



**Vertical Urban Design:
Social and Public Places in the Sky
THE PINNACLE DUXTON CASE STUDY
SINGAPORE**

Yuri Hadi,
BArch

ABSTRACT

One of the main underlying foundations of good cities is the quality of their social and public urban spaces. The needs for these quality spaces are uncompromising; if they lack rigor in planning and thorough implementation the affects and consequences can be dire upon the sustainability of these cities. The availability of and quality of such public places will take on increasing significance as we move towards 75% of the World's population living in urban areas by 2050 (Burdett & Rode, 2007). High-rises and tall buildings are increasingly becoming the solution in accommodating growing populations in areas opting for high-density development (Marcuse, 2000).

With increasing and intensifying urbanization has come a growing awareness of the relative qualities of living, socializing and public life. This has increased the consciousness among architects, planners and developers to design social places for people to use for the many layers of social exchange within the design of high-rises and tall buildings. How do we theoretically approach the design of social and public spaces in these new evolving urban settlements?

This thesis focuses upon analyzing attempts to design and realize place-making within social and public spaces of a recent high-rise residential development in Singapore. The Pinnacle @ Duxton Public Housing Project (2009) by the Housing Development Board of Singapore claims to succeed in achieving the concept of place-making within a high-rise settlement. This research utilizes post-occupancy methods from urban design theory in order to assess the perception of users and to record actual use and activity in these places. In doing so, this paper will attempt to identify the good and bad practices that make successful social and public places.

The Pinnacle & Duxton Plain Public Housing has attained huge publicity for its design of public and social spaces vertically on a grand scale. Evaluation of this project by empirical testing adapted from urban design could provide a new theoretical platform to how and why it could work for future developers, councils, architects and planners alike.

ACKNOWLEDGEMENT

It would not have been possible to write this doctoral thesis without the help and support of the kind people around me, to only some of whom it is possible to give particular mention here. Above all I would like to thank my parents, Mr. and Mrs. Abdul Hadi for their unconditional love, trust and support. My brother and two beautiful sisters have given me their unequivocal support throughout, as always, for which my mere expression of thanks likewise does not suffice. This thesis would not have been possible without the help, support and patience of my principal supervisor, Prof. Timothy Heath. The good advice, support and friendship of my second supervisor, Dr. Philip Oldfield, has been invaluable on both an academic and a personal level, for which I am extremely grateful. I would not have embarked on this journey of self-discovery and knowledge exploration without Prof. Ahmad Bashri Sulaiman and Dr. Shuhana Shamsuddin help and support, I thank you with all my heart. I wish also to thank the following people and institutional agencies, Dr Peter Rutherford, Dr. Micheal J. Short, The Singaporean Housing Development Board, The Urban Renewal Agency of Singapore, HDB Officer Mr. Vincent Fook Hoon and Architect Khoo Boon Ping.

I would like to acknowledge the academic and technical support of the University of Nottingham and its staff. The library facilities (notably the architecture and urban design collection) and computer facilities of the University have been indispensable. To be awarded a full scholarship abroad is a privilege and I am most grateful for the Ministry of Higher Education of Malaysia for its continual support financially. Thank you, Adam Lampon, David Hart and Matthew Mitchel for providing me the sense of humour and sanity when I sometimes had lost mine while writing up this doctoral thesis. I would have not made it without your motivation and support. Lastly, I thank all my friends in Great Britain, Malaysia and elsewhere for their support and encouragement throughout, some of whom have already been named.

CONTENTS

ABSTRACT.....

ACKNOWLEDGEMENT.....

TABLE OF CONTENTS.....

LIST OF PLANS.....

LIST OF TABLES.....

LIST OF PICTURES.....

LIST OF FIGURES.....

CHAPTER 1 INTRODUCTION: SOCIAL AND PUBLIC PLACES IN RESIDENTIAL HIGH-RISES

1.0 Background of the Study and Problem Definition

1.1 Aim of the Study

1.2 Definition of Case

1.4 Epistemology and Ontological Standing

1.5 Structure of the Thesis

CHAPTER 2 URBAN FUTURES: THE HIGH RISE & THE CHALLENGE OF MAKING THE PUBLIC REALM IN THE TYPOLOGY

2.0 Introduction: Urban Future in High Rise

 2.0.1 Post Industrial Futures: The Ecological Post-Modern Age

 2.0.2 Public Spaces Urban Places

2.1 Design Critiques and Issues

 2.1.1 Case Examples

 2.1.2 Participation and Involvement

 2.1.2 Zoning and Architectural Design

 2.1.3 The New Vertical Urban Environment

2.2 The Pinnacle @ Duxton, Singapore

 2.2.1 Vertical Urban Settlement

 2.2.2 Social Housing Model

 2.2.3 Sky Gardens

 2.2.4 Public Investment, Locally Managed and Design Awards

2.3 Chapter Summary

CHAPTER 3 FIVE GENERATIONS OF HOUSING: A HISTORICAL ANALYSIS OF SINGAPORE’S SOCIAL & POLITICAL HIGH RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

3.0 Introduction

3.1(1900-1960) Founding of the Market Economy and Shaping the Urban Residential Patterns in Colonial Singapore

 3.1.1 Colonial Port: The 1822 Jackson Plan.

 3.1.2 Urban Centre: Chinese Residential Patterns

 3.1.3 The Middle & Upper Classes

 3.1.4 Urban Periphery: The Malay Kampung

 3.1.5 Capitalism: The Driving Force in Creating the Pre War Residential Patterns

 3.1.6 Urban Pattern on the Brick of Social Breakdown

3.2 (1960-1980) Rearranging the Pre War Residential Patterns in the First and Second Generation of Public Housing by Stewarding an Industrial Economy

- 3.2.1 Post Second World War Scenario
- 3.2.2 The Early Attempts of the Singaporean Improvement Trust
- 3.2.3 The Housing Development Board: Persevering against All Odds
- 3.2.4 Transforming the Colonial Residential Patterns into Modern High-Rise Settlements
- 3.2.5 Social Economic Integration into the New Industrial Economy
- 3.2.6 Successful Social and Economic Shifts in the First and Second Generations of Housing

3.3 (1980-2000) The Consumer Economy and its Influence in the Third and Fourth Generation of High-Rise Residential Design in Singapore

- 3.3.1 Higher Wages for High Productivity to High Consumption Empowering the New Economy
- 3.3.2 The New Metropolitan Culture
- 3.3.3 Goldthorpe's Embourgeoisement Theory

3.4 (2000 and Beyond) Singapore as a Global City in the Fifth and Sixth Generation of High-Rise Housing Policy

- 3.4.1 The 2001 Singaporean Master-Plan
- 3.4.2 The Green Legacy
- 3.4.3 Creating the Sense of Place

3.5 Chapter Summary

CHAPTER 4 RESEARCH METHODOLOGY

4.0 Rationalizing the Case Study as the preferred Method for this Thesis.

4.1 Research Inquiry

4.2 Research Proposition

- 4.2.1 Theoretical Scope: Public Space and Public Life
- 4.2.2 Theoretical Proposition Part One: Social, Political and Economic Forces are Pre-requisite factors for Consideration to Make Good Social and Public Spaces in the Sky
- 4.2.3 Theoretical Proposition Part Two: Good Physical and Psychological Responsive Analysis Determines Successful Social and Public Spaces Design in Residential High-Rise Developments

4.3 Case Study Criteria

- 4.3.1 Population size resembles an urban settlement or neighbourhood within a larger Urban Sphere.
- 4.3.2 It has to be a form of High-Rise, High-Density Social Housing
- 4.3.3 Available Social Public Spaces located above ground floor plate of the design.
- 4.3.4 The Social and Public Spaces are managed by the Public Authority.
- 4.3.5 Awards and Recognition for Design

4.4 Single Case Study Design Rational

- 4.4.1 Unit of Analysis
- 4.4.2 Documentation
- 4.4.3 Direct Observation
 - 4.4.3a *Neighbourhood Park Observation Protocol*
 - 4.4.3b *Mini-Parks Evaluations Protocol*
- 4.4.4 Interviews
 - 4.4.4a *Interview Protocol One (The Architect & the Client)*
 - 4.4.4b *Interview Protocol Two (The Users)*
- 4.4.5 General Surveys

4.5 Chapter Summary

CHAPTER 5 NEIGHBOURHOOD PARK: THE THIRD FLOOR PODIUM

5.0 Introduction

5.1 The Pinnacle @ Duxton

- 5.1.1 Location and Context
- 5.1.2 The Duxton Plain Site History
- 5.1.3 Design Brief and Technical Requirements
- 5.1.4 Sky Houses: Flying Green. The Design Statement by Arc Studio and Urbanism Singapore

- 5.2 The Concept of a Neighbourhood Park
 - 5.2.1 History and Description
 - 5.2.2 Neighbourhood Parks in High Rises
- 5.3 Neighbourhood Park: The 3rd Storey Social and Public Spaces Architectural Observation
 - 5.3.1 Size and Location
 - 5.3.2 Program
 - 5.3.3 Use and Activities
 - 5.3.4 Visual Complexity
 - 5.3.4a Patterns and Aesthetic Quality
 - 5.3.4b Floorscape
 - 5.3.4c Soft Landscape
 - 5.3.7 Circulation Patterns
- 5.4 Chapter Conclusion

CHAPTER 6

MINI PARKS OR VEST POCKET SPACES: THE 26TH AND 50TH STOREY SKY-DECK

- 6.0 Introduction
- 6.1 Mini Parks or Vest Pocket Spaces
 - 6.1.1 History and Description
 - 6.1.2 Design Program
 - 6.1.3 Mini Parks in High Rises
- 6.2 Mini Parks or Vest Pocket Spaces on the 26th Floor Sky-Deck
 - 6.2.1 Location and Context
 - 6.2.2 Architecture Description
 - Mini Parks Hill and Sea Point
 - R.C Centre (Community Centre)
 - The Elderly Fitness Area
 - The Outdoor Gym (The Meadows)
 - The Community Plaza (Cradter)
 - Fitness Corner (Paddy Field)
 - 6.2.3 Use and Activities
 - Mini Parks Hill and Sea Point
 - R.C Centre (Community Centre)
 - The Elderly Fitness Area
 - The Outdoor Gym (The Meadows)
 - The Community Plaza (Cradter)
 - Fitness Corner (Paddy Field)
- 6.3 Mini Parks or Vest Pocket Spaces on the 50th Floor Sky-Deck
 - 6.3.1 Location and Context
 - 6.3.2 Architectural Description, Use and Activities
 - Hill and Sea View Point
 - Cottage
 - Beach
 - Lounge
 - Hillock
 - Fiesta
- 6.4 Chapter Conclusion

CHAPTER 7

THESIS CONCLUSION: KEY APPLICATIONS & MEASUREMENTS FOR MAKING SUCCESFUL SOCIAL AND PUBLIC SPACES IN HIGH-RISES

- 7.0 The Three Dimensions of Planning for Successful Social and Public Spaces in Residential High-Rises.
- 7.1 Governmental Pursuits and Stewardship
 - 7.1.1 Social Mobility and Class Structure
 - 7.1.2 Targeting for Sustainable Urban Growth
 - 7.1.3 Lifestyle as Commodity in the Re-Imagine High-Rise Typology

7.2 Mediating Between the Sky and Ground: Applying Neighbourhood Parks in the High Rise Typology

- 7.2.1 The Natural Setting
- 7.2.2 Balancing Human Contact

7.3 Sky Garden: Applying Mini Parks or Vest Pocket Spaces in the High Rise Typology

- 7.3.1 Entrance and Boundaries
- 7.3.2 Function and Play Area
- 7.3.3 Plants, Furniture and Surfaces
- 7.3.4 Management and Stewardship

7.3 From Case Study to General Conclusion: The Model Approach

7.4 Future Research

REFERENCES.....

APPENDICIES.....

LIST OF PLANS

- Plan 5.1:* The red circle indicates the Pinnacle @ Duxton's location within the larger city-state context. The blue circle at the eastern corner of the island is the International Changi Airport; the one at the north is Singapore's land access to its neighbour, Malaysia.
- Plan 5.2:* The location of the Pinnacle @ Duxton within the micro context of the city. Picture Source: URA (2005).
- Plan 5.3:* Post-war map of the Tanjong Pagar area circa 1930-60. Picture source: (URA, 2005).
- Plan 5.4:* The urban design guideline for Duxton Hill redevelopment by URA (URA, 2005).
- Plan 5.5:* The finalized layout of the third-floor social and public spaces. There were no major changes in the planning when compared to the first winning proposal with the exemption of the sky lift. Picture source: Arc Studio (2011).
- Plan 5.6:* The 26th storey final layout. The idea for social and public spaces on this floor is translated into mini-vest gardens. This area is designated only for residents. Picture source: Arc Studio (2011).
- Plan 5.7:* The 50th storey layout. Like the 26th storey sky deck, the social and public spaces are designed as mini-vest parks, though its purposes are only as pleasure gardens. It is a semi-public space accessible to all, within strict visiting hours. Picture source: Arc Studio (2011).
- Plan 5.8:* Structurally, each unit is created as a shell. The unit is designed in mind with the growth of its occupants from newly-weds to a family with children, teenagers and finally grandchildren, to the elderly. Toilets can be expended or merged. Kitchens can be opened up, rooms merged, neighbouring units merged. Source: URA (2005).
- Plan 5.9:* The architecture limitation of the park is highlighted by the red dotted lines. It is enclosed by five tower blocks facing Cantonment Road. The blue dotted lines mark the boundary line for Duxton Plain Park. The other two blocks are separated away from the public park. Connecting the Pinnacle @ Duxton and Duxton Plain Park is a spill over space behind it. The urban grain top-left of the settlement is denser, represented by the historical Chinese shop-houses built before the Second World War; while at the top-right are housing estates built in the 1960s and 1970s. This figure ground analysis shows the relationship between the Pinnacle @ Duxton and its surrounding context.
- Plan 5.10:* The architecture quality of the public park is defined by its massive enclosure of the five tower blocks. The park is further divided into three smaller enclosures. The centre of the park is a 4-metre-high artificial hill.
- Plan 5.11:* The original 2001 proposal that won the competition. The two huge circular structures located bottom-right and top of the middle of the plan are the high-speed lifts connecting all three sky gardens to the public without any restricted access. The original proposal dissects the public park into three parts, the Basketball Court, Nutmeg Court and the Playground. Kiosks are located in two of its small gardens. The central mound marks the highest hierarchy of space in the public park. Trees are planted all over the site to replicate an urban forest. There is a dedicated community hall next to it. Most importantly, the ground floor park has toilet facilities located next to the basketball court. The toilet facilities are crucial in any outdoor spaces, especially if they are located next to active social spaces. The child care centre is located next to the playground in a private enclosure away from pedestrian access. Picture source: (URA, 2005).
- Plan 5.12:* This plan of the third-storey public park obtained from Arc Design Studio (2009) illustrates the finalized layout of its social spaces. There are several changes made to the layout if compared to the winning 2001 proposal, though the third-storey public park still manages to retain its original character from the original proposal. The park still retains its three enclosures and the central mound. It has lost the high-speed lifts connecting the park to two other sky bridges above the settlement. The decision to remove the high-speed lifts is unfortunate as it affects connectivity and permeability between all sky parks. The community centre and public toilets were also removed. The child care centre has been incorporated into the tower blocks, opening its enclosed courtyard to pedestrian views. The kiosks, which could potentially have been converted to shops, were removed and replaced by sitting pavilions. Picture source: Arc Design Studio, Singapore (2010).
- Plan 5.13:* The central mound as the pleasure ground space for the inhabitants of the Pinnacle @ Duxton. The central mound is designed to replicate a natural hill covered with grass and large trees. It anchors all other spaces distributing it surrounding the park. The highest elevation in the park is in the middle where three ramps converge. The mound also acts as a massive ventilation shaft for the three lower levels used for parking and maintenance. Ventilation is provided by cut walls on two sides of its enclosure.
- Plan 5.14:* The third-storey floor plan as it is (2010). The plan carefully juxtaposes the buildings to form an enclave in the middle of the settlement focusing it as the main social and public space. Picture source: (URA, 2005).

- Plan 5.15:* The three main enclosures in the third-storey park. Enclosure A has three prescribed functions: from the right as a gathering square, a Heritage Garden, and a basketball court. Enclosure B is a pleasure garden incorporated within an urban-rural setting. Enclosure C is a pre-school yard. It is situated in front of the pre-school. The number 1 highlights the location of the grand staircase, which functions as the ceremonial entrance to the park.
- Plan 5.16:* Four of five vested small gardens sandwiched between the four tower blocks. These gardens are not part of the larger central park but leftover spaces for fire and emergency exits for respective blocks.
- Plan 5.17:* Another leftover space utilized as a separate park behind blocks C, D and E. Its close proximity to the pre-school located next to it designates it as a children's playground.
- Plan 5.18:* Plan showing the relationship between permanent programmes inhabiting next to the enclosures giving social motivations to how it shall be used. The proximity of enclosure C to the pre-school makes it a family place while enclosure A is for teens. The lack of similar attributes to enclosure B left it as a lost space in terms of use and activity despite it having the same quality of comfort and relaxation to C. It is also situated away from the major pedestrian artery in the settlement. Subsequently, the space facing the enclosure is empty and would better be used for additional cafes or other forms of social infrastructure needed by the settlement.
- Plan 5.19:* The red illustration highlights the covered walkway in the development. The walkway wraps round the park, connecting it to blocks F & G at the right end of the settlement. The walkway provides uninterrupted shelter and connection from residential blocks A to G. This quality is occasionally taken advantage of by the inhabitants who use it as a jogging path, for pram strolling and for roller-blading. The walkway is accessible by outsiders from four entrances: the first at the junction of Cantonment Road and Neil Road; the second at the Grand Staircase, the third from the far right and the fourth from Pinnacle Park.
- Plan 5.20:* Serial vision in the Pinnacle @ Duxton by pedestrian movement from the front entrance into and out of the park. The progression is marked in numbers engaging users with objects in space. The middle hill is the focus of the park. The series of smaller enclosures provides revelations to the journey. This significance creates a sense of 'hereness' and 'thereness' (Cullen, 1971) by visual clarity in the park.
- Plan 5.21:* An illustration of the paving coverage in the public park.
- Plan 5.22:* Soft landscaping (green) coverage in the public park.
- Plan 5.23:* An illustration of the paving coverage in the adjacent park behind blocks C, D and E.
- Plan 5.24:* Soft landscaping (green) coverage in the adjacent park behind blocks C, D and E.
- Plan 5.25:* A graphical illustration of landscape strategy in the third-floor park of the Pinnacle @ Duxton with its five types of landscape elements.
- Plan 5.26:* Graphical illustration of the landscape properties in the adjacent park behind blocks C and D.
- Plan 5.27:* Plan showing the pedestrian artery line between two important destinations: the Tanjong Pagar MRT station and the Pearl's Hill Park.
- Plan 5.28:* Diagram of Duxton Plain Park and destination stimuli along the path, like the Phoo Thor Jee Temple and Tanjong Pagar Market.
- Plan 5.29:* Spatial mapping on pedestrian usage surrounding the Pinnacle @ Duxton. The thick line suggests heavy pedestrian use along Cantonment Road (at the bottom) because of bus and taxi routes going in and out of the city-centre by this road. There are several key public buildings located along Cantonment Road from the Singapore General Hospital and The Central Police HQ to public schools, both secondary and primary. Pedestrian usage was deflected into the park as it connects with Duxton Plain Park in the upper section of the map. Other parts of the park were fairly used as pedestrian lines but the middle proved most popular as it weaves through into Duxton Plain Park towards key destination points like the Tanjong Pagar Market and its MRT station. This pedestrian map indicates the third-storey park is embedded successfully complementing existing pathways, making the park functionally accessible to the public. This is one of the key elements of making successful public spaces in high-rise buildings.
- Plan 5.30:* Plan showing the layout of the food court. The red arrow shows two destination points to Pearl's Hill Park on the left and Tanjong Pagar MRT station to the top right. The blue arrow shows direction to the third-storey public park. The food court sits at the intersection of both pedestrian lines. This plan also indicates the level of the food court three storeys below the Pinnacle @ Duxton's public park. This level is mostly occupied by car parks reserved for residents in the settlement.
- Plan 6.1:* Illustration of three types of location for mini-parks and vest-pocket spaces. Source: Marcus and Francis (1998).
- Plan 6.2:* Plan of Greenacre Park in New York City, New York. Built in 1971 in continues to be a successful pocket park till now. The Greenacre Park highlights how the pocket parks work best

in high-density environments as people places. Its design is a good example of serious evaluation from needs to behaviour. Source: Jasprizza (1999).

- Plan 6.3:** Plan illustrating the overall layout of the 26th floor social spaces. There are eight designated social spaces located on sky bridges. Seven of them are mini-parks with one community centre. A jogging path connects all social spaces together as one park. However, given the size and dimension of each social space, it is difficult to validate this as a park but rather a series of mini-parks or vest-pocket spaces (Marcus & Francis, 1998). The mini-parks come in various sizes illustrated by the plan above. Mini-park numbers 4 and 6 are the biggest. Number 2 is the community centre.
- Plan 6.4:** An overall plan illustrating the architecture description of the 26th floor sky park. All parks are open to the sky at least on one frontage prior to its location. The running track that also acts as a pedestrian pathway runs through all residential blocks. The sky park is accessible by seven lift shafts from each tower block. Residents from each tower block are able to access all mini-parks on this floor as all are connected by the long corridor. The walkway does not run around all blocks. It meanders in between the blocks.
- Plan 6.5:** 'Hill Point' and 'Sea Point' are two identical mini-parks located at each end of the 26th floor sky park. Both parks are the smallest among all the collection of mini-parks on the floor. These mini-parks are so small that they look like seating corners. The plan above illustrates the location of each park viewing the sea and hills of Singapore.
- Plans 6.7 & 6.8:** An illustration of both the 'recreational centre' and the 'senior citizen fitness corner' plan. The recreational centre is not a mini-park. The senior citizen fitness corner faces the pedestrian walkway and is hardly visible until users arrive right in front of it.
- Plan 6.9:** The 'outdoor gym' is the largest mini-park on the 26th floor sky park. Note the landscapes in the middle of the park are small mounds. The timber oval shapes in the middle are slanting platforms for users to lie down and enjoy the view. This park is called 'The Meadows'. It does not have any functions, though it was suggested as an 'outdoor gym'.
- Plan 6.10:** Plan of the children's playground mini-park. This mini-park is also called 'Space Net' because of the large play structure that dominates the site. This mini-park is clearly defined in space and function. Note that it is elevated and the boundary is designed to also function as seating areas.
- Plan 6.11:** Plan of the community plaza. This mini-park is named 'Crater'. The name might be taken from the word 'crater' referring to the landscape property in the middle. The design has three craters with small play structures between them. These 'craters' are filled with soft rubber surfaces in them in an attempt to mimic water elements like ponds.
- Plan 6.12:** The fitness corner is dominated by the soft rubber surfaces highlighting the jogging track that runs through the whole 26th floor sky deck. It is lined by seating spaces.
- Plan 6.13:** The original 2001 proposal that won the competition. The two huge circular structures located down right and top middle of the plan are the high-speed lifts, supposedly connecting all three sky gardens to the public without any restricted access. The sky gardens are also two storeys in height with extra spaces for a large community hall and a café. This original proposal indicates more spaces dedicated to social use with multi-purpose event spaces located thoroughly on the sky deck. These multi-purpose event spaces are supposed to be reminiscent of ground floor decks commonly referred to as social spaces in numerous high-rise public housing in Singapore (Appold, 2011). Picture source: URA (2005). Please refer to appendices for the detailed plan.
- Plan 6.14:** This plan of the 26th floor sky bridge obtained from Arc Design Studio (2009) illustrates the finalized layout of its social spaces. The programmatic layout changed from places for social events to pleasure gardens, though the architect still retained the community centre and the sky gyms.
- Plan 6.15:** Illustration of the 26th storey sky bridge plan obtained from the management of the Pinnacle @ Duxton. This plan is the official pamphlet informing residents and visitors alike of name and usage of all pocket mini-vests social spaces. The pamphlet shows a lot of inaccuracies pertaining to the name and usage from the finalized version of the design. Although mentioned in the pamphlet that the intended usage of these spaces was as social places, the signage within the 26th floor sky bridge says otherwise. It follows the same name proposed by the architect, highlighting it as pleasure gardens. This incident suggests some form of clash between the management and designers regarding the actual programme of these spaces.
- Plan 6.16:** Seven mini-parks on the 26th storey sky bridge. The parks are mono-function spaces spread horizontally, connected by a long winding jogging path. Note that the community centre is not a mini-park. The functions of the park are indicated in the illustration above derived from the information pamphlet.
- Plan 6.17:** The pedestrian pathway clashed with the observation point where users usually stand to see the view. There are also two unused spaces near the mini-park that could function well with extra seating facing the pedestrian flow. The location of the seating area is best nearer to the

	viewing point, letting the pedestrian pathway flow behind. This mini-park also needs more plant coverage. Note that this mini-park does not have any specific user functions.
Plan 6.18:	Plan of the recreational centre. The centre sits at an intersection. The entrance door faces the intersection with its signage.
Plan 6.19:	Plan of the elderly fitness area. There are 12 fitness machines fitted towards a framed view of the central business district. This arrangement is also ideal for group exercise.
Plan 6.20:	Plan based on the original winning proposal. The pocket park was supposed to be two storeys with a multi-purpose hall below. A garden sits above. The park is connected by high-speed lifts highlighted by the large circular form next to it.
Plan 6.21:	Plan of the 'outdoor gym' or 'The Meadows'. Many of its original features were downsized and abandoned. The pocket park is no longer two storeys. The multi-purpose hall was moved to another sky deck. The lush greenery was downsized to meagre patches of green and a few trees.
Plan 6.22:	Outdoor gym mini-park.
Plan 6.23:	Mini-park 'Space Net', a playground for the older children in the settlement.
Plan 6.24:	Plan and section showing the original winning proposal. Similar to the 'outdoor gym' this pocket park was supposed to be two storeys with a multi-purpose hall below. A palm grove sits above. This park is also connected by high-speed lifts highlighted by the large circular form next to it.
Plan 6.25:	Plan of the downsized mini-park 6 'community plaza'. Note that the space does not carry any significance as a place for gathering. Moreover, as a pleasure garden it failed in making any impression of a lush green meadow. Observation reveals the mini-park is often missed as pedestrians walked past it to go to the children's playground.
Plan 6.26:	Plan showing the fitness corner located in between blocks F and G. This plan indicates no facilities to suggest its use and function. The line in the middle shows the route of the jogging path cutting through it. This pocket park is named 'Paddy Fields'.
Plan 6.27:	Plan illustrating the overall layout of the 50 th floor social spaces. There are eight designated social spaces located on sky bridges. All of them are mini-parks.
Plan 6.28:	An overall plan illustrating the architecture description of the 50 th floor sky park. All parks are open to the sky on at least one frontage prior to its location. The sky park is accessible by seven lift shafts from each tower block. Residents from each tower block are able to access all mini-parks on this floor as all are connected by the long corridor. Public access is from tower 7.
Plan 6.29:	Layout of the pedestrian pathway pattern on the 50 th storey sky park connecting all mini-parks.
Plan 6.30:	The original 2001 roof plan. The original Picture source URA (2005).
Plan 6.31:	This plan of the 50 th floor sky bridge obtained from Arc Design Studio (2009) illustrates the finalized layout of its social spaces. The programmatic layout changed from places for social events to pleasure gardens.
Plan 6.32:	Both mini-parks located at the end of the 26 th floor sky park. The plan above illustrates the location of each park, viewing the sea and hills of Singapore.
Plan 6.33 & 6.34:	Plan of both 'Cottage' and 'Rocky' mini-parks.
Plan 6.35:	The 'Lounge' is trapezium in shape. The design is divided by a thoroughfare in the middle and two patches of green backed to the core wall.
Plan 6.36:	The name 'Hillock' implies the medium size mound located in the middle of the park. A circular platform sits in the middle of the mound that functions as a vista point. The park is 80% covered in timber decking.
Plan 6.37:	Showing mini-park 'Fiesta' in-between blocks F and G. This plan indicates no facilities to suggest its use and function. The line in the middle shows the pedestrian route cutting through it.

LIST OF TABLES

Table 2.1:	Adapted from Buchanan (2012). The three stages of modernism and its key measurement. The high-rise is entering the third age in its exploration parallel to modernism itself. This table justifies the third evolution of high-rises and its key measurement of exploration that this thesis seeks to explore.
Table 6.1:	Mini-parks Hill Point and Sea Point's successful and unsuccessful features.
Table 6.2:	The R.C. centre's successful and unsuccessful features.
Table 6.3:	The three types of elderly people. Picture source: Cartstens (1998).
Table 6.4:	The elderly mini-park's successful and unsuccessful features.
Table 6.5:	Outdoor gym/'The Meadows' successful and unsuccessful features.

Table 6.6:	<i>The 'Space Net' mini-park's successful and unsuccessful features.</i>
Table 6.7:	<i>The 'community plaza' mini-park's successful and unsuccessful features.</i>
Table 6.8:	<i>The 'Paddy Fields' mini-park's successful and unsuccessful features.</i>
Table 6.9:	<i>Successful and unsuccessful features for both viewpoints.</i>
Table 6.10:	<i>Successful and unsuccessful features of the mini-park 'cottage'.</i>
Table 6.11:	<i>Successful and unsuccessful features of mini-park 'Rocky'.</i>
Table 6.12:	<i>Successful and unsuccessful features for mini-park 'Beach'.</i>
Table 6.13:	<i>Successful and unsuccessful features for mini-park 'Lounge'.</i>
Table 6.14:	<i>Successful and unsuccessful features for mini-park 'Hillock'.</i>
Table 6.15:	<i>Mini-park 'Fiesta' successful and unsuccessful features.</i>
Table 7.1:	<i>Data illustrating numbers of users in the Pinnacle @ Duxton since January 2010.</i>

LIST OF PICTURES

Picture 2.1:	<i>5% of the world's population lived in a high-density environment as compared to suburban areas. In between 2001-2011 602 of the world's tallest high-rise buildings were built in Asia. Adapted from CTBUH (2012). Picture source: (Koolhaas, Boeri, Kwinter, Tazi, & Obrist, 2000).</i>
Picture 2.2:	<i>The industrial city form. This form encompasses means of transport by horse or foot. This in effect created a close spatial relationship in between residences and workplace. Urbanity expanded by links of public transport nominally along the railway belt. Picture source: Carmona et al. (2003).</i>
Picture 2.3:	<i>The increasing car ownership led to the building of a new infrastructure mainly of highways and motor roads that replaced the dependency in the railway system that serves the city. This process decentralised the inner city: people moved outside of the city. Picture source: Carmona et al. (2003).</i>
Picture 2.4:	<i>The information age reduces the need to expand horizontally. A myriad of urban choices was created that people could choose to live in. The results create many clusters of residential patterns. Spatial concentration of urbanity began to grow out of lifestyles choice. Picture source: Carmona et al. (2003).</i>
Picture 2.5:	<i>The Downtown Athletic Club, 1931. Picture source: (Koolhaas, 1978).</i>
Picture 2.6:	<i>Section of The Downtown Athletic Club, 1931. Picture source: (Koolhaas, 1978).</i>
Picture 2.7:	<i>Bibliothèques Jussieu competition entry. Picture source: (Koolhaas, 1995).</i>
Picture 3.1:	<i>The Jackson Plan. Singapore's first official urban layout characterized by the segregation of its ethnic groups in enclosed neighbourhood domains. The mouth of the river is the city's main port and market place. The Chinese immigrants settled the west, the middle by Europeans and the east by the Malays.</i>
Pictures 3.4 and 3.5:	<i>Left: View of a Malay settlement with a fortified manor on top of the hill belonging to the local chief of the community in Singapore called the Temenggong. Right: View of a water village that belongs to the Malay community jotted out along the coastline outside of the urban periphery within Singapore Island. These kinds of settlements were typical of the Malay, who were left out of the market economy and engaged in agricultural activities. They lived life fully self-sufficient, unaffected during the early years of Singapore while enjoying some degree of political power within the British administration. Picture sources: J. Toh (2009).</i>
Picture 3.6:	<i>The Singapore Improvement Trust Report 1953 booklet cover. Picture source: (Housing-Development-Board, 1961).</i>
Picture 3.7:	<i>Post-war depiction of street life in inner city slum within the downtown core of Singapore. This is Chinatown in 1970. Picture source: (URA, 1970).</i>
Picture 3.8:	<i>Shared living spaces in Chinatown, 1953 in post-war Singapore. Considered the poorest form of accommodation at that time where inhabitants, mostly immigrants, lived in cramped rooms decked among each other. Picture source: (URA, 1970).</i>
Pictures 3.9-3.12:	<i>Various pictures depicting high-rise residential complexes developed between 1970 and 1980. By the early 1970s the housing shortage in Singapore had been solved. This period of development marked a gradual shift in emphasis to address the needs of a new range of flat seekers: the baby boomers and middle-income groups. These needs were manifest in greater provisions of open spaces, playgrounds, landscaping and larger 4-room, 5-room and executive flats. In terms of social spaces, these 'New Towns' were provided with a town centre, bus interchange, neighbourhood centres, sports complexes and landscape parks within the grounds of the development. 1, 2: The Ang Mo Kio Complex. Built in 1973 with greater diversity in layouts and greater provisions of social spaces. 3: Toa Payoh. One of Singapore's most celebrated housing developments. The complex was built in the wake of a huge fire. 4:</i>

- Jurong West New Town Development. Jurong West was built as a population centre to support the industrial activity in Jurong at that time. Picture sources: (URA, 2005).*
- Pictures 3.13-3.17:** *Various pictures depicting high-rise residential complexes built between 1980 and 1990. The housing complexes were built in higher density. Compared to the housing projects built in the 1960s and 1970s, these complexes were built in greater diversity, both externally and internally. The grounds of the complexes were filled with amenities for public and social gatherings, depicting the new affluent middle classes living in them. 1-5: Picture sources: URA (2005).*
- Pictures 3.18-3.22:** *Pictures depicting various sites of high-rise housing in Singapore from early 1990 towards the early millennium. Enhanced liveability is done by extensive landscaping projects that highlight the sense of place within the grounds of each complex intended as social and public spaces. Picture sources: URA (2005).*
- Picture 5.1:** *The local market, situated at the foot of the development with the Pinnacle @ Duxton in the background.*
- Picture 5.2:** *The Tanjong Pagar Community Center.*
- Picture 5.3:** *The Singaporean Police HQ.*
- Picture 5.4:** *The first 1963 medium-rise flat built during the first Singaporean public housing programme. The building was demolished to make way for the Pinnacle @ Duxton, 2003. Picture Source: (URA, 2005).*
- Picture 5.5:** *The winning proposal by Arc Studio in April 2002. Picture source: URA (2005).*
- Picture 5.6:** *The finished product in 2010. Picture source: (e-architect, 2010).*
- Picture 5.7:** *Proposed image of a sky garden in between residential blocks in the Pinnacle @ Duxton. The sky garden provides greater proximity for residents without going down to ground level to experience it. Source: URA (2005).*
- Picture 5.8:** *The sky gardens also provide opportunities for active engagement, such as jogging tracks and fitness equipment. Source: URA (2005).*
- Picture 5.9:** *The three levels after it was finished in 2010. The architect managed to translate the idea successfully into built form with minor changes to the programme. Picture source: Arc Studio (2011).*
- Picture 5.10:** *The pre-school lot midday on a typical weekday.*
- Picture 5.11:** *The enclosure is a good space for parents to relax while observing the children in the toddler lot area. The seats are cast naturally into the central mound, thus providing shade. This feature creates a visually cool place to sit and relax while the children actively engage with one another in the park*
- Picture 5.12:** *Adults using the benches in enclosure C while waiting to pick up their children from the pre-school. The benches are sheltered and also provide a means of spontaneous interaction for the community in the park.*
- Picture 5.13:** *The enclosure late in the evening. The pre-school has closed but the space is still being utilized by the inhabitants. It is used as a playground, a reading space, a gossip corner. It is both in duality a good active and passive space for engagement.*
- Picture 5.14:** *A pavilion sits in the middle of the enclosure almost like a sculpture. The pavilion is designed to look informal providing many ranges of activities and usage on it.*
- Picture 5.15:** *Supervised activities are done regularly by children from the nearby pre-school underneath the elevated landscape above enclosure A. This large covered space is protected by the sun and other climatic elements, therefore making it a comfortable space for large gatherings. Still it does not have any provisions of seating in it. The space is also undefined in terms of what activity to do in it. The space is reminiscent of Singapore's first and second generation of housing where ground spaces were left empty for multi-purpose use with many degrees of success in function but lacking identity and character.*
- Picture 5.16:** *The basketball court in enclosure A is the most popular place for teens to meet. Regularly used, it is sometimes converted into a large event space. The enclosed shaded courtyard provides excellent space for spectating, though the lack of benches causes teens to sit uncomfortably on the ground. Even the upper floor garden is unused, for there are no places to sit looking into the arena.*
- Picture 5.17:** *View of the Heritage Garden from the meeting square. The Heritage Garden is built to emulate the old grid of the previous housing block situated in it. The garden is psychologically uncomfortable as it does not provide any protection from heat, sun and rain. Furthermore it does not offer any form of active engagement in it. Respectively, the original proposal intended to put water in it but this was omitted due to concerns of anti-social behaviour and management cost by the public authority. The wall, though graphically informing the function of the garden, is poorly designed and obstructive to the park itself.*
- Picture 5.18:** *View of the meeting square next to park from the top of the grand staircase. There is no indication of the importance of this area as a meeting place architecturally. The meeting space is not protected by heat, sun and rain. There are also no places for seating, benches or*

shelter. A small patch of grass indicates tree coverage intended for shelter. Most visitors, though informed of this as a meeting place, preferred enclosure C as a waiting space which is located nearby.

- Picture 5.20: The covered area next to the basketball court is converted into makeshift stalls like this Christmas gathering in December 2011.
- Pictures 5.21 and 5.22: Social gatherings organized in the basketball court. The left picture is the yearly Lantern Festival. The right picture is a Chinese New Year Celebration. These events prove the neighbourhood park is a successful place for social gathering.
- Picture 5.23: View of the central mound from the highest point of the park. This picture was taken at midday on a weekday. Note the concentration of trees in this area compared to other parts of the park. The idea behind this is to create a sanctuary surrounded by concrete. Though at the moment the trees are not matured, there is potential for this space to become a good social space for relaxing when the canopy provides foliage and shade in the park.
- Picture 5.24: View of the walkway leading up to the central mound from the grand staircase. Compared to other parts of the park, trees planted in the mound are the type that provides greater shade, like this 'fountain tree' *Delonix regia*. The tree will provide foliage and a flamboyant display of flowers. In many tropical parts of the world it is grown as an ornamental tree.
- Picture 5.25: Other forms of activities performed on the corridor. Taking advantage of its continuous length surrounding the whole settlement, some teens use it for roller-blading.
- Picture 5.26: Adults using the ground floor corridor spaces for jogging.
- Picture 5.27: Poster announcing the Pinnacle @ Duxton Flea Market.
- Picture 5.28: Void decks in the Pinnacle @ Duxton are located along corridors on the third-floor neighbourhood park. Flea Markets are organized by the Tanjong Pagar Community Centre with residents living in the Pinnacle @ Duxton taking part in them.
- Picture 5.29: Social activities for the elderly organized once a week in the void deck.
- Picture 5.31: Informal activities done in the small pavilions provided in the sub-spaces in-between blocks.
- Picture 5.32: The sub-spaces in-between blocks E & F. The space is dead with hardly any occupants in it. The area would be better utilized with an anchor programme that benefits the settlement since it is located with direct access to ground level. It is a lost space prone to anti-social behaviour.
- Picture 5.33: The public park is protected by a wall running along Cantonment Road. It is enclosed on all sides. The wall visually separates the settlement from the street but there is access for the public.
- Picture 5.34: The main frontage and entrance to the public park. Vehicular and pedestrian links merge here giving a strong sense of legibility before entering the social spaces in the third-storey park.
- Picture 5.35: The grand staircase provides visual impact for visitors entering the park.
- Picture 5.36: The grand staircase seen from the sidewalk along Cantonment Road.
- Picture 5.37: View from The Duxton Plain Park entrance.
- Picture 5.38: The centre mound mimics the natural environment psychologically tricking its users from knowing that the park is on a third-floor plane of the settlement.
- Picture 5.39: The centre mound seen from one of its three ramps. Given ample time to grow, the trees will provide lush vegetation to the park enhancing its 'naturalness state'.
- Picture 5.40-5.43: Spatial experience by unfolding different aspects of design called 'serial vision'. The park does have potential for full realization of the concept. 1: The Grand Staircase seen from the pedestrian walkway along Cantonment Road. The structure is an essential element marking the first series of kinaesthetic experience in the park. 2: The undulating landscape marking the centre space and enclosure defining 'activity spaces'. 3: The toddler park. A semi-enclosed space, a relief point through the progression. 4: The exit towards Duxton Plain Park. A winding staircase and ramp merge in front of the Duxton Plain Park Food Court.
- Picture 5.44: Bedford Square, London. Designed in 1776 as a unified whole where individual houses are treated as one façade. Only tenants held a key to access the garden square in the middle of it. Now it remains open to the public. Designers opting to make future squares in high-rise developments should look into these traditional precedences as they provide clues as to how an enclosed square garden/park could work by reimagining it vertically. Source: Webb (1990).
- Picture 5.45: The concept of a private garden shared by a single settlement is not unfounded. Bedford Square is among many London Georgian Squares to hold similar values of a controlled public space. Source: Webb (1990)
- Picture 5.46: The pathway on the right suggests linear movement by floor pattern towards the centre mound, which, in a series of spatial progressions, is the highest location on the park.
- Picture 5.47: The over-emphasizing of linear quality on the paving failed visually to suggest this space bears towards the centre of the park. It also failed to highlight it as the highest hierarchy of space within the whole park.
- Picture 5.48-5.52: Unity in materials and utilitarian in use. Visually, the aesthetic quality of the floor pattern is dull without any association to areas where people can stop and rest. There is also no sense of

visual vibrancy, though the concept succeeded in creating a clear sense of direction when exploring the park.

