zone, which segregates them spatially and visually from the main (N-South) axes of integration, and the main lines of visibility - on the ground level and partially from the decks above.

  ii- **Outward facing or 'exposed' Maisonettes:** The other quarter - one row of maisonettes in each square - are accessed from outside the courts. Their
### Table 5.4.3 A: Breakdown of Ground Dwellings by Visual Exposure

<table>
<thead>
<tr>
<th></th>
<th>East</th>
<th>West</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Faces:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hous</td>
<td>132</td>
<td>36</td>
<td>144</td>
</tr>
<tr>
<td>Mais</td>
<td>84</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td><strong>Front</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>132</td>
<td>120</td>
<td>252</td>
</tr>
<tr>
<td>(IN. COURT)</td>
<td></td>
<td></td>
<td>(IN. COURT)</td>
</tr>
<tr>
<td><strong>Back</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>132</td>
<td>156</td>
<td>612</td>
</tr>
<tr>
<td>(IN. COURT)</td>
<td></td>
<td></td>
<td>(IN. COURT)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>132</td>
<td>156</td>
<td>612</td>
</tr>
</tbody>
</table>

### Table 5.4.3 B: Breakdown of Burglaries/Burglary Rates by Visual Exposure/Dwelling Type

<table>
<thead>
<tr>
<th></th>
<th>East</th>
<th>West</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Buried</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Houses:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>No dwels</td>
<td>(132)</td>
<td>(84)</td>
<td>(216)</td>
</tr>
<tr>
<td>BURG RATE</td>
<td>0.76%</td>
<td>0.76%</td>
<td>1.52%</td>
</tr>
<tr>
<td><strong>Maisonnettes:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposed Fr.</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>No dwels</td>
<td>(36)</td>
<td>(60)</td>
<td>(96)</td>
</tr>
<tr>
<td>BURG RATE</td>
<td>0%</td>
<td>0%</td>
<td>0.67%</td>
</tr>
<tr>
<td>In. Court</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>No dwels</td>
<td>(120)</td>
<td>(180)</td>
<td>(300)</td>
</tr>
<tr>
<td>BURG RATE</td>
<td>2.5%</td>
<td>5.0%</td>
<td>10.67%</td>
</tr>
</tbody>
</table>

**Table 5.4.3 B:** Breakdown of burglaries/burglary rates by visual exposure/dwelling type.
entrances face the main pedestrian/vehicular routes feeding into the estate and are generally more integrated spatially and have a broad visual field of surveillance.

b) **Back Access**:

In terms of back exposure innercourt and outward facing maisonette groups are reversed:

- The back terraces of the outward facing maisonettes are enclosed within the courtyards (on the elevated roofs of the underground garages), and are highly segregated.
- The back gardens of the inner court maisonettes, on the other hand, face outwards onto the paths and open spaces often shared with houses. They differ little from the back gardens of the houses. In contrast the 'exposed' maisonettes differ strongly from houses in that they do not have front gardens.

**Table 5.4.3 B** presents the respective breakdown of burglary rates by dwelling categories by front and back 'visual exposure'. One finds the following:

- **Inner court** maisonettes are the most highly burgled category. They have over twice the burglary rate of outward facing ('exposed') maisonettes, which are only marginally more vulnerable than houses.

- There are no burglaries in the group of front- 'exposed' maisonettes in the east, but the number of dwellings is very low in this category anyway. In the west side the front-'exposed' maisonettes are burgled from both integrated front and segregated (innercourt) back.

What is also striking is the difference between front and back burglary patterns, east and west, of innercourt maisonettes: **no back burglaries in the west side, and twice as many back burglaries as front burglaries in the east.**

However, on closer observation one may note that, three out of the six back burglaries are situated on the western edge of the east part, behind a hilly stretch of green, which distances them from Kidbrooke Park Road. This outer row of back gardens (3 x 12 maisonettes) differs from the others with 'exposed' backs in that it is not overlooked by any dwellings nor surveillable by passers by on the main road. The landscaping (green mound) screens them from general view. They are also very integrated/back just off the unconstituted boundary (unconstituted access).
### Ground Maisonettes:

<table>
<thead>
<tr>
<th></th>
<th>EAST</th>
<th>WEST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burgled</td>
<td>FRONT</td>
<td>BACK</td>
<td>FRONT</td>
</tr>
<tr>
<td>Burgled</td>
<td>1</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>No Dwls</td>
<td>(36)</td>
<td></td>
<td>(36)</td>
</tr>
<tr>
<td>Burgrate</td>
<td>2.77%</td>
<td>8.33%</td>
<td></td>
</tr>
</tbody>
</table>

### Restrict View (back):  

<table>
<thead>
<tr>
<th></th>
<th>EAST</th>
<th>WEST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burgled</td>
<td>2</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>No Dwls</td>
<td>(94)</td>
<td>(180)</td>
<td>(264)</td>
</tr>
<tr>
<td>Burgrate</td>
<td>2.13%</td>
<td>3.19%</td>
<td>2.78%</td>
</tr>
</tbody>
</table>

### Excluding 'Restr View':  

<table>
<thead>
<tr>
<th></th>
<th>EAST</th>
<th>WEST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burgled</td>
<td>3</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>No Dwls</td>
<td>(140)</td>
<td>(180)</td>
<td>(264)</td>
</tr>
<tr>
<td>Burgrate</td>
<td>2.14%</td>
<td>4.28%</td>
<td>2.78%</td>
</tr>
</tbody>
</table>

### Total:  

<table>
<thead>
<tr>
<th></th>
<th>EAST</th>
<th>WEST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burgled</td>
<td>3</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>No Dwls</td>
<td>(140)</td>
<td>(180)</td>
<td>(264)</td>
</tr>
<tr>
<td>Burgrate</td>
<td>2.14%</td>
<td>4.28%</td>
<td>2.78%</td>
</tr>
</tbody>
</table>

Table 5.4.3 C: Burglaries in the 'Restricted View' Maisonette Subsample.
Table 5.4.3.C: presents the breakdown of burglaries/rates in the "Restricted view" maisonettes subsample. In this group of 'restricted view' maisonettes the burglary rate is the highest - with an overall rate of 11.11% (nearly four times above the average), which is particularly vulnerable from the back (8.33% back burglary rate). For the other maisonettes excluding the restricted view subgroup, the overall burglary rate and the rate of back burglaries is only marginally above average.

Clearly the increased back burglary rate of east maisonettes is due to the special local conditions of the 'restricted (back) view' sample. Excluding the former, the innercourt/ exposed-back maisonettes show a marginal difference in favour of back burglary in the east side. The question however still remains, whether there are particular reasons for the lack of back burglaries in the west side.

Excluding the special case of restricted view vulnerability and aggregate the data (houses and maisonettes) into exposed- enclosed categories for front and back access, as shown in Table 5.4.3.D (Breakdown by Front/Back access; dwelling type; enclosure/exposure), the following pattern of burglary risk emerges, which sums up vulnerability with respect to degree of visual exposure:

- Overall, both enclosed and exposed access are less vulnerable than the 'restricted view' cases discussed earlier.

- Segregated enclosed (inner court) access is over two times more vulnerable than exposed (and more integrated) access overall. This particularly concerns front access i.e. the recessed access to innercourt maisonettes.

- No conclusion can be drawn about enclosed back access (highly segregated), due to the very low number of burglaries. It appears to be equally vulnerable as exposed back access, since there is only one burglary in this category and the number of dwellings small. However, one might note that the enclosed back terraces are overlooked by the upper level decks from all three other sides, while the recessed entrances to the innercourt maisonettes have a much more restricted field of visual surveillance/exposure.
TABLE 5.4.3.D: BREAKDOWN BY FRONT/BACK ACCESS FACES AND DEGREE OF ENCLOSURE/EXPOSURE (EXCLUDING 'RESTRI. VIEW')

<table>
<thead>
<tr>
<th></th>
<th>ENCLOSING ALL:</th>
<th>EXPOSED ALL:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>EAST</td>
<td>WEST</td>
</tr>
<tr>
<td>FRONT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Innercourt Maisonnnettes</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Burglaries</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Dwellings</td>
<td>120</td>
<td>180</td>
</tr>
<tr>
<td>Burgl. Rate</td>
<td>2.50%</td>
<td>2.77%</td>
</tr>
<tr>
<td>BACK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outward facing Mais</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>Burglaries</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Dwellings</td>
<td>36</td>
<td>60</td>
</tr>
<tr>
<td>Burgl. Rate</td>
<td>0%</td>
<td>1.67%</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burglaries</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Dwelling Faces</td>
<td>396</td>
<td></td>
</tr>
<tr>
<td>Burgl. Rate</td>
<td>2.27%</td>
<td></td>
</tr>
</tbody>
</table>
5.4.4 **Dwelling Access and Vehicular Access - Potential Surveillance.**

Another consideration that appears to play an important role in the pattern of burglary is the relationship of dwellings to vehicular access - 'potential surveillance' from passing cars and car related pedestrian presence. Dwellings directly facing or opening onto vehicular access routes (excluding access to the underground garages in the court yards) have extra surveillance from passing cars (or police car patrols).

Examining the pattern of burglary locations on the Ferrier more carefully one notices, that burglars appear to avoid the open spaces, which have vehicular access and surveillance - with only one exception. That means that burglaries are committed from the other sides, away from vehicular surveillance range in 19 out of 20 cases.

In terms of vehicular surveillance potential the following differences between houses, outward facing and inner court maisonettes may be observed:

- **Houses**: tend to have vehicular access either front or back with a small percentage tucked away from vehicular routes.

- **Outward facing maisonettes ('exposed front')**: always have front vehicular surveillance (they open onto vehicular access routes feeding into the estate), and are never surveyed from the back.

- **Inner court maisonettes**: are not surveyed from the front (garage access and parking do not count). A small proportion of innercourt/back exposed maisonettes are surveyed from the back from the boundary road. (Restricted view are not surveyed).

Table 5.4.4.A presents the breakdown of dwelling types (E/W) by: front vehicular surveillance; back vehicular surveillance; and no vehicular surveillance. Once again one notices considerable differences between houses and maisonettes on the east and west halves of the estate, specifically:

- The majority of inner court maisonettes have no vehicular surveillance. This includes about 90% of the inner court maisonette sample in the east, considerably higher than the respective 73% of innercourt maisonettes in the west.
### TABLE 5.4.4.A: BREAKDOWN OF DWELLING FACES BY VISUAL SURVEILLANCE POTENTIAL FROM VEHICULAR ROUTES

<table>
<thead>
<tr>
<th></th>
<th>EAST</th>
<th>WEST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HOUSE</td>
<td>MAISON</td>
<td>HOUSE</td>
</tr>
<tr>
<td>FRONT</td>
<td>24 (EXPOSED)</td>
<td>36 (EXPOSED)</td>
<td>24</td>
</tr>
<tr>
<td>% OF H/M</td>
<td>18.18%</td>
<td>23.08%</td>
<td>28.57%</td>
</tr>
<tr>
<td>BACK</td>
<td>72 (IN.COURT)</td>
<td>12 (IN.COURT)</td>
<td>36</td>
</tr>
<tr>
<td>% OF H/M</td>
<td>54.55%</td>
<td>7.69%</td>
<td>42.86%</td>
</tr>
<tr>
<td>NO VEH SURV.</td>
<td>36 (IN.COURT)</td>
<td>108 (IN.COURT)</td>
<td>24</td>
</tr>
<tr>
<td>% OF H/M</td>
<td>27.27%</td>
<td>69.23%</td>
<td>28.57%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>132</td>
<td>156</td>
<td>84</td>
</tr>
<tr>
<td>%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
• The proportion of back surveyed maisonettes in the east is significantly lower: 7.69% compared to 20% of all maisonettes east and west respectively. Calculated on the basis of innercourt/back exposed samples, east and west, the difference is approx. 1:3 (10% compared to 27% respectively).

• The proportion of houses with no vehicular surveillance front or back is about half (27.27 and 28.57% east and west) the respective proportion of maisonettes. Houses overall have much higher levels of vehicular surveillance especially back surveillance. This is due to the fact that a greater proportion of houses is located on the periphery. In the east half the majority are located on the boundary road (Tudway Road), whereas on the west side, the proportion of houses with their backs facing the boundary road is lower, still over double the proportion of back surveyed maisonettes.

Looking at how this affects the pattern of dwelling vulnerability, Table 5.4.4 B presents the breakdown of burglaries and burglary rates (east/west) by front and back or no vehicular surveillance potential and dwelling type. The pattern of burglary risk with respect to the above 'vehicular surveillance' classification appears as follows:

• Dwellings with no vehicular surveillance (no face overlooking vehicular access routes), are considerably more vulnerable than those with front or back vehicular surveillance. Roughly speaking the 'no vehicular surveillance' group is about three times more vulnerable than the group with front or back vehicular access/surveillance. The most vulnerable subcategory is the sample of inner-court maisonettes with no vehicular surveillance front or back, particularly in the east side (Burgl. Rate 8.33%, though this also includes the 'restricted view' group).

• Front surveyed dwellings (with the exception of one burgled outward facing maisonette) tend to be burgled from the back.

• Back surveyed dwellings are burgled from the front only (see also plan in fig 5.02).

This pattern explains three out of the four burgled houses— the other is in the no surveillance group. There appears to be a pattern of avoidance of burglary from the side with vehicular access and/or surveillance.
<table>
<thead>
<tr>
<th></th>
<th>EAST</th>
<th>WEST</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HOUSE</td>
<td>MAISON</td>
<td>HOUSE</td>
</tr>
<tr>
<td>FRONT VEH SURVEILLANCE:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BURGL'S FR</td>
<td>24</td>
<td>36</td>
<td>24</td>
</tr>
<tr>
<td>BURGL'S BACK</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>BURGL'S F&amp;B</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>% OF H/M</td>
<td>0%</td>
<td>0%</td>
<td>4.17%</td>
</tr>
<tr>
<td>BACK</td>
<td>72</td>
<td>12</td>
<td>36</td>
</tr>
<tr>
<td>BURGL'S FR</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>BURGL'S BACK</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>BURGL'S F&amp;B</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>% OF H/M</td>
<td>1.33%</td>
<td>0%</td>
<td>2.77%</td>
</tr>
<tr>
<td>NO SURVEIL.</td>
<td>36</td>
<td>108</td>
<td>24</td>
</tr>
<tr>
<td>BURGL'S FR</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>BURGL'S BACK</td>
<td>1</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>BURGL'S F&amp;B</td>
<td>1</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>% OF H/M</td>
<td>2.77%</td>
<td>8.33%</td>
<td>0%</td>
</tr>
<tr>
<td>TOTAL GROUND</td>
<td>132</td>
<td>156</td>
<td>84</td>
</tr>
<tr>
<td>BURGL'S FR</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>BURGL'S BACK</td>
<td>1</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>BURGL'S F&amp;B</td>
<td>2</td>
<td>9</td>
<td>2</td>
</tr>
<tr>
<td>% OF H/M</td>
<td>1.52%</td>
<td>5.77%</td>
<td>2.38%</td>
</tr>
<tr>
<td>COLUMN TOTALS</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

**TABLE 5.4.4 B:** BREAKDOWN OF BURGLARIES & BURGLARY RATES BY FRONT BACK VEHICULAR SURVEILLANCE & DWELLING CATEGORIES.
5.4.5 **Summary of local factors and their influence on the Pattern of vulnerability - first discussion.**

In section 5.3 it was noted, that the three basic aspects of access on the Ferrier Estate showed no clear pattern with respect to burglary risk:

A. **Direct/Indirect block Access:** No clear difference; indirect access (tower blocks) appeared to be marginally less vulnerable than direct deck access.

B. **Access level:** the deck level appeared to be equally vulnerable as ground level (excluding OAP blocks). Upper levels (indirect access) were marginally less vulnerable.

C. **Dwelling access:** front/ back direct access (ground) appeared to be equally vulnerable as front only (direct access - deck level).

Whereas in other case studies ground direct access generally tends to be more vulnerable than deck access (direct above ground) and indirect access, on the Ferrier Estate no real difference could be identified in these terms. In contrast, the more striking differences in burglary risk appeared to relate to dwelling type whether these were houses and maisonettes, and whether they were located in the east and west halves of the estate:

- maisonettes were found to be clearly more vulnerable than houses at both ground and deck level;
- maisonettes in the east were more highly burgled than in the west, whereas with respect to houses, the east sample was less vulnerable;
- ground maisonettes were predominantly burgled from the back in the east, whereas in the west they were mainly burgled from the front.

By breaking down the sample of ground level houses and maisonettes, by front and back access, and east and west, it was possible to identify the local access conditions related to the above, which seemed to relate to higher or lower vulnerability:

- visibility - exposure/enclosure or restricted view;
- vehicular access and surveillance from vehicular traffic.

The particularly interesting feature with respect to the spatial layout and configuration of the Ferrier is that, on the one hand there is a rigid geometric repetitive block-/courtyard-layout on an orthogonal grid (global configuration), on the other, there are rather systematic variations in spatial articulation relating to visibility and surveillability: visual exposure / enclosure and restricted view; and vehicular access which are local variables which affect the access conditions of dwellings (See figure 5.26).
At deck level these local factors are controlled—constant, as is the number of links of each courtyard to the ground level, so that the only variations will be with respect to the spatial configuration and the relationship to the global spatial structure (global factors).

The detailed breakdown of burglary rates with respect to visual surveillability revealed that:

- **The 'restricted view' dwellings** on the integrated edge of the estate, are the most vulnerable category (8.33% back burglary rate, 11.11% front and back burglary rate). This group bears similarities to the also highly vulnerable restricted surveillance group on the elevated periphery of the Marquess Estate.

- **Innercourt maisonettes** with 'enclosed' front access, although not as vulnerable as the restricted view group, are the next most vulnerable category (at 3.79%), well over double the burglary rate of exposed front and/or back access.

Clearly 'restricted view' and enclosed access, which both relate to **restricted visual surveillance**, increase the risk of burglary, as has been identified in other research studies (see chapter 2, section 2.3). The extra surveillance relating to vehicular access, revealed in the detailed breakdown by front; back; and no vehicular surveillance potential, also appears to affect the pattern of burglary risk as follows:

- **Dwellings with no vehicular surveillance potential** (predominantly innercourt maisonettes) are more highly vulnerable than the front or the back surveilled groups (in this case mostly houses). Overall the nonsurveilled grouped ranked highest with a burglary rate of 5% compared with about 1% and 2% for the front and back surveillance categories.

- Where there is vehicular surveillance on one access face (front or back) burglaries are committed from the non-surveilled side. This suggests there is a **pattern of avoidance of vehicular surveillance**, which accounts for the 19 out of the 20 cases of burglary at ground level.

The above agrees with the findings of a UAS study of pedestrian and vehicular traffic in Barnsbury (Hillier et al: 1993) which suggested that vehicular traffic reduces risk of burglary, contradicting the prevailing views (supporting the exclusion or minimisation...
of traffic in residential areas), that vehicular access increases vulnerability. An important difference here, however, is that in this case the volumes of traffic are minimal, with overall strong physical segregation, in strong contrast to busy high streets and excessive volumes of traffic.

Having identified these basic local factors, which affect the vulnerability of the dwelling locations, the following question arise: How does accessibility within the global configuration (global accessibility) affect vulnerability; and, how do the local factors relate to the global factors, particularly integration/segregation identified already as a major global factor of vulnerability.

---

5.5 **Global Pattern of Vulnerability: Relationship between Burglary risk and Integration.**

This section examines the spatial patterns of burglary at the global level using the descriptive and analytic tools of spatial analysis and statistical methods of analysis in a more systematic framework.

5.5.1 **Differences between Mean Integration of Burgled and Nonburgled dwelling samples:**

Within the context of this thesis, the analysis focuses on the *parameter of Integration* (RRA) - calculated with respect to both simple and detailed spatial systems\(^{26}\). The dwellings' faces are indexed with integration values and are broken down into samples of burgled and nonburgled dwellings for the estate as a whole and for all levels separately, then focusing on direct ground access - excluding the OAP blocks where security management strongly differs. Since 9 out of the 20 ground burglaries were committed from the back, the front integration rates only would obviously be misleading, since they do not reflect the global vulnerability of back burgled dwellings directly. For whole burgled sample at ground level, one could only really consider the f/b rate as valid. It is, therefore, necessary to look at front and back access separately, and see how burgled 'faces' relate to nonburgled 'faces' both within the samples (front-back of burgled sample) and across them\(^ {27}\).

Statistical means and standard deviations were used to describe the central tendency and measure the degree of variation of the spatial variable of Integration for the burgled and nonburgled samples of dwellings. Using two-tailed Student t-tests, the significance of the differences between the means of burgled and nonburgled samples were investigated in terms of their degree of global accessibility.

---

\(^{26}\) Other measures were tested as well, but the results showed that Integration is the most meaningful and consistent measure of spatial accessibility. Thus, the emphasis is placed on Integration, the strongest predictor of 'natural' pedestrian movement; however, the same tests of spatial differences between burgled and nonburgled samples of dwellings were also conducted with the other spatial variables as a check.

\(^{27}\) Thus at ground level, both front and back access lines are taken into account. Each dwelling is given an integration value with respect to the front access line, its back access line, and a mean front/back access index. In the aggregate samples the mean front/back indexes are taken only where applicable (ground direct), otherwise the respective front access line value is taken into account.
<table>
<thead>
<tr>
<th></th>
<th>BURGLED SAMPLE</th>
<th>NONBURGLED SAMPLE</th>
<th>T-test 2tail</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEAN RRA S D</td>
<td>MEAN RRA S D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHOLE ESTATE</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LFER264 front</td>
<td>0.845 0.183</td>
<td>0.838 0.17</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.841 0.185</td>
<td>0.833 0.172</td>
<td>0.74</td>
<td></td>
</tr>
<tr>
<td>LFER400 front</td>
<td>0.817 0.17</td>
<td>0.809 0.16</td>
<td>0.72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.812 0.171</td>
<td>0.803 0.163</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>GROUND LEVEL ALL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LFER264 front</td>
<td>0.631 0.076</td>
<td>0.648 0.077</td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.621 0.056</td>
<td>0.636 0.06</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>LFER210 front</td>
<td>0.609 0.082</td>
<td>0.628 0.082</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.597 0.061</td>
<td>0.615 0.064</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>LFER131 front</td>
<td>0.641 0.1</td>
<td>0.662 0.095</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.627 0.075</td>
<td>0.647 0.075</td>
<td>0.24</td>
<td></td>
</tr>
<tr>
<td>LFER400 front</td>
<td>0.638 0.079</td>
<td>0.653 0.09</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.625 0.041</td>
<td>0.636 0.07</td>
<td>0.45</td>
<td></td>
</tr>
<tr>
<td>LFER268 front</td>
<td>0.614 0.085</td>
<td>0.629 0.099</td>
<td>0.51</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.599 0.044</td>
<td>0.61 0.075</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>DECK LEVEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LFER264 front</td>
<td>1.003 0.101</td>
<td>0.981 0.098</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>LFER400 front</td>
<td>1.000 0.09</td>
<td>0.988 0.089</td>
<td>0.56</td>
<td></td>
</tr>
<tr>
<td>TOWER BLOCKS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LFER264 front</td>
<td>0.913 0.059</td>
<td>0.923 0.063</td>
<td>0.52</td>
<td></td>
</tr>
<tr>
<td>LFER400 front</td>
<td>0.812 0.03</td>
<td>0.814 0.041</td>
<td>0.8</td>
<td></td>
</tr>
<tr>
<td>DIRECT ACCESS ALL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GROUND LEVEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LFER264/ front</td>
<td>0.631 0.076</td>
<td>0.635 0.064</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.621 0.056</td>
<td>0.629 0.055</td>
<td>0.49</td>
<td></td>
</tr>
<tr>
<td>LFER210 front</td>
<td>0.609 0.082</td>
<td>0.614 0.069</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.597 0.061</td>
<td>0.608 0.06</td>
<td>0.43</td>
<td></td>
</tr>
<tr>
<td>LFER131/ front</td>
<td>0.641 0.1</td>
<td>0.648 0.083</td>
<td>0.74</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.627 0.075</td>
<td>0.64 0.072</td>
<td>0.44</td>
<td></td>
</tr>
<tr>
<td>LFER400 front</td>
<td>0.638 0.079</td>
<td>0.638 0.078</td>
<td>0.995</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.625 0.041</td>
<td>0.623 0.055</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>LFER268/ front</td>
<td>0.614 0.085</td>
<td>0.612 0.085</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.599 0.044</td>
<td>0.596 0.059</td>
<td>0.83</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.5.1A: Differences between mean integration of burgled and nonburgled dwelling samples.
Table 5.5.1 A presents an overview of the differences between burgled and nonburgled samples with respect to degree of front/average front-back Integration in both simple (LFER264; LFER210; LFER131) and detailed (LFER400; LFER268) systems and the significances of the differences (based on results of T-tests):

- For the estate as a whole (all levels including tower blocks) the sample of burgled dwellings appears to be overall more segregated than the nonburgled both with respect to the front entrances only and with respect to mean front/back indexes, where applicable. (The difference is not statistically significant).

- At ground level (all), the burgled dwellings appear to be overall more integrated than the nonburgled aggregate sample. This holds for all spatial systems of reference, but it seems that the simple system gives sharper differences in terms of global accessibility. Statistical significance here is still weak (about 1:4 chances in the simple system, and 50% in the detailed, that this is not a real difference).

- At deck level in contrast to the ground, the burgled dwellings are more segregated (less than 1:3 chances that the difference is not real). Local conditions are relatively uniform here, but the number of burglaries is perhaps too low to produce statistical significance.

- In the tower blocks (indirect access), the sample of burgled dwellings is more integrated than the non-burgled in the simple system, but again significance is very weak. In the detailed system the difference diminishes. These results reflect the locations of tower blocks with more burglaries, rather than dwelling locations within tower blocks though other factors may be interfering here as well. 

Overall the differences in terms of integration between burgled and nonburgled dwelling samples (in the one year period) are weak. In all the above cases, the simple system reveals stronger differences. In the detailed system differences are much less pronounced, and significance levels are even weaker. Differing patterns between ground and deck level have been found in other studies. (and on the Andover Estate, as will be discussed in the next chapter). On Studley estate, vulnerability with respect to indirect access was also found to increase with integration (Hillier et al. 1990). With respect to direct access at ground level, however, in other case studies (e.g. Barnsbury

It should be noted that the axial mapping of vertical lines or links has been simplified; the vertical circulation core of the tower blocks is represented as one axial line, so that no differentiation is made between floor levels. All dwellings within the tower-block have the same spatial indexes.
### FERRIER ESTATE: FRONT VERSUS BACK BURGLED SAMPLES

<table>
<thead>
<tr>
<th>GROUND DIRECT</th>
<th>BURGLED SAMPLE</th>
<th>NONBURGLED SAMPLE</th>
<th>T-test/2tail</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCESS</td>
<td>MEAN RRA S D</td>
<td>MEAN RRA S D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRONT BURGL.</td>
<td>(11 burglars)</td>
<td>(592 Nonburgls)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LFER264</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>front</td>
<td>0.634</td>
<td>0.073</td>
<td>0.635</td>
<td>0.064</td>
</tr>
<tr>
<td>&gt;&gt; back</td>
<td>0.612</td>
<td>0.062</td>
<td>0.624</td>
<td>0.064</td>
</tr>
<tr>
<td>&gt;&gt; f b</td>
<td>0.623</td>
<td>0.053</td>
<td>0.629</td>
<td>0.055</td>
</tr>
<tr>
<td>LFER131</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>front</td>
<td>0.653</td>
<td>0.105</td>
<td>0.648</td>
<td>0.083</td>
</tr>
<tr>
<td>&gt;&gt; back</td>
<td>0.62</td>
<td>0.081</td>
<td>0.632</td>
<td>0.094</td>
</tr>
<tr>
<td>&gt;&gt; f b</td>
<td>0.636</td>
<td>0.075</td>
<td>0.64</td>
<td>0.072</td>
</tr>
<tr>
<td>LFER400</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>front</td>
<td>0.617</td>
<td>0.056</td>
<td>0.638</td>
<td>0.078</td>
</tr>
<tr>
<td>&gt;&gt; back</td>
<td>0.602</td>
<td>0.089</td>
<td>0.609</td>
<td>0.104</td>
</tr>
<tr>
<td>&gt;&gt; f b</td>
<td>0.61</td>
<td>0.04</td>
<td>0.623</td>
<td>0.55</td>
</tr>
<tr>
<td>LFER268</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>front</td>
<td>0.595</td>
<td>0.064</td>
<td>0.612</td>
<td>0.059</td>
</tr>
<tr>
<td>&gt;&gt; back</td>
<td>0.576</td>
<td>0.1</td>
<td>0.579</td>
<td>0.115</td>
</tr>
<tr>
<td>&gt;&gt; f b</td>
<td>0.585</td>
<td>0.047</td>
<td>0.596</td>
<td>0.075</td>
</tr>
<tr>
<td>BACK BURGL.</td>
<td>(9 burglars)</td>
<td>(592 Nonburgls)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LFER264</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>back</td>
<td>0.609</td>
<td>0.064</td>
<td>0.624</td>
<td>0.071</td>
</tr>
<tr>
<td>&gt;&gt; front</td>
<td>0.627</td>
<td>0.084</td>
<td>0.635</td>
<td>0.064</td>
</tr>
<tr>
<td>&gt;&gt; f b</td>
<td>0.618</td>
<td>0.062</td>
<td>0.629</td>
<td>0.55</td>
</tr>
<tr>
<td>LFER131</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>back</td>
<td>0.604</td>
<td>0.09</td>
<td>0.632</td>
<td>0.094</td>
</tr>
<tr>
<td>&gt;&gt; front</td>
<td>0.627</td>
<td>0.097</td>
<td>0.648</td>
<td>0.083</td>
</tr>
<tr>
<td>&gt;&gt; f b</td>
<td>0.616</td>
<td>0.079</td>
<td>0.64</td>
<td>0.072</td>
</tr>
<tr>
<td>LFER400</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>back</td>
<td>0.622</td>
<td>0.08</td>
<td>0.609</td>
<td>0.104</td>
</tr>
<tr>
<td>&gt;&gt; front</td>
<td>0.664</td>
<td>0.099</td>
<td>0.638</td>
<td>0.078</td>
</tr>
<tr>
<td>&gt;&gt; f b</td>
<td>0.643</td>
<td>0.037</td>
<td>0.623</td>
<td>0.55</td>
</tr>
<tr>
<td>LFER268</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>back</td>
<td>0.592</td>
<td>0.087</td>
<td>0.579</td>
<td>0.115</td>
</tr>
<tr>
<td>&gt;&gt; front</td>
<td>0.638</td>
<td>0.105</td>
<td>0.612</td>
<td>0.085</td>
</tr>
<tr>
<td>&gt;&gt; f b</td>
<td>0.615</td>
<td>0.037</td>
<td>0.596</td>
<td>0.059</td>
</tr>
</tbody>
</table>

**TABLE 5.51 B:** GROUND DIRECT ACCESS: DIFFERENCES BETWEEN FRONT AND BACK BURGLED SAMPLES.
Islington, Marquess Estate, Studley Estate), burgled dwellings were found to be significantly more segregated (see Hillier '88; and Hillier et al. '89a).

Focusing on direct ground access, Table 5.5.1 B presents the differences between burgled and nonburgled dwellings in terms of front- / back- /; and f/b Integration rates for front and back faces separately. The results suggest that although there is no significant difference between the samples, the burgled sample of dwellings still appears to be overall more integrated with respect to the mean front/back integration rate in the simple system, though in the detailed map the difference no longer holds. Looking at front and back access/ burglary risk separately the picture becomes even more puzzling:

- First one should note that back access is considerably more integrated than the front access overall, the difference appearing stronger in the detailed system.

With respect to front access (11/592 front burglaries):

- In the simple system there is no difference between burgled fronts and nonburgled fronts. If anything, the back gardens of the front burgled dwellings are more integrated than the backs of the nonburgled sample.
- In the detailed system, burgled front entrances appear to be more segregated than the nonburged (particularly with respect to the whole system), whereas their respective backs show no significant difference.
- The mean front/back integration rates in both simple and detailed systems tend to balance out in favour of overall higher integration of burgled dwellings, but again statistical significance is very weak.

With respect to back access (9/592 back burglaries):

- In the simple system burgled dwellings again appear to be more integrated than nonburgled dwellings with respect to their backs, as well as more integrated overall with respect to their front/back average rates. Significance is weak, particularly in the whole simple system.
- In the detailed system there appears to be no significant difference between burgled and nonburged backs, though burgled backs are marginally more segregated. Their respective fronts, and particularly the front/back averages show a somewhat stronger tendency for burgled dwellings to be more segregated overall.
The above results suggest that there is a different pattern of vulnerability with respect to front and back access, and differences between the simple and detailed frame of reference. This is hardly surprising, considering the fact that the majority of back gardens are more integrated and visually exposed (no difference in simple/detailed maps), while front entrances in the majority of dwellings (maisonettes) are enclosed and segregated/removed from the main axial lines of the simple system (see detailed maps). Front vulnerability appears to increase with relative integration; whereas the more integrated backs seem to become more vulnerable with overall front/back segregation.

The discrepancy in the direction in which vulnerability increases, with respect to global accessibility in the simple and detailed systems at ground level, is due to the different allocation of entrances discussed earlier. In contrast, deck level and tower block samples, where there are no mapping differences, show no such discrepancy between the simple and detailed system, though the differences seem to be accentuated in the simple system.

This suggests, that at ground level the effect of the detailed articulation of space has an important bearing on the pattern of global accessibility, which is captured by the detailed mapping of the system. With respect to relative accessibility in global terms (getting from A to B), for the deck level, the tower blocks and the estate as a whole, the detailing at ground level is less important, hence the sharper results captured in the simple system.

To sum up, the pattern of vulnerability with respect to integration/segregation appears to vary by level and type of access: at ground level there is no clear difference, marginally increasing with overall f/b integration; at deck access level it appears to increase with segregation, with respect to tower blocks (indirect access), it appears to increase with integration, however, for the estate overall the differences are diffused. The weak results in the case of the aggregate samples, the whole estate and ground level, are evidently related to the fact that different patterns are operating, making it clearly necessary to control for the intervening local factors. Due to the small number of cases in the burgled samples, there is need for more years data to arrive at stronger results for the differences in the above.
FIGURE 5.23 (I & II): CORRELATION BETWEEN BURGLARY RISK & MEAN INTEGRATION OF AXIAL LINES
(FRONT; BACK; FRONT-BACK; DECK; FRONT BACK-INDIRECT ACCESS)
This subsection focuses on the spatial characteristics of the sample of burgled lines in the attempt to further understand the degree to which, and the way in which, the pattern of Integration affects burglary risk. Burglaries are ascribed to the exact axial lines (accessing the front or the back), from which illegal entry was committed and respective burglary rates are calculated for each line and correlated to integration (in the various spatial systems).

Figure 5.23 presents the correlations between degree of Integration and burglary rates of axial lines, in the simple (column I: FER264) and detailed (column II: FER400) spatial systems. There is limited variation in burglary rates, due to the standardised number of dwellings per block, and the small number of burglaries in the period of a year (usually one only on a line). This clearly affects the results of the regression analysis between RRA and burglary rates as follows:

- The scattergrams A in columns I & II show the correlation between Front burglary rates and log(x) RRA in the simple and detailed systems for ground and deck level (direct access). There is no correlation; in the detailed system burglary rates tend to marginally increase with segregation. At the ground level the correlation between burglary rates and RRA in the simple axial system disappears.
- Looking at direct back burglaries/access only (scattergrams B; columns I & II), there is almost no variation in rates, hence no correlation.
- Scattergrams C / I & II show the correlation between burglary rates for front and back access (F-B) together at ground level: In the simple system, there is a weak but significant correlation with segregation (R=.442; p=.01).
- Scattergram D; column I presents the correlation at deck level (front access only). There appears to be a weak correlation in favour of segregation in the simple system (R=.389; p=.12), though in the detailed system it disappears (R=.287; p=.26).

It should be noted that the differences in mapping also affect the calculations of the number of front and back dwelling faces per line and consequently also the burglary rates. Both front entrances and back access were counted for each line: i.e. total potential access from each line. Front access and back access were recorded separately and then added so that it would be possible to investigate burglary rates according to mode of entry. Due to the limitations of the size of the sample, however, it was only practical to concentrate on composite burglary rates:
- Front/Back Access (F-B) only i.e. direct access;
- Front-Back and Indirect Access (F-B-I) which included the dwellings in the small OAP blocks in the calculation of burglary rates.


29 It should be noted that the differences in mapping also affect the calculations of the number of front and back dwelling faces per line and consequently also the burglary rates. Both front entrances and back access were counted for each line: i.e. total potential access from each line. Front access and back access were recorded separately and then added so that it would be possible to investigate burglary rates according to mode of entry. Due to the limitations of the size of the sample, however, it was only practical to concentrate on composite burglary rates:
- Front/Back Access (F-B) only i.e. direct access;
- Front-Back and Indirect Access (F-B-I) which included the dwellings in the small OAP blocks in the calculation of burglary rates.
Finally scattergrams E; columns I & II present the correlations between composite burglary rates for Front; Back and Indirect Access (F-B-I) for the whole estate and log(x)RRA, in the simple and detailed systems respectively. In the simple system (column I), there is a moderate correlation, but highly significant, (R=.474; p=.006). This suggests that one can predict just under 50% of the variation in burglary rates by the degree of integration of a line in the global system. As before there is no correlation in the detailed system (column II).

The overall trend is for vulnerability to increase with segregation, though it is difficult to assess the global pattern on the basis of burgled axial lines in this estate. Correlations suffer from the problem of 'standardisation' of burglary rates. Due to the standardised length block structures on the Ferrier, there is generally the same number of dwellings per block and thus per axial line. This has a particularly strong impact on correlations with respect to the front and back access at ground and front access at deck level. The correlation between burglary rates and segregation becomes clearer by aggregating data (front/ back/Indirect access) at the global level for the estate as a whole, which produces variation in the burglary rates and enhances the correlation to become statistically significant.
FIGURE 124: CORRELATION BETWEEN BURGLARY RISK & MEAN INTEGRATION IN RRA BANDS
5.5.3 Analysis of Burglary rates by Integration bands.

The breakdown of the sample of constituted lines into five RRA Bands (each comprising of 20% of the constituted lines in rank order in each band) attempts to overcome both the problem of zero burglary lines, as well as the problem of standardisation of dwelling numbers. Table 5.5.3 presents the various Indexes per Band for: Integration/ Mean RRA; Number of Spaces; Dwellings; Burglaries; and Burglary Rates - calculated as before, in terms of Front, Back, Indirect, and composite Front and Back (F-B) and Indirect (F-B-I) for the whole estate (excluding tower blocks), for the deck and ground level separately. These are then correlated to the Mean RRA values for each band.

Scattergrams A to D in figure 5.24 present the correlations between front (A); Back (B); Front-back (F-B) and Front- Back - and Indirect (F-B-I) burglary rates and degree of Integration of the bands at ground level in the simple and detailed system (columns I & II):

With respect to the integration bands for the ground level alone the correlations are poor and significances even poorer, there is no correlation. The scattergrams C and D in columns I & II show the correlations for the F/B and F/B/I burglary rates in the simple and detailed systems of reference, where the overall trend is for burglary risk to decrease with segregation, though the correlation is poor. The scatters indicate that burglary rates rise in the second most integrated band and fall in the most segregated band. Correlations in both simple and detailed systems are poor, but they follow more or less the same trends. Front burglary rates appears show no correlation, while back burglary rates (only three bands) tend to increase with integration. Composite rates generally decrease with segregation, but correlations are weak.

In contrast at deck level there is a strong clear correlation with segregation. Scattergram E in fig.5.24 presents the correlation of burglary rates by Integration bands at deck level (simple system): Here one observes a very powerful correlation between mean RRA and average burglary rates: \( R = 0.937 \) with a high statistical significance of \( p = 0.019 \). Burglary risk clearly increases with segregation of the band and the degree of segregation predicts about 90% of the variation in burglary rates for the bands.

---

30 The sample of constituted lines was broken down into five equal Integration bands. The sum of burglaries in each band was divided by the total number of dwellings in the band to produce an average burglary rate for each band. (See chapter on Methodology page.)
FERRIER ESTATE: WHOLE ESTATE: BURGLARY RATES AND DEGREE OF INTEGRATION
INTEGRATION BANDS

I: SIMPLIFIED SPATIAL SYSTEM (FER.64)

II: DETAILED SPATIAL SYSTEM (FER.400)

FIGURE 5.25 I & II: CORRELATION BETWEEN BURGLARY RISK & MEAN INTEGRATION OF RRA BANDS
Scattergrams A-D in Figure 5.25 (columns I and II) presents the correlations between mean burglary rates (Front; Back; Front-Back; and F-B-I excluding tower blocks respectively) against mean Integration values of the bands for the estate overall (in the simple LFER264 and detailed LFER400 systems respectively): Here strong differences appear between the two systems of reference.

Looking at front and back burglary rates separately two distinct patterns become quite clear: In the simple system there is a powerful correlation between overall front burglary rates and segregation of the Bands:

\[ R = .906 \quad p = .03 \] (see scattergram A), which is statistically significant; while -Back burglary rates increase with integration (lower RRA) with a correlation of \( r = 1 \) and \( p = .005 \) highly significant - but only three points (see scattergram B).

The front burglary pattern is mainly influenced by the deck level. In the detailed system, however the correlation disappears. With respect to back access, burglary risk in the detailed goes the other way, increasing with segregation. However, the allocation of burglaries in both systems relates to the main pattern, therefore, the detailed articulation would probably be less important for back access vulnerability.

Aggregate rates agree in both systems that burglary risk overall increases with segregation, though in the first three bands in the simple/four bands in the detailed system - the trend decreases with segregation.

The above clearly demonstrates that there is a split between ground and deck level where the more segregated locations tend to have higher burglary rates. Furthermore there is a split between front burglaries, which overall increase with segregation (though not at ground level) and back burglaries which are concentrated in the more integrated bands. Back access vulnerability tends to increase with integration in the simple system as a whole, yet within the detailed local framework they also appear to increase with segregation. Due to the limited range of data in the latter case - in the three more integrated bands - more research is necessary before conclusions can be drawn.
# FRRIFR FSTATE: INTEGRATION BANDS IN SIMPLF AND DFTAI ED SPATIAL SYSTEMS

<table>
<thead>
<tr>
<th>RRA BANDS</th>
<th>CONT END</th>
<th>TTD LINES</th>
<th>MD AN RRA</th>
<th>MIN RRA</th>
<th>MAX RRA</th>
<th>NUMBER OF ENTRANCES</th>
<th>NUMBER OF BURG N</th>
<th>BURGARY RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIMPLF GROUND SYSTEM (FER764)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOP 20% SEG</td>
<td>10</td>
<td>1</td>
<td>0.79</td>
<td>0.7</td>
<td>0.85</td>
<td>60</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>20-40% SEG</td>
<td>11</td>
<td>4</td>
<td>0.686</td>
<td>0.6</td>
<td>0.711</td>
<td>15</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>MID 20%</td>
<td>11</td>
<td>5</td>
<td>0.641</td>
<td>0.6</td>
<td>0.66</td>
<td>144</td>
<td>168</td>
<td>31</td>
</tr>
<tr>
<td>20 40% INT</td>
<td>11</td>
<td>5</td>
<td>0.604</td>
<td>0.5</td>
<td>0.69</td>
<td>15</td>
<td>6</td>
<td>48</td>
</tr>
<tr>
<td>TOP 20% INT</td>
<td>10</td>
<td>5</td>
<td>0.54</td>
<td>1</td>
<td>0.569</td>
<td>79</td>
<td>68</td>
<td>84</td>
</tr>
</tbody>
</table>

| BACK FFVFL ONLY: FER264 SIMPLF | | | | | | | | |
| TOP 20% SEG | 7 | 4 | 1.12 | 1.06 | 1.196 | 14 | * | * | * | * | * | 5 | 5 | 0.044 | * | * | |
| 20+40% SEG | 7 | 4 | 1.09 | 1.04 | 1.06 | 170 | * | * | * | * | * | 4 | * | 0.04 | * | * | |
| MID 20% | 8 | 5 | 1.02 | 0.974 | 1.01 | 124 | 3 | 3 | 8 | 10 | 8 | 4 | 4 | 0.024 | * | * | |
| 20 40% INT | 7 | 5 | 0.928 | 0.864 | 0.974 | 124 | 3 | 3 | 8 | 10 | 8 | 4 | 4 | 0.024 | * | * | |
| TOP 70% INT | 7 | 5 | 0.884 | 0.85 | 0.86 | 3 | * | * | * | * | * | 3 | * | 0.003 | * | * | |

| SIMPLF WHOLE SYSTEM (FER 264) | | | | | | | | |
| TOP 20% SEG | 18 | 8 | 1.064 | 1.0 | 1.196 | 194 | * | 0.94 | 0.94 | 0.04 | * | 10 | 0.074 | * | 0.074 | 0.004 |
| 20+40% SEG | 18 | 7 | 0.912 | 0.89 | 1.005 | 194 | * | 0.94 | 0.94 | 4 | 8 | 8 | 0.075 | * | 0.075 | 0.008 |
| MID 20% | 17 | 5 | 0.742 | 0.67 | 0.87 | 194 | * | 0.94 | 0.94 | 4 | 8 | 8 | 0.075 | * | 0.075 | 0.008 |
| 20 40% INT | 18 | 6 | 0.645 | 0.64 | 0.67 | 194 | * | 0.94 | 0.94 | 4 | 8 | 8 | 0.075 | * | 0.075 | 0.008 |
| TOP 20% INT | 8 | 6 | 0.565 | 0.56 | 0.615 | 8 | 264 | 7 | 49 | 564 | * | 5 | 5 | 0.02 | 0.039 | 0.0 |

| DFTAI ED GROUND SYSTEM (FER268) | | | | | | | | |
| TOP 20% SEG | 9 | 1 | 0.792 | 0.047 | 0.784 | 60 | 84 | 84 | 144 | 252 | 1 | 1 | 0.017 | * | 0.017 | 0.03 |
| 20+40% SEG | 9 | 2 | 0.679 | 0.01 | 0.634 | 144 | 84 | 84 | 279 | 279 | 5 | 5 | 0.017 | * | 0.017 | 0.03 |
| MID 20% | 19 | 4 | 0.671 | 0.011 | 0.66 | 132 | 98 | 98 | 228 | 228 | 5 | 5 | 0.017 | * | 0.017 | 0.03 |
| 20 40% INT | 19 | 6 | 0.583 | 0.014 | 0.55 | 144 | 84 | 84 | 228 | 228 | 5 | 5 | 0.017 | * | 0.017 | 0.03 |
| TOP 20% INT | 19 | 4 | 0.485 | 0.044 | 0.399 | 132 | 264 | 132 | 506 | 408 | 5 | 5 | 0.017 | * | 0.017 | 0.03 |

| DFTAI ED WHOLE SYSTEM: (FER400) | | | | | | | | |
| TOP 20% SEG | 36 | 12 | 1.079 | 0.047 | 1.157 | 430 | * | 430 | 430 | 4 | 4 | 16 | 10 | 0.01 | * | 0.01 | 0.03 |
| 20 40% SEG | 36 | 12 | 0.859 | 0.01 | 0.758 | 27 | 27 | 27 | 523 | 523 | 4 | 4 | 4 | 0.018 | * | 0.018 | 0.03 |
| MID 20% | 27 | 3 | 0.697 | 0.064 | 0.76 | 704 | 120 | 120 | 324 | 324 | 3 | 3 | 4 | 0.009 | 0.025 | 0.012 | 0.01 |
| 20+40% INT | 27 | 3 | 0.629 | 0.011 | 0.647 | 134 | 134 | 134 | 376 | 376 | 4 | 4 | 6 | 0.014 | 0.024 | 0.022 | 0.019 |
| TOP 20% INT | 27 | 3 | 0.546 | 0.044 | 0.599 | 40 | 776 | 132 | 516 | 526 | 6 | 6 | 10 | 0.02 | 0.014 | 0.019 | 0.019 |
5.5.4 **Summary of global pattern of vulnerability**

Drawing up the conclusions from the statistical analysis of dwelling samples, axial lines and integration bands, the global pattern of vulnerability on the Ferrier may be summed up as follows:

There are differences in the global pattern of vulnerability between ground and deck level and between front and back access. At ground level the pattern is overall diffused, since local detailing and local factors are not controlled, yet front and back patterns seem to be different. At deck level the pattern is clearer with vulnerability increasing with segregation, as is the trend for the estate overall. More specifically:

**A.** For the estate as a whole, burglary risk increases with segregation:

In the breakdown by Integration Bands, overall burglary rates and front burglary rates in particular correlate strongly with segregation. Similarly with respect to the axial lines, overall burglary rates showed a moderate but significant correlation with segregation. Finally, the whole sample of burgled dwellings is found to be more segregated than the nonburgled sample although the significance of the difference is not statistically proven. This is ultimately saying, that there is more burglary risk in more segregated places - supporting the general findings of the previous case study.

**B.** Within the global pattern of vulnerability, it is also apparent that patterns of vulnerability with respect to integration/segregation differ strongly between ground, deck level and tower-blocks, as well as between front and back access:

i- At **deck level**, where other access factors are controlled, vulnerability tends to increase with segregation, as is the case for the estate overall. This has generally been found to be the case with "direct" access in other case studies. At deck level (direct access) the burgled sample is more segregated than the nonburgled, and there is a very powerful correlation between burglary rates and segregation with respect to the Integration bands.

ii- With respect to the **tower blocks** (indirect upper level access), burgled dwellings are more integrated than the nonburgled sample, though significance is not proven - more data is necessary. Vulnerability, however appears to increase with integration, as has been established in the case study of Studley Estate (Hillier et al 1990).

iii- At **ground level** the picture is confusing, and the data is rather weak:
With respect to direct access (houses and maisonettes excluding the OAP blocks) at ground level the no clear pattern arise, and results conflict in the simple and detailed spatial systems of description particularly with respect to back access. Clearly the fine-tuning and detailed articulation, captured in the detailed spatial system, is very important. Vulnerability patterns are different with respect back access, and front access (particularly with respect to the simple system). Statistical significances are overall weak yet the following picture arises:

- vulnerability with respect to back access overall relates to integration (integrated back access) yet decreases with segregation in the detailed system;
- vulnerability with respect to front access generally relates to segregation but only up to a point (it tends to decrease at the most segregated end).

Within these categories of integrated back and segregated front access the evidence from the comparison of dwelling samples suggests that in both cases, there is a tendency for vulnerability to increase towards the middle:

- Integrated back vulnerability appears to increase with overall segregation (front/back) of the dwelling;
- Segregated front vulnerability appears to increase with integration;

The statistical significance of the above differences is not proven, these differences require further investigation, the weakness of the burglary data poses strong limitations on the statistical analysis. However, the pattern of vulnerability at ground level is clearly more complex than at other levels, due to the variation in local conditions related to the ground detailed structure (differing front or back access: visibility and vehicular access conditions) which have an effect on vulnerability of their own. Thus...

---

31 Clearly more data is necessary, however, this is beyond the limits of this study. However, it is important to keep in mind that it is difficult to expect statistical significance at the conventional standards set by other fields of scientific research, where controlled experiments are possible and where error margins have to be highly minimised. In the analysis of burglary locations, where many factors are at play, including chance opportunity or targetting of specific goods, it is unlikely that conventional significance levels can be reached with small samples. The results can only be treated as indicative, and the significance levels determined through the t-tests, can be used as some guide for the interpretation of our results. However, the above results could be used to determine the conditions, under which we might get significant results: necessary sample size; confidence intervals for the values of the difference. Based on the “t-formula” (see H Blablock, ‘Social Statistics’, Second edition, McGraw-Hill, 72 page 189) the necessary sample size to attain significance levels was calculated as follows:

If we take the critical value for t ( =1.96 for 95% confidence limit), we can calculate the necessary sample size for the difference between means to be significant on the basis of the t formula (t = √n x ln(M1-M2)/sd). For the ground level sample we would need at least n=62 cases in order to reach significance; for the upper level the necessary sample size would be n=76 and for ground+deck the necessary sample size rises to n=430 (for the given differences between means). In short we would need at least three-four years’ crime data.
the question is how accessibility -degree of Integration - performs in conjunction with
the local factors identified in the previous section. Clearly it is necessary to look at the
relationship between local factors and the global pattern in more detail.

The simple system of axial representation brings out overall more powerful differences between the
samples with respect to global accessibility in the deck and tower block samples, and in the overall
pattern of the Integration bands. At ground level it appears to overlook the subtler mechanisms of
distancing of dwellings from the main integrating lines, which is however very important. Due to the
discrepancy between detailed and simple systems, it seems important to focus on the detailed system at
ground level, which captures the effect of the varying local conditions and the importance of the detailed
structuring of space with respect to vulnerability to crime.
## Table 5.6.1 A: Differences Between East/West Dwelling Samples

<table>
<thead>
<tr>
<th></th>
<th>LFER400 (Detailed, Whole)</th>
<th>LFER264 (Simple Whole)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>East</td>
<td>West</td>
</tr>
<tr>
<td><strong>Front:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td>.649</td>
<td>.628</td>
</tr>
<tr>
<td>S.D.</td>
<td>.08</td>
<td>.074</td>
</tr>
<tr>
<td>Stat. Prob.</td>
<td>(p=.0009)</td>
<td></td>
</tr>
<tr>
<td><strong>Back:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td>.613</td>
<td>.605</td>
</tr>
<tr>
<td>S.D.</td>
<td>.102</td>
<td>.104</td>
</tr>
<tr>
<td>Stat. Prob.</td>
<td>(p=.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Front Back Ave.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td>.631</td>
<td>.617</td>
</tr>
<tr>
<td>S.D.</td>
<td>.06</td>
<td>.048</td>
</tr>
<tr>
<td>Stat. Prob.</td>
<td>(p=.0008)</td>
<td></td>
</tr>
</tbody>
</table>

## Table 5.6.1 B: RRA Differences Between Houses and Maisonettes (E+W)

<table>
<thead>
<tr>
<th></th>
<th>Houses</th>
<th>Maisonettes</th>
<th>Signif</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>No. of Dwells</strong></td>
<td>216</td>
<td>396</td>
<td></td>
</tr>
<tr>
<td><strong>Front Access:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td>.576</td>
<td>.632</td>
<td>p=.0001</td>
</tr>
<tr>
<td>St Dev</td>
<td>.054</td>
<td>.092</td>
<td></td>
</tr>
<tr>
<td>St Error</td>
<td>.004</td>
<td>.005</td>
<td></td>
</tr>
<tr>
<td><strong>Back Access:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td>.561</td>
<td>.59</td>
<td>p=.0023</td>
</tr>
<tr>
<td>St. Dev</td>
<td>.088</td>
<td>.125</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.006</td>
<td>.006</td>
<td></td>
</tr>
<tr>
<td><strong>Front Back Ave:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td>.568</td>
<td>.611</td>
<td>p=.0001</td>
</tr>
<tr>
<td>St. Dev</td>
<td>.055</td>
<td>.055</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.004</td>
<td>.003</td>
<td></td>
</tr>
</tbody>
</table>
The analysis of burglary data in section 5.4, pointed out that burglary rates in the maisonette group in the east half of the estate are nearly twice those of the west; and that the ground level maisonettes both in the east and west sides have over twice the burglary rate of the row houses, (overall average: Maisonnettes 4.04% compared to houses, 1.85%; in the more segregated east half of the estate: Mais. 5.77% compared to 2.92% for houses). The findings suggested that the 'restricted view' back burgled group off main integrating axes are the most vulnerable subgroup (8.33%); that enclosed front access in the courts is the next most vulnerable category, over double that of the exposed front or back access group (houses and exposed maisonettes). Furthermore, vehicular access/surveillance is avoided, the no surveillance category is the most vulnerable (two to three times higher than the front or back surveilled dwelling categories).

The question arises, whether there are also differences in terms of their degree of integration in the estate (global accessibility). How do the above local factors of vulnerability relate to integration/segregation the global factor? The next subsections attempt to deal with these questions step by step. The first step is to identify the general picture and investigate the main global differences between the various groups of dwellings: A. between east and west halves and B. between dwelling types. The next step is to investigate the global differences (RRA) between front and back-burgled houses and maisonettes, in relation to the degree of exposure/enclosure of the visibility field, and potential surveillance from vehicular traffic.