- Picture 5.53:** The only available bench near the basketball court. Given the popularity of this area, it would benefit greatly if seatings were provided surrounding the enclosure, giving a spectatorish-like quality to the place.
- Picture 5.54:** The Heritage Garden is designed such that it does not provide active engagement to its users. It is passive and unused by the people in the settlement.
- Picture 5.55:** Seating provisions in enclosure C. The seats are cast deep into the wall with provision of shade facing the tot-lot.
- Picture 5.56:** Benches randomly placed next to the Heritage Garden.
- Picture 5.57:** An example of the many pavilions provided in the park. It serves a dual function: as a place for relaxing, studying and socializing; also as a ventilation shaft for the two floors below.
- Picture 5.58:** An example of a medium size Rain Tree in Singapore. Note the huge crown coverage it provides when mature. The tree is a popular choice in gardens and road-side walkways. Picture source: NPB (2009)
- Picture 5.59:** An example of a medium size Yellow Flame Tree. The tree has strong durability in a dry landscape, popularly chosen for low-cost maintenance. Picture source: NPB (2009).
- Picture 5.60:** View of the third-storey public park from above, a few months after its completion. The park aims to have a maximum coverage of grass. Most concentration of trees is in the middle mound. More trees were planted after the development was settled. The trees when at full maturity can grow half the size of the same type on the main street on the right. Picture source: CTBUH (2008).
- Picture 5.61:** Rain Trees planted relatively distant in anticipation of their crown coverage when fully mature.
- Picture 5.62:** Based on an interview with the architect, this area is the location for a high-speed elevator connecting all three floors of the Pinnacle @ Duxton's social public spaces
- Picture 5.63:** The Pinnacle @ Duxton's food court located next to Duxton Plain Park. Due to its location, it is shaded by large Rain Trees and Yellow Flame Trees. The food court proved to be popular among white collar workers from the neighbouring financial district during lunch and tea breaks.
- Picture 5.64:** This children's park is located above the food court. Aesthetically the park is surrounded by lush greenery due to its location next to Duxton Plain Park. It has seven Rain Trees planted surrounding it to provide shade. The paving surfaces in the park are made of synthetic soft tarmac to absorb impact, safe for any form of activity in it. This park is not extensively used by the children in the development as most of them concentrate on enclosure C. This is because of few benches for surveillance by parents and the lack of shade.
- Picture 5.65:** This food court sits at the intersection of two pedestrian lines. It acts as a destination in the Pinnacle @ Duxton and is a by-product in the larger Duxton Plain Park route.
- Picture 5.66:** The owner of a food stall in the food court sets up additional tables for the incoming lunch crowd at 12 pm.
- Pictures 5.67 and 5.68:** Monthly activities held in the neighbourhood park organized by the nearby Community Club.
- Picture 5.69:** Poster informing the yearly Lantern Festival held in the neighbourhood park.
- Picture 5.70:** Resident's Dialogue and High Tea Session concerning the estate.
- Pictures 6.1-6.4:** Pictures depicting the development of mini-parks in empty lots at Philadelphia in the 1960s. The transformation of these lots creates social and public spaces in respective neighbourhoods. Picture source: City of Philadelphia & Philadelphia Neighbourhood Park Program (Jasprizza, 1999).
- Picture 6.5:** View of Paley Park in Midtown Manhattan New York in Spring. The dense vegetation creates an oasis of greenery in extremely concrete surroundings. Picture source: Jasprizza (1999).
- Picture 6.6:** View of the sitting area in Paley Park. This mini-park is a successful example of use as rest and relaxation, lunch area and meeting spot. Despite being 30 years old it still functions well to the need of the neighbourhood and its surroundings. Picture source: Jasprizza (1999).
- Picture 6.7:** Greenacre Park is another good example of a mini-park built in Mid-Manhattan New York. Bigger than Paley Park, this pocket park provides a focal point as it shelters from the noise. The shade provides good seating places in the summer. Picture source: Jasprizza (1999).
- Picture 6.8:** View of Paley Park seen from the street frontage in winter. Picture source: Jasprizza (1999).
- Picture 6.9:** Residents' access to the sky bridge by lifts.
- Picture 6.10:** Operating hours on the 26th storey sky bridge. The managing agent deals with maintenance while the EMSU is its after hour's security office.
- Picture 6.11:** The outer boundary wall is spread inward for safety and security. Rows of hedges are planted in-between to lessen vertigo effects.
- Picture 6.12:** The 26th storey sky deck also functions as a mechanical floor. A mechanical floor is a level of a high-rise building that is dedicated to mechanical and electronics equipment. The 26th floor contains break water tanks for water and sewerage in the settlement.

- Pictures 6.13 and 6.14:* The 26th storey sky decks seen from different angles. The left picture depicts mini-park 'Hill Point' and the R.C. Centre.
- Picture 6.15:* View of 'outdoor lounges' in 'Hill Point' mini-park. These areas are designed to emulate a living room with concrete seating resembling a sofa set.
- Picture 6.16:* The R.C. Centre.
- Picture 6.17:* The outdoor gym is also called 'The Meadows'. The landscape feature in the middle is an artificial mound attempting to emulate a 'meadow'. Its architectural effect is controversial; moreover, the use does not suggest any function as an outdoor gym.
- Picture 6.18:* The elderly fitness area is small but it is designed on an elevated platform defining its location and use.
- Picture 6.19:* View of the play structure. The play structure is compact. It functions as a climbing net with a small slide at the back. The floor surface is covered with soft rubber that is impact absorbent, relatively safe for young children playing in it.
- Picture 6.20:* View of the 'community plaza'. The boundary walls of this mini-park are the backyard of apartment units in upper floors. These apartment units have no direct access to this mini-park. The vertical strips in the middle of this picture hide an air well.
- Picture 6.21:* Play structures in the mini-park. These small play structures are listening tubes that connect to each other, spread sporadically around the park.
- Picture 6.22:* View of the 'fitness corner' towards the central business district. This mini-park is named 'Paddy Field', supposedly because of the wavy planter box shapes resembling paddy field platforms found in the hill rural countryside around South East Asia
- Pictures 6.23 to 6.25:* All mini-parks are connected by a jogging and pedestrian pathway that runs through the length from residential blocks A to G.
- Pictures 6.26 and 6.27:* The whole 26th floor sky deck under surveillance monitored by the management security office located at the ground floor.
- Picture 6.32:* An example of trellises applied in a successful mini-park. The trellises provide shade and a defined space. The principle if applied on both mini-parks would give greater attraction to use. Picture source: Jasprizza (1999).
- Picture 6.33:* This trellis in Greenacre Park, Manhattan New York overlooks an enclosed garden. This successful element could be applied to both Hill Point and Sea Point in the Pinnacle @ Duxton if they were closer to the barriers with seating areas overlooking the views. Picture source: Kugel (2008).
- Picture 6.34:* Vertical wall planting found in Newton Suites by WOHA. This same principle could be applied to the wall backing both mini-parks, maximizing green within the space. Picture source: WOHA, Breathing Architecture (2012).
- Picture 6.35:* Vertical wall plantings are found on the third floor neighbourhood park. The same effect could be applied on walls in mini-parks Hill Point and Sea Point, which are both bare from any greenery.
- Picture 6.36:* The outdoor sitting decks with doors opening to the R.C. centre.
- Picture 6.37:* The entrance to the R.C. centre. The signage only indicates the R.C. centre. It does not have a bulletin board informing the activities and use of the R.C.
- Picture 6.38:* View of the elderly fitness area during midday. The pocket spaces are clearly defined with informed awareness of their usage.
- Picture 6.39:* 'Elderly corner'. This seating area is a popular spot for the elderly to socialize. Despite the uncomfortable seating, the spot is still being utilized by them. Placing chairs with a back that comfortably respond to their anthropometrics would improve the spot.
- Picture 6.40:* The fitness equipment is permanent. Therefore this mini-park cannot be used for any other form of activities. The raised platform defines the space. The space is visible from the pedestrian walkway from entrance. The sub-space behind it does offer spots for privacy but with no bench there is no chance for any social interaction happening. Nonetheless, this mini-park is well-received by its target user. It is a good example of social spaces in a high-rise settlement. However, it can be further improved, thus giving more quality to place.
- Picture 6.41:* The 'Outdoor Gym' is also called 'The Meadows'. This pocket park is confusing as both names do not indicate how to use the space. The pocket park is poorly designed to be a pleasure park as there is little greenery to suggest it as a 'meadow'. Likewise, if this is an outdoor gym, it has no equipment or ample space to perform any cardiovascular activity.
- Picture 6.42:* The lush greenery was downsized only to planting a few trees in 'The Meadows'.
- Picture 6.43:* The landscape detail of this mini-park is an abstraction of a meadow. The slanting timber platform suggests nothing as to how it should be used, while its grass coverage does little to the effect of suggesting a garden.
- Picture 6.44:* User responses to the design of the benches are with mixed results. Usually none use it for seating but as a vantage point to capture images of the surrounding skyline. Note that the child is attempting to play with the structure, using it as a slide.

Picture 6.45:	The 'Children's Playground' on pocket park 5. Because of the climbing net, this space is called 'Space Net'. The name is not confusing as it affirms the use of this park. Young families make up mostly the inhabitants of the Pinnacle @ Duxton. This pocket park clearly addresses the need of that user group.
Picture 6.46:	Seating provisions in the mini-park. Uncomfortable and unnecessarily an art object. It does not encourage extended usage.
Picture 6.47:	The entrance to the 'Space Net' mini-park.
Picture 6.48:	The seating area used as a place to dry peanuts and floor mat. This is not allowed according to the rules and regulations on using the sky deck. This belongs to a parent who accompanied her child using the playground. Security came 30 minutes later telling her to evacuate the premises.
Picture 6.49:	The Meadows on the 26 th storey sky park. This image of the mini-park shows the confusing state of its function indicated by the management.
Picture 6.50:	The Meadows at midday. The characteristic of this mini-park resembles more of a playground. It neither works as a community plaza nor a pleasure garden.
Picture 6.51:	Children playing with the listening tubes on the 'community plaza' mini-park.
Picture 6.52:	At early evening the mini-park is used more as a playground for older children than a 'community plaza'. Adult users mostly jogged or walked past the mini-park.
Picture 6.53:	View of the mini-park. The spaces in-between the curved benches would function better if study tables were placed to give this mini-park a sense of purpose. The space is well shaded for occasional use by teens as a study area.
Picture 6.54:	Planter boxes and benches placed on both side of the walls.
Picture 6.55:	The outer boundary trench for safety and security. The trench also functions as a track for the service gondola. The height of the double railings further provides security to users within the park.
Picture 6.56:	The extruded core forms the block separating each mini-park on the sky deck. The extruded core does not have any usable spaces in it as it is only used as a mechanical floor.
Picture 6.57 and 6.58:	Residents taking a stroll on the pedestrian walkway in the late evening.
Picture 6.59:	Visitors' access to the 50 th floor sky park is situated at the far end of block G. Note that the entrance is the small corridor in front of the pedestrian bridge and behind the bus stop. The entrance's location is a problem as it is hard to find.
Picture 6.60:	Ticket machine for visitors.
Picture 6.61:	Entrance gate to the sky deck.
Picture 6.62:	A close-up view of the pedestrian pathway connecting all mini-parks on the sky deck.
Picture 6.63 and 6.64:	Illustration depicting the park in its early stages of the design development.
Picture 6.65:	View of 'outdoor lounges' on the sea viewpoint.
Picture 6.66:	Late evening use of the gazebo in the mini-park 'cottage'.
Picture 6.67 & 6.68:	The curved seating and raised platform define the use and function of the mini-park. The name 'Rocky' suits the design of the park without over-abstracting it. The climbing structure may be small but it is sufficient for active use among the park's target users.
Plan 6.34:	The 'Beach' is the Pinnacle @ Duxton's most iconic mini-park; though, despite its image, the park is barely used during the day. The landscape is unimaginative and the benches do not offer any chance for users to socialize.
Picture 6.69 and 6.70:	The iconic image of the sky garden in the Pinnacle @ Duxton. The most prevalent form of use in the park is only for relaxing and covert socializing. Picture source: Arc Studio (2009).
Picture 6.71:	A close-up view of the mini-park. This picture was taken after a thunderstorm. The park offers great views of the sea on the horizon.
Picture 6.72:	The steel signage is hard to read as it reflects light and glares under the sun.
Picture 6.73:	Signage indicating the name of the mini-park.
Picture 6.74 & 6.75:	The 'Lounge' has two separate seating areas. Each seating area is designed to resemble a sofa and a chair with a coffee table in the middle. The trees in the park could potentially grow, providing shade for the seating areas.
Picture 6.76:	Visitors taking pictures on the platform. The group is one of many officials visiting from foreign countries due to the Pinnacle @ Duxton's popularity as a high-rise social housing model. This group is representing the Municipal Council of Shenzhen, China.
Picture 6.77:	Landscape element in the park.
Picture 6.78:	The landscape element in the park is only dotted by a few trees that do not do any justice in providing a good ambience.
Picture 6.79:	The design of the park may highlight its location as a good vantage point but its abstract design has little use for other forms of socializing.
Picture 6.80:	View of the mini-park.
Picture 6.81:	Planter box placed on both sides of the walls.
Picture 7.1:	Boundary lines in mini-park 'elderly fitness centre'.

- Pictures 7.2 and 7.3:* Signage indicating location and name of mini-parks. The signs are made of stainless steel. Its shiny surface creates glare and is difficult to read.
- Picture 7.6:* Tree wells should be limited in mini-parks as they use most of the floor space.
- Picture 7.7:* Placing benches along this empty corridor would add use and function as it appeals to the elderly who like to sit and watch passers-by.
- Picture 7.8 (left) 7.9 (right):* Vertical landscape on walls can create alternative solutions for achieving maximum greenery in mini-parks located in high-rise buildings. In comparison to the corridor in the Pinnacle @ Duxton, this pathway succeeds immensely in creating vertical green within tight spaces; an approach that clearly gives more ground space that could be filled with furniture for social activities. Picture source: Blanc (2012).
- Pictures 7.10 (left) 7.11 (middle):* The revolving steel door entrance secures the whole 26th floor against intruders. Its design, however, restricts users in the space.
- Picture 7.9 (right):* Disabled access.
- Pictures 7.12 to 7.14:* The 26th storey sky deck is fully equipped with surveillance cameras monitoring all angles on site. Each mini-park is equipped with at least one camera monitored by the security office located at the ground floor of the settlement.
- Picture 7.15:* The park entrance door mechanism. Users need to swipe the door upon entering and exiting the sky deck. The mechanism only allows one person through the door at a time.
- Picture 7.16:* Signage warning users not to smoke or attempt to create a fire in the mini-parks.
- Picture 7.17:* The Sky Garden House Rules.
The rules are depicted as follows.
"Residents and visitors shall observe the following when using the Sky Gardens:-
No Pets
No food and beverage
No smoking or gambling
No touting and soliciting
No playing of loud music
No setting up of tents or camping overnight or barbeque
No social events at any part of the Sky Gardens
No littering, marking or painting in any part of the Sky Gardens
No storing of personal property or blocking of any entrance or exit
No hanging of any wet items, towels, bedding, clothing or any other article
No activities such as biking, skateboarding or other similar games or the use of any sports equipment
No damage shall be caused to any lawn, garden, trees, plants or flowers or any other facilities
Children must be accompanied by supervising adults
Everyone must leave the Sky Gardens when there is rain and a thunderstorm
Everyone must seek refuge at the 26th storey Sky Gardens or ground floor, via staircases in the event of any fire or other emergency
HDB will not be responsible for any loss or damage to personal belongings, mishap or accident"
- Pictures 7.18 and 7.19:* The Linked Hybrid Housing Project in Beijing, China, by Steven Holl Architects. The project is not a form of public housing like the Pinnacle @ Duxton but a form of private housing project aimed at the new affluent urban Chinese. The project illustrates a growing theme in making social and public spaces over ground level by connecting the building using a series of sky bridges. Picture source: Steven Holl Architects (2009).
- Pictures 7.20 and 7.21:* Edificio Mirador, Madrid by MVRDV Architects. Figure 7.4 Illustrates the conception of making social spaces in the sky within the settlement. Picture source: MVRDV (2009).
- Pictures 7.22 and 7.23:* WOHA's version of the Sky Ville @ Dawson. Picture source: WOHA (2012).
- Above pictures 7.24 and 7.25:* Both are the Sky Terrace by SCDA Architects and WOHA's version of the Sky Ville @ Dawson. Both settlements are under construction and will be occupied by early 2014. The building of both settlements is prevalent in that social and public spaces in the sky will become a norm in the Singaporean housing market. The question is, will these social and public spaces work with similar qualities to their counterparts found on the ground? Picture source: Pearson (2013).
Left: An illustration of the Sky Terrace @ Dawson by SCDA Architects. Picture source: SCDA Architects (2012).

LIST OF FIGURES

- Figure 2.1: A visual metaphor for the nature of places. Source: Canter (1977) 'The Psychology of Place'.
- Figure 2.2: Components of a sense of place. Source: Punter (1991) 'Participation in the design of urban space', pp24-27.
- Figure 2.3: Policy directions to foster an urban sense of place (or place making). Source: Montgomery (1998).
- Figure 3.1: Revised by the author on the comparative analysis between (Castells, 1978) capitalism and city theory and policies' evolution of high-rise housing stock built by the HDB, Singapore. The third paragraph compares policies in high-rise public housing to the current evolutionary stages of architecture and the built environment.
- Figure 3.2: A graphical representation of urban Singapore in between 1920-1940. Central to the port and market economy were the city's core shop-houses' residential typology of the Chinese and Indian communities. The Europeans were represented by their bungalow typology away from the crowded settlements. The hinterland was laid out without order, and inhabited by the Malays.
- Figure 3.3: Post-Second World War Singapore. Intense migration added pressure to the pre-war urban fabric intensifying the density of its downtown. The periphery villages grew into becoming slums and more land was explored as the Malays moved further out into the hinterland. Urbanity was still separated by social and economic rights of each community but had spiralled out of control by the local authorities.
- Figure 3.4: Historical Materialism: The progress of society by operation of economic forces by Karl Marx. This concept of historical materialism celebrates the background of residential patterns in Singapore outlying many of its political and economic conflicts by its inhabitants, possibly prompting the need to intervene by means of public housing. Source: (Lawson & Garrod, 2004).
- Figure 3.5: 1960-1970: Intense housing programme replaced all of the periphery slums and urban villages. The island expanded into an industrial economy.
- Figure 3.6: The overall substantial income below 1,000 SGD was 57.6%, representing half of Singapore's population. By the beginning of 1990 that figure dropped to 16%. The rising wages shows Singaporeans advancing into a dominant middle-class society. Higher wages attained by the middle class meant they have more purchasing power to spend on consuming. In terms of spatial economics, they can demand better quality design and value in social amenities. The logic is, compared to the working class, the middle class has more recreational time and are thus willing to spend money on socializing; hence, the need for public housing to evolve tailoring to the needs of this new dominant class. Source: (Grunsvén, 2000).
- Figure 3.7: The sudden rise in demand for three-room units shows the baby boom period between 1980 and 1990 that correlates with rising income and wealth. The 1980s mark the beginning of the consumer economy that sparks the rise of the middle class that became the dominant group in Singapore. This rise correlates with Figure 4.6 that shows the nominal income of a household unit gradually rise from 1980 to 1995. Source: (Grunsvén, 2000).
- Figure 3.8: Having achieved its economic and social status as a modern city with continuous growth, the period in between 1980 and 2000 was the city's transition into becoming a postmodern city. Source: (Fulcher & John, 2007).
- Figure 3.9: The 'Social Embourgeoisement' theory adapted by Goldthorpe (1964). The image above illustrates the effects of social and economic restructuring by public housing in Singapore throughout the first and second decade era that helped create embourgeoisement for its residents.
- Figure 3.10: Social Mobility Theory adapted from (Bourdieu, 1983) outlining the three factors of class mobility in a functioning society.
- Figure 3.11: The years in-between 1980 and 1990 witnessed unprecedented growth, turning the working class majority into an affluent middle class thus sustaining the consumer economy. Architectural-wise, the housing sector entered its postmodern period in an explosion of identity and sense of place focusing on the city's colonial and climatic heritage.
- Figure 3.12: Housing programme from 1990 to 2010 intensified by raising the density of new apartment blocks. The old first- and second-generation blocks were gutted and redesign. As concerns about sustainability rose at the end of the millennium, Singapore adapted a Green Policy that targets greening its high-rise environment with plants and vegetation. The sustainability efforts eventually evolved into extending its ground greenery vertically. The Pinnacle @ Duxton is Singapore's first testament of the efforts, opening up possibilities for other projects like the iconic Marina Bay Sands.
- Figure 3.13: The full anthology of Singapore growing into its singular high-rise urban entity with key buildings like the Pinnacle @ Duxton and Marina Bay Sands stewarding the next phase of its evolution by experimenting with social and public spaces in the sky.

- Figure 4.1: The five case study components that build the empirical entity of this method. The validity and links of each component are important to achieve a strong blueprint for conducting research. Adapted from Yin (2009).
- Figure 4.2: Stokols' (1978) Seven factors on perspectives of overcrowding. Adapted from (A. P. Bell, Greene, Fisher, & Baum, 2001).
- Figure 4.3: The three theoretical propositions that formed an overall assessment to determine successful social and public spaces as a testable theory applied onto a selected case study, thus creating the unit of analysis.
- Figure 4.4: The overall set of case criteria that built a strong case study analysis for the research project.
- Figure 4.5: Section 1, Survey, Pinnacle @ Duxton.
- Figure 4.6: Section 2, Survey, Pinnacle @ Duxton.
- Figure 4.7: Section 3, Survey, Pinnacle @ Duxton.
- Figure 4.8: Section 4, Survey, Pinnacle @ Duxton.
- Figure 4.9: Section 5, Survey, Pinnacle @ Duxton.
- Figure 4.10: Section 6, Survey, Pinnacle @ Duxton.
- Figure 5.1: Key planning parameters used as reference by competitors to build and design the Pinnacle @ Duxton. Note how social infrastructure played an integral theme in the redevelopment, thus encouraging how social and public spaces can be taken vertically within the high-rise typology. Source taken from the URA (2005).
- Figure 5.2: A cut section of a sky garden on the top-most level. The scheme tries to emulate a natural landscape, allowing its high location to be a form of temporary escapism from the high-density stress. Source: URA (2005).
- Figure 5.3: The undulating landscape provides opportunities to create rooms for community engagement on the sky park. Source: URA (2005).
- Figure 5.4: The three levels of social and public spaces in the development. The ground is the mediatory between city and neighbourhood. The two sky bridges layer it inhabitants between private and public. The blue structures are homes marking the private. Picture source: URA (2005).
- Figure 5.5: The architectural dimension of both public parks on the third-storey floor template. The dimensions are all in metres.
- Figure 5.6: The architectural dimension of all three enclosures within the larger public park. These enclosures, although designed as part of a coherent space within the public park, are visually vest-pocket spaces. The dimensions are all in metres.
- Figure 5.7: The division of facilities on all floors within the Pinnacle @ Duxton settlement.
- Figure 5.8: The 1960s' block projection as it was overlaid into the new block, thus defining the location of the Heritage Garden.
- Figure 5.10: The original proposal for the location of street furniture in the third-storey public park. The top diagram highlights the location of water elements in the park. All waterscape proposals were omitted due to concerns of upkeep and anti-social behaviour by the Municipal Council. Picture source: URA (2005).
- Figure 5.11: The five original proposals of street furniture to be applied in the Pinnacle @ Duxton. Only three were implemented: the pavilion, benches and fitness stations. Picture source: URA (2005).
- Figure 5.12: Ground network from all sides connecting the blocks and sky gardens by a system of vertical lifts spread along a pedestrian artery. The left picture indicates pathways meant for high-speed access by foot. Two high-speed lifts were proposed to connect the ground to two sky gardens placing it on the main east-west pedestrian artery line. The right picture indicates leisure paths in the system. Picture source: (URA, 2005).
- Figure 6.1: Illustration comparing sizes and dimensions in-between all mini-parks or vest-pocket and social spaces (community centre) on the 26th storey sky park. Mini-park numbers 1 and 8 are the same in size and shape. Adapted from Kostof (1993).
- Figure 6.2: The architectural dimensions of all vest-pocket social spaces in the 26th storey sky gardens. The dimensions are all in metres. The approx. square footage of each vest-pocket space is listed below:
Hill Point – 150sq, Recreational Centre/Community Hall – 450sq, Senior Citizen Fitness Corner – 200sq, Outdoor Gym – 1,000sq, Children's Playground – 312sq, Community Plaza – 900sq, Fitness Corner/Paddy Fields – 217sq, Sea Point – 150sq
- Figure 6.3: Pedestrian circulation patterns on the 26th storey sky park.
- Figure 6.4: Jogging pathway on the 26th storey sky park.

- Figure 6.5: Play area recommendations by three user types. Parents, and old and young children. Parents should always have surveillance into the mini-park. Young children need to be near to them while the older children occupy the centre. Picture source: Greene (1998).*
- Figure 6.6: Plan and section showing the original winning proposal. Similar to the 'outdoor gym' this pocket park was supposed to be two storeys with a multi-purpose hall below. A palm grove sits above. This park is also connected by high-speed lifts highlighted by the large circular form next to it.*
- Figure 6.7: Illustration comparing sizes and dimensions in-between all mini-parks or vest-pockets on the 50th storey sky park. Mini-park numbers 1 and 8 are the same in size and shape. Adapted from Kostof (1993).*
- Figure 6.8: The architectural dimensions of all vest- pocket social spaces on the 50th storey sky gardens. The dimensions are all in metres.*
- Figure 7.1: An illustration of three dimensions needing to be considered when designing social and public spaces in residential high-rises. These dimensions are good urban design guidelines that could ensure successful social and public spaces in the typology.*
- Figure 7.2: Mini-parks entry guidelines. Picture source: Greene (1998).*
- Figure 7.3: Considerations for making symbolic spaces in the high-rise settlement. The ground floor is the mediator between the settlement and its urban location. The ground makes the symbolic social spaces that tend to the needs of the settlement as a whole within the neighbourhood park. Adapted from Carmona M., in Layard et al. (2001), pp.179-81.*
- Figure 7.4: Considerations for making functional spaces in high-rise settlements. Functional places, according to Carr et al. (1992), are the representation of spaces that make up the weekly needs of people within a settlement. These spaces are social infrastructure links like neighbourhood shops, nursery, markets or eating areas. This figure illustrates the measurements for consideration when applying these 'functional public' spaces in the high-rise systems.*
- Figure 7.5: Considerations for making daily social spaces in high-rise settlements. Daily places, according to Carr et al. (1992), are the representation of spaces that make up the daily needs of people within a settlement. This figure illustrates the measurements for consideration when applying these 'functional public' spaces in the high-rise systems such as mini-parks.*

CHAPTER 1-INTRODUCTION

1.0 Background of the Study and Problem Definition

High-rise & tall buildings in architecture refer to a design typology of making buildings that go up by means of stacking. Usually comprising more than a single building or function, the high-rise suggests itself as a structure capable of becoming an urban neighbourhood in comparison to a small or medium-sized town. The high-rise typology is part of the modern urban design agenda concurrently the spark of many changes in urban theories in the past 40 years. Modernism emerged in architecture and planning at the end of the nineteenth century and the first half of the twentieth century as the beginning of the 'Machine Age' from which society would reap the benefits of technological advancements and industrial production (Carmona et al, 2010). No other design typology would best describe the 'Machine Age' modernist idea as the high-rise in its ideas of technological and industrial production. Without technological means high-rises could not be built in retrospect to its vertical transportation systems, electrical and water services. The high-rise is best demonstrated by its idea in Le Corbusier's 1924 book *The City of Tomorrow and its Planning*. Le Corbusier juxtaposed an image of Manhattan Island with his alternate version of 'The Contemporary City' depicted by his 24 cruciform towers standing in the park. New York's street grid has been replaced by a large field of gigantic mega-blocks redefined as free-standing objects in the park rather than part of a complex continuous diverse urban fabric (Jenkins, 1999). This demonstration re-emerged in his Plan Voisin proposal by superimposing the same model on the traditional Parisian grid. Plan Voisin seeks to erase the intimate horizontal fabric centre by imposing a new urban order. This new order is in response to what modernists saw as the traditional city being congested and unhealthy (Bharne, 2011).

Central to this principle is the high-rise building typology. The high-rise typology is important in the modern movement as it represents the opportunity to create high-density living while living in a healthy environment due to its openness on ground and sky. High-rises have spaces open to air, sun and ventilation. As the typology is separated from other buildings on the ground, it left open areas that allow air to flow freely around them. In retrospect to the logic of functional zoning, the high-rises are generally mono-functional whose activity and context are internalized. The mono-functionality highlights the buildings as being efficient in their purpose. High-rises are also built as an industrialized production unit and with mass construction techniques. These industrialized productions are singular, efficient and highly functional with no recognition of decorative ability built to represent pure geometrical forms as their aesthetic quality. Architecturally the design is standard

culminating in an international image that symbolizes cleanliness and pure beauty. Many of the high-rises located in places around the globe abandon their local context and culture expressed in architecture. By the late 1980s, high-rises were beginning to accommodate mixed uses in huge complex office-residential-commercial typologies. However, their adaptation remains true to the modern urban design zeitgeist: vertically disconnected and internalized, not integrated as a whole into the urban environment. Attempts to add cultural symbolism in the wake of the postmodern period resulted in vernacular elements like pagodas topping the towers. Nonetheless their planning remained unchanged (Wood, 2007).

As a result of modernist planning approaches that emerged from Fordist paradigms, the high-rise typology is often built on mass production, specialization and standardization. These approaches mostly overlooked high-rises being homogenous rather than heterogenous neighbourhoods, space rather than place making, zoned layout not mixed use, indirect rather than direct communication, and significantly more segregation than integration (Irving, 1993; Sandercock, 1998; Hanson, 2000; Nastrasony & Alexander, 2005). Placeless urban environments were created in high-rise buildings. Worst, modernist ideology articulates high-rise buildings as icons of vanity not humble living buildings.

Disillusion met towards high-rises is best illustrated by Britain with its post-war legacy of hundreds of poorly-designed, post-war tower blocks. Stigmatized by poverty and crime, attempts to build newer typologies have since been thwarted by planning laws. Britain is not alone in the rejection of skyscrapers. The distrust it further inculcates in popular media in 20th century Sci-fi dystopias from *Metropolis* to *Blade Runner* is that it is a symbol of humanity's alienation from the world and each other (Hanion, 2012). The disapproval towards the high-rise settlements urged urban designers and architects alike in the postmodern era to consider abandoning the typology.

2.0 Aims of the Study

The problem with high-rises is in the inherit genetic code. The contemporary urban environment is in opposition from the vernacular environment. Traditional pattern in design has always been incompatible with lifestyles and activities as it tends to evolve gradually without self-imposing rules and regulations. These evolving patterns are made by an understanding between the building and the users. The vernacular environment encouraged fixity, heterogeneity and quality urbanism, as all three, when emphasized, would bring forth a sense of place in space within buildings or urban settlements (Rapoport, 2005). It is a quality that the modern movement hugely neglects. The sheer mentioning of criticism towards high-rise buildings highlights first Jane Jacob's (1961) *The Death & Life of Great American Cities* revelation to the value of streets. The high-rise breaks the traditional urban morphology from the street. This subsequent removal creates the

alienation from the world and each other preventing social bounds within communities created in urban spatial platforms such as streets. Anderson (1991) asserts this lack of attention has created a situation in which public streets spaces and the house have become separated, gradually becoming anonymous and unsafe. With the failure to provide a connection to outdoor space, apartment towers are usually faced with social problems due to the anonymity of their inhospitable environments.

The problem is an irony to the lauded idea of high-rise buildings often being a symbol for good social housing. All modern high-rise templates originate from Le Corbusier's 'Streets in The Sky' concept developed and overseen by institutions such as CIAM (Congres Internationaux d'Architecture Moderne) and the Illinois Institute of Technology, Chicago. Unite D'Habitation in Marseilles is a progressive example of quality working class dwellings within a vast array of open spaces as public places on its ground plane. Its roof is converted with shared social spaces like schools and pubs. These ideas are considerations of humanizing the high-rise; moreover, they are spatial manifestations of social spaces in the sky. This would disprove that high-rise buildings are not planned to value the needs of social interaction for its residents, although even with spaces provided with complete social infrastructure these modernist high-rises still became social ghettos

This widespread argument launched numerous researches on high-rise living. At the end of 1970s after the infamous Pruitt Igoe debate in St Louis social implications on high-rise living were brought to light. Newman (1972), Conway and Adams (1977), and Stokols (1978) all summarized that social breakdowns in high-rise settlements are because social anxiety is represented by different groups of people living in these environments, nominally the nuclear family unit. The distress experienced by the nuclear family affects the fabric of social life and social control in neighbourhoods. All are in agreement that the high-rise typology lacked quality in the public realm, both physical and social-cultural. The designs of these public realms are important as they are the first psychological barrier that separates the city and its inhabitants (Newman, 1972). It is the most common psychological barrier between home and city that translates into security. In designing high-rises many architects and planners overlooked the complexity of creating these public realms in detail (Ali & Ajla, 2008). The result only resolved social infrastructure as spaces not places. The high-rise environment is also greatly disconnected from the natural environment. People living in high-rises have less physical connection to outdoor green spaces. The higher they live, the further they have to access available ground floor greenery. These various conditions are recipes for disaster when investing in building residential high-rise towers, culminating in their unpopularity as choice for urban settlement towards the end of the millennium. Much of their failure lies not in the idea itself but the typology which is still in its evolving process. Musiatowicz (2008, P.9) states that:

'What modernism professed as a new and better order in reality never eventuated as it failed to deal with the inherent complexity of life. The critiques brought by post-modernism saw a resurgence of interest in testing program and challenging predominant typological models'

As the world gets ever more crowded, cities are now faced with an ever more pressuring issue of sustaining growth without expanding horizontally encroaching into other essential land use needs (Hanion, 2012). High-rise buildings might give an alternate solution to low-rise suburbia. Planners assert that the concentration of population through high-density may reduce the suburban spread therefore reducing transport cost, size of infrastructure networks, lessening the proximity of residence and workplace. The greater potential for mixed use would mean efficient land use that would create greater efficiency (Wood, 2007). The future of cities, particularly in the urban environment, is rapidly expanding. In the United Kingdom alone, over 80% of the population already lives in urban areas (R.C.E.P. UK 2007). Facing this advent challenge to environmental changes, resource use and protection of the natural environment, it is vital that architects, planners and developers should build the urban environment that benefits these changes.

"Many urban designers & architects now regard tall buildings not so much as forms created in opposition to nature, as they have once perceived, but as essential elements in a sustainable or ecologically friendly strategy for urban design. In particular, they are seen as an important part of the solution to out of control urban growth in both the developed and the developing world, where the combination of vast megacities numbering tens of millions and chronic shortages of open land is critical" Abel et al. (2003 P.13)

Criteria for sustainability are illustrated by many strategies such as passive solar gain, high performance façade technology, solar energy, smart materials etc. However, these strategies have been only focused primarily on commercial buildings. Only recently, when more high-rise residential buildings were built, are new criteria being considered to address social sustainability that encompasses community development, social infrastructure, demographic and social integration. Sustainable interdependency between high-rises and their urban habitats is important. This interdependency is the unconsidered detail previously mentioned by numerous scholars against high-rises before the millennium. Social sustainability and community development in conjunction with the design of buildings and infrastructure determined the liability of cities and effects of high-rise city living (Ali & Armstrong, 2008). Ali and Armstrong (2008) conclude the liveable city is intrinsically related to the design and integration of sustainable principles applied to high-rise residential buildings and their urban environments. The strategy is derived from two social model stems for the designer's consideration: first, the relationship to one another as individual members of community; and second the relationship of the high-rise residence to its site and surroundings..

Subsequently, the provision of social infrastructure is relevant to support social organization; therefore, it is an important determinant of social ecology in the high-rise system. By improving the civic realm in the high-rise typology, it promotes ecological support that would create a sense of place culminating in social sustainability within the high-rise system.

3.0 Definition of Case

One significant aspect of urban design is its concern with the quality of the public realm, both physical and social-cultural. There are three stems of philosophical approach to its design process from the visual artistic to social usage, and finally making places which simultaneously are concerned with both visual and social (Carmona, Heath, Oc, & Tiesdell, 2003). The application of its scope is generally referenced by theoretical frameworks that provide different degrees of prescriptions of different desirable achievements. The urban design framework provides a general reference with different degrees of prescription regarding aims or desirable physical spatial form to the intent of the designers. It is not regarded as a formula but recommendations to be used with flexibility are derived from the understanding of justification, biases and interrelations. It is the underlying assumption that a good settlement is designed, developed and managed over an extended period of time in order to become successful places. The task however is that it is difficult to understand why a place is successful and, most importantly, whether and how this can be generated by setting the right conditions on other settings.

As urban design represents numerous philosophies, debate and recommendations, it is impossible to consider the scope of all layers in promoting quality social spaces as urban places in residential high-rise buildings. Urban design itself is divided into seven dimensions that fully illuminate and guide designers into making successful urban places (Carmona et al., 2003). One dimension holds most important when considering making successful urban spaces: the functional dimension. In creating good public places, function should always be the underlying consideration that encompasses all other considerations. All aims of spatial form should always be purposeful (functional) in context to the user's needs. That purpose includes all notions of choices from visual, morphology to temporality and management. In making good social places for residential high-rises, it is an underlying consideration that they should always be reflective to the needs of the people who live there. As most settlements revolve around the nominal nuclear family, therefore social spaces in high-rises need to consider making the civic realm purposeful upon interactions among family units towards its high-density ecology.

It is a common fact in any urban settlement that the basis of its social spaces are defined by what forms of public life the inhabitants practise in it. To know how social and public spaces are best

used is to first understand the value of the space. Social and public spaces are the stage upon which the drama of communal life unfolds. These dynamic spaces are an essential counterpart to settled places and routines of work and home life, providing the channels for movement, nodes of communication, and the common grounds of the playground (Car et al., 1992). The need for good and successful public spaces is vital, especially in high-density environments because of the negative effects from behavioural decline when populations are unable to organize themselves and are in disarray, thus vandalizing their environments.

In all communal life there is a dynamic balance between public and private activities. Within this balance, different cultures give different emphases on public space. Carr et al. (1992) summarized that public life must come from the understanding of how different cultures give different meanings to their spaces, not only focusing on religion and ethnicity but also their evolutionary state to time, place and context. Social and public space is defined by the constant shifts of cultural exchange, technology, changing political and economic systems and the ethos of time. These shifts occur not exclusively in the west but also in the east, particularly at places experiencing industrialization and densification of their urban environment. Globalization brought this new spatial order of cities. Cities are also defined along the lines of culture, function and status, although in the pattern today it is in many ways the combinations of these divisions (Marcuse & Kempen, 2000). Emphasizing locality, which gives identity and meaning to the public space, is not enough when cities evolve rapidly in the global economy.

The primary motive for making or remaking social and public spaces should always be viewed with the changing panorama of public life. Demands change with the rising complexities and contextualization of life and place. Sub-urbanization brought upon the identification of the shopping mall as the new centre for public life, diminishing and degrading the life on the street (Gottlieb & Glaeser, 2006). For the suburbanites, the backyard, the high-school playfield or tennis court, and the remaining undeveloped countryside have replaced the public park as a setting for family relaxation, while the television and recording machines have tended to keep the family at home, even for entertainment. Still, this is not to say there is no concept of social and public life in the suburban areas (Marcus & Francis, 1998). Socializing still happens but it does not relate to the same traditional relationships to places like streets and squares. In the suburban neighbourhoods, communal life occurs in the local Parents Teacher Association, church or temple, shopping centre and neighbourhood street corner (Marcus & Francis, 1998). On a weekend basis, even barbeque parties in garden backyards are also an event for socializing.

This is the striking new face of social trends that need understanding and observation; for, in the evolutionary context of time, society gives new and different meanings to social and public

places. The suburban context is one such example narrating why evolutionary needs are important in designing social and public spaces. According to Marcuse and Kempen (2000), cities evolve and within their structure cities shape their lines of function, needs and technology. Though it is argumentative to say the suburban city is not a prime example of a good city, the typology should not be abandoned but furthermore understood. The concept of good social and public space is not exclusively a fundamental product of the traditional European method. It is by understanding how societies inhabit cities, making the structure of their city, so their value of public life gives all the good qualities the city. And that is undeniably the success of many European towns and cities, for it addresses their complexities and contextualization of life and place.

While many urban settings represent bad case scenarios of high-rise social ecologies facing threat to social meltdown, Singapore on the other hand is experimenting with this concept of elevating its civic realm into the sky. The Housing Development Board (HDB), Singapore's main provider of housing aim to make even higher residential developments with new design strategies and tools that target social sustainability within the high-rise ecology. Singapore, more than any city and nation, recognizes the need to a sustainable growth managing its concentration of population through high-rise density (Yuen, 2009). In 2001 the Pinnacle @ Duxton Public Housing Competition was launched by the Urban Redevelopment Authority of Singapore. The competition highlighted the need for the inclusion of social spaces, particularly open and semi-open spaces, to be inserted in the high-rise development as a prerequisite new model. With the densification of the central district as the financial and commercial hub of Singapore City, the Singaporean Urban Development Authority (URA) recognised the need of people living in these districts highlighting the need of the concept of living cities. The project was built as a form of residential complex consisting of seven 50-storey-high residential towers linked by continuous sky-bridges on two separate levels. Each block consists of 264 residential homes spread into six units on one floor template. More importantly the two levels of sky bridges are designed as social spaces.

The project also considers making the public realm on its ground floor plane in a form of a neighbourhood park. The park is elevated three stories high to create a space that protects the settlement from the streets. It is not enclosed entirely but opened at strategic hotspots that connect with the existing urban network, allowing permeability into the ground floor plane around nodes that have been demarcated as social places.. Pinnacle @ Duxton was awarded Best Tall Building Asia & Australasia Winner in 2010 by the Council of Tall Buildings and Urban Habitat (CTBUH). CTBUH cited Pinnacle @ Duxton as:

"A big step forward in rethinking residential design, this massive development manages to be light, highly efficient and well integrated with its surroundings. All the more impressive is that the project was able to accomplish such a high level of execution and the inclusion of so much public space within the constraints of a public housing project. Very rarely do you see such success in making a public housing project a clear architectural statement"

Pinnacle @ Duxton presents a thought-provoking case investigating social and public spaces in residential high-rise development. This project resurrects fresh debate in the concept of 'streets in the sky' to a new level. This provides a fascinating experiment in high-density living and how we can make quality design in urban spaces on the evolving post-industrial form. Empirical analysis and data concerning high-rise living summarize better living conditions in high-rises can be achieved if the designs are adaptable to social and community value (Whitzman, 2001) .



Picture 1.1 (Left): The Pinnacle @ Duxton Public Housing project in Singapore. Picture source: Arc Studio Design, Singapore (2009).

Picture 1.2 (Right) Pinnacle @ Duxton model in the Urban Development Authority Gallery Hall.

4.0 Epistemology and Ontological Standing

This thesis purports knowledge and principles from the urban design dimension as necessary and sufficient considerations for making quality public realms in the high-rise typology. The design quality and successful public realm typologies are derived from both physical and social-cultural elements that provide the thesis theoretical proposition. The physical environment affects different reactions to human behaviour, with good or bad arrangements effectively influencing different levels of success while human behaviour inform how designers should approach designing social and public spaces (Marcus & Francis, 1998). The public realm is a forerunner to communal life. Social,

economic and political patterns of people living in cities affect how they shape social and public spaces within their realm. The impact of globalization in a Post-Fordist environment affects patterns of urbanization when choice is reflected by the progress of society through history by the operation of the economic forces. The outset of changed residential pattern affects the physical qualities of 'people places' in the urban environment. As the physical qualities of spaces changes so do the guidelines addressing the many specific typologies that summarized successful and less successful aspects of place making in urban design. This thesis emphasises towards understanding these new layers of social exchange as the means of creating new guidelines for making social and public spaces in residential high-rises. Studying social exchanges in high-rises is rare, for few opportunities are open by design that has a purposive public realm in the typology. The central concept to good public and social spaces design is in its response by the intended users. Historic precedents mostly established successful examples of social and public spaces in the urban form. Many past precedents were established in contexts where societies operated traditionally as they went to the market square for food, gather for water at village water pumps or linger in front of the court house to hear the news (Carr et.al, 1992). In the modern world, these activities were done in the privacy of people's own homes. Nonetheless, the need for public life is still there, although there are changes in the form of the activity. Public life has not disappeared but evolved. According to Marcus and Francis (1998), public life in the modern world is a whole new category of outdoor spaces that assume their importance as communal spaces did that were shared by settlements in the historically. They address a variety of new outdoor spaces such as those that are publicly owned, managed and accessed, those that are privately owned, managed but accessible to the public and, finally, those that are privately owned, managed and are only accessible to a specific group of users. These conurbations of new public places represent our new landscape for social public spaces often built in the modern urban world.

The past 20 years have witnessed global reconstruction of economic, political, social and cultural practices which had a profound impact upon the nature of public life (Bell & Jayne, 2004). In the post-industrial era, the economy is based on the interrelated production of such economic and cultural symbols within the spaces they are created and consumed. Sociability, urban lifestyles and social identities are not only the result of this change, but also the raw materials of the growth of the symbolic economy (Zukin, 1990). It is also the symbol of a newly evolved concept of living. High-rise and tall buildings are the symbols of these changes, with people more willing to live in high-density areas close to urban facilities.

This research recognises the opportunity of high-rise structures becoming an alternative choice among many other sustainable typologies. High-rises present one option of many, addressing

creative and innovative ways of solving urban design challenges. The problem bearing any disadvantages of the high-rise typology to social and public space design is by historical precedent too deterministic. Its ideals tend to fall into a theoretical trap; it does not fit into context. Debates on high-rises are divided between those who believe that the typology of concentrating population through high density with the combined economies is a sustainable option, while others argue that the embodied energies involved in construction impacting on the urban realm is anti-environmental (Wood, 2007). Wood (2007) explains the cases 'for' and 'against' high-rise and tall buildings design in the table below.

Case 'against' tall buildings—according to Roaf <i>et al.</i> (2005)	Case 'for' tall buildings—according to the author
Higher embodied energy in constructing at height—structure, materials, etc.	Denser cities = reduced transportation (and consequential impact on environment)
High energy consumption in operation—elevators (up to 15% of building energy use), services, etc.	Efficient land use in population concentration = reduced suburban spread/loss of countryside
Higher energy consumption for both maintenance and cleaning (e.g. replacement of façade silicon joints)	Concentrated cities = reduced size of infrastructure networks (urban/suburban, power, services, waste, etc.)
Impact on urban scale; wind downdrafts, overshadowing (solar rights), wind rights, right to light, etc.	Proximity of residence and workplace = less travel time (less wasted time?)
Overpopulation in certain localities/greater demand on existing urban services and infrastructure	Greater potential for mixed use = less travel time, less duplication of building form/resources
Antisocial internal environment—lack of open, recreational, communal space (especially in residential)	Standardization of floorplates and use of materials = material (prefabrication?) efficiencies
Greater wind loading at height (impact on size of primary structure, façade design, etc.)	Higher wind velocities at height = greater potential for harnessing wind energy
'Sealed' environments at height; requirement for air conditioning, artificial lighting, etc.	Higher atria/volume of space = potential for natural ventilation through increased 'stack effect', etc.
Less net usable area to gross area and restrictions on internal planning; vertical circulation core, etc.	High 'thermal mass' = potential for use in natural ventilation/heating/cooling strategies
Safety and security fears (especially post 9/11)—including safety during construction	Long, narrow floorplates = potential for good internal daylighting (and thus reduced energy)
Low ratio of external building surface area per floor area—impact on potential for solar arrays, etc.	Space in the sky = potential for 'secure' communal/recreational spaces, away from traffic, pollution, etc.
Implications of power failure (impact on vertical circulation, safety, etc.)	Potential for more efficient energy production and distribution systems
Increased travel time (wasted time?)	Urban densification adds value and vitality to cities
People suffering from vertigo—building occupation/human rights legislation?	Urban signposting/wayfinding
Recycling potential/urban impact of demolition/disposal of materials after demolition	Increased access to view, light and air at height

Table 1.1: This table illustrates the case 'against' and 'for' tall buildings on sustainable credentials. Table source: Wood (2007).

Table 1.1 brings forth a stimulating debate between choices 'for' or 'against' the typology. The debate 'against' paradigm suggests the difficult scenario high-rises faced in making their typology socially sustainable. This research stipulates that research unravelling these trepidations is important as they present numerous arguments highlighting the imperfectness of the typology. It is an imperfection that needed to be corrected; likewise, in the case 'for' them, high-rises are needed

in settings with no option but to go vertical. Negating findings from design faults could assist the evolution of becoming sustainable settlements. These public and social spaces are social infrastructure. Social infrastructure implies an essential means of service relevant to social organization, and it is a principal determinant of the nature and extent of social sustainability (Ali & Armstrong, 2008). To evaluate the success of social infrastructure in a human settlement is to verify its quality, in both physical and social-cultural aspects. This thesis proposes a study into an anthology of a case study of a high-rise ecology with the after-effects of globalization that affectively evolved the typology. The study derived from this research is pragmatic as it uses methods to validate the use of spaces purposely built as social places in high-rise buildings. The social spaces in the Pinnacle @ Duxton are in correlation with similar qualities of other urban spaces derived from social infrastructure needs nominally found in other urban developments. The empirical question is, **'how can this urban typology be on the winning side of the development and planning?'** By considering the range of factors and processes indicating how residential communities can effectively create successful cities, urban design is the main principle leading to the creation of good cities. Urban places are social spaces and good social spaces create good communities (Carmona et al., 2003). Successful residential high-rise buildings need good social and public spaces. Urban design theory and practice provides answers to how social public spaces can be designed through an open framework, rules and guidelines. Spatial change within cities in the Post-Fordist era is different. Therefore, through an open framework, **how can the urban design principles fit and be applied into this context?** This foregoing discussion therefore concludes the research's main underlying question, **'how can successful urban social public spaces in residential high-rise buildings be designed?'**

Historically, tall buildings have been primarily dictated by commerce and pre-occupied with their role as stand-alone isolationist pieces of sculptural urban imagery (Wood, 2005). Nonetheless, many of these structures are becoming more apparent in high-density cities ever competing for land that is becoming scarce. The question is, **can we make the high-rise buildings in the future a self-sustaining settlement simmering with vibrant, confident and culturally living places for communities?**

5.0 Structure of the Thesis

Succeeding this chapter, Chapter 2 shall present further discourses in explaining the case for public spaces as urban places in high-rise typology. It will introduce the possibility of high-rises as a positive urban future in the post-industrial urban form. It also perpetuates the need for planning sustainable cities and the high-rise position in the new archetype.. A discussion about the high-rise typology concerning its standard approach culminating into its critiques and issues shall enlighten

the case for the typology. Chapter 2 shall end with a conclusion highlighting the challenge in humanizing the high-rise typology with issues central to the case of this thesis and the introduction of the case study: The Pinnacle @ Duxton in Singapore. Chapter 4 highlights the anthology of Singapore's urban singularity as a high-rise city, thus concluding how it affects Pinnacle @ Duxton nominally being the case for finding good practices of making social public spaces in the sky. Block (2008), Marcuse (2002) and Thompson (2000) all described how urbanism with the after-effects of globalization generates cross-flows of capital, culture, people and information which affectively evolved urban patterns and spaces. Social groups living in places under this process of intense globalization will be influenced by changing worldviews, social relationships and networks that create and reconfigure new social spaces to suit their changing needs. Adapted from Castells (1978), capitalism and the city growth theory; the narrative will be in four stages of a city's rise to globalization pairing it to the growth of high-rise housing in Singapore. This chapter describes the knowledge to which these shifts added impetus to justify and reconstruct hereditary government intervention, economic transcendence, political relationships and social mobility that stewards the decision to make sky-high social public spaces in high-rise residential blocks.

The fourth chapter is the justification of the importance of the case study as the research methodology for this thesis. Like other qualitative research methods, the way of investigating an empirical topic is governed by a set of pre-specified procedures. This chapter will present the articulation and justification of these procedures in validating the empirical inquiry for charting good and bad practices of making social spaces as urban places in residential high-rise buildings. Chapter 4 will further articulate the case for Singapore and its site, the Pinnacle @ Duxton high-rise housing settlement. This chapter shall validate why Pinnacle @ Duxton is the mitigation between urban design and high-rises in having the necessary and sufficient data for considerations on justifying good attempts of making quality public realms in the high-rise typology. Chapter 5 is the main core as it investigates the evaluation of the third-floor sky deck as a neighbourhood park. It is a post-occupational analysis derived from Marcus and Francis's (1998) guidelines on how to design good neighbourhood parks by the functional dimension found through urban design. Chapter 6 focuses on the evaluation of the 26th and 50th floor sky deck as a collection of social and public spaces in the settlement. Both floors area collection of 'seven mini-parks or vest-pocket parks' (Marcus & Francis, 1998) inter-connected by a continuous pathway from residential block A to G. It is a study on how these spaces work using post-occupational analysis on the basis that these spaces are similar in characteristic to mini-parks or vest-pocket parks. In conclusion, Chapter 7 constructs the considerations of good and bad practices on making quality public realms in the high-rise typology.

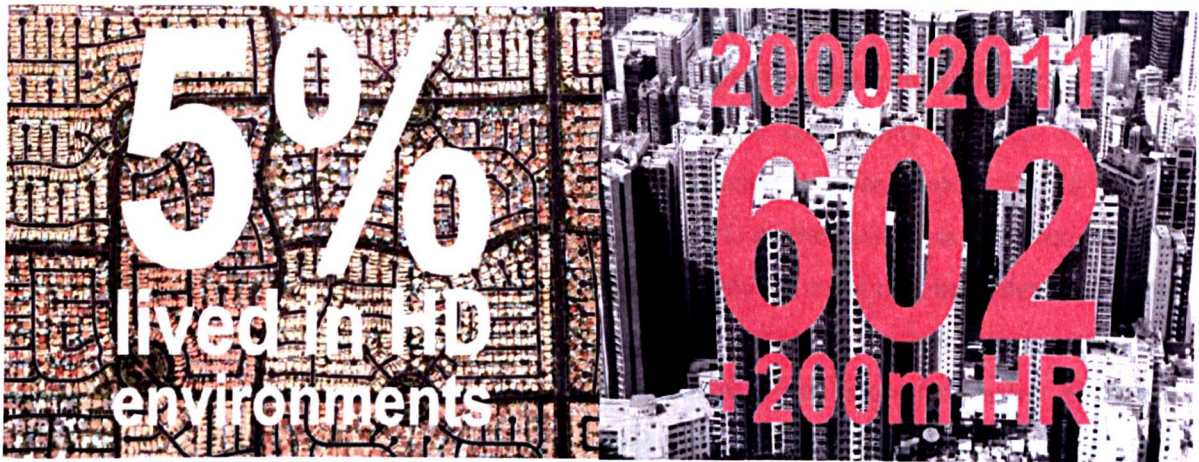
CHAPTER 2-URBAN FUTURES: THE HIGH-RISE & THE CHALLENGE OF MAKING THE PUBLIC REALM IN THE TYPOLOGY

2.0 Introduction: Urban Futures in High-Rises

The United Nations (2007) predict that 2.8 billion people will move into already densely built cities over the next 40 years. This will put an enormity of strain onto the existing urban fabric of cities, enforcing expansion and growth. Land use in the near future needs to be thoughtful not only for urban expansion but also the need for agriculture. What is apparent is establishing sustainable growth through many approaches in designing the built environment. The widespread agreement among climatologists today is that human activity is the principal contributor of climate change through the burning of fossil fuel (Smith, 2005). The biggest correlation between the burning of fossil fuel and human activity is from the use of automobiles in vast metropolitan and sub-urban areas (Smith, 2005). The determining factor contributing to this is from the looseness of land use in organization to planning that focuses on private transportation usage.

'The more sprawling and disconnected that houses are from workplaces and shops, the more miles and hours individuals must travel to get from one place and another. If there are no reasonable convenient or affordable alternatives to driving, all those hours of travelling will be spent behind the wheel of a car' Ewing and Kreutzner (2006), p21.

Increasing the density of cities is a necessary option for managing sustainability in urban expansion. Prospects are already looming for Asian megacities of 20 to 30 million people early next century. The difficulties however are the appropriate models and tools to plan sensible quality environments for these growing urban populations. Essentially, the concentration of people in denser cities by sharing space, infrastructure and facilities offers greater efficiency than expanding horizontally. Expanding horizontally would require more land use as well as high energy expenditure in infrastructure and mobility (Wood et al., 2012). The architectural characteristic of tall buildings is a consideration of increasing density in cities. It is a viable solution for urban centres in developing countries such as China or India. Nonetheless, the full implication of its adaptation into the built environment still lacks well-established bodies of theoretical and empirical knowledge studies. Moreover, in the developing world, building is like an uncontrollable speed of events. Its impact on sustainability is more likely to be greater than any other metropolitan area around the world.



Picture 2.1: 5% of the world's population lived in a high-density environment as compared to suburban areas. In between 2001-2011 602 of the world's tallest high-rise buildings were built in Asia. Adapted from CTBUH (2012). Picture source: (Koolhaas, Boeri, Kwinter, Tazi, & Obrist, 2000).

In confrontation to their potential future, high-rises also present the danger of implicating new problems in their typology. A smaller surface area per floor may limit contact between the occupier and the envelope, affecting natural lighting, view and ventilation, possibly leading to a lower quality of its internal environment. Worst, the effects of over-crowding create tension and social inclusion amongst its inhabitants, leading to psychological disorder and discomfort. These factors have already been proven by numerous literatures and studies as a contributing factor against the typology as a sustainable option in the urban environment (Newman, 1972; Conway & Adams, 1977; Stokols, 1978). More often these problems negate the huge disadvantage of choosing high-rise as an option for building cities when famous historical examples of its failure come to light from the Pruitt Igoe settlement in St Louis, USA to the Park Hill Development in Sheffield, England. Research presented by Newman (1972), Odeleye and Jogun (1983) and Whitzman (2001) is not disputed by its validity in narrating high-rise failure operating within the social realm. While examples drawn from the West and Africa have a myriad of papers presenting its disadvantages, the East is operating successfully by adapting the high-rise typology in its cities.

Cities like Hong Kong and Singapore are both high-rise cities with more than 80% of their urban population living in this typology (Yuen et al., 2003). Places like Singapore present a threshold stewarding the typology of not all myriads of its sustainability factors but the least from a social perspective that long haunted high-rises rise as a dominant choice of urbanity. There is no precedent in human history for the scale on dealing with making cities use the high-rise typology. It is therefore up to architects and planners to ultimately explore and experiment beyond the technical, functional and environmental responsibilities to identify new forms of sociability and of social public relevance that makes up new spaces in the new economy.

The ideal situation for any high-rise model to achieve sustainability is first to be liveable, healthy and able to sustain complex mechanism communities flourishing in the typology. Energy, engineering and economics that make up other sustainable creditability are also undeniably important though in making a successful human settlement; these factors should always complement social sustainability first (Ali & Armstrong, 2008).. As the awareness and importance of sustainable architecture increases, environmental responsibility must not only be understood in the context of carbon footprints and green building but equally how to integrate buildings into the social and cultural context to generate truly sustainable scenarios in the future (Scheeren, 2012). Tall buildings and high-rises are justifiably the key component in accommodating population growth, it is important that their potential offers solutions to the unavoidable problems society faces.

The problem facing any underlying society in urbanity is its social and public space. Urbanity describes a city of its form, activity, street life and urban culture. Good urban design is the sum of all these characters in making spaces for communities to thrive and prosper in the city. The success of any city depends on how well architects and planners make places for communities to perform their life, activity and culture in the city. Therefore, place making is the dominant concern of urban design. In order to make 'place' in the high-rises we must first ask what are the conditions and criteria known to recreate similar qualities from a known horizontal to a vertical setting. It is not to look for what makes the places successful in urban design but to understand why they are successful. Moreover, given the numerous bodies of theoretical and empirical knowledge in urban design, knowing which body of knowledge is suitable for making social and public spaces in high-rise buildings is important. Sherman (1998) asserts that all good examples of urban places have a structure and an underlying dynamic of activity to be understood and uncovered.

2.0.1 Post-Industrial Future: Ecological Postmodern

The high-rise is a product out of the evolutionary forms that have been emerging significantly from the pattern of land values and social geographies. It is an inherited product of the post-industrial form. The spatial relationship that builds the foundation of many urban design theories is formed from the necessity of urbanity precipitated from the Industrial Revolution. The industrial revolution encompasses the means of transport by horse or foot. This in effect created a close spatial relationship between residences and workplaces, thus identifying the character of neighbourhood within the industrial cities (Carmona et.al, 2003). Initially the introduction of mass public transport in the early 19th century enabled cities to expand, permitting the decentralization of residential land use within the city centre. Residential buildings were able to be built further away from city centres as the privatization of cars diluted the close relationship between residences and workplaces, separating them into two different entities. Still, pre-war cities, especially in Europe,

have maintained classical inherent qualities of neighbourhood, quarters and city-within-a-city characteristics. Growth is still dependable on mass public transportation, nominally the railway services.

The post-Second World War era led to high levels of suburbanization enabled by the growing middle class spending power as a growing class. The increasing car ownership led to the building of a new infrastructure, mainly highways and motor roads that replaced the dependency on the railway system that served the city (Carmona et.al, 2003). This process decentralised as the inner city people moved outside of the city. The traditional identity of neighbourhoods echoed by the close relationship between work and home was replaced by swath zoning of housing, commercial and industrial estates. Business, home, work and leisure have all now become different entities. The effect of this is massive decentralization. Though decentralization differs from geographical locations as America, Japan and Australia experience massive sprawling and suburbanization, Europe by contrast has tended to involve both suburbanization of larger cities and growth of smaller towns and villages due to the imposition of green belts, heritage and preservation laws (Breheny, 1997). This is the 'Fordist' City, a city built by means of private transportation and enterprises.

The effect of this suburbanization greatly dilutes the heterogeneity of cities in function and form. Affectively, various layers of land use and functions that build the compactness of cities decline, leading to the decentralization on inner cities. The transformation materially changes the form of the city, opening scattered growth and removing the necessity of being close to the city. Services, business and industry begins to locate itself between the inner city and its periphery. This evolution creates 'Edge Cities', as coined by Garreau (1991), where the concentration of jobs and services are pulled away from city centres as suburbanization pushes deeper into brown and greenfield sites. The central business districts continue to lose their competitiveness; moreover, they lose their accessibility due to choked transportation between residences and workplaces (Fishman, 1987). Ultimately this urban setting is to blame for raising concerns of carbon emissions created by intense use of private transportation set by the loose low density and land use in the Fordist City (Ali & Armstrong, 2008).

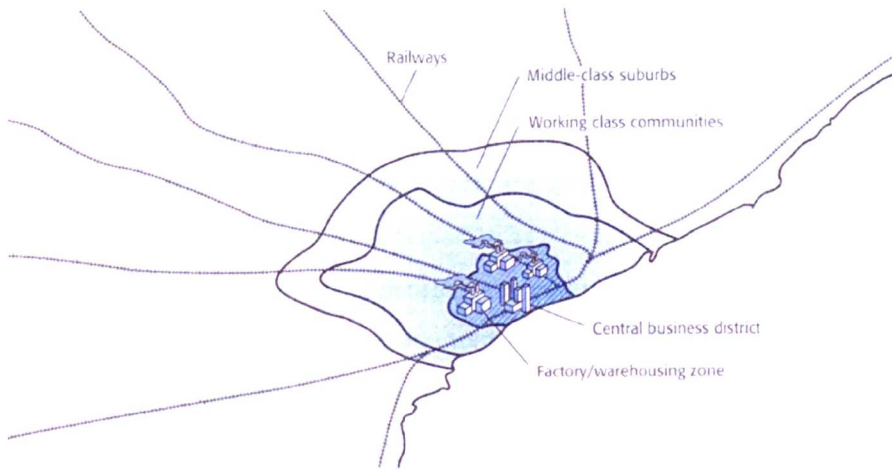
The major contributor to this pattern of growth is the car. Hence the reason why urbanity in the post-industrial period coined the term 'Fordist Cities' in honour of the Henry Ford Company of Ford Motors that made private cars affordable, breaking free people's dependency to rail centres and corridors. Cars became a necessity for both society and individuals such that the urban environment in the Fordist Era is built around them.. By the end of the 1980s, planners and architects were beginning to realise that the Fordist City were becoming increasingly monoculture and ecologically unsustainable. Worst, it is affecting the economic sense on managing cities on a

sustainable scale. The information age came as a consequence of cities evolving from industrial to post-industrial. The development of the information age changed economic and living patterns that shaped much of the Post-Fordist urban worldview. While patterns of urbanization were completely separated between home and work, the digital age brings both together. The necessity of commuting is blurred. Urbanity in the digital age is the case of 'urbanity by choice' not 'urbanity by necessity' (Carmona, Heath, Oc, & Tiesdell, 2003). Necessity has been the governing body that made people flocking the railway belts to commute into the city during the industrial age. In the Fordist age, the necessity is to move outside because of land, health and escaping density created sprawl.

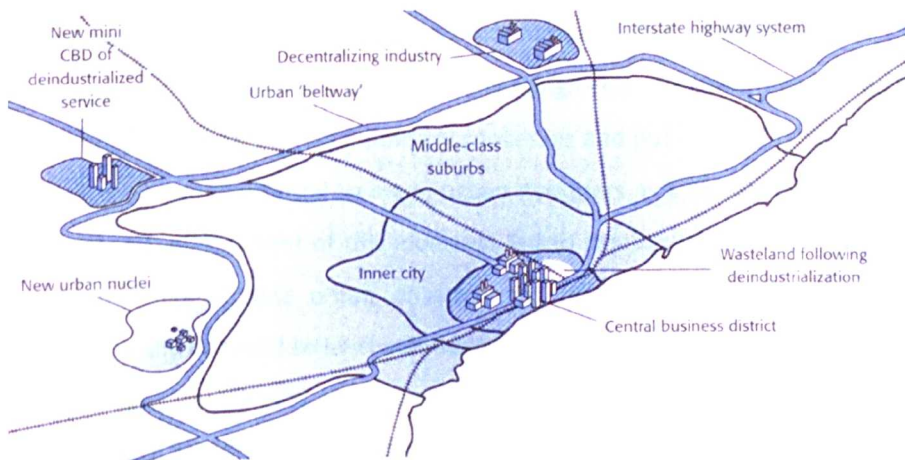
The information age reduces the need to expand horizontally.. What it creates is a myriad of urban choices that people could choose to live with. The results create many clusters of residential patterns from protective enclaves to high-rise citadels. Spatial concentration of urbanity began to grow out of lifestyle choice.

'There is a new spatial order of cities, commencing somewhere in the 1970s, in the period often described as one of a globalizing economy. While cities have always been divided along the lines of culture, function and status, the pattern today is a new, and in many ways deeper going, combination of divisions' Marcuse and Kempen (2000), p3-4.

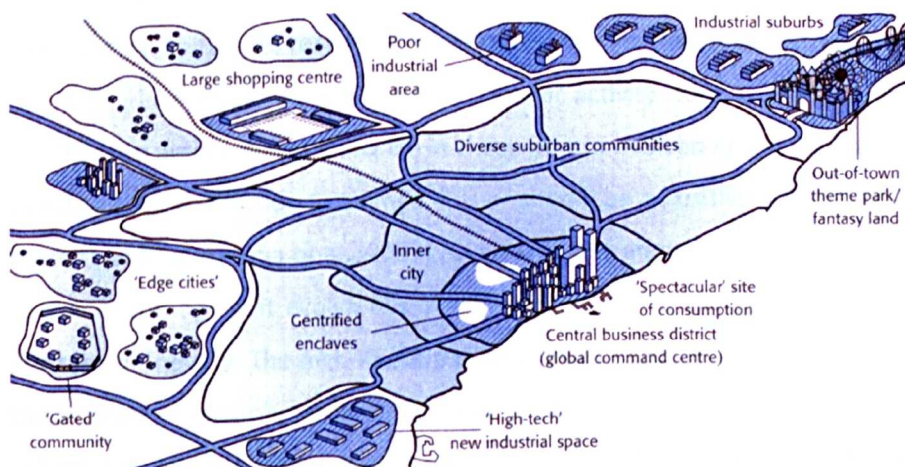
Marcuse and Kempen (2000) hypothesize that arguably the new spatial order in the information age (global economy) is representative of lifestyle choices created from the market economy. The market produces and reproduces these choices, subsequently forming the new urban environment of cities. The formations of these new urban environments are many. Each form of urbanity has its own problems, potential and geographical standing in the city. Most importantly these entities do not exist as an independent entity but part of the larger city. The myriads of issues and arguments on these forms of Post-Fordist urban patterns presents daunting cases as to how each context should be approached in order to facilitate its success. It is the representational image of our contemporary urban world that exists now.



Picture 2.2: The industrial city form. This form encompasses means of transport by horse or foot. This in effect created a close spatial relationship in between residences and workplace. Urbanity expanded by links of public transport nominally along the railway belt. Picture source: Carmona et al. (2003).



Picture 2.3: The increasing car ownership led to the building of a new infrastructure mainly of highways and motor roads that replaced the dependency in the railway system that serves the city. This process decentralised the inner city: people moved outside of the city. Picture source: Carmona et al. (2003).



Picture 2.4: The information age reduces the need to expand horizontally. A myriad of urban choices was created that people could choose to live in. The results create many clusters of residential patterns. Spatial concentration of urbanity began to grow out of lifestyles choice. Picture source: Carmona et al. (2003).

The complexity of the Post-Fordist metropolis is synonymous with tall buildings ostensibly found in the central areas of the city. If not central, high-rises are located within the urban sphere of the city closely knit into the larger networks and interfaces among other typologies. Cities like Paris (La Défense) and London (Canary Wharf) are good examples of this as both do not have high-rises located in the central location but operate as a central business district. High-rise became a defining element of the Post-Fordist landscape. Any central business district would not be complete if not identified with monumental streetscapes of towers. The Post-Fordist landscape presents a good opportunity for high-rises as a typology to reinvent itself to be more attuned to the third period of modernism (see Table 2.1). As the world turned towards climate change and sustainability, high-rises are in favour to relieve expanding urban areas from encroaching into other needs of ecology. The growing new global economy further supports the high-rise as living choices became more varied and were no longer a burden by commuting that shaped cities in the first modern period, although from a sustainable standpoint, the high-rise remains a negotiated territory. It is a juggling act between private interests, political processes and public good. The subsequent image of pre-war Europe serves fundamental to many urban designers as a pivotal idealness to a perfect urban form. The underlying argument of this idealness led to establishment of a New Urbanism Charter that set to change the current urban environment reverting to the natural vernacular state that is philosophically believed to be sustainable (Katz, 1994).

High-rises should be taken into consideration in positivity as traditional approaches to urbanism are limited in their application, especially when dealing with density. Without succumbing to one pro-choice of living, high-rises should be looked upon with opportunity to explore urbanity with choice on a presented case of geographies limited for land expansion. The contemporary expansion of the urban form is not secluded to one choice of typology. Noting how the Post-Fordist metropolis is shifting to residential patterns that can sustain focus growth, crucially there is the need to create place where people of such economic activity want to live and socialise. 'Place' and social facilities are assets to sustaining life in these new or evolved residential patterns. Urban design is not simply a passive reaction to change. It is or should be a positive attempt to shape change and make better places (Carmona et al., 2003). Central to this argument is 'how' to recreate social and public spaces in settings that evolve out of different economic backgrounds that create these residential patterns in the city. The high-rise is a predominant factor in any attempt to compact the city under the motives of environmental sustainability, although there are also other motives that need to be looked into, like social sustainability. Social sustainability in urban design is about making change to make better places. In humanizing the high-rise therefore its future design needs to work successfully, to be people-friendly and to have a positive environmental impact.

	The First Period	The Second Period	The Third Period
	Modern	Deconstructionist Post Modern	Ecological Post Modern
Meta-Narrative	Salvation and Progress	None(They are all power plays)	The Cosmological Unfolding
Truth Mode	Objectivism	Extreme	Experientialism
World	A collection of Objects	An Aggregate of fragments	A Community of Subjects
Reality	Fixed Order	Social Construction	Fragmented
Sense of Self	Socially Engineered	Fragmented	Processual
Primary Truth	The Universal	The Particular	The Particular in Context
Grounding	Mechanistic Universe	None(Total Groundlessness)	Cosmological Process
Nature	Nature as Opponent	Nature as a Wrong Object	Nature as Subject
Body	Control over Body	Erasure of the body' Its all social construction	Trust in the Body
Science	Reductionist	Its only a Narrative!	Complexity
Economics	Corporate	Post Capitalist	Community Based
Political Focus	Nation State	The Local	A Community Of Communities Of Communities
Sense of Divinity	God The Father	Gesturing towards the sublime'	Creativity in the Cosmos, ultimite mystery
Key Metaphors	Mechanics and Law	Economics	Ecology

Table 2.1: Adapted from Buchanan (2012). The three stages of modernism and its key measurement. The high-rise is entering the third age in its exploration parallel to modernism itself. This table justifies the third evolution of high-rises and its key measurement of exploration that this thesis seeks to explore.

2.0.2 Public Spaces Urban Places

Where do we begin in attempting to humanize the high-rise? It is by philosophical hypothesis that settlements flourish and prosper with social infrastructure by the existence of social and public places (Carr et al., 1992; Carmona et al., 2003). Place making plays an important role as the key for social sustainability of urban life in this typology.. The principle of understanding the sense of place is divided into three: first by emphasizing on the physical architectural setting, second is the psychological conception bound by mental maps of way-finding and memory of urban places, and third the study of activities that give life and rigor to the space. It is within this concept that successful urban places must combine all three qualities. This basic concept is best visualized by (Canter, 1977) in his figure of the nature to places.

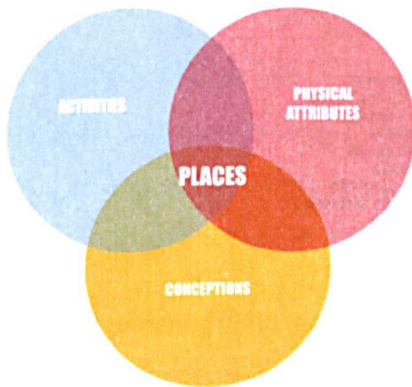


Figure 2.1: A visual metaphor for the nature of places. Source: Canter (1977) 'The Psychology of Place'.

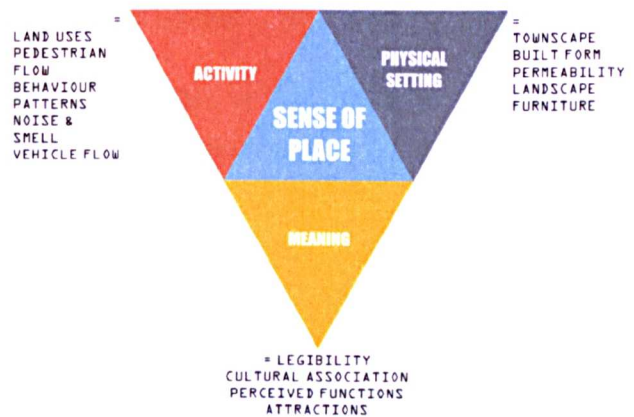


Figure 2.2: Components of a sense of place. Source: Punter (1991) 'Participation in the design of urban space', pp24-27.

Canter's (1977) conceptualization of place does not detail what are the kind of attributes to physical, concept and activities. Punter (1991) reinterprets these attributes into detail components of measurements found and used in architectural and social realms. Punter's (1991) conceptualization details that the physical settings are architectural assessments to build forms, meaning (replaced from conceptions) they are the psychological assessments to place while activities are events of behavioural patterns. The concept to sense of place is achieved by combining these three settings of meaning, physical setting and activity. A much detailed conceptualization of place is represented by (Montgomery 1998) who elaborated the three categories into activity, image and form. Montgomery (1998) clarifies form as scale, intensity, permeability, landmarks, space to building, ratio, stock, vertical grain and the public realm. Activity is grouped into an array of measurements from street life to pedestrian flow. Image is further expanded to cover areas in

cognition, perception and information. In short, these are the attributes of the built form that give good physical setting places in towns and cities from urban design.

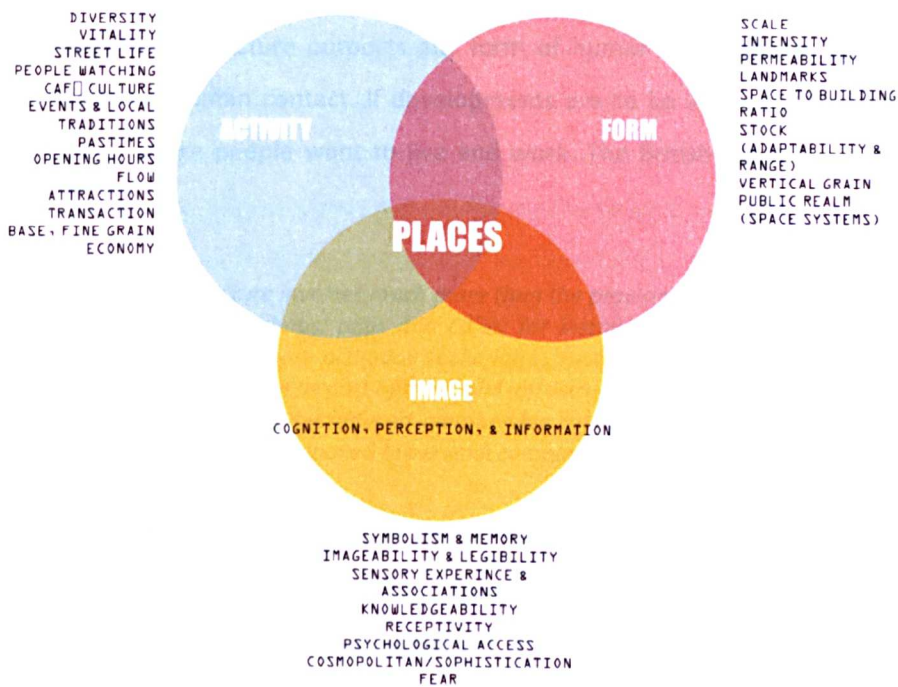


Figure 2.3:
Policy
directions to
foster an
urban sense of
place (or place
making).
Source:
Montgomery
(1998).

Montgomery (1998) asserts the existence of public life is prerequisite to the physical structure of public spaces. Every society has some mixture of public and private space; the emphasis given to each one and the values they express help to explain the differences across settings and culture. Key measurements presented in 'activity' are interrelated to 'form' and 'image'. From this thesis's philosophical standpoint, measuring 'activity' is a key proponent in offering good and successful design recommendations for making social and public places. A basic premise is that public places should be responsive. It should be designed and managed to serve the need of their users. With this, people will create strong connections to the place in their personal and community lives. The investigation in creating places using activities as a key proponent for measurement is defined by authors like Marcus and Francis (1998) from their publication *People Places: Design Guidelines for Urban Spaces*. *People Places* (1998) believes that public life is thriving in the contemporary industrialized city, and it is used as an important measurement for success. Form and image of the design of the public place will determine the popularity of its use. Potentially these factors in designing public places can be used as a measurement to design social and public places in high-rises. What is currently known in literature on designing guidelines or systematic compilation of behavioural analysis is usable for place making in high-rises. The current advancements in high-rise designs are not short of creative ideas on social public places in the sky, though none exists built on

performance related analysis. Most new developments are built under assumptions on prescription based spaces rather than a reminder of what seem essential to encourage use. How do public and social spaces in high-rises correlate to measurements found in urban design?

Social infrastructure purports any form of human settlement is always in need of lists of spaces made for human contact. If developments are to be viable in the long term, they need to create places where people want to live and work. The British Property Foundation (2010) states that:

'Social infrastructure involves much more than the provision of core public services such as schools and hospitals. The provision of shops, pubs and cafes, for instance, can be just as important to the long term sustainability of an area as more orthodox social infrastructure facilities. Semi-public facilities such as private leisure centres can also be seen as part of the social infrastructure mix, particularly where more inclusive access to them can be achieved (e.g. by reduced membership rates for local people). The provision of good quality public space is also an often overlooked but crucial component of successful communities' BPF (2010), p2.

Taking the range from social and economic conditions of the post-industrial form (Post-Fordist) many prefer the predictability of social life in their neighbourhood park, campus courtyard or office building plaza to the strangeness of a town plaza. Marcus & Francis (1998) listed seven types of communal spaces in relation to the post-industrial urban landscape. These types of communal spaces are neighbourhood parks, mini-parks, urban plaza, campus outdoor space, elderly housing outdoor space, child care open space and hospital outdoor place. These following definitions of new places are synonymous with the new post-industrial urban landscape. High-rise settlements in the post-industrial era usually consist of user groups predominantly of the nuclei family with children and teenagers. There are also a small number of elderly people living together with the nuclei family. For this reason, in emphasizing urban liveability for social sustainability, theories and recommendations on open social spaces presented by Marcus & Francis (1998) correlate with attempts on making public places in high-rises. Using design measurements offered by post-occupational research on neighbourhood parks, mini-parks and elderly spaces are assessment criteria on social public spaces in residential high-rises. This correlation is also based on emerging contemporary developments in residential high-rises in the third modern age (see Table 2.1) that attempts to meet the needs of the community.

2.1 Design Critiques and Issues

The early modern measurements to building high-rises juxtaposed the typology in an image of health and hygiene. Throughout the early modern movement, high-rises were built with this measurement culminating into many public housing projects built in Western Europe. Coupled with the pressure of urban expansion and a burgeoning post-war economy, the typology became synonymous with the Modern Movement. It spanned a style later dubbed the International Style, as its measurement to design is adapted monotonously around the world into many geographies and local contexts. Moreover, high-rises became the symbol of social housing. In 1949, the Housing Act in England paved the way for Municipal Councils and Local Authorities to provide housing types for a wide range of communities. The Housing Act focused mainly improving working class living conditions from dilapidated slums built in the pre-industrial period. In the socialist post-war architectural atmosphere, many praised Le Corbusier's Unité d'Habitation proposal for "putting clean and healthy housing in a parkland setting" (Colquhoun, 2008).

2.1.1 Case Examples

Between 1950 and 1970, this idealism was widely adopted in cities as part of an expanding programme of urban renewal. High-rise housing made a huge impact in housing and which Britain and France made burgeoning efforts in building them (Foges, 2013). Designed by Jack Lynn and Ivor Smith, Park Hill dominated the Sheffield skyline after it was completed in 1961. Park Hill may not be a high-rise but its credentials merit the idealism of a vertical city championed by Le Corbusier at its beginning with the strong reference to 'Streets in Sky'. The project is signified with its bridge-linked chain of slab blocks that snakes across a 32 acre sloping site that constitutes a single building of 1,000 apartments. The block has an outdoor corridor dubbed 'streets in the sky' that occurs on every three stories serving each duplex at deck level and above (Hollow, 2010). Park Hill carries all the credentials listed by the Charter from sanitary measures to vast swathse of park land readily available on its ground plane. It was initially liked but fell into disrepair and was plagued by crime and social disorder. Post-industrial decline in Britain between the late 1970s to 1990s brought further social problems such that it was later coined as a failed experiment. Similar circumstances followed other social housing developments at Trellick Towers and Robin Hood Gardens in London (Foges, 2013). In France, a similar disposition led to the failure of the Bois Le Prete apartment block built in 1961. Similar to Unité d'Habitation, this block had recessed balconies and was situated in a large park just outside urban Paris. The glass and aluminium walls were in direct response to the Charter's ideals of giving maximum penetration of sun and wind to improve health and sanitary levels in the building. Unfortunately, the cladding was poorly insulated and in wintery conditions the residents were subjected to freezing conditions and intolerable humidity in summer. Subsequently,

in 1980 the skin was replaced by insulated panels in an attempt to rectify this problem. The project shrunk the size of the windows culminating in the residential tower block becoming a defensive stature too foreboding to live in and not easy to approach (Foges, 2013).

The worst case example is chiefly the Pruitt Igoe high-rise housing complex in St Louis, USA. Another would be Hulme Estate in Manchester, England. Both were marred by serious construction and design errors culminating in the apparent demolition that was later referred to by postmodern architectural historian Charles Jencks as 'the day Modern architecture died' (J.S, 2011; Jenks, 1996). The consequences brought by this launched numerous critiques against the high-rise, particularly as place for social malaise far from its idealism as the answer for social improvement. Arguably, the cause of the failure is more complex than to be borne by architecture and planning alone. The measurements listed from the Athens Charter for building high-rises withhold the best intentions on improving the post-war conditions of cities. Unfortunately, the approach had been interpreted by its predecessors as being too shallow, succumbing to adapting literal aspects of its philosophy (Banham, 1987). Many, in trying to emulate Le Corbusier's ideas, only succeeded in encouraging social problems (Lund, 1996). High-rises in the first modern age were compromised from the outset by a combination of faults of local authorities advocating impractical architectural methods to design and construction faults that were frequently reproduced improper to geographical, economic and cultural conditions. In their hastiness to build a vast amount of high-rises for public housing, authorities forgot human conditions in the typology. A huge lack of understanding about the social consequences pertaining to detailed design features were ignorantly advocated in favour of shallow ideals of health and hygiene. Together, these oversights transformed many residential high-rises into detrimental places to live (Lund, 1996). The poor and superficial execution of these design decisions ruined the estimated benefits of the typology. The next sub-section lists these oversights brought by the first measurement of the Modern Movement.