5.6.1. Differences between East and West / Houses and Maisonettes in terms of Global Accessibility (RRA):

Table 5.6.1A presents the differences between east and west dwelling samples in terms of mean Integration (in both spatial systems of reference). Clearly the east half of the Ferrier is overall more segregated than the west half of the estate.

The differences between east and west dwelling samples are highly significant in the detailed system of reference and somewhat less significant in the simple whole.
## FERRIER ESTATE DIFFERENCES BETWEEN DWELLING SAMPLES

### LFER268 (DETAILED GROUND).

<table>
<thead>
<tr>
<th>EAST</th>
<th>WEST</th>
<th>E+W</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ROW HOUSES:

<table>
<thead>
<tr>
<th>No of Dwellings:</th>
<th>132</th>
<th>84</th>
<th>216</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT ACCESS:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td>.576</td>
<td>.574</td>
<td>.575</td>
</tr>
<tr>
<td>St Dev</td>
<td>.048</td>
<td>.063</td>
<td>.063</td>
</tr>
<tr>
<td>Signif.</td>
<td>(p=.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| BACK ACCESS:   |     |    |     |
| Mean RRA       | .55 | .578| .561|
| St. Dev.       | .094| .075| .088|
| Signif.        | (p=.02) |   |     |

| FRONT/BACK:   |     |    |     |
| Mean RRA      | .563| .576| .568|
| St. Dev.      | .063| .037| .056|
| Signif.       | (p=.0) |   |     |

### GROUND MAISONETTES:

<table>
<thead>
<tr>
<th>No of Dwellings</th>
<th>156</th>
<th>240</th>
<th>396</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRONT ACCESS:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td>.654</td>
<td>.618</td>
<td>.632</td>
</tr>
<tr>
<td>St Dev</td>
<td>.096</td>
<td>.086</td>
<td>.092</td>
</tr>
<tr>
<td>Signif.</td>
<td>(p=.0001)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| BACK ACCESS:   |     |    |     |
| Mean RRA       | .608| .578| .59 |
| St. Dev.       | .118| .128| .126|
| Signif.        | (p=.0185) |   |     |

| FRONT/BACK AVE:|     |    |     |
| Mean RRA       | .632| .598| .611|
| St. Dev.       | .047| .056| .054|
| Signif.        | (p=.0006) |   |     |

---

**TABLE 5.6.1 C : INTEGRATION LEVELS : HOUSES & MAISONETTES : E/W**
Thus from here on the analysis concentrates on the detailed spatial system, which is more sensitive to the local conditions of access and captures the detailed articulation of space. Clearly it is precisely these differences we want to investigate and how these affect the global pattern of vulnerability, and the detailed attempts to describe them more accurately in spatial terms.

Considering the relative integration of houses and maisonettes within the detailed ground level system: Table 5.6.1 B presents the overall differences between houses and maisonettes with respect to degree of integration (accessibility) in the global structure. One finds that maisonettes are highly significantly more segregated than houses with respect to both front and back access faces. This makes sense, since as noted earlier on, the majority of houses tend to be located towards the estate periphery or along main vehicular access routes.

Table 5.6.1 C presents the differences in terms degree of Integration between houses and ground maisonettes; in east and west halves (and overall). Some interesting differences emerge: It is mainly the maisonettes, both front and back faces, that are more segregated in the east. It is also east maisonettes that are the most vulnerable dwelling category. Houses have about the same integration levels east and west with respect to front access, whereas with respect to back access, west houses (also found to be more vulnerable than in the east, see section 5.4.1) are significantly more segregated.

5.6.2 Breakdown of sample of houses and maisonettes by Exposed /Enclosed Access:

Dwelling samples are broken down by degree of "visual exposure/enclosure" of front and back access faces - and by East/West/E+W. As discussed in section 5.4.3, there are the following front/back combinations:

- Exposed front and back: Houses
- Exposed front /enclosed back: outward facing maisonettes
- Enclosed front/exposed back*: innercourt maisonettes

As discussed earlier in section 5.5, the simple spatial system oversimplifies the layout design, the network of paths and landscaping (such as eg. recessed access zones, which distance the dwelling entrances from spaces such as the parking spaces and garage access in each courtyard, the detailed path system or the interior arrangement of the courtyards as captured in maps 5.06 A and B etc). As discussed in section 5.2.4 a large proportion of maisonettes in the simple system are ascribed directly to the long N/S axes which pass through the courtyards rather than the intentionally more segregated recessed zones.
<table>
<thead>
<tr>
<th>Summary in Var.</th>
<th>FR/NI</th>
<th>EAST FERRIER</th>
<th>BACK FERRIER</th>
<th>WFT FERRIER</th>
<th>4 + W FERRIR RAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FR/NI</td>
<td>FRONT</td>
<td>BACK</td>
<td>FRONT</td>
<td>BACK</td>
</tr>
<tr>
<td></td>
<td></td>
<td>H.R. (D)</td>
<td>H.R. (D)</td>
<td>H.R. (D)</td>
<td>H.R. (D)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NONBURG</td>
<td>NONBURG</td>
<td>NONBURG</td>
<td>NONBURG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MeanRRA</td>
<td>0.606</td>
<td>0.569</td>
<td>0.606</td>
<td>0.606</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.033</td>
<td>0.010</td>
<td>0.066</td>
<td>0.066</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.686</td>
<td>0.569</td>
<td>0.683</td>
<td>0.683</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.08</td>
<td>0.085</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Exposed Inc. R.V.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MeanRRA</td>
<td>0.56</td>
<td>0.569</td>
<td>0.56</td>
<td>0.56</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.034</td>
<td>0.085</td>
<td>0.034</td>
<td>0.085</td>
</tr>
<tr>
<td></td>
<td>FR/BA</td>
<td>0.583</td>
<td>0.632</td>
<td>0.589</td>
<td>0.587</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.041</td>
<td>0.037</td>
<td>0.041</td>
<td>0.037</td>
</tr>
<tr>
<td></td>
<td>Restricted view</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MeanRRA</td>
<td>0.629</td>
<td>0.695</td>
<td>0.691</td>
<td>0.618</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.046</td>
<td>0.056</td>
<td>0.045</td>
<td>0.045</td>
</tr>
<tr>
<td></td>
<td>FR/BA</td>
<td>0.572</td>
<td>0.518</td>
<td>0.518</td>
<td>0.572</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.045</td>
<td>0.045</td>
<td>0.045</td>
<td>0.045</td>
</tr>
<tr>
<td></td>
<td>Exposed Back</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MeanRRA</td>
<td>0.595</td>
<td>0.683</td>
<td>0.697</td>
<td>0.606</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.037</td>
<td>0.089</td>
<td>0.077</td>
<td>0.077</td>
</tr>
<tr>
<td></td>
<td>FR/BA</td>
<td>0.554</td>
<td>0.571</td>
<td>0.517</td>
<td>0.517</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.146</td>
<td>0.083</td>
<td>0.095</td>
<td>0.095</td>
</tr>
<tr>
<td></td>
<td>FR/BA</td>
<td>0.575</td>
<td>0.627</td>
<td>0.589</td>
<td>0.589</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.055</td>
<td>0.055</td>
<td>0.055</td>
<td>0.055</td>
</tr>
<tr>
<td></td>
<td>Excluding:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Restricted view</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Back</td>
<td>same as above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surveillance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>MeanRRA</td>
<td>0.595</td>
<td>0.697</td>
<td>0.606</td>
<td>0.606</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.037</td>
<td>0.075</td>
<td>0.037</td>
<td>0.037</td>
</tr>
<tr>
<td></td>
<td>FR/BA</td>
<td>0.554</td>
<td>0.577</td>
<td>0.571</td>
<td>0.517</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.146</td>
<td>0.089</td>
<td>0.095</td>
<td>0.095</td>
</tr>
<tr>
<td></td>
<td>FR/BA</td>
<td>0.575</td>
<td>0.618</td>
<td>0.589</td>
<td>0.589</td>
</tr>
<tr>
<td></td>
<td>St. Dev</td>
<td>0.055</td>
<td>0.038</td>
<td>0.055</td>
<td>0.038</td>
</tr>
</tbody>
</table>
Front and back faces and their vulnerability are analysed separately, due to differing conditions of exposure/surveillability and integration. T-tests (2-tailed) are carried out to investigate the significance of the differences in degree of Integration between front/back burgled and nonburgled samples. Tables 5.6.2 A, 5.6.2 B present the main differences between front and back burgled and nonburgled faces with respect to their mean integration rates (RRA) in the detailed ground system. The following pattern emerges:

i. **Inner court maisonettes: segregated front/integrated back:**
   (Table 5.6.2 A)

1. **Enclosed Front access:**

Front burgled dwellings are **significantly more integrated** than the nonburgled sample: Front mean RRA values:

- **East:** FrB: .606, NonB: .686; p=.08; (probably significant)
- **West:** FrB: .606, NonB: .65; p=.15 (stat. significance not proven); E+W ALL:
  FrB: .606, NonB: .664; p=.03; (stat. significant)

(One may also note that the back gardens of the front burgled sample tend to be more segregated than the backs of the nonburgled sample particularly in the west side (p=.14).)

2. **Exposed Back- (garden) Access:**

Back burgled (BaB) dwellings on the east side are **more segregated** than the nonburgled dwellings. The back burgled sample is also more segregated with respect to the respective front integration indexes of the dwellings, thus reinforcing the difference in terms of front/back average RRA.

When the small but highly vulnerable western edge of the east group with integrated, restricted view at the back is excluded, the difference between back and nonburgled dwellings becomes stronger with respect to both Back and F/B RRA:

---

See Appendix 5: Tables 8.1.0-8.8.2 for front vulnerability; tables 9.0-9.2.6 for back vulnerability with respect to whole range spatial variables).
<table>
<thead>
<tr>
<th>Study in Var</th>
<th>EAST FERRIER</th>
<th>WEST FERRIER</th>
<th>E+W FERRIER ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>front</td>
<td>back</td>
<td>front</td>
</tr>
<tr>
<td></td>
<td>exposed</td>
<td>non-exposed</td>
<td>exposed</td>
</tr>
<tr>
<td></td>
<td>Enclosure</td>
<td>back</td>
<td>non-exposed</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Exposure Front**

<table>
<thead>
<tr>
<th>Maisonette</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Dev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Dev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F/RBA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Dev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**House S+**

<table>
<thead>
<tr>
<th>Maisonette</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Dev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Dev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F/RBA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Dev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**F/B Vulnerability**

<table>
<thead>
<tr>
<th>Maisonette</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
<th>n=0</th>
<th>n=1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Dev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Dev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F/RBA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean RRA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>St Dev</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes**

- RRA: Reflected Radiation Angle
- C: Coefficient
- N: Number
- O: Observation
- M: Measurement
- F/R: Forward/Reverse
- E/W: East/West
- S+ and S- denote different settings
- In COR RT refers to conditions in the control room
- The table provides statistical data for various scenarios related to the FERIER estate, focusing on interrelationships between integration and visibility.
East:  
  b:  BaB: .618,  NonB: .571;  p=.35;  
  f/b:  BaB: .657,  NonB: .627  p=.22  (stat. significance not proven);  

E+W ALL:  
  BaB: .618,  NonB: .533;  p=.09;  (prob. stat. significant)  
  f/b:  BaB: .657,  NonB: .597;  p=.05;  (stat. significant)  

Excluding both restricted view and back vehicular surveillance samples, i.e. when back vehicular surveillance is controlled, for the estate overall, one finds that the difference between burgled 'exposed back' maisonettes compared to nonburgled back faces becomes highly significant in terms of segregation, both of the back and the average f/b mean Integration value:

E+W:  
  b. RRA:  BaB: .618, NonB: .523;  p=.047;  
  f/b RRA:  BaB: .657, NonB: .588;  p=.002;  
  (highly statistically significant)  

ii.  
  **Outward facing maisonettes: Front exposed/ back enclosed:**  
  (Table 5.6.2 B)  

There is only one front and one back burglary on the west side and no burglaries in this category in the east. Statistical results are only indicative:  
• The front burgled dwelling is slightly more integrated than the average for this sample. It is burgled from the most integrated side, in spite of vehicular surveillance!  
• The back burgled dwelling (from inside Lebrun Square) is more integrated (back) with respect to the other maisonettes in this category, (though very segregated with respect to the other dwelling categories). It is burgled from the more segregated side, its respective front is highly integrated has vehicular surveillance and is close to the boundary road.  

iii  
  **Houses : Exposed front and back (with front and back gardens):**  
  (Table 5.6.2 B)  

1. **Front Access (Exposed):**  
• In the east side the front burgled dwelling is more integrated (.552) than the average for houses (front RRA : .576), just off the unconstituted and highly integrated south boundary axis (Tudway Rd), with its back garden opening onto it.
• In the west side the front burgled dwelling is situated towards the middle, it is very segregated front (RRA = .629) and back (RRA = .617): compared with the average Front and Back Integration Rates for houses (NonB Fr. RRA: .575, b RRA: .577 respectively).

In both cases the dwellings are burgled from the more segregated side - (also avoiding potential surveillance from vehicular routes).

2. Back Access (Exposed):

In both east and west, the back burgled dwellings are more segregated than average. The east burglary is in the second row away from the southern boundary road, and the west burglary is just off the unconstituted north-west boundary road. The number of cases are too low, the statistical results are again indicative:

<table>
<thead>
<tr>
<th></th>
<th>BaB</th>
<th>NonB</th>
</tr>
</thead>
<tbody>
<tr>
<td>East</td>
<td>.597</td>
<td>.551</td>
</tr>
<tr>
<td>West</td>
<td>.587</td>
<td>.577</td>
</tr>
<tr>
<td>E+W All</td>
<td>.592</td>
<td>.561</td>
</tr>
</tbody>
</table>

E+W ALL: BaB: .592, NonB: .561; p=.6; (stat. significance not proven)

In the case of the east burglary there is no difference between front and back integration levels, whereas in the west case the burgled side is considerably more segregated!

iv. Table 5.6.2 B further aggregates the dwelling faces into the two exposed categories: back exposed all (Houses and innercourt maisonettes) and front exposed all (houses and outward facing maisonettes):

• In the exposed back case vulnerability clearly increases with segregation;

<table>
<thead>
<tr>
<th></th>
<th>BaB</th>
<th>NonB</th>
</tr>
</thead>
<tbody>
<tr>
<td>E+W</td>
<td>.607</td>
<td>.546</td>
</tr>
<tr>
<td>f/bRRA:</td>
<td>.624</td>
<td>.584</td>
</tr>
</tbody>
</table>

Whereas statistical significance is proven for exposed maisonettes, here the more integrated houses added to the burgled sample have had a sharp effect on the mean Integration rate of the back burgled sample, thus weakening the significance of the difference.

• In the exposed front case there appears to be no difference between front burgled and nonburgled (in terms of front mean RRA FrB: .564 - NonB: .563; though back
<table>
<thead>
<tr>
<th>MAPNRRA</th>
<th>FRB Access</th>
<th>VEHICULAR SURVEILLANCE FRONT</th>
<th>VEHICULAR SURVEILLANCE BACK</th>
<th>NO VEHICULAR SURVEILLANCE FB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dwelling Cat.</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>HOUSES</td>
<td>FRONT</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>No front</td>
</tr>
<tr>
<td></td>
<td>BACK</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.617</td>
</tr>
<tr>
<td></td>
<td>FR BA</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.586</td>
</tr>
<tr>
<td>MAISONETTES</td>
<td>n 1</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>HOUSES</td>
<td>EXPOSED FRONT</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.909</td>
</tr>
<tr>
<td></td>
<td>BACK</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.763</td>
</tr>
<tr>
<td></td>
<td>FR BA</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.636</td>
</tr>
<tr>
<td>BACK ACCESS VULNERABILITY</td>
<td>n 1</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>HOUSES</td>
<td>EXP MAISONETTES</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.909</td>
</tr>
<tr>
<td></td>
<td>FRONT</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.719</td>
</tr>
<tr>
<td></td>
<td>BACK</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.629</td>
</tr>
<tr>
<td></td>
<td>FR BA</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.053</td>
</tr>
<tr>
<td>FRONT ACCESS VULNERABILITY</td>
<td>n 1</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>HOUSES</td>
<td>DIFFERING FRONT</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.591</td>
</tr>
<tr>
<td></td>
<td>BACK</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.141</td>
</tr>
<tr>
<td></td>
<td>FR BA</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.554</td>
</tr>
<tr>
<td>FRONT/BACK VULNERABILITY</td>
<td>n 1</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>HOUSES</td>
<td>DIFFERING FRONT</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.054</td>
</tr>
<tr>
<td></td>
<td>BACK</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.517</td>
</tr>
<tr>
<td></td>
<td>FR BA</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.554</td>
</tr>
<tr>
<td>INNER COURTS</td>
<td>n 1</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>HOUSES</td>
<td>EXPOSED BACK</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.606</td>
</tr>
<tr>
<td></td>
<td>BACK</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.567</td>
</tr>
<tr>
<td></td>
<td>FR BA</td>
<td>MaasnHRA</td>
<td>St. Dev</td>
<td>0.587</td>
</tr>
<tr>
<td>Inner Access</td>
<td>n 1</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>
mean RRA of the front burgled dwellings is more integrated than the resp. nonburgled back average).

There are too few cases to draw conclusions and the pattern is not quite consistent in the East and West either. Vehicular surveillance (combined with unconstituted access from the outside boundary) are also playing a role.

5.6.3 Integration and the Vehicular surveillance factor:

As discussed in section 5.4.4, there is a strong vehicular surveillance avoidance pattern: where there is front surveillance, front exposed dwellings are burgled from the back, where there is back surveillance, houses and exposed maisonettes are burgled from the front. (both houses and maisonettes). Here, Front and back burglary global (RRA) risk patterns are analysed by further breaking down dwelling type/exposure categories (houses, exposed maisonettes and innercourt maisonettes) by vehicular surveillance categories. Due to the sparsity of the data, however, the data is aggregated again by overriding the E/W and Dwelling type classification.

Table 5.6.3 summarises the results of t-tests comparing differences between front/back burgled and nonburgled dwellings and their respective faces with respect to Integration, broken down by the categories of front; back and no vehicular surveillance and exposure.

A. Front exposed All:

There is one exception to the avoidance pattern - an outward facing maisonette with vehicular access - which is highly integrated (front), just off the north-west boundary road. The other burglaries are from the back, though the back access faces of houses and outward facing maisonettes are totally different, due to their different degree of exposure. However, one may note that for both houses and exposed maisonettes with front surveillance, the back burgled dwelling faces are more integrated than the respective nonburgled faces. This may be reflecting the fact that the majority tends to be relatively peripheral /close to the unconstituted boundaries.

With respect to other subcategories of surveillance (houses only):

- houses with back surveillance - no front: no difference between burgled (front) and nonburgled faces;
houses with no surveillance front or back: the one (back) burgled dwelling is relatively more segregated with respect to the nonburgled average. Due to the small numbers of burglaries conclusions with respect to the global factor are necessarily very limited.

B. Back exposed All: houses and inner court maisonettes (back):

- Where there is back surveillance: burglaries are committed from the front dwelling face, which also tends to be more segregated than the respective surveilled back access:
  BaBurgl: frRRA: .591 (baRRA: .517) - NoNB: frRRA: .628
In this case the burgled dwellings here are houses discussed above - no maisonettes. This explains why the mean burgled RRA is more integrated than the nonburgled mean RRA of this subsample.

- Where there is no surveillance front or back: burglaries are committed from front or back, (in this case mainly maisonettes and only one back burgled house):

  1. Front burgled dwelling faces are more integrated than nonburgled front access: (FrB: .606, NonB (frRRA): .639 p=.24)
The pattern is determined by front enclosed maisonettes, since the proportion of houses is very small (20%: 60/ 300). Again combining the two dwelling types and exposure categories obviously accounts for the weaker statistical significances. The respective back faces (of the front burgled dwellings) are more segregated then the nonburgled back: BaB*: .567 compared to Nonb= .537; p=.27).

  2. Back burgled dwelling faces are more segregated with respect to both back and front (high statistical significance). For the exposed back access category (excluding the "restricted view" subgroup) the differences between mean RRA rates are:

<table>
<thead>
<tr>
<th></th>
<th>Fr. RRA</th>
<th>Ba Burgl:</th>
<th>NonBurgl:</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>fRRA</td>
<td>BaBurgl:</td>
<td>.673</td>
<td>.632</td>
<td>.3</td>
</tr>
<tr>
<td></td>
<td>NonBurgl:</td>
<td>.539</td>
<td>.586</td>
<td>.005 (highly signif.)</td>
</tr>
<tr>
<td></td>
<td>p=.068</td>
<td>p=.005</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

When there is no vehicular surveillance, the pattern of vulnerability with respect to degree of Integration of dwellings - considering both front and back access - appears as follows:

FrontRRA: FrB: .603 NonB: .632 BaB*: .673
- **front vulnerability (enclosed)**: increases with (enclosed) integration front and segregation back;
- **back vulnerability (exposed)**: increases with segregation front and back.

Back burgled dwellings are strongly more segregated overall than front burgled dwellings! The pattern of vulnerability tends to increase in the direction of the middle range.

### 5.6.4 Summary

The vulnerability of dwelling faces in terms of global integration or segregation, appears to vary in relationship to the existing local conditions of enclosure/exposure (visibility) and vehicular surveillance potential (pedestrian and vehicular traffic). Although overall less vulnerable, the exposed back faces of houses and maisonettes, tend to become more vulnerable with segregation. The highly vulnerable restricted view group is highly integrated. The also vulnerable segregated enclosed maisonette entrances, tend to also become more vulnerable with relative integration. Where there is vehicular surveillance potential, burglaries are committed from the other (generally more segregated) side. Vulnerability increases where there is no vehicular surveillance. Thus the spatial pattern of burglary, influenced by both global and local factors, reflects the interaction between the two different sets/scales of spatial criteria: The global spatial configuration, on the one hand, and the finer articulation of space in terms of the ordering of blocks and of dwelling access, on the other, provide the spatial basis for the 'interplay' between the two.
## FFRRER ESTATE: GENERAL PROFILE OF TYPOLOGY OF DWELLING ACCESS AND SURVEILLABILITY

<table>
<thead>
<tr>
<th>GENERAL (GLOBAL) ACCESS FACTORS</th>
<th>LOCAL ACCESS FACTORS</th>
<th>BURGLARY RATES PER DWELLINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLOCK TYPOLOGY</td>
<td>ACCESS LAYOUT</td>
<td>BLOCK DWELLING TYPOLOGY</td>
</tr>
<tr>
<td>ACCESS MODE</td>
<td>LEVELS</td>
<td>DEGREE OF ENCLOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
<tr>
<td>Accessible</td>
<td>2 or 3 D</td>
<td>ENCLOSURE EXPOSURE</td>
</tr>
</tbody>
</table>
5.7. **Discussion and Conclusions: The design of the Ferrier Estate and the Pattern of Vulnerability to Burglary.**

Having analysed the factors of spatial vulnerability on the estate, and the patterns of burglary risk, the attempt is made to relate the spatial factors and the mechanisms of vulnerability back to the design concepts. In this way one can identify the design choices at the various stages of the design, which contribute to safety or to vulnerability to burglary on the Ferrier Estate.

A. **General design strategy - General Profile:**

The Ferrier Estate, a low density, mixed development of the early-seventies, is the largest estate in our sample (1900 dwelling units) and the least vulnerable with respect to burglary. It is built on a highly segregated site bounded off by stretches of green and railway lines to the north-east, next to British Rail's Kidbrooke Park station. The main road, Kidbrooke Park Road, cuts the estate into two almost completely separate halves via an elevated section. It links with the estate's boundary loop-roads at the south end, which join up at the north end in an underpass near the station. Vehicular access is peripheral, with a system of feeder roads and culs-de-sac accessing underground car-parks, in a typical Radburn-type layout. Kidbrooke Park road is insulated via stretches of green landscape which along with the estate centre are linked to the residential sections on both sides via a non-interrupted pedestrian network.

The estate comprises 11 eleven-storey tower blocks (30% high-rise); five-storey maisonette blocks (approximately 53% medium rise); two-storey rows of houses (11.3% low-rise) and 9 two-storey OAP blocks with controlled entrances (5.7%).

Unique in its lack of immediate built context; coupled with the uniformity of the stark modernist architecture, and the size of a small village, the Ferrier forms a distinct spatial and social island in its relatively affluent suburban context.

In spite of its reputation as an estate with high crime problems, the study shows only 56 residential burglaries recorded by the police in the period from September 1987 to September 1988 (twelve months), which is equal to a recorded burglary rate of 2.94% for the whole estate. The rate of burglary is very low for a 'problem estate', lower even than the recorded average 5-6% burglary rate for London in 1987-8.
B. Principles of Layout - Courtyard/Block typology:

The layout of the Ferrier is geometrically formal and strongly axial. The concept is based on the principle of repetition of open and enclosed courtyards in a 'chequered' design. The courtyards or 'squares' are either strongly enclosed by interconnected five-storey maisonette blocks with staircases at the four corners, or relatively open green spaces, flanked by the 'backs' of the maisonette blocks, and two-storey rows of houses facing each other front to back.

Maisonettes are grouped around rectangular courts, accessed at ground level mainly from inside the courts and via inward facing galleries at deck level. The tower blocks have two-sided entrances at ground level open to public access (entryphones had not been installed at the time of the study). They are linked at deck level to one courtyard complex each (for access to lifts), though originally they were linked on both sides, so that one could walk across the estate at deck level. At ground level there are no dwellings in the tower blocks.

Two thirds of dwellings are accessed directly from the network of open spaces (direct access), while one third is accessed via closed circulation spaces in the tower blocks (indirect access). Direct access overall (with a burglary rate of \( \frac{40}{1228} = 3.26\% \)) appears to be marginally more vulnerable than indirect access (BR: \( \frac{16}{572} = 2.80\% \)), though proportionally it is 1.16 times (16%) higher than indirect access.

Direct access comprises two levels of access:

- The **ground level** system of pedestrian paths; access routes; open spaces
- A discontinuous **deck level** system of inter-connected decks overlooking the maisonette courts, with multiple links / choice of exits to the ground. 34

Comparing burglary risk at ground and deck level separately one finds that ground direct access is equally vulnerable as deck level, (with burglary rates of \( \frac{20}{612} = 3.27\% \) and \( \frac{20}{616} = 3.25\% \) respectively). This is surprising, since research suggests the ground level is generally more vulnerable than the levels above ground (Newman '72; Coleman '86; Hillier '88; Also Marquess Estate and Andover Estate ). Although the rate of burglary is very low for the estate as a whole, it is the ground level burglary rate which is particularly low. So what is it in the design that contributes to this low rate of burglary?

---

34 Indirect access comprises ten levels of access above ground, with five dwellings per lobby. However, the analysis focuses on direct access, since towerblocks have insufficient variation in terms of local and global factors to merit analysis at this point.
Direct access: Block and dwelling typology:

There is a high degree of standardisation of the block and courtyard layout. The dwelling typology is simple:

- **Houses**: grouped together in parallel rows around green courts, generally aligned along the periphery, and the vehicular access roads. Houses have front and back gardens, but the garden walls are low.

- **Ground level maisonettes**: There are two groups: a) The majority (75%) are inward facing, accessed from inside the courts on three sides. b) The rest are accessed from the outside, facing the vehicular access route, with back terraces facing the courtyard. Maisonette entrances are recessed under arcades that distance them from the long sightlines/axes that traverse the estate, and thread the courtyards together.

- **Deck maisonettes**: These are accessed at second floor above ground via decks overlooking the interior of the courts, thus totally screened from the outside.

Looking at burglary rates by dwelling type one finds interesting differences: **Ground maisonettes**, which constitute 65% of direct accessed ground dwellings, are the most vulnerable category; they are 2.2 times more vulnerable than houses which are also ground level (with burglary rates of $16/396=4.04\%$ and $4/216=1.85\%$ respectively). The deck maisonettes have a somewhat lower rate of 3.25%; somewhere between the two.

Looking at burglary rates for houses and maisonettes broken down by east/west halves, the difference between them in terms of vulnerability appears to be much acute in the east half. Broken down by east and west halves, one finds that east maisonettes are almost twice as vulnerable as in the west half (with rates of $9/156=5.77\%$ compared to $7/240=2.92\%$), whereas houses in the east half are proportionally less vulnerable than in the west (BR $2/132=.51\%$ and $2/84=2.38\%$ respectively). Although dwelling types also involve certain household characteristics (target value), considering the standardisation of the block layout, these also involve certain conditions of access and visual surveillability, which will affect vulnerability. The question is, how do these dwelling access criteria perform with respect to burglary risk.
C. Layout Design: Local factors of Dwelling Accessibility and Visibility/ Surveillability:

At ground level all dwellings are directly accessible from both front and the back (front/back access). All have back gardens with low walls. Thus open spaces and the main pedestrian access paths are relatively continuously in contact with dwellings, both fronts or backs. In the visually enclosed maisonette courts dwelling entrances are recessed and withdrawn from the main pedestrian axes. Each estate half is relatively densely and continuously constituted in its residential section, though at the edges, and on the periphery the effect weakens, particularly in the west half. At deck level on the other hand (and in the upper levels of the tower blocks) there is front access only. It is continuously constituted and visually interconnected only in the local enclosure of the courtyard. At the global level deck access is totally discontinuous and visually segregated from the outside.

Thus there are the following important differences between ground and deck level and between houses and maisonettes relating to the conditions of accessibility:

- **Front/ back versus Front-only access:**

  With respect to direct access: front/back ground level access is equally vulnerable to front-only access at deck level (3.27% and 3.25% respectively). Again this is surprising, since one would expect that two access faces (front and back) would be an advantage from a burglar's point of view (choice of entry/escape).

- **Front and Back access and Dwelling types:**

  Overall front direct access (ground and deck) shows a marginally higher rate of burglary (2.36%) than back access; at ground level however, the difference turns round. Back access is proportionally slightly more vulnerable than front 11: 9 (1.8% compared to 1.47%) although clearly the numbers are very weak to draw firm conclusions. Looking at houses and maisonettes in each half separately, one finds that east maisonettes appear to be particularly vulnerable from the back (6/9 = 66% back burglaries); while west maisonettes are particularly vulnerable from the front (6/7 = 86% front burglaries). With houses front and back vulnerability is equal in both halves.

Due to the high standardisation of the courtyard/block typology, the spatial conditions surrounding front and back access of houses and maisonettes, fall into a few basic
combinations, depending on the location of entrances inside or outside the maisonette courts. Thus the above differences can be translated into combinations of front and back accessibility and surveillability, more specifically degree of enclosure/exposure and vehicular access and surveillance (and degree of global accessibility).

1. **Degree of enclosure/exposure:**

With respect to visual surveillability the **global impression** on the estate is one of openness, due to the low building density and coverage of the site. The lack of visually obtrusive landscaping allows long sightlines and wide uncluttered views. Views from the outside into the interior of the maisonette courts are restricted to the permeabilities, while views within the courts are contained at each level. There is no direct visual link between dwelling interiors and courtyard space or decks. Potential surveillance in the courts largely depends on presence of people (adults) in the courts.

The **local surveillability** of the dwelling faces is largely determined by the **degree of exposure/enclosure** of the court. Local visibility conditions are more or less constant within the maisonette courts but also outside them, since there is no visually obtrusive landscaping. Maisonette entrances are somewhat shielded visually under the arcades. At deck level there is visibility only across the court at the same level; there is no visual contact between dwelling interior and decks. The solid balustrades tend to reduce visibility, particularly from the ground level and provide visual cover even at deck level. Houses and the outward facing backs of maisonettes have good conditions of visibility of their flush facades (no recesses or shielding). Visual contact between dwelling interior and exterior is good, since garden walls are low. Thus there is both surveillance from public space of the security of the dwelling, and vice-versa.

The basic distinctions are between **enclosed or exposed access faces**. Furthermore, since access to one face from inside the maisonette courts automatically means that the other is facing outward, the combinations are restricted as follows:

**Houses:**  
* exposed front and back access;

**Maisonettes:**  
* 1/4 have exposed fronts/enclosed backs;  
* 3/4 have enclosed fronts/ exposed backs;

A small group of maisonettes on the edge of the east half of the estate have enclosed fronts backs with restricted views, due the hilly landscape morphology.
2. Vehicular access and surveillance:

Due to the spaciousness and openness of the visibility field, vehicular access routes, which tend to be highly integrated, not only affect accessibility of dwellings, but even more importantly, they affect surveillability. Vehicular traffic and vehicular related activities add to the degree of surveillability by the extra potential surveillance from moving cars (or police patrols). The closed maisonette courts are parking destinations where extra surveillance from vehicular traffic is negligible.

Vehicular surveillance potential is always combined with exposed front or back dwelling faces (but not vice versa) Thus front enclosed maisonettes never have front vehicular surveillance; outward facing exposed maisonettes always have front and never back vehicular surveillance (overview in figure 5.26). Houses fall into all categories, however they have a larger proportion of vehicular access/surveillance. Overall, 22% of houses have front vehicular surveillance, while 50% of houses have vehicular surveillance from the back. By contrast, approximately 24% of maisonettes have vehicular surveillance at the front (outward facing maisonettes), and only 15% have vehicular surveillance at the back.

There are differences in this distribution between east and west halves. In the east half, where maisonettes are most vulnerable from the back, the proportion of maisonettes with back vehicular surveillance drops to 7.7%, whereas in the west half it rises to 20% of maisonettes, while back vulnerability drops. With respect to houses the proportion with front vehicular surveillance is about 18% in the east, rising to 29% in the west. Finally about 28% of houses and 61% of ground maisonettes (as well as all deck maisonettes) have no vehicular surveillance front and back.

How do the above factors relate to vulnerability to burglary?

Exposure versus enclosure:

- Enclosed front access has a rate of burglary 2.5 times higher than that of exposed front access. Compare burglary rates of $8/300=2.67\%$ (inward facing maisonettes with no vehicular surveillance) and $3/312=0.96\%$ (houses and maisonettes, exposed vehicular and nonvehicular access) respectively.

- Exposed back access appears to be equally vulnerable to enclosed back access: backs of houses and backs of inward facing maisonettes (with and without vehicular
surveillance) with a burglary rate of $5/480=1.04\%$, while the enclosed backs of outward facing maisonettes have a burglary rate of $1/96=1.04\%$.

- The most highly vulnerable subgroup are the restricted view backs of innercourt maisonettes (no vehicular surveillance) on the east side of the estate with a rate of $3/36=8.33\%$.

- **Vehicular surveillance versus no vehicular access/surveillance:**

  Dwelling faces within view of vehicular access routes clearly seem to be less vulnerable than dwelling faces without vehicular surveillance. As a rule burglaries are committed away from the side with vehicular access, whether front or back.

  - Burglary risk is higher, where there is no vehicular surveillance front or back (BR. $15/300=5\%$) though this is strongly influenced by the restricted view group.
  - Dwellings with front vehicular surveillance have a burglary rate of $3/144=2.08\%$ but two out of three burglaries are committed from the back; the one front burglary is the exception to the rule.
  - Dwellings with back vehicular access have a burglary rate of $2/168=1.19\%$. Both burglaries are committed from the nonvehicular front.

  Looking at access faces separately, back vehicular access has $0/168=0\%$ burglary; front vehicular access has $1/144=0.69\%$ burglary; vehicular access overall has a burglary rate of $1/312=0.32\%$. In contrast, dwelling faces with no vehicular surveillance overall have a burglary rate of $19/912=2.08\%$ proportionally, clearly more vulnerable than the faces with front or back vehicular surveillance, even though, compared to other estates, the rate as such is very low. Due to the low numbers of burgled faces, further conclusions are very tentative.

  There does not appear to be a difference between front and back access with no vehicular surveillance ($10/468=2.14\%$ and $9/444=2.03\%$ respectively). However, there are differences between houses and maisonettes: maisonettes with no front vehicular surveillance are twice as vulnerable as the houses. Burglary rates are somewhat higher for maisonettes' back access in the east half, mainly due to the highly vulnerable restricted view subcategory.
D. Global accessibility: Degree of Integration / Segregation:

Whilst local conditions repeat themselves across the estate, what is unique to each dwelling location, is its relationship to all the others, i.e. its degree of global integration, which also indicates how accessible it is from all other parts of the estate.

The spatial structure of the Ferrier Estate is griddy in each of the estate halves, which makes the basic ground level relatively integrated. The two halves are weakly connected, mainly via the periphery and near the estate centre. The most integrating lines include Kidbrooke Park Road, which is not really part of the estate, and some of the boundary lines, but also axial lines around the centre, axial links between the two halves tangential to the shopping centre, and main north-south axes as well as east-west in the west half linking to the centre to the linking the purely residential quarters. In spite of the relative insularity of the two halves, there is a rather coherent integrating core, that links the two sides to the centre, but also integrates each of the halves separately.

The deck level is highly segregated, as are axial links around the staircases. At ground level short axial spaces within the courtyards relating to the recessed entrance zones to the maisonettes are often highly segregated. The spatial elaboration of the ground plan of the maisonette courts, the details of spatial arrangement create segregation, distancing dwelling entrances from the long integrating axes that traverse the estate halves.

The pattern of adult movement on the estate correlates quite strongly with the pattern of integration, more in agreement with the urban model rather than the estate model. Though peripheral axial lines near Kidbrooke Park Station overperform, as a result of the functional attraction, overall about 70% of the flow of movement as well as static use of space is predicted by degree of Integration. Children's activity does not correlate well with integration, as is often the case on housing estates.

The major axes linking the residential parts are reasonably well used; coupled with the high degree of global exposure that allows long and wide views across the estate, there is relatively continuous presence of people on the main access paths, pedestrian and vehicular. By contrast, in the maisonette courts numbers of people drop dramatically, particularly at deck level. In spite of the enclosed space and intense introverted focus, there are not enough people about to ensure continuous surveillance. Integration does not only indicate higher accessibility, but also higher social presence - potential surveillance.
With respect to global accessibility, the enclosed fronts of maisonettes are considerably more segregated than their exposed backs, which open directly onto the long axes. Maisonettes are significantly more segregated than houses overall. The east is overall more segregated than the west half, however, it is clearly the maisonettes that are more segregated in the east half, both front and back, and they are also the most vulnerable group. Fronts of houses are equally integrated east and west. In the east half, where houses have the lowest burglary rate, their backs are significantly more integrated, due to the fact that a large portion opens directly onto the boundary road.

The pattern of vulnerability with respect to global accessibility is diffused by local factors, though overall burgled dwellings seem to be marginally more segregated than nonburgled dwellings. Comparing the degree of global integration of burgled and nonburgled dwelling samples, the patterns of vulnerability appear to differ between indirect access and direct access, ground and deck level:

- With respect to indirect access (tower blocks), there is no significant difference between burgled and nonburgled dwellings in the detailed whole spatial system. In the simplified spatial system burgled dwellings appear to be somewhat more integrated than nonburgled, which indicates that the tower blocks with higher proportion of burglaries are more integrated than the others, however our limited data do not allow general conclusions.

- At deck level vulnerability increases with segregation. Deck maisonettes are the most segregated dwelling group on average anyway; burgled dwellings here are more segregated than nonburgled dwellings (front).

- At ground level there is no clear difference between burgled and nonburgled dwellings overall (both front only and f/b average RRAs), as local conditions vary. Front and back access appear to follow different trends. With respect to the detailed spatial system of reference, the overall more segregated fronts appear to become more vulnerable with integration, while the more integrated backs become more vulnerable with segregation. The simplified spatial system of reference, which attempts to capture more of the global structure, shows weaker results, often disagreeing with the detailed system, since it tends to ignore the local fine-tuning. The local detailing evidently plays a significant role in the definition of conditions of accessibility and surveillability at the local level, which in turn affect the global.
Correlating burglary risk to global accessibility in the sample of the axial lines from which burglaries are committed, one is again confronted with the problem of standardised numbers of dwellings/block. A moderate, but significant correlation however, is found, between overall burglary rates/line (front/back & indirect access) and degree of segregation, for the estate as a whole, and deck level alone. At ground level the correlation disintegrates.

Looking at the performance of integration bands (which overcomes the problem of standardisation of the number of dwellings per line and zero burglary lines) with respect to burglary risk, one finds a highly significant correlation between front burglary rates and increasing degree of segregation. Back access by contrast, which is restricted to the three most integrated bands in the simple whole system, shows a highly significant correlation between back burglary rates and integration, confirming the divergence observed in front and back vulnerability trends in the analysis of dwelling samples.

At deck access level, where other local factors are controlled, the correlation between front burglary rates and degree of segregation of the bands is even stronger. This clearly indicates that local conditions relating to front and back access at ground level affect the global pattern of vulnerability.

E. Interrelationship between global and local factors:

Whilst local conditions of accessibility and surveillability surrounding front and back access vary within and across dwelling types, they also have an intrinsic relationship to the global order of integration/segregation. Houses, exposed front / back, mostly located on the periphery or on vehicular access roads (higher proportion of vehicular surveillance than maisonettes), are highly significantly more integrated than maisonettes, both front and back. The 75% of maisonettes with entrances from the enclosed courts off recessed zones, are segregated from the main axes of movement and the long sightlines, and thus segregated at the global level.

Breaking down the dwelling samples by the local variables, one finds that trends vary:

- With respect to enclosed and relatively segregated front access (BR: 8/300= 2.67%); vulnerability to burglary increases with integration; the difference between burgled and nonburgled maisonettes' fronts is statistically significant.
• Enclosed back access (of outward facing maisonettes; BR 1/96=1.04%) is even more segregated than the respective front enclosed access and is less vulnerable. The burgled face here is considerably more integrated than average. This seems to correspond to the same pattern of vulnerability for segregated enclosure for the fronts.

• With respect to exposed front access the burglary data is weak, the number of dwellings is small and the number of burglaries is too low (BR: 3/312= 0.97%). One may only note the specific findings. With respect to exposed front access overall (houses and outward facing maisonettes) no conclusions can be drawn, since there are only two cases. The front burgled houses appear to be more segregated than the average for nonburgled dwellings (no statistical significance); the burgled maisonette, on the other hand, is highly integrated. This burglary is also the exception to the rule of avoidance of vehicular surveillance; the burglar/s make use of vehicular access just off the boundary road (integrated unconstituted access).

• With respect to the relatively integrated exposed back access (BR: 5/480=1.04%) vulnerability appears to increase with segregation of the back, and with overall front/back segregation. The difference between burgled and nonburgled backs of the above maisonettes (excluding the restricted view group) is probably significant in conventional statistical terms, whereas with the front/back average RRAs the difference is significant. The difference becomes sharper and even more significant when vehicular surveillance is controlled for. Exposed backs of houses (2/214=0.93%) appear to become more vulnerable with segregation, though the data again is too weak to generalise.

Regarding back exposed access overall the data is more substantial, though vulnerability is low (BR: 5/480= 1.04%), a coherent pattern emerges. Vulnerability increases with segregation, the burgled backs are more segregated than the nonburgled and the difference is probably significant, not only with respect to their back access, but also with respect to their overall front/back integration rate. This corresponds to the pattern of vulnerability for front exposed access in the case of houses.

When the factor of vehicular/ no vehicular access is controlled the pattern becomes even sharper. With one exception, all burglaries are committed away from the dwelling face with vehicular surveillance, whether front or back, which also tends to be the more integrated side.

• Enclosed access, front or back, never benefits from vehicular surveillance; although maisonettes with enclosed back access always have exposed fronts on
vehicular access routes. The data with respect to front or back vehicular surveillance is very weak. The larger group and most vulnerable group, however, comprises dwellings (houses and front enclosed/back exposed maisonettes) with no vehicular surveillance front and back (15/300=5%). Even excluding the highly vulnerable restricted view group, which seems to be a special case of vulnerability, the burglary rate comes down to 11/264=4.16%. With respect to exposed back access with no vehicular surveillance the pattern of vulnerability becomes sharper, and the differences between burgled and nonburgled dwellings become highly significant.

- With respect to the most vulnerable highly integrated, restricted view back access at the unconstituted edge of the estate (back BR: 3/36=8.33%), there is no difference between burgled and nonburgled dwelling faces. The integration range here, too narrow to allow observations, is specified by the special characteristics of the subgroup.

Summing up, the vulnerability trends for front and back access actually coincide. Front or back access do not appear to really differ here as such. What is more critical is their degree of exposure or enclosure, and overall accessibility:

- With respect to overall more segregated enclosure, vulnerability increases with integration (why go any deeper). In contrast, with respect to overall more integrated exposure, vulnerability increases with segregation.
- Vulnerability does not seem to relate to the extremes of integration/segregation. Both trends tend to pull towards the middle range. However, in all cases, the dwellings are burgled from the more segregated side.
- Vehicular access, combined with the openness of the visibility field on the estate, allow for extra vehicular surveillance, which seems to have a powerful deterrent effect, since burglaries are always away from potential vehicular surveillance.
- Restricted views combined with integrated unconstituted access become highly vulnerable.

- At deck level, vulnerability increases with segregation. The high choice of escape routes provided by the multiple staircases (and lifts in the tower blocks) combined with very low presence of people compensate for the extra effort in terms of axial depth.
Thus, the Ferrier's very low rate of burglary, particularly with respect to the ground level, can be explained by a combination of the following design factors that contribute to the low vulnerability:

- The openness of the layout due to the lower density and low coverage of the site, which allows a high degree of visual exposure of dwelling faces (particularly houses) and enhances the continuity of presence of people on the estate (social surveillance); Absence of obtrusive landscaping and cluttered views.
- The high degree of axiaility of the spatial structure (long views), and the griddiness and relatively high degree of integration within the estate halves, which structure a fairly balanced pattern of movement on the estate;
- The relative continuity of constitution of the spatial structure (in each estate half), by front and back dwelling faces, which includes integrating as well as more segregated spaces;
- Vehicular access routes with good exposed views, visual and direct physical contact with dwelling entrances, which allow extra surveillance from vehicular traffic.

Finally, the pattern of vulnerability on the Ferrier is found to be largely determined by the interrelationship between the local conditions of restricted visibility/surveillability, and unsurveilled global accessibility (in the overall spatial network). This mainly involves segregated enclosure (eg. ground and deck maisonette fronts) and restricted view backs combined with integrated access off the unconstituted edge of the estate.
CHAPTER SIX:  CASE STUDY III
ANDOVER ESTATE
London Borough of Islington

Ex -GLC; built 1972-78
High density, mixed-development;
Total number of dwellings: 924
Construction: Brickwork
FIGURE 6.00 A: GENERAL IMPRESSIONS OF ANDOVER ESTATE:

Top left: Main square with tower blocks; Unconstituted main pedestrian Thoroughfare; Exposed Backs. Birds eye view of cluster.
Figure 6.00 B: General Impressions of Andover Estate

Entances to the estate and blind boundary to the street

Right: Detailed views: Recessed Entrances at deck and ground level; Recess closed up after improvements to ground level.
FIGURE 6.00 C: GENERAL IMPRESSIONS OF ANDOVER ESTATE: Vehicular access spaces/ Culs de sac: Top right: Screened b of houses with parking. Bottom Right: Private garages with deck access above (recessed entrances and stairs to level above (recess 2). Left top and bottom: Ground level of tower blocks: highly vulnerable ground maisonettes with front vehicular screened access.
Figure 6.00 D: General impressions of Andover Estate: 
- Deck access partly interconnected overlooking vehicular entrances with garages underneath. 
- Bottom Right: Recessed 1 Entrances. 
- Bottom Left: Recessed 2 Entrances to Deck Maisonettes.
GENERAL IMPRESSIONS OF ANDOVER ESTATE: CLUSTER TYPOLOGY of spaces: From top left (clockwise): CIRCULAR SPACES with SCREENED BACKS- view into court; OFF-COURT SPACES; INNER COURT; DOUBLE-RECESSED naces; and TUNNEL SPACE.
CHAPTER SIX: CASE STUDY III
ANDOVER ESTATE
London Borough of Islington

Ex -GLC; built 1972-78
High density, mixed-development;
Total number of dwellings: 924
Construction: Brickwork

6.1 General Introduction: Estate Profile

The Andover Estate (former Alsen Road Estate) is situated in the Ward of Tollington, London Borough of Islington, off the junction of Seven Sisters Rd and Hornsey Road. It is one of the larger estates designed and built by the GLC in Islington in the nineteen seventies, and was transferred to the Local Authority in 1982. Incorporating ideas laid out in the GLC's (1978) 'Introduction to housing Layout', this is a prime example of a mixed development achieving high densities without resorting to the high-rise block developments of the nineteen fifties and early sixties.

The estate comprises of 924 dwelling units in predominantly low- to medium-rise blocks with three high-rise blocks at the centre, housing a population of about 2,800. The estate was studied by the UAS/gfw in a pilot project on comparative housing in 1987 from which some information on the population structure can be derived: approximately 44% of the households are families with children; 9% are single parent households; and 47% households with no children. The estate has a high percentage of old age pensioners (approx. 25%). The greatest proportion of residents is aged between 18-50, whereas the proportion of under -eighteen's is very low. There is a

---

1 Source: PSI, 1985, 'Study on Ethnic Minorities in the London Borough of Islington': 1981 Census data
2 Hillier, Kuehne-Buening, Rabs, Tsoskounoglou, Marshall, (1987), 'Problem Housing of the 1960's-1970's in Britain and Germany', unpublished, London -Joint research project conducted by the UAS, Bartlett School of Architecture and Planning, UCL and Gemeinnuetziger Foerderverein fuer Wohnungswesen (Gfw), Institute for Housing and Planning Research attached to the Ruhr Universitaet, Bochum, FRG; See section 2.1.2 and 2.3.1;
3 The rate of single parent households will have risen even further since the late eighties, due to priority given to the on the waiting lists.
high proportion of ethnic minorities and a high rate of unemployment (over 11% in 1987), though about average for London at the time.

The estate comprises 17% terraced housing; 64% of dwellings in four-storey blocks; and 19% dwellings in three tower blocks. More specifically in terms of dwelling type/block type the dwellings are distributed as follows:

<table>
<thead>
<tr>
<th>Type of Block</th>
<th>Type of Dwelling</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two-storey blocks:</td>
<td>Terraced houses</td>
<td>159</td>
<td>17%</td>
</tr>
<tr>
<td>Four-storey blocks:</td>
<td>Flats</td>
<td>376</td>
<td>41%</td>
</tr>
<tr>
<td></td>
<td>Maisonettes</td>
<td>216</td>
<td>23%</td>
</tr>
<tr>
<td>Tower blocks:</td>
<td>Flats</td>
<td>101</td>
<td>11%</td>
</tr>
<tr>
<td></td>
<td>Maisonettes</td>
<td>72</td>
<td>8%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>924</td>
<td>100%</td>
</tr>
</tbody>
</table>

Table 6.0.1 Breakdown of dwellings by block/dwelling type

The dwelling composition with respect to size of dwelling breaks down as follows:

<table>
<thead>
<tr>
<th>Number of Persons</th>
<th>Number of Dwellings</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2- person DWG.</td>
<td>356</td>
<td>39%</td>
</tr>
<tr>
<td>4- person DWG.</td>
<td>326</td>
<td>35%</td>
</tr>
<tr>
<td>5-6 person Dw. U.</td>
<td>242</td>
<td>26%</td>
</tr>
<tr>
<td>Total</td>
<td>924</td>
<td>100%</td>
</tr>
</tbody>
</table>

This shows a high proportion of larger dwelling types, for families with children, for which in a low- to medium-rise development is better suited.

---

FIGURE 6.01: MAP OF ANDOVER ESTATE EMBEDDED IN URBAN CONTEXT
6.1.1 Urban Context

Figure 6.01 presents the map of the estate embedded in its context, an area with mixed local authority and traditional terraced housing, and mixed uses: trade and commerce on the main traffic axes, light industrial uses, services, and leisure. Seven Sisters Rd, the boundary to the south, is a major traffic through-road linking Camden to the north-east of London. It is a very busy commercial road (small shops; large supermarkets; and retail), bustling with both vehicular and pedestrian traffic, which effectively cuts off the estate from the other side of the road. Hornsey Road, the west boundary is a north-south traffic axis, much narrower than Seven Sisters Rd, but also with considerable vehicular traffic. It has some shops and services, including a fire station and the police station, in direct proximity to the estate.

The corner site on the junction of Seven Sisters Rd and Hornsey Road was allocated for district social amenities and services for the area, including a swimming pool, baths, a primary school and at the other corner a doctor's surgery and an animal hospital (NRSPCA) in extension to the mixed uses on Seven Sisters Rd. There is an Old People's Home and the Alsen Day Centre on the eastern edge/behind the main central Tower block.

To the north, east and west of the estate, the neighbouring areas are predominantly residential. On the opposite side of Hornsey Road (west), there is a linear sixties' medium rise housing development; on the opposite side of Durham street, the north east boundary road, there is a fifties' medium-rise housing estate, with blocks opening directly onto the street, and some traditional terraced housing. Directly adjacent to the Andover Estate, on the north west periphery, is a group of pre-second world war tenement blocks.

The area further to the south of the estate includes the Sobbe Sports centre, a major municipal sports and leisure centre in North London, which forms a large urban island. About half a mile from the estate to the south and to the east run the BR railway tracks, which create a strong physical barrier to the wider area beyond.

Thus whilst the estate is reasonably integrated to the north, east and west, it is strongly bounded to the south. The larger context area of the estate, however, due to the railway lines, is strongly bounded to the southeast.
FIGURE 6.02: ANDOVER ESTATE: SITE LAYOUT AND GROUND LEVEL PLAN
FIGURE 6.03: ANDOVER ESTATE: DECK LEVEL PLAN (FIRST LEVEL ABOVE GROUND)
6.1.2 Site Layout: principles of architectural design.

Figures 6.02 and 6.03 present the ground level and deck level plans of the estate. The layout design is based on the repetition of courtyards around which dwellings are 'clustered'. The 'clusters' are embedded in a grid of main pedestrian and vehicular access spaces. They comprise of two-storey and four-storey blocks (with houses; flats and maisonettes) organised round little green courts. There is standardisation in the block formations and block/dwelling typology across clusters, though the uniformity is broken by slight variations in the cluster formation. The grid of main routes/vehicular access spaces is also slightly irregular, moderating the formality of the overall design.

Blocks are accessed at ground and one level above ground (deck level), though the open deck or balcony access is discontinuous, with maximum two and rarely three blocks linking together at a time (see figure 6.03). Decks always overlook the outside of the clusters: on the peripheral roads they overlook the exterior boundaries of the estate; and internally they look over the vehicular access roads and the neighbouring clusters. Unlike the deck level of the Ferrier Estate, or the roof-street system in the Marquess Rd Estate, the decks here do not form a continuous network of access above ground level.

At the centre of the site, there are three large stepped high-rise blocks grouped around a main square where certain local facilities - a day nursery, a small number of local shops and communal facilities are situated to form the focus of the estate. The two main pedestrian thoroughfares, which form the spine of the estate link the boundary roads to the centre: Corker Walk crossing through the estate north-south; and Mingard Walk east west linking to Hornsey Road intersect at the centre.

Vehicular and pedestrian Traffic: Parking:

There is segregation of vehicular and pedestrian traffic. No vehicular routes run through the estate; vehicular traffic is kept at the periphery branching into the residential area at regular intervals5 (about 80m), freeing the central spine and the dwelling areas for pedestrian use only. Vehicular traffic is restricted to access and parking in a

---

5 There are two vehicular access roads (Andover Rd and Newington Barrow Way) that run along the boundaries of the site feeding into culs-de-sac at regular intervals. They are both accessed off Hornsey Road; Andover Rd links to the streets at the top end, Moray Rd and Tollington Place, Newington Barrow way is blocked from joining SevenSisters Rd. A series of culs-de-sac feeds into the estate from Durham Rd - the northeast side.
BLOCK DWELLING TYPOLOGY IN CLUSTER:

Total: 54 dwellings at ground & deck level.

Type I: 2-storey Row-houses

Type II-IV: 4-storey blocks w. deck access:
- to Flats & upper level maisonettes

GROUND LEVEL:

Type II: ground flats w. recessed entrances/ back gardens

Type III: with 2-pers. flats on the 'inside' and single rows of garages on the outside

Type IV: with closed car-park at ground level

FIGURE 6.04: ANOVER ESTATE: TYPICAL LAYOUT OF CLUSTER- BLOCK TYPOLOGY.
variation of a Radburn type of layout. (Peripheral feeder roads and a system of culs-de-sac provide access to car parks, garages and open parking bays on the outskirts of each cluster). Clusters are thus surrounded by vehicular access on three sides and link to the main pedestrian thoroughfares on the fourth.