2.1.2 Social Participation and Involvement

High-rise design in the first age of modernism treats its users in a relatively passive role often assuming them as incapable to be an agent in operation of the environment and as an instigator of environmental change. Spatial layouts were made similar throughout the settlement from industrial construction techniques, nominally of concrete and steel. It is by this belief that housing could be made for the masses in the first Modern Age. In affect this makes high-rise housing lacking in dialogue with its end users. The result from the uniformly-built construction techniques created a monotonous internal layout. The layout also meant that residents needed to adjust accordingly into their apartment unit. Still, undeniably, the industrial fixtures such as sanitary and heating do benefit residents in comparison to sanitary levels in the old terrace slums.

From a social standpoint, this is a fallacy. This homogenous approach in design creates neighbourhood environments that are monotonous. The dwellings do not affirm to different living lifestyles of people they are normally associated with. Families, elderly, singles and couples are all subjected to the same layout. The layout also does not address the social background of people, nominally the working class, of whom traditional strong community ties were very active in the old urban environment. Vischer (1985) emphasizes that users are not passive and inert entities as viewed by modernists in the early modern age. Users take an active role in the environments, interacting with them and adjusting to suit changing situations. The modernist standpoint excludes these active roles in building the environment. There was no active participation and involvement by users, nominally for residents living in these high-rises, to take control in building the environment (Vischer, 1985). Highly evident is the failure of the Pruitt-Igoe housing development. In the wake of no control and personal responsibility to their environment, its communities broke into ruin (Newman, 1972). Hulme Estates in Manchester disregarded the affordability of its residents by giving an alternative under floor heating that was unreliable in the 1960s and 1970s. In the hope of providing maximum sun and air penetration, the internal units were poorly insulated (Burridge, 2011).

The problems pertaining to social participation in high-rise design in the first modern age were also not limited in its internal design but external outside spaces. The homogenous approach to high-rise housing design led to developers lacking understanding on the provision of the right social infrastructure in the settlement. In the case of Hulme Estates, severe design errors such as thick concrete balconies barred residents from seeing one another. The balconies had a flat aperture which allowed curious children to climb onto the balcony ledge. Children climbed onto the balcony ledge by putting a foot in the aperture and lifting themselves onto the ledge (Marcus, 1994). This insensitiveness in design reflects deeply on the architects' and planners' approach that excluded any thought of users affecting key measurements in design of their social environment. Whitzman (2001) suggests the need to understand how social infrastructure works before making any decision to design residential high-rise buildings. She concludes examples of two famous tall buildings built during the height of the first modern movement and then examines the implications of social infrastructure in these structures. Whitzman (2001, p.63) stated:

'There were clear problems with the planning and the design of the project. The most obvious is the assumption that the only one age group – young adults and one income group – the upwardly middle class would live in high rise housing. As long as the residents were middle class, they could pay for the upkeep of the privately owned recreational facilities, and support the large commercial units within the shopping centre. As long as they were childless adults, it didn't matter that the developer did not improve the local school or assign swatches of open space of green to specific purpose. Once poor people of verifying ages moved into St James Town, however, the stage is set for the erosion of recreational and shopping facilities, and tensions over the use of space between teens with nothing to do but hang around, and seniors who are intimidated by the youth's presence'

As a modernist 1980's 'city-within-a-city' project St James Town in Toronto is a depiction of blatant neglect by the architect into designing social spaces within the settlement. 'Living' stated by Whitzman (2001) argues how insensible the whole mega-development is to assume one group of society would inhabit it. Its failure is in the assumption over spaces that the community did not need. This over-assumption is typical of the early modernist thinking evidently by its grand proposal of public parks dominating the groundscape surrounding the high-rises. The over-assumption did not take into account the plurality of user groups living in the settlement. Although the original Unité d'Habitation did take into account making specific spaces for different user groups, this idealism was lost in interpretation to many later high-rise developments (Knox, 1987). Complexity is an important element in urban design that encompasses many values from function, visual and use (Carmona et al., 2003; Carr, Francis, Rivlin, & Stone, 1992). The subsequent mechanization of spaces neglects these layers and values unwittingly making social spaces in high-rises monotonous. Whitzman (2001) further implies that social infrastructure goes beyond the needs to fulfil basic living, more than spaces for shopping or recreation normally assumed in the early modern movement. The doom of many high-rises built for public housing was when schools, parks, and recreational places were often overlooked for the sake of commercial viability. Likewise it is these spaces that could sustain the commercial shops if attached to it. The community is therefore rendered unsustainable because of its inability to function because they do not have the wealth to spend in these spaces. Social economic factors played an important role in designing future social and public spaces in high-rises as upkeep is subject to their residents' economic affordability.

Whitzman (2001) research is hereditary from older criticism made towards measurements used in making high-rises in the first modern age. Jacobs (1961), Newman (1972), Stokols (1978), Vischer (1985), Lund (1996) and Burridge (2011) all made substantial cases against the narrow approach made by early planners and architects in designing high-rises. However, today public housing in high-rises is becoming more acceptable becoming more synonymous with urbanity. Cases against high-rises made by Newman (1972) and Jacobs (1962) may need to be revisited as they do not take into account external values to their failure when the typology seems to grow positively in

the East in places like Singapore, Japan and Hong Kong. However, this is not to undermine that findings made by these authors are irrelevant. Any such cases of places for community measurements made by Newman (1972) and Jacobs (1962) give fundamental clues on how to rectify this problem rather than condemning high-rises. Moreover, these authors are incremental in highlighting 'life' as an important measurement to building urban settlements. Schulz (1991) mentioned that the world of 'life' is evident when the spaces that we use give permanence and thus create identity to it. Social infrastructure suggests that place is where society gathers. Social infrastructure is therefore the determinants to 'place' in residential high-rise settlements. The method of finding 'place' in high-rises can be determined by how society functions in the settlement. There is a growing concern for the development of high-rises other than aspects of measurement nominally put forward towards 'hard infrastructure'. The term 'soft services' refers to social needs in the community when a particular development is made. The current approach to high-rise residential design does not carry any code or preferences to make social public spaces. Amenities for socializing seem to come later at the consent of the developers. In these measurements, according to Whitzman (2001), many early modern high-rise developments that neglected 'soft services' are doomed to fail early.

Community development in residential high-rises should be at the heart of the strategy for urban development, concentration on the technicality and medicinal qualities of high-rises offered in urban development as an additional value neglected by the early modern movement. During any building procurement process, social needs of the high-rise inhabitants should be high on the agenda. Any new high-rise development should provide an opportunity to offer facilities and economic benefits for the surrounding community. Ali and Ajla (2008) assert that with the insertion of social infrastructure after the construction phase opportunities will arise from the social function to employ and train people thus contributing liveability in the settlement. Socializing benefits people for a healthy body, mind and soul, to teach and learn skills; moreover, the making of culture through arts and entertainment. These are potential spaces or places for people in residential high-rise buildings. High-rises should be designed with measurements beyond their basic survival functions that epitomize individualism in the first modern period. It is an incremental paradigm shift that its future making needs to adhere to a functional society through living in evolving new urban but practising continuous humanistic values found in traditional cities. Like the traditional setting of a typical village, high-rises themselves consist of groups of people, living and involving through everyday lives. The residential high-rise is a human settlement.

2.1.3 Zoning and Architecture

As an extension from the logic of functional zoning dictated by early modern urban design, high-rises were single-use buildings. Zoning is a device of land-use planning used by local governments in most developed countries. The primary purpose of zoning is to segregate uses that are thought to be incompatible, mainly separating functional zones to promote health and sanitary conditions of cities. Prior to this philosophy, high-rises were built as mono-functional blocks (either residential or commercial) each block, located in designated functional zones in the city. In between these blocks and zones are gardens and parks with mono-functional civic buildings (Knox, 1987). Zoning became detrimental to cities as it reduced the spatiality of urban design into becoming monotonous and sporadic. Furthermore, extensive zoning puts everyday uses out of walking distance of each other, therefore leading to an increase in traffic since people have to get in their cars and drive to meet their needs throughout the day (Carmona et al., 2003). Single zoning contributes to urban sprawl as greater distances need to be covered in order to integrate the different life domain. Subsequently envisioned by Le Corbusier in his iconic Ville Verte (1927) vision of towers in gardens and parks, it eventually became towers in parking lots. Extensive zoning in planning of high-rise affects the function of the building on two levels, internally and externally. Internally, the subjected high of a residential high-rise creates social inclusion to inhabitants living on the top floors, while those living on lower floors were subjected to over-exclusion as the ground area was used for entering and exiting (Bell et al., 2001). Externally, extensive zoning creates greater distances between living functions; furthermore it discourages inhabitants from venturing into the public realm. Zoning permits little social interaction among people living in high-rises and along these lines contributed as a factor to failure.

By the late 1990s, high-rises were beginning to accommodate mixed uses in huge new complexes of office, residential, commercial typologies. The idea of promoting mixed use rather than zoning came into being after learning from mistakes in the first modern period. As an extension to form based guide to development patterns, mixed-used typologies in high-rises encouraged compact and walkable urbanism in response to single-use zoning regulations nominally practised in early modern planning. Mixed-used typologies address the deficiencies created by mono-function typologies by providing greater accessibility to various functions within noteworthy conditions and locations as a means to achieve sustainability in tall buildings. Wood (2007 p.409) stated that:

'Cross-programming or mixed use within tall buildings should be encouraged to give more opportunities for more sustainable live-work patterns (dualities of car parking, support functions, servicing, etc...) as well as variance in tall building form and expression to diversify urban form'

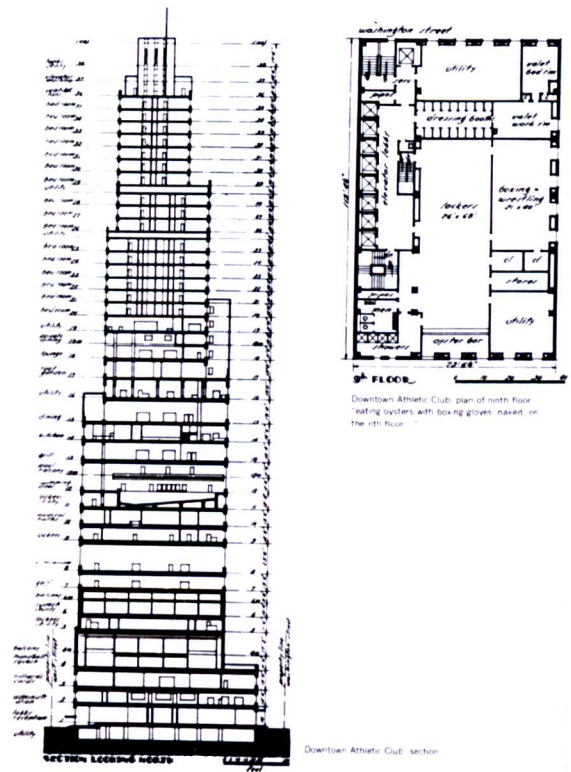
In multi-use buildings, social and economic factors may merge because such buildings accommodate both types of occupancies and their activities. The idea of providing banks, retail, and recreation facilities in the same complex facilitates the interaction of people in a community. The ground floor benefits others by providing large lobbies or atria that may encourage more opportunities for community interaction (Ali & Ajla, 2008). The concept of mixed use in high-rises creates a micro level state of urbanism in which its contained conditions encourage neighbourhoods to be established. The promotion of this contained neighbourhood suggests living concepts equal to horizontal towns or cities if the same essence in its liveability can be adapted into the typology. The proposal for a mini-urbanism in a high-rise is not new. One of the earliest examples of vertical urbanism was the Downtown Athletic Club, New York built in 1931 by Starrett & Van Vleck Architects. Social activity in the Downtown Athletic Club was planned in an abstract composition of activities. On each platform or floors are small fragments of the social needs typically spread horizontally on the ground. Though it is not 'place' in the context of real urban design, the idea sparked possibilities of making vertical social places in the high-rise buildings. Koolhaas (1995) asserts that New York City when compared to other metropolitan cities ground breaking for vertical experimentations, either by example of failed or successful attempts. New York City's 19th and 20th century experiments gave birth to vertical living. Experiments in high-rise buildings have never been done in any other cities than New York that are forced to embrace verticality. In his 1978 book *Delirious New York: The Culture of Congestion*, Koolhaas (1978 p,152) wrote:

'The Downtown Athletic Club the Skyscraper is used as a constructivist social condenser: a machine to generate and intensify desirable forms of human intercourse'

Unfortunately, the tower remains as the sole typology in its design as many high-rise buildings in the coming century resulted in the standard model – rectilinear and air-conditioned box. Very few residential towers have striven to create anything new, other than the exploration of an efficient floor plan (Wood, 2007). However, in the past couple of decades there has been a small but growing number of professional organizations that have looked to appropriate environmental responses as the main generator for high-rise buildings in a design direction which looks into the effects of climate change and patterns of living (Wood, 2007). The further embodiment of this spirit was proposed by Koolhaas (1995) for a competition called Bibliothèques Jussieu in Paris, France in which he creates vertical space in essence of the street and squares in the sky. The proposal embodies a manifestation of mini urbanism inside the interior of a building. Koolhaas (1995) attention to vertical architecture was a precedent to his previous theory on vertical urbanism.



Picture 2.9: The Downtown Athletic Club, 1931.
Picture source: (Koolhaas, 1978).



Picture 2.10: Section of The Downtown Athletic Club, 1931. Picture source: (Koolhaas, 1978).



Picture 2.11: Bibliotheques Jussieu competition entry.
Picture source: (Koolhaas, 1995).

From the micro context to the furthest extent of the mega-city, mixed use makes the city more compact. The intensification created by combining use as well as public with private functions and integrating new buildings with their surrounding fabric have all offered techniques to reintroduce civic life into barren centres devastated by the first modern movement. Unlike the

Athens Charter 'one size fits all' model, this new approach considers the intricacies of the contemporary city. It leads to hybrid conditions existing not only at a macro programmatic level but through housing different organizations and also across a number of scales from the point where individual spaces meet all the way up into the urban scale (Musiatowicz, 2008). The future of high-rises is in the exploration of its multi-functional spaces for which years of practice were determined by singular separated programmes. The original creation of high-rises which stood independently to their internal function is no longer valid for the complexity of living in the third modern age that justifies demands to more heterogeneity by social geographies and contexts. Therefore, heterogeneity in planning should be encouraged in making for future high-rises.

2.1.4 The New Vertical Urban Environment

Urbanity comes in many forms and conceptual making. One typology should not be the subscription form for others. The high-rise typology is one of the options of addressing the many ways of solving urban design. The problem bearing any disadvantages of the high-rise typology to social and public space design is by historical precedent too deterministic. Its ideals tend to fall into a theoretical trap; it does not fit into context. In most developments, the designs of social and public spaces are often made by placing themselves in support of retail or commercial developments, thus often being overlooked compared to the needs of social spaces, where these spaces are the basic infrastructure needed to sustain communities (Whizman, 2001). The real failure is when the sponsor and user failed to meet in between and understand how to make social and public spaces. Making social and public spaces is commonly thought of in putting too much into visual appeal rather than how and why to use it. Beyond visual appeal, public space should be seen to convey meanings, from those that reinforce personal and group life to those that challenge the accepted worldview of the culture and open mind to new insights (Carr et al., 1992).

To understand the value of social and public space is to draw upon the human dimensions in design, managing spaces, governments, developers, and community groups. This in turn will make it more likely that goals such as economic development and image enhancement can actually be furthered by public spaces (Carr et al., 1992). Successful social and public spaces are designed to serve the contextual human needs of the site, from passive relaxation to active engagement to others. There are three primary values that guide the understanding of how to best serve the design of social and public spaces. These values should be responsive, democratic and meaningful. Responsive spaces are those that are designed and managed to serve the needs of their users. People seek to satisfy themselves in public spaces for comfort, relaxation, active, passive engagement and discovery.

Summary of Theoretical Perspectives on Crowding

Conceptual Approach	Critical Cause(s) of Crowding	Primary Coping Mechanisms	Reference
Social Overload	Excessive social contact; too much social stimulation	Escape stimulation; prioritize input and disregard low priorities; withdrawal	Milgram, 1970; Saegert, 1978
Behaviour Constraints	Reduced behavioural freedom	Aggressive behaviour; leave situation; coordinate actions with others	Stokols, 1972; Sundstrom, 1978
Ecological	Scarcity of resources	Defence of group boundaries; exclusion of outsiders	Barker, 1968; Wicker, 1979
Arousal	Personal space violation plus appropriate attributions	Lower arousal to more optimal level	Evans, 1978; Paulus & Matthews, 1980
Unwanted Interaction	Excessive unregulable or unwanted contact with others	Withdrawal; organization of small primary groups	Baum & Valins, 1977 Calhoun, 1970
Interference	Disruption or blocking of goal-directed behaviour	Create structure; aggression; escape	Schopler & Stokdale, 1977; Sundstrom, 1978
Privacy Regulations	Inability to maintain desired privacy	Privacy controls mechanisms	Altman, 1975

Figure 2.4: Stokols' (1978) Seven factors on perspectives of overcrowding. Adapted from Bell et al. (2001)

Stokols (1978) summarises seven theoretical perspectives to crowding; one suggests behaviour constraints as a factor of cause. Addressing that common contextual psychological response to high-rise living, public and social spaces should be valued as settings for physical and mentally rewarding activities such as exercise, conversation or any other forms or social activities of the same to its inhabitants, though its responses should also maintain a good balance between privacy and public. According to Stokols (1978) excessive irregular or unwanted contact with others and too much social stimulation are among the many major negative impacts causing social disorder in high-density environments. This statement highlights good social and public spaces in the interest of its openness should also maintain a degree of privacy to those using it. A responsive space serves users not only in its heterogeneity but other forms of smaller groups and even individuals choosing themselves to be outside of their private spaces. It is a place of self or others, a step into the larger world (Carr et al., 1992). It is also spaces that provide visual and contact with nature and plants which result in better health. People respond to the natural environment, and social spaces should be designed with opportunities to engage with this kind of environment (Ulrich, 1979). Another key

value of successful social/public spaces is to give a democratic right as to how the spaces shall be used. Democratic spaces describe how people use the social spaces to carry out activities that represent their freedom of expression.

Studies in post-occupancy evaluations show human failures in social and public spaces are caused by the inability of their users to use the spaces according to their rights. People feel animosity towards the restrictive rights they are given to use the space. To some degree, even though the public spaces are being use constantly, their potential is not being expanded to its maximum. Often with good intentions, public spaces do represent some form of conflict between security and democratic rights. When sponsors have actually wanted to provide usable spaces for their employees and others with whom they feel comfortable, they have sometimes been burdened with unwanted management problems in attempting to exclude other potential users. Sponsors often fear 'undesirable' and 'deviant' users will use these spaces. As the result of this, democratic values of these spaces are taken away or managed with close scrutiny and bias. When this happens, designs for public spaces are often too constrained, not providing basic human needs such as comfort, relaxation, and discovery. Social activities are only allowed for passive engagement with others or to be structured with pre-determined actions, making them rigid and unchallenged (Carr et al., 1992). Potentially, if the values of democratic rights are taken away, these spaces in the long run might become underused and neglected.

When people experience freedom of expression, they gain a sense of attachment psychologically, therefore being subjected to see the social and public spaces becoming meaningful. Meaningful spaces are those that allow people to make strong connections between the place, their personal lives, and the larger world (Carr et al., 1992). These connections are representative values of one's own culture, history, biological or psychological realities to groups of people and ultimately the community. The continuous use of a good public/social space with its many memories of embedded meaning give a sense of permanence to the space, making it into a known 'place' of reference. Schulz (2000, p.36) wrote, "life takes place in time and places, is the demarcation to time: the very manifestation of life itself." This is called 'Stabilas Loci'; which refers to places that establish an existence to several spans of time without losing their identity of place. The theoretical establishment of this is when the life of the people who live there refers to the place as its identity, therefore giving their identity to who they are. It also serves as a demarcation to location. 'Place', according to Norberg-Schulz (2000), is a site that sums up all the comprehension of the life of the community or individual that lives there. From all that has been said, it is clear that we recognize our identity in the fact that life takes place, even though the specifics of this fact may change from place to place. The value of meaning gives root to identity, thus the creation of an anchor to one's sense of

community to the sense of personal continuity in the changing world of space. However, meaning is easily identified when we refer to strong perceptions of traditional qualities in urban design.

This theory states that successful social and public space is determined by means of living in a world that comprehends both place and community in which ones lives. Schulz (2000, p.40) wrote "and when that world is thwarted and rendered fruitless even though we may obtain the entire universe through the press, the radio, and the television – the alienation persists, inasmuch as there is no longer anything that has either proximity or significance." The meaning of significance in places is, with the absence of identity, it renders the living environment without meaning as both for the individual self or a community as a whole. In theory, to consider a successful social and public space is to determine ranges and factors that suggest a significant sense of identity. Visual and environment motives come into play in satisfying people's needs for passive engagement, discovery, and meaning. Spaces that satisfy people's needs, therefore, are quite likely to be economically successful and public space values must grow out of an understanding of why people go to spaces, how they actually use them, and what they mean to their users over time.

2.2 The Pinnacle @ Duxton Housing Project, Singapore.

In 2001, the Pinnacle @ Duxton Public Housing Competition was launched by the URA of Singapore. It attracted a huge number of architects and urban designers for the brief, opening up a new debate of community cohesion and sustainable design particularly within the high-rise residential design. The competition highlighted the need for the inclusion of social spaces, particularly open and semi-open spaces to be inserted in the high-rise development as a pre-requisite new model. The 2001 Singaporean Concept Masterplan targeted an increased live-in population within the downtown city area. The central area (Pinnacle @ Duxton Plain) at present contains 30,000 households that accommodate 3% of the total city population. With the densification of the central district as the financial and commercial hub of Singapore City, URA targets the increase of population up to 7%. While most central districts, commonly financial and commerce are dominated by commercial spaces, URA recognized the need of people living in these districts in retrospect to the Masterplan highlighting the need of the concept of living cities.

The design brief and technical requirements for the competition highlight environmentally appropriate forms and buildings capable of creating a strong sense of ownership and community. It is also stated, as a subsidised form of housing (built by the Singaporean HDB), that proposals need to be cost-effective before and after development. Competitors are given greater freedom and flexibility to introduce new and innovative solutions, but strict specifications of social communal spaces must be adapted in the design. Interestingly, the intention of making social spaces is

consistently highlighted from the Masterplan into the design. A total of 277 architectural firms took part, 74% from the Asia Pacific Region, 15% from Europe and 11% from the Americas. There are several notable architecture offices that took part in the competition, notably including: Zaha Hadid Associates and Alsop Architects from the United Kingdom (URA, 2005).

The competition itself generated huge widely-acclaimed publicity in the architectural community, notably for its experimentation in creating new forms of high-rise and high-density residential development. The winner of the competition was ARC Studio Architecture +Urbanism in collaboration with RSP Architects Planners & Engineers (PTE) Ltd (both local Singaporean firms). The winner of the competition was appointed as the Project Architect for the development in collaboration with the Singaporean HDB. ARC Studio Architects was awarded the project. In summary of the jury's comments, the design provided the best yet most simple solution of an urban high-rise residential scheme aligning with the competition brief of making communities an attractive high-rise living environment of the city. Overall, the scheme was dubbed simple, yet effective, incorporating many new design ideas addressing the brief and Singaporean high-rise housing issues. It also addressed all the key practical issues such as efficiency, build ability and maintenance, as well as privacy, safety and security (URA, 2005).

2.2.1 Vertical Urban Settlement

The Pinnacle @ Duxton was built on a high-density template for housing. The national average height for high-rise housing in Singapore was only 12 storeys. In other high-density areas, notably New York City's Manhattan Island, the average height for residential housing is not more than 20 storeys. The Pinnacle @ Duxton on the other hand was built with 50 storeys, almost quadruple the average height in Singapore and double those in Manhattan Island, New York. The Pinnacle @ Duxton stands at 163m (536ft) and it is classified as a High-Rise Megastructure (Firley & Gimbal, 2011). According to Firley and Gimbal (2011), it is an exceptional development, spectacular in an urban setting and with architecture rarely seen in public housing projects. The complex symbolizes the city's very positive attitude towards high-rise living. Furthermore, the Pinnacle @ Duxton translates a neighbourhood size of approximately one square kilometre or 80 hectares into only 2.5 hectares. This high-rise and high-density environment perfectly describes the complex as a vertical urban settlement.

The project was built as a form of residential complex consisting of seven 50-storey-high residential towers linked by continuous sky-bridges on three separate levels. Each block consists of 264 residential homes spread into six units on one floor template. A total of 1,848 families will live in this development. By the end of 2010 a total of 3,541 people had already lived in the development; 90% of its inhabitants are locals with ownership of the apartment units. The remaining 10% are

foreign expatriates in rented accommodation (URA, 2005). The population is set to grow within five years after which it will have been occupied by approximately 5,000 people.

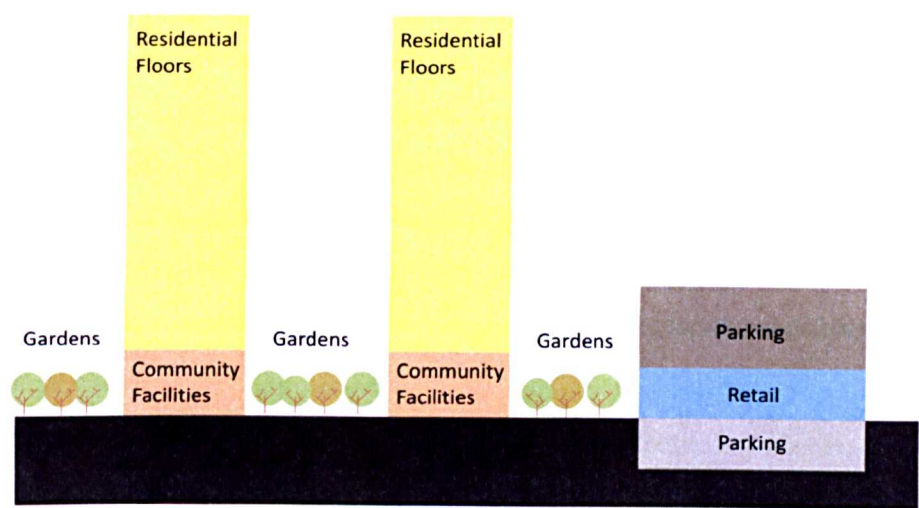
2.2.2 Social Housing Model

The Pinnacle @ Duxton claims to succeed in the latest development in public housing for Singapore's future. The complex is the forerunner for much more massive, space saving residential tower blocks to mushroom around the island. It is expected the Singaporean HDB would build even taller structures, 70-100 storeys high, as one key way to optimize scarce land resource (URA, 2005). This social housing model comes from the UDA itself, which from its 2001 Concept Masterplan for Singapore sets a long-term strategic plan aiming at creating a liveable city of wide arraying choices of comfortable housing locations and types. URA recognized the constraints of land availability for new development, thus proposing building more super high-rise, high-density housing close to the city in order to capitalize with good public transportation/amenities and emerging new urban lifestyles as Singapore is entering its Global City phase. The Pinnacle @ Duxton was also meant for new families seeking to live closer in the Central Business District. The area in which the complex is situated was identified by the Singaporean HDB as a greying population. Pinnacle @ Duxton was prioritized for newly-weds and young families with small children. In essence, the social housing model in the Pinnacle @ Duxton caters for family living. In principle the model aims to create a community neighbourhood in which a close-knit, socially homogeneous group engages in primary contact. All units are designed as 'white units', which in Singapore means open plan apartments with a flexible internal wall zone.

All residential units are created as an open shell. The 'white-units' concept is designed in mind with the growth of the household from newly-weds to a home with children, teenagers and finally an elderly couple with grandchildren. This implementation in public housing means that each household is able to transform the units according to their own personalization or growing nuclear family years into the future within the development. The model is an approach to creating a strong sense of permanence to the inhabitants by giving freedom to them in making choices to expand the household without moving out of the settlement. Rather than designing it as a highly atomized development, the Pinnacle @ Duxton attempts to contribute to a larger social sphere of mixed-use balanced development for social and public spaces rather than the typical mono-functional high-rise housing estate. It is a development in pursuit of a more sustainable option of living as a neighbourhood. It aspires to be self-sufficient, reducing the need to travel by encouraging opportunities for work and recreation closer to home.

2.2.3 Sky Gardens

The Pinnacle @ Duxton arranged itself with a clear frontage with a large open space, eventually marking the best response in the urban context. Blocks are linked together with horizontal sky parks giving residents social and recreational space. The sky decks are not merely open spaces but are designed as destination for community usage. The concentrations of the recreational and social facilities are provided in three vertical locations, bringing the facilities closer to residents, and giving more opportunities for social interaction. The design also demonstrated detailed consideration on how different groups of people use the spaces created. The scheme landscaped the garage deck as the major communal garden, forming various pockets of activity spaces with specific activities. There is a huge potential of success in the communal spaces for its detailed thought of activity relating to context, other than providing typically open spaces with no thought of programme.



Vertical organization of land-use in typical residential high-rise



Vertical organization of land-use in Pinnacle & Duxton

Figure 2.5: The exceptional criteria that made the Pinnacle @ Duxton the chosen case study for the testable site of the proposition.

2.2.4 Public Investment, Locally Managed and Design Awards

The whole scheme was designated as public housing, managed by the Singaporean HDB, which is a wholly-owned public governmental sector. HDB policies were largely parallel to the manifesto set out by the Singapore government in promoting social cohesion and patriotism within the country. Much of this will be discussed in the next chapter focusing on Singapore’s economic and social narratives that directed the idea of social and public spaces in the sky being promoted into the public housing sphere. The social and public spaces in the Pinnacle @ Duxton will be owned and

managed by the Tanjong Pagar Municipal Area. This characteristic is perfect as the social and public spaces will be accessible to all without being gated or privately secured. Since its completion, the Pinnacle @ Duxton High-Rise Housing Scheme has received numerous awards and praise for its design. It was awarded the best building for housing at the World Architecture Festival Winners 2010 – Completed Buildings. It was also awarded the Best Tall and High-Rise Building of the Year in the Asia & Australasia Region 2010 by CTBUH. Both awards highlighted the development as a potentially successful residential high-rise building by design in its social and public spaces.

2.4 Chapter Summary

The social agenda is becoming apparent as an important key measurement to encourage social sustainability in high-rises. The third wave of the modern movement suggests architecture and planning are entering an ecological period that focuses on community as the subject of creating the urban environment. Scientific endeavours in making architecture will be centred on complexity while the political focus will be directed towards communities within the greater communities (Buchanan, 2012). In the third modern, age architects and planners must foresee the possibilities of high-rises providing an alternative solution for the expansion of cities without degenerating life within it. The concept of living in the ecological post-modern period has changed how measurements on addressing social infrastructure are made within new and old urban settlements. The high-rise is experiencing a renaissance in its development that enables research in these measurements to learn from the mistakes of the past. The failed promise of the early modern era can be atoned in the third period by addressing and integrating social services as well as connecting to the urban fabric and the wider community.

The Pinnacle @ Duxton is the perfect site for studying the use of social and public spaces in a residential high-rise development. Empirical analysis and data concerning high-rise living summarize that better living conditions in high-rise/tall buildings can be achieved if the designs are adaptable to social and community value (Whitzman, 2001).. The Pinnacle @ Duxton claimed to be the answer to providing social and public spaces in high-rise buildings. Theoretical conditions established in urban design are believed to be able to transcend into any evolving form of urbanity. By matching existing theoretical propositions developed from urban design and the validity of post-occupancy evaluation of social and public spaces in the Pinnacle @ Duxton, the interpreted findings should be able to know good and bad practices to be considered to other developments of the same typology. Though typical criticism argues case studies are a poor basis for generalizing, it is generally accepted that this method always intends to generalize a larger universe. That universe is urban design theory. The Pinnacle @ Duxton is the perfect place to test it.

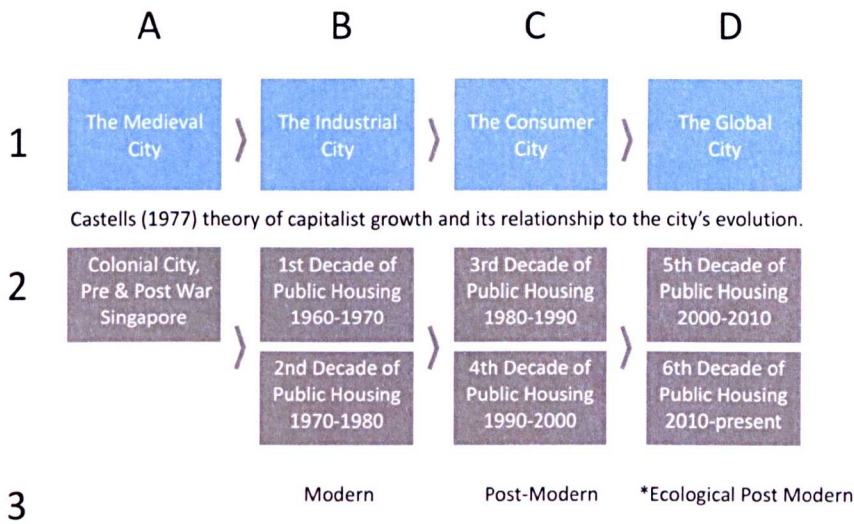
CHAPTER 3-FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

3.0 Introduction

The Pinnacle @ Duxton is not an afterthought by-product. It is a product of continuum process of authoritative intervention within various governmental agencies in Singapore. Internal change, whether it is natural or controlled, does affect the change of spatial needs by its inhabitants in growing cities. It is important to understand why some measures are taken as the necessary factor, underlying their foundation 50 years before, making social and public spaces in the sky a reality. Public housing in Singapore relates strongly to its relationship to the process of social & political relationship, not merely in its key policies but class & social mobility, governance, community and values systems (Goh, 2001). This chapter is organized in four sections highlighting the anthology of its urban singularity as a high-rise city thus concluding how politically it affects the Pinnacle @ Duxton, nominally the social public spaces in the sky. Block (2008), Marcuse (2002) and Thompson (2000) all described how urbanism with the after-effects of globalization generates cross flows of capital, culture, people and information which affectively evolved urban patterns and spaces. Changing worldviews, social, political relationships and networks that create and reconfigure new social spaces to suit their changing needs will influence social groups living in places under this process of intense globalization (Fulcher & John, 2007).

Traditional urban design practice addresses good and successful place making for social and public engagement in response to factors defining residents' background in their economic, culture and hierarchies (Castells, 1978). As an evolving pattern of urbanity, the high-rise model is not entirely traditional in its spatial pattern and quality. It is a product of a post-industrial urban form significantly different from traditional cities in form, pattern of land and social geographies. It is important that designers should take into account an understanding of political and residential patterns as a consideration when investing in public and social spaces for future residential high-rise developments.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY



The Housing Development Board, Singapore policies evolution in six decades.

*Ecological Post Modern: Peter Buchanan, The Big Rethink, Architectural Review Feb, 2012 pg 82-93

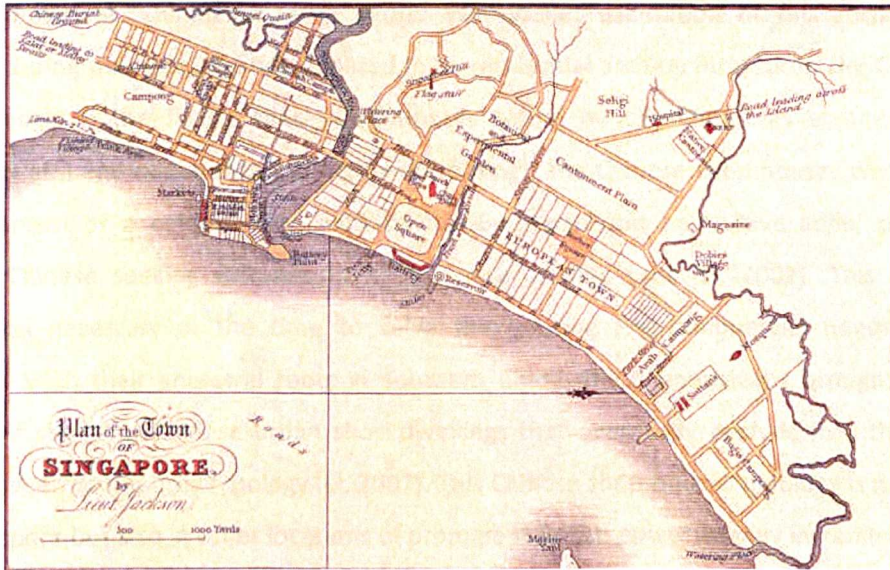
Figure 3.1: Revised by the author on the comparative analysis between (Castells, 1978) capitalism and city theory and policies' evolution of high-rise housing stock built by the HDB, Singapore. The third paragraph compares policies in high-rise public housing to the current evolutionary stages of architecture and the built environment.

3.1 1900–1960: Founding of the Market Economy and Shaping the Urban Residential Patterns in Colonial Singapore

3.1.1 Colonial Port: The 1822 Jackson Plan

The founding of the city was created out of race-based ghettos with communities subjected to economic specification. As a port and marketplace, its original inhabitants (the Malays) could not support Singapore's needs for labour, hence large groups of migrants were imported from China and India. Its foundation was protected by the British Empire, by strong governance and investment creating a stable market place for trading with the Far East (Beamish & Ferguson, 1989). This was crucial to enable capitalist growth similar to a medieval city market where protection (fortress) fused with port, empowering the marketplace economy for the city. This relationship was central to the rise and dynamic growth of the city. People are free to engage in any form of economic opportunity with independence (Castells, 1978). This allowed capitalism and citizenship to merge, setting the basis of social opportunity and mobility.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY



Picture 3.1 The Jackson Plan. Singapore's first official urban layout characterized by the segregation of its ethnic groups in enclosed neighbourhood domains. The mouth of the river is the city's main port and market place. The Chinese immigrants settled the west, the middle by Europeans and the east by the Malays.

The segregation of ethnic groups created many neighbourhood domains of effective exclusivity to each race from Chinatown to Little India, Arab Village and European Town. Each domain is different in its social order and spatial meaning. The only claim of urbanity by the Malays existed historically west of the city around the Sultan's Palace with a mixed population of Arab, Indian Muslims and Bugis¹ merchants. According to the 1938 Straits Settlement Colonial report (p20), residential typologies in Singapore were classified as follows:

'Houses with gardens occupied by the well-to-do residents, semi-detached houses or small bungalows occupied by less prosperous persons, or the less well paid of the salaried classes, terrace houses for clerks and people of the similar standing, shop-houses, common lodging houses, which are frequently overcrowded, tenements in closely built areas and wooden huts or semi-permanent houses on the outskirts of the city' (Reports., 1938).

Societal patterns during the time were strongly represented by the ideals of political ascription, role diffuseness, particularism, affectivity and collective orientation (Parson & Schütz, 1978) thus affecting the spatial order in each of the ethnic clusters within the city. This colonial

¹ Bugis: An ethnic group originating from Southern Sulawesi, Indonesia that dominates the politics and economy of the Malay Peninsular from their 1669 civil war diaspora. They became the power behind the Johor Sultanate that, during its partition, ceded Singapore Island to Stamford Raffles as a British port in 1819.

legacy will create powerful concerns of social disorder, criminality and youth deviancy that will become rampant in 'Chinatown' after World War II. Representation of this social malaise in Chinatown during the time was best idolized in its residential architectural form: the Chinese shop-houses (though in the future these shop-houses would be considered as architectural gems, gentrified by affluent inhabitants into high-end housing). The Chinese shop-houses were the typical dualistic pattern of a colonial city, with its half-European and half-native style, populated by immigrant Chinese seeking fortunes in Raffles' new trading post (Li, 2007). This architectural typology was necessary at the time to solve the housing and commercial needs of Chinese Immigrants. With their ancestral roots in southern China, these immigrants brought along their blueprints of southern Chinese urban shop dwellings that eventually evolved into the distinctive Straits' Chinese shop-houses typology (Li, 2007). This Chinese shop-houses typology is not distinctive just in Singapore but also in other locations of prominent British power, mainly in Peninsular Malaya: Penang, Malacca and Kuala Lumpur.

3.1.2 Urban Centre: Chinese Residential Patterns

Architecturally, the Chinese shop-houses are described as neatly terraced row houses built in stucco brick, with a red Chinese tiled roof, characteristic gable and interlocking tiles in an obligatory five-foot walkway (Beamish & Ferguson, 1989). Spatial usage of these houses is a reflection of the name itself, the ground floor serves as the commercial area and all upper top floors are mainly used as residential (Li, 2007). The building plots of these houses were narrow, making it long, connected by two or three air wells open to the sky. These air wells not only provided ventilation for the houses but also internal social spaces for inhabitants. Despite its distinctly architectural quality, many of these shop-houses do not represent the total quality of living for all Chinese classes. The working classes were often cramped with more than three families in one plot while dedicated social places were almost virtually non-existent.

A good Chinese shop-house could only hold comfortably up to two families, which were usually big (Grunsvén, 2000). However, despite the poor conditions in the urban tenements, social and community life was strong. Lack of free time due to working hours and low pay meant less recreational activities for these people. Life depends very much on each other for a means of security. The street frontage with its five-foot walkway became a flexible space for social interaction. Almost all engagements were done in the streets giving the locality a strong sense of identity. The communities in these streets were strong because their daily routines were undertaken together in

groups, sharing a short amount of resources. Social places were made for social interaction rather than for the natural recreational amenities (trees, water, grass, etc.). Streets became a place for gathering for particular groups who have no other places to socialize (Carr, Francis, Rivlin, & Stone, 1992). This is a strong reflection of street life similar to the heavy use of narrow streets in medieval European cities. This social condition mirrors Jacobs (1961) analysis on the Italian Quarter in Boston, USA. Though seemingly poor and unsanitary, her research argues the Quarter was strong in community spirit and order. According to Jacobs (1961), "neighbours knew neighbours making the streets inclusively for the use of its community excluding those who do not belong there."

The migrating Chinese also brought social organizations called 'Kongsi'. 'Kongsi' are used by the Chinese to describe 'a commercial company', representing the business interest of different migrating Chinese communities to South East Asia. However, these 'Kongsi's were nothing more than Clan Houses. A considerable amount of literature has mentioned the subject of these Clan Houses as being not merely a police problem but also sociological and political. Numerous Colonial Officers working in the Straits Settlement, W. A. Pickering (1877), Mervyn Wynne (1941), Leonard Comber (1959) and Wilfred Blythe (1969), in their reports supported how these societies were contributing to the continuing problem of social disorder and were rife with criminal activities (Pui Huen & Wong, 2000). Their impact on social and public spaces was so strong that it performed many informal traditional roles in education, religion and culture. Sadly, much of its architectural legacy was lost in Singapore but its legacy still survives in Penang,² which boasted many fine examples of these Clan Houses being the centre of social and public expressions within the Chinese community.

The Chinese community in colonial Singapore were business centric, with each Clan House governing different monopolies of trade and market economy. This form of societal background was explicit to the overseas Chinese. This background is the market economy (Castells, 1978), where mostly the merchant class consists of exporters and importers, big plantation owners, tin mining proprietors, big contractors, property owners and financiers; while the latter consisted of shopkeepers, general traders and small plantation owners (Ching-Hwang, 1987). This class system is fluid: there were no legal barriers to social mobility, nor an examination system that people had to go through for higher status, but it was driven on wealth (Ching-Hwang, 1987).

² Penang: One of four British colonial settlements (Penang, Malacca, Singapore, and Labuan) dubbed The Straits Settlement (1826-1946) in South East Asia. Penang was established by Sir Francis Light in 1786 as a port similar to Singapore; also a migration stop for the Chinese between the 17th and 20th centuries.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY



Pictures 3.2 and 3.3. Left: Battery Road and Tan Kin Seng Fountain. This photograph in 1900 shows the former financial district in Singapore, now Raffles Place. Not all buildings have survived to this day, replaced by high-rise buildings on site. Right: Hokkien Street 1890s. This is one of the oldest and poorest Chinese tenements in Singapore. As the name of the street implies, it was inhabited by immigrants from the Hokkien region in South Western China. Picture sources: Toh (2009).



Pictures 3.4. and 3.5. Left: View of a Malay settlement with a fortified manor on top of the hill belonging to the local chief of the community in Singapore called the Temenggong. Right: View of a water village that belongs to the Malay community jotted out along the coastline outside of the urban periphery within Singapore Island. These kinds of settlements were typical of the Malay, who were left out of the market economy and engaged in agricultural activities. They lived life fully self-sufficient, unaffected during the early years of Singapore while enjoying some degree of political power within the British administration. Picture sources: Toh (2009).

3.1.3 Urban Periphery: The Malay 'Kampungs'

Despite being in a position at the bottom of the urban socio-economic ladder, the Malays had a strong identity in their social and public life. The Malays were economically self-sufficient, unlike their other counterparts who were heavily dependent on the market economy. They were the largest ethnic group in acquisition of land, hence economically engaged in agriculture. They

preferred houses built in timber and palm; though they appear flimsy and substantial, the aesthetic quality of these houses are superb. Highly indigenous, the houses were built by generations of skilled carpenters using hard and durable wood in thin sections and careful joinery with the advent of nails. Some of its wall panelling was not made of timber but woven thatch made from a combination of materials found natively such as palm leaves or bamboo cut in various aesthetic patterns of expression (Beamish & Ferguson, 1989).

Unlike the colonial urban centre where houses were uniformly distributed in grids, Malay houses were laid out randomly. All were built to be movable, able to be dismantled and re-constructed in another place. The houses were raised above ground on timber supports in response to floods, animals and insects. This design not only addresses climatic responses in the tropics, but also the spaces below were used as an extended area for socializing. The design was different according to the geographical location along the peninsula but most of it would be compromised by a veranda, reception room, main house and kitchen at the back (Waterson, 1990).

Accessibility to the house was by stairs located at the front and the back. The demarcations of these staircases were profoundly created to separate men and women in their form of socializing (Waterson, 1990). Houses were decorated according to statuses and wealth of its inhabitants. The social significance of the Malay house was perhaps the strongest among all other ethnic references in colonial Singapore because of its sense of permanence and climatic responses. It was (and still is) a symbol of the socially independent Malay in defiance to urbanity. This is one of the reasons why, in the early years of National Housing Development, the Malays were hesitant of moving into the high-rise tenements. They were culturally and socially connected to their residential environment. The Indians and Chinese were not, as their acceptance to move out of the tenements was partially due to the unsanitary conditions of the houses themselves. The Malay house typology was so significant that when Raffles visited Singapore for the third and final time in 1822, he chose to build himself a wooden Malay-style house for the duration of his stay (Beamish & Ferguson, 1989). Raffles himself, with his experience in South East Asia, was equipped to conclude that this type of residential typology was most comfortably suited to the region. Unfortunately, in the 1960s, the Housing Development Board's mass programme of public housing eradicated these houses and its villages. Though some survived, it is now a relic not a living house representing the social and cultural background of its people.

3.1.4 Capitalism: The Driving Force in Creating the Pre-War Residential Patterns



Figure 3.2: A graphical representation of urban Singapore in between 1920-1940. Central to the port and market economy were the city's core shop-houses' residential typology of the Chinese and Indian communities. The Europeans were represented by their bungalow typology away from the crowded settlements. The hinterland was laid out without order, and inhabited by the Malays.

Up until the middle of the 20th century, these residential patterns continued to be a definitive urban pattern of Singapore. Places were marked by the strong identity of a segregated urban-scape created by class, occupation and ethnicity of its urban residents. This establishment became the driving force of its political social pattern. Key capitalist activity of each distinct community determined how they built urban spaces central to the growth of the city. Before the Second World War, Singapore was not an industrial city. Singapore is a 'Medieval City', established as an early centre of capitalist trading (Mumford, 1961) typified by traditional residential patterns of ethnic boroughs in citadel-like built environments. The 'Medieval City' according to Mumford (1961) did not engage in production but a vast market of distribution of material that originated from outside the city. Singapore served as a capitalist trading point from British Malaya as the biggest production of rubber and tin in the colonial world, shipped to the vast industrial heartland of Britain. Its capitalism force was port, finance and services. Its economy did not hold any major significance to industry as the bulk of its goods were transferred to other parts of the Empire, mainly Great Britain. A small degree of manufacturing did exist in the city's economy but they only benefited towards the needs of a small community.

The market commodity was the staple of its port where production in the hinterland made it possible to market specialized activities on a scale sufficiently large not just with the port and storage but also trading and financial activities (Huff, 1997). Huff (1997) asserts, "hinterland

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

producers will look upon ports focused on the characteristically complex of dealers, commission agents, brokers and exporters to other metropolitan markets." Singapore was connected to the hinterland of Malaya for the production of tin and rubber, similar to other world leading ports, such as Buenos Aires to grain, New Orleans to cotton and Rangoon to rice (Huff, 1997). The immigrant community was directly involved specifically in reference to many and various activities in the market economy. This large port economy was sufficient to support communities and the development of the city as a port.

3.1.5 Urban Pattern on the Brick of Social Breakdown

The market economy established the character of the city and its community, making pre-war Singapore a "thriving social world" (Fischer, 1975), a place for small minorities with enough 'critical mass' that enables them to create an isolated practice of culture within a diverse mix of other social backgrounds through commerce. This demographic peculiarity grew from its heavy dependency to immigration. The pronounced ethnic distinctiveness of these immigrants created separation from the indigenous ethnic hinterland population (Huff, 1997). This social political narrative would prove problematic when later generations of immigrants considered the port as their homeland, clashing with the hinterland population of Malaya after the Second World War. Singapore became viewed upon as a Chinese city under British rule. This identity was supported by numerous travellers describing Singapore as "a Chinese City within a European Settlement" rife with social problems (Huff, 1997). It was from this economic and social narrative that Singapore was shaped after the Second World War. Most profoundly, this background will create the political and spatial dynamics that paved the way for state-society relationships in post-war Singapore.

3.2 1960-1980: Rearranging Residential Patterns in the First and Second Generation of Public Housing by Stewarding an Industrial Economy

3.2.1 Post-Second World War Scenario

The Second World War severely affected the connection when transportation of goods to the West and production of raw materials stopped. Singapore survived with medium physical damage but with serious social problems in over-crowding and lack of housing (Beamish & Ferguson, 1989). With the re-establishment of international trade, by 1947 the demand for tin and rubber from British Malaya were back in high demand.. Singapore's population grew to almost a million, with

two-thirds of its population living in urban areas (Grunsvén, 2000). The 1957 census shows that the population grew at an annual rate of 4.26% between 1947 and 1957, rising from 988,000 to 1.45 million. Sixty-four percent of the population was locally born. Post-war environments' over-crowding of Chinese ghettos was because of intense diaspora during wartime in South East Asia (Harper, 1998). In the 1950s, there was fast re-growth triggering mass migration in the region due to the need of a labour force to reboot it. There was no readily available quality housing for the low-income urban group, thus transitional residences were made extensive from irregular housing and illegal expansion of the old traditional shop-houses found throughout the urban area. These kinds of residential patterns are described by (Marcuse, 2002) as a traditional tenement city; areas occupied by the labouring working class employed in the service sector, mainly in its port. These tenements were simply transitional residences on the way up, particularly for young families looking for opportunities to break away from their economic poverty.

The urban landscape was filled with periphery timber urban villages with 'attap',³ zinc or asbestos roofs constructed using temporary or semi-permanent building materials. These settlements were owned by one family or subdivided into small cubicles for a number of tenant families inhabited by the labouring class concentrating around the Singapore River. A quarter of a million inhabitants lived in such settlements from Telok Blangah to the west and Kallang Basin to the east (Housing-Development-Board, 1961). These neighbourhoods were usually filled with a mixed occupancy of those stably employed and those dependent on the informal labour market with close living quarters among the elderly, young families and youth. Tensions and hostilities between different categories of inhabitants can be part of everyday life (Marcuse & Kempen, 2000). These were the worst kinds of the housing stock making. Differential lifestyles between categories causes tension, racial problems, social isolation and fear to go outside at night (Marcuse & Kempen, 2000).

³ Attap: A type of roofing material that uses dry vegetation similar in fashion to straw and reed. An attap roof is made out of leaves of the Palm tree (*Nypa Fruticans*).

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE’S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY



Post-War Singapore 1950-1960

Figure 3.3: Post-Second World War Singapore. Intense migration added pressure to the pre-war urban fabric intensifying the density of its downtown. The periphery villages grew into becoming slums and more land was explored as the Malays moved further out into the hinterland. Urbanity was still separated by social and economic rights of each community but had spiralled out of control by the local authorities.

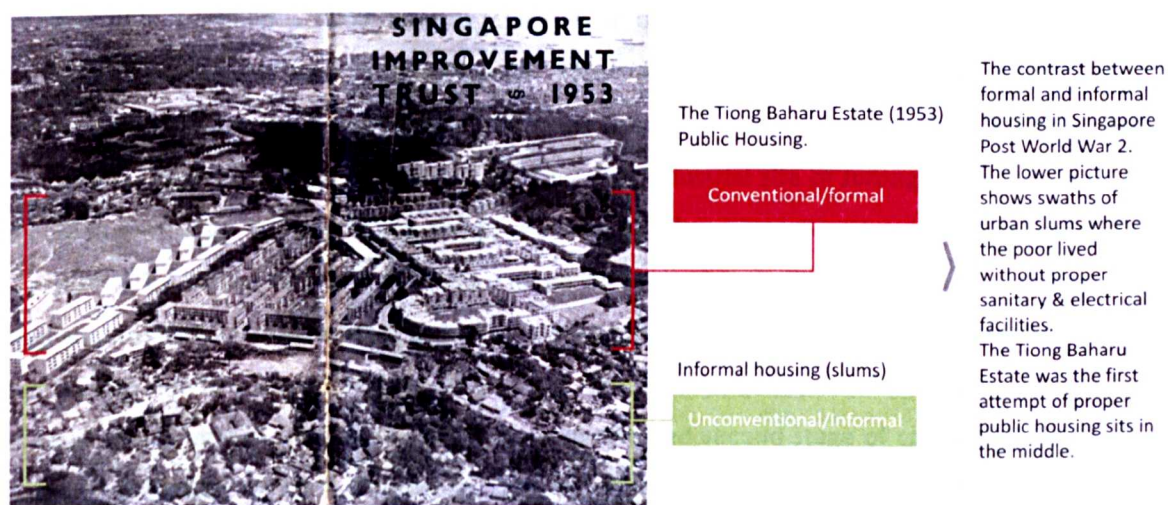
Historical materialism

	Asiatic Stage	Slave Stage	Feudal Stage	Capitalist Stage
Owners	State	Slave-masters	Land-owners	Bourgeoisie
Non-Owners	Villagers	Slaves	Landless	Proletariat
Mode of production	Self-sufficiency	Slavery	Agriculture	Industry

Figure 3.4: Historical Materialism: The progress of society by operation of economic forces by Karl Marx. This concept of historical materialism celebrates the background of residential patterns in Singapore outlying many of its political and economic conflicts by its inhabitants, possibly prompting the need to intervene by means of public housing. Source: (Lawson & Garrod, 2004).

3.2.2 The Early Attempts of the Singaporean Improvement Trust

The intent to provide quality housing for the poor in Singapore started before World War II in 1927 with the establishment of the Singapore Improvement Trust (SIT). The Trust did not embark on a huge scale relocation of slums and neighbourhood but built a few settlements for workers' housing based on ideas from Le Corbusier's emerging Modernist style in the 1930s. Unlike the HDB, the SIT did not have institutional power to alleviate funds in building mass quality housing for the poor. Hampered by lack of funds, the Trust's only substantial achievements were the upgrading of sanitary conditions in Chinese shop-house tenements by opening up the back-to-backs for ventilation and installing modern sanitation.



Picture 3.6: *The Singapore Improvement Trust Report 1953 booklet cover.* Picture source: (Housing-Development-Board, 1961).

Pre- and post-Second World War housing intervention under SIT only focused on appearance but no sympathy towards the plight of the Chinese working class community. Illustrated negative conditions of these slums were only described by their architectural and sanitary conditions. The darkness and stiffness of the shop-house cubicles, which Kaye (1956) took pains to illustrate, was of no serious concern to the dwellers. When the People's Action Party (PAP) came into power as the dominant political party in Singapore, they launched many political reforms favourably towards social reform and the creation of a more egalitarian society. The PAP approach towards politics arose in the wake of unjustified economic inequalities rife among the population during the period. Most of the root supporters of PAP were the disadvantaged urban Chinese population in the city (Stephan, 2003). This reform was Singapore's departure point of its full

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

transformation from port economy to an industrial city on a full governmental and institutionalized scale. The emergence of the PAP as a single dominant political power intensified efforts of continuing the social reform legacy left by the British colonials. It is incremental that, without the influence of the PAP, early efforts of mass-public housing in Singapore would not be possible (Loh, 2006). Furthermore, the choice to go high-rise was because many of its founding members were professionals with Western educational backgrounds who either studied or travelled in Europe during the post-war reconstruction period.

3.2.3 The Housing Development Board: Persevering Against All Odds

The 1960s' period saw the establishment of the HDB replacing the SIT. In its first three years, HDB was able to build 20,000 housing units in a programme of mass slum clearance and resettlement projects led by a prominent local industrialist called Lim Kim San. Lim himself was a prominent PAP member and, with support from the legislative power to the control of finance and land, led this huge scale of public housing building. The industrial site of Jurong was open south of the port to encourage manufacturing and production. This huge investment eventually became the JTC project (The Jurong Council). JTC was created to cope with the building industry and training skilled workforce in an area of heavy industry created away from the city centre. The creation of this industrial site needs mass housing for its workers. This investment by careful planning of industry and housing was vital in shaping the city into a fully-fledged second stage of capitalism. Singapore became an industrial centre in the region. The city still maintains its port activity, though not now more merely as a centre of depositary of goods but also for distribution of manufacturing and products. Jurong laid the foundations of many industrial periphery new towns like Toa Payoh in the late 1960s, Ang Mo Kio and Bedok in the 1970s and Huogang and Tampines in the 1980s (Beamish & Ferguson, 1989).

As Singapore grew, more of its outlying countryside was urbanized, contracting the residential spaces for Malays who were living in villages outside the city. Despite efforts to industrialize Singapore, residential patterns were still segregated as much as they were before the Second World War. Attempts made by the HDB did not make any huge impact towards the realization of combating the housing deficiency in the city. The 1964 race riots, however, marked the government realization to combat animosity and suspicion between all races to ensure political stability in the city. These culminating events proved that a multicultural society separated by residential patterns of different economic patterns was a major deterrent in attempting to create

successful public housing. The social and political hardship between the Second World War and its Independence fixated its ruling government towards solving the problem of overcrowding, insanitation and social control (Loh, 2006). From the post-war representation of the social pollution of shop-houses and village slums, an official policy of social engineering was drafted through the regulation of urban spaces. Rationalized by the sense of urban 'emergency', households were relocated en-masse as a spatial form of social mobilization to break down existing kinship and old community ties and create new allegiance between the state and its citizen (Clancey, 2003).

The problem is not unique to Singapore but was a common feature of a pre-industrial and early industrial city as it becomes organized, managed and contained in the 21st century (Fulcher & John, 2007). **The psychological state of the urban environment is also a contributing factor of animosity and segregation. The urban society was weakly integrated.** Singapore was laid out with the intention of no direct integration with reference to Sir Stamford Raffles' plan (Stephan, 2003). City dwellers had frequent but brief and superficial encounters among different people, races and gender rather than enduring strong relationships with respective differences. This weak integration meant urban life was unstable and liable to social breakdown. It is by this psychological affect that generations of racial conflicts were created between societies that were not integrated within its urban sphere.

One major narrative became the driven factor for housing and social intervention: the Chinese-concentrated deprivation in the inner city. The Chinese plight in pre- and post-war Singapore relates directly to the community struggles from immigrant to citizenship. The Chinese no longer saw themselves as a community of immigrants but Singaporeans. Their second generation was well educated mainly in Western schools and higher education. They also maintain a mind-set that Singapore is their home, different from their first generation settlers (Clancey, 2003). It is by aspiration that Singapore is now their home country. The same social representation can be agreed upon for the Indians too. **To establish this sense of permanence, it is best the deprived communities should be given opportunity to have a permanent home. The deprivation was also linked to the economic legacy.** The development of this public housing coincided with development of industrial sites to create an industrial working class society replacing the port and market activities racially linked with the many communities. While the SIT was oblivious towards the economic plight of the working class living in slums, HDB laid out plans on intervening household traditional dependency by integrating them with the nation's intention of industrial hegemony. This

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

impetus thus created a relationship between the people in the housing estates with the nation (government), severing their kinship or community ties, and hence stabilizing urban life from animosity and segregation.

The government viewed the new aim as establishing new loyalties to the state rather than have the subordinate classes challenge them. When political hegemony was achieved, many opposing left wing movements were detained, exiled to the Malay Peninsula or banished back to China and India (Loh, 2006). Thus, in effect, governed by strong political control, the government could uniformly focus on a singular social aim, thus being able to carry out large endeavours of social intervention throughout its urban environment. It was with this significance that the PAP in its first decade of power allowed the state to purchase and acquire private lands at a low price through new laws for public housing programmes. This narrowly defined social and commercial life in HDB estates with the new roles of the labour movement, mass media and educational system in its emerging economy by industrialization (Rodan, 1989).

3.2.4 Transforming the Colonial Residential Patterns into High-Rise Settlements

The first decade of high-rise housing transformation officially began between 1965 and 1970, marked by mass public housing programmes of resettlement focusing on racial ghettos and slums around the city. The resettlement plan was backed by governmental legislation and funds to provide better housing settlements for deprived people in the city. The clearance of slums was rigorously pursued, such that by the end of the 1960s almost all had disappeared from the city (Stephan, 2003). The affected population was offered no option but to move to the public housing developments in the city. The clearance of the slums also served another element of government policy of integration of all ethnic groups. The need for ethnic communities to intermix enduringly rather than in superficial encounters meant the government needed to stop the ghettoization of each respective community taking place in the city (Stephan, 2003).

By the end of the 1960s it had become increasingly objectified that almost all communities' ghettos were displaced, distributed homogenously in all public housing estates. Specifically, in 1969 the decision was taken to remove spatial concentrations of Malays and to disperse the community across the new public housing estates in the city (Grunsvén, 2000). It should be noted in this context that the political relevance was done to de-cluster the electoral votes of the Malays in the Geylang Serai/Eunos areas. De-clustering could pacify the strong articulation of interest for democratic rights in particularistic interest, demands or dissatisfaction by groups classified by the government as

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

threatening or de-stabilizing racial order in the urban environment. The government by dominant rule of the PAP wanted to minimize political pluralism and pacify polarization by segregating races in new housing complexes. Large-scale relocation ethnically mixed residential environments in public high-rise housing estates. Such environments were seen as the ideal for physical context to increase inter-ethnic contact and understanding (Grunsvén, 2000). The sort of stereotyping which had prevented socio-cultural integration, the source of animosity and distrust among communities, would gradually disappear in generations to come within these high-rise public housings across the city (Grunsvén, 2000). This model is highly controversial as the removal of significant segments of the population from their traditional housing patterns, environments and sense of place is deemed fascist by some, but the incorporation was also necessary to bring socio-cultural change as well as the adaptation of new values necessary for urban change in Singapore. This move controversially is a factor of why high-rise public housing works in Singapore.

The resettlement programme broke the traditional Chinese characteristic of social life that centred around Clan Houses, which were the driving force of community life before and after the Second World War. By the end of 1960, the social deviant activity was almost wiped out from the streets only to survive as underground criminal activities. The incorporation of the inhabitants into the industrial economy was able to eliminate the Chinese casual worker who, in reference to vagrancy, was described by O'Connor (1963) as "the most helpless, and therefore the most illuminating, of any large army of those outside the establishment, among whom we may include the very general, the criminals, the lunatics." The great official fear against this class was their sheer elusiveness that they are beyond the reach of the new state and most often linked with anti-social behaviour towards the public.

The PAP highlights that the growth of densely built housing in villages at the edge of the urban core with their own community and social norms with physical and social margins is dangerous, thus needing to be pushed back and restored (Douglas, 2002). In the minds of the post-war planners, this form of urbanity is a growing formless menace to the uniformity of neatly-organized modern blocks of high-rise housing. The official classification of the urban village dweller as an illegal squatter was one of the many marks of criminality stamped upon them and was part of a larger endeavour to show how crime was not something exceptional, but also something ordinary and genuinely social (Chevalier, 1973). This narrative subjected people living in these periphery urban villages to move forcefully into the newly-built HDB flats. Areas were occasionally described as

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

'Black Areas', subjected to this social and political discipline of the 1960s' and 1970s' justified clearance for social housing. The dissolution of these urban villages transformed the Chinese working class from a mobile class to one of fixed space and economy, where, increasingly deprived of subsidiary forms of work, they came to accept their role as a worker-citizen in the new economy (Clancey, 2003). The act of pacifying multiculturalism to a minimal level was Singapore's legacy in public housing during its first decade of public housing by the HDB. The approach was one of the most successful yet controversial foundations to integrate ethnic communities into mixing to stop rampant polarization compared to other cities that failed in their social housing programmes.

3.2.5 Economic Integration into the New Industrial Economy

Rearranging the residential patterns was not the only dominant intervention made by the HDB. The government recognized the need to integrate the economic workforce of its people away from its colonial legacy. Cities evolved in relationship to capitalism and consumption borne by its inhabitants. Embarking on its own version of a capitalist city, Singapore could only function if the employer (potential capitalist) was provided with an educated, healthy and housed labour force that was able to work. Castells (1978) asserts that employers would make a profit if the cost of providing these facilities were borne by the state. This is called collective consumption. By this, labour was not obtained from the market on an individual basis but collectively, provided by the state. Replacing its inhabitants from their traditional setting meant their traditional economic dependencies positively changed. This factor eventually hugely complemented the high-rise re-housing programme.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY



Picture 3.7: Post-war depiction of street life in inner city slum within the downtown core of Singapore. This is Chinatown in 1970. Picture source: (URA, 1970).



Picture 3.8: Shared living spaces in Chinatown, 1953 in post-war Singapore. Considered the poorest form of accommodation at that time where inhabitants, mostly immigrants, lived in cramped rooms decked among each other. Picture source: (URA, 1970).

Basically, by the end of 1965, Singapore's sectorial structure of the economy was ranked in order: commerce, 27.2% (port), finance and business, 16.6%, manufacturing, 15.2%, transport and communications, 11.5%, construction, 6.5%, utilities, 2.2%, and unidentified others, 17.6% (Singapore, 1965-2009). Polarization by ethnic background to sectorial structure in the economy was high. Commerce (port) was heavily Chinese, construction and utilities were mainly Indians and the unidentified others were mostly Malays with their rural informal economy independent from the global economy. These statistics would change five years later with commerce, 27.4%, manufacturing, 20.2%, finance and business, 16.6%, transport and communications, 10.7%, construction, 6.9%, utilities, 2.6%, and unidentified others, 12.9% (Singapore, 1965-2009). These figures illustrate a significant rise in manufacturing while there were decreases in other informal economy.

The rise in manufacturing suggests changing economic patterns affected by urbanization, particularly in the opening of new urban settlements near to industrial sites. The change from plural traditional economy to singular enterprise in manufacturing supported why the high-rise residential housing was able to survive its second decade as a successful form of social housing. This trend continued steadily into the third and fourth decade making Singapore one of the highest paid societies in Asia. The affluence of living supported the up-keep of these high-rise housing developments (Grunsvén, 2000).

The failure of other projects in the West, like the ill-fated Pruitt-Igoe Housing Development, was not entirely because of its architectural design but because of the social economic background of its people. It was intended for the development to be inhabited by young middle-class white and black tenants with separated blocks that ideally did not support the idea of integration among different races; when it was occupied, people were housed racially into different blocks. Eventually the concentrations of families living in it were the poor and they continue being poor without any social economic advancement to support living in high-rise housing. The poor do not have the economic wealth to spend on resources like day-care and maintenance in high-rise buildings. The area continues to be deprived. Ideally, the settlement was doomed to fail from the start in Pruitt-Igoe, not because of its architecture but the programme and social support do not take into account of the sustainability of its inhabitants by social-economic means.

Singapore recognizes these issues before they embark on resettlement and public housing. Economic and cultural sustainability does affect the success of its high-rise housing programme. Planning the urban environment is not a neutral bureaucratic process, for its process and decisions are shaped by class interest and class power (Fulcher & John, 2007). Extensive literature by Chiu, Ho and Lui (1997), Perry et al. (1997) and Rodan (1989) shows throughout the next decade four dominant and interlinked characteristics influenced Singapore's success in urban change: continuous high economic growth, structural transformation of the economy and of economic sectors, a profound role of international capital, and a significant role of government in the economy. During the period 1965-1980, its GDP growth was substantial, on an average annual rate of 9.1%. The second decade of high-rise housing development in Singapore was done in the interest of shaping an effective working class society. It is also in the interest of the government that this would eventually progress into becoming a middle-class society. This was done by changing the urban environment from its traditional racial class segregation communities to an integrated skilled working class society for manufacturing and industry (Grunsvan, 2000). The new working class with the acquisition of wealth would sustain living in these high-rise residential tenements.

Progressively each household was given the opportunity to own the tenements, paying back the HDB in mortgage, putting further future sustainable investment into the programme. Most inhabitants moved into the housing developments as tenants but were offered the opportunity to own the apartments with a low mortgage subsidized by the government. This cycle of economic and financial sustainability ensured the success of high-rise living in Singapore. By 1973, its inhabitants

own high percentages of the HDB flats, very different from the slums and villages that used to occupy the sites. To further encourage positive acceptance into high-rise housing in the second decade, HDB also invested in improvements of construction details, floor layout, and treatment of external spaces or estate management. The first generation of its high-rise public housing was often criticized for being too impersonal, too monotonous and too overwhelming. But the measurement at the time was quantity and the criticism was put side by side in comparison to private housing. Private housing was designed for the higher market, and therefore not affordable to the working class. The social-economic plan was, however, in favour of the working-class community and the objective of the first decade was to build as much public housing with the amount of money HDB could amass in its first decade.

Despite the criticism, in 1973 it is estimated about two-thirds of Singapore's urban population lived in these high-rise housing estates and it is generally recognized that life has improved for the inhabitants living in it (Singapore, 1965-2009). Housing units were built large, with 3-4 bedrooms. Despite being addressed as high-rise tenements (tenant meaning 'rented'), in the second decade of public housing most of the units were owned by their inhabitants. This is due to the ownership policy that became a key target of the state's social intervention, ensuring further sustainability in managing the high-rise residential developments. Ker (1973) states "in reflecting on problems and prospect in the second decade of housing insists on infilling vacant plots of land existing within the developments. It has become less attractive to rely on the central city for essential facilities. The emphasis should be turned towards a greater degree of self-sufficiency. Future and existing public housing is likely to be a pattern on this." Though the language of sustainability did not exist until the beginning of the millennium, this statement is similar to the concept social sustainability.

3.2.6 Successful Social and Economic Shifts in the First and Second Generations of Housing

The first and second decades of housing in Singapore were highly successful solely not because of the building programme but also the consideration of the power relations built by the state and its society engineered to fit into the newly-built environment. The period between the Second World War's end and the early 1960s was important for social and economic intervention, allowed by a powerful political body able to transform overt forms of resistance from below and eventually transformed the society in the formation of a new nation-state. Most importantly, in its first decade of housing, Singapore set the foundations of its high-rise legacy, not only in its built

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

form, but also by carefully craft of engineering its inhabitants who were living in it. Where most processes of removing communities from their urban environments met with many degrees of failures, Singapore succeeded because of its institutional settings that aligned with the plight of the working class who became inhabitants in these residential developments. These successful top-down initiatives came to the realization of fully utilizing its city space to vertical, high-rise, high-density residential complexes (Takahashi, 2009).



Figure 3.5: 1960-1970: Intense housing programme replaced all of the periphery slums and urban villages. The island expanded into an industrial economy.

The economic change experienced by its inhabitants raised the household incomes of the majority of working class people in these high-rise tenements. Taking advantage of this HDB offered accessible financing to support public ownership of these developments. By end of 1970, the government was able to raise the public ownership level to high levels. The policy of purchase rather than rental became incremental, for HDB recognizes how the sense of permanence is important for the development of the nuclei family ensuring the stability of any household in the residential development. According to Takahashi (2009), the striking rate of housing ownership attests to the availability of financial assistance. The HDB public finance sector was set early in its housing development to enable potential homebuyers to utilize subsidized mortgage rates for a unit. In sum, Singapore is a good case where indications of these three factors are needed for great achievement in the public housing programme. First, these kinds of housing projects must break ground at the initial phase of the development. Substantive success of public housing developments depends in part upon early implementation before cities become rampant and disordered. Second, the arrangement of institutional and administrative settings must be established, with strong political

resolve and stringent regulations. Third, the availability of financing services to render the poor eligible for housing development should be ensured (Takahashi, 2009).

This success continues into its third evolving state, bringing the idea of high-rise residential design towards further endeavour to the concept of quality living. This continuous pursuit and investment towards enhancing the living experience in high-rise residential buildings would not happen if there were no substantive foundation for intervention to steward change in residential patterns and economic dependency of the targeted working class. Mukhija (2001) wrote that the results of these circumstances caused the intended people in need of help not benefitting economically in living in these high-rise residential units. Above all, most history of housing development in the third world (note that in 1960-1980 Singapore was considered a third world nation) demonstrates open market solutions have not worked very well to alleviate the urban housing crisis (Takahashi, 2009). Singapore took control of its housing market, and therefore had the ability to overcome its housing crisis. Furthermore, they succeeded in introducing an urban singularity to the whole island in a form of high-rise developments. The programme defended the urban poor, putting them within the contemporary development planning and therefore giving them the ability to climb the social ladder in economic wealth.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY



1



2



3



4

Pictures 3.9 to 3.12: Various pictures depicting high-rise residential complexes developed between 1970 and 1980. By the early 1970s the housing shortage in Singapore had been solved. This period of development marked a gradual shift in emphasis to address the needs of a new range of flat seekers: the baby boomers and middle-income groups. These needs were manifest in greater provisions of open spaces, playgrounds, landscaping and larger 4-room, 5-room and executive flats. In terms of social spaces, these 'New Towns' were provided with a town centre, bus interchange, neighbourhood centres, sports complexes and landscape parks within the grounds of the development. 1, 2: The Ang Mo Kio Complex. Built in 1973 with greater diversity in layouts and greater provisions of social spaces. 3: Toa Payoh. One of Singapore's most celebrated housing developments. The complex was built in the wake of a huge fire. 4: Jurong West New Town Development. Jurong West was built as a population centre to support the industrial activity in Jurong at that time. Picture sources: (URA, 2005).

Though its inhabitants have not yet reached a form of wealth above the working class level, it is sufficient to sustain the upkeep of these residential high-rises. Moreover, this sets a form of mentality towards the culture of living in high-rise residential developments providing an essential relationship between the inhabitants and the upkeep of the built environments. Likewise, the first awareness towards building social and public spaces in the built environments starts with public

investment in the upkeep of their surrounding environment (Carr et al., 1992). More importantly, this opens up an operation of markets in the high-rise housing when inhabitants wished to exchange money for social services mainly in the form of active and passive spaces. Positively, this gave advantages towards the development of the high-rise units, as it enables the design to innovate within the sphere of quality living. The legacy of this value is strong, in that, even though policies changed, the need for quality living became the necessity of all high-rise housing projects in the future. By philosophy, the built environment needs evolution. It is important that change welcomes the future and accommodates the present without severing the thread of continuity with the past (Burtenshaw et al., 1991). It is by this past of providing quality living and the singularity of the high-rise setting that it became a realization to build the Pinnacle @ Duxton with its social and public spaces in the sky.

3.3 1980-2000: The Consumer Economy and its Influence on the Third and Fourth Decade of High-Rise Residential Design in Singapore

3.3.1 Higher Wages for High Productivity to High Consumption to Empower the New Economy

Gottlieb and Glaeser (2006) stated two essential elements of spatial economics that affect urban resurgence in the consumer city. First, consumer cities need to have higher forms of wages by their inhabitants. By this, people would be willing to live in the city centres. A high-density city centre becomes a form of attraction with the anticipation that higher wages bring more value of urban social amenities. With higher wages are more willing to spend money on hedonistic experiences, thus creating the need and economy for spaces to support these activities. This willingness correlate will create a reason for people to live in cities instead of moving into other forms of urbanity like low-density suburban housing. This principle supports why high-rise housing continued to be in demand as the preferred form of housing by Singaporeans in the 1980s. Singaporeans saw this opportunity in terms of spatial economics that it is more affordable and attractive to live in the high-rise environments closer to the city. Their higher wages meant they could have obtained social facilities. Figure 4.6 shows a substantial rise in income in comparison to the residential high-rise building boom (Figure 4.7) within the third and fourth decades.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

Monthly income (S\$)	Total 1980	Total 1990	Total 1995	Chin. 1980	Chin. 1990	Chin. 1995	Malay 1980	Malay 1990	Malay 1995	Indian 1980	Indian 1990	Indian 1995
Below 1,000	57.6	16.0	11.6	56.9	15.7	11.6	67.7	17.0	10.5	61.6	16.7	12.7
1,000 1,499	16.7	13.6	8.8	17.1	12.8	8.2	17.5	18.7	12.8	15.3	14.4	9.2
1,500 1,999	9.6	13.5	9.3	9.9	12.7	8.6	8.5	18.3	14.1	8.8	14.2	10.1
2,000 2,999	8.6	20.1	17.7	9.1	19.6	16.8	4.8	23.4	24.2	8.1	21.6	17.7
3,000 3,999	3.5	13.0	14.1	3.6	13.3	13.7	0.9	11.6	16.3	3.0	13.0	16.0
4,000 4,999	1.7	8.2	10.5	1.6	8.6	10.7	0.3	5.6	9.5	1.3	7.4	10.9
5,000 and over	2.3	15.6	28.0	1.8	17.3	30.4	0.3	5.4	12.7	1.9	12.7	23.4

* Although these incomes are nominal incomes, price inflation has always been very low in Singapore; therefore the figures are comparable between the years.

Source: Department of Statistics (1997)

Figure 3.6: The overall substantial income below 1,000 SGD was 57.6%, representing half of Singapore's population. By the beginning of 1990 that figure dropped to 16%. The rising wages shows Singaporeans advancing into a dominant middle-class society. Higher wages attained by the middle class meant they have more purchasing power to spend on consuming. In terms of spatial economics, they can demand better quality design and value in social amenities. The logic is, compared to the working class, the middle class has more recreational time and are thus willing to spend money on socializing; hence, the need for public housing to evolve tailoring to the needs of this new dominant class. Source: (Grunsvén, 2000).

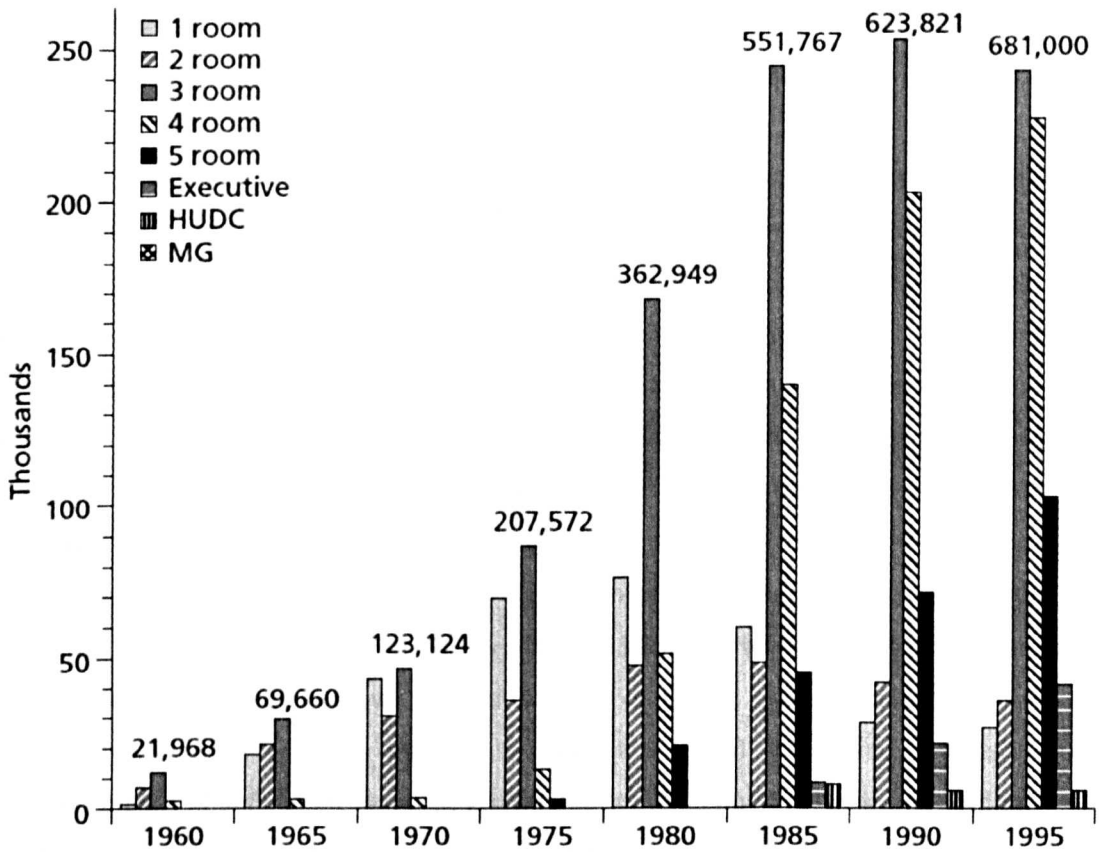


Figure 3.7: The sudden rise in demand for three-room units shows the baby boom period between 1980 and 1990 that correlates with rising income and wealth. The 1980s mark the beginning of the consumer economy that sparks the rise of the middle class that became the dominant group in Singapore. This rise correlates with Figure 4.6 that shows the nominal income of a household unit gradually rise from 1980 to 1995. Source: (Grunsvén, 2000).

The second element of spatial economics asserts that cities with the producer advantage (high productivity) will have firms locating themselves within the vicinity of the particular city, thus providing employment with a likely higher wage due to high production outputs. This framework implies that higher wages give high levels of productivity and high wages affects cost of living, consequently influencing consumer amenities. If the high nominal wages were not accompanied by high productivity, then firms would leave. If the real high wages were not accompanied by amenities, then workers would not flock to the city (Gottlieb & Glaeser, 2006). Gottlieb and Glaeser (2006) explain this framework by suggesting three important metrics of urban economics to steer success in any urban building: Population Growth, Income Growth, and Housing Price Growth.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

Population growth captures the quantity side of popular demand to live within the city confines without migrating to other forms of urbanity. Nominal income growth implies rising productivity. Housing price growth implies a greater willingness of consumers to pay to receive a place's bundle of wages and amenities.

This measurement on its own does not imply total success but, taken together with the combination of a rising population, income and jobs ensure healthy urban growth. In the case of Singapore, this steadily affects the building and evolution of its high-rise residential programmes. The household income continued to expand throughout the third decade, affecting the new generation of people living in it. Rising household income also meant bigger size in the Singaporean family unit. Whilst typically in America the baby boom years signal growth in suburban housing, Singapore on the other hand expands in the form of urban high-rise residential blocks. Sixteen New Towns were built in this one singular urban entity during the third and fourth decade programme. This overview of housing characteristics can be found in extensive literature: Wong and Yeh (1985), Perry, Kong, and Yeoh (1997) and Siew Eng and Kong (1997). As urban decline is usually reflected by the durability of the housing stock (Glaeser & Gyourko, 2005), and declining cities were easily predicted by the declining household size throughout the third and fourth decades, Singapore continues to expand defying these terms. Both durability of its housing stock and continued rise of its household size happened within the high-rise environment. By the middle of the 1980s Singapore achieved one singularity in its urban identity, the High-Rise City.

3.3.2 The New Metropolitan Culture

In terms of its social, political and economic structure, the third and fourth decade period saw employment trends shifting from being labour-intensive and less technologically-based activities to the creation of jobs in higher value-added markets and high technologically-based activities. This change is significant to the second generation living in the high-rise housing who benefited from the social and economic wealth obtained by the first generation who lived and benefited under the first and second decade housing programme. The second generation are better educated, thus went into higher-qualified jobs. Manufacturing therefore shifted from low tech to high tech.

The first generation was a working-class society. They have less time for recreation and socializing, hence there was less need for elaborate design in places for social and public engagement. It was not until the emergence of a dominant middle-class society that the concept of making places came into effect by realization of urban design in Singapore. Singapore wants to

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

express its sense of identity, culture and place. This need for identity culture and place is a personification of a consumer city. A consumer city is defined by four factors. First, a city is reshaped by investment by means of consumption. Beginning at the end of 1980 onwards to the year 2000 Singapore has managed to transform itself into a centre of consumption, attracting consumers and tourists from the South East Asian region. This proof of mass consumption was the rise of Orchard Street as a regional shopping street on a par with the Champs-Élysées, Paris or Oxford Street, London. These places of consumption were constructed with the high interest of marketing the city image, which is the second inaugural factor that defined a consumer city. These affectively influence architectural expression in residential high-rise buildings. High-rise settlements became more important and extravagant when compared to the functionalist first and second generation high-rise housing. Social and public spaces were designed in specific detail, providing comfort and quality for social and public engagement of the public at these places of consumption. Contributing to the use of these public and social places is the employment and service that supported this service-based economy. With the disappearance of some local low tech manufacturing industries, culture becomes the business of cities (Fulcher & John, 2007).