Two main pedestrian thoroughfares, Corker Walk, and Mingard Way traverse the estate: the first linking Seven Sisters Rd through to Moray Rd (north-south axis) - though stopping short before it joins the boundary street at the north end of the estate. Mingard Walk, runs perpendicular to the first, linking the central square to Hornsey Road. These main pedestrian thoroughfares passes through the central space, and forms the 'spine' of the estate, linking up with the network of footpaths and vehicular access spaces.

A system of narrow pedestrian footpaths accessing the dwelling entrances runs between the main pedestrian and vehicular access routes which accesses the dwelling entrances, creating a hierarchy of public to private spaces. The majority of dwellings at ground level have back gardens with high walls; some two-person flats have short front gardens, acting as buffer zones to the narrow access paths. At deck and upper levels (including towerblocks) dwellings have balcony terraces, which give the four-storey blocks a stepped form.

On-street parking is provided on the vehicular access roads and the culs-de-sac. As mentioned earlier, there are closed car parks on the ground level of the four-storey blocks on the periphery of the estate and on the boundary roads, but the majority is not in use due to car crime and excessive vandalism. Each cluster also has a row of individual garages opening onto the cul-de-sac - incorporated on the ground half of the adjacent block. Maximum distance between parking and dwelling is 50 metres.

6.1.3 Cluster Formation and Block/Dwelling Typology.

- The 'cluster' as basis of the layout design: Block typology.

Figure 6.04 presents the plan of a typical 'cluster'. Each cluster consists of the same two- and four-storey block types with a standardised number of dwellings in each block; and the same configuration with small variations according to the respective position in the overall grid of the layout. (The Block/dwelling typology is discussed further in section 6.3.2; Dwelling plans and sections are presented in figure 6.04b.)

The salient features of the cluster which remain constant are:
FIGURE 6.04b: ANOVER ESTATE: TYPICAL SECTION; BLOCK/DWELLING TYPOLOGY
At the heart of each cluster is a green court, surrounded by three blocks of two-storey row-houses (block type I) and by four-storey blocks on two or three sides. The four-storey blocks have two upper levels of dwellings accessed via deck (balcony access), linked to the ground level via stairs or ramps at the end of each block.

Short four-storey blocks (type II): are positioned between the courts and the main pedestrian thoroughfares, at a right angle to the cul-de-sac; these have ground flats with recessed entrances off the courts and back gardens flanking the main pedestrian thoroughfares, or vice versa, recessed entrances off the pedestrian thoroughfares and back gardens facing the court.

Four-storey blocks are always wrapped around the outside of the cluster with vehicular access:
i- Blocks (type III) with 2-person flats on the 'inside' and single rows of garages on the outside have vehicular access from culs-de-sac shared between two clusters;
ii- The blocks on the periphery of the estate (type IV) as a rule have closed car-parks at ground level with entrances at the side. These blocks build a blind barrier to the outside at ground level.

Clusters are introverted with dwellings entrances away from main vehicular routes (which surround each cluster from three sides) and the main pedestrian thoroughfares which link to each cluster on the fourth side. There are no dwellings opening onto the boundary roads at street level. The car parks located on the periphery create the fortress effect, which also characterises the Marquess Rd Estate; the two layers of dwellings above step back from the facade, so that the deck access is not visible from street level.

Towerblocks:

The tower blocks are designed in a three-winged layout, with a total of ten storeys, which increasingly recede with height at the top five storeys, creating a stepped pyramid form. (see details of plan/section in figure 6.04b) They are accessed at every second floor (four access levels above ground), with individual staircases (visible on the facade) accessing pairs of entrances on the floor above. The tower blocks have controlled entrances with entryphones on all levels for every corridor (four upper levels with three separate corridors each).
In Noll House and Dibdin House, the two wings have dwellings (maisonettes with back gardens) at ground level accessed directly from the public paths; the third wing is on pilotis. The central towerblock, Docura House, has communal facilities at ground level, clubrooms; two shops and offices. The uniform facade treatment typical of tower blocks is counteracted with the stepped form and elements adding plasticity, such as slanted roofs of individual dwellings and projecting staircases.

6.1.4 Dwelling Access: Pedestrian and Vehicular:

Dwellings are accessed at ground and deck level directly from the network of public access. Overall the composition of dwellings in terms of level of access on Andover Estate is:

<table>
<thead>
<tr>
<th>Level of Access</th>
<th>Number of Dwellings</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground level</td>
<td>340</td>
<td>36.76%</td>
</tr>
<tr>
<td>Deck level</td>
<td>432</td>
<td>46.70%</td>
</tr>
<tr>
<td>Towerblocks/Upper levels</td>
<td>153</td>
<td>16.54%</td>
</tr>
<tr>
<td>Total</td>
<td>924</td>
<td>100%</td>
</tr>
</tbody>
</table>

Just under half the total number of dwellings is accessed via decks, and over a third is on the ground level. Only about a sixth of the total number of dwellings is in the high-rise blocks. More specifically:

Ground Level (Figures 6.02/6.04):

- Houses and some flats have two 'faces': front entrances and back gardens.
- Two-person (OAP) flats have front only access.
- There are maisonettes at the ground level of the two tower blocks with front and back faces which are directly accessed from the open network.

Front entrances are always accessed from a system of narrow pedestrian paths, off and around the green courts, with a few exceptions (e.g. at the ground level maisonettes, and some recessed entrances off the edge of culs-de-sac.

Vehicular access routes and cul-de-sacs are always flanked by back gardens, the dwelling entrances are thus turned inwards, away from the more 'public' and generally more busy spaces. The gardens have six foot high, mostly solid brick, walls. This means that there is no real supervision of the parking bays from the dwellings - nor vice-versa.

---

6 See also article in AJ 2.5.1973 pp.
Deck Level (Figure 6.03): Two layers of dwellings are accessed at deck level in the four-storey blocks:

- **Deck Flats** are accessed directly from the decks; and
- **deck-maisonettes**, one level above deck, are accessed in pairs, via semiprivate stairs.

The decks always face away from the cluster they belong to, overlooking the vehicular access spaces and link to the ground at the end of each block.

**Towerblocks:**

Dwellings (flats and maisonettes) here are accessed at every second floor (four access levels above ground), with individual staircases (visible on the facade) accessing pairs of entrances on the floor above. The tower blocks have controlled entrances with entryphones on all levels for every corridor (four upper levels with three separate corridors each).

6.1.5 **Open spaces: Degree of Exposure/Enclosure and landscaping.**

Open spaces on the Andover are almost always enclosed. Due to the relatively small size and the high density of the site with low/medium-rise buildings, there is little open space left. Apart from the main central square, and a stretch of green that functions as a play ground by the Seven Sisters Rd entrance to the estate (Corker way), the open spaces are contained and subdivided into the green courts and main paths and access routes. The main pedestrian thoroughfares are laid out on the site of the previous streets. These are also spaces that are more open (in relative terms) allowing long views into the estate, though space is broken down by the landscaping. On Mingard Walk there is a sunken play ground for older children bound by brick walls. Views into the estate and on the estate are blocked by electric stations/refuse huts at the end of each of the culs-de-sac. There is permeability, but no visual link between vehicular access spaces/culs-de-sac and the main pedestrian routes.

The green courts are strongly enclosed spaces, though buildings gradually step back with increasing height. Flanked by back gardens on two sides and dwelling entrances on the other sides, they partly open on one side linking to the narrow stretches of green along the main pedestrian thoroughfares. This allows partial views into the courts from the main public paths thus increasing the surveillance potential. The courts are intended as semi-private areas, and are not linked via designated paths, however, they are still easily accessible from main thoroughfares. In the courts there are play facilities for young children, close to the supervision of parents and neighbours.
There is considerable investment in the landscaping, both in terms of trees and vegetation (soft landscaping) and brick (hard) landscaping, which normally add to the attractiveness of an estate, for example in screening on-street parking. Brickwork is used for the landscaping and the high garden walls. Both hard and soft landscaping restrict the views and break down the visibility field, particularly in summer.

Thus, overall, the estate is characterised by the high density of the built structure and high degree of enclosure, although there is contrast between the openness of main pedestrian thoroughfares and the narrow alleys, where dwelling entrances are tucked away. Views are further broken down by the brick landscaping, the staircases linking to the decks and other built elements.

6.1.6 Experience of the estate: Fear of Crime.

The presence of people is low. On the main pedestrian paths and the central space there is some through movement resulting in a relatively continuous presence of adults and children (to be discussed in more detail in section 6.2.2). People are usually to be seen near the entrances to the estate; and in vehicular access spaces, with static activity in relation to parked cars. Teenage children often congregate off the main square and by the south entrance to the estate near the main play ground. Otherwise, the majority of spaces, the courts and the alleys are mostly deserted (day and night).

The high degree of enclosure and blocked views reduce the awareness of the presence of people even further. Garden walls are built about six foot high, attempting to screen the private living sphere from the outside, but allowing no surveillance from inside the dwellings nor vice versa from the outside into the dwellings. Across the estate, front doors are almost never in sight, tucked away down narrow paths and in recesses. The decks at the upper level are partly visible from the ground level (vehicular access spaces), however, balustrades are not transparent and tend to restrict views. Entrance 'niches' at both ground and deck level are designed to create a buffer-zone for the dwelling entrances; doors are generally screened from view and obscured in the shadows of recesses, particularly at deck level, where staircases in each of the niches lead to the maisonettes one level above.

---

7 At deck level the entrances are tucked away in small but relatively deep entrance niches. In each niche there are two dwellings at deck level and stairs linking to two maisonettes at the level above. At ground level entrances to the flats in blocks type II and type III are also recessed, forming visually screened buffer spaces, which are shared by two entrances.
There is much evidence of incivilities on the estate: The blind sides of buildings, areas under the stairs and near garages, especially the collective garages, often suffer from vandalism and criminal damage. This is pervasive all through the estate, both off the culs-de-sac and off the main pedestrian paths. The collective car parks are predominantly not in use. Their entrances bear the signs of vandalism, destruction and abandonment. The shops fronts are usually covered with graffiti, broken shop windows boarded up, as is often the case on problem estates. The tower blocks suffer considerable damage to their lobbies and entrances and staircases, in spite of target-hardening. The main entrance doors are often vandalised and intercoms not working.

As mentioned in the section 1.2 such signs of incivilities and abandonment add to the feelings of insecurity in the environment. Other aspects of the detailing of the environment may also be considered to cause concern and unease. Specifically:

i. The niches and obscure recesses provide potential cover for intruders or attackers. The same applies for the dense landscaping and vegetation, often combined with narrow alleys, projecting walls staircases, elements that create dark corners and create discomforting shadows at night.

ii. The sharp corners on the narrow alleys also allow no visibility of who or what is round the corner, adding to the feelings of insecurity particularly at night, when no one is about.

A spell of muggings and attacks, and two sexual assaults (attempted rapes) which took place on the estate, caused much fear on the estate and brought much bad publicity in the local press in the mid-eighties, highlighting the high crime problem the estate faced, in spite of its location practically "in the back yard' of the local police station.

---

8 On one visit the author observed one of the doors lying on the ground beside the building, ripped off at the hinges.
FIGURE 6.05: AXIAL MAP OF ANOVER ESTATE EMBEDDED IN CONTEXT
6.2 **Spatial Analysis.**

The spatial configuration of the estate was analysed using the UAS syntactic methods of description focusing on the following spatial systems:

- estate embedded in its urban context;
- estate as a whole on its own;
- ground level only;

The spatial configuration was analysed in a detailed way - including the details of the spatial arrangement of the entrances in accordance with the designers' intentions, and the recesses which lead to dwelling entrances, which are designed as 'semi-private' spaces, yet still are part of the access system (there are no gates). The reason for this is that it makes a significant difference, whether a door opens directly onto a pedestrian path, or is distanced sufficiently to require change of direction (an extra axial step) before facing the door. Thus although for the global pattern of movement, these recesses are negligible, when approaching a door, and in the case of burglary, a potential target, these spaces have to be taken into consideration as part of the system of public access. However, a simplified map ignoring the 'semiprivate' entrance spaces has also been analysed, for purposes of comparison.

6.2.1 **Spatial Description of the Axial Structure:**

Figure 6.05 presents the axial map of the estate embedded in its urban context. As with the Marquess Rd. Estate, the most striking feature on this map is the massive scaling down of the system of open spaces by about 1:4. In the catchment area surrounding the estate (about five times larger than the area of the estate) there are about 127 axial spaces and on the ground level (simple mapping) there are 125. If the semiprivate recessed entrance spaces are added the number rises to 205 axial lines on ground level alone. Adding the deck level system, which form rings with the ground network (116 spaces in the basic deck system and another 80 for the staircases) the grand total reaches to 429 spaces -excluding the tower blocks.

The axial map represents the 'micro-spatial' configuration, and it is at this micro-environmental level of reality, that opportunity for criminal's is perceived and spatial vulnerability for the residents is constituted. Adding an axial line often signifies a change of direction, distancing and removing a space from the line of sight.
FIGURE 6.06*: ANDOVER ESTATE: AXIAL MAP OF SIMPLE /DETAILED GROUND LEVEL

AXIAL LINES:
- GROUND LEVEL
- DETAILED GROUND
- GROUND BURGLARIES
AXIAL LINES:
- DECK LEVEL
- UPPER DECK
BURGLARIES
DECK LEVEL >>

FIGURE 6.07* : ANDOVER ESTATE: AXIAL MAP OF SIMPLE/DETAILED DECK LEVEL
Figures 6.06 and 6.07 present the axial maps of the ground level of the estate on its own and of the deck level on its own respectively. The dark lines represent the basic spatial network, whilst the lighter lines represent the detailed articulation. On the ground level there is a main grid-like system that involves the links between the interior and its surrounding street pattern. These lines are relatively long, particularly the axial lines representing the main pedestrian thoroughfares, Corker Walk in the north south direction and Mingard Walk east-west. These link with the central square, and along with the majority of vehicular access lines are only one step deep from the outside. Off Durham Rd there are many shorter axial lines penetrating the estate; off Seven Sisters Rd the two longer axial lines link to the heart of the estate. Off Hornsey Rd only the main pedestrian walk runs deep into the estate, the vehicular axes in contrast are cut short allowing only short views into the estate ("discouraging through traffic"). From south to north it takes four axial steps or changes of direction, since the main pedestrian thoroughfare (Corker Walk) is blocked at the top from joining Moray Rd directly. Similarly it takes four axial steps to get from Hornsey Rd to Durham Rd.

Within the clusters axial lines are shorter and interconnected in something like a 'swastika' shape with the green courts at the middle. The rows of very short parallel lines, are dead ends (only one link) where the recessed entrances are. The hierarchy of public to private involves the progressive reduction in length and in the number of links to a line, and increasing depth, particularly approaching the dwelling entrances.

Thus although the estate overall is shallow to the outside, particularly the east side off Durham Rd, local articulation adds depth. Dwelling access is 2.5 steps deep on average (the deepest are dwellings on the courts with a depth of 3), but on the west side depth increases by one step in most clusters.

The deck level map (figure 6.07) shows that there is no independent spatial system at deck level. There is a discontinuous series of interconnected decks forming deep rings with the ground. At deck level, depth increases up to four five or six steps deep (the deck maisonettes are the deepest from the outside).

6.2.2 Pattern of Integration.

Figure 6.08 presents the pattern of integration/segregation for the estate as a whole (detailed system RRA561) embedded in its context. Figure 6.08* presents the same map excluding the towerblocks (RRA552), and Figure 6.09 presents the pattern of Integration for the estate in its context in the simplified map (RRA328). In all systems,
FIGURE 6.09: ANDOVER ESTATE: PATTERN OF INTEGRATION:
SIMPLIFIED SYSTEM IN URBAN CONTEXT (GR & DECK: ANDOV368)
FIGURE 6.10: ANDOVER ESTATE: PATTERN OF INTEGRATION: GROUND LEVEL IN URBAN CONTEXT (ANDOV328)
FIGURE 6.12: ANDOVER ESTATE: PATTERN OF INTEGRATION:
GROUND LEVEL ON ITS OWN (ANDOV 205)
the most integrating lines (colour red) are: the pedestrian thoroughfares Corker Walk (the south section is the top integrator), and Mingard Walk. While the section of Seven Sisters Rd ranks second. Other main axes on the periphery of the estate also enter the top integrating range in the simplified map (fig. 6.09): Hornsey Rd, Durham Rd; as well as some of the main vehicular access spaces, notably Andover Rd and the parallel to Corker Walk- Newington Barrow Way linking to Seven Sisters Rd. Clearly the towerblocks do not make a difference in the overall pattern, whilst in the simplified map a few more lines enter the most integrated band. A considerable proportion of the vehicular access spaces in the estate fall in the second most integrated band (colour coding yellow). In all systems, the most segregated spaces are clearly at deck level in both detailed and simplified systems; almost all the recesses fall into the most segregated band (dark blue). The most segregated spaces at ground level are the recesses (deadends) in the detailed system (fig 6.08), and some of the dwelling access spaces in the clusters (this is clearer in the simplified system (fig. 6.09), though predominantly in the second most integrated band (light blue).

Figure 6.11 presents the pattern of integration/segregation for the estate on its own ground and deck level respectively, whilst figure 6.12 presents the pattern of integration/segregation for the ground level on its own. It becomes clear that the estate has an integrating structure based on the main pedestrian thoroughfares Corker Walk and Mingard Walk, which consistently fall in the 5% most integrating band. The majority of main access spaces, particularly the vehicular access lines off Durham Road, and the north periphery are relatively well integrated (yellow) integrated to both the outside and the rest of the estate. The peripheral vehicular route at the south side (Newington Barrow Way) and the route that ends at the bottom of the towerblocks in the heart of the estate, are relatively segregated (green in figure 6.11, and light blue in figure 6.12). As in the previous maps, the most segregated spaces (dark blue) are the recessed entrances at the upper level and the upper level in general. On the ground the most segregated spaces are the recessed entrances across the estate and south vehicular peripheral route, the semiprivate recessed access spaces and most of the courts and internal paths in the clusters.

The picture painted by Integration maps shows that, overall the Andover Estate is physically well integrated in its urban context with long axial lines penetrating the estate right to the centre. The designers' intention to distance private from public space through a hierarchy of spaces is also achieved in spatial terms in step-wise increasingly segregating the spaces with dwelling entrances (and green courts) from the overall integrating structure. Clearly, in so far as the central square and its facilities are well integrated (red and yellow) the physical structure enhances its function as a centre, and
provides a focus for the estate community. The tower blocks around the central square of the estate are located on the integrating core of the estate, though they also link to less integrated vehicular access spaces at the back; they provide a visual focus in '3 D' for the estate.

6.2.3 Pattern of Movement and Space Use:

The pattern of movement on Andover Estate was observed by Jian Ming Xu, a researcher and PhD student at the UAS as part of his doctoral thesis, and is reported here with his permission. Observations were carried out, counting the numbers of moving adults, static adults; 'static' (if there is such a thing) and moving children per hundred metres, or per minute walking time (phm/pm) encountered by the observer. Counts were made over all periods of the day, under a mixture of weather conditions in a total of twenty rounds. Figures 6.13 and 6.14 present the route selected for encounter observations (taking into account all types of spaces and degrees of integration) with the average rates of moving and static adults and children respectively - plotted accordingly on the map. (Each dot represents 1 person per 1000 metres or per ten minutes walking time).

Overall the average rates of both moving and static adults and children are very low in the estate interior, comparable to those on Marquess Estate, and less than half the equivalent average rates on the Ferrier. The average rate of moving adults was found to be 0.315 phm/pm (marginally less than the equivalent average rate on Marquess Rd of 0.35 phm/pm, and under half the 0.696 phm rate on the Ferrier). It is much lower than the average of about 2.0 phm/pm for the 72 residential area of Barnsbury. For static adults the rate was 0.085 phm/pm; the average rates of moving children and static children were 0.09 phm and 0.134 phm respectively. Once again these are similar to the rates on the Marquess and less than a third of the equivalent ground rates on the Ferrier (see sections 4.2.3 and 5.2.3 respectively).

Figures 6.13 shows the distribution of moving and static adults on the axial map. One observes a relatively sharp drop in the numbers of people (particularly moving adults) between boundary roads/main pedestrian routes and the interiors of clusters. Seven Sisters Rd is by far the busiest space with a rate of about 9.0 moving adults per hundred metres (phm), Hornsey Rd has a rate of about 5.6 moving adults and 0.8 static adults phm/pm, whereas Durham Rd has 1.5 moving adults, and 0.15 static per

---

10 Xu, Jian Ming, "Space and Function in Modern Inner City Housing", unpublished Doctoral Thesis, UAS, Bartlett School of Graduate Studies, UCL, forthcoming 1995,
Figure 6.13: Anover Estate: Rates of Moving & Static Adults Plotted on Axial Map
FIGURE 6.14 : ANOVER ESTATE: RATES OF MOVING & STATIC CHILDREN PLOTTED ON AXIAL MAP
Showing the observation route with each (*) equivalent to the average encounter rate 0.1 person/100m or (1 person per 10 minutes).
hundred metres. On the main pedestrian thoroughfares the rates are: 1.81 moving adults and 0.67 static adults phm/pm on Corker Walk; and 1.18 mov. adults / 0.57 static adults phm/pm near the centre respectively. At the vehicular entrances one finds just over 1 moving adult and around zero static adults phm/pm off Hornsey Rd and off Seven Sisters Rd. Other vehicular access roads tend to have rates well below 1 mov. adult phm/pm. The narrow spaces in the clusters where the front entrances are, as well as the courts have predominantly close to zero rates of both moving and static adults. This drop is also observed with static adults; the spaces with relatively higher rates of pedestrian movement seem to also attract more static presence of people as well as children with few exceptions. However, the distribution of children on the estate does not follow the adult pattern, and seems more evenly distributed both in more integrating spaces 9 main routs and the quieter residential parts. This is a feature also observed in the other case studies (Hillier et al, 1989).

On the basis of the above observations Xu found a correlation between moving adults and Global Integration (in the simple system with context) of $R = 0.774$ with a significance of $p=0.001$, which is relatively high for an estate, approaching more the correlation found in traditional street based urban systems (see findings from larger area of Kings Cross/Barnsbury for Hillier et al, 1989). This is also the case on the Ferrier estate ( $R= 0.68$ for estate on its own, $p=.0002$), but not on the Marquess Estate where, rates are quite similar, but the correlation with Integration is very weak, as the estate's integrating structure is mainly on the periphery.

Summing up, the pattern of movement of adults on the estate is largely predictable from the pattern of global Integration (for the estate embedded in its urban context). The more segregated paths and the courts, have a low presence of people (moving and static) much lower than the already relatively quiet vehicular access spaces. This confirms that the clusters effectively discourage people from passing through, as the design intended, but fail to provide a continuous local presence of residents coming and going and using the spaces. Only the main pedestrian routes linking to the estate centre have high rates of moving and static people, which, though well below rates of movement on the commercial high streets, are comparable to those on Durham Rd, and would guarantee a continuous presence of adults in public space.
FIGURE 6.15: ANDOVER ESTATE: GROUND LEVEL: PATTERN OF DWELLING ENTRANCES
FIGURE 6.16: ANDOVER ESTATE: DECK LEVEL: PATTERN OF DWELLING ENTRANCES
6.2.4 Pattern of Constitution - Dwelling Access: Hierarchy between public and private space.

Dwellings on the Andover Estate at ground level predominantly have two faces - front and back - that are accessible from the open network of pedestrian and vehicular access spaces. They have front entrances only, since back gardens are not intended for access, and due to the height of the garden walls and the absence of a back garden door in most cases, the back gardens cannot be considered as constituting open space in syntactic terms. Back faces, however, are still access points for illegal entry.

Figure 6.15 presents the location of dwelling entrances in the spatial structure of the estate at ground level, and figure 6.16, the equivalent for deck level. The following can be observed:

- There are no dwellings at ground level on the boundary streets, nor at the entrances to the estate-the spaces linking the interior of the estate to the outside. The main pedestrian thoroughfares are in principle unconstituted. The few blocks that are accessed from Corker Walk and Mingard Walk, have recessed entrances and are distanced from the public paths. by grassed areas.

- Vehicular access spaces have no front entrances opening directly on to them, only back gardens with high brick walls.

- Constituted spaces are on the inside of the clusters: front entrances are focused in and around the back of the courts; front entrances are also tucked away in the short recessed spaces one axial step off the pedestrian paths. The dwellings are on average two to four steps deep from the outside, though off Durham Rd there are spaces that are one step deep- linking directly to the outside.

Figure 6.17 presents the pattern of front and back dwelling access i.e. the map of potential access points. Thick black line segments indicate the spaces where there are dwelling entrances, the dotted line segments indicate where there are back gardens/back access. From this map one observes the following:

- Front and back access tends to be on separate axial lines and in most cases separate mutually exclusive spaces at the convex level of the system. Only in the courts do front entrances face the back gardens across the court- sharing the same convex space. Vehicular access spaces are generally flanked by back gardens on one side.
FIGURE 6.18: ANDOVER ESTATE: DECK LEVEL: MAP OF UNCONSTITUTED SEGMENTS
• Front constituted spaces link together within the clusters forming chains at the local level. The clusters are separated from each other via unconstituted spaces usually in contact with back gardens. Thus with respect to the overall spatial network the pattern of front constitution is discontinuous at the global level, although, when taking both front and back access into account, the interior open spaces of the estate are in relatively continuous contact with dwellings.

• At deck level (see figure 6.18) spaces with dwelling entrances are discontinuous, separated by blind spaces (with no dwellings) at the sides of the buildings and unconstituted links to the ground. The deck level is also accessible via unconstituted routes from the outside.

Considering also the relationship between dwelling access and the pattern of Integration/ segregation, (figure 6.19), one observes that, as a general rule, the more integrating axial lines, pedestrian and vehicular, are unconstituted (compare maps 6.17 and 6.19):

Summing up, the Andover is constituted by front entrances only, though backs are potentially accessible from the network of open spaces. The pattern of constitution on the Andover Estate is characterised by unconstituted integration and clustering. The dwelling interface is distanced from the street and from the interior integrating spaces. Thus a hierarchy of public to private spaces is achieved also in relation to the pattern of Integration segregation, focusing dwelling entrances in the segregated interior of the clusters in and around the back of the courts. In contrast, the majority of back dwelling faces are accessible from the unconstituted integrated grid.

This estate is thus similar in some respects to the Ferrier - in that there are two actual access faces and that fronts tend to be clustered around courts - and similar to the Marquess, (and traditional streets), in that there is only front constitution. However, it differs from the Ferrier, where both dwelling fronts and backs constitute the open spaces, and from the Marquess, or a traditional streetbased layout, where backs do not come into contact with the public space, in that backs of dwellings are accessible for those with an intention to break-in. It differs strongly to the traditional street layout in that there is discontinuity of constitution at the global level.
AXIAL LINES:
- 10% TOP INTEGRATED
- GROUND LEVEL
BURGLARIES
- GROUND LEVEL >>
- DWELLING ENTRANCE

FIGURE 6.19: ANDOVER ESTATE: AXIAL MAP OF 10% TOP INTEGRATED LINES (AND241)
FIGURE 6.20: ANDOVER ESTATE: GROUND LEVEL: PATTERN OF BURGLED LOCATIONS
FIGURE 6.21: ANDOVER ESTATE: DECK LEVEL: PATTERN OF BURGLED LOCATIONS
6.3. **The Distribution of Burgled Locations**

6.3.0 **General Data on Burglary on the estate.**

The Andover is considered to have a particularly high crime profile with respect to burglary, car crime, muggings and attacks, the problems of crime on the Andover Estate have often been highlighted by the local press\(^\text{11}\). Feelings of insecurity on the estate run high. The survey carried out as part of the UAS/gfw pilot project in 1987 found that the majority (54%) of respondents considered the estate unsafe, and the rating for safety was the lowest in the whole range of evaluation criteria\(^\text{12}\).

Data was obtained from the Metropolitan police on detailed locations of burglary on the estate for the period of June '85 to May '86 (just under a year). The list is to be found in Appendix IV; Table R.1.

The total number of reported burglaries for the period is 64 out of 924 dwellings, which is equivalent to a (reported) burglary rate of 6.93%. If one projects the above 6.93% rate to a full year, rather than 11 months, the burglary rate goes up to 7.56% for 12 months. This is well above average for inner London; about the same as the 7.5% burglary rate on the Marquess Estate, and higher than the 6.3% in Barnsbury, which are both in the same borough (of Islington).

6.3.1 **Observations on the Pattern of Burgled Locations.**

The red dots in figures 6.02 and 6.03 show the locations of burgled dwellings at ground and deck level. Figures 6.20 and 6.21 present the pattern of burgled locations, plotted on the axial maps of the ground and deck level repetively. Back entries are indicated by a faint dotted line linking to the line from which illegal entry was made. From simple visual inspection no particular concentrations can be observed; burglaries seem to be fairly evenly distributed across the estate, at both levels. However, certain observations can be made:

\(^{11}\) See clippings from local press.
\(^{12}\) Hillier, Kuenne-Buening, Rahs, Tsoskounoglou, Marshall, (1987), 'Problem Housing of the 1960's-1970's in Britain and Germany', unpublished, London -Joint research project conducted by the UAS, Bartlet School of Architecture and Planning, UCL and Gemeinnuetziger Foerderverein fuer Wohnungswesen (Gfw), Institute for Housing and Planning Research attached to the Ruhr Universitaet, Bochum, FRG; See section 2.3.5 on Attitudes to the environment, also table III in the Appendix.
• There is no increase of burglary targets towards the periphery of the estate.
• A small concentration of burglaries can be observed near the south entrance to the estate perhaps just off Corker Way, the most integrated route on the estate.
• The majority of ground burglaries are accessible via unconstituted routes although this also applies for the majority of dwellings (with the exception of the recessed entrances).
• The majority of burglaries are two and three steps deep from the outside; only one burglary is one axial step deep. On the upper level the majority are four and five axial steps deep from the outside.
• There is a considerable proportion of burglaries off dead ends or recessed entrances with minimum surveillability.
• There appear to be no burglaries off the culs-de-sac one step off Durham Rd, but there are a few burglaries (back and front entries) off Briset Way, the relatively segregated internal vehicular access road ending at the back of the tower blocks.

6.3.2 General Breakdown of burglary rates.

This section examines how burgled dwellings are distributed within the overall dwelling structure, aiming to establish which access factors appear to make a difference in burglary risk. Thus the sample of dwellings on Andover Estate - burgled and nonburgled - are broken down by different criteria, starting from the general criteria of access, relating to the Block typology and access to buildings/blocks of dwellings, as well as the typology of dwellings. This is then to be followed by the more specific local dwelling access criteria in the next section.

• **Access level/access type.**

As described in section 6.1, the Andover Estate has two basic types or modes of block access, direct and indirect access, which give access to dwellings at the following levels:

• **Direct Access:** All dwellings at ground and deck level (one level above ground) are directly accessible via the network of open public spaces. Tower blocks have dwellings at ground level opening directly on to public open space (direct ground access).
ANDOVER ESTATE: GENERAL DISTRIBUTION OF BURGLED DWELLINGS

<table>
<thead>
<tr>
<th></th>
<th>BURGLARIES</th>
<th>DWELLINGS</th>
<th>BURGL. RATE.</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUND LEVEL</td>
<td>27</td>
<td>339</td>
<td>7.97% (8.70%)</td>
</tr>
<tr>
<td>DECK LEVEL</td>
<td>27</td>
<td>432</td>
<td>6.25% (6.82%)</td>
</tr>
<tr>
<td>DIRECT ACCESS</td>
<td>54</td>
<td>771</td>
<td>7.00% (7.64%)</td>
</tr>
<tr>
<td>INDIRECT ACCESS</td>
<td>10</td>
<td>153</td>
<td>6.54% (7.14%)</td>
</tr>
<tr>
<td>(UPPER LEVELS)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WHOLI</td>
<td>64</td>
<td>924</td>
<td>6.93% (7.56%)</td>
</tr>
</tbody>
</table>

**TABLE 6.3.2 A: BREAKDOWN OF BURGLARY RATES BY ACCESS LEVEL AND BLOCK ACCESS TYPE**

* Rates in ( ) represent projected % for 12 months.

<table>
<thead>
<tr>
<th>TOWER BLOCKS</th>
<th>BURGLARIES</th>
<th>DWELLINGS</th>
<th>BURGL. RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>GROUND LEVEL</td>
<td>2</td>
<td>2X10=20</td>
<td>10.0%</td>
</tr>
<tr>
<td>2ND-LEVEL</td>
<td>4</td>
<td>3X21=63</td>
<td>6.35%</td>
</tr>
<tr>
<td>4TH-LEVEL</td>
<td>5</td>
<td>3X18=54</td>
<td>9.26%</td>
</tr>
<tr>
<td>6TH-LEVEL</td>
<td>1</td>
<td>3X 9=27</td>
<td>3.70%</td>
</tr>
<tr>
<td>8TH LEVEL</td>
<td>0</td>
<td>3X 3= 9</td>
<td>0.00%</td>
</tr>
<tr>
<td>SUBTOTAL</td>
<td>10</td>
<td>153</td>
<td>6.54%</td>
</tr>
</tbody>
</table>

**TABLE 6.3.2 B: BREAKDOWN OF BURGLARY BY LEVEL IN TOWER BLOCKS**
Indirect Access: The upper levels of the tower blocks accessed in this way via a controlled ground entrance lobby and closed circulation spaces at each second level (4x2 upper levels per block). Small semiprivate staircases link access the dwellings, one level above the corridor, at the intermediate levels. The four access levels each have three separate corridors with entryphones (for each wing), and a main central vertical circulation core that links to the ground floor main entrance lobby. Fire exits link directly to the outside.

Tables 6.3.2 A and 6.3.2.B present the breakdown of burglary rates by access level and for Direct and Indirect access (tower blocks). The differences between burglary rates tend to be rather marginal as absolute figures. However compared proportionally to each other and to the average rates, the following may be observed:

- Overall, direct access (ground and deck) and indirect access score about the same, around 7%. (Indirect access is marginally below the average for the estate as a whole.
- Focusing on direct access: The ground level appears to have about 15% higher burglary risk than the average for the whole; the deck level is about 10% below the average. Comparing ground and deck level one finds that the ground level burglary rate is considerably more vulnerable, about 25% higher than the deck rate.

Tower blocks: Indirect Upper level access: (Table 6.3.2 B)

In dealing with the distribution of burglaries per level of access in the tower blocks one must note that the number of dwellings limited overall; however, one observes:

- The ground level (direct access) is predictably the most vulnerable, but it is (10%) about 1.5 times more than the average, the 4th level of access appears to be almost equally vulnerable, though the second is about average for the estate.
- Between fourth and sixth level the burglary rate drops by almost two thirds, and then goes down to zero at the top level. The sharp drop in the number of burglaries coincides with the point, where the blocks start stepping back above the 5th floor, sharply reducing the numbers of dwellings per floor/wing, however, one cannot really draw conclusions about that due to the limited numbers

---

13 Whilst between the second and fourth level of access, the burglary rate appears to increase to about the same as the ground level, from the 6th level to the 8th level of access the number of burglaries stepwise decreases to zero. This at first sight may appear paradoxical paradox raising the question, whether height plays any role here at all. However, as the numbers of dwellings and burglaries are small, some of the fluctuation could be explained by the sharp impact that each single burglary has on the burglary rate (further amplified by the fact that, there is a drop in the numbers of dwellings per corridor with increasing height from 2nd to 4th and an even sharper drop at the 6th and 8th)
When examining where precisely the burgled dwellings are located, one notes that the majority (8/10) of burglaries in the tower blocks are committed up the semi-private staircases leading to the flats one flight above the corridor level. These landings accessing two dwellings at a time, are totally obscured from view. This suggests that the local surveillability is playing an important role here, probably irrespective of level.

Summing up the differences with respect to levels of access for direct and slightly less vulnerable indirect access, the ground level (direct access) appears to be more vulnerable than the above ground levels, both compared to deck (direct) access and to the tower blocks (indirect). This is consistent to the research findings to date. What is rather surprising is that the tower blocks with entryphones at each level, are equally vulnerable overall to the deck level, which is open, strongly linked to the ground and more 'easily accessible'. With respect to the upper levels of the tower blocks, one needs to further investigate the question, whether decreasing the numbers of dwellings per corridor may have an effect on vulnerability. Research conducted by Alice Coleman (and O Newman) has pointed in this direction. Decreasing the number of dwellings accessed through a corridor door, may have the effect of increasing the likelihood, that the intercoms and door locks at the entrance to each corridor will be working. Clearly further research is necessary here.

6.3.3 Direct Access: Dwelling typology and burglary risk.

Focusing on the majority (83%) of dwellings on the estate, which are accessed directly from the network of open spaces. the next subsection analyses the distribution of burgled dwellings with respect to the typology of dwellings in the configuration of the cluster. As discussed in section 6.1.3, figure 6.04 presents the plan of a typical 'cluster'; each cluster consists of the same block/dwelling types, the configuration of which is repeated with slight variations, though certain rules of composition are maintained. Since dwelling typology is closely linked to the typology of the blocks, and clusters, the dwelling typology basically incorporates the following access criteria:
• level of access;
• front and back access from public space/ front-only access;

as well as typical characteristics of the dwelling as:

---

14 See A Coleman(1990) "Utopia on Trial", p. 66-71; though actual numbers of dwellings/corridor are not counted. Newman(1973: 71) mentions the "significance of number" in the subdivision of buildings, including no. of dwellings/hallway etc., but does not really research this accordingly.

373
dwellings interior - size\textsuperscript{15}/ layout: number, location of rooms; one/two levels;
Exterior facade/design of the boundary and its openings/entrances;
existence of a front or back garden;

Dwelling interior layout has an effect on the location of windows/rooms from which surveillance of open space is possible, though windows are rarely a reliable deterrent, or an effective form of surveillance\textsuperscript{16}. The latter two are of considerable importance, in terms of the security of the boundary as such, although the target hardening aspect is not of issue here. The spatial conditions governing its boundary, however are important, the boundary being the point of interface with public space.

Thus there are the following dwelling types:

**Ground Level:**
- **Row-houses (G-2):** (in Block type I) two-faced with back gardens
- **Flats (G-2R):** (in Block type II) with recessed entrances and back gardens;
- **2-person flats (G1):** (in block type III) single fronted with short front garden; accessed off the little dead end alleys (shared by two flats) off the narrow pedestrian paths.
- **Maisonettes (G2-M):** (ground level of the tower blocks); double faced with back garden.

**Deck Level:**
1. **Deck Flats (D1):**
2. **Deck Maisonettes one level above (D2):**

Deck dwellings are always front only. Recessed entrances are always shared by two front entrances at both ground and deck level (dwelling types G2-R and D1). The top level maisonettes (D2) are accessed by 'semiprivate' stairs (off the deck level) leading to a small landing shared by two dwellings at a time.

\textsuperscript{15} On the basis of dwelling size/level, dwelling type may also relate to socio-economic household characteristics, which could affect vulnerability in ways beyond the spatial. For instance target value might be partly related to dwelling type - larger size of household - more income?; or the predominance of more vulnerable DAP's in two-person ground flats could make them also popular targets. Thus it is necessary to keep dwelling type also as an independent factor in mind.

\textsuperscript{16} Research has shown for instance that surveillance from windows has had no affect on telephone vandalism, see P Mayhew et al,(1980), in Designing out Crime, HMSO, London;
## Andover Estate: General Distribution of Burgled Dwellings

### Direct Access:

<table>
<thead>
<tr>
<th>Dwel. Type</th>
<th>Burgls</th>
<th>Dwell.</th>
<th>Burgl. rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Houses (f/b) G2a</td>
<td>13</td>
<td>159</td>
<td>8.18%</td>
</tr>
<tr>
<td>T.B. Maison. f h G2b</td>
<td>2</td>
<td>20</td>
<td>10.0%</td>
</tr>
<tr>
<td>Flats (f/b) G2R</td>
<td>3</td>
<td>46</td>
<td>6.52%</td>
</tr>
<tr>
<td>2Pers. Flats (f) G1</td>
<td>9</td>
<td>114</td>
<td>7.90%</td>
</tr>
<tr>
<td><strong>GROUND ALL</strong></td>
<td><strong>27</strong></td>
<td><strong>339</strong></td>
<td><strong>7.96%</strong></td>
</tr>
<tr>
<td>Deck Flats (f) D1</td>
<td>12</td>
<td>216</td>
<td>5.55%</td>
</tr>
<tr>
<td>Deck up. Mais.(f) D2</td>
<td>15</td>
<td>216</td>
<td>6.94%</td>
</tr>
<tr>
<td><strong>DECK ALL</strong></td>
<td><strong>27</strong></td>
<td><strong>432</strong></td>
<td><strong>6.25%</strong></td>
</tr>
<tr>
<td>Total Direct</td>
<td>54</td>
<td>771</td>
<td>7.00%</td>
</tr>
</tbody>
</table>

### Table 6.3.3: Breakdown of Burglary Rates by Dwelling Type.
The distribution of burglaries with respect to the above dwelling typology is presented in Table 6.3.3. A considerable variation in burglary rates can be noted across dwelling types:

- The most highly burgled dwelling type is the ground maisonette (G2M) at the bottom of the towerblocks (as noted earlier). They have a burglary rate of $2/20 = 10\%$, (well above the average rate for ground level at 7.90% and about 40% above the average rate for direct access overall at 7%), though the number of cases is small.
- Houses, the second most vulnerable category (8.18%), are just above the ground average rate of 7.90%, but about 15% above the overall average for direct access at 7.00%.
- The 2-person flats (G1) with front only access are about average for the ground level (7.90%).
- Next in terms of rank order of vulnerability are the upper deck maisonettes (D2) with a burglary rate of 6.94%, which is close to the average for direct access, considerably more vulnerable than the D1 deck flats.
- Finally the front/back access flats (G2R) with a rate of 6.52% are the least vulnerable ground dwelling type, while the deck flats (D1) with a burglary rate of 5.55% are the least vulnerable dwelling type overall.

Summing up, ground level maisonettes and houses are the most vulnerable types followed by front-only (G1) 2-person flats. Although, as noted earlier, ground dwellings generally tend to be more vulnerable than the deck level dwellings, front/back access flats (G2R) appear to 'underperform' in terms of burglary risk compared to houses and ground maisoennettes, and in spite of the two access possibilities, also compared to the front-only G1 flats.

Deck maisonettes are 1.25 times more vulnerable than deck flats. The difference between the two appears to be the extra flight of stairs (similar to what was observed at the upper levels of the tower blocks) and the obscured semiprivate entrances. It is worth noting that both the G1 ground flats and the D2 upper deck maisonettes are the dwellings with higher 'territorial definition'; their access involves a sequence of spaces/stairs between public and private space. Their high burglary rates, however, appear to contradict notions of 'defensible space'.

If the sample is considered from the point of view of dwelling type, the question raised is, why are front/back flats less vulnerable than houses and maisonettes, and why are the front-only dwellings (G1) and (D2) so vulnerable?
**ANDOVER ESTATE: DISTRIBUTION OF BURGLED DWELLINGS**

**BY LOCAL CRITERIA**

<table>
<thead>
<tr>
<th>Ground &amp; Deck</th>
<th>Burglaries</th>
<th>Dwellings</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Only</td>
<td>36</td>
<td>546</td>
<td>6.59%</td>
</tr>
<tr>
<td>Front Back</td>
<td>18</td>
<td>225</td>
<td>8.00%</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>771</td>
<td>7.00%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ground Lvl Fl</th>
<th>Burglaries</th>
<th>Dwellings</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Only</td>
<td>9</td>
<td>114</td>
<td>7.89%</td>
</tr>
<tr>
<td>Front Back</td>
<td>18</td>
<td>225</td>
<td>8.00%</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>339</td>
<td>7.97%</td>
</tr>
</tbody>
</table>

**Table 6.4.1: Breakdown of Burglary Rates by Front/Back and Front Only Access**

Having dealt with the general access factors relating to the block (direct/indirect; level of access and dwelling type; single-front or double-fronted), this section investigates, how and to what extent the local factors of access and visibility/surveillability apply here, in the design of the Andover Estate. Having established that in contrast to the Ferrier Estate, the degree of enclosure is relatively constant on the whole, the interest focuses on the local conditions surrounding the front and back dwelling faces and their directly adjacent access spaces:

- visibility and visual surveillability
- vehicular access or nonvehicular access;

Other factors which for instance were identified as variables in the case of the Marquess Rd Estate, are constant in this design:

- Unconstituted access tends to apply across the dwelling sample (see figure 6.17). In the layout design of the Andover almost all spaces with dwelling entrances are accessible from the open network via unconstituted routes, since the main pedestrian thoroughfares and vehicular access routes are unconstituted.
- The number of dwellings per axial line/per block is not an independent variable here. The standardisation of the block structure and of dwelling types means that there are specific numbers of dwelling entrances per line, and not sufficient variation, particularly at deck level.

6.4.1 Front-only versus Front/Back Access Vulnerability.

The first question is, how do the dwellings with one access face (single front access flats and deck flats and maisonettes)- perform with respect to burglary risk compared to dwellings with front and back access (double-fronted houses, flats and maisonettes)? Table 6.4.1 presents the detailed breakdown of burglary rates accordingly:

Double-fronted dwellings are considerably more vulnerable than single-front dwellings with respect the sample of direct access overall (ground and deck) with burglary rates of 8% versus 6.5% respectively. At ground level, however, there appears to be no difference in terms of vulnerability between front-only and front/back accessed dwellings (both at about 8%). This is quite surprising, since dwellings with front and
back access have actually two possibilities of entry and escape, i.e. more choice
/opportunity for entry and escape.

Considering the **mode of entry**, front or back, in the case of dwellings with front
and back access, the burglaries break down as follows:

<table>
<thead>
<tr>
<th>Burglaries from the back</th>
<th>11 (61%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burglaries from the front</td>
<td>7 (39%)</td>
</tr>
<tr>
<td>Total f/b access burglaries</td>
<td>18 (100%)</td>
</tr>
</tbody>
</table>

The ratio of back versus front burglary is approximately 3 : 2 from the back. This
shows, that where there is choice between front or back access, **back access is
clearly more vulnerable**. The question is what is the difference between the two?

Front and back access differ in terms of the characteristics of the dwelling boundary,
walls, doors and windows (boundary permeabilities):\(^\text{17}\):

- **Front dwelling faces** generally comprise a main entrance to the dwelling and
  a kitchen window, since kitchens are usually layed out at the front of the dwelling,
  leaving the living area at the back.
- The **back boundary** really consists of two layers, the high brick garden wall -
as mentioned earlier six-foot high to ensure privacy in a dense environment, and the
dwelling boundary, with large windows and glassed door opening onto the back
garden.

Whilst in the Ferrier case study, there are only limited combinations of front and back
access conditions and a simple dwelling typology, on the Andover there is high
variation within and across dwelling types. There are many local variable categories
and even more combinations of front and back access conditions, which make
meaningful analysis difficult, due to the diminishing numbers of dwellings and
burglaries in each combination. It is clearly necessary to consider front and back access
separately here, in order to discern the difference in front and back vulnerability, even
though the combinations as such may also be important too.

In the next subsections the sample of dwellings/dwelling faces will be broken down
by the **local variables**: dwelling type; visual surveillability; and vehicular access

---
\(^\text{17}\) See Plans and sections in figure 6.04 b.also see AJ article ...
The description focuses on the main access level, upstairs, where applicable there are always bedrooms
at the back and secondary spaces at the front.
ANDOVER ESTATE: GENERAL DISTRIBUTION OF BURGLED DWELLINGS

<table>
<thead>
<tr>
<th>Dwelling type</th>
<th>BACK</th>
<th>FRONT</th>
<th>TOT.FB</th>
<th>Total DW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Houses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No of DWEL. faces</td>
<td>159</td>
<td>159</td>
<td>258</td>
<td>159</td>
</tr>
<tr>
<td>BURGLS</td>
<td>10</td>
<td>3</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>%</td>
<td>6.30%</td>
<td>1.89%</td>
<td>5.04%</td>
<td>8.18%</td>
</tr>
<tr>
<td>F B Maison</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No of DWEL. faces</td>
<td>20</td>
<td>20</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>(T.BL)</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>BURGLS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>0.00%</td>
<td>10.0%</td>
<td>5.00%</td>
<td>10.0%</td>
</tr>
<tr>
<td>F B Flats</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No of DWEL. faces</td>
<td>46</td>
<td>46</td>
<td>92</td>
<td>46</td>
</tr>
<tr>
<td>BURGLS</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>%</td>
<td>2.17%</td>
<td>4.35%</td>
<td>3.26%</td>
<td>6.52%</td>
</tr>
<tr>
<td>F B TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No of DWEL. faces</td>
<td>225</td>
<td>225</td>
<td>450</td>
<td>225</td>
</tr>
<tr>
<td>BURGLS</td>
<td>11</td>
<td>7</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>%</td>
<td>4.89%</td>
<td>3.11%</td>
<td>4.00%</td>
<td>8.0%</td>
</tr>
<tr>
<td>Hats (F)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No of DWEL. faces</td>
<td>-</td>
<td>114</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td>front only</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BURGLS</td>
<td>-</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>%</td>
<td>-</td>
<td>7.90%</td>
<td>7.90%</td>
<td>7.90%</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No of DWEL. faces</td>
<td>225</td>
<td>339</td>
<td>564</td>
<td>339</td>
</tr>
<tr>
<td>Ground</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BURGLS</td>
<td>11</td>
<td>16</td>
<td>27</td>
<td>27</td>
</tr>
<tr>
<td>%</td>
<td>4.88%</td>
<td>4.72%</td>
<td>4.79%</td>
<td>7.96%</td>
</tr>
</tbody>
</table>

TABLE 6.4.2: BREAKDOWN OF FB DWELLING FACES BY DWELLING TYPE.
potential; increasingly specifying the local conditions of individual groups of dwelling faces - in order to establish, how burglaries and burglary risk are distributed amongst the sub groups/subcategories.

6.4.2 Front and Back Access Vulnerability and Dwelling Type.

Table 6.4.2 presents the breakdown of ground level dwellings/burglaries by front and back access faces and by dwelling type. Whilst the backs of the front/back dwellings have been found to be overall more vulnerable than the respective fronts (4.89% compared to 3.11%), taking front and back access faces for all dwelling categories separately, one notes that front and back faces are overall equally vulnerable (back access 4.88%; front access 4.72% respectively).

Examining how front and back burglaries are distributed with respect to dwelling types (house; maisonettes flats etc.) one observes:

- The most vulnerable dwelling access category (though very limited in numbers) appears to be the fronts of the ground level tower block maisonettes (20%), in contrast to their backs, which have no occurrences of burglary (0% burglary).
- The front only (G1) flats are the second most vulnerable group (7.90%), a much larger group. The rate is equal the overall average burglary rate for f/b accessed dwellings, however, if one looks at the front faces separately, the G1 group are over 1.67 times more vulnerable than the average for dwelling fronts (4.72%).
- With respect to back access, it is clearly the backs of houses that are vulnerable. The backs are also clearly more vulnerable than the respective fronts, with 11/159 (6.30%) back burglaries compared to 3/159 (1.89%) front burglary risk.
- This does not appear to apply to the front/back G2R flats (which are overall less vulnerable). Here two burglaries are from the front and only one from the back.

To sum up, front-only access is less vulnerable than front/back access. Considering front and back faces separately, front access at ground level is overall equally vulnerable as back access. However, with respect to dwellings with front and back access, back access is more vulnerable than front access. It is mainly the backs of houses (the largest f/b dwelling group) that are vulnerable, whereas the backs of f/b
flats and maisonettes are not. On the contrary, the fronts of the ground tower block maisonettes though few, appear to be the most vulnerable front/back access category overall, with the front-only G1 flats second.

Considering the differences in the conditions surrounding front and back access across dwelling types, for instance the fact that the front-only dwelling access group have recessed/obscured entrances, the question arises, how do the visibility/surveillability conditions surrounding the front and back access fronts affect vulnerability.

6.4.3 Local degree of Exposure/Enclosure and Visual Surveillability of Dwelling Faces.

As described in section 6.1.5, in the Andover Estate open space is generally contained, due to the density of the built structure (see front photos), though degrees of enclosure vary sharply between different types of spaces. Apart from the main pedestrian thoroughfares - along Corker Walk with green spaces at the south entrance and at the centre and to a lesser degree along Mingard Walk - both of which have the width of the pre-existing streets they substituted, all the other spaces, particularly those associated with dwellings, tend to be strongly enclosed by buildings. Vehicular access spaces are relatively wider (flanked by back gardens); the closer one gets to dwelling entrances, spaces become increasingly bounded/enclosed and views become increasingly restricted, though back access is usually more 'exposed' in relative terms.

The variation with respect to the degree of exposure and enclosure for front and back access on the Andover Estate is in a different range than the simpler categories that fully described the Ferrier (see section 5.4.3), making it difficult to transfer the notions of enclosure/exposure in a straightforward way, as in the case of the Ferrier. Here, a higher degree of elaboration of descriptive tools and a more systematic method of measurement of the visual field is necessary, which the rather restricted burglary data would not do justice to.

---

Dwelling fronts are treated differently to the backs. As a rule front doors on the estate tend to be hidden from view particularly with respect to the main access routes. The spaces accessing front entrances to dwellings narrow down, limiting the visibility field dramatically, or as in the case of the courts, are visually open at the local level. Back gardens tend to flank relatively wider spaces: vehicular access spaces, pedestrian thoroughfares, or courts. Thus they are generally more exposed than the fronts, depending of course on the location. Their six foot high garden walls are high enough to screen dwellings from view, though not high enough to keep intruders out, thus gardens are 'potentially' accessible.
DEGREES OF ENCLOSURE

VISIBILITY:
Breakdown of Convex Spaces with overlaps based on hard boundaries and visual projection lines.

GROUND LEVEL:
Layout of typical cluster.
Total: 28 Ground dwellings.
Double-sided: 20 (71.4%)
Single fronted: 8 (28.6%)

DEGREES OF ENCLOSURE / VISIBILITY:

VISUAL SURVEILLABILITY:
Categories in rank visibility order:
1. EXPOSED
2. SCREENED
3. 'TUNNEL':
4. ON-COURT
5. OFF-COURT
6. RECESSED 1
7. RECESSED 2

FIGURE 6.22: ANOVER ESTATE: DEGREES OF ENCLOSURE AND VISUAL SURVEILLABILITY CATEGORIES IN TYPICAL CLUSTER PLAN
However, since the cluster layout is repetitive (standard block formation), spatial conditions, which determine visual surveillability of the dwellings and the interface between private and public space are easily classifiable. It was thus decided to define an ordinal scale of visual surveillability categories based on the simplified range of access spaces with thus defined visual fields within and around the cluster. The seven categories of visual surveillability (in rough rank order) are as follows:

1. **Visually Exposed:**
   There are back gardens exposed to view along the main pedestrian access routes (thoroughfares), the only spaces where views are relatively long and spaces open. There usually are stretches of grass in front of them, but no visually obstructive landscaping, nor other forms of shielding.

2. **Shielded:** (SHIELD)
   Dwellings with back faces facing vehicular access routes and culs-de-sac and some dwelling fronts have parking bays in front them screened by vegetation: little trees and shrubs etc. Without vehicles the garden walls or the front entrances would be relatively exposed visually. However, as observed by the author parking bays are filled with cars and vans most of the time; combined with the landscaping this shields the view of the backs or respective fronts providing cover for potential intruders.

3. **Inner-Courts:** (INCOURT)
   Each courts comprises a relatively enclosed main convex space at the heart of the clusters constituted by dwelling fronts on one or two sides and back garden walls on the others. The front entrances are 'surveillable' from within the courts as well as from the sides. Their surveillability, however, is at the local level, dependent on the immediate access spaces and on the windows and doors of the neighbours. Similarly the back garden walls are openly visible from within the court- though not the dwelling's back entry points and interior as such - these are only visible from windows of the deck flats and maisonettes.

4. **Off-court:** (OFFCRT)
   These spaces at the open corners of the courts, which tend to be partly visually 'restricted' by the blind sides of buildings facing them, but open at the sides, linking spatially and visually to the path network. To the one side, courts tend to be open to a main pedestrian thoroughfare -the pedestrian spine- whilst the blind sides of the blocks enclosing the court provide some visual cover. Thus in
the 'off court' spaces the dwellings (mainly back gardens) are partly visually surveillable and partly screened from the inside of the court and from the outside.

5. **'Tunnels':** (TUNNEL)
These are the long and narrow footpaths within the clusters, which access the entrances of houses, whose backs face the courtyards in each cluster. They have relatively long but narrow views from both ends, where the 'tunnel's meet other spaces. Entrance doors are slightly recessed, (about 60cm) softening the otherwise tight transition from the private interior to the public exterior. The 'tunnels' also feed little dead end spaces further accessing two entrances each, described in the last category.

6. **Recessed-1:** (REC1)
This category includes recessed front entrance spaces (shared by two entrances) acting as a buffer between public and private space; in effect it screens them from public view and distances the entrances from public space. The visual field from which one is able to see the entrances is limited. This is either:
- **Off the courts** and vehicular access spaces; few cases are actually off the main pedestrian thoroughfares, (dwelling type G2R).
- **At deck level,** entrances to deck flats (D1) are recessed and thus visually screened from the decks, and to an extent from the ground level.\(^\text{19}\)

7. **Recessed-2:** (REC2)
Finally, in this double-recessed category entrances are even more visually obscured than the one before. Not only is there a recessed buffer zone, but the front doors are further recessed from that, almost completely obscured from view from the normal access path, as is the case with:
- The 2-person (G1) flats with recessed entrances off little dead ends. Their entrances are totally obscured from the paths and are visible only from within the 'semiprivate' access space (dead end).
- Entrances to the deck maisonettes (D2) are also off a shared landing recessed one level above the deck, connected by stairs (one axial step), and are similarly visually almost totally obscured.

Front and back access differ with respect to the range of surveillability categories. There is no visually exposed front access and there is no recessed back. The front/back dwelling types have ranges of combinations of surveillability of the back or the

\(^{19}\) In this case there is no extra axial line, in order to distinguish the deck entrances (D1) from the upper deck entrances (D2)
Table 6.4.3: Breakdown of Dwelling Faces Burglaries by Degree of Visual Surveillability.

<table>
<thead>
<tr>
<th>VIS. EXPOSED</th>
<th>GROUND</th>
<th>DECK</th>
<th>FRONT</th>
<th>TOTAL</th>
<th>DIRECT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BACK</td>
<td>FRONT</td>
<td>(F)</td>
<td>ALL</td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>BURGLS</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
</tr>
<tr>
<td>SHIELDFD</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>97</td>
<td>19</td>
<td>-</td>
<td>19</td>
<td>116</td>
</tr>
<tr>
<td>BURGLS</td>
<td>4</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>%</td>
<td>4.12%</td>
<td>10.53%</td>
<td>10.53%</td>
<td>5.17%</td>
<td></td>
</tr>
<tr>
<td>IN.COURT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>59</td>
<td>37</td>
<td>-</td>
<td>37</td>
<td>96</td>
</tr>
<tr>
<td>BURGLS</td>
<td>4</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>%</td>
<td>6.78%</td>
<td>0%</td>
<td>0%</td>
<td>4.17%</td>
<td></td>
</tr>
<tr>
<td>OFF.COURT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>41</td>
<td>29</td>
<td>-</td>
<td>29</td>
<td>70</td>
</tr>
<tr>
<td>BURGLS</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>%</td>
<td>7.32%</td>
<td>3.45%</td>
<td>3.45%</td>
<td>5.71%</td>
<td></td>
</tr>
<tr>
<td>TUNNEL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>8</td>
<td>94</td>
<td>-</td>
<td>94</td>
<td>102</td>
</tr>
<tr>
<td>BURGLS</td>
<td>0</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>2.13%</td>
<td>2.13%</td>
<td>1.96%</td>
<td></td>
</tr>
<tr>
<td>RECES.-1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>-</td>
<td>54</td>
<td>216</td>
<td>270</td>
<td>270</td>
</tr>
<tr>
<td>BURGLS</td>
<td>-</td>
<td>2</td>
<td>12</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>%</td>
<td>3.70%</td>
<td>5.55%</td>
<td>5.19%</td>
<td>5.19%</td>
<td></td>
</tr>
<tr>
<td>RECES.-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>-</td>
<td>106</td>
<td>216</td>
<td>322</td>
<td>322</td>
</tr>
<tr>
<td>BURGLS</td>
<td>-</td>
<td>9</td>
<td>15</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>%</td>
<td>8.49%</td>
<td>6.94%</td>
<td>8.07%</td>
<td>8.07%</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>225</td>
<td>339</td>
<td>432</td>
<td>771</td>
<td>996</td>
</tr>
<tr>
<td>BURGLS</td>
<td>11</td>
<td>16</td>
<td>27</td>
<td>43</td>
<td>54</td>
</tr>
<tr>
<td>%</td>
<td>4.88%</td>
<td>4.72%</td>
<td>6.25%</td>
<td>5.58%</td>
<td>5.42%</td>
</tr>
</tbody>
</table>
front access face, although the houses, f/b flats and ground maisonettes of the tower blocks each have specific ranges of combinations as shown in the table 6.4.5. With respect to the deck level, there is a straightforward correspondence between dwelling types and front entrance conditions: Deck level flats have recessed-1 entrances and the upstairs deck maisonettes, recessed-2.

A. **Breakdown of front and back dwelling faces by visual surveillability:**

Section 6.2.3 discussed how constituted spaces (controlled by front doors) relate to increasing depth and segregation; this section looks at how the visual relationship between private entrances to dwellings and public access is elaborated in terms of surveillability at the local level. **Table 6.4.3.A** presents the breakdown of dwelling faces, burglaries and burglary rates, with respect to degree of visual surveillability, front and back. One observes the following:

- Looking at the **total front and back faces**, it is clearly the **recessed-2 group** that is most vulnerable, with a burglary rate of 8.07%. The off-court group is the second most vulnerable general category (5.7%), but only marginally above the average (5.42%) for total dwelling faces. The recessed-1 group (5.19%) and the shielded group (5.17%) are marginally below the overall average, while tunnels (1.96%) and visually exposed back faces (0%) are the least vulnerable overall.

- The **deck level recessed dwelling faces** with an average rate of 6.25% are actually **more vulnerable** than the average for both front (4.88%) and back (4.72%) ground faces.

However, the detailed breakdown reveals that there are considerable differences in the distribution of burglaries with respect to visual surveillability:

**Front faces:**
- The most vulnerable category appears to be the small **shielded front** group with 2/19 burglaries (10.53%).
- The 'recessed-2' group with 9/106 burglaries at ground level (8.49%), is the second most vulnerable front access group.
- The ground 'recessed 1' fronts have under half the rate of burglary of the 'recessed 2' group (3.70% compared to 8.49%).
- The least vulnerable front faces are the 'inner court's (0/37 = 0%) and the 'tunnel's (2/94 = 3.45%)
<table>
<thead>
<tr>
<th>GROUND LEVEL:</th>
<th>FRONT</th>
<th>BACK</th>
<th>F ONLY</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vis. Exposed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Back:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwells</td>
<td>20</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Burgls</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Shielded</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwells</td>
<td>-</td>
<td>19</td>
<td>-</td>
<td>19</td>
</tr>
<tr>
<td>Burgls</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Back:</td>
<td>71</td>
<td>6</td>
<td>20</td>
<td>97</td>
</tr>
<tr>
<td>Dwells</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Burgls</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>In. Court:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwells</td>
<td>37</td>
<td>-</td>
<td>-</td>
<td>37</td>
</tr>
<tr>
<td>Burgls</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Back:</td>
<td>52</td>
<td>7</td>
<td>-</td>
<td>59</td>
</tr>
<tr>
<td>Dwells</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Burgls</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Off. Court:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwells</td>
<td>28</td>
<td>-</td>
<td>1</td>
<td>29</td>
</tr>
<tr>
<td>Burgls</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Back:</td>
<td>36</td>
<td>5</td>
<td>-</td>
<td>41</td>
</tr>
<tr>
<td>Dwells</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Burgls</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Tunnel:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwells</td>
<td>94</td>
<td>-</td>
<td>-</td>
<td>94</td>
</tr>
<tr>
<td>Burgls</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Back:</td>
<td>36</td>
<td>5</td>
<td>-</td>
<td>41</td>
</tr>
<tr>
<td>Dwells</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Burgls</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Ref. Exs.-1:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwells</td>
<td>-</td>
<td>46</td>
<td>-</td>
<td>54</td>
</tr>
<tr>
<td>Burgls</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Ref. Exs.-2:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwells</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>106</td>
</tr>
<tr>
<td>Burgls</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dwells</td>
<td>159</td>
<td>46</td>
<td>20</td>
<td>106</td>
</tr>
<tr>
<td>Burgls</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Back:</td>
<td>159</td>
<td>46</td>
<td>20</td>
<td>-</td>
</tr>
<tr>
<td>Dwells</td>
<td>8</td>
<td>1</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>Burgls</td>
<td>5.03%</td>
<td>2.17%</td>
<td>0%</td>
<td>4.00%</td>
</tr>
</tbody>
</table>

Table 6.4.3 B: Breakdown of Dwelling Types by F/B Surveillability
**Back faces:**

- The most vulnerable back access group is the 'off-court' category (7.31%) closely followed by the 'inner-court' back access group (6.78%).
- The 'shielded' backs appear to be less vulnerable (4.12%), considerably lower than the inner court and off court backs, and below the average of 4.88%.
- The least vulnerable back faces are the visually exposed backs (0/20=0%).

**Deck access-fronts:**

- The recessed-2 group is more vulnerable (6.94%) than the recessed-1 group (5.55%), as is the case at ground level, though the difference is not as strong.

Comparing front and back access, certain interesting discrepancies emerge: There appears to be a strong difference between the vulnerability of shielded fronts and shielded backs (fronts are over 2-times more vulnerable). There is also a sharp contrast between off court backs (7.3%) and inner court backs (6.78%) on the one hand, which are about the same with respect to vulnerability, and the respective off court fronts (3.57%) and inner court fronts (0.0%), on the other. Finally the difference between recessed-1 and recessed-2 vulnerability is also considerable.

The question is, to what extent is the different character of the front and back access boundary, and to what extent are other factors, responsible for these discrepancies.

**B. Breakdown of front and back dwelling faces by dwelling type and visual surveillability categories:**

Looking at the relationship between dwelling type and front and back surveillability, as noted earlier, there are specific ranges of combinations in each dwelling type. Table 6.4.3 B presents the breakdown of dwelling types by front and back access surveillability. Here one begins to discern, how burglary risk relates to dwelling type, through the particularities of the faces:

- **Houses:** The backs of houses fall mainly into the shielded category, and to a lesser extent, inner-court and off-court, while the fronts are primarily tunnels, with relatively fewer entrances in the courts and off-courts.
  
  a. The house fronts are less vulnerable; the off-court fronts have a burglary rate of 1/28 = 3.53%; tunnels 2/94=2.13% and inner court fronts 0/37.
  
  b. It is the 'off court' and 'inner court' backs of houses that are vulnerable with burglary rates of 8.33% and 5.77% respectively), rather than the shielded
backs (2.82%). The former are more vulnerable than any of the respective front categories.

- **Front and back access flats**: have 'recessed -1' fronts, and a wide range of backs, the largest category being the exposed backs (0/20=0% burglary rate), and few cases of tunnels (0/8 burglary rate), off-courts (0/5 burglary rate), inner-courts (1/7) and shielded backs (0/6 burglaries).
  
a. It is the inner court backs and the recessed-1 fronts (with a burglary rate of 2/46=4.35%), that appear to be vulnerable.
  
b. The back faces break down into categories with receding numbers, so that general conclusions cannot be drawn; however, one may note that the visually exposed backs appear to be less vulnerable.

- **Ground level maisonettes**: with shielded fronts, which with 2/19 = 10.53% burglaries, are the most vulnerable subgroup. In contrast the respective shielded backs have no burglaries. One suspects there is a special case of vulnerability here.

- **Front-only G1 flats**: comprise the largest single group overall, with 'recessed-2' fronts which with form the second most vulnerable category (9/106 burglaries = 8.5%) after the shielded fronts.

Thus, at ground level, it is the shielded fronts of the tower block maisonettes; the recessed-2 fronts of the G1 flats; and the off court and the inner court backs of houses (and flats) that seem to be more vulnerable (above average). Overall however, the recessed category is clearly more vulnerable than the exposed/shielded category.

6.4.4 **Dwelling access and Vehicular access.**

Front and back access of the various dwelling types differ with respect to vehicular or non-vehicular access, although there is somewhat less variation on the Andover than on the Ferrier. As mentioned in earlier sections the rules here are:

- Front entrances are generally away from the vehicular access routes and parking bays, with the exception of some of the blocks (type II; with recessed front entrances), whose one side borders on to the culs-de-sac.
<table>
<thead>
<tr>
<th>GROUND DIRECT ACCESS</th>
<th>TOTAL</th>
<th>BACK</th>
<th>FRONT</th>
<th>f_b</th>
</tr>
</thead>
<tbody>
<tr>
<td>VEHICULAR ACCESS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>79</td>
<td>19</td>
<td>98</td>
<td></td>
</tr>
<tr>
<td>BURGLS</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>2.53%</td>
<td>15.79%</td>
<td>5.10%</td>
<td></td>
</tr>
<tr>
<td>NON VEHIC. ACCESS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>146</td>
<td>320</td>
<td>466</td>
<td></td>
</tr>
<tr>
<td>BURGLS</td>
<td>9</td>
<td>13</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>6.16%</td>
<td>4.06%</td>
<td>4.72%</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DWELS</td>
<td>225</td>
<td>339</td>
<td>564</td>
<td></td>
</tr>
<tr>
<td>BURGLS</td>
<td>11</td>
<td>16</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td>4.88%</td>
<td>4.72%</td>
<td>4.79%</td>
<td></td>
</tr>
</tbody>
</table>

**Table 6.4.4A**: Breakdown of Front/Back Dwelling Faces by Vehicular / Non-Vehicular Access
Vehicular access routes and parking bays are generally flanked by back gardens, though the height of the walls does not allow for supervision from within the dwellings, nor vice versa.

Table 6.4.4 A presents the breakdown of front and back dwelling access faces and burglaries/burglary rates with respect to vehicular and non-vehicular access:

The non-vehicular access group is clearly the large majority. Vehicular access comprises a mere 98/564 =17.4% of total ground access faces, the exception rather than the rule, particularly with respect to front access with 19/339 cases (a mere 5.6%), whereas back access with 79/225 cases (35.1%) comprises about a third of the all back access. With respect to burglary risk one observes:

- Overall the average rate of burglary for dwelling faces with vehicular access is approximately the same as the respective rate for dwelling faces with no vehicular access (5.10% and 4.79% respectively). However, there clearly is a strong variation between front and back ground direct access with respect to vehicular access or no vehicular access:
  - Vehicular access: Back vehicular access, which comprises 80% of dwelling faces with vehicular access, has a remarkably lower rate of burglary than front vehicular access (2/79=2.53% back compared to 3/19=15.79% front vehicular access).
  - Non-vehicular access: In contrast to the above, back non-vehicular access has a higher burglary rate than the equivalent front access group (9/146=6.16% compared to 13/320=4.06% respectively).

Thus, overall it appears to be front vehicular and back non-vehicular access that are vulnerable, a result, which calls for further clarification.

Since vehicular access does not operate alone as a factor, but comes in a 'package deal' with other factors such as dwelling type and visual surveillability, the following questions arise with respect to vulnerability to burglary:

i. How do front/ back vehicular and non-vehicular access relate to dwelling type.
ii. How do front/ back vehicular and non-vehicular access relate to visual surveillability.
### Table 64.4 B: Breakdown of Dwelling Faces by Dwelling Type and Front Back Vehicular Access

<table>
<thead>
<tr>
<th></th>
<th>Back</th>
<th>Front</th>
<th>Total</th>
<th>Back</th>
<th>Front</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Houses</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Dwel. Faces</td>
<td>65</td>
<td>0</td>
<td>65</td>
<td>94</td>
<td>159</td>
<td>253</td>
</tr>
<tr>
<td>BURGLS.</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>8</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>%</td>
<td>3.08%</td>
<td>-</td>
<td>3.08%</td>
<td>8.51%</td>
<td>1.89%</td>
<td>4.35%</td>
</tr>
<tr>
<td><strong>F B H.ats</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Dwel. Faces</td>
<td>4</td>
<td>10</td>
<td>14</td>
<td>42</td>
<td>36</td>
<td>78</td>
</tr>
<tr>
<td>BURGLS.</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>10.0%</td>
<td>7.14%</td>
<td>2.38%</td>
<td>2.78%</td>
<td>2.56%</td>
</tr>
<tr>
<td><strong>F B Mais. (TB)</strong></td>
<td>10</td>
<td>9</td>
<td>19</td>
<td>10</td>
<td>11</td>
<td>21</td>
</tr>
<tr>
<td>BURGLS.</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>%</td>
<td>0%</td>
<td>22.22%</td>
<td>10.53%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>F. only Fl.ats</strong></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td>BURGLS.</td>
<td></td>
<td></td>
<td></td>
<td>9</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td>7.90%</td>
<td>7.90%</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of Dwel. Faces</td>
<td>79</td>
<td>19</td>
<td>98</td>
<td>146</td>
<td>320</td>
<td>466</td>
</tr>
<tr>
<td>BURGLS.</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>9</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td>%</td>
<td>2.53%</td>
<td>15.79%</td>
<td>5.10%</td>
<td>6.16%</td>
<td>4.06%</td>
<td>4.72%</td>
</tr>
</tbody>
</table>

**Andover Estate: Distribution of Dwellings by Local Criteria**
i. Breakdown of front and back dwelling faces by dwelling type and vehicular/ non-vehicular access potential:

Table 6.4.4.B presents the breakdown of front and back vehicular access by dwelling type. This table reveals the following:

**Vehicular front access:** f/b flats and maisonettes:

- It is the fronts of f/b maisonettes with vehicular access, in contrast to the equivalent non-vehicular fronts and backs, that appear to be highly vulnerable with a burglary rate (22.22% - over 5 times the average of approximately 5%). One has to bear in mind, however, that the number of dwellings in this category is very low, so that caution is required with our conclusions.

- Similarly, the fronts of f/b flats (recessed-1 category) with vehicular access (1/10=10% burglary rate) appear to be 3.5 times more vulnerable than the respective fronts of the f/b flats with no vehicular access. (Once again, due to the small number of cases conclusions here have to be treated with caution).

**Non-vehicular front access:**

- In contrast to the above, the also highly vulnerable 'front only' flats (the 'recessed-2' category as already established in previous sections) with a burglary rate of 7.90%, have no vehicular access.

- The other cases of non-vehicular front access are least vulnerable (ground maisonettes 0/11, houses 3/159= 1.89% and f/b flats 1/36=2.78%).

**Non-vehicular - versus vehicular back access:**

- It is the backs of houses with non-vehicular access (8/94=8.51%) that are most vulnerable, whereas the backs of f/b flats (1/42=2.38%) and maisonettes (0/10=0%) also with non-vehicular back access, do not appear to be vulnerable.

- Houses with vehicular back access are much less vulnerable than the respective non-vehicular backs (2/65=3.08%). Vehicular access backs of maisonettes (0/10) and f/b flats (0/4) have no burglaries, though the numbers of cases are limited.
ANDOVER ESTATE: DISTRIBUTION OF DWELLINGS FACES BY LOCAL CRITERIA

<table>
<thead>
<tr>
<th>GROUND</th>
<th>VEHICULAR ACCESS</th>
<th>NONVEHICULAR ACCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BACK</td>
<td>FRONT</td>
</tr>
<tr>
<td>VIS. EXPOSED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. DWEL. FACES</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BURGLS</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SHIELDED</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. DWEL. FACES</td>
<td>79</td>
<td>9</td>
</tr>
<tr>
<td>BURGLS</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>2.53% 22.2% 4.55% 9.52% 0% 6.45%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IN. COURT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. DWEL. FACES</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BURGLS</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>6.78% 0% 4.17%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFF COURT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. DWEL. FACES</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BURGLS</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>7.32% 3.45% 5.71%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TUNNEL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. DWEL. FACES</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BURGLS</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>0% 2.13% 1.96%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RCS. 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. DWEL. FACES</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>BURGLS</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td><strong>10% 10% 2.27% 2.27%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RCS. 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. DWEL. FACES</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BURGLS</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>8.49% 8.49%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NO. DWEL. FACES</td>
<td>79</td>
<td>19</td>
</tr>
<tr>
<td>BURGLS</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
| **2.53% 15.79% 5.10% 6.16% 4.06% 4.72%**

TABLE 6.4.4 C: BREAKDOWN OF DWELLING FACES BURGLARIES BY SURVEILLABILITY AND VEHICULAR ACCESS.
ii. **Breakdown of front and back dwelling faces by visual surveillability and vehicular/non-vehicular access potential:**

The front and back faces of the various dwelling types fall into a specific range of surveillance categories each. Table 6.4.4 C presents the breakdown of front and back dwelling faces by visual surveillability categories and by vehicular access. From this table one discerns the following:

**Vehicular access:**

- With respect to front vehicular access, it is clearly the dwellings with shielded fronts (ground level maisonettes) and with recessed-1 fronts of the f/b flats, that are highly vulnerable.
- On the other hand, the shielded vehicular backs of houses (shielded by parked vehicles and vegetation) do not appear to be vulnerable (2.53%).

**Non-vehicular access:**

- The highly vulnerable categories are:
  a. Dwellings with recessed-2 fronts (front only G1 flats) with a burglary rate of 8.49%.
  b. Shielded backs (houses, flats and maisonettes) with a burglary rate of 9.52%; off court backs (houses and f/b flats) with a burglary rate of 7.32% inner court backs (houses and flats) with a burglary rate of 6.78%;
- Exposed backs (f/b flats) with 0% burglary; tunnels (fronts of houses and few backs) with an overall burglary rate of 1.96%; and inner court (0%) and off court (3.45%) fronts of houses all non-vehicular access, are less vulnerable.

The above results suggest that:
1. There are two extremes:
   - the recessed-2 non-vehicular fronts with the least visual surveillability, which are highly vulnerable; and
   - the exposed backs, the inner-court fronts, and the 'tunnel' access fronts, non-vehicular access with higher surveillability, which are least vulnerable.
2. In the medium range of visual surveillability: comprising the 'shielded' fronts and backs; the 'off court' backs and fronts; the inner court backs and 'recessed 1' fronts, vulnerability tends to vary with respect to vehicular access or non-vehicular access.
<table>
<thead>
<tr>
<th>DECK LEVEL:</th>
<th>FRONT ACCESS</th>
<th>% BURGL</th>
<th>BACK ACCESS</th>
<th>% BURGL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Front-only ACCESS</td>
<td>DECK FLAT (D1)</td>
<td>RECESSED 1</td>
<td>12/216 = 5.55%</td>
<td>N/A</td>
</tr>
<tr>
<td>MAISONETTE (D2)</td>
<td>RECESSED 2</td>
<td>15/216 6.94%</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>GROUND LEVEL:</td>
<td>F-only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-FLATS (G1)</td>
<td>RECESSED 2</td>
<td>9/114 7.90%</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>F/B FLATS (G2R)</td>
<td>RECESSED-1</td>
<td>2/46 = 4.35%</td>
<td>EXPOSED IN-/OFFCOURT (Nonveh &amp; veh) (TUNNELS)</td>
<td>1/46 = 2.17%</td>
</tr>
<tr>
<td>TB MAISONETTES</td>
<td>SHIELDED (Veh. &amp; Nonv.) (OFF-COURT)</td>
<td>2/20 10.00%</td>
<td>SHIELDED (Veh. &amp; Nonv.)</td>
<td>0/20 = 0.00%</td>
</tr>
<tr>
<td>HOUSES (G2)</td>
<td>TUNNEL</td>
<td>3/159 = 1.89%</td>
<td>SHIELDED (Veh. &amp; Nonv.)</td>
<td>10/159 6.30%</td>
</tr>
<tr>
<td>IN-COURT OFF-COURT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>7/225 = 3.11%</td>
<td></td>
<td>11/225 4.89%</td>
</tr>
</tbody>
</table>
6.4.5 Summary and first discussion

Summing up, the first stage of the analysis of the pattern of vulnerability on the Andover Estate, has established the following:

**Direct access** (ground and deck level) is about equally vulnerable as indirect access (upper levels of the tower blocks), with a burglary rate of 7% overall only marginally higher than the 6.54% rate for indirect access.

**Ground level** dwellings are most vulnerable (8%), while indirect upper level access is about the same as deck access (the rate of burglary is marginally higher 6.54% compared to 6.25%, but there are only a third of the number of dwellings).

Whereas overall **front-back direct access** is clearly more vulnerable than front-only access overall (8% compared to 6.59%), at ground level dwellings with front-only access (7.9%) are equally vulnerable as dwellings with front and back access.

In terms of **dwelling types**: the ground level **towerblock maisonettes** are the most vulnerable group, though it only comprises 20 cases. **Houses** are also highly vulnerable and front only flats about average for ground level, f/b flats are least vulnerable.

The majority of burglaries at ground level are committed from the **front** (16/27 front; 11/27 back, whereas at deck level with front access only there are-27 burglaries). However, where there is a choice of front or back access (houses; f/b flats and maisonettes), almost two thirds of **burglaries are committed from the back** (11/18 back burglaries; 7/18 front burglaries). Front and Back access (garden walls) are very different, a fact which is likely to affect vulnerability per se, however local conditions appear to also play a role. Certain combinations of local factors relating to front and back access, visual surveillability and vehicular- non-vehicular access have been identified, which appear to affect the vulnerability of dwellings to burglary:

**Ground level (front and back access):**
- It is the backs of houses with non-vehicular access: off-court; inner-court; (including certain 'shielded' backs just off the courts) that are particularly vulnerable;
- It is the shielded fronts of the tower block maisonettes and the recessed fronts of f/b flats with vehicular access that are vulnerable; and finally
It is the front-only ground flats with recessed-2, obscured entrances (and non-vehicular access) that are highly vulnerable.

**Deck level (front only- non-vehicular access):**

- The recessed-2 deck maisonettes are more vulnerable than the recessed-1 deck flats.

**Visual surveillability** in general appears to play an important role overall, since the least visually surveillable 'recessed-2' dwellings (G1 and D2 types) appear to be the most vulnerable categories, with 'off-courts' both back and front second. Overall, it seems that spatial vulnerability increases with diminishing visual surveillability: the exposed end of the scale (exposed and shielded faces) with higher surveillance potential seems to be the least vulnerable, while the other end of the scale with recessed-1 and particularly the recessed -2 entrances seems to be highly vulnerable, though recessed-1 fronts are less vulnerable at ground level.

Unlike the Ferrier estate, where potential surveillance from vehicular access routes seemed to increase safety, vehicular access here appears overall equally vulnerable as non-vehicular access. However, there are different highly vulnerable combinations: such as shielded or recessed-1 fronts with vehicular access, few in number, but with high burglary rates - and backs particularly off-courts and inner-courts with non-vehicular access, which are also vulnerable, though not as highly as the former.

The question arises to what extent vehicular access does play a role, due to the 'package deal' in which the variety of local factors come, particularly in the middle visibility range. It is apparent that specific combinations of local factors, which have been identified, do play an important role, however, the reasons why are not clear.

As noted in the earlier sections, exposed and vehicular access spaces tend to be more integrated than the courts and the dead-end alleys. The 'inner court'/ 'off court' spaces and the recessed entrance spaces are likely to be highly segregated. The next step is to examine, how the local variables relate to integration/ segregation, and how combinations seem to work in terms of vulnerability. The global factor of accessibility clearly needs to be investigated before one can make any proper sense of the local factors.
6.5 The Global Pattern of Vulnerability: Relationship between Burglary Risk and Integration.

Having established how specific local factors affect vulnerability, this section focuses on how global accessibility, the degree of integration/segregation in the spatial structure as a whole, measured by RRA, influences the vulnerability of dwelling locations. As in previous case studies (see sections 4.5 and 5.5), the relationship between Integration and burglary risk is examined from three perspectives:

1. Comparing the samples of burgled/nonburgled dwellings;
2. Correlating burglary rates with degree of integration of access lines from which they are committed;
3. Correlating burglary rates to degree of integration for the whole sample of access lines, broken down into five integration bands.

6.5.1 Analysis of Burgled/Nonburgled Dwelling Samples.

Mean Integration (RRA) values - the index of spatial accessibility - are calculated for burgled and nonburgled dwelling samples with respect to the following spatial systems of reference:

1. the whole estate on its own - ground and deck: 429 spaces - (AND429);
2. the ground level on its own: 205 spaces - (AND205);
3. the ground level in its urban context: 328 spaces - (AND328);
4. the whole estate in its urban context: 552 axial spaces (AND552) or 561 spaces including tower blocks (AND561);
5. the simplified estate system in its context: 368 spaces - (AND368);

The three tower blocks (indirect upper level access) are excluded from the analysis of burgled and nonburgled dwelling samples with direct access. The scope for comparative analysis with respect to the global vulnerability of these blocks is limited, since the data is so weak (3-4 burglaries per block), the range of values limited to three Integration values. Indirect access has an undoubted, but unspecifiable impact on the way and extent to which global factors impinge on the local conditions of access.

As in the previous case studies, the dwelling samples are broken down by levels of access:

- Whole (ground & deck levels);
### Table 6.51A: Overall Sample of Dwellings - Ground + Deck Level

<table>
<thead>
<tr>
<th>RRA Spatial System</th>
<th>Front AVE. (n=54, N=720)</th>
<th>Front Access (n=43, N=731)</th>
<th>Deck Access (n=27, N=408)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RRA ANDOVER 429</strong>&lt;br&gt;Estate alone&lt;br&gt;Mean St. Dev</td>
<td>0.854 0.184</td>
<td>0.92 0.197</td>
<td>1.028 0.16</td>
</tr>
<tr>
<td><strong>RRA ANDOVER 552</strong>&lt;br&gt;Whole in context&lt;br&gt;Mean St. Dev</td>
<td>0.808 0.166</td>
<td>0.868 0.181</td>
<td>0.971 0.142</td>
</tr>
<tr>
<td><strong>RRA GL ANDOVER 368</strong>&lt;br&gt;Simplified&lt;br&gt;Mean St. Dev</td>
<td>0.773 0.164</td>
<td>0.87 0.197</td>
<td>0.97 0.135</td>
</tr>
</tbody>
</table>

### Table 6.51B: Overall Sample of Dwellings - Ground Level

<table>
<thead>
<tr>
<th>RRA Spatial System</th>
<th>Front AVE. (n=27, N=312)</th>
<th>Front Access (n=15, N=323)</th>
<th>Back Access (n=11, N=215)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RRA ANDOVER 429</strong>&lt;br&gt;Estate alone&lt;br&gt;Mean St. Dev</td>
<td>0.679 0.084</td>
<td>0.738 0.097</td>
<td>0.611 0.058</td>
</tr>
<tr>
<td><strong>RRA ANDOVER 205</strong>&lt;br&gt;Ground alone&lt;br&gt;Mean St. Dev</td>
<td>0.633 0.092</td>
<td>0.701 0.117</td>
<td>0.569 0.096</td>
</tr>
<tr>
<td><strong>RRA GL ANDOVER 328</strong>&lt;br&gt;Ground globe&lt;br&gt;Mean St. Dev</td>
<td>0.653 0.07</td>
<td>0.703 0.097</td>
<td>0.615 0.058</td>
</tr>
<tr>
<td><strong>RRA GL ANDOVER 552</strong>&lt;br&gt;Whole in context&lt;br&gt;Mean St. Dev</td>
<td>0.644 0.065</td>
<td>0.693 0.088</td>
<td>0.603 0.052</td>
</tr>
<tr>
<td><strong>RRA GL ANDOVER 368</strong>&lt;br&gt;Simplified&lt;br&gt;Mean St. Dev</td>
<td>0.615 0.055</td>
<td>0.631 0.102</td>
<td>0.625 0.059</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interactions</th>
<th>Prob. (2-tail)</th>
<th>Prob. (2-tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURG</td>
<td>NONB</td>
<td>BURG</td>
</tr>
<tr>
<td>0.81</td>
<td>0.08</td>
<td>0.72</td>
</tr>
<tr>
<td>0.16</td>
<td>0.073</td>
<td>0.691</td>
</tr>
<tr>
<td>0.50</td>
<td>0.057</td>
<td>0.689</td>
</tr>
<tr>
<td>0.392</td>
<td>0.55</td>
<td>0.693</td>
</tr>
<tr>
<td>0.16</td>
<td>0.631</td>
<td>0.674</td>
</tr>
</tbody>
</table>

### Table 6.51C: Overall Sample of Dwellings - Deck Level

<table>
<thead>
<tr>
<th>RRA Spatial System</th>
<th>Front AVE. (n=12, N=207)</th>
<th>Front Access (n=12, N=207)</th>
<th>Back Access (n=12, N=207)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RRA ANDOVER 429</strong>&lt;br&gt;Estate alone&lt;br&gt;Mean St. Dev</td>
<td>0.679 0.084</td>
<td>0.738 0.097</td>
<td>0.611 0.058</td>
</tr>
<tr>
<td><strong>RRA ANDOVER 205</strong>&lt;br&gt;Ground alone&lt;br&gt;Mean St. Dev</td>
<td>0.633 0.092</td>
<td>0.701 0.117</td>
<td>0.569 0.096</td>
</tr>
<tr>
<td><strong>RRA GL ANDOVER 328</strong>&lt;br&gt;Ground globe&lt;br&gt;Mean St. Dev</td>
<td>0.653 0.07</td>
<td>0.703 0.097</td>
<td>0.615 0.058</td>
</tr>
<tr>
<td><strong>RRA GL ANDOVER 552</strong>&lt;br&gt;Whole in context&lt;br&gt;Mean St. Dev</td>
<td>0.644 0.065</td>
<td>0.693 0.088</td>
<td>0.603 0.052</td>
</tr>
<tr>
<td><strong>RRA GL ANDOVER 368</strong>&lt;br&gt;Simplified&lt;br&gt;Mean St. Dev</td>
<td>0.615 0.055</td>
<td>0.631 0.102</td>
<td>0.625 0.059</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interactions</th>
<th>Prob. (2-tail)</th>
<th>Prob. (2-tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BURG</td>
<td>NONB</td>
<td>BURG</td>
</tr>
<tr>
<td>0.81</td>
<td>0.08</td>
<td>0.72</td>
</tr>
<tr>
<td>0.16</td>
<td>0.073</td>
<td>0.691</td>
</tr>
<tr>
<td>0.50</td>
<td>0.057</td>
<td>0.689</td>
</tr>
<tr>
<td>0.392</td>
<td>0.55</td>
<td>0.693</td>
</tr>
<tr>
<td>0.16</td>
<td>0.631</td>
<td>0.674</td>
</tr>
</tbody>
</table>
Furthermore, as in the Ferrier Estate, front and back access need to be considered separately. Unlike the Ferrier, where the variation with respect to local access factors is restricted to few combinations, on the Andover with its multiplicity of local combinations, it is difficult to adhere to dwellings as units of analysis, and more appropriate to take dwelling access faces instead, as in the latter stages of the Ferrier case study).

A. Differences between burgled and nonburgled dwellings with respect to degree of integration

Table 6.5.1 A presents the differences in terms of mean Integration between burgled and nonburgled samples of dwellings, and front and back access faces for the whole estate, the deck level and the ground level separately. The statistical significances of the differences between the samples are calculated on the basis of two tailed T-tests. The table suggests the following:

I. Whole Estate (excluding tower blocks):
- There appears to be no difference between burgled and nonburgled samples with respect to their average front/back RRA indexes in all systems of reference.
- With respect to front access on its own: front burgled dwellings are more segregated than nonburgled dwelling fronts; the difference is statistically significant with respect to both local and global systems of reference: for instance with respect to the estate on its own (AND429):
  Burgled: mean RRA = 0.92; Nonburgled: mean RRA = 0.857; p = .024 (sign.);
  In global system (AND552):
  Burgled: mean RRA = 0.868; Nonburgled: mean RRA = 0.804; p = .027 (sign.);

II. Deck Access:
- Looking at deck access on its own, one finds that burgled dwellings are significantly more segregated than nonburgled dwellings, in all systems of reference. This is also the case in the simple global system, ignoring the little recessed axial links to the upper deck dwellings. With respect to the whole estate in the global context (AND552) the difference
  Burgled: mean RRA = 1.028; Nonburgled: mean RRA = 0.973; p = .028 (sign.);

III. Ground Level:
- With respect to the front/back average RRAs of burgled and nonburgled samples at ground level, the picture reverses: Burgled dwellings appear to be overall more integrated than the respective nonburgled dwellings (particularly with respect to the ground level on its own and the simple global system), but the differences are not statistically proven:
  AND205: Burgled: mean RRA = 0.633; Nonburgled: mean RRA = 0.659; p = .16 ;
### Differences Between:

#### Ground Level Front / Back Access

<table>
<thead>
<tr>
<th>RRA Spatial System</th>
<th>NonBurgled Faces</th>
<th>Burgled Faces</th>
<th>Ground Deck Acc.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Front N 339</td>
<td>Back n 225</td>
<td>Prob. (2 tail)</td>
</tr>
<tr>
<td><strong>RR ANDOV 429</strong></td>
<td>0.713 0.096</td>
<td>0.602 0.08</td>
<td>0.0001</td>
</tr>
<tr>
<td>Estate alone</td>
<td>0.0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RR ANDOV 205</strong></td>
<td>0.691 0.116</td>
<td>0.56 0.095</td>
<td>0.0001</td>
</tr>
<tr>
<td>Ground alone</td>
<td>0.0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RR GL Gr ANDOV 328</strong></td>
<td>0.69 0.097</td>
<td>0.584 0.084</td>
<td>0.0001</td>
</tr>
<tr>
<td>Ground global</td>
<td>0.0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RR Gl all ANDOV 552</strong></td>
<td>0.68 0.086</td>
<td>0.581 0.073</td>
<td>0.0001</td>
</tr>
<tr>
<td>Who c in context</td>
<td>0.0001</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>RR GL Simp 4Xd ANDOV 368</strong></td>
<td>0.673 0.102</td>
<td>0.598 0.08</td>
<td>0.0001</td>
</tr>
<tr>
<td></td>
<td>0.0001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Table 6.5.1B: T tests on differences in all spatial systems
AND552: Burgled: mean RRA=0.644; Nonburgled: mean RRA= 0.655; p=.39;

- Looking at front access on its own, one finds that burgled fronts at ground level are slightly more segregated than nonburgled fronts, particularly with respect to the estate on its own AND429. This follows the trend of the whole sample described earlier, but the differences are weaker and not statistically significant:
  - AND429: Burgled: mean RRA=0.738; Nonburgled: mean RRA= 0.712; p=.28;
  - AND552: Burgled: mean RRA=0.693; Nonburgled: mean RRA= 0.680; p=.55;

- With respect to back access, one finds that back burgled dwellings are also slightly more segregated than nonburgled back faces. The difference is marginal in the local systems and but stronger in the global systems (though not statistically significant):
  - AND205: Burgled: mean RRA=0.569; Nonburgled: mean RRA= 0.56; p=.74;
  - AND552: Burgled: mean RRA=0.603; Nonburgled: mean RRA= 0.58; p=.33;
  - In the simple Global:
    - AND328: Burgled: mean RRA=0.625; Nonburgled: mean RRA= 0.596; p=.24;

B. Differences between front and back access at ground and deck level with respect to global Integration

Table 6.5.1 B presents the results of T-Tests on the differences in terms of global Integration between front and back access faces, and front and back burgled faces at ground level, and the differences between ground (all) and deck dwelling faces. One may observe the following:

1. Comparing front and back access, one finds that back access is highly significantly more integrated than front access and the same applies to the burgled sample: burgled backs are highly significantly more integrated than burgled fronts:
   - Nonburgled Dwellings:
     - AND205: Front: mean RRA=0.691; Back: mean RRA= 0.56; p=.0001;
     - AND552: Front: mean RRA=0.680; Back: mean RRA= 0.581; p=.001;
   - Burgled Dwellings:
     - AND205: Front: mean RRA=0.701; Back: mean RRA= 0.569; p=.0005;
     - AND552: Front: mean RRA=0.693; Back: mean RRA= 0.603; p=.0015;

2. Comparing ground and deck access one finds that ground access is highly significantly more integrated than deck access, and that, in terms of the range and distribution of Integration values, they also behave as different samples.
   - AND552: Ground: mean/b RRA=0.641; Deck: mean RRA= 0.919; p=.0001;

Summing up, the findings from the analysis of dwelling samples suggest the following:

- Back access is significantly more integrated than front access, and ground is significantly more integrated than deck access. These statistical differences in terms of mean Integration and standard deviation suggest that the samples could be treated as separate samples (with differing ranges). As with the local factors, back and front
access has to be examined separately and the whole sample of dwelling faces needs to be broken down by ground and deck level for statistical purposes.

• Whilst there is no clear difference between average front/back mean Integration values of burgled and nonburgled dwellings, with respect to front access alone, front burgled entrances were found to be significantly more segregated than nonburgled fronts overall. This was clearly the case at deck level (alone), where dwellings have front access only and little variation in terms of local factors, burgled dwellings were statistically, significantly more segregated than the nonburgled group. Thus the general trend for front access overall, and at deck level in particular, is for vulnerability to increase with segregation.

• Looking at front and back access at ground level, burgled dwelling faces appear to be more segregated than the respective nonburgled faces, in both cases, but the difference is weaker and not statistically proven. With respect to the front/back average RRAs however, the difference goes the other way: burgled dwellings are overall more integrated than the nonburgled, particularly with respect to the ground system on its own, though again the differences are not statistically proven.

This may at first sight seem rather contradictory, since taken separately front and back access appear to become more vulnerable with segregation. What this may be suggesting, is that the nonburgled faces of burgled dwellings tend to be more integrated, so that the average f/b degree of integration of burgled dwellings is higher than the average. This may also make sense when considering how burglars operate, as the usual procedure is to first check that the house is empty, by ringing the door bell a couple of times first and then breaking in shortly after, preferably from the back 20.

6.5.2 Relationship between Burglary risk and Integration:
Sample of burgled axial lines.

Burglary rates are calculated on the basis of potential targets (front or back access faces) per axial line in order to establish the relationship between burglary risk and integration - as a measure of global accessibility- of the axial lines.

20 See interviews with burglars in Maguire (1982) 'Burglary in a Dwelling' pp. 82-86
The scattergrams in figures 6.22 A; B; and C; show the relationship between burglary rates and the degree of Integration (log) RRA with respect to all systems of reference:
- local systems: for the whole estate on its own; the ground level on its own; (scattergrams A and B respectively); and
- global systems: -the whole and the ground embedded in the urban context (scattergrams C and D respectively).

Figure 6.22A deals with total access (front and back); Figures 6.22 B and 6.22 C deal with front and back access separately. By simple visual inspection of the scattergrams one notes that many spaces have equal burglary rates (forming a horizontal line), particularly those with a rate of 1/2. The standardisation of number of dwellings per axial line, inevitably has an effect on the scatters and generally weakens the correlations, as noted in the case of the Ferrier. Here however, the range is wider and some of the correlations in the first column (total access) are strong:

- On the ground level, both alone and embedded in its context there is a powerful and highly statistically significant correlation between RRA and burglary rates, with burglary risk increasing with segregation:
  - AND205 (local system): \( R = .812 \) \( p = .0001 \) (highly significant)
  - AND328 (global ground): \( R = .787 \) \( p = .0001 \)

- With respect to the whole estate one finds somewhat less powerful correlations, and less tidy scatters, yet still highly significant:
  - ANDOV429 (local all): \( R = .577 \) \( p = .0001 \)
  - ANDOV552 (global all): \( R = .604 \) \( p = .0001 \)

Looking at front access on its own (figure 6.22 B):

- With respect to the ground level on its own (Scattergram B) the powerful correlation observed for the whole (ground and deck) sample remains; in the whole system correlations are somewhat weaker, influenced by the standardisation of recessed entrance spaces with burglary rates of 1/2, which particularly affects the deck level. However, the trend is the same as with total access rates, with burglary risk increasing with segregation:
  - AND205 (local ground): \( R = .812 \) \( p = .0001 \)
  - AND552 (global whole): \( R = .503 \) \( p = .0018 \)
  - AND328 (global ground): \( R = .78 \) \( p = .0004 \)

Looking at back access on its own (figure 6.22 C):

- Here the correlations break down. A clear split in the scatters is observable, between the more segregated spaces, with constant burglary rates of 1/4, and the more integrated spaces. One discerns a second trend, with burglary rates increasing with Integration.
  - AND205: \( R = .554 \) \( p = .15 \) (non sign.)

\(^{21}\) This is due to the standardised block typology, combined with the fact that most axial lines only cover one block of dwellings front or back; the recesses and dead end alleys always have two entrances.
### ANDOVER FSTATE: 209 INTEGRATION BANDS

<table>
<thead>
<tr>
<th>RRA BANDS</th>
<th>RANGE</th>
<th>NUMBER OF AXIAL LINES</th>
<th>TOTAL NO BURG. FACTS</th>
<th>TOTAL ACCNS. FACTS</th>
<th>FRONT ACCNS. FACTS</th>
<th>BACK ACCNS. FACTS</th>
<th>FRONT BURG. FACTS</th>
<th>BACK BURG. FACTS</th>
<th>RRA RANG.</th>
<th>AVERAGE FE BACK ACCNS. (%)</th>
<th>VISUAL EXPOSURE</th>
<th>% OF YHRC ACCNS.</th>
<th>LEYKI</th>
</tr>
</thead>
<tbody>
<tr>
<td>WHOLE FSTATE: RRA 49</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOP 20%</td>
<td>INT</td>
<td>59</td>
<td>16</td>
<td>5</td>
<td>13</td>
<td>11</td>
<td>0.439</td>
<td>0.694</td>
<td>0.609</td>
<td>87.9%</td>
<td>4.52</td>
<td>4.13</td>
<td></td>
</tr>
<tr>
<td>20-40%</td>
<td>INT</td>
<td>58</td>
<td>5</td>
<td>1</td>
<td>13</td>
<td>4</td>
<td>1</td>
<td>0.701</td>
<td>0.766</td>
<td>0.737</td>
<td>44.8%</td>
<td>2.45</td>
<td>8.6%</td>
</tr>
<tr>
<td>40-60%</td>
<td>MID</td>
<td>58</td>
<td>16</td>
<td>277</td>
<td>277</td>
<td>0</td>
<td>166</td>
<td>0.768</td>
<td>0.892</td>
<td>0.858</td>
<td>79.9%</td>
<td>1.91</td>
<td>7.4%</td>
</tr>
<tr>
<td>40-60%</td>
<td>SFG</td>
<td>58</td>
<td>6</td>
<td>160</td>
<td>194</td>
<td>0</td>
<td>0</td>
<td>0.92</td>
<td>1.077</td>
<td>0.977</td>
<td>0</td>
<td>1.14</td>
<td>2</td>
</tr>
<tr>
<td>TOP 20%</td>
<td>SFG</td>
<td>58</td>
<td>1</td>
<td>40</td>
<td>140</td>
<td>0</td>
<td>12</td>
<td>1.077</td>
<td>1.394</td>
<td>1.109</td>
<td>0</td>
<td>1.06</td>
<td>2</td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
<td></td>
<td>55</td>
<td>996</td>
<td>77</td>
<td>43</td>
<td>0.439</td>
<td>1.784</td>
<td>0.833</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FSTATE IN CONTEXT: RRA 492</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOP 20%</td>
<td>INT</td>
<td>59</td>
<td>15</td>
<td>3</td>
<td>14</td>
<td>186</td>
<td>5</td>
<td>0</td>
<td>0.435</td>
<td>0.665</td>
<td>0.583</td>
<td>91.38</td>
<td>4.48</td>
</tr>
<tr>
<td>20-40%</td>
<td>INT</td>
<td>58</td>
<td>9</td>
<td>1</td>
<td>118</td>
<td>4</td>
<td>8</td>
<td>0.666</td>
<td>0.733</td>
<td>0.705</td>
<td>59.66</td>
<td>2.43</td>
<td>8.6%</td>
</tr>
<tr>
<td>40-60%</td>
<td>MID</td>
<td>58</td>
<td>11</td>
<td>226</td>
<td>226</td>
<td>0</td>
<td>11</td>
<td>0.71</td>
<td>0.853</td>
<td>0.787</td>
<td>2.41</td>
<td>1.93</td>
<td>14.4%</td>
</tr>
<tr>
<td>40-60%</td>
<td>SFG</td>
<td>58</td>
<td>5</td>
<td>149</td>
<td>149</td>
<td>0</td>
<td>5</td>
<td>0.857</td>
<td>0.993</td>
<td>0.94</td>
<td>5.17</td>
<td>1.32</td>
<td>1.74%</td>
</tr>
<tr>
<td>TOP 20%</td>
<td>SFG</td>
<td>58</td>
<td>14</td>
<td>176</td>
<td>176</td>
<td>0</td>
<td>16</td>
<td>0.983</td>
<td>1.281</td>
<td>0.966</td>
<td>0</td>
<td>1.07</td>
<td>0</td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
<td></td>
<td>90</td>
<td>990</td>
<td>77</td>
<td>43</td>
<td>0.439</td>
<td>1.784</td>
<td>0.833</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>GROUND BAND 20%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOP 20%</td>
<td>INT</td>
<td>59</td>
<td>7</td>
<td>194</td>
<td>71</td>
<td>1</td>
<td>5</td>
<td>0.369</td>
<td>0.963</td>
<td>0.909</td>
<td>100</td>
<td>5.09</td>
<td>71.1%</td>
</tr>
<tr>
<td>20-40%</td>
<td>INT</td>
<td>58</td>
<td>9</td>
<td>1</td>
<td>141</td>
<td>1</td>
<td>4</td>
<td>0.563</td>
<td>0.671</td>
<td>0.671</td>
<td>86.67</td>
<td>4.07</td>
<td>0</td>
</tr>
<tr>
<td>40-60%</td>
<td>MID</td>
<td>58</td>
<td>5</td>
<td>77</td>
<td>50</td>
<td>27</td>
<td>5</td>
<td>0.693</td>
<td>0.723</td>
<td>0.706</td>
<td>44.83</td>
<td>2.62</td>
<td>10.34</td>
</tr>
<tr>
<td>40-60%</td>
<td>SFG</td>
<td>58</td>
<td>5</td>
<td>4</td>
<td>66</td>
<td>8</td>
<td>5</td>
<td>0.79</td>
<td>0.796</td>
<td>0.746</td>
<td>40</td>
<td>2.03</td>
<td>7.5%</td>
</tr>
<tr>
<td>TOP 20%</td>
<td>SFG</td>
<td>58</td>
<td>7</td>
<td>78</td>
<td>78</td>
<td>0</td>
<td>5</td>
<td>0.796</td>
<td>0.897</td>
<td>0.841</td>
<td>4.67</td>
<td>2.07</td>
<td>1.11%</td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
<td></td>
<td>90</td>
<td>990</td>
<td>77</td>
<td>43</td>
<td>0.439</td>
<td>1.784</td>
<td>0.833</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DFZ ONLY RRA 429</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOP 20%</td>
<td>INT</td>
<td>4</td>
<td>3</td>
<td>89</td>
<td>88</td>
<td>0</td>
<td>3</td>
<td>0.729</td>
<td>0.924</td>
<td>0.843</td>
<td>1.78</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>20-40%</td>
<td>INT</td>
<td>8</td>
<td>2</td>
<td>78</td>
<td>78</td>
<td>0</td>
<td>2</td>
<td>0.927</td>
<td>0.981</td>
<td>0.961</td>
<td>1.18</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>40-60%</td>
<td>MID</td>
<td>29</td>
<td>4</td>
<td>62</td>
<td>6</td>
<td>0</td>
<td>4</td>
<td>0.98</td>
<td>1.027</td>
<td>1.092</td>
<td>1.07</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>40-60%</td>
<td>SFG</td>
<td>28</td>
<td>0</td>
<td>56</td>
<td>56</td>
<td>0</td>
<td>0</td>
<td>1.051</td>
<td>1.097</td>
<td>1.067</td>
<td>1</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>TOP 20%</td>
<td>SFG</td>
<td>28</td>
<td>12</td>
<td>80</td>
<td>80</td>
<td>0</td>
<td>17</td>
<td>1.097</td>
<td>1.294</td>
<td>1.218</td>
<td>1.14</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
<td></td>
<td>143</td>
<td>143</td>
<td>77</td>
<td>43</td>
<td>0.439</td>
<td>1.784</td>
<td>0.833</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>DFZ RRA 432</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOP 20%</td>
<td>INT</td>
<td>8</td>
<td>8</td>
<td>176</td>
<td>176</td>
<td>0</td>
<td>8</td>
<td>0.658</td>
<td>0.865</td>
<td>0.785</td>
<td>1.78</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>20-40%</td>
<td>INT</td>
<td>8</td>
<td>7</td>
<td>79</td>
<td>79</td>
<td>0</td>
<td>3</td>
<td>0.851</td>
<td>0.922</td>
<td>0.895</td>
<td>1.18</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>40-60%</td>
<td>MID</td>
<td>9</td>
<td>3</td>
<td>62</td>
<td>62</td>
<td>0</td>
<td>3</td>
<td>0.922</td>
<td>0.977</td>
<td>0.94</td>
<td>1.07</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>40-60%</td>
<td>SFG</td>
<td>28</td>
<td>3</td>
<td>58</td>
<td>58</td>
<td>0</td>
<td>3</td>
<td>0.977</td>
<td>1.023</td>
<td>0.995</td>
<td>1.04</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>TOP 20%</td>
<td>SFG</td>
<td>28</td>
<td>10</td>
<td>74</td>
<td>74</td>
<td>0</td>
<td>10</td>
<td>1.023</td>
<td>1.155</td>
<td>1.129</td>
<td>1.11</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>TOTALS</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
<td>5</td>
<td>77</td>
<td>43</td>
<td>0.439</td>
<td>1.784</td>
<td>0.833</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Summing up, overall there appears to be a strong correlation between burglary rates and degree of segregation of the axial lines, particularly at ground level, since at deck the standardised dwellings per line distort the correlation. However, looking at front and back access separately, one finds that it is front access which shows the strong correlation between burglary rates and segregation, though the correlation is largely influenced by the high proportion of spaces with 'semiprivate' recessed front access. With respect to back access there appear to be two trends, one coinciding with front access and a second trend going in the opposite direction, with burglary rates increasing with integration, particularly in relation to the more integrated spaces. The latter reversal with back access was also observed in the previous case study (see section 5.5).

However, in order to attain a more complete picture of the relationship between Integration/segregation and burglary risk, one needs to overcome the problem of standardisation, as well as that of the performance of spaces with no burglaries (during the one year data period) - by looking at the Integration bands.

6.5.3 Relationship between Burglary risk and Integration: Breakdown into Integration bands:

The sample of axial lines with front and back access are ordered and broken into five RRA bands, in each spatial system of reference as before. For each band, burglary rates are calculated on the basis of the sum of burglaries divided by the sum of dwelling faces for front access and back access ground level samples, deck level and the whole (see section 3.4.5). Other dwelling variables such as degree of surveillability; proportion of front and back accessed dwellings; proportion of vehicular access lines; and proportion of lines on ground and deck level are also included, in order to give a fuller picture of the estate profile with respect to integration bands. Table 6.5.3 presents the tabulated data with respect to the Integration bands.

I. Estate as a whole:

Indexed with a number of dwelling faces, and a number of burgled faces and ordered with respect to degree of integration, the sample of lines in rank order of Integration is broken down into five equal bands, comprising of 20% of the access lines each, covering the range from the 20% most integrated to the 20% most segregated band.
ANOVER ESTATE: INTEGRATION BANDS

ESTATE ON ITS OWN

ESTATE IN CONTEXT

SCATTERGRAM A
FR B TOTAL ACCESS
Correlation: R = .592
p = .29

SCATTERGRAM B
FRONT ACCESS
Correlation: R = .713
p = .18

SCATTERGRAM C
BACK ACCESS
Correlation: R = .603
p = .28

y = .06x + .002, r² = .351

y = .08x - .015, r² = .508

y = .06x + .092, r² = .347

y = .08x - .01, r² = .347

y = .08x - .015, r² = .351

y = .08x - .01, r² = .347

y = .093x - .018, r² = .364

y = .245x + .197, r² = 1

y = .245x + .197, r² = 1

FIGURE 6.23: WHOLE ESTATE: CORRELATION BETWEEN BURGLAR RATES & INTEGRATION OF BANDS

COLUMN I: RRA 429

COLUMN II: RRA 552
Figure 6.23 presents the correlation between burglary rates (for total access (scattergrams A), front access (scattergrams B) and back access (scattergrams C) and mean Integration values for the five Integration bands, with respect to the estate system on its own (AND429- Column I). Column II presents the equivalent correlations with respect to the global spatial system of the estate embedded in its urban context (AND552). Each of these scattergrams plots the rate of burglary in each band against the degree of integration/segregation of the band, each space symbolising a band.