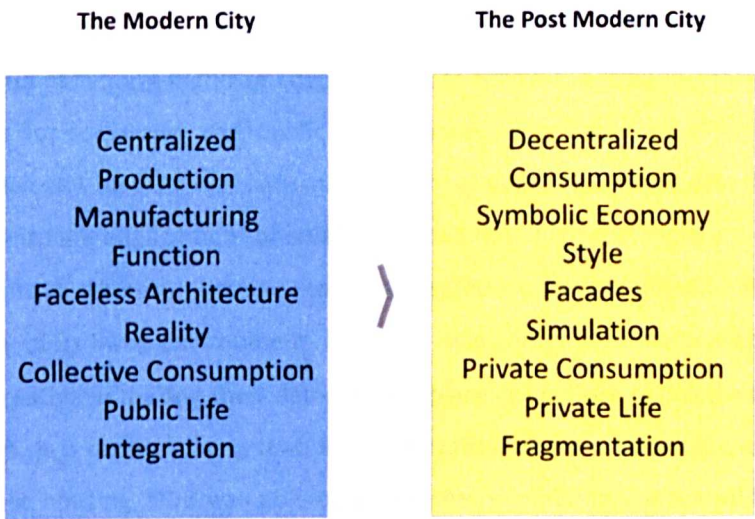


Figure 3.8: Having achieved its economic and social status as a modern city with continuous growth, the period in between 1980 and 2000 was the city's transition into becoming a postmodern city. Source: (Fulcher & John, 2007).

From 1990 onwards, culture became an important activity of the consumer city, although it cannot be concluded that the industrial economy has disappeared completely; it is still being produced but with greater design and larger value. Manufacturing in high-labour factories was replaced by technologically-based activities. The production of higher-skilled jobs readily supplied by the growing educated middle-class society further complemented the consumer economy. The image of the city became an important factor for attracting investment through 'place marketing'. To do this, new sectors of the economy were created, like advertising, public relations, media designers and software companies of various other new industries to make and sell images. This is the fourth factor of a consumer city.

The growing economic importance of culture, tourism and education eventually gave the city its new breath of life of reinventing itself in order to sustain growth without succumbing to urban decline. More importantly, the growth created a more highly-educated society by higher cultural complexity and being deeply rooted in urban life by the background of a high-density environment. This brings in other business into the symbolic economy where people can locate themselves where employees want them to be. The effects from all these factors suggest new interests in public investment towards making places for social and public engagement. The cultural aspect of city life became more important and the production of culture increased. These effects elevate the concept of living in high-rise environments to follow suit in having the same architectural quality of spaces for socializing and public engagement experienced on these shopping streets. Housing quality was not focused narrowly into residential units themselves, but the restructuring of their inhabitants into the engagement of creating a new urban high-rise society.

These shifts in value and the new economy created a society in demand for spaces of culture within the vicinity of its living environment. Aware of its high-density environment, they recognized the need to be creative in making their demands for places of culture respectively limited spaces in high-rise buildings. It is not surprising that, in its realization of these circumstances while providing demands for public housing, HDB was able to accept the revolutionary proposal for the Pinnacle @ Duxton.

3.3.3 Goldthorpe's Embourgeoisement Theory

Grunsvén (2000) concludes this economic restructuring in the urban environment was less marginalized and impoverished to any groups of race as had been illustrated in the post-Second World War era. Furthermore, the upper class started to expand, to include a number of extremely

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

wealthy families strongly dominated by the Chinese. The middle class grew bigger, heterogonous in income, ethnicity and household characteristic. This is strongly expressed by Goldthorpe (1964) 'Embougeoisement Theory', which illustrates wealth of nations representing the diamond shape class structure compared to the pyramidal form mainly associated with poorer countries.

The Embourgeoisement Theory

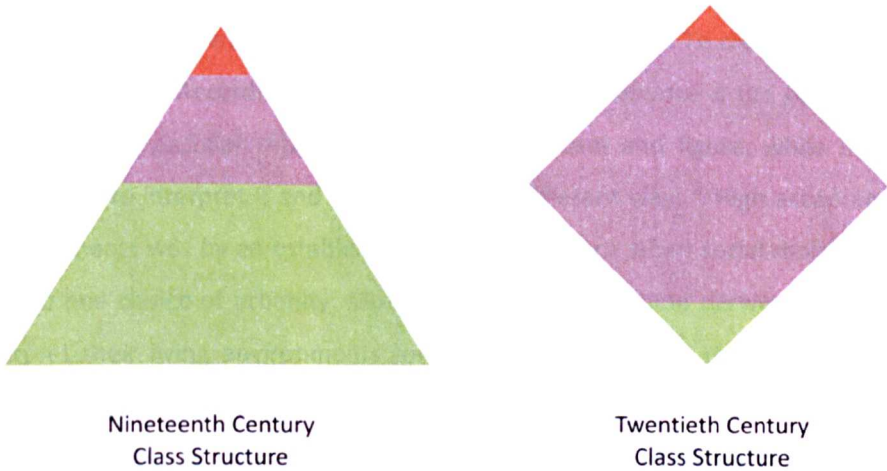


Figure 3.9: The 'Social Embourgeoisement' theory adapted by Goldthorpe (1964). The image above illustrates the effects of social and economic restructuring by public housing in Singapore throughout the first and second decade era that helped create embourgeoisement for its residents.

It is important to state the strong interventionist role by the government within the political and economic sphere played a positive role in encouraging social mobility to people living in these residential high-rise complexes. Social mobility refers to the movement of individuals or groups in social position over time. The term refers to all kinds of mobility among classes, ethnic groups, or entire nations by the measurement of health status, literacy, and education. However, it is more commonly referred to individuals or families to their change in income, wealth and purchasing power (Grusky & Manwai, 2008). Vertical mobility in Singapore is high by movement of individuals or groups from one socio-economic level to another. This verticality is highly represented by rising household income. Statistics in 1980 (Figure 4.6) show 57.6% of the population were below the income level of SGD 1,000 per-month, but by 1995 it shrank to become only 11.6%. Collectively more than 50% of its inhabitants earned more than SGD 2,000 per month in the year 1995.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

It is best also to summarize that the previous interventionist role spans inter-generationally between the inhabitant's parents and previous family generations. Effectively the architectural background of this vertical mobility was in the high-rise, high-density environments consequently benefiting growth of the typology as the dominant urban setting. As the only available typology for housing, the output of greater wealth and high home ownership creates permanence to Singaporeans living in their high-rise urban environment. This establishment of the 'Genius Loci' cultivates the sense of living in the high-rise environments. To create a sense of place is to established permanence. According to Schulz (2000, p.34) permanence is the genius of the place "which is to say its own peculiar relationship with space, form and figure, while the mutability derives from the need to interpret it and reinterpret it in different ways." High acceptance to living in high-rise environments was by an establishment of permanence when social mobility and wealth were trapped into one choice of urbanity. Mutability on the other hand derives from the need for people to interpret their living environments forming new expressions to their social and public spaces in high-rise complexes.

The identity of place is assured by routine ways of building and by architectural style. This means that space, form and figure constitute the formal language that makes possible an unending array of new interpretations, in relation to specific tasks of building. This foundation from the success in public housing manifests itself as high-rise, high-density residential complexes creating place for social and public spaces. This evolution in Singapore suggests why the housing market, mainly its high-rise residential developments, has been able to survive and evolve gracefully into its current experimental typology, the Pinnacle @ Duxton.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY



1



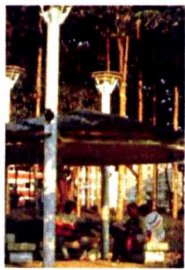
3



2



4



5

Pictures 3.13-3.17: Various pictures depicting high-rise residential complexes built between 1980 and 1990. The housing complexes were built in higher density. Compared to the housing projects built in the 1960s and 1970s, these complexes were built in greater diversity, both externally and internally. The grounds of the complexes were filled with amenities for public and social gatherings, depicting the new affluent middle classes living in them. 1-5: Picture sources: URA (2005).

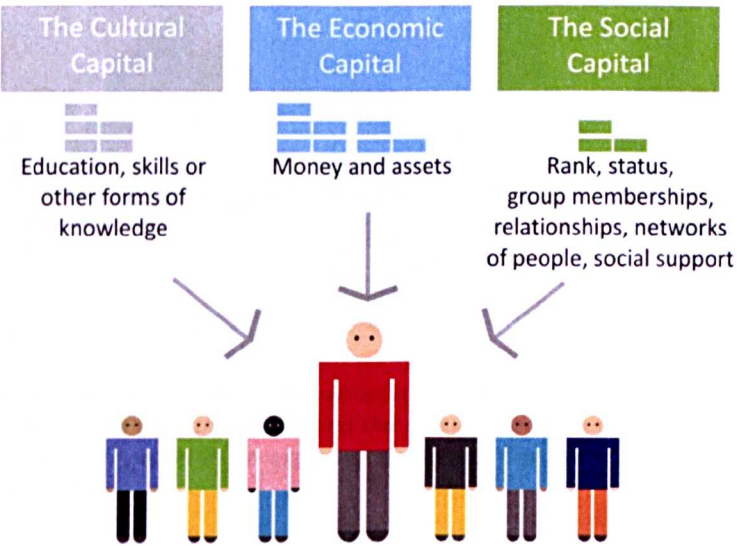


Figure 3.10: Social Mobility Theory adapted from (Bourdieu, 1983) outlining the three factors of class mobility in a functioning society.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

It is yet to be defined whether the concept of place making in high-rise residential developments would evolve into built places that would carry qualities similar to successful old world typology in its streets and squares. However, this thesis can suggest, in order to make good social and public spaces in high-rise and high-density environments, it is important to assess the class fractions of its inhabitants for it determines what kind of spatial provisions could be provided for communities living in the high-rise environments. Successful social mobility within two generations of its actors saw the 'embourgeoisement' of its inhabitants while adapting housing in accordance to changing social needs. There is no best example of shifts in urban typologies that typify the middle class moving into low suburban environments in other countries. The continuous building of the same high-rise typology growing with more architectural complexity, amplified by rising metropolitan cultural needs of its new bourgeoisie society sustained its evolution greatly. This architectural complexity would not happen if the people living in the high-rise residential buildings were to continue to be tenants and remain stuck in their social classes. Furthermore, systematic arrangement of institutional and administration settings established in the first and second decades with strong political resolution and stringent regulations are clear successive features in public housing.

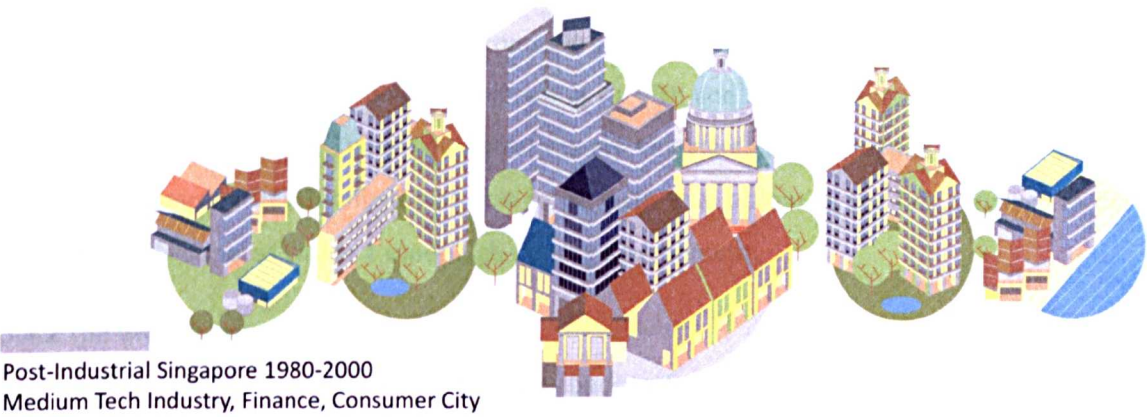


Figure 3.11: The years in-between 1980 and 1990 witnessed unprecedented growth, turning the working class majority into an affluent middle class thus sustaining the consumer economy. Architectural-wise, the housing sector entered its postmodern period in an explosion of identity and sense of place focusing on the city's colonial and climatic heritage.

3.4 2000 and Beyond: Singapore as a Global City in the Fifth and Six Evolution of High-Rise Housing Policy

3.4.1 The 2003 New Singaporean Masterplan

As the result of economic prosperity, the fifth and sixth housing policies changed from macro to micro as globalization brought the emergence of a multi-layered city of growing heterogeneities, fluxes and inconstancies (Marcuse, 2002). These new waves of change appeared by the influence of the new divergent economy, politics and society. The effects of these changes towards the built environment are the shifting development onto the global creative movement. As entrepreneurship and creativity became the central underpinning of urban competitiveness, there must be changes in urban planning strategies to support and improve flexibility in the land market to support this.

To do this in 2003, The New Singapore Masterplan was created replacing three decades of land use and masterplanning that gives greater choice of locations and flexibility, moving away from prescriptive land use towards an impact-based zoning scheme. The implication of this perspective is a liberalization and recasting of urban development that strengthens creativity cultures in the city encouraging flexibility and innovation in spatial design (Soh & Yuen, 2011). Having achieved an urban singularity of high-rise tenements, this implication encourages creativity and innovation in building better designs. This new wave of change comes in two major narratives that became the spotlight of many residential high-rise buildings developed in its fifth and sixth decade, first: Green Urbanism and second: Gentrification. These two narratives are key elements to why the Pinnacle @ Duxton Plain Public Housing Development was able to be built, thus becoming the first typology to design social and public spaces within a super high-density environment.

3.4.2 The Green Legacy

Singapore's Green Plan traces its history back to 1960 in its first generation housing policies. Its initial thought for the Green Plan was not on the social public basis but as an idea of creating an urban environment with clean and healthy air to breath. It is a concept that traces back its hereditary features to modern architecture in retrospect to the architectural approach of all its public housing stock from the 1960s right to the end of the 1980s. The effects of this policy saw the creation of vast open spaces on the ground level of public housing. This phenomenon was one of the major aspects of modern planning during the time. Urban greenery is a necessity to the foundation

of modern cities for health reasons. The second reading of the Public Environmental Health Bill in 1968 continued to strengthen this concept to further invest in making more parks in the city. By careful land use, through planning and effective pollution control, Singapore had become a world-renowned 'garden city' by the late 1980s, a testament to the country's success in achieving environmentally-friendly economic progress (Wong et al., 2008). The effects of the intense greening of the city during its early years of planning and building unexpectedly became an invaluable asset for identity and the image of changing urban form from modern to postmodern. Finding itself as a city evolving from an industrial-consumer-global city, this asset became its major image and identity. This impetus eventually launched Singapore in its global city brand, 'The Garden City' because of its streets lined with large canopied trees and rain-forested environments in the city.

Pressure by demands for new open spaces caused city planners to consider looking skywards and create rooftop greenery. This approach quickly became the main public policy in growth and development, such that by 2001 commitment to further greening of the city was announced, its public sector taking the lead in implementing sky deck greenery in their public housing estates and public buildings (Singapore Government Press Release Speech by Prime Minister Goh Chok Tong, 26 June 2001). This prime consideration for greening up the sky was put in writing by the Urban Redevelopment Authority Plan (2001) to target at least a 0.75% hectare of parkland per 1,000 population in their vision. The main strategies of urban greening include three objectives of development: first, the creation of more parks and gardens including 'gardens in the sky'; second, the safeguarding of its natural heritage, which includes its rain and mangrove forests; third, designing parks and gardens to be more accessible to all, including the elderly and disabled. According to Yuen and Hien (2004), this approach is to provide 'seamless greenery' through a network of park connectors and opportunities for greenery to occur beyond ground level. Essentially, nature trails with resting places, and jogging and cycling paths will connect all parks and open spaces to form a continuous corridor. With 'places' having a density population higher than medium- and high-rise buildings these connectors will rise vertically.

This notion was initially pursued only to facilitate the use of flat roofs in the late 1990s as roof gardens. By the year 2001, it had been reviewed with potential to include sky bridges, sky terraces as vertical gardens to form an overall percentage of parks in super high-density areas achieving the percentage target per 1,000 population. This revision eventually gave greater flexibility to design larger and better vertical gardens that include quality social public spaces beyond the

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

ground that imitate a similar quality to the ones on the ground. Furthermore, ground spaces are becoming more premium, especially in the downtown core that invest in parks and gardens, guaranteeing smaller returns to property development. The motivation for vertical greenery allowed developers to design ground spaces as commercial in a residential development moving away from its 1960s' approach of leaving it empty as a multi-purpose space. However, there is still a seeming reluctance among the local building professionals to include green roofs in their projects namely because of concerns over a lack of appreciation by its users, therefore justifying a worthwhile investment (Yuen & Hien, 2004). Unfortunately, the reluctance proved insufficient as, when surveyed, 80% of Singapore residents voted for more roof gardens to be implemented in the city's plans. Recreational reasons, such as leisure and relaxation, beautifying the environment, and greenery and nature, received the most votes from the residents (Yuen & Hien, 2004).



Global City, Singapore 2000-onwards

Figure 3.12: Housing programme from 1990 to 2010 intensified by raising the density of new apartment blocks. The old first- and second-generation blocks were gutted and redesign. As concerns about sustainability rose at the end of the millennium, Singapore adapted a Green Policy that targets greening its high-rise environment with plants and vegetation. The sustainability efforts eventually evolved into extending its ground greenery vertically. The Pinnacle @ Duxton is Singapore's first testament of the efforts, opening up possibilities for other projects like the iconic Marina Bay Sands.

By 2009, Singapore had become one of Asia's most active cities in promoting the idea of a Green Urban Development, especially in its high-rise buildings (Newman, 2010). Its achievement in Green Development is supported by Newman (2010) stating Singapore as being one of the best landscaped cities in tropical Asia through some innovative architecture ideas by Ken Yeang. Ken Yeang initiated the idea of Skyrise Greenery in the early 1990s, mainly to show how it could be

applied in the tropics. Yeang's approach to Green Design in high-rise architecture is by designing them as an eco-system, not simply placing vegetation. According to Hart (2011), Yeang's works are regarded as total 'living systems', designed as constructed ecosystems requiring the creation of new habitats within and around the development, involving the matching of selected native species with these constructed habitats, setting their biodiversity targets, and thus providing physical conditions within these habitats to enable them to survive over the seasons of the year. In achieving this, his builds and ideas become more than just 'vertically-landscaped architecture' but are in effect constructed 'living systems'. Yeang's approaches are influential, especially within the South East Asian architectural school of thoughts. His ideas eventually created a new ethos that influenced the move of Singapore's aim from 'the garden in the city to the city in a garden'.

Yeang's approach is more prominent in his high-rise designs leading to an influential approach to rethink the skyscraper in design. His book *The Skyscraper: Bioclimatically Considered* (1996) proposed ideas on how high-rises could be designed within the climatic scope of their location, outlying innovative approach and new inventions by others to further advance this typology. Yeang's most influential image of his ideas is the image of a vertical skyscraper filled with vegetation complementing the energy efficiency and liveability of the typology. As residential high-rises are increasingly built there must be a need to increase the liveability of the typology to the maximum. The more people have a high quality to living and a strong commitment to community, the lower its ecological footprint and more valuable ecological sources are enhanced. Enhanced liveability in these residential high-rise towers creates a special sense of place, nurturing the sustainability of the typology motivating better social infrastructure (Yeang, 2002). This sense of place approach in Singapore narrows down its strategy within the scope of Green Urbanism as an archetypal place-based city.

3.4.3 The Sense of Place & Gentrification

The 'Sense of Place' strategies were already apparent in Singapore as its urban form was broken into many polycentric districts in the late 1980s. The government further supported this approach in self-identity by HDB's own decentralization in 1988, which allowed local town councils to give communities in housing development a sense of determinism and self-reliance in a form of a mini-government. Initially, this system was intended to allow each town council the freedom to decide at the constituency level whether to employ their own workers or appoint a managing agent to run their built environment. Effectively, this objective allows maintenance needs to be addressed

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

more quickly than before, narrowing the red-tape gap between authorities considering the sheer massive size of the HDB Singapore in managing all housing estates in the city (Goh, 2001). The polycentric urban form meant that each centre was given choice to create a distinct identity as well as having the core functions of school, shops (including a traditional wet market and hawker centre), library, health and other government services. To further cement the urban form in ethnic plurality, the Singaporean HDB also ensures that each block of apartments has a cross-section of the population to avoid race ghettos which typified most high-rise housing problems (Newman, 2010). This significant control reflects the government intentions of pushing upwards in terms of social mobility to emerge the new upper-middle class as the dominant group in high-rise buildings.



Pictures 3.18-3.22: Pictures depicting various sites of high-rise housing in Singapore from early 1990 towards the early millennium. Enhanced liveability is done by extensive landscaping projects that highlight the sense of place within the grounds of each complex intended as social and public spaces. Picture sources: URA (2005).

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

This managing system also allows each municipal authority to decide among them the kind of environment they want to live in with the opportunity to create any distinct identity for each housing estate. The approach is distinctive with new developments in the early and middle 1990s that were designed to have different architectural features in their façades of open public spaces. Along with the new policy of building new towns of high-rise residential developments, the older ones were also redeveloped by HDB for renewal. A new governmental agency was created to handle this, called the Estate Renewal Strategy that selected old en-block schemes built in the first and second generation for redevelopment with modern up-to-date architectural fittings and environments. Ten sites under the scheme were selected in Ang Mo Kio, Bedok, Bukit Merah, Queenstown, Jurong West and Tao Payoh, all with architectural and planning layouts hereditary to the first and second generation; 3,450 units were affected and given a full face-lift with residents offered an attractive financial package to help them purchase the replacement flats. This programme, administered by HDB, received a good response from the public, as it is a holistic approach in upgrading the living conditions of older generation flats. The after-effects saw the same community coming back to the redevelopment scheme, proved by the few leases sold in exchanging the flats for cash in the enhanced value of the property (Goh, 2001). Note that the majority of the first generation housing was closer to the inner city.

Coupled with its Green Agenda, this achievement through the polycentric urban form created a strong sense of place among its residents. More landmark buildings, landscaping, open spaces, special architectural features and finishes were incorporated into new and old housing schemes. This was done with great care to create a sense of identity and territorial exclusivity to residential areas in their high-rise environments (Goh, 2001). Most importantly, this programme complements greatly the rising class while sustaining affluence to the third and fourth generations of people living in the housing estates. The programme also encouraged positive gentrification within the first generation housing flats. This form of gentrification is unique, as the existing community did not move out but was simply replaced by its next successive generation of families who grew up to become professionals with accumulate more wealth. This continuous effort in maintaining and upgrading the current housing supply benefited the growth of the typology further into the new millennium as the dominant urban form for Singapore. Further pressure of urbanization, population growth, and immigration has provided the impetus of intense urban concentrations and eventually making the skyscraper the most common development type. Expanding from the city centre, its

high-rise buildings continue to be built upwards, expanding 60 storeys upwards. By 2008, 3.4 million of Singapore's residential population lived in high-rise apartments, with 84% in public housing and the 6% super rich in private apartments/condominiums. The Urban Development Authority Concept Plan 2001 projected more in the future will live in high-rise apartments with a current projection of growth of the 5.5 million people in 40 to 50 years' time (URA, 2005).

The evidence of its reproduction of space from the upgrading of its old high-rise housing to the intensified rebuilding of its downtown core anchors Singapore as a city entering the globalizing state. According to Sassen (2000), the replication of consumption and gentrified residential spaces reflects cities catering to a transnational class where production of its urban space is on display through property development. The display of this urban development embraced a cosmopolitan culture in the city, suggestively evoking all social groups to consider adapting to the new spatiality or way of living. The Pinnacle @ Duxton is by sense a development by the HDB to display the real and imagined future of its high-rise residential landscape by this narrative. It is suggestively built in the process of urban restructuring in the global era. Evidently, this trajectory is similar to many other global cities where contemporary consumption is increasingly planned as an integral part of good urban living (Soh & Yuen, 2011) though the focus is within a singular urban form: the High-Rise.

3.5 Chapter Summary

Public housing was often regarded as a social cost instead of a productive investment, thus housing policies have seldom incorporated national and political goals (Takahashi, 2009). Singapore on the other hand adopted an aggressive approach of changing its urban landscape incorporating many of its formal settlements with national economic development through mass public housing investment. Singapore's management of social and economic development increases output and expression in its urbanity (Goh, 2001). This prompted the need for quality living cultivating a strong metropolitan awareness of identity, ecology and sense of place. This accomplished Singapore in its emerging new socio-spatial environment by legacy of urban high-density environments within the globalized economy. This sense of globalization and compactness has led to urban restructuring and reimagining of its residential high-rises with measurements of sustainability and quality living. This concluded with the creation of the Pinnacle @ Duxton (case study) as the experimental seed for the evolving typology with social and public spaces in the sky.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

This chapter describes the knowledge to which these shifts added impetus, justifying and reconstructing hereditary government political intervention, economic transcendence and social mobility that stewards the decision to make sky-high social public spaces in high-rise residential blocks. The chapter highlights these factors of success applicable in the form of a development model able to consider other similar contexts, thus expanding the solution of creating quality spaces as places in the urban realm. As Thornley and Rydin (2002) state, planning of cities in the global era is no longer limited to physical planning but also encompasses the economic (issues of employment and wealth creation) and social fabric (issues of identity and belonging). The formulation of designing a place would need a weight of policies that could strengthen place identity, accelerate growth and yet be adaptable to the needs of a highly mobile and global society (Soh & Yuen, 2011). The stark ideologies of social housing are often distant of the social and spatial dynamics of the urban-society relationship, especially in the post-war period when massive intervention and investment were made. Therefore, it is important, before any post-occupancy analyses are made or concluded in this thesis, that key narratives on social history and geography need to be uncovered. With these findings, this chapter will be able to chart a strategic discourse of how to make successful social and public spaces as urban places in residential high-rise communities.

FIVE GENERATIONS OF HOUSING: A HISTORICAL SOCIAL & POLITICAL ANALYSIS OF SINGAPORE'S HIGH-RISE HOUSING & ITS RELATIONSHIP ON MAKING SOCIAL PUBLIC SPACES IN THE SKY

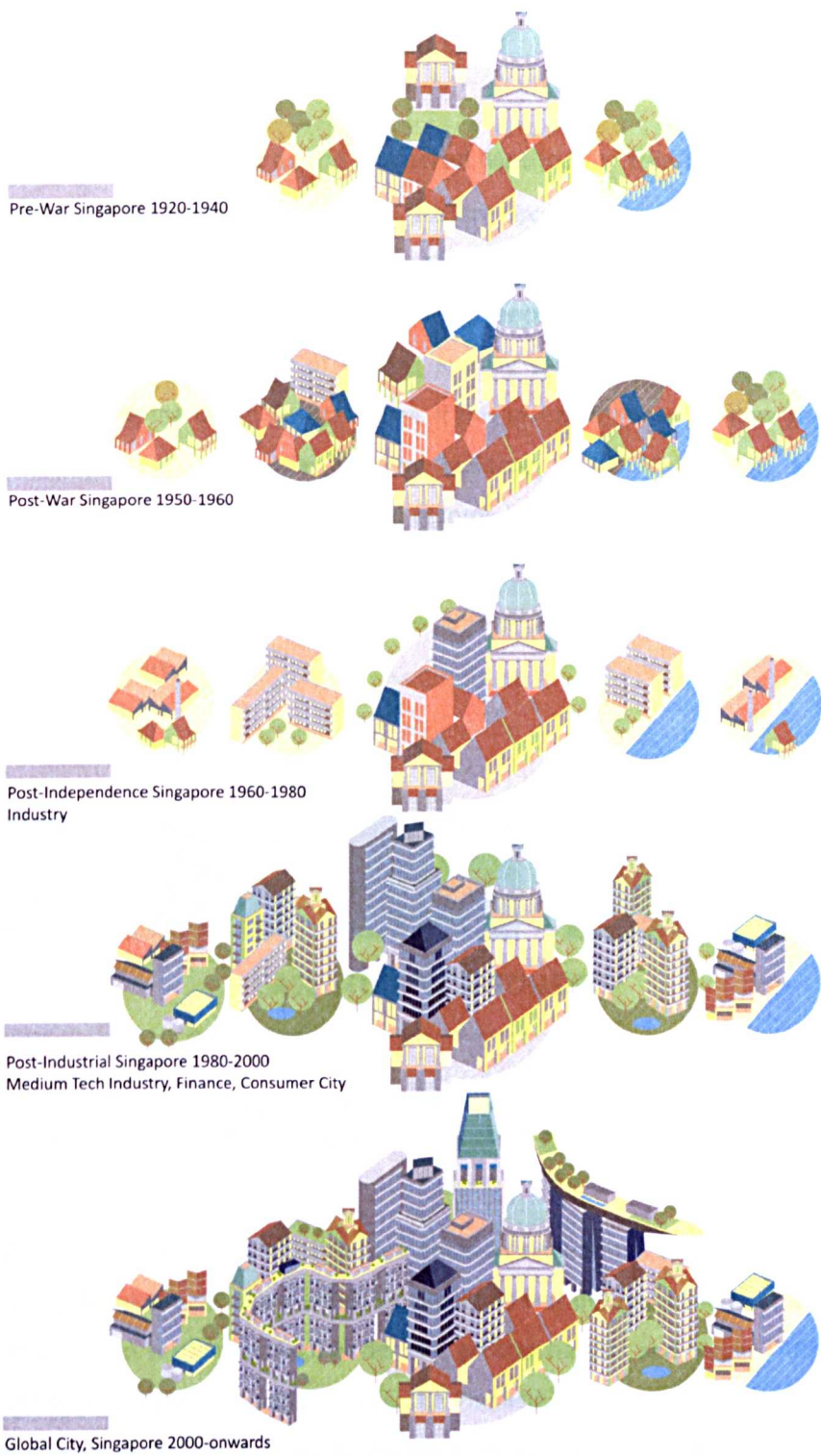


Figure 3.13: The full anthology of Singapore growing into its singular high-rise urban entity with key buildings like the Pinnacle @ Duxton and Marina Bay Sands stewarding the next phase of its evolution by experimenting with social and public spaces in the sky.

CHAPTER 4-RESEARCH METHODOLOGY

4.0 Rationalizing the Case Study as the Preferred Method for this Thesis

The more the questions seek to explain present circumstances of ‘how’ and ‘why’, the more the case study method is relevant. The insight for these research questions of ‘why’ and ‘how’ is best found in extensive in-depth description of the phenomenon: social places as urban spaces in high-rise residential designs. The success of making socially sustainable residential high-rise designs depends on researching the urban design values. If this research wants to know good practices for successful social spaces in residential high-rise buildings, it would be likely to be relying on observation, survey or examination of archival records leading to the creation of the behavioural events. The Pinnacle @ Duxton in Singapore provides the perfect place to investigate purpose-built social spaces in a context of higher densities, greater heights and bigger Floor Area Ratios (FARs)/Plot Ratios (PRs) are.

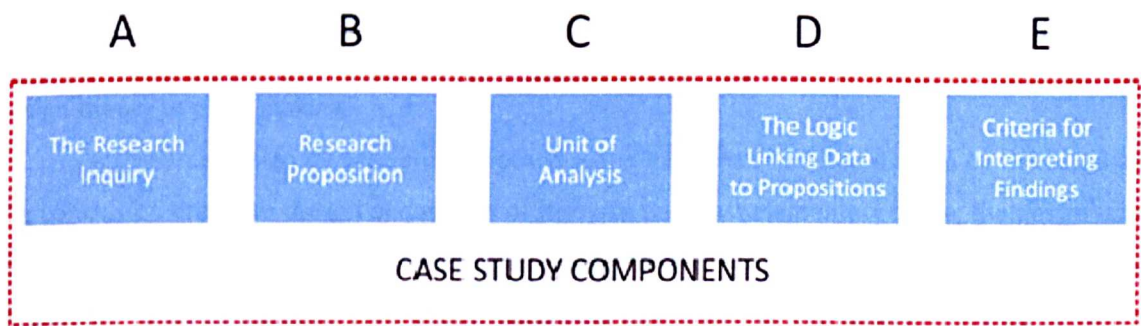


Figure 3.1: The five case study components that build the empirical entity of this method. The validity and links of each component are important to achieve a strong blueprint for conducting research. Adapted from Yin (2009).

The Pinnacle @ Duxton High-Rise Settlement is an evolution of these pioneering ideas by the authority Housing Development Board (HDB) Singapore. It was designed and built with social spaces in the scale of an urban settlement high in density, greater heights and bigger FARs/PRs. With the existence of these purposely built social spaces, the Pinnacle @ Duxton is the field of evaluation, as ‘the explanatory case study’ for deriving an empirical response to ‘why’ and ‘how’ social places as urban spaces in residential high-rise buildings could work successfully. This case study inquiry will cover many variables of interests, relying on multiple sources of evidence, converging and triangulating with each other with a guide from prior theoretical propositions suggested in the

literature review. In essence, the inquiry by this thesis case study method is an all-encompassing method covering the logic of the method, data techniques, and specific approaches to data analysis.

This introduction established a strong validity of the case study as the research method to this thesis. Case study research is remarkably hard, possibly because investigators have the tendency not to create and follow systematic procedures. The articulation and justification of these procedures in validating the empirical inquiry is important for this thesis to provide a strong legitimate methodology approach for its empirical response. Without systematic procedures this research will be biased to influence the direction of the findings and conclusions. Such lack of rigor is less likely to be presented in other methods for the existence of numerous methodological texts providing investigators with specific procedures to be followed (Silverman, 2010) . There are only a few examples for researchers to follow how to do a case study research. Other than systematic procedures, this case study is also based on a single experiment. It is a common argument in case studies that being single on its own provides little generalization of scientific facts. Scientific experiments are usually based on an array of experiments that could repeatedly replicate the phenomenon under different conditions. This generalization makes it responsive to populations and universes. Case studies are generalizations to theoretical propositions with the goal of expanding theories (analytical generalization), therefore establishing this research as an extension of urban design theory to place making.

A research design by case study method is the logic that links the data to be collected and the conclusion drawn to the initial question of study. In the most elementary sense, the design is the logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusions (Yin, 2009). According to Philiber et al., (1980), research designs in general deal with a set of four problems: what question to study, what data are relevant, what data to collect, and how to analyse the results. In case studies, research designs are divided into five components: research inquiry, propositions, unit of analysis, the logic linking the data to propositions, and the criteria for interpreting findings. These five components are the blueprint for achieving the empirical inquiry in the thesis.

4.1 Research Inquiry

Research inquiries are best described as the suggested form of the question in terms of who, what, where, how and why. The high-rise typology has grown beyond its historical introduction by Le Corbusier in the 1920s. This research concludes that this typology is still relevant by choice for cities opting to create its urbanity in high-rise, high-density environments. In the presence of growing concerns to better manage resources, land and the sustainability of the environment, some

metropolitan areas need to go vertical as space becomes increasingly valuable for other forms of use. Residential development in high-rise and high-density environments will need to be considered in an overall frame of future urban expansion. The question is, 'how can this urban typology be on the winning side of the development and planning?' By considering the range of factors and processes indicating how residential communities can effectively create successful cities (see Chapter 2), the main principle leading to the creation of good cities lies in its urban places. Urban places are social spaces, and good social spaces create good communities. Successful residential high-rise buildings need good social and public spaces. Spatial change within cities in the Post-Fordist era is different. Therefore, through the open framework, how can the urban design principles fit and be applied into this context? This foregoing discussion therefore concludes the research's main underlying question, **'What are good urban design practices for social public spaces in residential high-rise buildings?'**

4.2 Research Proposition

A research proposition is the scope of study of the subject directed into. Propositions reflect the theoretical issue within the research that gives relevant evidence to the content of this research legitimizing its findings (Yin, 2009). The subject of exploration within this context follows a list of propositions that define the criteria by which how the exploration will be judged by answering the research question. The underlying question for this thesis is **'What are the good urban and bad design practices for making social public spaces in residential high-rise buildings?'** This research defined studying the realm of public space and public life as the scope of the research. The realm of public space and public life will able to list propositions that conclude successful practices of making public spaces and public life. These successful practices will be the unit of analysis that define the study of this thesis.

4.2.1 Theoretical Scope: Public Space and Public Life

Any good and successful designs of social and public spaces are an outcome of well thought-out understanding from the forms of public life to the people meant to use it. To know how social and public spaces are best used is to first understand the value of the space. Social and public spaces are the stage upon which the drama of communal life unfolds (Carr, Francis, Rivlin, & Stone, 1992). Carr et al. (1992) summarised, public life must come from the understanding of how different cultures give different meanings to their spaces, not only focusing on religion and ethnicity but also on their evolutionary state to time, place and context. It is also defined by the constant shifts of cultural exchange, technology, changing political and economic systems and the ethos of time. These shifts occurred not exclusively in the West but also in the East, particularly at places experiencing

industrialization and densification of their urban environment. Globalization brought this new spatial order of cities (Marcuse & Kempen, 2000). Emphasizing locality, which gives identity and meaning to the public space, is not enough when cities evolve tremendously in the global economy. Good and successful public space needs to address the evolutionary needs of societies, adapting to situations by economy, technology and their political will.

People Places (1998) by Claire Cooper Marcus and Carolyn Francis suggests human behaviour and social activities do inform how designers should take an approach in designing social/public spaces. *People Places* (Marcus & Francis, 1998) provides the fundamental background for this thesis's theoretical proposition for its theory presented in an actual real setting with a description of how and why it works. The theory presents itself in design guidelines addressed to specific typologies of social space, with summaries of good and less successful aspects of its practice. Each social space is presented in terms of how it was physically and socially at the time its evaluative studies were done. Contextually, *People Places* listed seven types of people places for public and social activities in the urban environment, which are the neighbourhood park, mini-park, urban plaza, campus outdoor space, elderly housing outdoor space, childcare open space, and hospital outdoor space. In the focused interest of this thesis, the theoretical output will be only towards post-occupancy guidelines to answer the empirical needs of social public spaces in high-rise housing. Good housing development, in accordance with sustainable development, occurs when the provision of social infrastructure as the basic framework of services pertaining to the organization of society, underlying any human settlement is provided sensibly. And to evaluate the success of social infrastructure in a human settlement is to verify its quality in both physical and social-cultural aspects in accordance to this thesis's empirical question: **how can social spaces in high-rise/tall buildings made successful?**

This thesis's theoretical proposition is divided into two parts, which as a whole complete a larger theoretical proposition for good social and public space design practices in residential high-rise buildings. These theoretical parts are the focused justification of how and why public life could be successful in any development of urban design. *Public Spaces* (Carr et al., 1992) provides answers of theoretical conditions to how and why social/public spaces succeed in an urban environment. Carr et al. (1992) wrote in their preface about how social spaces evolve with public life, thus creating new forms of spaces, old ones being discarded and some being revived. They emphasize the need to understand how these spaces are created and maintain that they are appropriate to their users and context. *Public Spaces* (Carr et al., 1992) provides the critical perspectives for this thesis as to **what motivation builds good public and social spaces in the urban realm?**

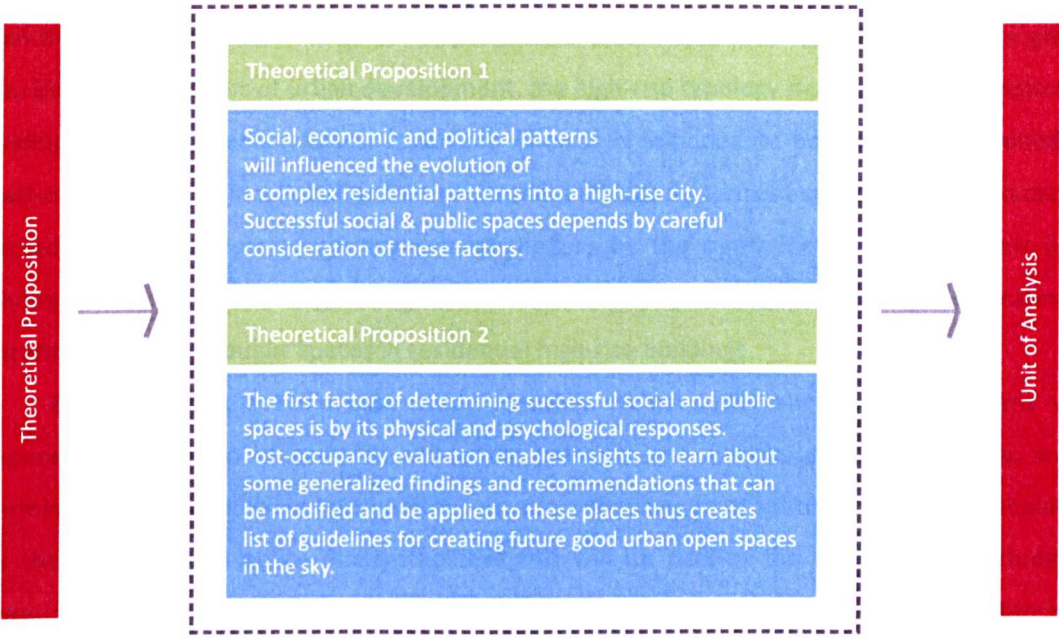


Figure 4.3: The three theoretical propositions that formed an overall assessment to determine successful social and public spaces as a testable theory applied onto a selected case study, thus creating the unit of analysis.

Overall, the theoretical proposition proposes how public life in residential high-rise buildings represents the same paradigm as to how we as designers could design social spaces by the urban design paradigm, thus potentially making the high-rise typology socially a sustainable development. By analysing a case study in a high-rise residential complex, complete with a purposely built social and public space in the sky, the aims is to find and conclude **what are the good design practices that will motivates the success of the typology into a flourishing new urban settlement?** . This thesis aims to shed light to governments, authorities, municipal councils and developers seeking to invest as to how they can make successful social and public spaces in future high-rise residential communities.

4.2.2 Theoretical Proposition Part One: Social, Political and Economic Forces are Pre-requisite Factors for Consideration to Make Good Social and Public Spaces in the Sky

The first theoretical proposition argues that social, economic and political patterns of people living in cities affect how they shape social and public spaces within their realm. This part theory argues when considering building social and public spaces in high-rise residential buildings, designers should focus on understanding the economic background of its target inhabitants. The planning of social and public spaces in the high-rise context should be broadened outside of its typical physical planning but also include the economic issues of employment and wealth creation. This argument is based on Thornley and Rydin (2002), that it is important to value the social construct of any

community before proposing parks, squares or open spaces that act as social and public spaces within the group. The social construct of people will affect how they react to the spaces given to them. Unlike other forms of urban development, the high-rise typology demands huge investment in providing social and public spaces, especially when it is intended to be built above ground. The impact of globalization in a Post-Fordist environment affects patterns of urbanization when choice is reflected by the progress of society through history by the operation of the economic forces. Analysing these forces of change will give this thesis the 'why' and 'how' to pursue in creating and replicating good social public spaces in residential high-rise buildings.