- **Total burglary rates: front and back access all.**
  The scatters are untidy and the correlation are weak, however the trend is for burglary risk to increase with segregation:
  
<table>
<thead>
<tr>
<th>System</th>
<th>R</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND429</td>
<td>.592</td>
<td>.29</td>
</tr>
<tr>
<td>AND552</td>
<td>.589</td>
<td>.296</td>
</tr>
</tbody>
</table>

  Of more interest is the actual scatter, one observes that although the overall trend is defined at the edges - the top integrated and segregated bands- towards the middle range the burglary rates appear to 'seesaw' (in the local system) or to reverse (in the global). In both cases however, there is a sharp drop after the first integration band (20% most integrated band), and a sharp rise at the other end between the fourth and fifth band (most segregated bands).

Looking at front and back access separately two different trends appear:

- **Front Access:** (see scattergrams B in columns I and II)
  In both the local (AND429) and the global (AND552) systems the front burglary rates follow more or less the same pattern as the total burglary rates (compare scattergrams A and D). The correlation is somewhat stronger, but the shape of the scatter is the same.

- **Back access:** (scattergrams C)
  The breakdown into integration bands shows that the more integrated back access is restricted to the two first bands in both AND429 and 552 systems. Here there is a clear drop in the back burglary rate with increasing segregation (from the top integration band to the 20-40% integration band).

Thus the sharp drop in (total) burglary rates between the first and second integration band can be explained as a result of combining the two trends (front and back): front burglary rates generally increasing with degree of segregation over the whole range of integration bands, and back access strongly influencing the pattern of vulnerability in the two most integrated bands.

Focusing on the above, the next subsection deals with ground and deck level separately with respect to their own respective integration bands. Figure 6.24 presents the scattergrams for ground (column I) and for Deck (column II) .follows the pattern of
ANDOVER ESTATE: GROUND & DECK LEVEL: INTEGRATION BANDS

GROUND ON ITS OWN

DECK LEVEL

FIGURE 6.24: GROUND DECK ACCESS: CORRELATION BETWEEN BURGL RATES & INTEGRATION OF BANDS
the previous figure dealing with . Column two only deals with front access in the local and global whole systems.

II -Ground Level on its own:

Figure 6.24 Column I presents as in the previous figure, the relationship between total burglary rates (Scattergram A) front (Scattergram B) and Back burglary rates (Scattergram C) respectively with degree of integration of the bands with respect to the ground system on its own (AND205). The correlations break down due to the sparsity of the data:

- There is no correlation between total ground burglary rates and degree of integration of the bands.
- Front access shows a very weak correlation (R = .338 p = .575) with segregation;
- Back access, which in this case covers four integration bands shows a weak correlation with integration, (R = .535 p = .465) as found in the previous subsection.

ii- Deck Level: (Column II)
The two scattergrams B1 and B2 present the correlation between front access burglary rates and degree of integration per band for the deck level in AND429 and AND552 respectively. The correlation with segregation is somewhat stronger:
AND552 R = .779 p = .12 and probably significant (significance is not proven; though logging this would improve the result).

This suggests that at deck level the probability of being burgled increases with the degree of segregation of the access line (particularly near the stairs to the upper level). At ground level there is no clear correlation between burglary risk and Integration/segregation. Front burglary rates overall tend to increase with segregation, though the dead end recessed access may be playing a role here, as at deck level. Which implies that local factors are affecting the pattern of risk. With respect to back access there is a trend also observed on the raised ground level of the Marquess Rd Estate, where risk first increases slightly with segregation but then falls with segregation towards the middle range.

On the whole, increasing segregation tends to increase vulnerability on the estate, though clearly at ground level back access and other local factors play an important role. Thus the next step is to examine how local factors such as degree of surveillability, vehicular access front/back or front only access relate to the integration bands?
FIGURE 6.25: LOCAL FACTORS: CORRELATION BETWEEN AVE RATES & INTEGRATION OF BANDS
- **Correlation between Local factors and Integration of bands.**

Scattergrams a-e in figure 6.25 illustrate the relationship between the local factors and degree of integration of the bands for the estate embedded in its context AND552: average surveillability of lines (scattergram a); total number of accessed dwelling faces (scattergram b); proportion above ground level access lines (scattergram c); proportion of lines with f/b dwellings (scattergram d); proportion of access lines with vehicular access (scattergram e) respectively. One observes the following:

- **Average surveillability:** one finds that there is a very strong correlation with degree of Integration of the bands: $R = .902$ with a high statistical significance of $p = .036$. In the most segregated bands visual surveillability is highly restricted (mainly recessed dwelling entrance spaces).

- **Level of Access:** as expected, there is a very strong correlation between proportion of deck access lines and segregation:
  
  AND552 (global system): $R = .949$ $p = .014$ highly significant.

  In the top two segregation bands almost all access lines are at deck level.

- **Front/back access (double sided):** there is also a strong correlation between the proportion of lines accessing f/b dwellings and the degree of integration of the bands:
  
  AND552 (global system): $R = .91$ $p = .032$ statistically significant.

  This suggests that dwellings with front and back access tend to be accessed from more integrated lines. The front only accessed dwellings are on the more segregated lines. Again in the top two segregated bands there are no f/b dwelling lines.

- **Vehicular access:** again there is the same predictable pattern as above. The proportion of access lines with vehicular access drops with increasing segregation. The correlations are very strong and predictability is very high:
  
  ANDOV552 (global system): $R = .907$ $p = .033$ (statistically significant).

  Again in the top two segregated bands there are obviously no vehicular access lines, since, as noted above, they are at deck level.

---

23 The same scattergrams with respect to AND429 (whole on its own) show equally powerful correlations. The local factors were attributed to access spaces and axial lines, and then summed and divided into bands.

24 Here surveillability is measured roughly in terms of the surveillability of the majority of dwellings on the axial line, by degrees of surveillability in an interval scale from 1-7, equivalent to the categories discussed in section 4.3.
SCATTERGRAM A
TOTAL BURGL RATES
Correlation
R = .354
p = .56

SCATTERGRAM B
TOTAL BURGL RATES
Correlation
R = .395
p = .51

FIGURE 6.26 : LOCAL FACTORS; CORRELATION BETWEEN TOTAL BURGL RATES & LOCAL FACTORS IN INT. BAND
Total number of access faces (Scattergram b): Here one finds strong fluctuation in the distribution of dwelling faces per Integration band, and a relatively weaker correlation with segregation. The highest number of dwelling faces is in the most integrated band, but drops sharply in the second most integrated band, rising again in the third (middle) band and dropping again in the two most segregated bands.

Finally figure 6.26 investigates the correlation between total burglary rates and average degree of surveillability per band (scattergram A), and total burglary rates and total access per band scattergram B):

- No correlations appear in either case, which suggests that although the local variables correlate well with degree of Integration of the bands, these variables are not intervening with respect to the correlation between burglary rates and mean RRA of the bands.

Summing up, there is a rather surprising consistency in the relationship between the local factors and the degree of Integration of the five bands. What the above scattergrams illustrate, is that with increasing segregation of the bands, the average degree of visual surveillability in the axial spaces falls, that there is an increasing proportion of deck level access, decreasing proportion of access to front/back dwellings and decreasing proportion of spaces with vehicular access. With the exception of the average number of dwellings per band, the above factors seem to increase or decrease in correlation to the degree of integration of the bands, so that the spatial hierarchy is also followed by a parallel hierarchy in the degree of surveillability; the proportion of vehicular access; proportion of deck access; etc. local variables - at the level of the band. Thus ground and deck level relate to basic thresholds of integration segregation. The exception here is - the total number of access faces (b) which generally decreases with segregation, but shows no clear correlation.

6.5.4 Summary of the Pattern of Vulnerability with respect to Global Accessibility.

The analysis of the samples of burgled/nonburgled dwelling faces: revealed that front access, which comprises over 70% of access overall, is highly significantly more segregated than back access, and deck access highly significantly more segregated than ground. Whilst overall the differences between burgled and nonburgled samples showed no clear difference, front access clearly seemed to become more vulnerable with segregation - burgled dwelling faces were found to be significantly more
segregated than nonburgled overall, and at deck level in particular - where local factors
are relatively controlled.

At ground level the differences weaken, but the same trend can be discerned. Front and
back burgled faces are more segregated than nonburgled one, though with back access
this applies only with respect to the global systems not the local ground system.
However, with respect to average front/back Integration rates, burgled
dwellings were found to be overall more integrated than nonburgled dwellings.
This is not as contradictory as it seems at first, since front and back access to each
dwelling may differ considerably, and burgled dwellings' nonburgied sides tend to
be highly integrated, shifting the front /back average. Furthermore, since burglars
would always check whether the dwelling is occupied, and would go round the front
first to ring the bell, it is likely that the overall integration of the dwelling,
particularly the back, would play an important role in target selection.

The analysis of burgled axial lines, agrees with the above pattern of vulnerability,
though correlations are strongly influenced by the standardisation of numbers of
dwellings per axial line, due to the block and cluster typology. Strong correlations are
found between front burglary rates and degree of segregation, in all systems,
local and global for the estate as a whole and particularly with respect to the ground
level on its own, since at deck level, and to a lesser degree at ground level, the standard
number of dwellings per axial line strongly affects the correlation. (Front access clearly
determines the overall trend to a large degree.) With respect to back access on its own
the correlations weaken, as two different trends appear: one trend with high burglary
rates at the more segregated end, another trend with burglary rates at the more
integrated end decreasing with segregation. The first trend could be explained by
the high burglary rates on shorter and more segregated lines with standardised fewer
numbers of dwellings.

In the breakdown by integration bands, the differences between front and back access
within the global pattern of vulnerability are illustrated more clearly:
Front burglary risk tends to increase with segregation, though this pattern is
determined at the extremes of the RRA scale, for the whole estate, while scatters are
untidy and correlations relatively weak in all systems. At ground level on its own, the
correlation weakens even further, and for total f/b burglary rates the correlation
disappears completely, since front and back ground burglary risk patterns appear to
clash. Back access, restricted to the top integrated bands in the whole system,
clearly decreases in risk with segregation. Elaborated in more detail at ground level
alone, this trend first peaks in the second band and then decreases in the following
bands to zero in the most segregated band. This agrees with the findings on the Ferrier Estate (see section 5.5.3), where back burglary risk decreases with segregation, also in contrast to the front vulnerability pattern.

Local access factors, which were found to play an important role in determining burglary risk (section 6.3), correlate strongly with the degree of integration of the bands (but not with the burglary rates of the bands). The global pattern of vulnerability is influenced by the multiplicity of local factors, which are at play, as discussed in earlier sections, and by the higher ratio between back and front access (ratio 2:3). At deck level, as in the case on the Marquess and the Ferrier, the variation in terms of local factors is highly restricted, while the global pattern clearly relates to segregation. The analysis of the integration bands for the estate as a whole shows that back access is restricted mainly to the two top integrated bands, while deck access is restricted to the top two most segregated bands. The highly significant correlation between proportion of above ground lines and degree of Integration in the bands confirms this.

Differences between front and back access in terms of local factors and differences between ground and deck, can be explained further by the local factors relating to them - making it clearly necessary to treat front and back access as separate faces and ground and deck level as separate categories. Local factors analysed with respect of the bands are found to strongly correlate strongly with degree of Integration of the RRA bands, particularly the average degree of visual surveillability; the proportion of vehicular access spaces; the proportion of front/back dwellings decrease in strong correlation with degree of segregation, whilst the proportion of deck access increases accordingly. These correlations illustrate the principle of hierarchy of public to private access in the overall spatial structure very clearly, in essence showing that the hierarchy of access relating to spatial segregation is also reflected in a hierarchy of reduced surveillability and predominantly pedestrian only access.

Combining the results of the three stages of the analysis of vulnerability with respect to global accessibility, the overall pattern that arises appears to relate predominantly to segregation -both in the local spatial system (estate on its own) and the estate embedded in its context. However, it is front access that determines the overall trend; whilst back access, which differs from front access in local terms as well as in terms of range of integration, vulnerability increases with integration. However, there is clearly interaction between the global and local factors, the problem thus remains to identify the relationship between them, particularly at ground level, where the local factors vary to a large degree.
6.6 **Interrelationship between Local and Global factors.**

Section 6.3 identified that local factors affected the pattern of burglary risk: restricted visual surveillability was found to increase burglary risk, as well as specific combinations of front/back or front-only access; dwelling type; low visual surveillability; vehicular/non-vehicular access, were found to have particularly high burglary rates. Specifically, with respect to:

- **Front access:**
  i- Front/back maisonettes and flats with 'shielded' or 'recessed-1' front vehicular access are most vulnerable;
  ii- Front-only, 'recessed 2', non-vehicular access, with front entrances off the tunnels at ground level (G1 flats) and up the semiprivate stairs at deck level (D2 maisonettes) are highly vulnerable;

- **Back access:**
  i- the backs of houses (G2), off-court and in-court, with non-vehicular access are most vulnerable;

On the other hand, combinations such as 'shielded' backs of houses with vehicular access; or 'recessed-1' fronts with non-vehicular access; were found to be less vulnerable.

Section 6.5 found that segregation tends to generally increase vulnerability with respect to the overall more segregated front access, whereas with respect to back access it is integration, which increases vulnerability. But also that front access is considerably more segregated than back access, and deck more segregated than ground.

The final section of the analysis focuses on the way the local factors of accessibility and visual surveillability relate to the global factor of integration/segregation (or ranges thereof as discussed in the previous section), and how this interrelationship affects or determines the pattern of vulnerability.

In the following subsections, the sample of dwellings on the estate will be broken down by the local factors and differences between mean integration rates of burgled and nonburgled dwelling faces (front and back; ground and deck level) will be examined for each subcategory using T-tests as before for determining relative significance. The local factors examined here separately and then in combination are: dwelling type; degree of visual surveillability and vehicular access.
### Deck Level: Front Only Access

<table>
<thead>
<tr>
<th>RRA Spatial System</th>
<th>Upper Maisonettes</th>
<th>Deck Flats</th>
<th>Ground Level: FB Maisonettes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BURGL N 12</td>
<td>NONB N 01</td>
<td>Prob (2 tail)</td>
</tr>
<tr>
<td>RRA &amp;OVA429 Estate alone</td>
<td>1091</td>
<td>1054</td>
<td>217</td>
</tr>
<tr>
<td>RRA &amp;OVA205 Ground alone</td>
<td>Mean St Dev</td>
<td>0.152</td>
<td>0.106</td>
</tr>
<tr>
<td>RRA &amp;OVA478 Ground global</td>
<td>Mean St Dev</td>
<td>1.035</td>
<td>0.991</td>
</tr>
<tr>
<td>RRA &amp;OVA552 Whole in context</td>
<td>Mean &amp; OVA68 Simplified</td>
<td>0.971</td>
<td>0.897</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RRA Spatial System</th>
<th>Front Access</th>
<th>Back Access</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BURGL N 12</td>
<td>NONB N 01</td>
</tr>
<tr>
<td>RRA &amp;OVA429 Estate alone</td>
<td>Mean St Dev</td>
<td>0.769</td>
</tr>
<tr>
<td>RRA &amp;OVA205 Ground alone</td>
<td>Mean St Dev</td>
<td>0.772</td>
</tr>
<tr>
<td>RRA &amp;OVA478 Ground global</td>
<td>Mean St Dev</td>
<td>0.719</td>
</tr>
<tr>
<td>RRA &amp;OVA552 Whole in context</td>
<td>Mean St Dev</td>
<td>0.719</td>
</tr>
<tr>
<td>RRA &amp;OVA68</td>
<td>Mean St Dev</td>
<td>0.595</td>
</tr>
</tbody>
</table>
6.6.1 Breakdown of Sample of Dwelling Faces (Mean RRAs) by Front / Back Access and Dwelling Type.

Table 6.6.1A presents the differences between burgled/nonburgled dwellings in terms of front and back mean Integration values broken down by dwelling type. From this one may observe the following:

I. Ground level:

1. Front-only flats-(G1): -the most vulnerable category - are also the most segregated group at ground level. The difference between burgled and nonburgled fronts varies between systems of reference: Apart from the whole estate on its own (AND429), where burgled dwelling fronts are slightly more segregated than nonbugled ones; with respect to the ground system on its own; and the global ground and whole systems, burgled dwellings appear to be somewhat more integrated than nonburgled, though significance are rather weak or statistically 'not proven':

<table>
<thead>
<tr>
<th>System</th>
<th>Burgled m.RRA</th>
<th>Nonb. m.RRA</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND429</td>
<td>.769</td>
<td>.753</td>
<td>.54</td>
</tr>
<tr>
<td>AND205</td>
<td>.724</td>
<td>.748</td>
<td>.274</td>
</tr>
<tr>
<td>AND552</td>
<td>.710</td>
<td>.723</td>
<td>.19</td>
</tr>
</tbody>
</table>

2. Double sided dwellings: Front/back access: are more integrated front and back:

A. Front access:

- Houses: Burgled fronts are more integrated than nonburgled -fronts:

<table>
<thead>
<tr>
<th>System</th>
<th>Burgled m.RRA</th>
<th>Nonb. m.RRA</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND328</td>
<td>.577</td>
<td>.666</td>
<td>.14</td>
</tr>
<tr>
<td>AND552</td>
<td>.589</td>
<td>.658</td>
<td>.19</td>
</tr>
</tbody>
</table>

(significance not proven)

- The more vulnerable burgled fronts of F/B flats ('recessed-1') and maisonettes ('shielded' fronts) are overall more segregated than the nonburgled fronts, in all systems of reference. For example:

<table>
<thead>
<tr>
<th>Flats:</th>
<th>Burgled m.RRA</th>
<th>Nonb. m.RRA</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND429</td>
<td>.837</td>
<td>.747</td>
<td>.06</td>
</tr>
<tr>
<td>AND552</td>
<td>.807</td>
<td>.699</td>
<td>.11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maisonettes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burgled m.RRA</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>AND205</td>
</tr>
<tr>
<td>AND552</td>
</tr>
</tbody>
</table>

B. Back access:

- The more vulnerable burgled backs of houses, are more segregated than nonburgled backs, particularly in the global ground and global whole system, whereas with respect to the local systems the difference between burgled and nonburgled backs almost disappears:

<table>
<thead>
<tr>
<th>System</th>
<th>Burgled m.RRA</th>
<th>Nonb. m.RRA</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANDO5328:</td>
<td>.611</td>
<td>.582</td>
<td>.20</td>
</tr>
<tr>
<td>ANDO552:</td>
<td>.598</td>
<td>.581</td>
<td>.37</td>
</tr>
<tr>
<td>DWELLING TYPE</td>
<td>RRA - SPATIAL SYSTEM</td>
<td>FRONT ACCESS</td>
<td>BURGL RISK</td>
</tr>
<tr>
<td>---------------</td>
<td>----------------------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>DECK MAISONETTES</td>
<td>ANDOV552 GLOBAL ALL</td>
<td>Mean</td>
<td>1.035</td>
</tr>
<tr>
<td>DFCK FLATS</td>
<td>ANDOV552 GLOBAL ALL</td>
<td>Mean</td>
<td>0.89</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GROUND LEVEL</th>
<th>BACK ACCESS</th>
<th>BURGL RISK</th>
<th>DWEL.FACE</th>
</tr>
</thead>
<tbody>
<tr>
<td>G1 FLATS FRONT-ONLY</td>
<td>ANDOVO525 Local ground</td>
<td>Mean</td>
<td>0.724</td>
</tr>
<tr>
<td></td>
<td>ANDOVO552 GLOBAL ALL</td>
<td>Mean</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F/B FLATS</td>
<td>ANDOVO525 Local ground</td>
<td>Mean</td>
<td>0.841</td>
</tr>
<tr>
<td></td>
<td>ANDOVO552 GLOBAL ALL</td>
<td>Mean</td>
<td>0.807</td>
</tr>
<tr>
<td>HOUSES</td>
<td>ANDOVO525 Local ground</td>
<td>Mean</td>
<td>0.578</td>
</tr>
<tr>
<td></td>
<td>ANDOVO552 GLOBAL ALL</td>
<td>Mean</td>
<td>0.589</td>
</tr>
<tr>
<td>MAISONETTE F/B</td>
<td>ANDOVO525 Local ground</td>
<td>Mean</td>
<td>0.641</td>
</tr>
<tr>
<td></td>
<td>ANDOVO552 GLOBAL ALL</td>
<td>Mean</td>
<td>0.661</td>
</tr>
</tbody>
</table>
With respect to the f/b flats there is only one burgled back (inner court), which is more segregated than the average, but no conclusions can be drawn here.

AND205: Burgled RRA= .605  Nonb. m.RRA=.571  p=.81
ANDOV552: Burgled RRA= .644  Nonb. m.RRA=.587  p=.57

There are no back burglaries in the maisonette group.

II. **Deck level (front-only access):**

- The more vulnerable D2 deck maisonettes (recessed-2; up the stairs) are also considerably more segregated than the D1 deck flats (recessed-1), which are accessed directly off the decks.

- In both cases burgled dwellings are more segregated than nonburgled dwellings in all spatial systems of reference, and the difference is probably significant statistically, for example in:
  
  **ANDOV552:**
  
  MAIS.: Burgled m. RRA=1.035  Nonb. m.RRA=.991  p=.105  (Prob. signif)
  FLATS: Burgled m. RRA=.89  Nonb. m.RRA=.842  p=.116

With respect to deck flats, the difference in terms of global integration between burgled and nonburgled dwellings is significant in the global simple spatial system ANDOV368: Burgled m. RRA=.97  Nonb. m.RRA=.897  p=.05

Summing up, vulnerability to burglary with respect to dwelling type and respective degree of integration, the following pattern of arises (see figure 6.6.1B):

- In the majority of cases vulnerability increases with segregation a.) **across dwelling types** and to an extent b.) **within** dwelling type categories:
  
  a. Comparing across dwelling types in terms of burglary risk and integration:

  i) Deck maisonettes are found to be more segregated and more highly vulnerable than deck flats (with burglary rates of 6.94% and 5.55% respectively);

  ii) At ground level, the G1 flats (front-only) are more segregated and also highly burgled (7.9%)\(^{25}\), compared to both the fronts and backs of houses and f/b flats, with the exception of the limited number of ground maisonettes.

  b. Comparing burgled/nonburgled dwellings within each dwelling type:

  i- In the case of **deck maisonettes** (D2) and **flats** (D1), burgled fronts are more segregated than nonburgled.

  ii- At ground level the more vulnerable burgled **fronts of f/b maisonettes and flats** are more segregated than their respective nonburgled average. The more vulnerable burgled **backs of houses** (in-court, off-court, and shielded) are more segregated than respective nonburgled backs.

2. In contrast to the above, the burgled fronts of already highly segregated front-only G1 flats, are more integrated than their respective nonburgled fronts.

\(^{25}\) See table 6.4.2.
### Ground Level

<table>
<thead>
<tr>
<th>Spatial System</th>
<th>Visually Exposed</th>
<th>Visually Shielded</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>RR</strong></td>
<td>Front Access 4%</td>
<td>Front Access 2%</td>
</tr>
<tr>
<td></td>
<td>Back Access 4%</td>
<td>Back Access 2%</td>
</tr>
<tr>
<td><strong>ANDOVER 429</strong></td>
<td>Estate al ne</td>
<td>Estate al ne</td>
</tr>
<tr>
<td></td>
<td>Mean 0.545</td>
<td>Mean 0.545</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.127</td>
<td>St. Dev 0.104</td>
</tr>
<tr>
<td><strong>ANDOVER 205</strong></td>
<td>Ground at ne</td>
<td>Ground at ne</td>
</tr>
<tr>
<td></td>
<td>Mean 0.495</td>
<td>Mean 0.545</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.154</td>
<td>St. Dev 0.105</td>
</tr>
<tr>
<td><strong>RR</strong></td>
<td>Grun gal</td>
<td>Grun gal</td>
</tr>
<tr>
<td><strong>ANDOVER 328</strong></td>
<td>Mean 0.551</td>
<td>Mean 0.551</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.117</td>
<td>St. Dev 0.105</td>
</tr>
<tr>
<td><strong>RR</strong></td>
<td>Grun gal</td>
<td>Grun gal</td>
</tr>
<tr>
<td><strong>ANDOVER 5</strong></td>
<td>Mean 0.553</td>
<td>Mean 0.553</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.109</td>
<td>St. Dev 0.094</td>
</tr>
</tbody>
</table>

### Tunnel

<table>
<thead>
<tr>
<th>Spatial System</th>
<th>Front Access 4%</th>
<th>Front Access 2%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANDOVER 429</strong></td>
<td>Estate al ne</td>
<td>Estate al ne</td>
</tr>
<tr>
<td></td>
<td>Mean 0.781</td>
<td>Mean 0.781</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.009</td>
<td>St. Dev 0.006</td>
</tr>
<tr>
<td><strong>ANDOVER 205</strong></td>
<td>Ground at ne</td>
<td>Ground at ne</td>
</tr>
<tr>
<td></td>
<td>Mean 0.772</td>
<td>Mean 0.772</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.005</td>
<td>St. Dev 0.005</td>
</tr>
<tr>
<td><strong>RR</strong></td>
<td>Grun gal</td>
<td>Grun gal</td>
</tr>
<tr>
<td><strong>ANDOVER 328</strong></td>
<td>Mean 0.761</td>
<td>Mean 0.761</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.004</td>
<td>St. Dev 0.006</td>
</tr>
<tr>
<td><strong>RR</strong></td>
<td>Grun gal</td>
<td>Grun gal</td>
</tr>
<tr>
<td><strong>ANDOVER 5</strong></td>
<td>Mean 0.745</td>
<td>Mean 0.745</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.007</td>
<td>St. Dev 0.009</td>
</tr>
<tr>
<td><strong>RR</strong></td>
<td>Grun gal</td>
<td>Grun gal</td>
</tr>
<tr>
<td><strong>ANDOVER 5</strong></td>
<td>Mean 0.725</td>
<td>Mean 0.725</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.008</td>
<td>St. Dev 0.004</td>
</tr>
</tbody>
</table>

### Off Court

<table>
<thead>
<tr>
<th>Spatial System</th>
<th>Front Access 4%</th>
<th>Front Access 2%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANDOVER 429</strong></td>
<td>Estate al ne</td>
<td>Estate al ne</td>
</tr>
<tr>
<td></td>
<td>Mean 0.547</td>
<td>Mean 0.547</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.007</td>
<td>St. Dev 0.007</td>
</tr>
<tr>
<td><strong>ANDOVER 205</strong></td>
<td>Ground at ne</td>
<td>Ground at ne</td>
</tr>
<tr>
<td></td>
<td>Mean 0.764</td>
<td>Mean 0.764</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.004</td>
<td>St. Dev 0.006</td>
</tr>
<tr>
<td><strong>RR</strong></td>
<td>Grun gal</td>
<td>Grun gal</td>
</tr>
<tr>
<td><strong>ANDOVER 328</strong></td>
<td>Mean 0.564</td>
<td>Mean 0.564</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.007</td>
<td>St. Dev 0.006</td>
</tr>
<tr>
<td><strong>RR</strong></td>
<td>Grun gal</td>
<td>Grun gal</td>
</tr>
<tr>
<td><strong>ANDOVER 5</strong></td>
<td>Mean 0.545</td>
<td>Mean 0.545</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.006</td>
<td>St. Dev 0.009</td>
</tr>
<tr>
<td><strong>RR</strong></td>
<td>Grun gal</td>
<td>Grun gal</td>
</tr>
<tr>
<td><strong>ANDOVER 5</strong></td>
<td>Mean 0.571</td>
<td>Mean 0.571</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.008</td>
<td>St. Dev 0.006</td>
</tr>
</tbody>
</table>

### Ground Level

<table>
<thead>
<tr>
<th>Spatial System</th>
<th>Front Access 4%</th>
<th>Front Access 2%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ANDOVER 429</strong></td>
<td>Estate al ne</td>
<td>Estate al ne</td>
</tr>
<tr>
<td></td>
<td>Mean 0.547</td>
<td>Mean 0.547</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.007</td>
<td>St. Dev 0.007</td>
</tr>
<tr>
<td><strong>ANDOVER 205</strong></td>
<td>Ground at ne</td>
<td>Ground at ne</td>
</tr>
<tr>
<td></td>
<td>Mean 0.495</td>
<td>Mean 0.495</td>
</tr>
<tr>
<td></td>
<td>St. Dev 0.154</td>
<td>St. Dev 0.104</td>
</tr>
</tbody>
</table>
G1 flats with 'recessed-2' entrances are one of the main vulnerable dwelling categories (with a burglary rate of 8.49%)\(^{26}\), whereas the burgled house fronts, which are also more integrated than the nonburgled sample, with varying degrees of surveillability are overall amongst the least vulnerable categories with a burglary rate of 1.89%.

At deck level, the conditions which relate to vulnerability are clear: **Increased segregation and minimum surveillability** increase burglary risk. At ground level there is a considerable range of combinations of factors, which needs further investigation.

### 6.6.2 Breakdown of Dwelling Samples (Mean Integration) by Surveillability Categories.

This subsection examines, how degree of surveillability and degree of integration relate to each other, and how their combined effects performs. **Table 6.6.2** presents the differences between front and back - burgled and nonburgled dwelling faces with respect to degree of Integration, broken down by degree of surveillability. As before the two aspects to be examined are: a) comparing across surveillability categories in terms of average Integration Rates and respective burglary rates; and b) investigating the relationship between degree of integration/segregation of burgled / nonburgled faces within each category.

With respect to the overall relationship between degree of surveillability, degree of integration and vulnerability (across categories) one observes the following:

- **Exposed** (back access only): is the most integrated category overall (for instance with respect to the whole estate in its global context ANDOV552: m.RRA = .53), the visually exposed backs category, is crime free (0/20 burglaries).

- **Shielded**: Front and back access:
  
  Fronts: The most integrated front access category, the shielded fronts of the ground flats of the tower blocks (AND552: NONB.\(^{27}\) m.RRA = .563) have one burglary out of 1/17 cases (5.88%), though on the basis of only one burglary it is difficult to make firm statements.

---

\(^{26}\) This rate is excluding the eight cases of Recessed -1 flats (not accessed off the little alleys) - with zero burglaries, otherwise the burglary rate for the G1 category is slightly lower at 7.9% as mentioned earlier.

\(^{27}\) The mean RRAs of the Nonburgled samples are used here, considering that they are close enough to the mean RRA of the whole Parent sample, at least for the purposes of this comparison.
Backs: The second most integrated back access category and second most integrated overall (ANDOV552: m. RRA = 0.56) with a burglary rate of 4.12%, below the overall average for back access of 4.88%

- **Tunnels**: Front access (and 8 backs):

The second most integrated front access category and third most integrated category overall, (ANDOV552: NONB. m.RRA = 0.599 front) are the tunnels28 with a very low burglary rate of 2.13%). Here vulnerability is very low (2.1%), though surveillability is restricted to axial views at the ends including views from the main access routes and the periphery but no visual surveillance from other dwellings.

- **Inner-courts and off-courts**: front and back access:

These are next in rank order of visual surveillability after the shielded, however both fronts and backs are considerably segregated more than the tunnels:

ANDOV552: Front Access Back Access
Offcourt: NONB. m.RRA (fr)=.741; NONB. m.RRA (back)=.626
In. court: NONB. m.RRA (fr)=.745; NONB. m.RRA (back)=.662

Although they are more integrated than the highly segregated recessed -1 and -2 groups as a whole (ground and deck level), at ground level they are actually the most segregated. Front access is considerably more segregated than back access, though vulnerability is higher with respect to back access29. Off-court backs are slightly more segregated than inner-courts and also more vulnerable with burglary rates of 7.31% and 6.78% respectively.

- **Recessed -1 and -2**: front access only:

ANDOV552:
Recessed-1: NONB. m.RRA (all)=.813; NONB. m.RRA (gr.)=.700
Recessed-2: NONB. m.RRA (all)=.904; NONB. m.RRA (gr.)=.725

With respect to ground and deck level (direct all) the recessed -1 and -2 groups are clearly the most segregated categories, the recessed-2 being the most segregated category overall. At ground level however, the recessed -1 and -2 groups come after the tunnel group in terms of degree of integration, and before the off- and inner courts (see table 6.6.2 (*) for overview).

Recessed -2 fronts are highly vulnerable with a burglary rate of 8.07% overall (ground and deck); 8.49% on the ground level only (second most vulnerable category overall); whereas recessed-1 are considerably less vulnerable with rates of 5.19% overall and 3.70% for ground level only.

Summing up, one finds that there is no straightforward correspondence between the rank order of surveillability categories and degree of Integration and that both integrated and segregated categories can be vulnerable:

---

28 There are also eight backs of f/b flats accessed off a tunnel space, with zero burglaries, but these have been left out of the analysis here since there is hardly anything one can say on the basis of so few cases.

29 Off-courts have a burglary rate of 3.45%, while inner-courts, even more segregated than the off-courts have a burglary rate of 0.00%
• With respect to **front access**: the main large highly vulnerable category are the recessed-2 fronts, which overall (ground and deck) are the most segregated. At ground level recessed -2 with a rate of (8.49%), though highly segregated, are less so than the off- and inner-courts, which have a relatively low rate of burglary (3.45% - less than half that of the recessed-2), while the inner-court fronts, the most segregated ground fronts have zero burglaries (0.00%). In contrast, the small and most vulnerable subgroup of shielded fronts (10.53%) are the most integrated. In the middle ground, the relatively integrated tunnels are second least vulnerable (2.13%) and after them in RRA rank order at ground level, the recessed -1 fronts are below the average.

• With respect to **back access**: the off - and inner- courts, the most vulnerable categories (with rates of 7.31% and 6.78% respectively) are the most segregated categories. The visually shielded backs (with burglary rate of 4.12%) are highly integrated and less vulnerable, whilst the top integrated exposed back subgroup are crime free.

2. Comparing degree of Integration of burgled and nonburgled dwelling samples within surveillability categories, the following picture emerges:

- **Front access:**
  - **Visually shielded**: front burgled dwellings are considerably more segregated than the nonburgled fronts- though statistically the difference is not proven:
    \[ \text{ANDOV552: Burgled m.RRA= .681} \quad \text{Nonb. m.RRA=.563} \quad p=.24 \]
  - **Tunnel access**: burgled dwelling fronts are slightly more segregated than nonburgled fronts in the local whole system, but about the same in the global system:
    \[ \text{ANDOV429: Burgled m.RRA= .652} \quad \text{Nonb. m.RRA=.629} \quad p=.55 \]
    \[ \text{ANDOV552: Burgled m.RRA= .606} \quad \text{Nonb. m.RRA=.599} \quad p=.85 \]
  - **Recessed-1** burgled fronts are more segregated than nonburgled fronts, at ground level alone the difference is probably statistically significant in both local and global whole systems, whereas for ground and deck level together the difference is significant:
    \[ \text{ANDOV552: Burgled m.RRA= .807} \quad \text{Nonb. m.RRA=.700} \quad p=.084 \]
    \[ \text{ANDOV552: Burgled m.RRA= .879} \quad \text{Nonb. m.RRA=.813} \quad p=.039 \]
  - **Recessed-2**: burgled fronts at ground level are more integrated than nonburgled fronts (statistical significance not proven):
    \[ \text{ANDOV552: Burgled m.RRA= .71} \quad \text{Nonb. m.RRA=.725} \quad p=.146 \]
    This is contrary to the trend at deck level (see previous section). Thus for the whole ground plus deck sample, burgled fronts are overall marginally more segregated than the nonburgled, but the difference is not significant:
    \[ \text{ANDOV552: Burgled m.RRA= .913} \quad \text{Nonb. m.RRA=.904} \quad p=.78 \]
<table>
<thead>
<tr>
<th>SURVEILLABILITY</th>
<th>SPATIAL SYSTEM</th>
<th>DVRACE Các</th>
<th>DVRACE Các</th>
<th>DVRACE Các</th>
</tr>
</thead>
<tbody>
<tr>
<td>VNR ALL</td>
<td>VNR ALL</td>
<td>VNR ALL</td>
<td>VNR ALL</td>
<td>VNR ALL</td>
</tr>
<tr>
<td>LOWND</td>
<td>LOWND</td>
<td>LOWND</td>
<td>LOWND</td>
<td>LOWND</td>
</tr>
<tr>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
</tr>
<tr>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
</tr>
<tr>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td>0.664</td>
<td>0.661</td>
<td>0.661</td>
<td>0.643</td>
<td>0.697</td>
</tr>
<tr>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
</tr>
<tr>
<td>0.511</td>
<td>0.563</td>
<td>0.563</td>
<td>0.606</td>
<td>0.599</td>
</tr>
<tr>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
</tr>
<tr>
<td>2.00%</td>
<td>3.00%</td>
<td>3.00%</td>
<td>2.50%</td>
<td>3.45%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>REGION 1</td>
<td>REGION 2</td>
<td>REGION 3</td>
<td>REGION 4</td>
<td>REGION 5</td>
</tr>
<tr>
<td>GROUND</td>
<td>GROUND</td>
<td>GROUND</td>
<td>GROUND</td>
<td>GROUND</td>
</tr>
<tr>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
</tr>
<tr>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
</tr>
<tr>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td>0.718</td>
<td>0.725</td>
<td>0.725</td>
<td>0.718</td>
<td>0.725</td>
</tr>
<tr>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
</tr>
<tr>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
</tr>
<tr>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
</tr>
<tr>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TUNNEL</td>
<td>TUNNEL</td>
<td>TUNNEL</td>
<td>TUNNEL</td>
<td>TUNNEL</td>
</tr>
<tr>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
</tr>
<tr>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
</tr>
<tr>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td>0.718</td>
<td>0.725</td>
<td>0.725</td>
<td>0.718</td>
<td>0.725</td>
</tr>
<tr>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
</tr>
<tr>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
</tr>
<tr>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
</tr>
<tr>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OFF COURT</td>
<td>OFF COURT</td>
<td>OFF COURT</td>
<td>OFF COURT</td>
<td>OFF COURT</td>
</tr>
<tr>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
</tr>
<tr>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
</tr>
<tr>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td>0.745</td>
<td>0.757</td>
<td>0.757</td>
<td>0.745</td>
<td>0.757</td>
</tr>
<tr>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
</tr>
<tr>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
</tr>
<tr>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
</tr>
<tr>
<td>4.00%</td>
<td>4.00%</td>
<td>4.00%</td>
<td>4.00%</td>
<td>4.00%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IN COURT</td>
<td>IN COURT</td>
<td>IN COURT</td>
<td>IN COURT</td>
<td>IN COURT</td>
</tr>
<tr>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
</tr>
<tr>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
</tr>
<tr>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td>0.745</td>
<td>0.757</td>
<td>0.757</td>
<td>0.745</td>
<td>0.757</td>
</tr>
<tr>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
</tr>
<tr>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
<td>0.757</td>
</tr>
<tr>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
</tr>
<tr>
<td>4.00%</td>
<td>4.00%</td>
<td>4.00%</td>
<td>4.00%</td>
<td>4.00%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deck Flats</td>
<td>Deck Flats</td>
<td>Deck Flats</td>
<td>Deck Flats</td>
<td>Deck Flats</td>
</tr>
<tr>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
</tr>
<tr>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
</tr>
<tr>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td>0.879</td>
<td>0.859</td>
<td>0.859</td>
<td>0.879</td>
<td>0.859</td>
</tr>
<tr>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
</tr>
<tr>
<td>0.859</td>
<td>0.859</td>
<td>0.859</td>
<td>0.859</td>
<td>0.859</td>
</tr>
<tr>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
</tr>
<tr>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deck Flats</td>
<td>Deck Flats</td>
<td>Deck Flats</td>
<td>Deck Flats</td>
<td>Deck Flats</td>
</tr>
<tr>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
<td>ANDNO 095</td>
</tr>
<tr>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
<td>DROBAL ALL</td>
</tr>
<tr>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
<td>Mean</td>
</tr>
<tr>
<td>0.913</td>
<td>0.904</td>
<td>0.904</td>
<td>0.913</td>
<td>0.904</td>
</tr>
<tr>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
<td>N = 100</td>
</tr>
<tr>
<td>0.904</td>
<td>0.904</td>
<td>0.904</td>
<td>0.904</td>
<td>0.904</td>
</tr>
<tr>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
<td>1005%</td>
</tr>
<tr>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
<td>3.50%</td>
</tr>
</tbody>
</table>
v- Off-court: The one burgled front is strongly more integrated than the nonburgled average, and the difference is significant in all systems:
\[
\text{ANDOV552: Burgled m.RRA= .554 Nonb. m.RRA=.739 p=.01}
\]
(There are no front burglaries in the inner-court category.)

- Back access:
  i- Visually shielded: there is no difference between burgled and nonburgled backs in terms of degree of integration in the local ground and whole system; with respect to the global systems the difference is marginally in favour of segregation, but significance is weak:
\[
\begin{align*}
\text{ANDOV552:} & \quad \text{Burgled m.RRA=.573 Nonb. m.RRA=.56 p=.68} \\
\text{AND328:} & \quad \text{Burgled m.RRA=.587 Nonb. m.RRA=.557 p=.15}
\end{align*}
\]

ii- Inner-court: There is no clear difference in the global system, in the local systems, they are more integrated, though once again significance is weak (four cases only):
\[
\begin{align*}
\text{ANDOV429:} & \quad \text{Burgled m.RRA=.593 Nonb. m.RRA=.628 p=.30} \\
\text{ANDOV552:} & \quad \text{Burgled m.RRA=.549 Nonb. m.RRA=.606 p=.72}
\end{align*}
\]

iii- Off-court burgled backs are more segregated than the nonburgled backs in all systems (significance is not proven):
\[
\begin{align*}
\text{ANDOV552:} & \quad \text{Burgled m.RRA=.652 Nonb. m.RRA=.626 p=.48}
\end{align*}
\]

Table 6.6.2 (*) summarises the above findings. The surveillability categories are ordered by average degree of integration of the front access nonburgled group. The rank order with respect to back access is slightly different to the front averages. Back access only covers four out of the seven surveillability categories (exposed; visually shielded, off- and inner-courts- the eight cases of tunnel - backs are negligible) and only in the case of inner and off- court is there a difference in rank order of integration, here inner court backs are more integrated than off court backs.

At ground level vulnerability drops to zero at the extremes of the range of integration/segregation, with the exposed group (top integrated back access) and inner courts (most segregated front access). Vulnerability arises as follows:

- The off- and inner-court backs are more integrated than the fronts and appear to be at least twice as vulnerable, than the respective fronts: off-courts: 7.32% back compared to 3.45% front; inner-courts 4/59= 6.78% backs compared to 0/37= 0% front burglary.\(^{30}\)

- The visually shielded fronts (tower block maisonettes), however, are more integrated than the respective backs and over twice as vulnerable (with 2/19

\(^{30}\) The rather surprising difference between inner- and off-court front and back vulnerability may well have something to do with the characteristics of the dwelling boundary itself (as discussed in section 6.4.2). Dwelling fronts usually have kitchen windows (see drawings in figure 6.04b) contributing to the surveillance potential and spatial 'control' by front access. In contrast, the high garden walls increase back access vulnerability. It takes a few seconds to jump over, but once behind the wall, surveillability drops dramatically - the burglars can work with ease.
Thus, the pattern of differences between and within front and back vulnerability varies depending on the degree of integration. In the more integrated surveillability categories (exposed; shielded; tunnel and recessed-1) burgled dwelling faces tend to be more segregated than nonburgled i.e. segregation increases vulnerability. With respect to the more segregated surveillability categories (recessed-2; off court; and inner-court front, and off-court back access categories), burgled faces are more integrated than nonburgled. There is a reversal of the trend of vulnerability with segregation in the most segregated and usually less visually surveillable front and back access categories.

This implies that in the more visually exposed and more integrated categories segregation increases vulnerability up to a point, a threshold, from which point onwards, vulnerability does not increase further - why go any deeper - but decreases with segregation. This is similar to the Ferrier Estate, where segregated enclosure was found to be more vulnerable than integrated exposure, but while segregation increased vulnerability of exposed faces, vulnerability dropped with increasing segregation of the enclosed faces (see relevant section 5.6).

Finally, since vehicular and non-vehicular access varies within certain surveillability and dwelling type categories, the role vehicular access plays in all this remains to be examined.

6.6.3 Breakdown of Dwelling Samples by Vehicular /Non-vehicular access:

Section 6.4.4 found vehicular and non-vehicular access to be overall equally vulnerable (5.10% compared to 4.72% respectively) at ground level - taking into consideration the different size of the samples\(^{31}\). There were, however, striking differences within and across these categories broken down by front and back access\(^{32}\): - Non-vehicular back access with a burglary rate of 9/146= 6.16% was found to be more vulnerable than

\(^{31}\) Vehicular access is the exception rather than the rule on the Andover Estate, particularly with respect to ground front access (a mere 5.6% of front and about 35% of back access)

\(^{32}\) Vehicular and nonvehicular access combine with specific categories of front/ back surveillability and dwelling type, within which burglary rates vary (see Tables 6.4.4 B and 6.4.4 C).
## ANDOVER ESTATE: BURGLED NONB. DWELLING SAMPLES: FRONT BACK VEHICULAR PED ACCESS:

<table>
<thead>
<tr>
<th>GROUND LEVEL</th>
<th>VEHICULAR ACCESS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FRONT 15.79%</td>
</tr>
<tr>
<td></td>
<td>BURGL NONB</td>
</tr>
<tr>
<td></td>
<td>n-3 N 16</td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>Spatial System</td>
<td></td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>ANDOVER</td>
<td></td>
</tr>
<tr>
<td>Estate al nc</td>
<td></td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>ANDOVER</td>
<td></td>
</tr>
<tr>
<td>205 Gr und a nc</td>
<td></td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>ANDOVER</td>
<td></td>
</tr>
<tr>
<td>328 Gr und g. 1 d</td>
<td></td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>ANDOVER</td>
<td></td>
</tr>
<tr>
<td>352 W. ln c mext</td>
<td></td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>GLS</td>
<td></td>
</tr>
<tr>
<td>ANDOVER</td>
<td></td>
</tr>
<tr>
<td>368 R</td>
<td></td>
</tr>
<tr>
<td>Spatial System</td>
<td></td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>ANDOVER</td>
<td></td>
</tr>
<tr>
<td>Estate al nc</td>
<td></td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>ANDOVER</td>
<td></td>
</tr>
<tr>
<td>205 Gr und a nc</td>
<td></td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>ANDOVER</td>
<td></td>
</tr>
<tr>
<td>328 Gr und g. ol al</td>
<td></td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>ANDOVER</td>
<td></td>
</tr>
<tr>
<td>352 Wh le c text</td>
<td></td>
</tr>
<tr>
<td>RRA</td>
<td></td>
</tr>
<tr>
<td>GLS</td>
<td></td>
</tr>
<tr>
<td>ANDOVER</td>
<td></td>
</tr>
<tr>
<td>368 R</td>
<td></td>
</tr>
</tbody>
</table>

**Table 6.6.3:** MEAN RRA OF DWELLING FACES: BREAKDOWN BY VEHICULAR NONVEHIC. ACCESS
non-vehicular front access (the largest category with a rate of 3/320= 4.06%) overall, however the small subgroup of front faces with vehicular access was found to be highly vulnerable (shielded and recessed-1 maisonettes and f/b flats with a burglary rate of 3/19=15.79%) In contrast, the relatively larger number of backs with vehicular access (shielded- mainly houses) are least vulnerable with an overall burglary rate of 2/79= 2.53%. The question this subsection addresses is, how do the above dwelling access categories relate to the pattern of integration and segregation.

Table 6.6.3 presents the differences between burgled and nonburgled dwelling faces in terms of degree of integration, broken down by front and back vehicular/ non-vehicular access. One observes the following:

- **Front access:**
  
i- **Vehicular front access**, the most vulnerable (15.79%) group, is also the most segregated category, though it comprises a small number of cases. With respect to the direction in which vulnerability increases the situation is unclear. Whereas with respect to the whole estate on its own, burgled dwellings faces are more segregated, in all other systems, burgled dwellings are more integrated than nonburgled Statistical Significance is very weak:
    
    ANDOV429: Burgl. m.RRA= .727 Nonburgl. m.RRA= .705 p=.61
    ANDOV552: Burgl. m.RRA= .710 Nonburgl. m.RRA= .734 p=.64

ii- **Non-vehicular front access** is the numerically largest ground category, with a burglary rate (4.06%) slightly below the average for the estate. It is the second most segregated group (of the four), although it is considerably less segregated than the above vehicular fronts. Burgled dwellings are marginally more segregated than the nonburgled, but again the significance is weak. With respect to the whole estate on its own the difference is sharper:
    
    ANDOV429: Burgl. m.RRA= .741 Nonburgl. m.RRA= .712 p=.30.
    ANDOV552: Burgl. m.RRA= .689 Nonburgl. m.RRA= .677 p=.62

It is also worth noting that, in the simple global system ANDOV368 the difference goes the other way - burgled dwelling fronts on the basic path system (excluding the recessed entrances) are actually more integrated than the nonburgled:
    
    ANDOV368: Burgl. m.RRA= .595 Nonburgl. m.RRA= .674 p=.20

- **Back Access:**
  
i- **Vehicular back access** is the most integrated and least vulnerable category with a very low burglary rate of 2.53%. Burgled dwellings are more segregated than nonburgled, the difference is stronger in the global ground system though significance is not proven (the number of cases is too small):
    
    ANDOV328: Burgl. m.RRA= .626 Nonburgl. m.RRA= .56 p=.24
    ANDOV552: Burgl. m.RRA= .601 Nonburgl. m.RRA= .567 p=.44

ii- **Non-vehicular back access** is above average in terms of burglary risk (6.16%) with respect to the estate overall. It is slightly less integrated than vehicular back access, but significantly more integrated than non-vehicular front access. Burgled dwellings are marginally more segregated than nonburgled, however, statistical significance is very weak (no difference in the local systems ANDOV429 and 205):
    
    ANDOV552: Burgl. m.RRA= .603 Nonburgl. m.RRA= .588 p=.57
<table>
<thead>
<tr>
<th>RRA</th>
<th>SPATIAL SYSTEM</th>
<th>N</th>
<th>N-77</th>
<th>%</th>
<th>TYPE &amp; SURVEILLIETY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VEHICULAR</td>
<td>ANDOV205</td>
<td>Mean</td>
<td>0.571</td>
<td>0.552</td>
<td>2.53% Burged more</td>
</tr>
<tr>
<td>BACK ACCESS</td>
<td>Local gr und</td>
<td></td>
<td></td>
<td></td>
<td>SEGREGATED</td>
</tr>
<tr>
<td></td>
<td>ANDOV52</td>
<td>Mean</td>
<td>0.601</td>
<td>0.567</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GLOBAL ALL</td>
<td></td>
<td></td>
<td></td>
<td>Houses Back</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N-9</td>
<td></td>
<td></td>
<td>B flats SHEILDDED</td>
</tr>
<tr>
<td>NONVEHICULAR</td>
<td>ANDOV205</td>
<td>Mean</td>
<td>0.569</td>
<td>0.564</td>
<td>6.16% Burged/ Nonburg</td>
</tr>
<tr>
<td>BACK ACCESS</td>
<td>Local gr und</td>
<td></td>
<td></td>
<td></td>
<td>No DIFFERENCE</td>
</tr>
<tr>
<td></td>
<td>ANDOV52</td>
<td>Mean</td>
<td>0.603</td>
<td>0.588</td>
<td>marginally more</td>
</tr>
<tr>
<td></td>
<td>GLOBAL ALL</td>
<td></td>
<td></td>
<td></td>
<td>SEGR. in global</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n 13</td>
<td></td>
<td></td>
<td>All F/B types</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N 138</td>
<td></td>
<td></td>
<td>OFF/IN-COURT EXPOSED</td>
</tr>
<tr>
<td>NONVEHICULAR</td>
<td>ANDOV205</td>
<td>Mean</td>
<td>0.7</td>
<td>0.687</td>
<td>4.06% Burged marginally</td>
</tr>
<tr>
<td>FRONT ACCESS</td>
<td>Local gr und</td>
<td></td>
<td></td>
<td></td>
<td>SEGREGATED</td>
</tr>
<tr>
<td></td>
<td>ANDOV52</td>
<td>Mean</td>
<td>0.689</td>
<td>0.677</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GLOBAL ALL</td>
<td></td>
<td></td>
<td></td>
<td>All Dwel Types</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n 3</td>
<td></td>
<td></td>
<td>TUNNELS RECESSED 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N 107</td>
<td></td>
<td></td>
<td>SHEILD REC 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TYPE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VEHICULAR</td>
<td>ANDOV205</td>
<td>Mean</td>
<td>0.708</td>
<td>0.759</td>
<td>15.7% Burged more</td>
</tr>
<tr>
<td>FRONT ACCESS</td>
<td>Local gr und</td>
<td></td>
<td></td>
<td></td>
<td>INTEGRATED</td>
</tr>
<tr>
<td></td>
<td>ANDOV52</td>
<td>Mean</td>
<td>0.7</td>
<td>0.734</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GLOBAL ALL</td>
<td></td>
<td></td>
<td></td>
<td>F/B Maison and Flats</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n 5</td>
<td></td>
<td></td>
<td>SHEILDDED RECESSED 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N 93</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TYPE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VEHICULAR</td>
<td>ANDOV205</td>
<td>Mean</td>
<td>0.655</td>
<td>0.587</td>
<td>5.10% Burged signif</td>
</tr>
<tr>
<td>ALL</td>
<td>Local ground</td>
<td></td>
<td></td>
<td></td>
<td>more SEGREGATED</td>
</tr>
<tr>
<td></td>
<td>ANDOV52</td>
<td>Mean</td>
<td>0.666</td>
<td>0.596</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GLOBAL ALL</td>
<td></td>
<td></td>
<td></td>
<td>F/B mason &amp; Flats</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n 22</td>
<td></td>
<td></td>
<td>Houses Back</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N 445</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NONVEHICULAR</td>
<td>ANDOV205</td>
<td>Mean</td>
<td>0.646</td>
<td>0.649</td>
<td>4.67% Burged/Nonburg</td>
</tr>
<tr>
<td>ALL</td>
<td>Local ground</td>
<td></td>
<td></td>
<td></td>
<td>No Signif. Difference</td>
</tr>
<tr>
<td></td>
<td>ANDOV52</td>
<td>Mean</td>
<td>0.654</td>
<td>0.649</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GLOBAL ALL</td>
<td></td>
<td></td>
<td></td>
<td>Houses G1 Flats</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type</td>
<td></td>
<td></td>
<td>F/B Flats &amp; maisonettes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 6.6.3*): Ground Pattern of Burglary Risk: Vehicular Access Integration**
Table 6.6.3 (* ) summarises the above results, with vehicular and non-vehicular categories in rank order of integration. Overall vehicular access (front and back) is more integrated than non-vehicular access, although the front and back vehicular access categories rank at the extremes of the segregation/integration scale, while front non-vehicular and the more integrated back non-vehicular groups rank in the middle.

In terms of vulnerability, the most vulnerable front vehicular access and the least vulnerable back vehicular access groups are at the extremes. The second most vulnerable back non-vehicular and front non-vehicular rank in between. In the more integrated categories (back vehicular, back non-vehicular and front non-vehicular) burglary risk tends to increase with segregation, whereas in the segregated vehicular front access category risk appears to increase with integration (nonsignificant difference). This agrees with the pattern of burglary risk observed earlier, in the breakdown by surveillability categories.

Summing up, there is no direct correspondence between degree of Integration and degree of vulnerability of the four main f/b vehicular/non-vehicular access categories. The way vulnerability with respect to Integration works depends on the local circumstances, as well as the position of the access subgroup in the whole range. There are important differences in the composition of the four vehicular/non-vehicular samples in terms of local factors and degree/range of Integration. Whilst the large non-vehicular access groups cover a wide range of local factors, the vulnerability of the vehicular access subgroup is based on a specific combination of front access; relatively restricted surveillability/dwelling type and segregation. In contrast, the relatively larger and least vulnerable back vehicular category is clearly more integrated.

What remains to be examined in the final stage of the analysis, is the performance of the combinations of local factors (altogether) and Integration with respect to burglary risk.

Taking front and back faces together, burgled faces with vehicular access are significantly more segregated than nonburgled faces, though as we have already discussed this covers up two different trends. With respect to front and back nonvehicular access, the difference between burgled and nonburgled dwelling faces diminishes.
<table>
<thead>
<tr>
<th>SURVEILLABILITY</th>
<th>DWEL TYPE</th>
<th>BURG</th>
<th>TOT DW</th>
<th>%</th>
<th>GENERAL %</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vehicular Front Access</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visually Shielded</td>
<td>Houses</td>
<td>2</td>
<td>9</td>
<td>22.22%</td>
<td>22.22%</td>
</tr>
<tr>
<td>T/B Maison</td>
<td>F/B Flats</td>
<td>0</td>
<td>0</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td><strong>Refused-1</strong></td>
<td>F/B Flats</td>
<td>1</td>
<td>10</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Non-Vehicular Front Access</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tunnels</td>
<td>Houses</td>
<td>2</td>
<td>94</td>
<td>2.13%</td>
<td>2.13%</td>
</tr>
<tr>
<td>Visually Shielded</td>
<td>Houses</td>
<td>0</td>
<td>0</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>T/B Maison</td>
<td>F/B Flats</td>
<td>0</td>
<td>0</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Off-Court</td>
<td>Houses</td>
<td>1</td>
<td>29</td>
<td>3.45%</td>
<td>3.45%</td>
</tr>
<tr>
<td>In-Court</td>
<td>Houses</td>
<td>0</td>
<td>37</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Refused-1</td>
<td>F/B Flats</td>
<td>1</td>
<td>36</td>
<td>2.78%</td>
<td>1/44 = 2.27%</td>
</tr>
<tr>
<td>Flats</td>
<td>0</td>
<td>8</td>
<td>0.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vehicular Back Access</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visually Shielded</td>
<td>Houses</td>
<td>2</td>
<td>65</td>
<td>3.07%</td>
<td></td>
</tr>
<tr>
<td>T/B Maison</td>
<td>F/B Flats</td>
<td>0</td>
<td>10</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Refused-1</td>
<td>F/B Flats</td>
<td>0</td>
<td>4</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td><strong>Non-Vehicular Back Access</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposed</td>
<td>F/B Flats</td>
<td>0</td>
<td>20</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Visually Shielded</td>
<td>Houses</td>
<td>2</td>
<td>6</td>
<td>33.33%</td>
<td></td>
</tr>
<tr>
<td>T/B Maison</td>
<td>F/B Flats</td>
<td>0</td>
<td>10</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Refused-1</td>
<td>F/B Flats</td>
<td>0</td>
<td>2</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Tunnels</td>
<td>Houses</td>
<td>0</td>
<td>8</td>
<td>0.00%</td>
<td></td>
</tr>
<tr>
<td>Off-Court</td>
<td>Houses</td>
<td>3</td>
<td>36</td>
<td>8.33%</td>
<td>4/31 7.31%</td>
</tr>
<tr>
<td>F/B Flats</td>
<td>0</td>
<td>5</td>
<td>0.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In-Court</td>
<td>Houses</td>
<td>3</td>
<td>52</td>
<td>5.77%</td>
<td>4/59 6.78%</td>
</tr>
<tr>
<td>F/B Flats</td>
<td>1</td>
<td>7</td>
<td>14.29%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.6.4 Synthesis of the pattern of vulnerability:
Analysis of the combination of local and global factors.

Having looked at the local factors in relationship to integration separately and their 'performance' with respect to burglary risk, this final subsection brings the analysis to the final level of resolution: the interrelationship between all components (at ground level). The basic variable conditions which characterise all dwelling faces are:

- front only/front and back access;
- dwelling type;
- surveillability or degree of local visibility;
- vehicular/non-vehicular access;
- accessibility measured as degree of Integration in the global spatial structure

The large general categories, which distinguish the sample, are front and back access on the one hand, and vehicular/non-vehicular on the other. Front-only access is combined with basically one dwelling type (front-only flats) at ground level.34

Table 6.6.4 A presents the pattern of burglary risk with respect to the breakdown of front and back vehicular and non-vehicular access by surveillability, and dwelling type. This breaks down the burglary rates by the combination of all local factors involved. Thus one observes:

I. Vehicular access:

A. The fronts of dwellings with vehicular access, (the most highly vulnerable group as mentioned earlier with a burglary rate of 3/19 = 15.79%) comprise two subcategories:
   i. 'shielded' tower-block maisonettes (2/9 = 22.22%);
   ii. 'recessed-1' f/b flats (1/10 = 10%).
   Both have burglary rates far above the ground average for the estate, particularly the 'shielded' maisonettes.

B. The far less vulnerable backs with vehicular access (2/79 = 2.53%) are all in the 'shielded' back category, though dwelling types vary:
   i. The large majority are shielded backs of houses with a burglary rate of 2/65 = 3.07%
   ii. 'shielded' vehicular backs of maisonettes in contrast to the equivalent fronts have 0/10 = 0% burglary;
   iii. Four shielded backs of f/b flats with 0% burglaries.

II. Non-vehicular access:

34 As discussed in section 6.3. front-only or single-front access involves all deck access and all flats with 'recessed-2' entrances, with only one small group (8 dwellings) of 'recessed-1' entrances at ground level.
A. Non-vehicular **front access** comprises all surveillability and dwelling type categories excluding the exposed, with the following order of vulnerability (observed burglary risk):

i. **Recessed-2 fronts of front-only flats** (with a burglary rate of 9/106= 8.49%);

ii. **Off-court fronts of houses** (1/28= 3.45%);

iii. **Recessed-1 fronts of f/b flats** (1/36= 2.78%), while 'recessed-1 front-only flats have no burglaries (0/8=0.00%), (overall the 'recessed-1' nonvehicular group has a rate of 2.27%);

iv. 'tunnel' fronted houses (2.13%);

v. 'inner-court' fronted houses have no burglaries (0/37= 0.00%).

B. **Back access** is ordered in terms of vulnerability as follows:

i. **Shielded backs with non-vehicular access**; although far less numerous (less than 1:4) than the respective vehicular backs are over 3.5 times more vulnerable (9.52% compared to 2.53%). Breaking the shielded non-vehicular backs down further by dwelling type one finds:

- **houses** (few cases where the off-court backs merge with the main pedestrian thoroughfares), have the highest rate of burglary 2/6=33.33% in the given data period;

- **maisonettes**, in contrast to the vehicular fronts have no burglaries (0/10=0%);

- **f/b flats** also 0/4=0%.

ii. The **off-court backs** are also highly vulnerable with an overall burglary rate of 7.31%. These further break down into:

- **houses** (3/36=8.33%);

- **f/b flats** (0/5=0%);

iii. **Inner-court backs** - also considerably vulnerable with a burglary rate of 6.78% overall - further break down into:

- **houses** (3/52=5.77%);

- **f/b flats** (1/7=14.29%).

iv. **Exposed backs of f/b flats** have no burglaries (0/20=0%);

v. **Tunnel backs** (f/b flats) also have no burglaries (0/8=0%).

Having defined the local factors, the global factor of Integration can be defined respectively for each combination of local factors (21 subcategories in total at ground level), thus completing the minimum necessary description of each subgroup in order to compare them. Figure 6.27 presents in summary, the mean RRA rates of burgled and nonburgled dwellings in the local ground-only (ANDOV205) and the global whole (ANDOV552) spatial systems of reference for each individual subcategory listed in the previous paragraphs (as well respective size, burglary rates and local characteristics).

The table is ordered into the four columns of main ground access categories: front/back vehicular and non-vehicular access. Columns and categories are listed in the **rank order of segregation**, with non-vehicular front and back access, which comprise the main body of subgroups (or subcategories), in the central columns and vehicular front and vehicular back access, with fewer subgroups, at the sides. Furthermore, the subgroups in all four columns are listed in the overall order of degree of Integration (starting from the top) with the more segregated categories at the bottom. The order of integration/segregation is maintained across columns. The table thus
illustrates the relative position of each individual subgroup within the global spatial structure.

Finally the colour coding represents the degree of vulnerability (burglary rate) of each subgroup: red is highly vulnerable, above average for the ground level dwellings (approximately 5%); dark blue is low vulnerability - below average or about average; and light sky blue is 0% burglary - no observed burglaries in the subgroup in the given data period. In order to provide some measure of relative position in the Integration scale the total sample of ground dwelling faces is divided into quarters \((546 \times 0.25 = 142\) dw. faces each) -starting from the most integrated down to the most segregated quarter. The following observations can be made:

1. **Top Integrated 25% of dwelling faces:**
   
   i. The most integrated subgroups:
      - non-vehicular shielded backs and fronts of tower block maisonettes;
      - visually exposed backs (non-vehicular access) of f/b flats;
      - tunnel backs (non-vehicular) of f/b flats;
      
      comprising approximately 0.10 of the total number of dwelling faces appear to have no burglaries \(-0/48=0\%\ burglary rate. Their Mean RRAs range from .399 to .52 in AND205 or .473 to .554 in AND429 respectively.
   
   ii. Next in order of Integration are the vehicular shielded backs of houses with a relatively low rate of burglary \((2/63=3.08\%):\)
       
       AND205:  Burgl. m.RRA=.571 Nonb. m.RRA=.532 p=.36  
       AND552:  Burgl. m.RRA=.601 Nonb. m.RRA=.547 p=.10 
       These are closely followed by the highly vulnerable non-vehicular shielded backs of houses (Burglary Rate. \(2/63=33.33\%):\)
       
       AND205:  Burgl. m.RRA=.495 Nonb. m.RRA=.546 p=.068  
       AND552:  Burgl. m.RRA=.546 Nonb. m.RRA=.577 p=.17 
       The differences in terms of mean RRA between the groups are marginal, however, apart from the burglary rate and vehicular/non-vehicular access, they differ with respect to the direction in which vulnerability goes. In the case of vehicular group, burgled dwellings are more segregated than the nonburgled group, whereas with respect to the non-vehicular mini group burgled dwellings are clearly more integrated.
   
   iii. At the end of the top integrated quarter going into the next quarter are the inner-court non-vehicular backs of houses with a burglary rate of \(3/52=5.77\%\) above the average for ground dwelling faces at 4.95%:
       
       AND205:  Burgl. m RRA=.531 Nonb. m.RRA=.575 p=.286  
       AND552:  Burgl. m.RRA=.579 Nonb. m.RRA=.597 p=.57  
       Burgled dwelling faces are more integrated than the respective nonburgled average, though significance is not proven.

2. **Second most integrated 25% of dwelling faces:**

   i. Following the inner court backs in the rank order of integration are the tunnel fronts (non-vehicular) of houses, the first main group of fronts with a rate of
burglary 2/94 - 2.13%, below half the average 5% burglary rate for ground dwelling faces:

AND205: Burgl. m.RRA=.607 Nonb. m.RRA=.589 p=.70
AND552: Burgl. m.RRA=.606 Nonb. m.RRA=.598 p=.82

Burgled dwelling faces do not differ from the respective nonburgled average, only marginally more segregated particularly in the local ground system.

ii. The off-court backs of houses (non-vehicular) follow in rank order with a high burglary rate of 3/36=8.33%:

AND205: Burgl. m.RRA=.644 Nonb. m.RRA=.605 p=.43
AND552: Burgl. m.RRA=.652 Nonb. m.RRA=.621 p=.41

They are overall more segregated and more vulnerable than the inner-court backs. In contrast to the latter, but similar to the tunnels above, burgled dwelling faces are more segregated than the respective nonburgled average, (significance is not proven).

3. Third Quarter: second most segregated 25%:

i. Vehicular shielded backs and vehicular shielded fronts of maisonettes follow in the above order, and whereas backs have 0/10=0% burglaries, the fronts have the highest front burglary rate of 2/9=22.22%:

Back:
AND205: Nonb. m.RRA=.605
AND552: Nonb. m.RRA=.621

Front:
AND205: Burgl. m.RRA=.641 Nonb. m.RRA=.643 p=.88
AND552: Burgl. m.RRA=.661 Nonb. m.RRA=.664 p=.89

There appears to be no difference between burgled and nonburgled faces. Since there are only two blocks, it is impossible to draw conclusions.

ii. Next in rank order come two minor subgroups, the off-court backs (non-vehicular) of f/b flats (with 0 burglaries out of 5 dwellings), and the vehicular shielded backs of f/b flats (0/4 dwelling faces) with mean RRA's .662 and .676 in ANDOV205, and .602; .667 in AND552 respectively.

iii. The next group are the non-vehicular recessed-1 fronts of f/b flats with a burglary rate of 1/36=2.78% followed by the equivalent front only flats with 0/8=0% burglaries. With respect to the f/b flats:

AND205: Burgl. m.RRA=.841 Nonb. m.RRA=.686 p=.22
AND552: Burgl. m.RRA=.807 Nonb. m.RRA=.677 p=.15

The burgled dwelling is clearly more segregated than the nonburgled average, as is the case with the subgroups in the second quarter.

iv. Next come the non-vehicular inner-court backs of f/b flats with a high burglary rate of 1/7=14.29%. These are more segregated than the equivalent houses (on the verge between first and second quarter):

AND205: Burgl. m.RRA=.605 Nonb. m.RRA=.70 p=.167
AND552: Burgl. m.RRA=.644 Nonb. m.RRA=.675 p=.37

Here the burgled dwelling is found to be more integrated than the nonburgled average, in contrast to the preceding subgroups of the second and third quarter.

v. Finally after the two odd cases of non-vehicular shielded backs of f/b flats at the end of the third quarter and going on to the fourth/ most segregated quarter, is the
main group of front-only flats with recessed-2 entrances (non-vehicular) with a very high burglary rate of \( \frac{9}{106} = 8.49\% \):

<table>
<thead>
<tr>
<th>Location</th>
<th>Burgled m.RRA</th>
<th>Nonb. m.RRA</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND205</td>
<td>0.724</td>
<td>0.753</td>
<td>0.19</td>
</tr>
<tr>
<td>AND552</td>
<td>0.71</td>
<td>0.725</td>
<td>0.146</td>
</tr>
</tbody>
</table>

Burgled dwelling faces here are more integrated than the respective nonburgled faces of the group (the difference is probably significant).

4. Fourth quarter: most segregated 25% of dwelling faces:

i. Following the recessed-2 fronts are the off-court fronts (non-vehicular) of houses with a \( \frac{1}{29} = 3.45\% \) burglary rate:

<table>
<thead>
<tr>
<th>Location</th>
<th>Burgled m.RRA</th>
<th>Nonb. m.RRA</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND205</td>
<td>0.52</td>
<td>0.764</td>
<td>0.008</td>
</tr>
<tr>
<td>AND552</td>
<td>0.554</td>
<td>0.739</td>
<td>0.01</td>
</tr>
</tbody>
</table>

As in the case above, the burgled dwelling face is more integrated than the respective nonburgled average, and the difference here is highly significant. The burgled dwelling face is just off Corker Walk near the central open square, and in that sense clearly differs from the off-court backs at the edges of the relatively segregated green squares of the clusters.

ii. The inner-court backs (non-vehicular) of houses, are the second most segregated subgroup overall, marginally more segregated than the off-courts, and have no burglaries (0/37=0%):

<table>
<thead>
<tr>
<th>Location</th>
<th>mean RRA</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND205</td>
<td>0.772</td>
</tr>
<tr>
<td>AND552</td>
<td>0.745</td>
</tr>
</tbody>
</table>

This fits in with the pattern observed at the most segregated end of the scale, where vulnerability does not increase with segregation anymore.

iii. Finally, the most segregated subgroup are the vehicular recessed-1 fronts of f/b flats, considerably more segregated than the vehicular shielded fronts of maisonettes, and the equivalent non-vehicular recessed-1 fronts. Vulnerability is high, though less than the vehicular shielded fronts, but there is one burglary out of ten here (10%):

<table>
<thead>
<tr>
<th>Location</th>
<th>Burgled m.RRA</th>
<th>Nonb. m.RRA</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND205</td>
<td>0.841</td>
<td>0.849</td>
<td>0.85</td>
</tr>
<tr>
<td>AND552</td>
<td>0.807</td>
<td>0.788</td>
<td>0.77</td>
</tr>
</tbody>
</table>

There is no clear difference between burgled and nonburgled fronts, the burgled dwelling front is marginally more integrated, as in the cases above.

From the above there are three main issues to be discussed: the interrelationship between local and global factors; and differences between front and back vulnerability; and differences between general access categories versus specific combinations which determine vulnerability.

A. The interrelationship between local and global factors:

The above presentation in the order of Integration highlights the interrelationship between the global dimension and the more local criteria of access and surveillability which affect vulnerability:

1. Looking at the distribution of the highly vulnerable categories in the global pattern, one finds, as mentioned before, that there are few burglaries at the extremes - with the
exception of the two highly segregated burgled recessed-i fronts (one vehicular- one non-vehicular). There are no burglaries at the most integrated end, whereas at the most segregated end the one burglary is with vehicular access. Even the off-court front burglary (third most segregated group) is actually relatively integrated.

It becomes apparent that there are two main zones where vulnerability tends to concentrate:

a. The relatively integrated zone at the end of the top integrated quarter going into the second quarter with non-vehicular back access. This includes: The highly vulnerable non-vehicular shielded backs mini group, just off the main pedestrian thoroughfares; the inner-court backs and the even more vulnerable off-court backs of houses, which approach the middle RRA zone, though in average, still more integrated than the mean front/back RRA for ground dwellings.

b. The relatively segregated zone at the end of the third quarter and beginning of the fourth and most segregated quarter). This includes: The inner-court backs of f/b flats; and the large and highly vulnerable group of front-only 'recessed-2' flats.

The highly vulnerable vehicular fronts appear to tag on at the end of each zone. However, it is more appropriate to consider these separately, since the main body of access, as discussed above, is non-vehicular back and front access.

2. Considering the direction in which vulnerability increases (from the difference between burgled and nonburgled averages) a somewhat complicated picture arises:

- At the segregated end (off-court fronts of houses; recessed-2 f/-only flats; inner-court backs of f/b flats) vulnerability increases with relative integration.

- In the second integrated quarter zone towards the middle into the third quarter, (tunnel fronts; off-court backs of houses; and recessed-1 fronts;) vulnerability increases with relative segregation. This is also the case with vehicular shielded backs in the top integrated quarter.

- In the top integrated quarter - the highly integrated subgroups of shielded non-vehicular backs of houses and the inner-court backs - the trend reverses again. Vulnerability appears to relate to higher integration. In both cases burgled

---

35 The overall mean RRA for ground level front and back is .659 in AND205 and .655 in AND552 see table 6.5.1.A
dwellings are just off the estate's main integrating axial line (Corker Walk), thus combining unconstituted access with a relatively high degree of Integration.

High degree of Integration alone does not create vulnerability. The other non-vehicular shielded fronts and backs of maisonettes; the exposed backs of flats; the shielded vehicular backs, and the tunnels, which are the most integrated subgroups, have no or very few burglaries. It appears that in combination with unconstituted access and some visual shielding integration becomes vulnerable.

B. Front versus back vehicular access:

Clearly there is a difference in terms of vulnerability between front and back vehicular access that goes beyond dwelling type and surveillability categories. For instance, in the maisonettes category, it is the front vehicular shielded subgroup, that seem to be particularly vulnerable. The respective non-vehicular fronts do not appear to be vulnerable, nor the respective backs of maisonettes. Similarly the vehicular 'recessed-1'f/b flats are considerably more vulnerable than the respective non-vehicular majority of recessed-1 f/b flats, and the 'recessed-1', front-only flats.

Thus, it does not appear to be the maisoneues as a type that are necessarily vulnerable, nor is it the 'shielded' surveillability category - the back vehicular shielded are not very vulnerable. It cannot be vehicular access as such either, for the same reason. In contrast to the integrated vehicular shielded backs, it appears that fronts with vehicular access, are vulnerable in both cases of dwelling type and surveillability. Although at different positions in the overall global structure, both the highly segregated recessed-1 fronts and the shielded fronts, which are round about average with respect to the degree of Integration in the estate overall, combine front vehicular access with a certain degree of segregation. The vehicular backs (shielded), on the other hand, are clearly more integrated in their vast majority and are much less vulnerable (half the average burglary rate).

Thus, the main difference between the vulnerability of front and back vehicular access could be attributed to two things:

i. The degree of Integration/ segregation: This also has an effect on the levels of space use and the degree of through-movement. Integrated backs may have more 'informal visual surveillance' than the more segregated fronts.
ii. The different nature of the front and back boundary: In the case of front access, the door/window accesses the interior directly. In the case of the back garden wall, there is an intervening garden or terrace and then the dwelling boundary wall proper. The high back wall, once passed over, provides visual cover for the back entry, however for escape with bulkier objects it can be an obstacle.

Each condition separately could explain the difference in vulnerability and, even more so, the combination of the two. One should also consider the difference between burglaries with vehicles, as quite different to burglaries on foot. As discussed earlier in Chapter 2 there are differences between burglaries with or without use of a vehicle for escape (see also Poyner '91), the range of goods that can be stolen and transferred is different. However, if vehicles are to be used to escape with the goods, carrying a heavy stereo system or large television set over the back garden wall in a hurry is not such a good idea after all. In contrast a parked van directly in front of the burgled front door, at minimum distance, may be a positive asset, it also serves as a visual shield.

In contrast to the above, clearly in the case of non-vehicular access- burglar on foot- it is the back that is more vulnerable.

C. General access characteristics, individual factors specifically, and/or the combinations of factors influencing vulnerability:

Considering the strong differences in size amongst the subgroups, there is a problem in assessing the difference in degree of vulnerability between more 'individual' groups (e.g. shielded non-vehicular backs of houses 33.33%; shielded vehicular fronts of maisonettes 22.22%) and more general categories (e.g. 'recessed-2' fronts of f-flats 8.49%; or off-court backs of houses 8.33%). In small sub-groups with few cases, the burglary rates will be disproportionally high, due to the small size of the sample. One may wonder, whether it is the general categories of surveillability; front/back access etc., or is it the combination of factors, that is causing vulnerability.

The general factors which create vulnerability, for instance recessed-2 fronts, are clearly identifiable in the larger groups, which are less broken down by multiple factors (as identified in the early stages of the analysis). Even where these categories do break down by dwelling type, it becomes apparent that high vulnerability relates to one or more access characteristics shared by a wider group\textsuperscript{36}. Even if categories/groups do break into smaller subgroups as, for instance, with the off-court backs, where apart

\textsuperscript{36} See table 6.6.4 A, some categories remain large with small variation in local conditions eg, the recessed-2 fronts are all front-only flats and always nonvehicular.
from the houses the other groups dwindle in numbers, one finds that it is the 'off-court' factor that is vulnerable, rather than the subcategories of houses versus flats etc. These again need to be seen also in conjunction with their relative degree of segregation especially compared to the more integrated shielded vehicular backs.

Comparing degree of vulnerability (%), however, is difficult; one needs to keep in mind the number of cases, as well as the percentages and compare with related subgroups. One can however identify the vulnerability potential across categories, in that the burglaries did take place successfully. Once specific combinations of local factors of accessibility and surveillability and global integration have been identified as particularly vulnerable, one needs to examine whether there are common denominators- patterns in the combinations which could be identified.

In the case of the shielded and 'recessed-l' vehicular fronts, they are both highly vulnerable (22.22% and 10% respectively) particularly the shielded, but so is the whole access category of front vehicular access (15.79%). Since these burglaries represent 3/7 front burglaries in the front/back access category, in spite of the small number of cases, there is little doubt that the relatively segregated front vehicular group and subgroups are highly vulnerable.

Ultimately one is interested in identifying the characteristics of dwellings' access and surveillability that make them vulnerable. Each successful break-in is a vulnerable target, although in some cases chance opportunity may play a role. The burglary rates are as close as one can get to an objective measure of spatial performance in one year, they cannot be anything more than that, serving as guides to the investigation, with no absolute value of their own, and need to be viewed in context.

6.6.5 Interrelationship between front and back dwelling faces.

Up to this point dwelling access has been investigated as front and back access separately, though clearly there is a link between the two, in that for each double-fronted dwelling, front and back access lead to a single target. Since the most vulnerable side will probably be selected for illegal entry, this will affect the pattern of front/back burgled faces and the breakdown of burglary rates, depending on the given

Clearly, one cannot claim, that actual vulnerability is higher in a group, for instance like the segregated inner-court backs of f/b flats (with a burglary rate of 1/7=14.29%) - compared to the inner-court houses (with 3/52=5.77% burglary), or the off-court houses (with 3/36=8.33% burglary). and the interpreter needs to always place them in context, for it is through comparison with the other results that one can make proper sense of it all.
<table>
<thead>
<tr>
<th></th>
<th>FRONT ACCESS</th>
<th>BACK ACCESS</th>
<th>% OF BURGLARIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GROUND FLOOR:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRONT ONLY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deck Flat (D1)</td>
<td>RECESSED 1</td>
<td>N/A</td>
<td>12 /216 5.55%</td>
</tr>
<tr>
<td>Maisonette (D2)</td>
<td>RECESSED 2</td>
<td>N/A</td>
<td>15 /216 6.94%</td>
</tr>
<tr>
<td><strong>FIRST FLOOR:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FRONT ONLY</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F-FLATS (G1)</td>
<td>RECESSED-2</td>
<td>N/A</td>
<td>9 /114 7.90%</td>
</tr>
<tr>
<td></td>
<td>RECESSED 1</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>F/B Flats (G2R)</td>
<td>RECESSED 1</td>
<td>Nonvehc.</td>
<td>1F / 10 10%</td>
</tr>
<tr>
<td></td>
<td>RECESSED 1</td>
<td>VEH</td>
<td>1F / 10=10%</td>
</tr>
<tr>
<td></td>
<td>SHIELDED</td>
<td>SHIELDED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SHIELDED</td>
<td>Nonveh.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TUNNEL</td>
<td>Nonveh.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OFF-COURT</td>
<td>&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IN-COURT</td>
<td>&gt;&gt;</td>
<td>1B /7 14.29%</td>
</tr>
<tr>
<td>TB MAISONETTES</td>
<td>SHIELDED</td>
<td>VEH</td>
<td>2F /9 22.22%</td>
</tr>
<tr>
<td></td>
<td>SHIELDED</td>
<td>SHIELDED</td>
<td></td>
</tr>
<tr>
<td></td>
<td>OFF-COURT</td>
<td>Nonveh.</td>
<td></td>
</tr>
<tr>
<td>HOUSES (G2)</td>
<td>TUNNEL</td>
<td>Nonveh.</td>
<td>1F+3B /36 11.11%</td>
</tr>
<tr>
<td></td>
<td>IN COURT</td>
<td>IN COURT</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SHIELDED</td>
<td>&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SHIELDED</td>
<td>&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SHIELDED</td>
<td>&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SHIELDED</td>
<td>&gt;&gt;</td>
<td>2B /37 5.41%</td>
</tr>
<tr>
<td></td>
<td>SHIELDED</td>
<td>&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VEH</td>
<td>&gt;&gt;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VEH</td>
<td>&gt;&gt;</td>
<td>2B / 6 33.33%</td>
</tr>
<tr>
<td></td>
<td>VEH</td>
<td>&gt;&gt;</td>
<td>1F /28 3.57%</td>
</tr>
</tbody>
</table>
combinations of front and back faces. The Ferrier, Estate case study for instance, found that entry was always made from the most segregated side away from vehicular access spaces.

Thus, one needs to also consider the relationship between the two dwelling faces, where there is both front and back access, since for burglars with a specific target in mind, there is a choice of entry routes. Table 6.6.5 A presents the combinations of front and back (local) factors per dwelling type. In some cases it is obvious that one type of combination is more vulnerable than the other. For instance with respect to houses, the more segregated inner- and off-court backs are more vulnerable than the tunnel fronts; or with respect to tower block maisonettes, the shielded vehicular fronts are more vulnerable than their shielded non-vehicular backs. In other cases both faces are equally vulnerable or equally less vulnerable, for instance tunnel fronts and shielded vehicular backs of houses.

Finally looking at the sample of burgled dwellings one may compare the degree of integration of the burgled face to that of the nonburgled face. Table 6.6.5.B presents the characteristics of the burgled dwellings and the RRAs of the burgled and the respective nonburgled side, in all spatial systems.

In 8/10 cases the burgled face is more integrated than the nonburgled, though in certain cases the difference is marginal. Seven of the eight cases are burgled back faces:

- The shielded non-vehicular backs and the inner court back (on the same axial line off Corker Walk) are more integrated than the respective tunnel fronts.
- The two burgled shielded vehicular backs are also more integrated than their respective inner court fronts.
- One of the three burgled off-court backs is more integrated than its tunnel front.

This suggests, that the factor of global accessibility, the relative degree of Integration, is not the only criterion of the vulnerable face, and that surveillability and non-vehicular access and whatever other factors may come into consideration, play an equally important role here.

The above results are quite different to the findings on the Ferrier Estate. The Ferrier is a simpler layout, has fewer dwelling types and combinations of front/ back features. The degree of exposure or enclosure is defined at the large scale. The degree of Integration on the Ferrier is more closely tied to the distinction between enclosed

\[\text{38 For instance if specific goods of interest such as video, stereo, computer etc. are known to have been purchased}\]
<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>AXIAL LINE No.</th>
<th>BURGLAR D</th>
<th>Entry Mode</th>
<th>Number of Dwells</th>
<th>Local Factors</th>
<th>Integration Value</th>
<th>5-B Integration</th>
<th>OTHR</th>
<th>SDR</th>
<th>SURVAIL</th>
</tr>
</thead>
<tbody>
<tr>
<td>CORNWYCK</td>
<td></td>
<td>46</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEANWYCK</td>
<td></td>
<td>175</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.849 0.797</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOWNTWYCK</td>
<td></td>
<td>469</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.796 0.748</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAVYNCK</td>
<td></td>
<td>34</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAYNCK</td>
<td></td>
<td>17</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CORNWYCK</td>
<td></td>
<td>40</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TORKSWYK</td>
<td></td>
<td>356</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ALBERTWYK</td>
<td></td>
<td>307</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELDWNCK</td>
<td></td>
<td>57</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELDWNCK</td>
<td></td>
<td>407</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELDWNCK</td>
<td></td>
<td>405</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOHIL 7</td>
<td></td>
<td>58</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BERWYK 7</td>
<td></td>
<td>44</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BERNIDEN</td>
<td></td>
<td>31</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FALLSWYK</td>
<td></td>
<td>81</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HANRAWAY</td>
<td></td>
<td>7</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAYNWYK 3</td>
<td></td>
<td>12</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SELDWNCK 44</td>
<td></td>
<td>89</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FALLSWYK 41</td>
<td></td>
<td>94</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOSWYK 3</td>
<td></td>
<td>47</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOWNWYK 30</td>
<td></td>
<td>66</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BEERWYK 4</td>
<td></td>
<td>74</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RAYNWYK 26</td>
<td></td>
<td>4</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FALLSWYK 14</td>
<td></td>
<td>88</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FALLSWYK 2</td>
<td></td>
<td>88</td>
<td>FRONT</td>
<td>F</td>
<td>F FLAT REC</td>
<td>NONVHRR</td>
<td>0.8109 0.7551</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
courtyards -axial breakdown and exposed squares -longer axial lines. Thus, it is hardly surprising that on the Andover the pattern of global and local vulnerability is more complicated, since on the Ferrier the variables of access and surveillability are very different and the combinations of factors considerably more restricted.

It is interesting to note, how factors of vulnerability and their relative weight on an estate are differently defined, case by case. The mechanisms of what makes a good target for a burglar - a vulnerable location in design terms - and the criteria of spatial vulnerability, however, remain the same. This just confirms the rather common sense notion, that it is the combination of spatial factors - the interaction between local and global factors- that counts, not just isolated criteria, and that there is undoubtedly a trade-off between global and local factors, where there are more and less vulnerable features of access and of the dwelling face itself. It is the balance that tips either in the one or the other direction, and characterises higher or lower vulnerability.
6.7. **Summary and Discussion: Design and the Pattern of Vulnerability to burglary on the Andover Estate.**

Having completed the analysis of burgled locations; identified the local and global spatial factors of accessibility and surveillability, and the resulting pattern of vulnerability to crime, this concluding section, summarises the findings of the case study and attempts to relate the factors and the pattern of vulnerability to the architectural choices at the various stages of design, from the general layout to the detailed arrangement of dwelling entrances.

A. **General design strategy - General burglary profile:**

The Andover Estate is a high density mixed development relatively integrated in its urban context. The layout design of the Andover Estate is based on the clustering of low and medium-rise blocks around green courts in an irregular, geometrically non rigid 'supergrid'. This is formed by the main central pedestrian thoroughfares and vehicular access spaces in a variation of the Radburn layout principle. The clusters are similar in layout with a standardised block typology and layout formation. Vehicular access is restricted to three sides of each cluster, while the fourth links to the main pedestrian routes. The interior of the clusters and the spine of the estate are pedestrian only. Vehicular access is strongly restricted to a system of culs-de-sac (no through routes) with parking accommodated 'on-street' and in garages on the periphery. There are three stepped tower blocks around the main square with communal facilities and shops creating a focus for the estate.

Data on burglary locations was obtained from the Metropolitan Police records for the eleven month period between June 1985 to end of May 1986 was found to include a total of 64 burglaries out of 924 dwelling units giving an overall burglary rate of 6.93% (equivalent to 7.56% in a year).

**Clusters/Block typology and general access categories:**

There are four types of blocks each standardised in terms of dwelling layout, position in the cluster, and in relation to the system of access. The block/dwelling typology is more complicated than on the Ferrer: 17% of dwellings are in two-storey blocks; 63% of dwellings are in four-storey blocks and only 19% are in high rise. Two-storey blocks of row houses flank the green courts at the heart of each cluster, while four-
storey blocks with deck (balcony) access are wrapped around them. All have similar
dwelling layout above ground accessed at the first level (deck access) with semi-
private staircases accessing the top level maisonettes. At ground level they vary: accommodating flats; combinations of flats on one side and individual garages at the
back; and large collective car parks. The carparks on the periphery of the estate build a
blind barrier to the street at ground level.

The majority of dwellings on the Andover Estate are directly accessible from the
network of open spaces (83.5 % direct access) and only a small percentage of
dwellings are in high-rise blocks. The tower blocks have controlled entrances - with
entryphones at ground level and on each of the four upper access levels at each wing/corridor (indirect access). In two of the tower blocks, there are maisonnets at
the ground level of accessed directly from the public network.

Direct access at ground level comprises a hierarchical system of main routes,
pedestrian and vehicular and narrower footpaths. At the first level above ground,
decks are usually interconnected - mainly two blocks at a time - with frequent links to
the ground. Indirect access comprises upper level single loaded corridors (2nd,
4th, 6th and 8th level) in tower blocks. Small staircases, shared by two entrances at a
time, access the intermediate levels, both at deck level and in the tower blocks.

Examining the burglary rates for the general block access categories respectively, direct
and indirect access appear to be equally vulnerable: the overall burglary rate for direct
access is 7% (=7.64% in a year), whereas for indirect it is 6.54% (=7.14% in a
year).

Broken down by level of access, direct ground access is found to be 1.25 times
more vulnerable than the deck level with burglary rates of 27/339=7.97% (=8.7%
in a year), and 27/432=6.25% (=6.82% in a year) respectively. This agrees with the
findings in other research studies (eg. Hillier et al 1989; and on the Marquess Rd
Estate). Upper levels, in spite of entryphones (indirect access), are equally
vulnerable as deck level, with a burglary rate of 10/153 = 6.54%.

At the upper levels of the tower blocks, burglary rates increase from the 2nd level to
the 4th level, but then fall steadily to 0% at the 8th level, but as the data is limited, it is
difficult to draw firm conclusions here. However, it is important to note that in 9/10
cases, burglaries tended to occur up the 'semiprivate' access staircases, which are out
of view of the corridors. Since the Andover Estate is predominantly a low- to medium-
rise development and the number of high-rise blocks very small, the study accordingly
concentrated on direct access.

B. Direct Access : Dwelling/Block typology:

The dwelling typology covers a broad range in the Andover Estate. At ground level
there are:

- Row houses (17% of total dwellings) around the courts, with entrances either
  from within the courts or off narrow pedestrian paths, and back gardens either on
  the vehicular access /parking spaces or on- off- courts;
- Two-person flats with front-only access (12% of total dwellings) with
double- recessed entrances off the narrow alleys;
- Double-fronted flats (5% of dwellings) with recessed entrances off the
courts and back gardens facing the main pedestrian thoroughfares (or vice-versa);
- Double-fronted maisonettes (2%) at the ground level of the tower blocks.

At deck level there are:

- Deck flats (23%) with recessed shared entrance spaces;
- Deck maisonettes (23%) accessed by 'semiprivate' staircases from deck
  level.

Burglary rates calculated by dwelling type showed that: at ground level, the most
vulnerable type of dwelling were the tower block maisonettes with a burglary rate
of 2/20=10%, followed by houses (13/159=8.18%) and front-only flats (9/114=
7.90%). Front/back flats were least vulnerable (3/46=6.52%) at ground level. At the
deck level, maisonettes were found to be more vulnerable than the latter f/b flats and
deck flats (15/216=6.94% compared to 12/216=5.55%).

Dwelling types relate to different types and sizes of household and potentially
may have some effect on "target value" especially the 2-person OAP flats or the larger
houses. Dwelling types therefore need to be considered as independent factors.
However, in spatial terms the key criteria of a good (i.e. safe) target from a burglar's
point of view are easy access and escape - not being seen nor caught. How do these
criteria relate to dwellings and the layout?

C. Layout design: Local Factors variables related to Accessibility
and Surveillability:
Each dwelling type comprises specific characteristics of the dwelling boundary and dwelling layout, and conditions relating to its accessibility and surveillability, or ranges thereof, design choices that can affect the vulnerability of a dwelling. Apart from level of access, there may be one or two ways in or one (single-front or double-fronted access). This immediately raises the distinction between front and back access, which differ strongly in all dwelling types on the Andover. Back access always involves back gardens with high walls, which unlike the back gardens on the Ferrier Estate, do not constitute open spaces, since there are no doors at the back.

Local conditions surrounding the back faces are always different to the conditions at the front, forcing us to treat front and back access in each dwelling separately with respect to the degree of accessibility and visibility. Since a third of back gardens are accessible from vehicular access spaces, while front entrances are generally away from vehicular access spaces, the effect of vehicular access on target selection, or on visual surveillance through higher levels of space use needs to be taken into consideration. Access faces need to be classified by vehicular access and nonvehicular access.

Visual surveillability on the Andover Estate is very different to the relatively simpler conditions of exposure/enclosure on the Ferrier Estate. Due to the high density/low- to medium-rise built environment, there is overall a high degree of enclosure at the global scale. Open spaces are generally well defined, bounded by the exteriors of the neighbouring buildings, and views are restricted and predictable. Space is consistently broken down and increasingly enclosed the closer one gets to dwelling entrances. Due to the standardisation of the cluster design, there are regularities in the position and distance between blocks, the arrangement of open spaces, and in the position of dwelling types in the cluster layout, which define the degree of visibility and surveillability of the dwelling face. Seven categories of spaces accessing dwellings can thus be defined and ordered according to the size and shape of the open space and the length of views, which indicate the degree of local surveillability of the dwelling face. These rank from the most visually exposed: the shielded; the off-court and inner-court faces; the tunnels; to the recessed-1 and recessed-2 fronts. At ground level dwelling faces cover the full range, whereas at deck level there are only recessed-1 and recessed-2 entrances to the flats and maisonettes respectively.

The design approach to vehicular and pedestrian traffic on the Andover is hierarchical. There is a clear scaling down in overall width and length and connectivity, from the main pedestrian thoroughfares and main vehicular access spaces
(including culs de-sac) to the paths accessing dwellings and the decks, which are not meant for through movement. Front entrances as a rule open onto pedestrian paths/courts or decks-only 5.6% of dwellings front onto spaces with vehicular access — (some tower block maisonettes and f/b access flats). In contrast, about 35% of back gardens (predominantly houses) flank vehicular access spaces. Whilst they do not open onto the vehicular access spaces, they are still accessible from the point of view of burglary. The great majority of front and to a lesser degree back dwelling faces have nonvehicular access.

Finally, dwellings' accessibility is related to the overall network of access spaces. Accessibility at the global level is measured by degree of Global Integration (RRA). The categories of front and back access and surveillability relate to specific ranges in the overall scale of integration/segregation.

• Local factors and vulnerability to burglary:

In each dwelling type there is a whole range of combinations of front and back dwelling face characteristics (21 combinations in total with dwindling numbers of dwellings in each combination). For practical reasons it is necessary to examine front and back access separately, analysing the vulnerability of dwelling faces rather than dwelling units. Starting from the general categories and then going on to the combinations of factors, the following pattern of spatial vulnerability emerges:

• Single -front or front/back:

Deck level access is front-only, whereas at ground level the majority is front/back. Overall double-fronted (front and back) access is about 20% more vulnerable than front-only access: Front-only (ground and deck level) dwellings have a burglary rate of 36/546=6.59%; while front/back access dwellings (ground only) have a burglary rate of 18/225=8%. At ground level on its own, however, front-only and front/back access are equally vulnerable (front-only ground access: 7.90% compared to 8% front-back), a result which seems paradoxical at first, however similar to results on the Ferrier. However, local conditions explain this paradox.

• Front and Back Access:

Strong differences were found between front and back access faces both within and across dwelling types. Looking at mode of entry in burgled dwellings, one found that on the whole, front access is marginally more vulnerable than back- taking the
ground and deck level into account (with a burglary rate of 43/771 = 5.58% compared to 11/225 = 4.89%). With respect to ground level only, front access overall appeared to be equally vulnerable to back access (16/339 = 4.42% compared to 4.89%).

However, looking at dwellings with front and back access, i.e. where there is a choice, back access was more vulnerable than front. Going back to dwelling types, one finds that it is backs of houses that are particularly vulnerable (8/13 burglaries from the back and only five from the front), rather than the fronts, and on the contrary, it is the fronts of the tower block maisonettes (2/2 front burglaries) that stand out as the most vulnerable categories.

- **Front and back Vehicular Access- Nonvehicular Access:**

Although vehicular access is overall equally vulnerable to nonvehicular access - with overall burglary rates of 5/98 = 5.10% and 22/466 = 4.88% respectively - broken down by front and back access, strong discrepancies appeared: Front vehicular access is highly vulnerable (3/19 = 15.79%), whereas back vehicular access is the least vulnerable category (2/79 = 2.53%). Back nonvehicular access is the second most vulnerable category (6.16%) after the front vehicular minority) and 1.25 times more vulnerable than front nonvehicular access with 4.06%, well below the average for ground dwelling faces.

- **Surveillability of dwelling faces and entrances:**

Given the high degree of variation with respect to local surveillability on the Andover Estate, risk generally appeared to increase with lower surveillability: **Recessed-2 faces**, the largest group (front - only access) was found to be most vulnerable (with an overall burglary rate of 21/322 = 8.07%), which breaks down to 9/106 = 8.49% at ground level and somewhat less, 15/216 = 6.94%, at deck level. The **off-court group** (front and particularly back faces-ground only) were found to come second (with a burglary rate of 4/70 = 5.71%) , closely followed by the **recessed-1 group** (front access with an overall burglary rate of 14/270 = 5.19%) , mainly vulnerable at deck level (12/216 = 5.5%). At ground level recessed -1 group appeared low risk (2/54 = 3.70%); while the shielded front and back faces (ground only) with a burglary rate of 6/116 = 5.17% fared about average for front and back dwelling faces. The inner-courts were less vulnerable than the off-courts (4/96 = 4.17%) with a burglary rate below the average 4.8% for ground front and/or back access; the least vulnerable were found to be the tunnels (2/102 = 1.96%) ; and the exposed backs (0/37 = 0%).
There are strong differences between front and back access in terms of their respective ranges of surveillability. Back access includes exposed and a high number of shielded faces, and excludes the recessed-1 and -2 categories, which on the other hand feature prominently in front access.

**Front access:** Shielded fronts appear to be the most vulnerable category (2/19=10.53%), followed by the recessed-2 fronts of the single-front flats (8.49%). The recessed-1 fronts are vulnerable at deck level, but not at ground. Tunnels (BR 2.13%); off-courts (BR 1/29=3.45%) do not appear very vulnerable, whilst inner-courts have no burglary (0%).

**Back access:** In contrast to the front, it is the off-court backs (3/41=7.32%) and inner-court backs (4/59=6.78%) that are the most vulnerable categories. The shielded are less vulnerable (4/97=4.12% below the average); the few tunnels and the exposed backs have no burglaries (0%).

However, certain categories split into vehicular and nonvehicular access: **Vehicular access:** the highly vulnerable front vehicular access category comprises shielded and recessed-1 fronts (with burglary rates of 2/9=22.22% and 1/10=10% respectively). In contrast the shielded vehicular backs are not vulnerable, the burglary rate here is a mere 2/79=2.53%.

As conditions of dwelling access are further specified by dwelling type specific combinations of local factors emerge, which appear to be vulnerable, though the more one specifies and overlays factors, the smaller the numbers in each subgroup (and the higher the burglary rate). The more 'individual' patterns of vulnerability on the estate were thus identified as:

- **Shielded vehicular fronts** of tower block maisonettes appeared to a very high burglary rate, while the other nonvehicular shielded fronts have no burglary (22.22% compared to 0%).
- **The recessed-1 vehicular fronts** of f/b flats also appeared vulnerable, while the nonvehicular ones were far less vulnerable (10% compared to 1/36-2.78%).

With respect to back access there is a more limited range of surveillability categories but a more varied dwelling typology. The backs of houses (the majority of backs 159/225), and the backs of f/b flats have the most subcategories and combinations, often with dwindling numbers of cases, too low to be analysed sensibly. The main findings suggest that:
• Back vulnerability is mainly related to houses with off-court backs (3/36=8.33%) and inner-court backs (3/52=5.77%).

• In contrast to front shielded, vehicular shielded backs are less vulnerable (2.53%) than the average 4.8%. For houses alone this rate increases slightly to 2/65=3.07%. However, the smaller nonvehicular shielded back group has a high burglary rate (2/18=9.52%). Broken down further by dwelling type one finds that there is small subgroup of houses just off the highly integrated pedestrian thoroughfare (Corker Walk), which have had a double burglary and the highest rate of burglary overall (2/6=33.33%).

The above suggests that it is not vehicular access, or shielded surveillability factors of tower block maisonettes per se that are vulnerable, but the combination of factors. In both cases it appears that vulnerability depends on the front vehicular access factor combined with shielded, or recessed-1 surveillability i.e. with some visual cover. Whilst nonvehicular off court backs and shielded backs of houses pinpoint vulnerability patterns with respect to back access.

While local characteristics are not quite unique for each dwelling, shared to some extent by a larger group, what is unique for each dwelling is the combination of local factors and degree of integration of its dwelling faces. Dwelling faces grouped by level of access, surveillability and access categories fall into specific ranges of the integration segregation scale, and it is the factor of global integration which ties the pattern of vulnerability together.

D. Global Factor of Accessibility: Degree of Integration/Segregation.

The spatial structure of the estate is strongly characterised by the two themes: hierarchy of vehicular/pedestrian access with unconstituted integration, and segregated constitution in clusters. The pedestrian thoroughfares that form the spine of the estate, Corker Walk and Mingard Walk, are highly integrated (with respect to the estate alone and embedded in its context), and attract the highest proportion of movement, and relatively continuous presence of people. These highly integrating axes, divorced from dwelling entrances and flanked with few back gardens with high garden walls, create a pattern of unconstituted integration, which as already observed on the Marquess Rd Estate, can be very vulnerable. They are linked to a series of relatively well integrated also unconstituted main vehicular access spaces, which together form the more integrated - 'public' in character, and traffic distribution oriented supergrid.
The interiors of the dwelling clusters are relatively segregated - particularly the green courts, which thus function as semi-private areas for residents only, discouraging through movement - as intended by the design. The main pedestrian thoroughfares actually link via grass areas with the visually and spatially segregated courts, although there are generally no designated paved paths. Whereas only a visual link is intended, there is no physical boundary to block access apart from soft landscaping, which by no means poses an obstacle to illegal entry or quick escape.

The analysis of the global pattern of vulnerability is based on the comparison of burgled and nonburgled dwellings/dwelling faces; the correlation between burglary rates and degree of integration of access lines; and the correlation of burglary rates and integration by integration bands (in order to overcome the problem of zero burglary lines and standardisation of dwellings per line). Compiling the findings from all three stages, the following pattern emerges:

Overall vulnerability with respect to global integration relates to segregation, however, there are two major factors, which influence this:

1. Differences in range of Integration between general categories of access: Front access (the majority of access faces) is significantly more segregated than back access and deck access is significantly more segregated than ground access overall.

2. Differences in terms of the range of local factors of surveillability and vehicular access etc. between front and back, ground and deck level, which also affect vulnerability at the global level.

At the deck level, where the variation of local factors is restricted (front-only; recessed -1 and -2; flats or maisonettes respectively), vulnerability with respect to global integration clearly increases with segregation. At ground level there is a split between front and back access, which perform differently with respect to vulnerability at the global level, as well as between ground and deck level.

The overall pattern is diffused: in terms of average front/back Integration rates, there is no clear difference between burgled and nonburgled dwellings for direct access overall. At ground level burgled dwellings are overall slightly more integrated (f/b RRA) than nonburgled dwellings. However, looking at front and back access separately the pattern becomes clearer:
With respect to **front access**, which comprises the majority (70%) of access faces and strongly influences the overall pattern, vulnerability increases with **segregation**. This trend is confirmed by comparing burgled and nonburgled front faces; correlating front burglary rates and degree of integration of access lines; and the same correlations for integration bands—for the whole, and for the ground level alone. At deck level with less interference from local factors this trend is clearer; at ground level, the correlations are rather less tidy with respect to integration bands, but there is a strong and highly significant correlation with respect to burgled lines.

With respect to **back access**, which is restricted to the top two integrated bands in the whole integration range the trend reverses: **back vulnerability increases with integration**. However, there is a certain split here too. At the most integrated end of the scale, vulnerability increases with segregation, in the subsequent somewhat less integrated range, vulnerability increases with integration.

Thus front and back access are the two major factors, which seem to determine the global pattern of vulnerability. As front and back access relate to specific combinations of local factors, the pattern of burglary risk with respect to global integration was further analysed by surveillability and vehicular access—the local factors—and even more importantly the combinations thereof.

- **Interrelationship between local and global factors.**

The investigation of the statistical differences in degree of integration between burgled/nonburgled faces in relationship to the local factors revealed the following:

- Whereas vehicular access is more integrated than nonvehicular access, it is back vehicular access, which is most integrated and least vulnerable (m.RRA = .552; BR 2.53%). **Front vehicular access** which is more **segregated** is **most vulnerable** (m.RRA = .759; BR 15.79%). With respect to nonvehicular access (the large majority) - **back access** is again more integrated but **more vulnerable** (back: m.RRA = .564, BR = 6.16%; front: m.RRA = .687, BR = 4.06%). Vehicular access is at the extremes of the vulnerability range, but the **most vulnerable is the segregated end**.

The above categories come hand in hand with surveillability categories, which also relate to or 'fit into' the global structure in particular ranges:

Firstly one found that the rough rank order of visual surveillability categories does not directly correspond with the rank order of integration. The exposed backs, the
shielded fronts and backs, and the tunnels are most integrated and least vulnerable with the exception of the shielded (vehicular) fronts. As for the rest - nonvehicular front and backs were found, surprisingly, that the ground recessed-1 and -2 fronts are less segregated than the off court and inner court fronts. The segregated recessed-2 fronts are the most vulnerable category, while with respect to the off-court and inner court fronts vulnerability gradually drops to 0%.

The inner court and off-court backs, on the other hand, are the most segregated back category yet still considerably more integrated than the recessed as well as the off- and inner-court fronts. They are also relatively highly vulnerable - somewhat less vulnerable than the segregated recessed-2 (front-only) group.

Specifying local factors even further, by adding dwelling type to the picture, the special cases of vulnerability and their position in the overall integration/segregation scale could be more clearly identified. The most integrated categories are the nonvehicular exposed backs of flats (Corker Walk) and nonvehicular shielded backs and fronts of maisonettes are burglary free, followed by the vehicular shielded backs of houses with a low burglary rate of about 3%. In the middle range, the vehicular shielded fronts of tower block maisonettes, present a special case of vulnerability, along with the recessed-1 vehicular fronts, at the very segregated end of the scale. Furthermore a small highly integrated subgroup, the nonvehicular shielded backs of houses seem to also present a special case of high burglary risk, just off the main integrator Corker Walk.

Considering vulnerability within subgroups (differences between Integration of burgled and nonburgled dwelling faces) showed that in the more integrated band vulnerability first increased with integration but then increased with segregation. At the segregated end vulnerability increases with integration. This symmetrical in a sense pattern with risk increasing towards the centre is similar to that observed on the Ferrier Estate.

However, overall one found that the surveillability categories at the extremes of the integration/segregation range (exposed backs; inner court fronts) have no burglary, and that with the exception of nonvehicular shielded backs the vulnerable categories tend to be more segregated and less visually surveillable - e.g. the obscured recessed-2 fronts and the off-court and inner-court backs. The more integrated exposed and shielded faces are less vulnerable.
Whilst lower visual surveillability clearly defines vulnerability (recessed -2; off courts etc.) in other cases the pattern of vulnerability with respect to local factors is not clear. It is not vehicular access overall that is vulnerable, just specifically relatively segregated front vehicular access, that is vulnerable. Furthermore, it is not 'shielded' faces overall that are vulnerable, (since the nonvehicular shielded fronts of maisonettes did not appear to be vulnerable, just as the majority of shielded vehicular backs appeared to be well below average in terms of burglary risk). Similarly the recessed-1 fronts of flats are not particularly vulnerable, just the highly segregated vehicular lot.

In the above cases it is the combination of local and global factors that create vulnerability. This means that these are small mini-groups with highly tailored vulnerability profiles, rather than any general categories of local/global factors on the estate. These highly vulnerable subcategories occur in other case studies, such as, for instance, the raised ground dwellings on the periphery of Marquess Rd Estate, and the highly integrated restricted view group on the edge on the Ferrier.

Going back to the question whether dwelling type per se affects vulnerability, there is no clear answer - a wider study would be necessary and more data. The high vulnerability of the ground tower block maisonettes can be explained by their shielded vehicular fronts. The front-only 2-person flats can be explained by the double recessed entrances, which also are a problem with deck maisonettes. The vulnerability of houses can be attributed to a specific range of characteristics of their backs (particularly the relatively segregated off-court; inner-court and the highly integrated shielded backs), while the fronts -(relatively integrated 'tunnels'; highly segregated off-courts and inner-courts, all nonvehicular categories)- are overall less vulnerable. This may relate to the fact that the backs are more vulnerable as such, due to the high garden walls, and the 11:7 ratio -where there is choice- confirms this.

Thus, although designed to provide privacy in a highly dense environment the high garden walls may be causing unnecessary risk. In contrast to the Ferrier, once over the walls (it only takes a few minutes), burglars are provided full visual cover. Furthermore, visual surveillance of public space or of the courts from inside the dwelling at ground level is obstructed, as is also the possibility of direct interception, if anything were to be witnessed by neighbours.

Similarly, the recessed fronts designed as buffers between private space and public view (at ground and deck level) reduce visual surveillability, while increasing territorial definition and segregation. Generally the hierarchy of public to private access which increases segregation of the courts and reduces visual
surveillability close to dwellings which characterises the design of this estate, clearly increases vulnerability of the dwellings - in spite of its high 'defensibility' in Newman terms.

Unconstituted integration also encourages vulnerability, though vehicular access seems to somewhat remedy that. Where there is a choice front/back houses and flats seem to be predominantly burgled from the nonvehicular access faces, and this is not always the more segregated side. Less integrated, and therefore less frequented vehicular front access seems to also be vulnerable, particularly when the respective backs are more integrated. Finally neither extreme integration nor segregation is vulnerable; the peaks are more in the slightly less segregated and the slightly less integrated zones of the integration/segregation range, with vulnerability increasing in the direction of the middle.

Summing up, the main factors or patterns of vulnerability on the Andover Estate are:

- **Unconstituted integration**: a result of the hierarchy of pedestrian and vehicular access, and the hierarchical concept of public to private space in the cluster design.
- **Integration coupled with visual shielding**: (lower surveillability); and back access.
- **Segregated constitution**: dwelling entrances divorced from the main pattern of access, coupled with restricted surveillability, for instance with recessed entrances.
- **Segregated front vehicular access** with restricted visual surveillability.
- **Visual cover**: by high back garden walls; obtrusive landscaping.