By analysing a specific case study focusing on its social and political patterns which influenced its evolution of complex residential patterns into a successful high-rise city, we can determine whether controlled interventions do affect the change of spatial needs by its inhabitants. How the agencies and policy makers achieve this will be part of the analysis to conclude as a theoretical factor of good public and social space design in residential high-rise buildings. Moreover, it is important to understand why, and understanding of these measurements was taken as the necessary factor, underlying a foundation before making a public/social space in the sky a reality. *Chapter 3 presents a strong case of how these measurements affects making good social public spaces in sky. This thesis suggests the centrality of high-rise housing in the built environment relates strongly to its relationship part of a larger process of social transformation, not merely in its key policies but also class and social mobility, governance, community and values systems.* This argument is supported by Goh (2001) when he suggests this relationship creates value towards social cohesion and capital thus beginning to illustrate how these values will become a source of 'commodity' as the domain of safety and security with compatible lifestyle packages reflected to various people are sold within the high-rise complexes. The idea of the neighbourhood becomes a 'consumption' niche in the market operational force.

The driving force towards the success of any community is also reflected by their capitalist operational force. Schulz (1991) argues that the creation of magnificent urban piazzas and public spaces of Italian Renaissance/Baroque would not be a reality without the wealth of its inhabitants reflected by the market operational forces of the Italian towns. The reference of successful social urban spaces was traditional but the basis of their creation comes from consumption as a niche in identity and sense of place. Eventually these places grew into becoming 'Genius Loci'. This first theoretical proposal highlight the anthology of a winning case study as a high-rise city with the after-effects of globalization that generate cross flows of capital, culture, people and information, which affectively evolved the typology. In theory, social groups living in places under the process of intense globalization will be influenced by changing worldviews, relationships and social networks that will

create and reconfigure new social public spaces to suit their changing needs. Social housing within the high-rise context is often being labelled as distant to the social and spatial dynamics of the urban-society relationship, especially in the post-war period. Before any post-occupancy analyses are made or concluded, it is important first to examine key narratives on social history, sociology, urban and historical geography of a place on the winning side of the typology.

4.2.3 Theoretical Proposition Part Two: Good Physical and Psychological Responsive Analysis Determines Successful Social and Public Spaces Design in Residential High-Rise Developments

The central concept to good public and social spaces design is in its response by the intended users. Historic precedents established successful examples of social and public spaces in the urban form. Most historical precedents were established in context where societies went to the market square for food or water at village water pumps, or gathered in front of the court house to hear the news. In the modern world the necessity of these activities is done in the privacy of people's own homes, although the need for public life is still there. What has changed is the form of the activity, as contemporary lives always reflect the character of its inhabitants. Public life has not disappeared, it has evolved. According to Marcus and Francis (1998), places for public life in the modern world is a whole new category of outdoor spaces that assumes its importance in the same way as communal space shared by specific groups that use it. They address a variety of new outdoor spaces such as those that are publicly owned, managed and accessed, those that are privately owned, managed but accessible to the public, and finally those that are privately owned, managed and only accessible to a specific group of users. These conurbations of new public places represent our new landscape for social public spaces often built in the modern urban world.

The success of all these public places requires participatory process where the eventual users are involved. Marcus and Francis (1998), through their book *People Places: Design Guidelines for Urban Open Space*, inform this participatory process by its users thus creating a list of guidelines for creating these urban open spaces. Their post-occupancy evaluation enables insights to learn about some generalized findings and recommendations that can be modified and applied to these places. The key for their findings is not to apply cloning methods of replicating the same product at a different location but an illustration of a theoretical programme if applied should give verifying styles, depending on the local and regional context, climate, culture, designer tendencies and so on. Most importantly, in the pursuit of the new, these post-occupancy evaluations can determine new guidelines for evolving social public places of other urban forms, which is in this thesis: The Residential High-Rise Form. *People Places* (Marcus & Francis, 1998) listed seven new outdoor spaces in definition representing social and public places in the new urban Post-Fordist form. The relevancy of these spaces represents a range of social and economic activities when society engages within a

greater consciousness towards the consumer and global economy. Though focused on the North American context, the recommendations, case studies and research method can be inspired to generate findings pertinent to other cultures and climates across the world.

The design recommendations from the book are largely taken from research on existing outdoor spaces and how they are used, what seem to work, and which elements are often overlooked. The physical and psychological responses will look into the evaluation of rigorous and systematic uses after the spaces had been built, particularly towards its architectural elements. In most cases, designers and their clients would presumably design these architectural elements according to their knowledge background. The post-evaluation analysis done in activity observation and participant observation determines how people really react to the social and public spaces. The second part, theoretical proposition, is a continuum from the first. While the first part proposed the success of social public spaces in the sky needs to fulfil a list of pre-conditions within the social-economic sphere, the second part suggests good social and public spaces stem from criticism based on human physical needs. The learning experience from instructive study of a designated setting highlights the key features of its usage. This evaluation, based on the theoretical thesis of Marcus and Francis (1998), aims to answer the 'how' social and public spaces built in residential high-rises react to the physical response of its users. Affectively, the results will put into perspective a set of physical guidelines; how to build/design good social public spaces in the sky within a high-rise residential development.

4.3 Case Study Criteria

A case study criterion is a set of conditions that will enable the theoretical proposition being tested in order to validate the objective of this thesis. This set of conditions is important in order to test the proposition accurately in order to specify a good outcome of research questions. The case study criterion is also needed to create a chain of inquiry in keeping with this research focus and context. Each theoretical proposition directs attention to something that should be considered before examining the scope of the study. According to Yin (2009), this set of criteria is the subject that enables the justification of this 'exploration'. Every subject of an exploration should state this, by which an exploration will be judged successfully. A case study criterion will help any research to identify relevant sites for information to be collected without it being tempted to cover 'everything' about the subject, which is impossible to do. The more a case study is built within the scope of a specific criterion to test, the more it will stay focused within its test limit. It also helps to narrow down the body of knowledge to be discovered. Most importantly, the body of knowledge achieved in this thesis can be adapted within the scope on conditions that defined this research itself: Designing Successful Social & Public Spaces in the Sky for The Urban Residential High-rise Settlement

Typology. This case study is based on four lists of criteria that were derived from the literature review and theoretical propositions for this thesis. The lists are discussed below.

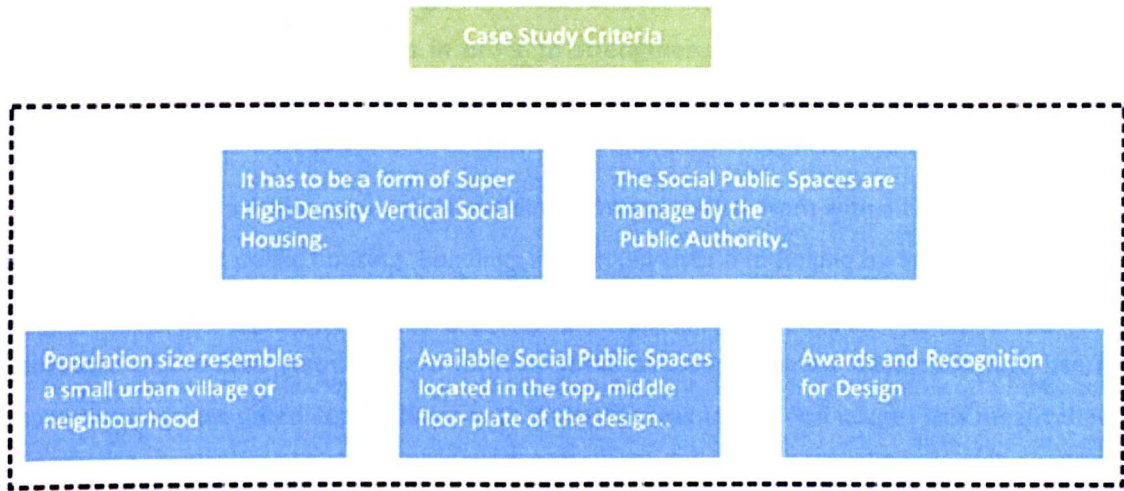


Figure 4.4: The overall set of case criteria that built a strong case study analysis for the research project.

4.3.1 Population Size Resembles an Urban Settlement or Neighbourhood within a Larger Urban Sphere

In order to test the proposition, the case study must be in population size resembling an urban settlement or neighbourhood. Smaller scale developments with smaller population size may hinder in-depth analysis, therefore hindering comprehensive data to conclude the objective of this thesis. As an urban analysis, the testable size needs to be in an urban context. The effectiveness of the social and public spaces built within the case study needed to be tested by addressing a larger scale of groups of buildings, streets and other public spaces. If the testable size is not located inside a complex urban context it will draw weak results regarding how well the social and public spaces are used in the site. The size also needed to be represented within a cosmopolitan environment. A cosmopolitan environment suggests the site and size of people representing many demographics of life, from income size to social lifestyles. The objective of this criterion is in response to the thesis’s inquiry addressing the residential high-rise typology as an evolving form of urbanity. The proposition must be tested in an urban settlement in order to create strong legitimacy to the case.

4.3.2 It Has to be a Form of High-Rise, High-Density Social Housing

The case study must be a form of high-rise/high-density residential development. This case study criterion relates back to a research inquiry focusing on the development of the high-rise phenomenon in urban design. A high-rise/high-density development is described as a building built more than eight storeys high. However, according to construction economics, most high-rise buildings are usually more than 20 storeys. High-rise/high-density is also described as a development

that maximizes the full potential of its building plot by inhabiting more people per square feet within a small plot of land. This form of urban development is synonymous to places with limited land expansion but a high population living in it. This thesis acknowledges that the criterion for the case study must be more than 20 floors in order to strengthen the validity of the case. The form of housing must also be built with the development maximizing the building plot, thus achieving its high-density status.

While there are many residential developments to choose from with a high-rise/high-density status, most are not public housing. Buildings like Linked Hybrid in Beijing by Steven Holl Architects and Edificio Mirador, Madrid by MVRDV Architects are private housing. This thesis recognises the importance of the case study to be a form of social housing. Privately developed high-rise/high-density housings are gated communities with limited access to site and usage. This meant that the data would be limited to residents living in the development. The data would also only focus on a small representation of people, limiting in-depth analysis of the social public spaces. The term 'public spaces' denotes that these places must be accessible to the public and its residents without any direct policing or gated entry, thus enclosing it as private. Public housing development tends to be built with access to the complex being freer. It also has to be built with strong social ideas and models. Testing the proposition on a site with this criterion will also address how successful these ideas and models are in keeping with this thesis's line of inquiry towards the concern of the evolving form of social public spaces in high-rise developments.

4.3.3 Available Social Public Spaces Located Above Ground Floor Plate of the Design

This thesis hypothesizes residential high-rise design needing social and public spaces in order to be sustainable for the long run. These social and public spaces have to be built as part of the high-rise system inserted in between floors of the building providing easy access to its inhabitants. This notion as part of this thesis case study criteria is in response to high-density developments. In order to make this an exceptional case of an evolving urban form, the social and public spaces must be located vertically away from the ground area. This thesis argues, by transferring the public realms into the vertical spaces within buildings, these open spaces are effectively brought closer to greater intimacy with the living spaces of its residents. Typical design solutions to high-density are usually done by alleviating the functions of its commercial and services zones nearer to the ground while the top floors are reserved for residential purposes. A case study with social and public spaces that creatively elevate these functions vertically without conforming to the typical design solutions will be the perfect testable site for post-occupancy evaluations. The post-occupancy evaluations will be tested on a new typology as these social and public spaces are built high above ground. The higher, the better the quality of the case study in order to strongly argue how well these spaces are used by

their inhabitants. As an evolving form of social and public space in urban design, these spaces need to be tested as only few high-rise buildings have been built using this new idea. In order to create a strong hypothesis as to 'how' designers can build successful social and public space, the case study must have its social and public spaces built above ground in its architectural design.

4.3.4 The Social and Public Spaces are managed by the Public Authority

According to Carr et al. (1992), three primary values guide any challenges to success of any good social and public spaces. These three primary values believe social and public spaces should be responsive, democratic and meaningful. The fourth case study criterion for this thesis is based on the notion that the social and public spaces need to be democratic. The democratic perspective states that the spaces are accessible to all groups. The problem faced with most high-rise developments is of its nature being a gated community only accessible to the people living in it. The social and public spaces also are managed by a private entity, therefore not incorporated within a larger public space within the city. The social and public spaces are not defined as 'public welfare'. In order to test the proposition, the case study must be a form of social and public spaces accessible to all groups. It has to be managed by the public represented by a local authority, municipality or council that bears responsibly for the upkeep and governance of the space.

4.3.5 Awards and Recognition for Design

A case study with awards and recognition for its design will help to create stronger grounds to test its validity in terms of its ideas and social model. The awards will also create strong evidence that can be reviewed repeatedly to corroborate the argument of its usage, whether or not the social and public spaces confirm its recognition. Furthermore, if the awards are specifically focused into the subject topic of 'social and public' spaces, that will add quality to the case therefore providing greater validity to the results. This would further strengthen the inquiry and focus to the most important inquiry to the case, 'does it work?'.

4.4 Single Case Study Design Rationale

There are four types of designs for case studies, which are (Type 1) single case holistic designs, (Type 2) single case embedded designs, (Type 3) multiple case (holistic) designs, and (Type-4) multiple embedded designs (Yin, 2009). This research is a type 2 single case study using multiple embedded units of analysis design. In order to test the validity of the formulated theory, this research needed a case set in multiple layers of data. By this method, the results from the Pinnacle @ Duxton as the single case study should provide an extended theory to make public spaces in high-rise buildings. Findings from the Pinnacle @ Duxton can be used to determine whether propositions of designing successful public and social spaces in urban design theory are applicable. The Pinnacle

@ Duxton as a single case can represent a significant contribution to knowledge and theory building for successful public and social spaces in residential high-rise/tall buildings. It is a proposition that could help to refocus its design in an entire field of high-rise social housing. This is also a revelatory case study. This thesis will observe and analyze the phenomenon made unique to the condition of a society living in a purposely-built residential high-rise building. It is an investigation to uncover prevalent phenomenon made accessible only by the building of the Pinnacle @ Duxton, of which its conditions justified this as a single case study on the grounds of its revelatory nature. Could the provision of social infrastructure in high-rise residential design make the development socially sustainable? Having been a 'type 2 single case embedded study', the design of this research also involves more than one unit of analysis but several for the nature of the phenomenon representing several numbers of groups involved from making and using it. These groups are analyzed by several perspectives that built the unit of analysis referred from the theoretical propositions suggested earlier in the case study thesis.

4.4.1 Unit of Analysis

Units of analysis in case design are the accurate definition of what is to be studied in answering this thesis's empirical question (Yin, 2009). It is represented by topics to provide a more complex design that should provide significant opportunities for extensive analysis, enhancing the insights of the single case. The overall data from the unit of analysis should give the holistic aspect of the case, in keeping of its empirical topic: Social/Public Spaces in Residential High Rise & Tall Buildings. The list below should be the representative units of analysis to conduct this thesis. The holistic definition of this case study is 'how' and 'why' social and public spaces in the Pinnacle @ Duxton suggestively could be a successful idea using the same ideals and operational evaluations of urban spaces from the urban design theory. Case study evidence comes from six sources, documents, archival records, interviews, direct observation, participant observation, and physical artefacts. These six sources of evidence are the data characteristics in the determined unit of analysis for this thesis. All six sources are potentially relevant to the thesis, but only three will be used. These were chosen in comparative weaknesses and strengths, more importantly drawing reliability and validity to the holistic aspects of the case.

4.4.2 Documentation

Documentations are formal studies or evaluations of the case being studied. For case studies, it is most important that the use of these documents corroborates and augments evidence from other sources. The use of documents is helpful in verifying the correct spellings and titles of organizations that might have been mentioned in the interview. Second, documents can provide

other specific details to corroborate information from other sources. If the documentary evidence is contradictory rather than corroboratory, one needs to pursue the problem by inquiring further into the topic. Third, one can make inferences from documents, by observing the distribution list for specific documentation within an organization.

The HDB and the URA both generate the policies and laws of all high-rise social housing in Singapore. These governmental bodies played an active role in drafting and implementing the possible policies, thus making projects such as the Pinnacle @ Duxton a reality. The achievement of any significant improvements in urban design is typically a long process and needed long-term goals and strategies that require the support of a broad-based coalition of all interest groups. According to Punter (1999), cities with a high reputation of good urban designs have reputations of planning histories with long-term commitment by many ranges of its stakeholders. This unit of analysis suggests investigation into the role of HDB as the main provider of public housing in Singapore and URA following their conception since 1964 to the 2001 Singaporean Concept Masterplan as to how these bodies affected the eventual making of the Pinnacle @ Duxton. This analysis suggests the study of policies as to 'how' and 'why' it was drafted and implemented in the development. Most importantly, do all these policies, guidelines and laws affirm or parallel good urban design practices in order to create successful social and public spaces? Methodological-wise, this will provide answers to the inquiry in finding out important narratives that made the Pinnacle @ Duxton an exceptional case, therefore listing future directories to others thinking of pursuing a project similar to it.

4.4.3 Direct Observation

The basic premise of any usage on social and public spaces is that it should be responsive. This thesis uses direct observation as the method of study in uncovering the responses of people towards the social and public space at the Pinnacle @ Duxton. A case study should take place in the natural setting of the inquiry. Assuming that the phenomenon of interest has not been purely historical, some relevant behaviour or environmental conditions will be available for observation making this as one source of evidence in the unit of analysis (Yin, 2009). Direct observation is appropriate as the research inquiries are set in a condition to present human meanings and interactions viewed within the insider's perspectives from the Pinnacle @ Duxton. The research is also an investigation observing the everyday life situation and setting as it was designed by an outsider (the architect) to how the insider (users) respond to it. As the researcher, it is also important to gain access to the setting, which was granted for this thesis by co-operation of the HDB and Tanjong Pagar Municipal Council, Singapore.

The site for this investigation is huge but controlled in size and location, therefore being appropriate for focused observation on social and public spaces usage in high-rise buildings. The research problem will be addressed by data gathered pertinent to the field setting design by the architect and other stakeholders of the development. A public space is designed and managed to serve the need of its users, accessible to all groups and providing freedom of action and meaning it allows people to make strong connections between the place, their personal lives, and the larger world (Carr et al., 1992). The characteristics of any good social and public spaces are always strongly endorsed with their usage. The endorsement of this is by analysing the insider's viewpoint. In the course of daily life, people make sense of the world around them. They give meaning to that sense and interact on the basis of these meanings (Schulz, 1991).

Direct observation will provide this practical and theoretical truth about human social behavioural needs in the residential high-rise setting. As one of two units of analysis in the thesis, interpretation from direct observation should support the explanatory basis of how the social and public spaces are used. Direct observation inquiry ranges from nominal or marginal to being a native insider with direct membership within the site. It is highly desirable for the participant to perform multiple roles of the research to gain many perspectives of situations and settings of the inquiry. Descriptively this almost sounds akin to ethnography, but it is not. The intent of this thesis is geared towards theory building by explaining the phenomenon being tested within the study. This thesis uses direct observation as a form of inquiry to explain a potential theory building.

As an observant, the researcher must gain access and maintain a professional relationship towards the people in the field. This relationship is key, in order to allow oneself permission to be in the field. The character of the field relations heavily influences the research ability to collect accurate, truthful information. Access to the Pinnacle @ Duxton in the field was given by cooperation of the HDB of Singapore, Research Division of Research Officer, Mr Vincent Fook Lee (2011). The HDB is the main stakeholder of the development. They maintain and govern all architectural and social aspects of the design. The inhabitants of the Pinnacle @ Duxton bought their units through HDB. Any concerns regarding the architecture validity of its residential units fall within the responsibility of HDB Singapore. The consent for conducting research was given by the Municipal Council of Tanjong Pagar, which is part of the Greater Singapore Metropolitan Council. The local municipal council maintains all open social and public spaces in the development. While retaining the identity as researcher, direct observations in this thesis were done by observing response to usage within the daily lives of the inhabitants. Activities were collected by photograph and descriptive response on site.

The subject for this response will be divided into two parts. The first is the quantitative data of how many people use the social and public spaces in the Pinnacle @ Duxton. The inquiry will chart usage through seven days of daily life from morning to the end of the day. The objective of the chart is to validate the extent of usage by numbers to the reliability of the design itself. The success of good social and public spaces is responsive to the popularity of its usage in relationship to the daily lives of its direct inhabitants. Social and public spaces in the Pinnacle @ Duxton are divided into three parts: the third floor platform as the first social and public space, accessible to all, the middle floor (23rd storey) accessible only to residents and the roof top (50th storey) public sky deck, accessible to all with specific opening hours to the public. The quantitative data will chart by numbers the usage of these spaces therefore concluding data to be discussed in the results chapter.

The second part is the continuation from the first in maintaining the chain of inquiry to provide quality form of evidence to the thesis. While the first part is purely quantitative, the second is qualitative. The second part is an inquiry for users and spatial relationship within the space, to uncover and analyse the philosophical undertakings and theoretical measurements the architect and their stakeholders intended. The design of social and public spaces is always prescriptive, hence this inquiry is to analyse the responses of its users. Using theoretical reference from *People Places: Design Guidelines for Urban Open Spaces* (Marcus & Francis, 1998), the aim is to test these modified guidelines as a hypothesis to be tested and clarified in the Pinnacle @ Duxton empirical setting. *People Places* (Marcus & Francis, 1998) is used as the literature reference for making good social and public space, covering studies of both formal aspects of the designs and user's needs. It is a book devoted towards making new design guidelines from several case studies. Post-evaluation analysis from *People Places* (Marcus & Francis, 1998) uses the case study method accompanied by a site plan, description of the site use and summaries of successful and less successful aspects of it. Case studies presented by the researchers in the book are present to the actual setting of its time describing how they function in relation to the issue presented in the book: creating successful people places in the new urban environment.

The case studies are all intended as real examples of an up-to-date design response relevant to the Post-Fordist urban environment. Each space is presented in terms of how it was physically and socially analyzed. It is in the interest of this thesis to apply the same method, for the empirical question is parallel. In the book, the varieties of outdoor spaces are categorically put into seven different characteristics of a new form of social infrastructure to the urban environment. The seven social and public spaces are classified as neighbourhood parks, mini-park, urban plaza, campus outdoor spaces, elderly housing outdoor space, child-care open spaces, and hospital outdoor spaces (Marcus & Francis, 1998). The Pinnacle @ Duxton was designed by the architect with three levels of

social and public spaces in a form of an urban vertical park. The open space of the building nearest to the ground level was designed to be a neighbourhood park. A neighbourhood park is described as predominantly soft landscape of grass, trees and planting areas, usually located in a residential setting and detail furnished for a variety of active and passive uses. The third floor social and public spaces in the Pinnacle @ Duxton are similar to the hereditary characteristic of an urban park described above. All social and public spaces will be analysed according to the post-occupancy checklist taken from the empirical hypothesis of the neighbourhood park chapter from *People Places* (Marcus & Francis, 1998). The design review checklist is divided into six sections of observation covering major themes of inquiries. The observation protocol checklists for 'Neighbourhood Parks' are listed below.

4.4.3a Post-Occupation Evaluations Protocol

1. General User Needs

- Are the numbers of single benches placed at some distance from active areas to give sitters pleasant views of greenery?
- Do planting and detailing create a rich and varied aesthetic environment, with ranges of colour, texture, shape and smell?
- Have trees been planted in locations that will allow them to grow to their full size without drastic pruning?
- Has a mown strip of approximately 36 inches been maintained alongside paths through naturalized areas, so users will not assume the park is neglected?
- Do meandering pathways pass by or through a variety of natural settings?
- Have most benches been placed so that a wall, planting, or tree provides a back, adding to a sense of security?
- Are there somewhat isolated tables and benches or chairs, where a person can eat, read, or study in a natural setting?
- Are some areas for sitting close to the park's perimeter for use by those with mobility problems, little time, or concerns about security?
- Have quiet setting areas been situated with concerns of micro-climate? Has placement beneath deciduous trees been considered for the sun shade that they provide?
- Has the park been designed so that subareas are image-able, enabling people to describe an easily planned meeting location?
- Does the seating allow a variety of arrangements, both supporting socializing and to permit use without intrusion by strangers?
- Have some movable seats been provided, perhaps rentable deckchairs?
- Are there picnic tables, both in large barbecuing areas and in more secluded locations?
- Is there a wide pathway through the park, providing a pleasant experience for those who will only be walking through?
- Have subareas been designed so that regular groups of users can claim a particular spot, a certain sitting, or a group of tables as theirs?
- Is the main section of the park fairly open to allow people to look for a group of friends who may be present?
- Are there benches next to various facilities, tennis courts, basketball courts, recreation building to enable conversation among bench users?

- Does the circulation system allow walkers to pass by and check out areas of potential social contact without forcing them to enter?
- Do some benches allow a sitter to watch the people moving through the park or along the adjacent side-walks?

2. *Special Users' Group Needs*

Elderly Person

- Are there seating areas just inside the park for elderly people who cannot or do not wish to walk farther into the park?
- Have entries been planned to coincide with bus-stops and crosswalks?
- Are drinking fountains, rest room facilities and shelters nearby for use by older people?
- If the surrounding neighbourhood contains many elderly people living alone, does the park's design emphasize enjoyable places for meeting? Conversely, if there are many elderly residents of group facilities with social programmes, is the emphasis on elements that will allow access to and enjoyment of the natural setting?
- Have benches been chosen with dimensions conducive to socializing, and have they been orientated to that end, keeping in mind issues of lessened flexibility and hearing loss?
- If there are quite a few elderly residents in the neighbourhood, have one or more walkways been designed to have limited or no grade change?
- Are ramps used instead of stairs where possible and, if stairs are necessary, are they non-slip, without overhanging treads, and accompanied by a handrail?
- Are benches placed at relatively short intervals along pathways to allow frequent resting?
- Are benches placed where a wall or planting behind them will add a sense of security?
- Have benches intended for use by elderly park users been provided with backs and armrests?
- Are the surfacing materials for walkways smooth yet not slippery and free of glare?
- If possible, are there programmed activities and games for the elderly?
- Are there games tables in both sunny and shady locations to allow choice?
- If game courts are to be provided for the residents, is there seating for spectators nearby?
- If the neighbourhood includes many elderly persons with no access to a private yard, has creating a fenced community garden (with storage lockers, adequate access to water, and perhaps raised beds) within the park been considered?

Disabled People

- Are walkways designed to follow contours of the land, with slope not to exceed 1:20 (or 1:50 for cross slope)?
- Are cues such as paving material changes used indicating changes in level, path intersection, and types of use?
- Are handrails that meet Disability Guidelines provided at ramps and stairways?
- When stairs are used, is a landing provided for every four feet of rise?
- Are passengers' unloading zones located near park entrances and activity areas?
- Have curbs been avoided in the parking area or, if necessary, been painted to increase visibility?
- Are deciduous trees and fruiting plants located so that falling vegetation will not create problems on walkways?
- Will there be sufficient maintenance to ensure that plants are pruned away from pathways? If not, the planting design should reflect the need to keep pathways unobstructed.
- Do park signs use dark lettering on a light background?
- Are major park signs lit for night visibility?

- Are Braille signs placed where they can easily be touched?
- Do signs have their main focal point about four feet high?
- Are the tables directly accessible from hard-surfaced paths and placed on an accessible surface?
- Do drinking fountains, trash containers, and bathrooms meet accessibility guidelines?

Pre-School Children

- Is any tot lot area located well away from the street?
- Are rest rooms with diaper-changing facilities easily accessible from the tot lot?
- Are the walkways to and within the tot lot smooth surfaced?
- Is the tot lot enclosed by a three-foot-high fence or dense planting to prevent dogs or other animals from entering?
- Are benches orientated to encourage adults' socializing?
- Do some benches overlook the tot lot for supervising?
- Is the play equipment strong enough to withstand occasional adult use?
- Has sand or other government approved resilient surfacing material been provided under play equipment to help prevent fall injuries?
- Has a separate sand play area been provided?
- Is there a water source in the tot lot for drinking and for sand and water play?

School Aged Children

- Has some area of the park been left undersigned or carefully crafted to be natural, leftover space?
- Has this area been planned to allow digging in the dirt, crawling through shrubbery, and so on?
- Does the topography of the park feature both undulating and flat areas?
- Are there some provisions for water play, with a natural streambed the most desirable?
- Have hardy, low branching trees been planted where the tree itself and the space around it can create a rich play environment for the children?
- Have natural elements such as logs and boulders been incorporated into the park design for their play potential?
- Has moving equipment and equipment requiring physical exertion and providing a challenge been chosen over sculptural elements?
- Does all equipment meet government safety standards?
- Is there some provision for a supply of loose parts in the park, either through a play leader who can check out materials or through a periodic replenishing of loose boards, bricks, or whatever is in the left-over section of the park?
- Has the possibility been explored of having a permanent recreation staff in the park?

Teenagers

- If there is a considerable amount of teen population in the development (Pinnacle @ Duxton), has a potential hangout area been created, preferably at the park entrance with both pedestrian and vehicular traffic, that will allow teens to claim the location without creating conflict between them and other users?
- Is there good visual connection between passers-by and teenagers using the hangout area?
- Are the boundaries of the hangout clearly defined?
- Is there seating for at least five to seven people in the hangout area?
- Has the placement of this area near the parking lot been considered to allow teens in cars to join the group?
- Can a few small, private areas be created in the park, where couples or small groups can sit out of sight of authority?

- If a nearby high school or junior high school suggests lunchtime use of the park, has an area of picnic tables and plentiful trash receptacles been provided? Has such an area been sited with the same concerns as a hangout and finished to be attractive to teens?

3. *Observation on Conventional Activities*

- Is seating for spectators located next to game courts? Has a gently sloped lawn been considered for casual spectators?
- Are game courts situated on the park's periphery so that noise and congestion will not bother quiet areas?
- Owing to their potential for use as a teen or young adult hangout, are basketball courts located at a distance from children's play equipment?
- Are drinking fountains near all game courts?
- Are courts placed away from park buildings so as to avoid damage by stray balls to windows or lighting fixtures?
- Are equipment storages for sports located near courts?
- Has night-lighting of courts been considered, to extend usable time and to make the park safer in the evenings by encouraging users?
- Is there at least one sizeable, relatively flat area?
- Has a jogging trail been considered?
- Are picnic areas located near areas of easy transportation of food?
- Is there easy access to the picnic areas for those coming on foot?
- Is the picnic area attractive and comfortable, using planting, trellises, or gazebos to define and partially enclose the area?
- Have picnic tables been placed on a hard surface to prevent erosion and to allow access by all park users?
- Have picnic tables been provided and places for BBQs?
- Are trash receptacles, a source of water, and grills available close to the tables?
- Have oversized trash cans been provided where pickup is infrequent?
- Are the trash receptacles securely fastened or anchored to prevent being overturned by children, dogs or wildlife?
- Are there picnic tables near the tot lot to allow young children to play within sight of the picnicking adults and to provide a work surface for the supervising adults at other times?
- Are there shelters at bus stops and near picnic tables, game courts, and tot lots, to permit use of the park in inclement weather? Depending on climate, are there shelters for many users to be sheltered briefly from thunder-showers?

4. *Observation on Unconventional Activities*

- Has the creation of a pets-only section in the park been considered?
- Is there provision for cycling, skateboarding and roller-skating in the park?
- Are there bicycle racks in easily observable locations near high-activity areas and play equipment?
- Are there separate paths for pedestrian and wheeled sports, at the least are walkways wide enough to accommodate simultaneous use and marked to show which side is intended for which use?
- Have special courses been considered for bicyclists, skateboarders, and roller-skaters, incorporating mounds, banked curves, and so on?

5. *Antisocial Activities*

- Has the park been made so attractive to legitimate users that its heavy use will discourage antisocial activities?
- Will an official gardener or groundskeeper be present in the park to lend an air of authority and safety?
- Does the park operate as a shortcut between two streets to increase the number of people walking through and provide casual surveillance?
- If illegitimate use of the park after hours is expected, does it have an attractive fencing and gates that can be locked during those times?
- Are park facilities planned and located to avoid proximity of potentially conflicting uses, often the cause of vandalism?
- Is there adequate access to the park to avoid damaged fences, trampled planting, and the like?
- Rather than one flat, open space, is there a variety of spaces that can be claimed as territory by different groups to avoid damaged fences, trampled planting, and the like?
- Are permanent fixtures such as benches, barbecues, and trash receptacles located where they will not provide climbing access to park building roofs?
- Are gates or removable bollards used to block direct vehicle access to internal roads making theft and destruction of property more difficult?
- Are men's and women's rest room entries located on the same side of the building to increase casual surveillance, and are rest rooms situated where they are not immediately accessible from park entrances?
- Has an effort been made to avoid direct sightlines from main park access points and building windows or skylights to decrease their target potential?
- Have public areas that are closed at certain times been fenced?
- Have high, solid walls that reduce visibility been avoided?
- Are walls and fences made of materials that can be easily cleaned and/or painted?
- Has dark-colour, exposed-aggregate concrete which discourages graffiti been considered for especially vulnerable walls?
- Have large expanses of light-coloured, smooth material been considered?
- Has unnecessary fencing been eliminated to reduce user's frustration or irritation?
- Have benches been placed along paths so as to discourage carving?
- Has light-coloured treated wood been used on picnic tables to discourage carving?
- Have heavy duty trash receptacles been provided?
- If standard garbage cans are provided, have they been placed in another receptacle, such as a wooden box, etc. which blends with the park surroundings?
- In a redesign, have more trash receptacles been provided in areas that have more serious littering?
- Do park signs avoid large white background areas, which invite graffiti?
- Have heavy timber signposts been used, which are difficult to remove?
- Have signs been attached flush along the post and when more than one sign is used, attached to each other, to prevent their removal?
- Has an edging material such as a concrete block or cobblestone been used to reinforce lawns at path intersections and along short cuts?
- Have faceted rather than globe light fixtures been used to minimize target potential?
- Has a community-created mural or other more spontaneous artwork been incorporated in the park to discourage less acceptable graffiti?
- Has quick and efficient maintenance been planned and budgeted to stop the vicious cycle of abuse, neglect and misuse or non-use?

- Has consideration been given to offering financial incentives to youth groups that help prevent damage, which is often cheaper than repair and replacements?
- If vandalism is an ongoing problem, has there been an attempt to identify the perpetrators and to address a solution to that particular group?
- Have special programming dances, or cultural celebrations been considered to increase park use as well as community pride in the park?
- Is there a reporting system that will identify damage caused by poor design, rather than intention, to allow ongoing redesign?
- Are there arrangements for police patrol of the park – preferably on foot by officers familiar with the neighbourhood to increase perceived safety and use?
- Have the operating hours of recreation facilities been planned to coincide as closely as possible with demand to avoid vandalism caused by frustration and unauthorized use?

6. *Safety Issues in Parks*

- Have walls, fences, shrubbery, and changes in elevation that separated the park from surrounding streets been avoided?
- Have clear and effective sightlines and circulation been created?
- Have new activities been placed near active edges of the park?
- Have night-time activities been clustered in areas that are not inherently unsafe? Have programmed activities been included, lighting levels raised to street level in these areas and the paths to them, and landscape elements prevented from blocking the light?
- Are unimpeded sightlines maintained from pathways, especially where they curve or change grade?
- Has a choice of routes been provided within the park, and multiple entrance/exit points been created, especially to fenced areas?
- Has creation of entrapment zones through fencing or planting been avoided?
- Does the design include clear signage throughout the park, identifying paths and facilities, park exits, park headquarters building, telephone, toilets and information on how to find help and report maintenance problems?
- Have emergency telephones been provided in isolated areas, including along paths?
- Are children's play areas located near other activity nodes?
- Have local residents and business owners been involved during the redesign process in defining security issues and suggesting possible responses?

4.4.3b Architectural Observation Protocol

The Architecture observation checklist protocols for all three levels are listed below.

1. *Size*

- What is the size in terms of dimension for a comfortable social space (open space) in terms of maximum distance for observation?
- Architectural limitation of the space?

Size is an architectural analysis of the built space. This inquiry is to investigate whether the built space is parallel to examples of good urban design dimension in response to Moughtin (2003).

2. Visual Complexity

- Does the design incorporate a view variety of forms, colours, textures-fountains, sculptures, different places to sit, nooks and corners, plants and shrubs, changes of levels and boundaries?
- If a complex view from the space is possible, has the design capitalized it in terms of Urban Language and Townscape?

3. Use and Activities

- Has the space been designed to accommodate passers-through or, if both functions are able to be included, have they been provided for all or a distinct sub-area of the space, to avoid conflict of private/public life?
- If residents are encouraged to take shortcuts through the space, have barriers between sidewalk and parks (open spaces), including grade changes, been eliminated?
- To encourage people to stop and linger in the space, have dense furniture, attractive focal elements, and definitive edges been used?
- If public gatherings for the residents are anticipated, have unimpeded open areas been provided?
- Does the social space address the difference between men's and women's use of space? If yes, how?
- Have the social spaces been designed to encourage heavy use to minimize vandalism or undesirables?

This section aims to investigate how the built space is being used. Its observations are meant to examine if the built design encourages social activities, the success of which, according to urban design, is determined by the above observation.

4. Micro Climate

- Is the social space to receive maximum year-round sunshine?
- In the climate, is shade provided by means of vegetation, canopies, and trellises?
- Is there a city policy to climate in the creation of open social spaces?
- Wind patterns, glare, temperature ... how does it affect the use of the social spaces?

Climate plays an important role in how people react to outdoor and large indoor open spaces. This section analyzes design features in the development that respond to the tropical climate concurrently affecting how its residents react and use the spaces.

5. Boundaries

- Do boundaries such as paving changes or planting define the space distinct from sidewalks?
- Are there space design features such as plantings?
- Have the space edges been designed with many nooks and corners to provide a variety of seating and viewing opportunities?

The creation of a social place requires clear demarcation of boundaries from pathway to a place to stop or gather. This section investigates how social spaces in the development address boundaries for circulation (fire-exits, vertical transportation). This is also to observe if the spaces

encourage socialization by simply demarking or suggesting where to do it by placing the above design features.

6. Sub-Spaces

- Has the space been divided into sub-spaces to provide a variety of experiential seating for users?
- Have features such as grade changes, planting diversity and seating arrangement been used to create subareas?
- Are sub-spaces large enough so that users entering an area will not feel as if they are intruding if someone is already using that space?
- Are the sub-spaces scaled so that a person will not feel intimidated or alienated sitting there alone or with few others present?

Sub-spaces are small pockets of areas that encourage groupings in the social spaces. In theory, people create groups that reflect similar values, gender and interest. This observation is to find out whether the inhabitants in the high-rise development create or use these sub-spaces.

7. Circulation

- Have the spaces been designed to mesh with or enhance existing ground level circulation patterns?
- Is it connected with other pedestrian walkways in the development?
- Does the space have easy access to other spaces in the development?
- By other routes, short cuts?
- If there is the desire to control the pedestrian flow, what kind of physical barriers or distinct changes of level, texture colour?
- Does the space allow the tendency of pedestrians going to the centre and sitters going to the edges?
- Does the space accommodate the needs of the disabled, elderly, parents with strollers, vendors?
- Ramps accessible to all areas?

The development is created out of four towers linked together by a horizontal sky bridge on three levels. Ideally, this creates a free-flow circulation for all the residents in the development. Circulation is a pattern of networks and linkages in an urban settlement. This investigation aims to find out whether the circulation does encourage the inhabitants to use the social spaces.

8. Programme

- Do the management policies encourage special events in the space?
- Does the design include a stage area that can be used for sitting, eating, in a special event that requires the use of the space?
- If there is a purposely-built area, is the stage situated to avoid undue disruption to pedestrian circulation and to avoid making the audience face the sun?
- Is there a place for temporary concessions to set up on the events?
- Are there places on the space to post event schedules and notices readily visible from the ground level?

9. Seating

- Does the design recognize seating as an important element?
- Does the seating meet the needs of the varying types of sitters commonly found in the space?
- Has seating been placed in those locations that are sunny during lunch hours or, in a hot location, where it can be shaded?
- Does the space reflect seats are commonly drawn to locations where they can be observed and see other people using the space or passing by?
- Has secondary seating (grass, mounds, steps, etc) been incorporated into the space that might be used if the primary seating has been fully occupied?
- Is there at least as much primary and secondary seating in the social space?
- Have wooden benches been given priorities?
- Is some seating linear, circular, outward facing to allow people to sit close with strangers without the need of eye-contact or interaction been provided?
- Has a sense of variety been created in some areas?
- Has a variety of orientations been included to allow views?
- Have the seating materials used seemed warm as those were avoided cold (concrete, metal, and stone) or that looks damage clothing sat on?
- Is there a guideline used in the local/municipality area to provide how many/how to create seating in open areas?

This section is to investigate how the concept of seating in the built design does or does not encourage its users to socialize.

10. Information and Signs

- Is there a name for the social space?
- Is the name of the spaces clearly displayed and well lit after dark?
- Is the main entrance to the space obvious?
- After entering the space, is an information panel visible?
- Are there signs directing visitors/residents from elevators to the space?
- On leaving the space is there a clear sign indicating the exit to the ground level?
- Has a simple map of the social space been considered?

This criterion evaluates planting as a measurement complementing the seating provided in the social spaces. This is also to enquire how planting is designed or arranged affecting use of social spaces in the high-rise complex.

11. Planting

- Has a variety of planting been used to heighten and enliven the user's perception in change of colour, light, ground slope, smells, sounds and textures?
- Have feathery-leafed, quasi-open trees been selected where a see-through effect to other subareas/spaces is desirable?
- Has an open canopy of trees been selected to reduce potential damage associated with foliage and high winds?

- Have eventual height and mass of mature plants been considered in regard to views, shade, and maintenance?
- Is there adequate seating so that people are not forced to sit in planted areas, thus damaging the vegetation?
- Do lawns on the social spaces encourage picnicking, sleeping, reading, sunbathing, sprawling and other casual activities?
- Is the lawn area raised or sloped to improve seating and viewing opportunities, and has it avoided creating a vast prairie in favour of smaller, intimate areas?

12. Food

- Are food services available in or next to the social spaces?
- Such as food vendors, a food kiosk, or an indoor/outdoor cafe?
- Are there comfortable places to sit and eat brought out from the household, or bought from the vendor/caterer?
- Is there a drinking fountain, rest rooms and telephones to augment the facilities for eating in the social spaces?

13. Maintenance and Activities

- Will there be adequate staff to maintain plantings so that lawns are green and trimmed, dead flowers removed, and so forth?
- If there is some question about the availability of maintenance, an effort should be made to provide attractive low-maintenance planting.
- Are there enough litter containers and a collection schedule to prevent over-flowing?
- Will lawns as well as shrubs and flowers in planters double as seats?