The general conclusions from this case study are:

- There are two poles in the pattern of vulnerability of the Andover Estate: on the one hand, there are **general categories/characteristics** that are more vulnerable: direct ground access, back access, restricted surveillability; segregation; on the other hand, there are **specific combinations** of factors that become vulnerable.
- Ultimately it is always the interrelationship between the local factors and the global factor of integration, which determines the overall pattern of vulnerability. Though our aim is to identify the factors and the mechanisms of spatial vulnerability produced in each housing design to a specific degree, not just the individual characteristics of vulnerable dwelling groups.
CHAPTER SEVEN: DISCUSSION AND CONCLUSIONS

7.0 Introduction:

Having completed the analysis of the case studies, this chapter returns to the original questions posed by this thesis: How does the design of housing affect spatial vulnerability to crime? How do choices made in the layout design perform with respect to crime vulnerability? This chapter sums up the findings of the study and attempts to provide some answers to the above, structured as follows:

- It summarises the key insights derived from the review of the discourse and how the approach adopted in this thesis responds to them.
- It presents the salient characteristics of the design of the three selected estates and the summarises the findings with respect to the design variables and patterns of vulnerability, identified in the case studies, and discusses these in the light of previous research.
- It then outlines the principles and mechanisms of vulnerability to crime, underlying the 'performance' of local and global design factors across the case studies;
- It draws up the relationship between the former and the later, as choices at various stages of the design.
- It outlines the issues for further research;
- It discusses the implications of the findings of this study for housing design guidance (feedback on existing approaches to safer design) and makes suggestions for design improvements to the estates investigated in this thesis.

7.1 Insights from the Review of the Discourse / Elaboration of the present approach:

In investigating the relationship between crime and design, and more broadly speaking, crime and space, the literature review found that one is ultimately dealing with the relationship between Man and the Environment. Three basic perspectives were identified within which the disciplines and their related discourse fall, which revealed the following:

- The Architects' perspective: The architectural discourse was found to have generally ignored the problem of crime, considering the relationship between man and the social/physical environment in idealised terms. Ideas of defensible space (Oscar Newman), however, have filtered through into the design guidance in the late seventies
(GLC, 1978) combined with notions of spatial organisation related to enclosure, hierarchy of public to private and territorial/functional demarcations, and segregation.

• The managing authorities' and policy makers perspective: Society's response to crime in the environment lies in the attempt to protect the potential victims. Crime prevention and the design against crime discourse, presents the Man-Environment relation from the victims' point of view. Whilst Jane Jacobs was the first to point out the link between urban design and crime, it is Oscar Newman's 'defensible space' theory and Alice Coleman's design disadvantagement scale, which have dominated the discussion, for lack of other design focused research. Both Newman and Coleman's approach attempted to relate features of blocks (large size/height, specific type of corridor and entrance features etc.) to high crime rates per block, but failed to overcome the problem of separating the social factors affecting the high crime rates from the design factors. Newman related vulnerability to lack of territorial definition, large size/height (anonymity), juxtaposition to high crime areas and image of vulnerability (Newman), whilst Coleman placed emphasis on anonymity, multiple escape routes (overhead walkways) and street surveillance. Whilst drawing attention to an important issue, these approaches have created theoretical confusion about the link between crime and design, through the behaviourist notions that design affects behaviour (causal link) and can trigger territoriality and 'defensive' behaviour. With the current emphasis on multi-strategy crime prevention combining policing, management; design improvements and community approaches - which partly results from the apparent disillusionment from the results of defensible space implementation - the confusion is perpetuated. The relationship between crime and design, what works and why, remains obscured, particularly the role of accessibility and pedestrian traffic.

• Criminological perspective: The paucity of the defensible space approach becomes even more apparent in the light of recent developments in the criminological discourse, focusing on the spatial dimension of crime: the crime event and the M-E link from the criminal's perspective: Partly in the wake of Newman's work, Environmental Criminology and the 'situational approach' adopted in Britain, have developed more sophisticated notions about the link between crime and the spatial environment, based on the study of criminal's mobility and spatial behaviour; environmental perception/mental maps and the target selection process. Interviews with offenders, coupled with increasing research focus on patterns of specific types of crime at the micro-environmental level, were found to provide useful insights on how offenders move in the environment and use space and
spatial cues to select their targets (re. property crime), given the decision to offend has been made.

The review found a fundamental lack of knowledge on the micro-spatial factors of crime victimisation, due to the lack of rigorous tools for spatial description and a suitable methodological framework. However, certain key environmental factors of vulnerability were identified. With respect to burglars' and burglary patterns (the most location specific crime), research had established that there is a trade-off between two fundamental factors, accessibility, (mainly understood as easy access and escape, though still unclear) and surveillability, the risk of being seen, which can be directly related to the built structure and design. Other nonspatial factors found to affect vulnerability/ risk were dwelling occupancy and target value.

Focusing on the purposes of this study, clearly the main stumbling block in research to date has been how to distinguish social and spatial 'causes' due to the limitations of using the block as the unit of analysis, (which allowed limited investigation of architectural features at a local level). This thesis thus adopted a 'situational framework' investigating the characteristics of burgled locations at the micro-spatial level in the attempt to define the spatial criteria of target selection and logic of spatial vulnerability. Furthermore in order to study the accessibility of these locations within the overall network of access, it applied the UAS' methodology of spatial description (Hillier and Hanson, 1984; Hillier et al 1983), which allowed quantitative measurement of spatial properties of access networks, and comparison across different layouts, and provides a theoretical framework for the understanding of the relationship between space use/movement and spatial configuration (Hillier et al 1987).

7.2 Case Studies on Spatial Vulnerability in Housing Design:

Addressing this important gap between disciplines, on the basis of in-depth exploratory case studies, the research set out to study the spatial and architectural characteristics of the housing layout, and the spatial and architectural characteristics of burgled locations, using police recorded data. It focused on the two basic spatial factors relating to burglary risk: surveillability and accessibility and tried to define them in design terms, ie. determine the design choices/design factors that related to burglary victimisation.
## OVERVIEW: FSTAT Design Statgifs

<table>
<thead>
<tr>
<th>DESIGN FACTORS</th>
<th>MARQUESS RD STATE</th>
<th>FERRIER STATE</th>
<th>ANDOVER STATE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SIZE</strong></td>
<td>985 Dwellings</td>
<td>1908</td>
<td>911</td>
</tr>
<tr>
<td><strong>BURGLARY RATE</strong></td>
<td>7.50%</td>
<td>64</td>
<td>6.91% (7.56%)</td>
</tr>
</tbody>
</table>

### STRATEGY:
- **MARQUESS RD STATE**
  - HIGH DENSITY, High % ground Coverage
  - MEDIUM TO LOW RISE: 4 storey 85%, 3 storey 15%
  - NON-GEOMETRIC/ informal layout
  - NEO VERNACULAR
  - North/ South sections divided by green
  - Winding lanes, village greens/ squares
  - Standardised BLOCK IN SECTION
- **FERRIER STATE**
  - MEDIUM DENSITY, LOWER % ground coverage
  - MIXED DEVELOPMENT: 5 storey 53%, 7 storey 17%
  - GEOMETRIC/ AXIAL LAYOUT
  - FORMAL/ REPETITIVE
  - Bvsected into East/West by Kidbrooke Pk Road
- **ANDOVER STATE**
  - HIGH DENSITY, High ground Coverage
  - MIXED DEVELOPMENT: 4 storey 64%, 7 storey 17%

### PRINCIPLES OF LAYOUT:
- **MARQUESS RD STATE**
  - URBAN /insular scheme
  - SUBURBAN /segregated location
- **FERRIER STATE**
  - HIERARCHICAL GRID, REPEITION OF CLUSTER
- **ANDOVER STATE**
  - PEDESTRIAN ONLY SPINE: thoroughfares/ nonveh

### ORDERING PRINCIPLES:
- **MARQUESS RD STATE**
  - PEDESTRIAN/ VEHICL SEGREGATION
  - System of Cul de sac, No through traffic
- **FERRIER STATE**
  - CLUSTERS / COURTYARDS
  - Relat. stand. BLOCK/DWELLING TYP in CLUSTER
- **ANDOVER STATE**
  - VEHICL ACCESS
  - PEDISTRIAN/ VEHICL SEGREGATION
  - System of Cul de sac, No through traffic

### VEHICL PEDESTRIAN ACCESS:
- **MARQUESS RD STATE**
  - Minimum Vehicular Access to Garages
  - GARAGES on periphery, underneath blocks
  - Illegal on street parking by default
- **FERRIER STATE**
  - PEDESTRIAN/ VEHICL SEGREGATION
  - RADBURGH TYPE LAYOUT
  - GARAGES under Masonette Courts
  - Limited on street parking
- **ANDOVER STATE**
  - VEHICL ACCESS
  - PEDISTRIAN/ VEHICL SEGREGATION
  - System of Cul de sac, No through traffic

### BLOCK - DWELLINGS:
- **MARQUESS RD STATE**
  - Scissors maisonettes, BACK to BACK
  - 2 storey row houses forming open courts
  - 5 storey Masonette blocks forming encl COURTS
  - 4 storey blocks with deck access (flats & maisonettes)
- **FERRIER STATE**
  - Rowhouse type access (DIRECT) at three levels
  - stand dwell access typology, ground direct fls access
  - deck access (maisonettes) inward facing
  - On street parking
- **ANDOVER STATE**
  - ROWHOUSE TYPE ACCESS
  - 2 storey row houses around courtyard front/back

### SPATIAL EXPERIENCE:
- **MARQUESS RD STATE**
  - HIGH DEGREE OF ENCLOSURE
  - SHORT views/exces. brick landscaping, garden walls
  - Griddly, relatively integrated, shallow to outside
  - Man Integrators linking to estate centre
  - Deck discontinuous chains; deep rings with ground.
  - Hierarchical structure: Integrated spine/ supergrd
  - Segregated courtyards/ dwelling access spaces
  - Unconstituted Integration
  - Deck discontinuous; strongly linked to ground
  - Clusters of entrances away from Integrating spaces
  - Unconstituted Integrated access from the outside
- **FERRIER STATE**
  - RELATIVE High degree of EXPOSURE at ground
  - Recessed entrance zones in maisonette courts
- **ANDOVER STATE**
  - HIERARCHY of access spaces width/integrat Avhec
  - Overall high degree of Enclosure/ local variation

### SPATIAL ANALYSIS:
- **MARQUESS RD STATE**
  - SEGREGATED from context; high axial breakdown
  - Integrating lines on periphery / vehicular access
  - Generally UNCONSTITUTED INTEGRATION
- **FERRIER STATE**
  - Generally UNCONSTITUTED INTEGRATION
- **ANDOVER STATE**
  - Deep; (3-4 axial steps from outside)
  - Relatively continuous interior ground sections
  - RAISED GROUND: DISCONTINUOUS
  - Front and back constitution
  - Relative continuity of dwelling access/ control

### PATTERN OF INTEGRATION:
- **MARQUESS RD STATE**
  - Generally UNCONSTITUTED INTEGRATION
- **FERRIER STATE**
  - Generally UNCONSTITUTED INTEGRATION
- **ANDOVER STATE**
  - Deep; (3-4 axial steps from outside)
  - Relatively continuous interior ground sections
  - RAISED GROUND: DISCONTINUOUS
The analysis focused on three large ex-GLC public housing estates of the seventies, selected on the basis that they were considered to be high crime, 'hard to let" estates, broadly similar in terms of socio-economic make-up, yet different in spatial/architectural terms. However, the estates were all variations of the introverted/insular design, and enclosed 'court' or 'green' morphology, representative of the seventies' design guidance, which permitted some form of direct comparison on the variations to the 'theme'. In each case study the analysis comprised four/five stages, which identified:

I: the spatial (syntactic) characteristics of dwelling access; II & III: the design variables (general and local factors) which affected vulnerability and how they performed;

IV: the pattern of vulnerability with respect to global accessibility (Integration-Segregation); and V: the interrelationship between global and local factors.

The main findings in terms of the design variables and constants, which affect vulnerability in each case and patterns of vulnerability, (discussed already at the end of each study) can be summarised as follows (Table 7.2 A presents the overview of estates' design characteristics):

I. **Marquess Rd Estate**: London borough of Islington. Burglary rate of 8%.

**General Characteristics**: Insular urban scheme; large seventies' redevelopment bordering on the New River Canal; comprising approximately 985 dwellings; High-density; low-medium-rise only, and high coverage.

**Ordering principles of Layout**: Nongeometric, 'informal' layout in typical neo-vernacular style (narrow winding alleys and greens), creating strong break of continuity in the street context. Separated in two parts with old green core and social facilities in the middle.

- Highest degree of vehicular and pedestrian segregation: Vehicular access restricted to Garage access, mainly on the peripheral boundary to the surrounding main streets, under the five storey blocks - at sunken ground level.

**Block Dwelling typology**: Row house type access at three main levels of access:

- ground and raised ground (over garages); and
- upper level (roof streets) with frequent but highly inconspicuous links to ground level. All dwellings with open direct access from public space; Dwellings (85% scissors maisonettes; 15% flats) generally have front only access with front
gardens/ terraces restricting visibility of the dwelling access points (at ground and raised ground).

II. **Ferrier Estate: London Borough of Greenwich:**

*Burglary rate of 2.64%*

*General Characteristics:* In stark contrast to the Marquess Rd Estate, the Ferrier Estate lies in the suburban outskirts of south east London in a highly segregated location with minimum urban context, further cut in two by main vehicular throughroute (Kidbrooke Park Rd). It comprises just under 2000 dwellings in a medium density mixed development, with a low degree of ground coverage and a relatively open, highly geometric and axial layout with high degree of uniformity/standardisation in block typology and formation.

*Ordering principles:* The layout is based on the repetition of open and closed courtyards with standardised block/dwelling typology in an orthogonal grid. Vehicular and Pedestrian Access is segregated in a typical Radburn type layout. Vehicular Access is based on a system of culs-de-sac feeding off the boundary loop road with underground garages at the centre of each maisonette court. Green stretches buffer residential parts from the main road; two underpasses link up the estate halves near the estate centre (with commercial social and communal facilities) and near Kidbrooke Station BR. The pedestrian network is highly axial allowing long views.

*Block/Dwelling typology:* Highly standardised:
- four-storey maisonette blocks: forming closed introverted courts with ground and deck access; alternating with
- two-storey rows of houses around open green courts
- Courts linked to eleven 11-storey tower blocks with flats.

Ground dwellings with **direct** front and back garden access (excluding OAP blocks).

III. **Andover Estate: London Borough of ISLINGTON**

*Burglary rate of 6.93% ( ~7.56% in 12 months)*

*General Characteristics:* Relatively integrated urban scheme with 925 dwellings, high density; high coverage; Mixed development predominantly low- to medium-rise; Tight
### Overview: Design Factors Affecting Patterns of Vulnerability

<table>
<thead>
<tr>
<th>Design Factors</th>
<th>Marquess Rd Estate</th>
<th>Ferrer Estate</th>
<th>Andover Estate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Burglary Rate</strong></td>
<td>74 985</td>
<td>56 190</td>
<td>64 924</td>
</tr>
<tr>
<td><strong>Global Accessibility</strong></td>
<td>Segregated/ Unconstituted entrances</td>
<td>Segregated no context; Shallow to outside, gridded; integrated Ground Increased depth through detailed articulation</td>
<td>Relatively integrated into context/ unconstituted Integr Relatively shallow ground dwellings (2.5) steps; Deck level 3.6 steps deep (esp. deck main/ten.) DIRECT (ground &amp; Deck), INDIRECT (Tower blocks)</td>
</tr>
<tr>
<td><strong>Block Access</strong></td>
<td>Direct Access Only</td>
<td>DIRECT (ground &amp; Deck); INDIRECT (Tower blocks)</td>
<td>Direct Access Only</td>
</tr>
<tr>
<td><strong>Level of Access</strong></td>
<td>Ground</td>
<td>Ground</td>
<td>Ground</td>
</tr>
<tr>
<td></td>
<td>Raised ground 1st level</td>
<td>Deck: 2nd Level</td>
<td>Deck: 1st Level</td>
</tr>
<tr>
<td></td>
<td>Upper (roof streets) 3rd level</td>
<td>Upper (tower blocks): 2.11 levels</td>
<td>Upper (tower blocks): 2.9 levels</td>
</tr>
<tr>
<td><strong>Single/Dual Faced</strong></td>
<td>Front-only</td>
<td>Front/back: Ground Direct</td>
<td>Front/back: Ground Direct</td>
</tr>
<tr>
<td>** Dwelling Types**</td>
<td>Scissors Maisonettes 5 persons 3-4 persons</td>
<td>Houses (F/B) 5 persons</td>
<td>Houses (F/B) 5 persons</td>
</tr>
<tr>
<td>Household size type</td>
<td>Flats (upper level) 1-2 persons</td>
<td>Ground Maisonettes (F/B) 3-4 persons</td>
<td>Ground Maisonettes (F/B) 4 persons</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deck Maisonettes (F) 2-3 persons</td>
<td>Deck Maisonettes (F) 3.4 persons</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Flats (F IND)</td>
<td>Flats (F IND)</td>
</tr>
<tr>
<td><strong>Local Accessibility</strong></td>
<td>Front Faces</td>
<td>Front Back Faces (ground)</td>
<td>Front Back Faces (ground)</td>
</tr>
<tr>
<td><strong>Vehicular NonVehicular Traffic</strong></td>
<td>Nonvehicular Only</td>
<td>Vehicular/ Nonvehicular Front</td>
<td>Vehicular/ Nonvehicular Front</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vehicular/ Nonvehicular Back</td>
<td>Vehicular/ Nonvehicular Back</td>
</tr>
<tr>
<td><strong>Visual Surveillability</strong></td>
<td>(Global Constant)</td>
<td>Exposed courts/open spaces: Houses (FR &amp; B), Exposed (Back); Screened (Back)</td>
<td>Overall high degree of fencing/enclosure</td>
</tr>
<tr>
<td>Local Visibility Varies by 1 F/B</td>
<td>Restricted: Ground &amp; Raised GR. Tunnel (FR);</td>
<td>Mansions (BACK) 75% &amp; Front 25%</td>
<td>Local Variations F/B:</td>
</tr>
<tr>
<td>Upper level local visual field relatively open</td>
<td>Enclosed Courts</td>
<td>Mansions 75% Front REC;</td>
<td>On court, Off court (FR &amp; B)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mansions Back 25%;</td>
<td>Recessed 1 (FR)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Restricted view Back (local)</td>
<td>Recessed 2 (FR)</td>
</tr>
</tbody>
</table>
and dense scheme, typical of 1978 GLC guidelines characterised by repetition of clusters in a slightly irregular supergrid:

**Ordering principles**  Layout based on the *clustering* of dwellings/blocks around green spaces. There is a hierarchy of public to private spaces, expressed in terms of width/length, degree of spatial and visual integration. Two main pedestrian only thoroughfares form the spine of estate, with no vehicular through routes. Pedestrian and vehicular traffic is partly segregated based on a system of culs-de-sac serving: garages on the boundary of each cluster/the estate; and internal on-street parking.

**Block Dwelling typology:** Relatively standardised:
- Two-storey row-houses with back gardens.
- Four-storey blocks: with deck access (to flats and maisonettes at second and third level) and at ground level: either:
  a. maisonettes with recessed entrances and back gardens;
  b. OAP flats with double recessed entrances and little front gardens on one side (and private garages on the outside);
  or  
  c. collective car parks situated under blocks on the periphery of the estate, building fortress-like blind boundaries to the surrounding streets
- Three stepped 11-storey tower blocks at the centre with controlled access (entryphones).

**Analysis of factors relating to visibility / accessibility:**
Design Variables /Constants in each design. (Table 7.2 B)

I. **Marquess Rd Estate:**

- High degree of visual enclosure relatively constant overall; Local conditions are relatively constant per access level:
- Local visibility/surveillability of dwelling entrances is restricted at ground level due to high garden walls. At roof level, there is a more direct visual exposure of dwelling entrances at the immediate local level, yet overall limited surveillability.
- There is no vehicular access (traffic) related to dwellings on the estate

The main access variables relate to level of access; number of dwellings (neighbours on an axial line, depth; and degree of Integration.

II. **Ferrier Estate:**
Local conditions of access vary by block/dwelling type (direct/indirect) and by Level of access: ground; deck (direct) and upper levels (indirect) and dwelling type and by front only or front/back. Dwelling types: (houses and maisonettes) come in a limited set of combinations of:

• **Degree of exposure:** Front and back either exposed or enclosed in courts:

• **Vehicular access/potential surveillance:** with houses and front exposed maisonsettes have vehicular surveillance potential, whilst enclosed and restricted view front and backs have no vehicular surveillance, as is the majority of exposed backs, particularly maisonsettes do not have either, though the proportions vary between east/west particularly due to back gardens opening onto the east's de boundary road.

### III Andover Estate:

The Andover presents the largest number of design variables, and combinations thereof:

• **Direct/Indirect Access:** Direct (ground and deck) and upper level indirect access

• **Levels:** with a wide range of dwelling types at ground level; and at deck:

• **Front only and Front/back access.** Front only at deck level, but also at ground level (with double recessed entrances) whilst the majority of houses and maisonsettes have front/back access.

• Overall, the degree of Enclosure on the estate is relatively constant, However, local conditions of surveillability and accessibility of access faces: vary with respect to the visual field: from minimal visibility (recessed-2; recessed-1); enclosed spaces 'off court' and on the courts; 'tunnel'- shaped; and at the relatively exposed end "screened" and 'exposed'.

• Furthermore visual surveillability categories also combine with vehicular/pedestrian only access and potential surveillance: (Vehicular access mostly relates to back gardens).

• **Patterns of vulnerability: Interrelationship between factors.**

### I Marquess Rd Estate:

Dwellings are twice as vulnerable at ground/raised ground than at deck level. More specifically:
1. The **raised ground level** is most vulnerable: particularly, on the **periphery** of the south section which is **relatively shallow to the highly integrated boundary** axes. This combines also with:

2. **Unconstituted access**: 90% of burglaries at ground /raised ground level are committed on the first constituted axial segment on a route from the outside.

3. Overall Burglary risk increases with degree of **segregation of lines** at ground level within the local spatial reference system (with the exception of the raised ground periphery, where the trend is with integration). Burglary risk also increases with **diminishing numbers of dwellings/ neighbours** per line.

4. At the highly segregated **deck level**, burglary risk drops overall, however, there still seems to be a pattern of risk relating to global segregation, coupled with a tendency for burgled dwellings to be near (one axial step away from) lifts/staircases, particularly in the north section.

II  **Ferrier Estate:**

**In terms of exposure/enclosure:** • The front and back exposed (houses) are least vulnerable, as are the front exposed back enclosed maisonettes.

• **Maisonettes:** the majority front enclosed with back exposed are more vulnerable and the restricted view group on the eastern fringe are the most vulnerable subgroup.

**In terms of vehicular/ nonvehicular access:** the most vulnerable group are those with **no surveillance** front or back (main y maisonettes). Burglaries as a rule are committed away from spaces with vehicular surveillance potential.

• **Restricted view on the fringe**, shallow to the highly integrated boundary.

• **Enclosed** faces are more vulnerable, than more exposed faces.

• Burglaries almost always **away from** the side with vehicular surveillance.

• **Global Segregation** increases burglary risk at the deck level. Despite increasing depth, deck access equally vulnerable as the overall more exposed ground access.

• However, integration/ segregation are not necessarily vulnerable at the extremes. Opposite **trends** increase towards the middle range. The overall more integrated exposed backs become more vulnerable with segregation, while segregated enclosed fronts become increasingly vulnerable with integration. (Why go any deeper)?

• Differences between general access categories appeared to be marginal, levelled off by local variables. Ground and Deck access, just as, Front-only and Front/Back access appear equally vulnerable, due to high degree of surveillability, and integration at ground level. **Ground safety:** is related to axiality of grid, high degree of integration and exposure and long views, along with continuous relationship to dwelling entrances. (Also high overall segregation of location).
III. Andover Estate:

-Whilst differences between Direct/Indirect Access were found to be marginal (7.00% compared to 6.5%), the ground level appeared to be proportionally more vulnerable than the deck (~7.9% compared to 6.25%).

- Front only access overall is less vulnerable than Front/back access. However, at ground level front only access (with double-recessed entrances) rates about the same as two-sided front/back access overall.

-Dwelling type: At deck level: the upper level maisonettes with double-recessed entrances (6.9%) are more vulnerable than the simple recessed deck flats (5.5%).

Ground level: OAP flats (double-recessed, f/only) are highly vulnerable (8%); twice as vulnerable as f/b flats with recessed entrances; whilst houses (f/b) are least vulnerable overall (<2%). The small group of ground maisonettes at the bottom of the tower blocks has the highest burglary rate (10%).

Focusing on the mode of entry: back access (particularly backs of houses) appeared to be 1.5 times more vulnerable than front (11:7), where there was choice. In contrast, it was the fronts of f/b flats/maisonettes that were found to be vulnerable. This relates to:

- Local Conditions of surveillability and accessibility of access faces: vary with respect to the visual field: from minimal visibility (recessed-2; recessed-1); enclosed spaces 'off court' and on the courts; 'tunnel'-shaped; and at the relatively exposed end "screened" and 'exposed'. Furthermore access may be via vehicular or pedestrian only routes.

-In general terms: high degree of enclosure and restricted visibility (recessed entrances) are most vulnerable, and relative segregation in terms of global accessibility. The two combined increase vulnerability to a high degree, since the one restricts the possibility of being seen and segregation also limits the possibility of any witness being there and intervening.

- Unconstituted access, is more or less constant here, since it applies to almost all dwelling access (mostly 2; max. 4 steps deep from the outside).

However, there are also specific combinations which appear to create vulnerability:

- Whilst Back access with (high garden walls) is more vulnerable than front, it is particularly in locations off the segregated courts (often devoid of people) rather than the screened relatively more integrated spaces of vehicular access.
However, screened back access (nonvehicular) off highly integrating and unconstituted axes also appears highly vulnerable near entrances into estate.

- **Vehicular access**: appears equally vulnerable as pedestrian-only access overall, with the exception of front vehicular access, which under specific combinations becomes vulnerable: screened or recessed fronts with vehicular access from less integrated spaces, appear to be relatively highly vulnerable (15.8%). There is limited surveillance, some cover and direct entry/exit through front doors, which allows quick and convenient loading and getaway.

### 7.3 Principles: Patterns and Mechanisms of spatial vulnerability

Overall the results of the analysis suggest that there are basic conditions or **principles** of vulnerability and there are certain **combinations of conditions** which create **patterns of vulnerability** more specific to the dwelling or estate:

- **With respect to Visual Surveillability (visibility)**: In all estates high degree of Enclosure and Restricted Visibility create vulnerability as a **rule**. This can be traced at both the **local level** i.e. of the specific dwelling face (on the Andover for example, out of seven visual surveillability categories, the most restricted view dwellings recessed 2) are clearly the most vulnerable at ground and at deck level); but also at a **global level** in the degree of enclosure characterising the residential development as a whole:

  - On the Ferrier, enclosed front access was found to be more vulnerable than relatively exposed' front and back access faces; On the Marquess, the degree of Enclosure and restricted visibility, is overall very high at both local and global level, with relatively restricted variation by access level).

- **With respect to Accessibility: Segregation and Integration**, can both be vulnerable depending on **local conditions** (front/back etc.). Generally the extremes of the range are not vulnerable. Contrary to the generally accepted notions of "easy access", it is **segregation** as a rule that appears to increase vulnerability in the case studies (eg. Marquess Rd at ground level and upper level sections; Deck Level on the Ferrier; Front access on the Andover), whilst Integration tends to be the exception.

**Specific combinations** of the above are found to be vulnerable in all estates:
- **Restricted view/ restricted surveillability** on the fringe of estates (shallow to the outside), adjacent to highly integrating spaces or
- **Access off highly integrating spaces without direct 'control' by dwelling entrances** (unconstituted access). For example:
- Marquess Rd Estate: The Raised ground periphery is almost twice as vulnerable as the estate average with a burglary rate of 13.8% compared to the average 7.5% for the estate, (20% compared to 9.00% average burglary rate in the south section);

- Ferrier Estate: The ground maisonettes on the east fringe, with a burglary rate about 3 times the average of other ground maisonettes (11.11% compared to 3.79%) are the most vulnerable subgroup
- Andover Estate: Screened backs off the main thoroughfare near entrance to the estate.

This combination appears to combine the benefits of the both the above principles.

- **Vehicular access:** As with Integration, under conditions of relative exposure/openness (and long views) vehicular access can act as a safeguard, adding to the surveillance potential of spaces (as on the Ferrier: where burglaries are always committed away from spaces with vehicular surveillance potential). It, can however under specific conditions also create problems:

    - **Front vehicular access** on the Andover, combined with some visual cover and relative segregation (limited presence of people e.g. culs-de-sac), appears to be vulnerable (small group with 10% burglary rate). It allows easy loading of goods (through front door) and easy escape for the type of burglary that requires a van/car to carry the goods. A high back garden wall would be a drawback in this case for the burglars.

    - In contrast, in more integrated spaces, where there is greater through-movement and presence of people, the risk is reduced. For example, the screened backs of houses with vehicular access on the Andover have a very low rate (about 2%): Burglaries tend to be committed from the front and off the segregated (empty) courtyards.

Whilst the principle of reduced visual surveillability, hardly needs explaining, surprisingly, the second principle of spatial accessibility (integration/segregation) appears to work both ways, as also found in the literature review.

Spatial segregation and step-depth from the outside, have been found to correlate inversely to the number of people moving through/using spaces, in studies carried out by the UAS (Hillier et al; 1993; 1989 a and b). This means fewer people passing through, on their way to or from their homes. Thus segregation and depth may predictably relate to less social surveillance potential, due to the absence of people who might witness, recognise and intercept the offenders - and offenders are likely to know and use that. What is important as a deterrent, as studies have shown, is not just visual surveillance (e.g. windows, CCT cameras etc.), but also the knowledge that someone is willing to do something about it, i.e. that some one is going to be able to intervene.
# Layout Design & Typology of Dwelling Access: Local and Global Factors of Accessibility and Surveillability

## General Characteristics of Access:

- **Block Mode:**
  - Direct: Open Public
  - Indirect: Sed. controlled, corporate space

- **Level:**
  - Ground, Direct
  - Upper, Ind.

- **Dwelling Type:**
  - Flats: Deck Ground
  - Mais Nettes: Deck F/B
  - Houses: Deck F/B

- **Faces:**
  - Single Front F only
  - Double Fronted (F/B)

## Specific Characteristics of Dwelling Faces

- **VEH NO VEHICULAR:**
  - FRONT BACK

- **Surveillability:**
  - EXP SED EXP SED
  - SHIELDED TUNNEL
  - ENCLOSED IN COURT
  - OFF COURT RECESS 1
  - REST View RECESS 2

- **Boundary Design:**
  - Related to dwelling type
    - Deck Mais Net E
    - Deck Flat
    - GF only FLAT
    - FB FLAT
    - House

---

**Figure:** Global and local design variables related to factors of accessibility and surveillability.
Thus, whilst **Integration** can be vulnerable, combined with some visual cover or lack of social control/surveillance by dwellings (unconstituted access), Integration can also be **safer**, due the 'surveillance potential'- in the presence of people, which predictably increases with Integration and vehicular access as a rule. There appears also to be a certain trade-off between **segregation** and **axial depth** (number of changes of direction) from the integrating spaces and the estate boundary. **Integration**, can be considered to relate to the principle of easy access/escape, particularly escape via spaces, which would allow one to disappear quickly, blend in with other people eg on busy high streets.(This is unlikely in the interior of estates).

Thus, the spatial **mechanisms** of vulnerability with respect to global accessibility are **twofold**: On the one hand they relate to 'easy access' (Integration) and can be defined at the **local** level (detailing of dwelling access) and at the overall (**global**) level of the spatial structure as a whole; but also relate to **limited social surveillance** from the absence of people/traffic. Both visibility and accessibility ultimately have to do with **surveillability in two forms**: visual (views) or social (active presence of people). Furthermore it is not just **visibility** links between private dwellings and public access spaces, that are enough, but also **permeability** links, which allow direct control action (interception).

### 7.4 Relationship between Design Choices and Spatial Vulnerability

Going back to the design related factors summarised in **Figure 7.01**, one can begin to interpret their performance in terms of the above principles of vulnerability:

- The factor of **direct or indirect access** (controlled/block access) may be seen to relate to both accessibility (through block entrances) and the surveillability principle, since **indirect access**, involves in principle less **visually surveillable access spaces**, often internal and obscured spaces. Whilst Hillier et al (1991) found indirect ground access considerably more vulnerable than direct, no clear difference was found here in terms of vulnerability between direct/indirect access. The data was too limited, as the selected estates were predominantly direct access. Further research is necessary here.

- The 'Level of access' factor :may be related to Integration ranges and provides basic thresholds of segregation above ground. Thus the more integrated **ground**
level, is found to be more vulnerable than deck and upper levels. (On the Marquess Rd Estate-ground level dwellings are twice as vulnerable as the upper level; and 1.5 times on the Andover Estate). However, mitigating circumstances may intervene, as is the case of the ground level on the Ferrier Estate with high degree of exposure and surveillability. Correlating burglary risk to degree of integration/segregation of lines by each level of access separately, showed that vulnerability tends to increase with segregation (eg, Marquess: ground and upper level; Andover: ground and deck level; Ferrier: deck level).

• **Double-sided** (front and back) as opposed to **one-sided** access. Although higher choice and flexibility makes two-sided access probably more vulnerable, since it doubles a burglar's opportunities for entry/escape, however, local conditions also play a role here:
  - On the ground level on the Andover Estate, minimum surveillability of one-sided f-only access (double recessed fronts) equalise the vulnerability of f/b access.
  - Similarly, front only deck maisonettes are more vulnerable than houses on the Ferrier.

• **Front and back access** also seem to perform differently at ground level. Findings on both the Ferrier and the Andover estates suggest that front access tends to become more vulnerable with segregation, whilst back access, which in both estates is significantly more integrated overall, seems to go the other way. This may relate to the pattern of 'Unconstituted Integration', however, local conditions need to be further investigated in a larger study.

• Differences between front and back access vulnerability are difficult to generalise, due to local detailing. In both the Marquess and the Andover, the high garden walls obviously pose a serious problem, in terms of reducing surveillability of both private and public space, whilst not really posing an obstruction to offenders. Though designed in order to safeguard privacy in a tight and dense environment, they may be incurring disproportional security risks. The same goes for landscaping, and other details of the articulation of dwelling entrances and facades.

Finally: **Dwelling type** can be used as a coded description of a whole range of other access/surveillability criteria, it needs, however, to considered as an independent factor also. Indirectly the social characteristics of the dwelling (size/type of household, etc.) may be creating distortions in the distribution of burglaries, in terms of target value/dwelling occupancy etc. These rather complex matters need to be investigated in a much larger context, and this is an issue for further research.
**Fig. 7.2 Relationship Between Design and Spatial Vulnerability**
Going back to the question, how do design choices affect spatial vulnerability, the summary diagram in (figure 7.02) presents an answer: it maps the relationship between design choices and consequences in terms of spatial vulnerability. There are two tiers - relating to global and increasingly local decisions:

A. Strategic choices- global concepts (related to the brief; policies; site):

- **Density/ building form/ degree of ground coverage**, which will affect the overall degree of enclosure (and visual surveillability);
- **Global concept/ structure of access** - pedestrian and vehicular traffic networks: which affects the pattern of accessibility/integration segregation (social surveillance potential);
- **Dwelling typology**: Dwelling type/ size/ boundary design; also relating to socio-economic population factors (household characteristics; target value).

B. Layout principles and the design tactics at the local level:

These relate to:

- **Typology of the Block and Block Formation**: Type of block/ Block access; and grouping thereof, which involve/ affect accessibility and surveillability factors at the increasingly local level; (direct/ indirect; Levels of Access; number of access faces vehicular/ non-vehicular; local articulation of layout), and
- **Typology of Dwelling- Access**: Detailing of entrance arrangements; facades; landscaping (recesses; gardens; boundary demarcations): These affect accessibility and surveillability at the local level

7.5 Conclusions and Implications for existing approaches.

Summing up how design choices perform with respect to vulnerability, the findings in this study suggest, that there are spatial principles of vulnerability: which relate to restricted visual surveillability; restricted surveillance potential (encouraged by segregation) and lack of discontinuity of dwelling control combined with easy access from highly integrated boundary or entrance spaces. However, there are no simple general rules about good or bad design features. It is the combination of circumstances, the interrelationship between local and global factors, which determine vulnerability.
Research evidence from this study suggests that 'defensible space', which aims at keeping people out (assuming that offenders are not local residents); encouraging defensive behaviour through territorial exclusion; and increasing control through hierarchy of public to private space (increasing segregation) suffers on two accounts:

A. It is based on a series of invalid assumptions about 'strangers' and about territorial behaviour which have had little theoretical or empirical support, to date (on the contrary).

B. It ignores the dual role of 'accessibility' / Integration: On the one hand, integration means 'easy access' for offenders (combined with conditions of restricted surveillability, in one form or another), whilst on the other, it increases surveillance by taking natural advantage of the presence of passers-by - as in J Jacobs' notion of natural surveillance. The evidence here suggests that hierarchy and segregation increase vulnerability on high-density housing estates.

In positive terms, this thesis argues that the spatial principles of 'natural surveillance' are three: visibility (visual surveillability); accessibility at the global level increasing the presence of people (social surveillance potential); and control of spaces by dwellings (constitution). This agrees with J Jacobs' (1961) ideas about self policing neighbourhoods, which depend on: "well-used, lively streets"; "eyes on the street"; strangers policing the streets and inhabitants keeping an eye on the strangers; with inhabitants able to step out directly onto the street, to intervene or assist where necessary.

7.6 Issues For Further Research:

Clearly there is a need for more research to further test out the findings of this study, and the mechanisms of vulnerability outlined above, on the basis of a larger data basis: a) in terms of more years data, and b) in terms of more case studies - a broader range of designs. The first question, which sociologists will pose, is, what about the other factors relating to the socio-economic characteristics of the households; target value and occupancy. Although, the issue is effectively isolated in this approach (allowing for dwelling type as the indirect form in which the nonspatial variables may surface), it would undoubtedly be important to investigate these factors in a larger multi-disciplinary study (best achieved by independent survey), with dwelling specific data, which the authorities do not normally keep records of.
Furthermore, in the existing framework, specific issues that need to be further identified can be outlined as follows:

1. More rigorous measurement of the visibility field:
   - New computer aided methods of area measurement would allow ratio-level measurement of the visibility field of each dwelling access face, rather than the simplified categories (ordinal scale) used within the framework of this study.

2. Further investigation into accessibility with respect to the syntactic properties of the spatial configuration:
   i. Research into other measures of global accessibility/ integration apart from the measure of Relativised Real Assymetry (RRA) : with varying Radius down to RA Radius 3 (local Integration).
   ii. Investigation of depth and spatial vulnerability: (from the outside boundary, and depth from main integrators), also in relation to unconstituted access.
   iii. Investigation of 'Intelligibility' (correlation between Integration and connectivity) at the local and global level , and the relationship between the two and burglary risk of an estate overall. This would require a broader sample of estates.

3. Investigation into the relationship between presence of people and burglary risk in spaces:
   - Systematic observations of space use and movement in relationship to burglary rates of spaces.
   - Systematic investigation of the relationship between adults and children's patterns of space use and burglary risk.

4. Further investigation of the relationship between number of dwellings on a line and burglary risk controlling for the degree of Integration/segregation, so as to assess the degree to which more neighbours may actually enhance safety. This may tie into the idea that corner locations tend to be more vulnerable than 'middle of the row' ones.

Finally, considering the discrepancy between architects intentions and built reality as experienced by the users; the discrepancy between architects' assessment of good design and users needs and perceptions, more research is necessary to improve the understanding and performance of designs in accordance with intentions and users needs, particularly in terms of privacy, community and feelings of insecurity.
7.7 Implications For Design Against Crime And Housing

Design Guidance

The findings of this study have important implications for design against crime. First of all it shows, that architectural choices determining the shape and structure of the residential environment and its relationship to its context, and structuring the relationship between private space, 'communal' space and public space (system of access), determine the ways in which opportunity for crime is provided: in terms of accessibility without surveillability - reducing risk of being seen or caught. Clearly, there are no simple recipes for 'safe' design, since spatial vulnerability can be determined in different ways (and in varying degrees) as an interrelationship of global and local factors, individual to each estate design and location/context. This means that contrary to the preference for simple prescription - to be followed without necessarily understanding the link between design and crime - the simple guidelines as offered in the case of defensible space or design disadvantaged scales, will be inadequate, if not misleading. What is necessary is a greater awareness of the role the spatial configuration plays in structuring space use and 'abuse' and design guidance in terms of principles and mechanisms of vulnerability or safety.

More specifically, in the light of the findings of this study, certain issues in the existing design guidance and crime prevention discourse need to be reassessed:

• Limitations of 'defensible space' and A. Coleman's approach:
Based on the mechanisms of vulnerability outlined in the previous pages, one can begin to explain, why the Marquess Rd and the Andover estates are so vulnerable. Both appear to combine: insular design (with entrance spaces removed from control by private dwelling entrances); a high overall degree of enclosure, and restricted local surveillability. Considering the degree of articulation of the layout at the local level, one might argue that both estates score very high with respect to defensible space, and evade Coleman's Disadvantaged Scale. The Andover, is a prime example of the GLC (1978) housing Layout guidelines (hierarchical design with clusters; vehicular segregation; spatial enclosure; incorporating 'defensible space' principles). Clearly 'defensible space' does not contribute to safety here. On the contrary, the Ferrier Estate, which suffers in that respect at ground level provides some clues to what is safer: higher degree of openness; axiality; extra surveillance boosted from vehicular access spaces; limited visually obtrusive landscaping.

• It is necessary to reconsider the link between design and crime as a matter of movement, perception and space use rather than territorial behaviour.
Burglars and other types of offenders use the environment in the same way as people with less deviant tendencies. It is also important to reconsider the notion that strangers are dangerous. On the contrary, as research literature suggests, on housing estates with a high proportion of petty crime, the offenders are less likely to be strangers on the estate but local youths.

- The pattern of spatial vulnerability cannot be attributed to generalised block/dwelling features, but needs to be considered in terms of the **interrelationship between local conditions of dwelling access and the overall context of the network of open spaces and surrounding streets**.

- Whilst design guidance focuses on a locally oriented approach to design (enclosure; micro-spatial articulation), more thought should be given to the **global design concepts**:
  - Constraints on **density and coverage** in large scale projects, without a globally-orientated access network of public space.
  - Importance of **simplifying and integrating spatial structure**, mixing uses and stimulating/activating sufficient presence of people and unforced local interaction.

- Defensible space oriented design ideology needs to be reassessed:
  - **Insular approach to public housing**: This weakens safety in transition zones and at the 'edges'. It is preferable to integrate housing into the context and avoid discontinuity in the control of public space via dwelling entrances.
  - **Hierarchy and clustering**: Effectively weakens the presence of people to critical levels, thus reducing the potential for surveillance of dwelling access.
  - **Need to reassess the idea of "Public to Private hierarchy"**.

Defensible space ideas incorporated in housing design guidelines based on hierarchy of public to private, can create vulnerability, by limiting visibility and surveillability and filtering out the strangers that boost natural surveillance, whilst not actually keeping intruders out. It is important to recognise, how different, **in principle, Jane Jacobs' ideas about natural surveillance and a self policing environment are to Newman's anti-urban ideology**.

- The problem of "**community versus privacy**" one of the key issues in design also needs to be weighed against considerations of security. In spaces with weak natural presence of people, surveillability should be maximised, rather than reduced in favour of privacy. Otherwise, the relationship between public and private space should be simplified, cutting out the unnecessary local articulation. Alternatively
one should treat under-used 'semi-public/private spaces as clearly private, controlling them properly with gates and keys.

- Although there are no absolute rules of good or bad design, and in each residential environment there will be ways of committing crime and avoiding apprehension, one needs to check the 'fitness' of designs against vulnerability. The principles of accessibility and visibility, which contribute to the natural surveillance potential of an environment, need to be taken into consideration at all stages of the design, keeping in mind there is a certain trade-off, between easy access' and presence of people, as well as restricted views and surveillance. The key is to maximise surveillability (visibility and permeability) of access spaces and minimise dwelling accessibility by target hardening.

7.8 Suggestions For Design Improvements for the Estates:

Based on the findings of this study presented above, certain basic recommendations can be made for the improvement of the estates' design in terms of safety. All design proposals clearly also need to be analysed and tested (as with the existing design), so as to minimise the possibility of negative side-effects and new forms of vulnerability. However, certain initial considerations for improvement would include the following:

I. Marquess Road Estate:

The fundamental problem with the design of the estate is the lack of an integrating structure in the residential sections of the estate, and the high complexity of axial breakdown, which contribute to the critically low levels of presence of people in the majority of spaces. Whilst drastic and highly expensive redesign would be necessary to achieve improvement in simplifying the spatial configuration and integrating the estate to the outside, however, with the existing structure, some improvement is still possible:

The main aspect of the design which can be improved, is the degree of visual surveillability in its tight, dense and relatively unfrequented spaces. This would involve:

- **Ground level**: Improving visibility of dwelling access points from access spaces, by reducing the height of the garden walls or replacing the brick with other types of (vertical fencing which do not block visual links. This would not only improve security...
of the dwellings, but also decrease vulnerability and the feelings of insecurity of pedestrians in the network of access spaces. It would improve surveillance of the public space of the estate by inhabitants from inside the dwellings.

- **Raised ground level**: Similarly, at the highly vulnerable raised ground level visual surveillability of walkways on the periphery of the estate, could be improved with transparent balustrades, allowing visual links with the street level passers-by).

- **Upper level**: The most secure, yet not necessarily friendly solution, would be to apply the fortress/prison design principle at the upper level: as has already been introduced making it totally inaccessibly to the public. Passages with links to the upper level could be improved to function like block entrances, with improved lighting conditions and maximising visibility with secure glass walls/doors. The staircases are also in drastic need of improvement, to allow visual and acoustic links through openings to the outside where possible.

As it turns out, improvements currently being carried out by the council are in tune with these suggestions, and it will be interesting to check the results in terms of security in the future.

- **Garages and Vehicular Access**: The possibility of redesigning the vehicular access route to run through the estate, so as to enhance through-movement with strict speed control devices (sleeping policemen) needs to be examined, though the dangers of introducing the 'one step off integrating spaces' vulnerability also need to be taken into consideration. However, this could increase the presence of people/vehicular surveillance. Where garages are in use, tight security systems with added security patrols may need to be introduced to encourage more people to use them. This would effect some decongestion of the tight ground level spaces, where cars are currently parking illegally. (Other commercial uses for the garages could be considered, to be let out). Some on street parking should be encouraged to stimulate presence of people, however, spaces should be properly allocated with restriction on overall numbers, and care be taken of excessive 'screening' of dwelling access.

### III. Andover Estate:

There is considerable room for improvement on the Andover with respect to the local detailing; improving the continuity of control by dwelling entrances, and simplifying the network of public spaces by excluding semi-public spaces from the public network:

i. **At the global level**: Constituting the main integrating thoroughfares by turning some dwellings round to be accessed directly off these main pedestrian routes.
Furthermore, by removing the electricity substations, which block the end of most culs-de-sac, surveillance could be overall improved, opening up visual inks between the vehicular access spaces/ culs-de-sac and the main pedestrian spine of the estate;

ii. Improving local visual surveillability between private and public space by reducing the height of garden walls, opening gates and even replacing the brick walls with more 'transparent' vertical fencing elements. Also closing off recessed entrance spaces by bringing forward the doors (flush with wall).

iii. Trimming down visually obtrusive landscaping cutting high bushes and shrubbery/ or low branches of trees, and clearing/ uncluttering views of access points. This would reduce possibilities for lurking in shaded/ dark corners both day and night.

iv. Removing some parking spaces and vehicular access in front of the ground level maisonettes at the backs of the Tower blocks. Alternatively one may turn the dwellings round to be accessed from the more busy central spaces. Here again the greenery would need to be trimmed to improve visual surveillability.

v. One option to improving surveillability in the clusters/ courts in consultation with tenants, would be to close-off the under-used 'semi-private' access spaces in the clusters into 'corporate' spaces as is usual with interior block circulation, by installing gates with intercoms off the more 'public' and frequented spaces. This could condense natural presence of people in the 'grid' off main access spaces, which would be enhanced by dwelling entrances opening onto them directly, where possible.

vi. Finally in cases of unused/ vandalised collective garages: Either open them up completely; or introduce other uses (more dwellings ?). The garages on the boundary to the surrounding streets could be converted to commercial spaces to be let. This would reduce the current fortress-like image, and add to security by intensifying use of space and continuity of human presence/ control on the boundary.

II. Ferrier Estate:

Since burglary levels at ground level are low there is probably little need for expensive improvements. Improvements have already been carried out here to the staircases at the corners of each maisonette block, to increase control of access to the deck level. At ground level, the recessed entrance zones within the maisonette court have been improved by creating front private terraces, thus bringing forward the entrance doors onto the main open courtyard space, allowing longer views of the access zones. In the maisonette courts, the underground carparks have been completely removed and ground level play areas have been introduced at the centre of each closed court, with on street parking bays (see photos). A recent visit to the estate showed the spaces and new front gardens to have been well received by the tenants.
Finally, it should be noted, that caution is necessary when dealing with extensive improvements, since unforeseen secondary effects could bring a new range of dwellings to risk as targets. Trial and error is perhaps unavoidable, however, if improvements are monitored properly as part of an on-going feedback process, it is the only way of getting it 'right' eventually - within the framework of each case.
MAN - ENVIRONMENT - COMMUNITY

FIGURE 8.0: THE LINK BETWEEN MAN (CRIMINAL AND VICTIM); COMMUNITY & THE BUILT ENVIRONMENT / DESIGN
CHAPTER EIGHT: EPILOGUE:
Guiding principles for safety-conscious public housing design:

Architectural and urban design strongly influence the relationship between man and the 'environment' by shaping the built context. Through the ordering of boundaries and openings, which allow spatial control and/or spatial links (access, architecture structures the environment in spatial and social terms: encouraging or permitting social integration/interaction/awareness of people, or segregating/creating physical barriers and distance. It manipulates the relationship between public and private space and the relationship between locality/local residential structure, and its integration into a larger whole.

Crime and fear of crime are both serious social problems, which need to be taken into consideration in designing urban housing schemes, just as fire, accidents and other hazards for safety. Figure 8.0 illustrates the relationship between man/woman (normal or deviant), community and the built environment. Amplified by the mixed dense co-existence in modern urban society, crime takes place in the spatial environment, where offenders move (just like everybody else, using it to select targets and carry out their decision to commit illegal entry; mugging etc. Their success depends largely on recognising spatial opportunity (based on minimum effort/maximum payoff - not getting seen nor caught). This, the physical configuration provides in two forms: either by the lack of people/potential witnesses - the 'urban desert' often observed in housing estates usually less accessible to the outside; or by too many people and busy through-movement (with limited static control) - for example, off busy roads, but hardly the case in public housing estates.

Though architects cannot change the social causes of crime directly, nor totally avoid the problem of displacement of crime - they can affect in important ways the vulnerability of the residential environment (the environmental opportunity structure) to crime. This they can achieve by increasing surveillability, both visual and social; minimising accessibility to the dwelling/building (with clear-cut boundaries between public and private/corporate space); and target-hardening the dwelling, the building and the layout. The model one chooses to apply in 'target hardening' the layout, partly depends on what kind of local group/social class one is dealing with. Street closures have been very popular in middle- and upper-income housing groups in the USA (ghettos for the rich designed as fortified hamlets, often controlled by additional security patrols. However, at a global urban level, this is no solution, for it signifies the ultimate desolation of the city - a city of 'turfs' with highly vulnerable
non-man's land in between. The prison or fortress model is the safest design, but only those who wish to, should live there.

Target hardening of dwellings in public housing is a prerequisite, in the sense of basic security precautions (often not adhered to). However, this approach is limited beyond a certain point. The design of housing estates has fluctuated between the two extremes: from overstructuring and overdetermining 'community' (socio-spatial correspondence in terms of identity and spatial links) or anonymous 'production line' building - stringing dwellings along endless corridors/ or layers of corridors, limiting the opportunity for social integration/-interaction and informal spatial co-presence, which discourage community-building at the level beyond the immediate corridor.

Hanson and Hillier (1987) have argued, that there is an alternative to the spatially closed community (correspondence model), which has been the prevailing recipe of the time. There is an open, more transpatial community, in the model of the traditional mixed and lively urban environments (see J Jacobs, 1961, description of North-End in Boston), which thrives locally by attracting and hosting through-movement, while stimulating local interaction and belonging/caring, sense of identity/place and so on. This, Jane Jacobs argues, provides a basis for a healthy self policing environment. Similarly, this thesis argues, a balanced approach to designing public housing is necessary, that allows interaction and simultaneous co-presence - integration of people in 'public space' that will allow the necessary awareness of human co-existence and the exertion of social control, in an informal way.

In concluding this thesis, certain general guiding principles for a safer environment are proposed, which relate to Jane Jacobs' and Bill Hillier's ideas about safe streets and neighbourhoods, rather than the Oscar Newman approach which has dominated the architectural scene. The main idea is to strengthen the 'natural surveillance potential of public space, by increasing visual surveillability; intensifying social presence; and encouraging interception and direct control/access. How can these be achieved, in an 'anonymous' urban environment? On the basis of the overall experience of this study, one may suggest that there are five basic keys to safety in public housing design, which clearly also would need further testing out - in controlled design experiments:

A The first key is to discard of the notion of 'insularity' in the design of public housing schemes, and integrate public housing provision into the existing urban structure/context. Local authorities can provide green spaces, communal activity centres and social amenities for the community as a whole, not just an introverted ghetto. Exclusivity by segregation may be considered by some as a privilege, for
which many are willing to pay extra money, however, it does not work for the less privileged within the framework of this society. At the turn of the twenty-first century, where ideals of community by design have been strongly watered down, there is little justification for this notion of insular design, and often the urban fabric as a whole suffers. Peter Rowe (1993: 330-331) in *Modernity and Housing* argues against sharp distinctions between housing "projects" and "pieces of the city": "Problems arise,...when unnecessary or exaggerated conditions of self-containment and architectural autonomy begin to emerge...". By integrating public housing, as has been the case in the mid to late eighties developments, and pursuing low key, smaller scale interventions, one eliminates the discontinuity of control of public space, and avoids creating the vulnerable 'edge effect'.

**B. Simplifying the relationship between public and private space so as to condense/intensify use of space, natural surveillance, and 'control' of public space from private space and vice-versa.** Eliminating unnecessary hierarchy of public to private space, and introducing clear-cut distinctions and direct relations between public and private space (as J Jacobs and later also A Coleman have argued). The hierarchical model merely thins out the presence of people - including the 'strangers' necessary to provide 'natural surveillance'- without prohibiting access to those having decided to offend.

This is easier to achieve in new designs than in existing estate designs. In the latter case, one option is to create controlled 'corporate' 1 spaces by introducing effective entry-control systems (locked gates with keys). This principle has usually been restricted to block access (for the interior circulation spaces of the blocks). Entry control (entryphones) systems have been widely put into effect with relatively disappointing results (SNU: 1986) as discussed in chapter two. One could introduce similar solutions for clusters, with open air access instead of closed corridors etc. The scale of the 'corporate' group (in a spatial sense) has to be small enough to facilitate control by the group 2. It cannot be introduced on a larger scale (eg. street closures propagated by O Newman: 1974; or Appleyard: 1981), for this would merely weaken the security of public space on the boundary by creating a no man's land around it. As

---

1 Corporate: Term denoting spaces under the control management of the group of inhabitants of a block with central responsibility, as described by Mary Buls and Steven Walker (1988) in their proposal for the management of high rise blocks. It indicates the clear cut status of communal space shared within a building or between groups of dwellings that is not public. See also Anderson, Bulos and Walker (1985) based on their study of tower blocks.

2 These kinds of solutions with entryphones are difficult for younger children, who cannot reach or have no key; and tend to create problems for both children and parents. Another drawback of the gates and entry-control systems, is that they are usually reminiscent of prison design, operating on precisely the same spatial principles, only reversed.
findings of this thesis suggest, **continuity of control** by dwelling entrances is important; 'corporate' solutions require active support and participation of residents and children, who may have to be 'encouraged to change to a mentality of caring about the communal spaces as a corporate extension of the private dwelling\(^3\) and actively participating in the upkeep of security. Effective **caretaking** or **concierge systems** are other key aspects to be investigated\(^4\).

**C Scale** : A lot of problems can be avoided by dealing with the large and small scale in a more efficient way, particularly the advantages versus the disadvantages of both. Clearly the smaller the project the less problematic its integration into the urban context; and the less the need for an internal global spatial structure, since the existing street network takes on that role. However, there is the danger of creating vulnerability by providing one step-off integrating streets with restricted surveillability type of spaces. Small scale spatial articulation, often found in cozy 'mews' type or neo vernacular schemes create spaces devoid of human presence and highly unpredictable due to restricted views, which lose out on the benefits that the larger scale and axially oriented environment provides in terms of surveillability. On the other hand, smaller units/ blocks, integrated rather than segregated from the global system, can retain 'identity-individuality' and coherence, while being easier to control and keep up standards of maintenance and security. However, links need to be conspicuous and boundaries between globalised public and controlled corporate space need to be clear cut.

**D Improving visual links between private and public space.** by reducing visual obstructions and maximising visibility of dwelling entry points, and allowing direct view and control (by doors) of public access spaces from inside the dwellings. (Visibility) This means weighing privacy needs against surveillability and possible effects on overall security, especially where levels of natural presence of people (surveillance) is low. The detailing; landscaping and vegetation should always be checked for unnecessary dark corners, where visibility is restricted and potential danger could occur. This equivalent is standard practice in shops and supermarkets, where maximum visibility/surveillability of spaces is strictly pursued, avoiding blind spots.

---

\(^3\) In cultures where there is n 'public housing' this can be even seen in the attitude to the street (Greek islands; vernacular settlement or even present day Germany, where residents are responsible for sweeping the snow and the leaves and maintaining the public space directly in front of their doorstep. If everybody contributed (and peer pressure makes sure they do) the whole place function better, is well kept and is enjoyed by all. However, it is in the design, which will re educate people to care for their environment and behave with respect for communal property. Educating and encouraging by incentives and penalties, and all the means that official and private corporations and media use to sell their products or new lifestyles, are necessary to win over the public.

\(^4\) See M. Roberts 1988 arguing on the importance of caretaking in her critique of Utopia on Trial from this perspective.
E. Stimulating activity and social presence in public spaces: by encouraging mixed uses: For example, allowing pedestrian use, and interaction low key vehicular traffic and parking, with speed control devices and restrictions to the areas where parking is allowed. Concepts like these have been introduced in Holland and Germany in the "Wohnstrassen" eg in Ulla Schreiber's (1982 *Modelle für Humanes Wohnen*) 5 Furthermore, allowing more mix with commercial uses at street level, with housing above. As with everything else, there is a need for 'economy' and 'efficiency' of open public space.

Going back to the importance of the global perspective:
To conclude, one might comment that the understanding to date of the 'social' performance of architecture is limited, caught between interdisciplinary boundaries. This is mainly due to the difficulty of achieving a 'global view' that allows the fragmented approaches to be connected. The largely 'routinized' forms of recursive day to day activities of a practical nature, are constituted in the spatial context and in time 6.
It is crucial that designers become more conscious of this key 'function' of the environment, and the consequences this has on people's daily lives and the structuring of modes of social co-presence. The importance of the global perspective, is that it takes account of the connections between things (local and global, spatial and social).
A socially responsible architecture needs this perspective, to deal with social consequences in a more conscious way, and not by chance, intuition and general beliefs. This not only involves looking at projects as a whole and in terms of their relationship to the larger context (global spatial level), but also being conscious of the links between a 'balanced' (local/global; privacy/community; integration/segregation) environment and a 'healthier' and/or safer social co-existence.

BIBLIOGRAPHY

A. ARCHITECTURAL DISCOURSE: ARCHITECTURE AND THE ENVIRONMENT.
   - PERCEPTION OF THE ENVIRONMENT; BEHAVIOURAL GEOGRAPHY
   - SOCIETY-ENVIRONMENT: URBAN GEOGRAPHY
   - FEAR OF CRIME:

B. DESIGN AND CRIME: CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN

C. CRIME AND SPACE: CRIMINOLOGICAL PERSPECTIVE
   - BURGLARY PATTERNS
   - SCIENTIFIC METHODOLOGY.
BIBLIOGRAPHY

A. ARCHITECTURAL DISCOURSE: ARCHITECTURE AND THE ENVIRONMENT.


HILLIER, BILL (1991): ‘*Can architecture cause social malaise?’* Paper given at the Medical Research Council seminar on Housing and Health: 15.11.91


UNWIN, RAYMOND(1919): *Town Planning in Practice*; T.Fisher Unwin; London


PERCEPTION OF THE ENVIRONMENT: BEHAVIOURAL GEOGRAPHY


SOCITY-ENVIRONMENT: URBAN GEOGRAPHY


BURGESS, E.W. (1926): The Urban Community; Chicago: Chicago University Press;


**FEAR OF CRIME:**


HUNTER A. (1978): 'Symbols of incivility: social disorder and fear of crime in urban neighborhoods.' Presented at the annual meeting of the American Society of Criminology, Dallas, Nov. 1978


Van Der VOORT, D.J.M. (1988): 'Spatial Analysis of Crime and Anxiety - Research Data from the Netherlands and Implications for Design.


B. DESIGN AND CRIME: CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN


HILLIER, BILL (1973): 'In Defense of Space'. RIBAJournal , 80; Nov.'73; pp.539-44.


INSTITUTION OF LIGHTING ENGINEERS, (1990): The Lighting and Crime File. Rugby ; ILE.


MURRAY, C., MOTOYAMA, T. & ROUSE, W. V. (1980); The Link between Crime and the Built Environment. Washington DC: US Department of Justice; National Institute of Justice; GPO.

NACRO (Bright Jon and Petterson Geraldine) (1984): The Safe Neighbourhoods Unit. Community Based Improvement Programmes on Twelve Inner London Housing Estates; London: SNU.


C. CRIME AND SPACE: CRIMINOLOGICAL PERSPECTIVE


HOPE, TIM; & SHAW MARGARET; Editors (1988): Communities and Crime Reduction; London: Home Office Research and Planning Unit; London: HMSO.


STOKS, FRANCIS (undated paper): *Assessing Urban Public Space Environments for Danger of Violent Crime, Especially Rape*


BURGLARY PATTERNS


BRANTINGHAM, P.J.& BRANTINGHAM, P.L (1975) : 'Residential Burglary and Urban Form'. Urban Studies No.12 pp 273-84


SCIENTIFIC METHODOLOGY:


APPENDIX I: LARGER PROBLEM CONTEXT:


As argued in this thesis, the role of the built environment is instrumental in providing the opportunities for informal social control of crime. This section discusses a number of key issues which highlight importance of the problem of design and crime on housing estates within this context. These are:

a) the extent of crime in urban areas and the amount of public concern about victimisation risk.

b) high fear of crime and the effects thereof on the lives of people and

c) the limitations of the official crime control agencies, the police who enforce law and order, to provide adequate crime prevention and alleviate social anxiety about crime.

Crime is an essential part of people's everyday reality. One reads about it every day in the press, hears about it on the radio and sees it on TV. People tend to take certain basic precautions when going out against been broken into (like closing/locking windows, locking the doors etc). When out shopping in the high street, or in the crowded shops, or at the tube station, getting on or out of trains, buses etc, anywhere where we are in spaces with too many people in close proximity, one tends to take care about money and bags/handbags. Informed advice from the police, from the media, and from our own and our neighbour's and relatives painful experience suggest it is necessary to take precautions. There is strong evidence from research in North America, Britain (and Europe) that the public is aware, that fear of crime is a problem which cannot be ignored, and that out of fear of crime people generally conform their behaviour in order to protect themselves against crime.


Police statistics are published every year; however, the recorded crime rates actually present a fraction of crime that actually takes place. This is due to both the fact that a lot of crimes do not come to the attention of the police (e.g. not all incidents get

1 The Metropolitan police have published numerous leaflets on how to protect oneself against various types of crime e.g. HMSO leaflet: Police advice on Preventing Crime, and actively advertise about these issues.

2 There is extensive criminological literature on fear of crime, a brief review of which is presented in S. Smith's (86) paper: Social and Spatial Aspects of fear of crime presented at the conference on 'The Geography of Crime', North Stafford Polytechnic, March 5, 1986.
reported to the police), and of the reported crimes, again only a portion gets actually recorded, due to police recording practices. The proportion of crimes that get reported and recorded vary for different types of crime. (Burglary for instance has a relatively high reporting rate; from the estimates of victim surveys as for example the Islington Crime Survey only about 70-80% gets reported and 50% thereof recorded, that is only 41% of actual burglaries and illegal entries in Islington reported in official statistics in 1985.)

For this reason victim surveys which actually ask residents directly of their experience of crime incidents present a more accurate picture of the actual extent of crime occurrence, people's experience of and attitudes to the problem of crime.

Crime is higher in cities than in rural areas, and again in cities it varies geographically, generally tending to be higher in the innercity areas.

The Islington Crime Survey, the first extensive victim survey to be carried out in London found that the rates for different types of crime varied considerably within the borough, both geographically as well as within different segments of the population (broken down by age, gender, income, race, tenure etc).

Looking at the overall occurrence of crime reported by the Islington respondents, the survey found that 50% of households had a direct experience of crime. For the main categories of crime for which follow up interviews were carried out: vandalism, burglary, theft from person, assault and sexual assault, the proportion of households affected is much lower at 31%, indicating that there is also a high proportion of multiple victimisation - the same households tend to be victimised again.

The rate of burglary uncovered by the Islington Crime Survey (ICS) was just over 12%, very close to the rate found by the British Crime Survey (BCS) for high risk (inner city) areas. This means that about one in eight households was burgled on average in a year, though again the rate of multiple victimisation is quite high (24% of break-ins). This varied within the borough wards to the extent that the ward with the highest burglary rate (Mildmay) was found to have one and a half times higher risk of burglary than the ward with the lowest rate (Holloway). Broken down by other population characteristics the ICS found that younger people are more at risk.

---

3 Survey techniques developed and used in the USA were developed and tested in the '70s in Britain by R. Sparks et al; See Sparks et al, Surveying Victims, John Wiley and Sons, 1977

4 Regional differences are illustrated in the British Crime Survey (BCS), carried out in two sweeps, in 1982 and then with more fine tuning in 1984. The survey found that crime patterns cluster around the major urban conurbations and cities.

than older, men more than women, Blacks more than Whites and Asians. By far, however, it was older black females (over 45), and young, (under 25), asian and other non-white men that are most at risk. The survey also found that there is a strong inverse relationship between victimisation and both perception of crime and satisfaction with the neighbourhood.

With respect to income the picture is more complicated. Risk is greater for the higher and highest income groups (in 1985: £8000 and above), but there is also higher risk (above average) for the lowest income category (under £3000 in 1985). With respect to type of tenure: private rentals were more at risk than public rentals and owner occupiers, though squatters were by far the highest risk group.

This complex pattern of risk with respect to income and area is explained according to the authors of the ICS by the fact, that there is a greater mix of high income groups living in close proximity with low income groups, as for instance in the case of Mildmay ward. (Holloway in contrast is characterised by a more homogeneous income group.)

For other types of crime the ICS found the following:

- Vandalism: The variation of rates for criminal damage/vandalism were found to follow in most ways (except for age) the patterns of risk for burglary.
- Theft from person: 13.9% of households were victimised of which only 16% were robbery (where weapons or threat of violence were used).

Younger persons, black persons and women were found to be more likely to be victimised. Perception of crime and satisfaction with the neighbourhood were found to strongly relate to rates of theft.

- Assault (including sexual, racist and domestic violence): This category of crime is strongly underrepresented by official police statistics, since the majority of cases does not get recorded by the police or as for instance is the case with domestic violence doesn't get reported to the police. (Overall only 6% of assault cases was recorded, -17% of reported. - often because most people know their assailant/ or even live with them, as in the case of domestic violence).

The average rate of assault incidents for the borough was found to be at 18.6% of households, almost four times higher than the national average reported by the BCS. Again there is a strong correlation with age, race and gender. Younger people are nearly thirteen times as likely to be assaulted than people over 45; blacks on average twice as likely, women half as likely. Here too there is an inverse relationship between assault rates and satisfaction with the neighbourhood. Conversely,
households from which respondents expressed high fear of crime are three times as likely to be victimised as respondents who expressed low fear.

- Overall apart from the consistent relationship between dissatisfaction with the neighbourhood and victimisation rates for all types of crime, as well as perception of high crime and victimisation there is also a consistent relationship with going out in the evenings and victimisation for all types of crime.

The survey found that over 70% of Islington residents see crime as a problem, (second to unemployment and lack of youth facilities, out of a list of neighbourhood problems). Women in general tend to think crime is a problem more than men do, across age and ethnic groups. (p.35). Perception of risk across age, gender and ethnic groups tend to relate to actual vulnerability. This does not necessarily mean actual victimisation rates, but the perception of overall exposure to risk and of their actual chances of defending themselves.

Comparing different types of crime, overall 56% worried about being burgled and 46% of being mugged. Nearly half of all women worry about being raped or sexually assaulted.

About 60% of Islington residents thought there were risks for women going out on their own in the streets at night (considerably higher than Londoners as a whole according to the Policy Studies Institute survey in '83) and about 50% of Islington residents feared for their own safety in the streets at night (about the same for Londoners as a whole).

The findings of the ICS showed that people's fear of crime is justified and it is related to a realistic perception of crime that takes place.

A1.2 Fear of crime

Susan Smith 6 distinguishes fear of crime from "concern about crime as a local problem" and 'awareness of crime in the environment". She defines crime as an "emotional response to a threat; an admission to self and others that crime is intimidating; a sense of danger and anxiety at the prospect of being harmed. ... unlike crime, fear is not so much an event as a persistent or recurring sense of malaise. ....... Fear of crime is a social phenomenon, not just a facet of individuals

---

psychology. It is related to crime in so far as vulnerable and fearful populations overlap, but it mediates many other facets of community life."

Research in the USA and in Britain has shown that fear of crime is a serious problem in urban areas. The second sweep of the British Crime Survey ('84) was able to pinpoint the highest levels of anxiety about burglary and mugging in the poorest council estates and in multiracial areas. In north central Birmingham S Smith reports that 70% of the population always, often or occasionally feel unsafe, and that over half (56%) admit there are times when they live in fear of burglary.

Victims of crime tend to suffer anxiety and worry about their safety. Many North American studies show a consistent relationship between fear of crime and victimisation (eg Giles-Sims '84; Sundeen '77; Stafford and Galle '84). M Maguire finds insecurity and unease amongst the majority of burglary victims over two months after the event: "people become suspicious of their acquaintances, feel anxious about entering their own homes and are afraid to stay alone at night". The BCS finds that about 60% of burglary victims are "extremely upset" by the event. The ICS as discussed above finds that burglary victimisation rates, as well rates of all other crime categories, relate to higher levels of fear of crime. Amongst victims, single women and the elderly are more highly affected by fear of crime.

Fear however is not limited to those with direct experience of crime, non victims are as likely to experience anxiety about safety. T Baumer's study of fear of crime in the USA finds that amongst the elderly non-victims fear is more widespread than amongst the victims. This shows that fear is related to a multiplicity of factors, and thus crime prevention policies alone would not suffice to alleviate the problem.

Of course it is also likely that those most anxious, and most vulnerable, tend to take the most precautions, by for instance not going out, thus reducing the likelihood of being victimised.

---

7 Findings of victim surveys in Britain e.g. the Merseyside Crime Survey (Kinsey, '84; S Smith '83, '84a) confirming research findings on the pattern of variation in the spatial distribution of fear in other western industrialised countries (USA, Canada etc.)
See S Smith op. cit. '86
8 S Smith, 'Public Policy and the Effects of Crime in the Inner City', in Urban Studies 20, pp 229-239, 1983

491
Baumer\textsuperscript{11} shows that while fear of crime increases amongst men with age, it is pervasive among women of all age groups. The BCS ('82) finds that 60\% of women in innercity areas feel at least somewhat unsafe. In the second sweep the BCS shows that approximately 10\% more women than men at all ages are afraid of burglary, and that the proportionate differences are even greater for mugging and robbery. However, by far the most widespread fear among women is fear of rape, affecting 40\% of the 16-30 group\textsuperscript{12}. Local surveys, such as the Policy Studies Institute survey in London\textsuperscript{13} and the ICS discussed earlier, confirm the predominence of women's fear of crime.

The elderly's fear of crime is highest with respect to assault, whereas with respect to fear of household crimes the age discrepancy is less, though anxiety is more widespread. Researchers relate the somewhat disproportionate fear of the elderly partly to their awareness of increasing frailty and inability to resist attack\textsuperscript{14}. Kennedy and Silvermann's\textsuperscript{15} study associates fear of crime among the elderly with the sense of isolation and loneliness. These factors perhaps particularly worth noting since as will be argued in later sections this is also linked to the architecture of the environment.

Other social biases which were observed in victimisation rates are also related to fear of crime:

- Fear varies also between racial groups. Blacks are more fearful than whites both in the USA (consistent findings of the National Crime Surveys and in Britain (see PSI, ICS).
- Income class: fear of crime is overall inversely related to income.

S Smith however argues that the anomalies in the distribution of fear are explained by the fact that "where people live is often more important than who they are in determining the extent of anxiety"\textsuperscript{16}.

\begin{thebibliography}{9}
\bibitem{11} T L Baumer, 'Testing a general model for fear of crime', \textit{J Research in Crime and Delinquency} 22, 1985 : pp239-55
\bibitem{13} D J Smith and J Gray, 'Police and People in L nd n', Gower, Aldershot, 1985
\bibitem{14} S SMith op cit. '86
\bibitem{15} L W Kennedy and R A Silverman, 'SIgnificant others and fear of crime among the elderly ', in \textit{Aging and Human Development} 20: pp 241-56
\bibitem{16} S J Smith, op cit. 86
\end{thebibliography}
• Neighbourhood specific origins of fear:

Local crime rates clearly bear relation to fear of crime as has been discussed in previous paragraphs. This is both associated to crime committed in the familiar environment, as well as crime committed elsewhere. Taub et al.\(^{17}\) have constructed an empirical model to explain this, which suggests that the net impact of crime in any one area depends on the perceived and the actual risk of victimisation in the local neighbourhood, compared with perceived levels of risk elsewhere, and weighed against the positive rewards of living there.

Beyond that however there are other factors that contribute to anxiety and feelings of insecurity such as:
• Evidence of deviant behaviour, "incivilities", for example abandoned and damaged buildings or parts thereof; Lewis and Maxfield\(^{18}\) (’80) assert that people’s perception of crime is shaped less by criminality itself but rather by environmental cues, which imply that deviance may be present.
• Dissatisfaction with the environment, with an urban lifestyle, with the deterioration of community life, social isolation, and with discontent associated with poor service provision and limited residential options

Lewis (’80) advocates an approach relating fear of crime with anxiety about the decline of an area, inability to control through political and social structures the social disorganisation, the ‘physical and moral disruption of community life’ experienced by the residents which he terms the ‘social control perspective’.

Social scientists, criminologists, geographers and psychologists etc have focussed on fear as a social phenomenon, but very little attention has been given to the direct effect of the built environment beyond the generally assigned passive role as a stage set. There is some evidence that specific characteristics of buildings or of the environment trigger and exacerbate fear (stairwells and lifts, underpasses etc)\(^{19}\).

---

A.I.3 Effects of crime and of fear of crime

The direct impact of crime on peoples lives can be psychological, physical economical, etc depends naturally on the type of crime and severity of the damage or loss. However, there is a marked difference in the impact on the various groups of the population, the effects being greater on the weaker sections of the population. The social and economical consequences of even 'minor' loss can be more devastating for the economically weaker groups, they also are more likely to have less means available to protect themselves. The resulting fear of crime can be particularly debilitating, especially for women\(^{20}\) and the elderly. As Smith (’86) phrases it, "although the links between attitudes and behaviour will always remain elusive, the observed effects of fear on lifestyle are too marked to ignore".

The effects of fear can be very negative on the lifestyle of individuals as well as for the life of the local community. The BCS finds that 68% of those who feel unsafe avoid going out on foot. Fear inhibits mobility and participation in leisure activities and restricts people to fortifying themselves in their own homes. The effect on women's lives, and on the life of the elderly (particularly single households) is often much like a curfew effect. They avoid going out in fear of being victimised. The ICS found that 37% of women never go out at night (compared to 7% of men), and that with age avoidance behaviour tended to increase (ICS, p.167), though once again the differences between men and women decreased with age. In Merseyside, the MCS uncovered a similar pattern; Kinsey (’84) and Kinsey and Young (’85) portray the region as one in which many of the residents live under a curfew imposed by the threat of crime. The problem with these defensive responses is that they also tend to further excarbate fear and its consequences further in perpetuity.

The relationship between how safe people feel and how satisfied they are with the neighbourhood and local life has been highlighted by numerous studies mentioned above (ICS, PSI). Fear has been associated with isolation, the fragmentation of community life - loss of social cohesion, and the decline of urban neighbourhoods.

From the literature discussed above it is however sometimes difficult to distinguish causes and effects. The physical environment of neighbourhoods is a key aspect which generally has been ignored by the majority of research studies. The structure of the built environment often has a much more deterministic effect on the quality of social reality of a housing estate than has been generally acknowledged. Research

\(^{20}\) M Maguire (’82) found that the long term psychological effects are experienced almost exclusively by women.
conducted by the UAS ('83, '88) indicates that it can largely influence social isolation through spatial segregation and encourage or diffuse informal social interaction and awareness of the presence of people - what B Hillier has termed the "virtual community".21

Fear of crime can also trigger positive responses to the problem and activate communities in the attempt to establish more direct control over the environment - for example by local neighbourhood watch schemes or other local initiatives. Unfortunately this tends to be the exception, and it often much depends on the support from official agencies as the local authorities and the police.

Summing up, the main point that is to be made here, is that the above review attempts to highlight the extent of the problem of crime and fear of crime; the disturbing effects they may have on the lives of individuals, particularly the more vulnerable sections of the population, as well as on the quality of life in an estate or a particular area. These issues are perhaps not fully appreciated by architects and those responsible for the planning and construction of housing and thus it is necessary to draw attention to them. The role of the physical environment in this respect is not yet sufficiently explored.

APPENDIX II: ARCHITECTURAL DISCOURSE:

AII.1 Creative process of Design

The literature on design method often assumes a simplification of the designer's work, considering the design process as a set of interrelated tasks each involving decisions, i.e., problem solving (see for instance Heath; 1984). It is argued that each aspect of the design has a specific aim and comprises a specific problem to be defined, bounded by external and internal constraints, in order to arrive at a formal solution. Thus the design process involves a series of decisions at various stages with respect to defining and solving specific tasks. Decisions about building form will affect access. Parking will affect road layout or building. Degree of private open spaces and public open space will also depend on each other and building form, height, as well as car allocation per dwelling.

Design is not just influenced by design guidance on the rational basis of an analysis-synthesis problem. Each design solution is a whole, that is more than the sum of the parts. Hillier, Musgrove and O'Sullivan (1972) in their article 'Knowledge and Design' argue that there is no simple transition of analysis to synthesis, and that design is not a merely rational process, as do authors such as Broadbent (1973); Cullen (1961) agree. According to Hillier et al. (1972) the intuitive aspects of design that are usually related to the creation of formal proposals, also relate to prestructured solution concepts in the designer's mind, which are part of the framework with which the architect thinks/designs.

The process of design, is more that of conjecture-analysis (testing) using the Popperian analogy to theory formulation, rather than an inductive process of analysis-synthesis. There is a selection of concept (sketch of possible solution) adaptation, combination testing new design proposal rather than merely an analysis-synthesis problem solving approach. At each stage the designer weighs up the...

---

22 Geoffrey Broadbent (1973a) in Design Method describes the design process as one of reasoning between client's motivation and user's requirements, making use of past experience and as much well-tested information as possible. He produces a chart of three essentials systems, human environmental and building and their elements. Early investigations into the design are guided by precedent, building type. The translation from a brief and a diagram to a physical form, Broadbent argues that architects make use of four possible types of design, or most likely a combination thereof: 1. pragmatic design: involves the use of available materials and methods by trial and error (e.g., selection of construction method); 2. iconic design: the literal repetition of a tried and accepted form (copying a Greek temple); 3. Analogical design: the creative transfer of ideas and forms from one context to another, drawing from their own experience, or that of others (e.g., publications); 4. Canonic design: involving the use of a geometric grid; a modular proportional system.

23 See K Popper (1979; 1989).
pro's/con's of each particular aspect of the design probably this would be part of the 'testing of conjectures' phase, in order to ensure the max. suitability of the solution to the specific project. It is at this stage that more information and sharper criteria are essential, while eventually the criteria also get embedded into the prestructured patterns.

Thus the architect will have to make use of his own experience, or existing models or copying from the design examples of others. The built forms of the past and the experience thereof, provide a set of basic models (archetypes) of the housing environment, which are the basic conceptual material, part of the 'knowledge bank' from which design is elaborated.

• **Four Basic Models of the Residential Environment of the past:**

The basic source of knowledge and experience on which the practicing architect draws, in the search for optimal formal solutions as discussed earlier, is mainly by reference to various architectural books (historical books, books with pictorial material etc) on housing in a specific period, and or country/set of countries and handbooks or design guides targeting the problem. The majority of books are based on a reference to history and development of the subject, a classification of areas, or project or building types etc, and a series of illustrated examples. Drawings and photographs can speak far more than words could convey. On the other hand this also means that the discussion of ideas in Architecture is limited, since a large proportion of information - the design decisions involved in each solution are never fully transparent and objectified, so as to lend themselves to systematic criticism.

The basic characteristics of the housing environment in each case can be summarised as follows:

• **Traditional urban model**: street-based housing areas: structuring element the street (and squares) defined by more or less continuous building faces. Residential buildings in continuous terraces, (3-4 storeys) low-rise. Direct relationship between public and private.

Within this category both vernacular urban villages, the spec-built terraces for the working class and early planned residential developments of the 18th and 19th

---

24 One could say that these models are categories/forms of the residential environment, patterns which encapsulate conscious and unconscious information or, as Bill Hillier would call them, discursive and -nondiscursive patterns of relationships embedded in the form, under the name or category of the model.
century by developers and landowners (as for example in Georgian London\textsuperscript{25}: Barnsbury; Bloomsbury) for the increasing working and middle class population. Developers maximised the number of dwellings in a block, by building in long terraces, while limiting the frontage to each house. Terraces were built slightly setback from the street, mostly to allow light, and access to the basement, and had private gardens at the back. In the richer areas there were coach houses at the back accessed by mews or narrow lanes. Inner layouts are relatively standardised. In poorer streets, plots were narrower with houses often built at the back (back to back) opening onto narrow courts of 3-5 metres with shared water and toilet facilities, which with increasing population and poverty, came to be characterised by poor environmental and sanitary conditions and great overcrowding\textsuperscript{26}. In principle, the urban tradition in England (and Wales) is for single family houses in terraces in contrast to the multi-family houses (tenements), which are generally to be found on the continent, and in Scotland. However, in all cases the basic structuring element of urban space is the bounded street.

As one of the chief designers of housing for the L.B. of Camden describes it:

".... old streets provided a context of neighbourliness and contact, socially recognisable groups, choice, freedom, mutual dependence and resposibility immediacy of contact with the outdoors, the local shops and backyard industry, with the ease of access and continuity which gave every home its place in the scheme of the city."\textsuperscript{27}

\textbf{• Philanthropic Housing:} Philanthropic housing schemes constitute the first attempts at improving the living conditions of the labouring classes in England, which with the exception of the few early utopian experiments (e.g. R Owen’s New Lamarck at the end of the 18th century; Fourier’s Phalanstère; and Titus Salts’ industrial village Saltaire), started in mid nineteenth century\textsuperscript{28}. Legislation (Public Health Acts of 1848 and 1875) empowered local authorities to control housing and

\textsuperscript{25} An account of the historic development of the urban architecture and housing in London is given in: Steen Eiler Rasmussen (1982/1934): \textit{London: A Unique City}. MIT Press, Cambridge MA.

\textsuperscript{26} Amongst multiplicity of ethnographic and ethographic sources, see Andrew Mearns, 1883: \textit{The Bitter Cry of Outcast London}; quoted in Hall, P 1988: \textit{Cities of Tomorrow}.

\textsuperscript{27} Friedrich Engel’s (1945), \textit{The Condition of the Working Class in England} according to personal Impressions and Authentic Sources, Revised translation (1962) by Foreign Languages Publishing House; Moscow. Translation from edition in German of 1947, published in Berlin.

\textsuperscript{28} Social reformers, on the one hand, and private philanthropy and enlightened industrialists on the other, confronting appalling social conditions and explosive urban growth contributed to the initiation of reforms and controls on the housing conditions for the urban poor and the realisation of the first experiments in social housing. For short history see for instance: K Frampton, (1985): \textit{Moderen Architecture: A critical History}. Thames and Hudson; London; pp. 21-23; Colquhoun & Fauset (1991): \textit{"Housing Design in Practice"}. Longman Scientific and Technical; pp.7-14.
sanitary conditions, and encouraged local authorities and charitable building societies, such as for example Peabody Trust, to provide alternative housing and clear slums. In the mid to late 19th century collective housing forms for the inner city were developed to upgrade the living conditions of the working classes, and replace the rookeries and slums heavily criticised for their appalling environmental and sanitary conditions and for overcrowding. Urban reformist housing alternatives adopted the characteristic form of the Victorian tenement block, which also formed the basis of the later the London County Council's standard neo-georgian blocks: 5-storey blocks of flats with gallery access, generally still related to the existing street pattern, though not always directly bordering the street; open spaces distancing blocks, used as communal space.

In the late 19th and early twentieth century, model industrial villages built by industrialist philanthropists (Cadbury's Bournville founded in 1879; and Lever's Port Sunlight, 1888, developed along the principles of a garden suburb, low density worker's cottage estate, reflecting "something of the small rural towns and villages", of the pre-industrial revolution, 18th century picturesque.

C. Garden-city Model: Chief exponent of the Garden City Movement, Ebenezer Howard published the book "Tomorrow: A Peaceful Path to Real Reform" in 1898, which was republished in 1902 under the better known title "Garden Cities of Tomorrow". The garden city presents an anti-urban model environment of limited size as well as an autonomous socio-economic and political ideal concept, combining the advantages of town and country -accessibility of towns with living and working in the healthy environment of the country-side- whilst avoiding the disadvantages -distance from work and social amenities, and overcrowded expensive poor housing. Based on the idea of a concentric plan with industry and agricultural land uses on the green periphery, it incorporated houses with were varied in character, mainly semidetached cottages with gardens, some with collective gardens and kitchen facilities. The garden city model is characterised by a high proportion of open space (over 80% of site area) in which other facilities and landuses are embedded. The model incorporated the idea of a decentral and hierarchical model of regional

---


30 Conditions were measured by early cartographers/statisticians in the late 19th century as Charles Booth, (1892): Life and Labour of the People in London. Macmillan; London


33 E Howard, (1965): Garden Cities of Tomorrow, Faber; Reprint of 1946 Edition; The Garden city movement is the culmination of the 19th century idea ism and reformism. Several books have been written on the Garden city model and its influence.
planning. Under Howard's direction two garden cities were built, Letchworth (1903) and Welwyn Garden City (1921). The followers of Howard, Raymond Unwin and his assistant Barry Parker who designed Letchworth, later built the Hampstead Garden Suburb, not a garden city but a dormitory suburb with lower densities. They developed Howard's ideas further, and as Hall (1988; 1992) argues, it is in their writings that low densities become more important.\(^\text{34}\)

The garden city model influenced some of the early suburban cottage estates. Though it represents the detriment of the city, and has come to be associated with low densities, in the original concept the densities were actually at higher levels, equivalent to urban densities. The garden city ideal has been highly influential on modernist views of the city, as will be discussed in the following paragraphs, on the Continent and in North America.\(^\text{35}\) In this model also lie the origins of the 'neighbourhood unit'\(^\text{36}\) which becomes a larger concern in subsequent years for the followers of Howard in the USA, Clarence Perry, one of the main contributors to the New York Plan of the 1920's; and his associate Clarence Stein\(^\text{37}\) planner of the new town development at Radburn in New Jersey (1928). This is where the idea of segregating pedestrian and vehicular routes originated, which has been fundamental to the later development of housing areas. The neighbourhood unit idea was taken up enthusiastically by British planners after the Second World War, as exemplified in the writings of Sir Frederick Gibberd (1953) in "Design in Town and Village", but came increasingly under criticism in the sixties, for instance by C. Alexander (1963) in his highly influential book: "A City is not a Tree" arguing that people have different needs for local services, and that the principle of choice is paramount, as can be observed on housing estates with local centres in the present day.

---


\(^\text{35}\) In France Tony Garnier developed in parallel to E Howard the "Cité Industrielle", published also in 1898, which influenced Corbusian 'Radiant City model'. In Germany variant od the garden city were developed in the twenties Siedlungen and Stellite towns (Tabantenstädte) for examples around Frankfurt under ernst May. For the m re literature on the Garden City movement and its influence on decentralised regional planning advocated by Patrick Geddes (1915); Patrick Abercrombie, Lewis Mumford (1938); Clarence Stein (1957); Henry Wright; Catherine Bauer and the decentrists See also Jane Jacobs (1962) for critical appraisal pp 27-35.

\(^\text{36}\) Perry s (872-1944) "neighbourhood unit consisted of an area housing up to 5000 inhabitants-the catchment area of a primary school, with a local centre and social amenities such as schools c mer sh ps at traffic junctions all in walking distance from the home. The idea is not just a practical device, but a piece of social engineering aiming to create some identification of local community with neighbourhood (See P Hall, (1992).

\(^\text{37}\) Stein (1882-1975) took the neighb urhood idea further by giving weight to the rapidly increasingly importance of the motor-car. Radburn C. S. Stein: 1957: "Towards New Towns for America". Van Nostrand Reinhold Ltd.
Modernist Model or the Rationalist Approach: Mainly expressed by Le Corbusier's ideas on architecture and urban planning, presented in his visionary drawings of a contemporary City of three million inhabitants (1922) and the Voisin Plan for Paris (1925) and the later development there of the Radiant City Plan, La Ville Radieuse (1933). His ideas exposed in a large number of books and publications, notably The City of Tomorrow (1924); Towards A New Architecture (1931) and The Radiant City (1933). These doctrines aim at a radical break with the architectural traditions and the 'disordered' growth of the urban environment of the past. Instead he argues for a rationalised, functionally and geometrically ordered environment, that can accommodate the future traffic, business and housing needs, whilst allowing a very high proportion of green and open space at ground level to allow for air light and recreation, maintaining high densities overall with local variation by functional zones. The key changes are:

- **The rejection of the "corridor street"** (defined by continuous boundary of buildings), in favour of buildings as free standing objects in a garden-environment, with maximum exposure to light and air;
- the concentration of traffic on routes designed in multiple layers separated according to speed; purpose; type of transport network; with intersections according to hierarchy of use;
- the rejection of the traditional urban block with continuous building bordering the street, in favour of the large scale superblock unit defined by the main vehicular routes (approximately 400 yards length).
- Functional clarity by separation of functions by building type and by area (zoning) with different densities. Thus the cruciform tower blocks and skyscrapers were intended for business/ offices in contrast to the residential buildings with set-backs (maeandering slab blocks) embedded in parks, and in the honeycomb or "cellular" system of maisonette blocks with hanging gardens etc, with varying heights, and lower densities.
- Rejection of traditional building construction in favour of industrialisation of building construction; mass produced housing using prefabricated concrete system and new materials
- Rejection of "accidental" plans of cities ('disorder' of old cities') for formal geometrical plans as an expression of order and progress. Straight roads (axiality) - the direct way of getting from one point to another- rather than the "pack-donkey's way" of winding roads, which are only suitable for recreational purposes.
- Repetition and standardisation as an expression of order, a virtue and necessity of industrialisation and economy, a "consequence of geometrical plans". Ideal of uniformity rather than diversity and disorder

Le Corbusier's ideas on changing the concepts of street, housing and open spaces influenced generations of architects and planners and the post-war reconstruction in Britain and Europe and urban development across the world.

---

38 See Le Corbusier, *The City of Tomorrow*, The Architectural Press; London, Reprint 1987, pp 170: "We must decongest the centres .."augment density" "increase the means of getting about and ..."increase parks and open spaces ."
The design of a housing project starts with the formulation of a specific brief; which from the start, poses certain limitations on the range of possible solutions. Colquhoun and Fauset (1991), in their book 'Housing Design in Practice' argue that the brief is important if good housing design is to be achieved. The preparation of the brief requires careful analysis of the site consideration of the costs (maintenance as well as capital costs) in order to assess the feasible density/total number of dwellings and a clear understanding of future user's requirements. According to the Institute of Housing and the Royal Institute of British Architects (1983) Homes for the Future minimum requirements of a reasonable brief include specifications on:

- dwelling mix and size of dwellings;
- form of building, type of access and layout features;
- policy on private outdoor space and public or communal open space;
- information on the management of the scheme;
- capital and maintenance budgets;
- policy on heating and energy conservation;
- proposals for vehicular servicing; refuse disposal and children's play policy towards housing the elderly and disabled.

The brief thus lays out certain principles on which the design is to be developed: density, of persons and dwellings; ratio of cars/dwelling; and site space coefficients for open space on site, as well as provisions of public or communal/and private open space; These in turn influence the range of possible solutions in terms of building form and height; and dwelling typology. The latter is also influenced by social policy; economic considerations;

It is recommended that the brief should not be regarded as a static document, but as a basis for arriving at the best balance between conflicting demands and competing priorities. As Heath (1984: 107) argues, ultimately the design process is one of arriving at a "consensus". Therefore the brief needs to provide sufficient information for an optimum compromise/balance. Poor housing schemes have frequently resulted in the past due to the imposition of standard solutions". (Colquhoun & Fauset; 1991;152).
Ann Beer; 1982: "The External Environment of Housing Areas" (published in Built Environment vol.8 No 1 pp 25 9) describing the process of preparing a brief argues that it must be based on: 1) a thorough assessment of the natural environment and the physical characteristics of the site; 2. on a detailed analysis of the users and their requirements and 3. the relationship between the two, site and users which is the key. "The interaction between social needs and the physical characteristics is the key to this process and enables the development of a number of alternative design solutions which can be tested against social, natural environmental and visual objectives"; rather than just a matter of subjective judgement. The Essex Guide to residential areas (1973), recommends that the brief consist of three parts, specifying: type of development in social economic market context; site characteristics ("implied brief") and the community brief, (user's requirements).

Heath (1984; 185) however warns against driving "a wedge between the brief and the design. The notion that some things about design are 'facts' or 'given' and that other things are design and therefore under the control of the designer glosses over the difficulties about the quality of knowledge available to the designer .." (referring to the relationship between rational/functional/technical and aesthetic choices). The brief is usually formulated by the client, which in the case of public housing means the housing authority (housing committee and its professional advisers). It leaves out the actual users, a problem much discussed in the early eighties, which calls for special attention (and user participation), if higher satisfaction and a better fit between designers assumptions and user's requirements /expectations is to be achieved40.

- **Interrelationship between Density and built form**.

The brief for a housing project will contain some definition of the number of dwellings to be built on site41, as well as some guidelines for the quality of the building and finishes. The Ministry of Housing and Local Government (MoHLG) in the 1950s and later the Department of the Environment (DOE) in the 1960s published a series of design guidance Bulletins, specifically dealing with densities in

---

40 J Darke 1983) in her articles argues that designers ideas and preferences and the actual user's ideas and expectations are not matched, and that architects, nor the bureaucratic authorities show enough concern to inform themselves better and test their assumptions. She argues for tenant participation in the design process.

41 According to Evans (1973): 'Housing Layout and Density' density information may originate from planning controls, or may reflect a quantity surveyors' view of what can be built within the cost limits, or it may, unusually, be the result of someone imagining the type of housing area that they would like to see created and setting the density accordingly. (pp.63)
residential areas as well as housing layout \(^{42}\). Measure of Density is generally given as a ratio of the number of dwellings relative to standard area of land: dwell/ha, or more accurate: number of people/ha or bedspaces or number of habitable rooms. High; medium and low, though thresholds vague; In *Planning Bulletin 2: Residential Areas: Higher Densities*, publ. by MoH a LG in 1962 the following were advised: Low: < 70 bedsp./acre (173 bdsp/ha); Medium: < 120 bedsp./acre or (296 bdsp/ha) and High: > 120 bdsp/acre, though these were again relatively low compared with later views. In IH/ RIBA (1983), *Homes for the future*, relatively low densities: 20-25 dwels/ acre (50-60 dwels/ha) are recommended. However there is no ideal density; Location of site (urban/suburban or rural) usually determines the type of housing to be adopted, and the density. Land shortage/ high land prices create pressure to increase density, to reduce proportionate land cost/unit. Selecting density/total number is usually dependent on economic considerations.

The issue of cost/ density is one of the main determinants of housing form. A number of research studies at Cambridge University have investigated the relationship between the geometry of built form and measures of density in the early '70's, discussed in the main text.

---

A11.3 Feedback on Design through Considerations on the Perception of the Environment: Perceptual approach:

The perceptual approach to design attempts to improve and enrich the design of urban environments by understanding the way an environment is perceived (and the effect thereof). This important question is approached in two very different ways: on the one hand, the 'poetic', nonscientific, self justifying in a very art and crafts mentality way of 'Townscape', by Gordon Cullen (1961), and on the other hand, by Kevin Lynch's (1960) more 'objective' 'The image of the City' approach, developed also as a tool for designing more coherent, intelligible environments.

Cullen's thesis is that there is an 'Art of relationship' in architecture - the art of environment: weaving in all elements of the physical environment, man-made and natural to create "dramatic event"-city." Science based on averages provides pliability, flexibility; his aim is not to "dictate the shape of town/environment " but to "manipulate within the tolerances". The main aim of the approach is to manipulate the elements of the town so that an impact on the emotions is achieved" (p.8-9). This is achieved in 3 ways, Optics; Place; Content; based on:

1. The importance of sight in the experience/apprehension of the environment; Key Concept Serial Vision: - existing view- emerging view.
2. Reactions to position of body in the environment.- impacts of exposure and enclosure. being in, entering, leaving a space etc. "Since it is an instinctive and continuous habit of the body to relate itself to the environment, this sense of position cannot be ignored; it becomes a factor in the design of the environment.... I would go further and say that it should be exploited." He implies that the greatest townscape effects achieved in skillful relationship between the two.- sequence-
3. Examination of the fabric/ textures of a town (aesthetic experience): colour, texture, scale, style, character, personality, uniqueness. Changing styles/periods. Diversity versus conformity; This and That; The art is synthesising all the above with imagination. In the form of a casebook, each of the three ways/criteria are analysed within a rather ad hoc series of pictures with descriptions of the characteristic event/situation/emotional response of category/mood/relationship.

Cullen's work has been enormously influential, particularly in housing design guidance. This can be seen as a major constituent of the nineteen-sixties' reaction to the modernist utopian doctrine mainly in the form of the "picturesque" tradition in the form of the rediscovery of the past - the cult of townscape- and the cult of science.
fiction - nostalgia for the future. Colin Rowe argues that the importance of 'townscape' is such that "much of present day activity would be incomprehensible unless we are prepared to recognise the ramifications of townscape's influence." referring to both Jane Jacobs and Kevin Lynch, but also the futuristic 'revival' (Archigram; Megastructures; etc) of the sixties.

Kevin Lynch (1960) developed a new more scientific approach to urban design, based on an analysis of citizen's mental images of the city, using interviews to identify desirable design measures and area definition. His theoretical contribution in 'The Image of a City' lies in the analysis of mental maps showing how the city is perceived by its inhabitants, and how the elements are used for orientation, and finding one's way around the city. His notion of 'imageability' was tested out in three field studies: Boston, MA.; Jersey City and New York. According to Lynch, the elements of analysis of the visual structure or mental map of a city are: paths; nodes; landmarks; barriers (edges); and districts. The first four play a strong role in the identity and imageability/legibility of a district. These concepts are used both as analytic and operational design tools, and he goes on to suggest how to design for clarity and legibility of mobility and space use by drawing attention to the following qualities and principles of structure:

• **singularity**: clear articulation of boundaries, contrast; sensitive detailing bringing out the qualities that make a spatial location noticeable, identifiable. Thus when familiarity with the whole increase, the observer/user can rely more on the parts to find his/her way round.

• **form simplicity**: simple geometric forms are more intelligible.

• **continuity**: of edge, surface etc (as in street); nearness of parts, similarity, repetition analogy; common building materials. These qualities facilitate the perception of a complex physical reality as **one**, or a set of interrelated parts, bestowing a single identity.

• **Dominance**: of one part over another by means of size, intensity etc resulting in the reading of the whole as a principal feature with an associated cluster. This, like continuity, allows the necessary simplification of the image of the whole.

• **Clarity of joint**: high visibility of joints and seams eg at major intersections; clear relation and interconnection of a building to its site, since these are the "strategic moments of structure and should be highly perceptible".

• **Visual scope**: qualities which increase the range and penetration of vision such as for example transparency (glass in buildings); overlapping spaces; vistas (" as on...

---

43 Colin Rowe & Fred Koetter, (1978 83): 'Colage City'. MIT Press Ltd; Cambridge MA.

44 See Lynch:(1960); pages91-117 and pages 105-108 in particular.
axial streets, broad open spaces, high views) which increase depth of vision and the grasping of a complex whole.

- **Motion awareness**: qualities, which make sensible through vision and kinaesthetic senses one's actual or potential motion. The city is sensed in motion, and such qualities help articulate orientation, sense of distance and direction.

- **Time series**: referring to series (interlinked items or forms) which are perceived as a continuity over time.

- **Names and meanings**: may enhance the imageability of an element.

Lynch emphasises the importance of the sense of the whole, which he argues is often obliterated: "In discussing design by elements, there is often a tendency to skim over the interrelation of the parts to the whole".

This is in essence the difference between Lynch and the approaches of Cullen or of the GLC design guide. Lynch's approach depends largely on the global concept as well as the parts, whereas in Cullen's art of relationship focusses on the local dimension, while missing out the importance of the whole. Both approaches were applied in the urban design projects. Cullen's use of sequential images as a creative design tool was further elaborated in *The Scanner* and *Notation* (Cullen, 1966; and 1968 respectively) though it was mainly Lynch's work that found wider application, due to the greater 'objectivity' of the designers method. Inspite of the weak scientific substantiation in Cullens approach, in Britain this work proved to be a milestone in the change of direction that took place in British public housing in the seventies.

---

APPENDIX IV

CASE STUDIES

A.4 MARQUESS RD ESTATE
<table>
<thead>
<tr>
<th>MARQUESS RD</th>
<th>PERIOD 85 86</th>
<th>SOUTH SECTIONS</th>
<th>Address Numbers</th>
<th>No of Burglaries</th>
<th>MAR 224</th>
<th>MAR 396</th>
<th>MAR 224</th>
<th>MAR 396</th>
<th>TOTAL BURGLS</th>
<th>NORTH SECTIONS</th>
<th>Address Numbers</th>
<th>No of Burglaries</th>
<th>MAR 224</th>
<th>MAR 396</th>
<th>TOTAL BURGLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arran Walk</td>
<td>22 24 2</td>
<td>3</td>
<td>7</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>22 24 2</td>
<td>3</td>
<td>7</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Caldy Walk</td>
<td>17</td>
<td>1</td>
<td>50</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17</td>
<td>1</td>
<td>50</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Gulland Walk</td>
<td>14 8</td>
<td>2</td>
<td>45</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14 8</td>
<td>2</td>
<td>45</td>
<td>45</td>
<td></td>
</tr>
<tr>
<td>Ominsey Walk</td>
<td>12 6 13</td>
<td>3</td>
<td>22</td>
<td>27</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>12 6 13</td>
<td>3</td>
<td>22</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Silly Walk</td>
<td>34 34</td>
<td>2</td>
<td>106</td>
<td>104</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>34 34</td>
<td>2</td>
<td>106</td>
<td>104</td>
<td></td>
</tr>
<tr>
<td>Cardigan Walk</td>
<td>5, 11, 13, 10</td>
<td>5</td>
<td>83</td>
<td>83</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5, 11, 13, 10</td>
<td>5</td>
<td>83</td>
<td>83</td>
<td></td>
</tr>
<tr>
<td>Skomer Walk</td>
<td>14 10, 16, 13</td>
<td>4</td>
<td>89</td>
<td>89</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14 10, 16, 13</td>
<td>4</td>
<td>89</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>Bathshe Walk</td>
<td>10</td>
<td>1</td>
<td>16</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
<td>1</td>
<td>16</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Upper Caldy Walk</td>
<td>6</td>
<td>1</td>
<td>138</td>
<td>138</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>1</td>
<td>138</td>
<td>138</td>
<td></td>
</tr>
<tr>
<td>Upper Gulland Walk</td>
<td>53</td>
<td>1</td>
<td>143</td>
<td>143</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>53</td>
<td>1</td>
<td>143</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td>Upper Lismore Walk</td>
<td>14</td>
<td>1</td>
<td>17</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td>1</td>
<td>17</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Upper Mill Walk</td>
<td>36</td>
<td>1</td>
<td>351</td>
<td>351</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>36</td>
<td>1</td>
<td>351</td>
<td>351</td>
<td></td>
</tr>
<tr>
<td>Upper Ramsey Walk</td>
<td>23</td>
<td>1</td>
<td>222</td>
<td>222</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23</td>
<td>1</td>
<td>222</td>
<td>222</td>
<td></td>
</tr>
<tr>
<td>Crowline Walk</td>
<td>25.22</td>
<td>2</td>
<td>156</td>
<td>326</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25.22</td>
<td>2</td>
<td>156</td>
<td>326</td>
<td></td>
</tr>
<tr>
<td>Hands Walk</td>
<td>27.50</td>
<td>2</td>
<td>75</td>
<td>223</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>27.50</td>
<td>2</td>
<td>75</td>
<td>223</td>
<td></td>
</tr>
<tr>
<td>Mull Walk</td>
<td>15 131</td>
<td>13</td>
<td>120</td>
<td>353</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15 131</td>
<td>13</td>
<td>120</td>
<td>353</td>
<td></td>
</tr>
<tr>
<td>Lismore Walk</td>
<td>14</td>
<td>1</td>
<td>290</td>
<td>57</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td>1</td>
<td>290</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>Ramsey Walk</td>
<td>20</td>
<td>1</td>
<td>39</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20</td>
<td>1</td>
<td>39</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Rd Walk</td>
<td>4</td>
<td>1</td>
<td>16</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4</td>
<td>1</td>
<td>16</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Scarba Walk</td>
<td>8</td>
<td>8</td>
<td>233</td>
<td>233</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td>8</td>
<td>233</td>
<td>233</td>
<td></td>
</tr>
<tr>
<td>Shuna Walk</td>
<td>1</td>
<td>1</td>
<td>16</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
<td>16</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>Wainey Walk</td>
<td>184</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE A.4.1 MARQUESS RD ESTATE: LIST OF BURGLARY LOCATIONS
WE WANT MORE TENANTS' PLEA ON VANDAL ESTATE

COUNCIL PLEDGES: 'CASH SHORTAGE WON'T HIT FIGHT AGAINST CRIME'

CRIME PREVENTION MEASURES WILL NOT BE AFFECTED BY A SHORTAGE OF CASH, DURHAM COUNCIL HAS PLEDGED...

AUG.

VANDALS PUT LIVES AT RISK

EDGED, JUNE 8, 1974.

VANDALS ON AN ILFORD ESTATE ARE PUTTING LIVES IN DANGER BY BREAKING WINDOWS THAT OVERLOOK BUSY WALKWAYS.

THE WINDOWS ON SEVERAL EMPTY HOUSES ON THE MARQUESS ESTATE ARE BEING SMASHED BY CHILDREN WHO THROW BRICKS...
APPENDIX IV

CASE STUDIES

A.5 FERRIER ESTATE
<table>
<thead>
<tr>
<th>Ferrier W</th>
<th>Address No</th>
<th>No of Burglary</th>
<th>AXIAL NO</th>
<th>LEVEL</th>
<th>BURGLARY WHOLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dando Crescent</td>
<td>18*</td>
<td>083</td>
<td>1</td>
<td>160</td>
<td>056</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>056</td>
<td>1</td>
<td>214</td>
<td></td>
</tr>
<tr>
<td></td>
<td>80</td>
<td>(056)</td>
<td>1</td>
<td>212</td>
<td></td>
</tr>
<tr>
<td>Edbon Way</td>
<td>57</td>
<td>(083)</td>
<td>1</td>
<td>320</td>
<td>154</td>
</tr>
<tr>
<td></td>
<td>84</td>
<td>(083)</td>
<td>1</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td></td>
<td>86</td>
<td>(056)</td>
<td>1</td>
<td>231</td>
<td></td>
</tr>
<tr>
<td>Galus Square</td>
<td>6</td>
<td>(083)</td>
<td>1</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>31</td>
<td>186</td>
<td>2</td>
<td>210</td>
</tr>
<tr>
<td></td>
<td>56</td>
<td>(083)</td>
<td>1</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Labrun Square</td>
<td>6</td>
<td>(083)</td>
<td>1</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>056</td>
<td>1</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td></td>
<td>54</td>
<td>(056)</td>
<td>1</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>Pinto Way</td>
<td>36</td>
<td>083</td>
<td>1</td>
<td>53/54</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>110</td>
<td>(056)</td>
<td>1</td>
<td>235</td>
<td></td>
</tr>
<tr>
<td></td>
<td>111</td>
<td>(056)</td>
<td>1</td>
<td>233</td>
<td></td>
</tr>
<tr>
<td>Clock House</td>
<td>Crozer House</td>
<td>48, 49</td>
<td>039</td>
<td>2</td>
<td>142</td>
</tr>
<tr>
<td>Goldmark House</td>
<td>Leclair House</td>
<td>10</td>
<td>019</td>
<td>1</td>
<td>212</td>
</tr>
<tr>
<td>Sala House</td>
<td>34, 43</td>
<td>(039)</td>
<td>2</td>
<td>149</td>
<td></td>
</tr>
<tr>
<td>TOTAL Ferrier W</td>
<td>22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ferrier E</td>
<td>Cambert Way</td>
<td>3</td>
<td>(083)</td>
<td>1</td>
<td>G</td>
</tr>
<tr>
<td></td>
<td>05</td>
<td>083</td>
<td>1</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td></td>
<td>68</td>
<td>056</td>
<td>2</td>
<td>GB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>86</td>
<td>(056)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E Ford Close</td>
<td>27</td>
<td>(083)</td>
<td>1</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td></td>
<td>45</td>
<td>(083)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Romero Square</td>
<td>10</td>
<td>20</td>
<td>083</td>
<td>2</td>
<td>GB</td>
</tr>
<tr>
<td></td>
<td>26</td>
<td>(083)</td>
<td>1</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td></td>
<td>76</td>
<td>86</td>
<td>(111)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>114</td>
<td>(186)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Ryan Close</td>
<td>55</td>
<td>(083)</td>
<td>1</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td></td>
<td>73</td>
<td>(083)</td>
<td>1</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td></td>
<td>106</td>
<td>112</td>
<td>(186)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>(056)</td>
<td>1</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Telemar Square</td>
<td>5</td>
<td>55</td>
<td>083</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>94</td>
<td>(048)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tushway Road</td>
<td>48</td>
<td>028</td>
<td>1</td>
<td>G</td>
<td></td>
</tr>
<tr>
<td>Felton House</td>
<td>13</td>
<td>20</td>
<td>039</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Ronald House</td>
<td>42</td>
<td>42</td>
<td>058</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Standish House</td>
<td>2</td>
<td>5</td>
<td>019</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Steiner House</td>
<td>3</td>
<td>4</td>
<td>039</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Steing House</td>
<td>Wilson House</td>
<td>4</td>
<td>003</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>12</td>
<td>058</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>TOTAL Ferrier E</td>
<td>34</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL FERRIER</td>
<td>59</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TABLE A.5.1  FERRIER ESTATE: LIST OF BURGLARY LOCATIONS.
APPENDIX IV

CASE STUDIES

A.6 ANDOVER ESTATE
z

z

C-,

C-,