To sum it all up, these observational criteria's objective is to review whether the architect and HDB Singapore convey their philosophical intent to the users by post-occupancy evaluations and performance of the social and public spaces.

4.4.4 Interviews

The interview is one of the most important sources of evidence in the case study method. It is one of six sources of evidence commonly used in case studies. Interviews are essential sources for the case study for its guided conversations rather than structured queries (Oppenheim, 1992). Interviews are a persistent line of inquiry using streamline topics focusing on the heart of this thesis's theoretical proposition: Public Spaces, Social Places. The interview process will follow two basic lines of inquiry, reflected in the case study protocol. The first line of inquiry is to know 'why' a particular process occurred as it did, and the second is 'how' the particular process occurred leading to an understanding of the phenomenon. The query is to understand the user's response to the social and public spaces they use in the Pinnacle @ Duxton. The major purpose of the interview is to corroborate certain facts established in this thesis's theoretical proposal. It is to inquire about community life from the view of selected households within the development. It is also to probe if the intention of the designers and stakeholders does meet with expectations as to how the people

living in the development use the space. This is a focused interview, in which a person is interviewed for a short period of time. The interviews are open-ended and assume a conversational manner followed by a certain set of protocols (from theoretical propositions). It will follow along the lines of a formal survey, part of the embedded case study method. Overall, interviews are an essential source of case study evidence because most case studies are about research on human affairs and behavioural events (Oppenheim, 1992).

4.4.4a Interview Protocol One (The Architect and The Client)

The focus interview sessions will be divided into two sources: the architect of the project and the owner of the development. The first is with the architect in charge of the project, ARC Studio Architecture Urbanism, Singapore and the owner of the development, the Singaporean HDB. The aim is to find out the designer's grounded social understanding concerning social and public spaces design in the development. Good practices in urban design are always a reflection of the designer understands of its theory and philosophy. When designs are not grounded in social understanding, they may fall back on the relative certainties of geometry, in preference to the apparent vagaries of use and meaning (Carr et al., 1992). Carr et al (1992, p.40) wrote, "designers may easily confuse their desire to make a strong visual statement with good design while public space is more concerned with the understanding and serving the public good, not aesthetic." The focus of the interview is to determine if the architect did refer to any specific method to make the social and public spaces in the Pinnacle @ Duxton. Most importantly, why and how is it being implemented in the design?

It is important that the interview is based on a formal protocol, for the purpose is to extract specific information relevant to the thesis inquiry. The heart of the protocol is a set of substantive questions reflecting the line of inquiry. Protocol questions in essence are reminders as to why the information needs to be collected. The specific questions serve as prompts in asking questions during a case study interview maintaining the line of inquiry in keeping with the thesis's theoretical proposal. Another purpose of the protocol questions is to keep on track as data collection proceeds to build the findings of the thesis. The general protocol of the question in this interview wishes to uncover how the design of the social and public spaces came into being.

Yin (2009) explains that questions in a case study protocol are divided into five levels: Level 1: questions asked of a specific interview, Level 2: questions asked of an individual case (these are the questions in the case study protocol to be answered by the investigator during a single case study, even when the single case study is part of a larger, multiple case study), Level 3: questions asked of a pattern of findings across multiple cases, Level 4: questions asked in an entire study (for example calling on information beyond the case study evidence and including other literature or published data that may have been reviewed), and Level 5: normative questions about policy

recommendations and conclusions, going beyond the narrow scope of the study. As part of a multiple source of evidence the methodology is a type Level 2 protocol. This is because of the objective: to uncover the process of 'how' and 'why', focusing on the architect (1st case) and client (2nd case). The general inquiry protocol questions are as follows:

- Do the client and architect determine the concept of the social and public space?
- Do the client and architect determine the function of social and public space in how it should be designed?

The inquiry protocols are divided into two parts, one focusing on the Arc Design Studio (the architect) and, second, HDB Singapore (owner and maintenance manager of the development). Though the social and public spaces are maintained by the Municipal Council of Tanjong Pagar, managerial and ownership accounts are centralized by HDB. These are the protocol questions.

Interview Protocol for the Architect and HDB Singapore

- The Pinnacle @ Duxton was designed with the idea of creating a sense of community life in the high-rise development; what planning design philosophy did you adapt or use?
- What specific theoretical and philosophical aspect of the design did you use to create community life in the development?

This is to establish philosophical links that serve the underlying concept of making places for social and public life. The architect and the client are the decision maker for the development. This inquiry will shed light on their understanding of the urban life as an important unit of analysis to understand why social/public spaces could work in a high-rise development.

- How did you use this theoretical and philosophical basis as the design strategy?
- Can you explain more about the design strategy in relation to making spaces for social and public places in a high-rise design?

When the architect has established his/her philosophical basis for the design, further inquiry is made as to how it is being implemented into the design itself. This is to investigate the 'why', establishing philosophical links to the general urban design theory and principles.

- In the three years of designing and building the Pinnacle @ Duxton, are you able to make all these design intentions or have some compromises been made due to financial, managerial or technology concerns?
- How well have all the designs been adapted to meet these constraints?

Good social and public spaces are designed with consideration of financial, managerial and technology concerns. The processes define how successful the project is from proposal to build. This protocol is to enquire how well these processes have been executed.

4.4.4b Interview Protocol Two (The Users)

The second part is focused on interviews with 15 residents of different households in the Pinnacle @ Duxton in order to gain deep familiarity from them as daily users. The defined size of the sample was used by sample tables precision (e) of +/- 10%, and from the population of 3,541, 15 was determined as an adequate sample size with a confidence level of 95%. The protocol follows a line of inquiry focusing on how individually the residents respond to the social and public spaces. The protocol also aims to enquire about effects from these spaces on their social and community life within the development. These are the sets of questions and its reasons.

Interview Protocol for Users

- Why did you choose to live in the Pinnacle @ Duxton?
- How did you know about the Pinnacle @ Duxton?

This is to enquire if the social and public spaces in the development design are an attraction factor and opportunity for quality living in high-rise buildings such as the Pinnacle @ Duxton.

- Was your previous home a high-rise unit in a high-density environment? How long have you lived in a high-rise unit?
- Why is the Pinnacle @ Duxton different from any other public housing development in Singapore?

Familiarity with context is a factor as to why people choose to live in high-density environments. This is also to test occupants' awareness of the difference between the Pinnacle @ Duxton to other housing developments.

- What is your cultural/religious background?
- How often do you practice your cultural and religious background?
- Do you practice it regularly?
- Do you practice it in groups?
- And open spaces?

This is to know about cultural preference and background which will determine how they respond to the current built concept of their social life within the development.

- How do you spend your social time?

- Do you spend your social time in public/social spaces?
- Where do you go to spend your social time in the vicinity of the neighbourhood?
- What do you normally do?
- Do you think the spaces for your socializing benefits are well designed?
- If yes/no, state why?

This section investigates how the interviewee uses and affirms the social spaces designed at the Pinnacle @ Duxton responding to their own cultural and lifestyle practices.

- Is the concern of who is your neighbour important? Why?
- Socializing is a way of knowing who your neighbours are; do you often socialize with your neighbour?
- Where do you usually socialize with members of your neighbourhood?

To foster the success of social and public life is first to understand the concept of community and neighbourhood life. Communal living defines how and why social and public spaces are used at best in any community.

- Does the design of the social and public spaces in the Pinnacle @ Duxton fulfil the needs of your socializing benefits?
- If yes/no, state why?
- What opportunities would you suggest for further improvement of the public and social spaces in the Pinnacle @ Duxton?

This section investigates satisfaction in the use of these spaces. It is also to identify, as members using the social and public spaces, what can be further improved in relationship to their lifestyles, and the upkeep of the neighbourhood itself.

4.4.5 General Surveys

Surveys are 'fact gathering' data's aim to support claims of how good practices of making social and public spaces in high-rises can be achieved. The design of a surveys requires technical knowledge, is a prolonged and arduous intellectual exercise which need to be clear towards the goals of the research (Oppenheim, 1992). In keeping with the aims of this research the general surveys are designed to find out how the population living in Pinnacle @ Duxton react to the social spaces built for them. . Each set of questions, scales and indicators in the survey are formulated to answer this. (Figure 3.5) The first section of the survey covers basic statistical reference to people living in Pinnacle @ Duxton. The age and occupational demographic census was taken from the Singapore Census 2010. Pinnacle @ Duxton is a design as development that tries to encourage the nuclear family to prosper in it. The marital status box is to enquire the legibility of families living in

the settlement. This is continued with an enquiry of children within the families. It is vital to enquire the previous housing type the inhabitants lived before they settled at Pinnacle @ Duxton. This is to formulate, if the inhabitants of the development previously lived in high-rise, high-density environment.

Age 16-26 27-36 37-46 47-56 56 above	Gender Male Female	Marital Status Single Living Together Married If married with family how many children in the household? 1 2 3 4 or more
Previous housing type before moving to Pinnacle & Duxton? Flats/Apartment Terrace House Bungalows Others	Occupation Groups Clerical/Secretarial Management/Director Finance & Business Trade/Manual Worker Professional Sales/Shop Assistant Public Sector Self-Employed Unemployed Student Retired Housewives/Husbands	

Figure 4.5: Section 1, Survey, Pinnacle @ Duxton.

The second section specifies usage as its main inquiry. The Pinnacle @ Duxton was occupied for more than 3 years. The first question is to find out how long the residents have lived in it. The second and third aims of the surveys how is to enquiry how often all three levels of social spaces was used by the residents. This survey is further detailed to how many number of times the space are used in a span of the week.

How long have you lived in Pinnacle & Duxton? Less than 6 months More than 1 Year More than 2 Years		
Which level of the social/public spaces do you use the most? 3rd Storey Garden 26thStorey Sky Park Roof Deck Sky Park		
How often do you use these social/public spaces? Daily 2-3 times a week Once a week 3rd Storey Garden 26thStorey Sky Park Roof Deck Sky Park		Are these social/public spaces easily accessible for usage? Yes No

Figure 4.6: Section 2, Survey, Pinnacle @ Duxton.

What form of activities do you often do in these spaces?

3rd Storey Garden

Exercising ☐Socializing ☐Relaxing ☐Strolling ☐

26th Storey Sky Park

Exercising ☐Socializing ☐Relaxing ☐Strolling ☐

Roof Deck Sky Park

Exercising ☐Socializing ☐Relaxing ☐Strolling ☐

Which time of the day do you usually use the social/public space in Pinnacle & Duxton?

Early Morning ☐Morning ☐Afternoon ☐Evening ☐LateEvening ☐

6am-8am8am-1212pm-3pm3pm-5pm5pm-8pm

Figure 4.7: Section 3, Survey, Pinnacle @ Duxton.

The third section is enquires about the type of activities residents did in all three levels of the social &public spaces. The four general forms of social & public activities are listed as exercising, socializing, relaxing and strolling (adapted from Carr et. al 1992). Climate and topography will always be a significant contributor to the design of any public and social spaces (Carr et.al;. 1992). While public life is more pronounce in Mediterranean because of its comfortably warm climate, public life in the equatorial climate are constraint to cool, shaded areas and the time of the day where heat is low. Section 4 of the survey is an architectural design enquiry of the inhabitants by sense of security and image.

Have you ever lived/grew-up in a high-density environment before this?

Yes ☐No ☐

Is the architecture design of these social/public spaces pleasing?

Yes ☐No ☐

Does the design of the social/public spaces provide a sense of security for its users?

Yes ☐No ☐

Figure 4.8: Section 4, Survey, Pinnacle @ Duxton.

Annually, Singapore's National Day Speech was broadcast live from the Roof Deck Sky Garden of Pinnacle & Duxton. It is also a tourist destination. Do you feel the Roof Deck Sky Garden is a Symbolic Public Space in Pinnacle & Duxton?

Strongly Agree ☐ : Agree ☐ : Undecided ☐ : Disagree ☐ : Strongly Disagree ☐

Which social/public space in Pinnacle and Duxton do you recognized the most by memory?

Historical Park	<input type="checkbox"/>	Roof Deck Sky Garden	<input type="checkbox"/>
26th Floor Sky Garden	<input type="checkbox"/>	Duxton Plain Park Food Court	<input type="checkbox"/>
Cantonment Entrance Grand Staircase	<input type="checkbox"/>		

The design of the public/social spaces is comfortable...

Strongly Agree ☐ : Agree ☐ : Undecided ☐ : Disagree ☐ : Strongly Disagree ☐

The design of the public/social spaces are filled with an adequate amount of greenery and feel more in touch with nature...

Strongly Agree ☐ : Agree ☐ : Undecided ☐ : Disagree ☐ : Strongly Disagree ☐

How often do you greet a neighbour in the social/public spaces?

Once a week ☐

2/3 times a week ☐

Daily ☐

How often do you use the social/public spaces with your children?

Once a week ☐

2/3 times a week ☐

Daily ☐

How often do you use the social/public spaces to meet an outsider, visitor?

Once a week ☐

2/3 times a week ☐

Daily ☐

Figure 4.9: Section 5, Survey, Pinnacle @ Duxton.

A good public & social space is naturally filled with life, energy and the sense of enjoyment. The source of this success is because it is a natural setting to the existence of public life defined by the values of the people living in the area. Throughout history, communities have developed public spaces that support their needs, whether these are markets, places for sacred celebrations, or sites for local rituals. Public spaces often evolved to symbolize its community and the larger society which it exists (Carr et. al, 1992). Section 5 of the survey uses questions to enquire this fact. The celebration of Independence Day in Singapore was held with huge fireworks displays and pageantry annually. Huge crowds flocked the top most sky deck every year to witness this event. The first question of the survey asks whether the inhabitants agree or disagree with the notion of their settlement being coined as a symbolic space within the greater Singaporean city. Good social & public spaces are also communal spaces where neighbours know each other thus creating familiarity to groups of people using it. . The question at the end of this section investigates how these social & public spaces are used for neighbourhood activities. . This section is to enquire the social & functional aspects within the settlement by the use of the social& public spaces designed by the architect.

The final section of the survey investigates satisfaction response of the users. It also probes into the concept of ‘sense of place’. The settlement was designed to encourage a sense of ownership not only to housing units but the use of its social spaces.

Are these social/
public spaces
good for social
and community
interaction?

Yes ☐
No ☐
If not, why?

Do these social/
public spaces
create a strong
sense of belonging
and social
ownership of the
whole development?

Yes ☐
No ☐

Do these social/public spaces
create opportunities for
socializing and community building?
Yes ☐ No ☐

Are the facilities provided in the
social/public spaces effective for
social interaction?
Yes ☐ No ☐

Any comments about
the social/public
spaces in Pinnacle
& Duxton?

Figure 4.10: Section 6, Survey, Pinnacle @ Duxton.

4.5 Chapter Summary

A case study investigator must have a methodology versatility not necessarily required for using other methods and must follow certain formal procedures to ensure quality control during the data collection process (Yin, 2009). The methodology written in this chapter covers procedures prior to onsite data collection. This thesis is an investigation of the social life phenomenon in high-rise buildings. This phenomenon will be the answer to the question of ‘how’ and ‘why’ social and public spaces work in high-rise/tall buildings. The entire unit of analysis, documentation, direct observation, interviews and surveys is to be considered in the case study database, composing the answer to this thesis’s question and hypothesis. The principles described in the methodology are steps and justifications. They are not intended to be a straightjacket approach, but are intended to make the process as precise as possible, so the results of the investigation reflect reliability and validity to its objective, thus becoming worthy of a quality conclusion.

CHAPTER 5-NEIGHBOURHOOD PARK: THE THIRD FLOOR PODIUM

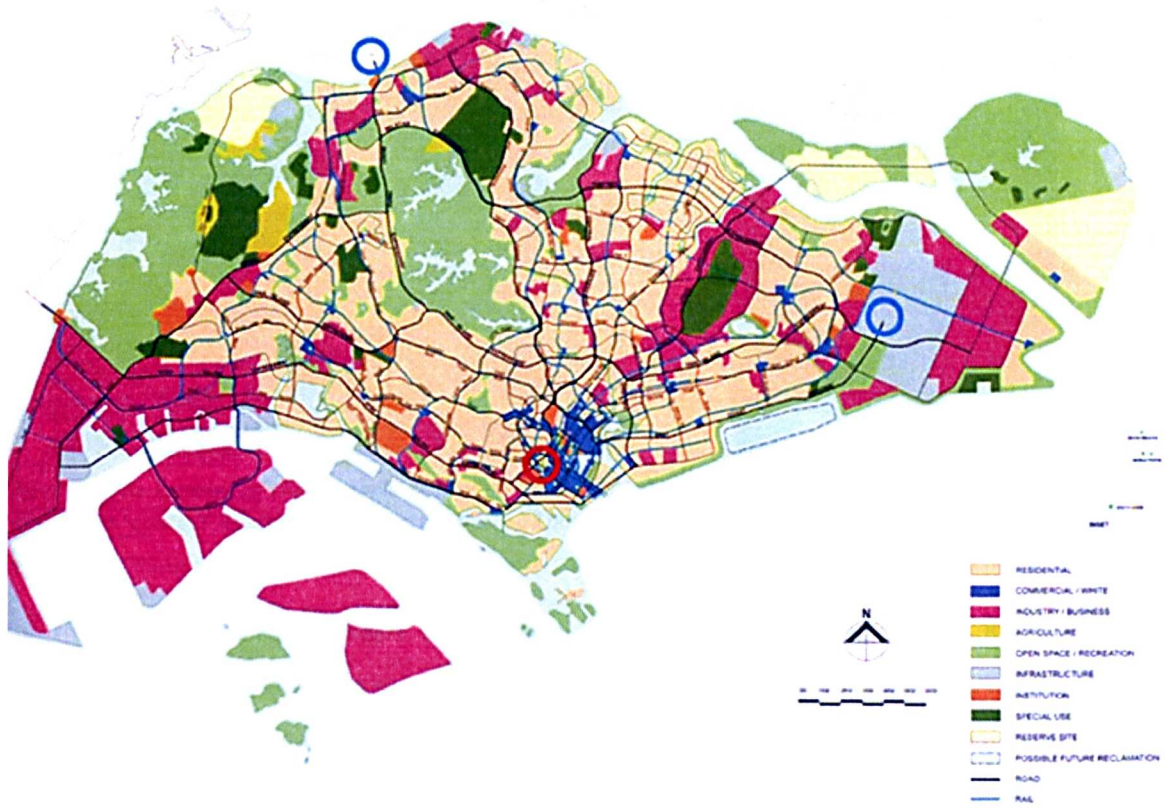
5.0 Introduction

The Pinnacle @ Duxton was shaped by the evolution of the public housing programme from 1960 to 2000. This evolution created an urban singularity making high-rises the dominant urban form in Singapore. Through this evolution, social lives flourished in high-rise settlements throughout the city. The programme marked a new beginning of an evolution in social housing where neighbourhood parameters are pushed higher than their usual lower floor locality. Social infrastructures like open parks, playgrounds and plazas are built on higher floors to support neighbourhood development in aiming to achieve social sustainability in the high-rise typology. The inquiry in this chapter is to investigate whether the built social and public spaces in the Pinnacle @ Duxton are parallel to the good dimensions of urban design by their architectural qualities. These architectural qualities will be analysed using theoretical guidelines from Marcus and Francis (1998), Moughtin (2003), and Carmona et al., (2003). Overall, these architectural evaluations are to review and discuss whether the architect and developer (Housing Development Board, Singapore) convey its philosophical intent in the Pinnacle @ Duxton's social and public spaces by urban design principles.

5.1 The Pinnacle @ Duxton

5.1.1 Location and Context

According to the Singaporean Department of Statistic Population Trends report (2011), the Pinnacle @ Duxton is situated at the edge of the Downtown Core bordering Bukit Merah and the Outram district. It is listed within the Tanjong Pagar constituency. The whole of Tanjong Pagar contained less than 10,000 residents in June 2011. It had a moderately high percent residents aged 65 years and above. The area had a small population below 15 years old (Wong, 2011). The proportion of residents living in high-rise buildings is high with 70% to 80% of households occupying HDB developments. The area surrounding the Pinnacle @ Duxton is considered as a greying population, for it was built and occupied in the early 1970s. In 2011, the elderly proportion was highest in the following order: Outram, Downtown Core, Rochor, Queenstown, Bukit Merah and Toa Payoh districts. Ownership of housing units in this area are high with many still occupied by the same first generation families (Wong, 2011). Due to its proximity to the central business district, the settlement also attracts a lot of professionals from the banking and business sector.



Plan 5.1: The red circle indicates the Pinnacle @ Duxton's location within the larger city-state context. The blue circle at the eastern corner of the island is the International Changi Airport; the one at the north is Singapore's land access to its neighbour, Malaysia.

Most of its ethnic population are Chinese with medium to upper-medium incomes. There are other minorities such as Malay Muslims and Indians, though their presences are not culturally significant on site. The street atmosphere in Cantonment Road is busy during the day as it is a major road artery into the city. It has excellent public transport routes connecting the Pinnacle @ Duxton to other major locations in the city. The Cantonment Primary School recently opened near the development in January 2011 as part of an urban regeneration project for the neighbourhood.



Plan 5.2: The location of the Pinnacle @ Duxton within the micro context of the city. Picture Source: URA (2005).

Picture 5.1: The local market, situated at the foot of the development with the Pinnacle @ Duxton in the background.

Neil Road which borders the western edge of the Pinnacle @ Duxton has been highly gentrified with numerous boutique hotels, office spaces and night bars. At the intersection between Cantonment and Neil Road sits The Singaporean Police Headquarters connected to the Outram MRT Station with busy pedestrian movement during the day, chiefly morning, lunchtime and evening rush hour. The Pinnacle @ Duxton is also connected to Duxton Plain Park, which is a major green artery within the neighbourhood. Historically this linear park used to be a railway linking the old port and Chinatown but now functions as a horizontal green zone in accordance to the Green Plan aimed at connecting all green areas within a larger network throughout the city and the island. The park atmosphere is lively and vibrant with activities concentrating at its south-east entrance gate connected by a staircase towards the Tanjong Pagar market and shopping centre. The area is very lively, for it sells local groceries, meat, fish and poultry. Local services like the Post Office, banks, sundry shops and a local supermarket are located in the shopping centre.



Picture 5.2: The Tanjong Pagar Community Center.



Picture 5.3: The Singaporean Police HQ.

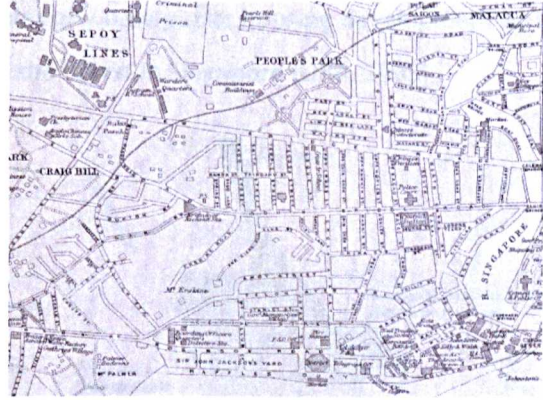
Another major social infrastructure within the area is the Tanjong Pagar Community Center, which is located in between two residential tower blocks in the Pinnacle @ Duxton. The Pinnacle @ Duxton neighbours two other major HDB high-rise housing developments called Everton Park and the Tanjong Pagar complex. Everton Park was built in the early 1970s as the second generation middle-rise housing units with long rectangular blocks and generous open ground park space. The Tanjong Pagar complex, though similar in its genetic imprint, was additionally designed with a ground floor shopping complex and market. The Tanjong Pagar complex has most of the neighbourhood service infrastructure such as postal offices, a municipal office and banks. It is also much older than Everton Park, for it is among one of Singapore's first generation housing developments built in the 1960s. The Pinnacle @ Duxton's location and context as a settlement within the metropolitan area is excellent. Basic facilities like health, education, and security are located nearby within walking distance from the development. The site is also connected by two major subway arteries leading to downtown Singapore, the Changi International Airport, Tanjong Pagar seaport and the western industrial estates of Jurong. The Tanjong Pagar MRT station is located across the market with a 30-minute access to Changi International Airport and it is only 10 minutes' walking distance from the Pinnacle @ Duxton. Singapore's Central Business District, called Raffles Place, is only 30 minutes by foot. The site is accessible by bus routes that run and stop at two dedicated bus stops on Cantonment Road. Public car parks are located in lots on the first and second storeys on a short-term basis from 7am to 10.30pm daily. The car-parking system is fully automated and charges per hour from 7am to 10.30pm, with different rates for weekends and weekdays.

5.1.2 The Duxton Plain Site History

Historically the site was home to nutmeg plantations. The name Duxton referred to a huge mansion that stood on the site before the end of the 19th century. The whole of Duxton Hill was then bought by the Tanjong Pagar Dock Company in 1899 and leased out for developers. Tanjong Pagar eventually developed into a harbour throughout the 20th century, turning the area from agriculture to commercial and residential. Originally the area was inhabited by local affluent families conducting business in nearby Chinatown, Port and the Financial District. This changed by the mid-19th century as the port economy shifted from the mouth of the Singapore River to Tanjong Pagar Docklands. Working-class families flocked to the area, especially those employed by the Municipal Council. The demographic change drove out all affluent mansion owners and population density grew as shop-houses were built to support new immigrants supporting the pre-war economy in Singapore. Tanjong Pagar was then the gateway into Singapore and Malaya because it is located near to the Port. Tanjong Pagar Grand Central was also located nearby, connecting the site to the interiors of Malaya famed for their rubber and tin industry (URA, 2005).



Picture 5.4: The first 1963 medium-rise flat built during the first Singaporean public housing programme. The building was demolished to make way for the Pinnacle @ Duxton, 2003. Picture Source: (URA, 2005).



Plan 5.3: Post-war map of the Tanjong Pagar area circa 1930-60. Picture source: (URA, 2005).

Tanjong Pagar was one of many of Singapore's famous slums during the inter-war years. It was populated by rickshaw coolies, coal workers, stevedores and seamen. The state of the living quarters at the area grew worse in the advent of the post-Second World War. The narrative of this social disorder was discussed in Chapter 4, highlighting why public housing became an important agenda in the nation building effectively, shaping Singapore's social and urban singularity into high-rise buildings. By that time Singapore had achieved self-governance and it was imperative that Tanjong Pagar should be the first public housing project aimed at improving living conditions within the city. Tanjong Pagar represented the heart of Singapore's social and economic problems in the 1960s. In 1963, two blocks of 167 flats each were built along Cantonment Road to kick-start the social and building programme in the area. The blocks built by the HDB were among the first public housing projects built as part of a larger urban renewal scheme targeting slum eradication (Guan, 1989; HDB, 1963; URA, 2005).

5.1.3 Design Brief and Technical Requirements

Fast forward after the millennium to meet with the 2001 Singaporean Concept Plan; the public housing project built in 1963 was chosen for redevelopment as part of the new urban renewal strategy to increase inner city population in the Tanjong Pagar Area. The original 1963 blocks were bulldozed for higher density and height. HDB generally operated on building high-rise housing at the density of 2.8 plot ratio and no more than 30 storeys. Though other developments were built up to 4.0 plot-ratios, they are only located on selected locations situated far inland away from the restriction height and far from proximity to Changi International Airport. Nonetheless the Pinnacle @ Duxton sits beyond the airport's height rules. The 2001 Concept Plan is allowed for an increased

height of between 7.4 to 8.4 plot ratios, which enables any new public housing development to be built up to 50 storeys, making the Pinnacle @ Duxton the tallest in Singapore (URA, 2005).

Key Planning Parameters	
Parameter	Requirement
Site Area	2.51 hectares
Gross Plot Ratio (GPR)	7.4 (minimum) to 8.4 (maximum)
Gross Floor Area (GFA)	186,207 to 211,370 sqm
Allowable Building Height	Approx. 150.4m (261.00m RL)
Building Setback	7.5m from Duxton Plain Park; 3.0m from common boundary with adjacent developments
Size and Proportion of Dwelling Units (DUs)	2/3rds Type S1 = 80 to 100 sqm*; 1/3rd Type S2 = 101 to 110 sqm*
Accommodation	Living / dining room, 3 bedrooms, kitchen, 2 bathrooms, household shelter, service balcony
Social / Communal / Commercial Facilities	Inter-Precinct Open Space : 1,500 sqm Childcare Centre : 350 to 400 sqm Resident Committee Centre : 160 sqm Cafeteria / Foodshop : 200 to 250 sqm Convenience Shop : 100 to 150 sqm Covered Space for Future Social / Communal Activities : 300 to 400 sqm
Car Parking	Type S1 = 1 lot / 1.8 DUs Type S2 = 1 lot / 1.3 DUs Additional lots for supporting uses
Construction Cost	\$1,350/sqm (maximum) of internal floor space of the DUs

* net internal floor area

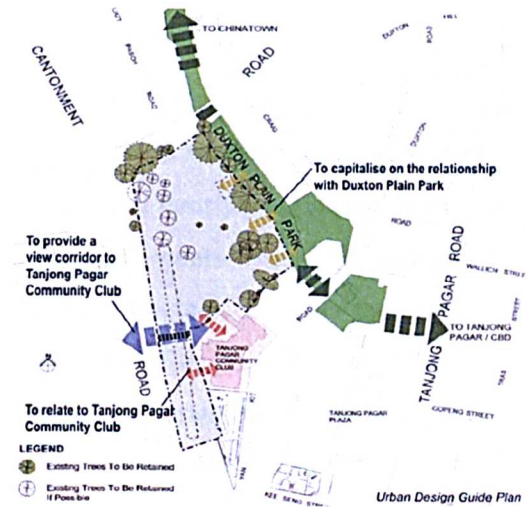


Figure 5.1: Key planning parameters used as reference by competitors to build and design the Pinnacle @ Duxton. Note how social infrastructure played an integral theme in the redevelopment, thus encouraging how social and public spaces can be taken vertically within the high-rise typology. Source taken from the URA (2005).

Plan 5.4: The urban design guideline for Duxton Hill redevelopment by URA (URA, 2005).

Several key planning parameters were set for designers to work with minimum mandatory requirements highlighting site context, cost considerations and an understanding of housing in the local social context. Traditional HDB design requirements were omitted to encourage creative solutions by architects in this new social housing typology, though three design parameters were highlighted as most important to the site. First, in view of its historical site as one of the first generation public housing projects built by HDB, the competition called for proposals to meaningfully capture its historical value and re-site its commemorative plaques, ‘laying the foundation stone’ on 15 May 1963 and opening on 10 April 1964 by the then Prime Minister of Singapore, Lee Kuan Yew. Second, the proposal must integrate its design without destroying the existing Tanjong Pagar Community Club. Third, in light of Singapore’s garden city identity, the design must correlate with Duxton Plain Park. Minimum intervention that might result in chopping down existing mature trees in the site was discouraged. Furthermore, future designs must require putting forward a comprehensive landscape strategy that extends all greenery surrounding the site horizontally or vertically (URA, 2005). These requirements were met with mixed results from architects during the competition, but ultimately the project was awarded to Arc Studio Architecture and Urbanism.

5.1.4 Sky Houses: Flying Green. The Design Statement by Arc Studio Architecture and Urbanism, Singapore

Arc Studio Architecture and Urbanism is a Singaporean-based design company whose understanding of high-rise living, particularly in the Singaporean context, helped in building architectural narratives for the project. According to Khoo Peng Beng (the architect) the Pinnacle @ Duxton is designed based upon three architectural narratives. First is its relationship between public (city) and private (housing), highlighted by its design on the ground floor plane. Second is the sky garden, highlighted by the need for outdoor spaces in vertical settlements. Third, the design of its residential units focusing on the creation of quality living, often neglected in the high-rise environment. These three narratives are important from the view of its designers, Arc Studio, in future high-rise settlements. In an interview with the architect of the design, Khoo Peng Beng stated that, 'as high-rise buildings get higher, it creates deeper psychological barriers between its inhabitants and the urban environment. The premise of future urban high-rise density housing needs to address these psychological barriers'. Building high-density housing needs to be sustainable as it integrates the financial, technical and strategic masterplanning requirements. The sustainability factor of any high-rise housing project is determined by its longevity. These narratives address the psychological barriers by creating three important planning/design parameters in order to create a liveable, safe and sustainable environment from the social and cultural perspective of Singapore.

The first parameter is the ground-the mediation between public and private. This first psychological barrier separates the city and its inhabitant's and the most common psychological barrier between home and city is security. The existing ground is lifted three stories high to create a defensible space that protects the settlement from the streets. The three floors below are filled with services and car parks. This defensible space is not enclosed entirely but opened at strategic hotspots that connect with the existing urban network. The pathways slice into the ground floor around nodes demarking public and social places. The ground dips, rises, and peels to form a roof, seats, enclosures and ventilation slots. Ultimately, it creates an artificial landscape of small undulating mounds and hills. This mutual interference of pathways and nodes acts as filters between home and city, providing a sense of security. It also creates spaces for interaction between the inhabitants and outsiders coming into the settlement, without invading the privacy of the homes.



Picture 5.5: The winning proposal by Arc Studio in April 2002. Picture source: URA (2005).

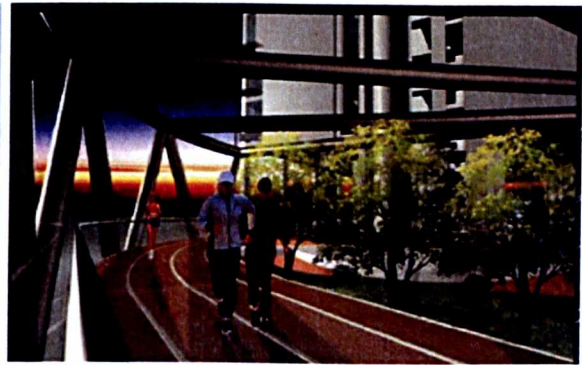


Picture 5.6: The finished product in 2010. Picture source: (e-architect, 2010).

Arc Studio stated the success of high-rise living is valued at how its ground floor spaces are designed. Failed interference between the city and high-rise homes is often reflected by ground floor spaces that did not provide a sense of security for its inhabitants. Arc Studio quoted Newman (1972), reflecting the failure of Pruitt-Igoe while taking considerations from numerous urban design theories, like Jacobs (1961), and experience from high-rise living in Singapore as their driving inspiration and philosophical force in detailed design for the ground floor plane. This careful layer between home and city is cited by HDB as a success in new public housing design. Old high-rise housing layouts tend to neglect careful programming and layering between home and city. Usually there were no barriers between private and public. Public housing, especially in high-rise design, does not have a boundary wall while private housing tends to shut its boundaries into walled compounds. The special consideration given to the ground floor is a breakthrough in social housing typology as it achieves equilibrium between public and private without it resulting in becoming a gated settlement. Moreover, the concept provides a place where inhabitants within the settlement can interface with the city in a secured environment. The potential for this layer is huge with anticipation that it will evolve into urban places unique to the Pinnacle @ Duxton settlement. This suggests the Pinnacle @ Duxton becoming a high-rise settlement, a new urban typology similar to towns and villages that operate on the horizontal level.

The second parameter focuses on green spaces in high-rise settlements. The higher a building goes the less connection it has to outdoor green spaces. Outdoor green spaces are important for vitality in cities. These green spaces are manifested in many forms from private gardens to shared open parks in small communities to large urban forests in city neighbourhoods. The height of a 50-storey development would mean residents living on top floors have less access to

the ground floor social public spaces. Sky parks were introduced in the Pinnacle @ Duxton to bring outdoor green spaces closer to residents living on top floors. Two sky parks are located on two floors, one on the 27th floor and the other on the 50th floor. The rationale for this location is to provide greater proximity and accessibility for high-rise residents to experience greenery. Careful design in the park considers the creation of natural physical features in the landscape, like mounds or large trees, to evoke a psychological sense of security to the ground. This goal is important for residents living in high-rise environments. They are more affected towards social inclusion due to stress as the situational environments in high-rise settlements are often crowded. Crowding is conceptualized as a psychological state characterized by stress (Bell et al., 2001). To dissipate this stress is to provide access to nearby greenery as a form of temporary escapism (Ulrich, 1979). Having incorporated this into the Pinnacle @ Duxton, Arc Studio hopes it reduces this effect, thus elevating the quality of living in the high-rise environment.



Picture 5.7: Proposed image of a sky garden in between residential blocks in the Pinnacle @ Duxton. The sky garden provides greater proximity for residents without going down to ground level to experience it. Source: URA (2005).

Picture 5.8: The sky gardens also provide opportunities for active engagement, such as jogging tracks and fitness equipment. Source: URA (2005).

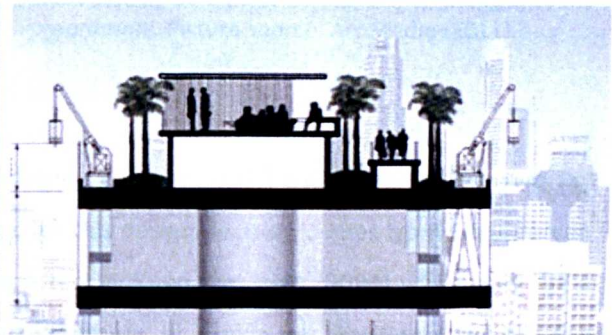
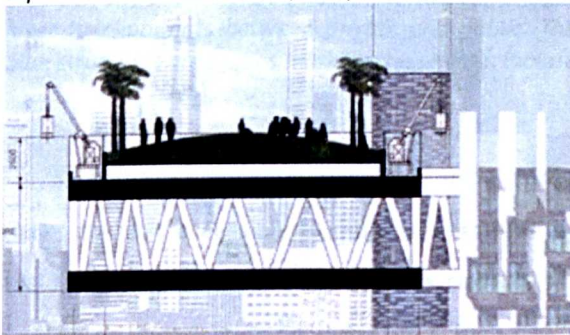


Figure 5.2: A cut section of a sky garden on the top-most level. The scheme tries to emulate a natural landscape, allowing its high location to be a form of temporary escapism from the high-density stress. Source: URA (2005).

Figure 5.3: The undulating landscape provides opportunities to create rooms for community engagement on the sky park. Source: URA (2005).

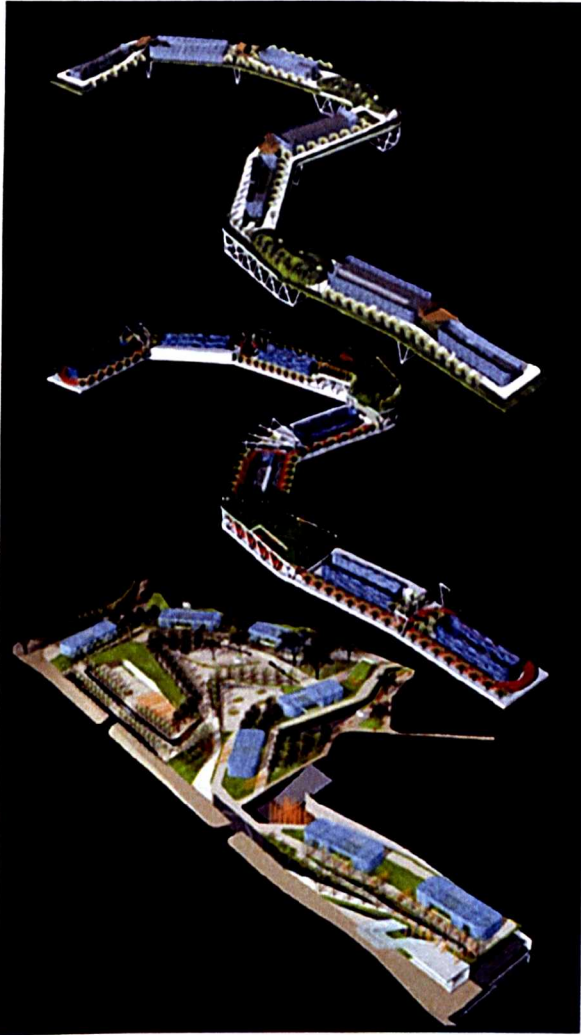


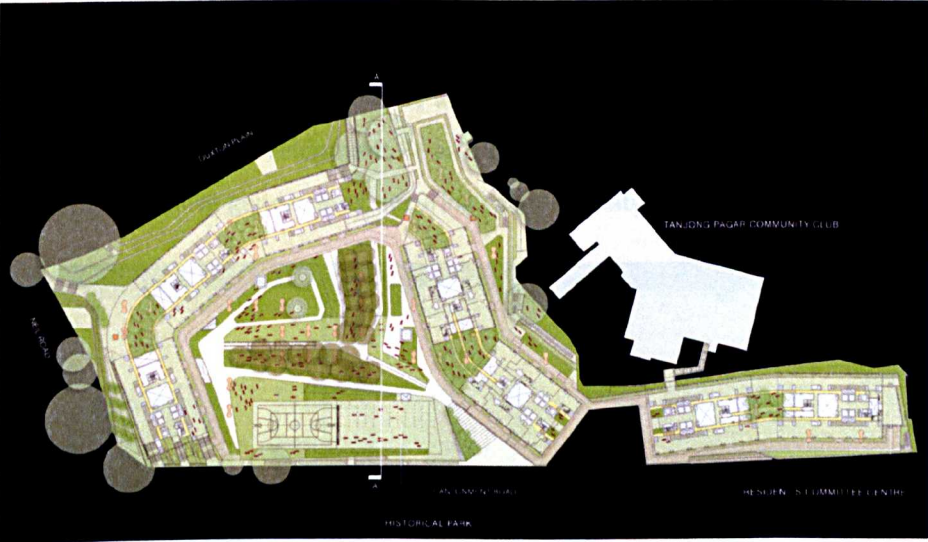
Figure 5.4: The three levels of social and public spaces in the development. The ground is the mediatory between city and neighbourhood. The two sky bridges layer it inhabitants between private and public. The blue structures are homes marking the private. Picture source: URA (2005).



Picture 5.9: The three levels after it was finished in 2010. The architect managed to translate the idea successfully into built form with minor changes to the programme. Picture source: Arc Studio (2011).

Without providing excessive social contact and too much social stimulation, these two sky parks are only accessible to the residents. The logic for this design decision comes from Singaporean residents' concerns for security. This claim is supported by Yuen and Hien (2004) when they did a survey on satisfaction in living in a high-rise development in Singapore. Residents in high-rise developments prefer their settlement to be inclusive to themselves without any direct access from the public in them. The concern is directed towards crime. Though crime rates in Singapore are low, security is crucial as a symbol of psychological protection against the threats of high-density living (Newman, 1972). Though it is a pity the original idea in the winning completion proposed two high-

speed lifts between the three floors for public access, there were cancelled due to concerns of security and building budgeting issues. However, according to Arc Studio there could be a possibility to include them in the near future, depending on the reaction of the inhabitants since the high speed lifts are not part of an integral structure of the building.



Plan 5.5: The finalized layout of the third-floor social and public spaces. There were no major changes in the planning when compared to the first winning proposal with the exemption of the sky lift. Picture source: Arc Studio (2011).

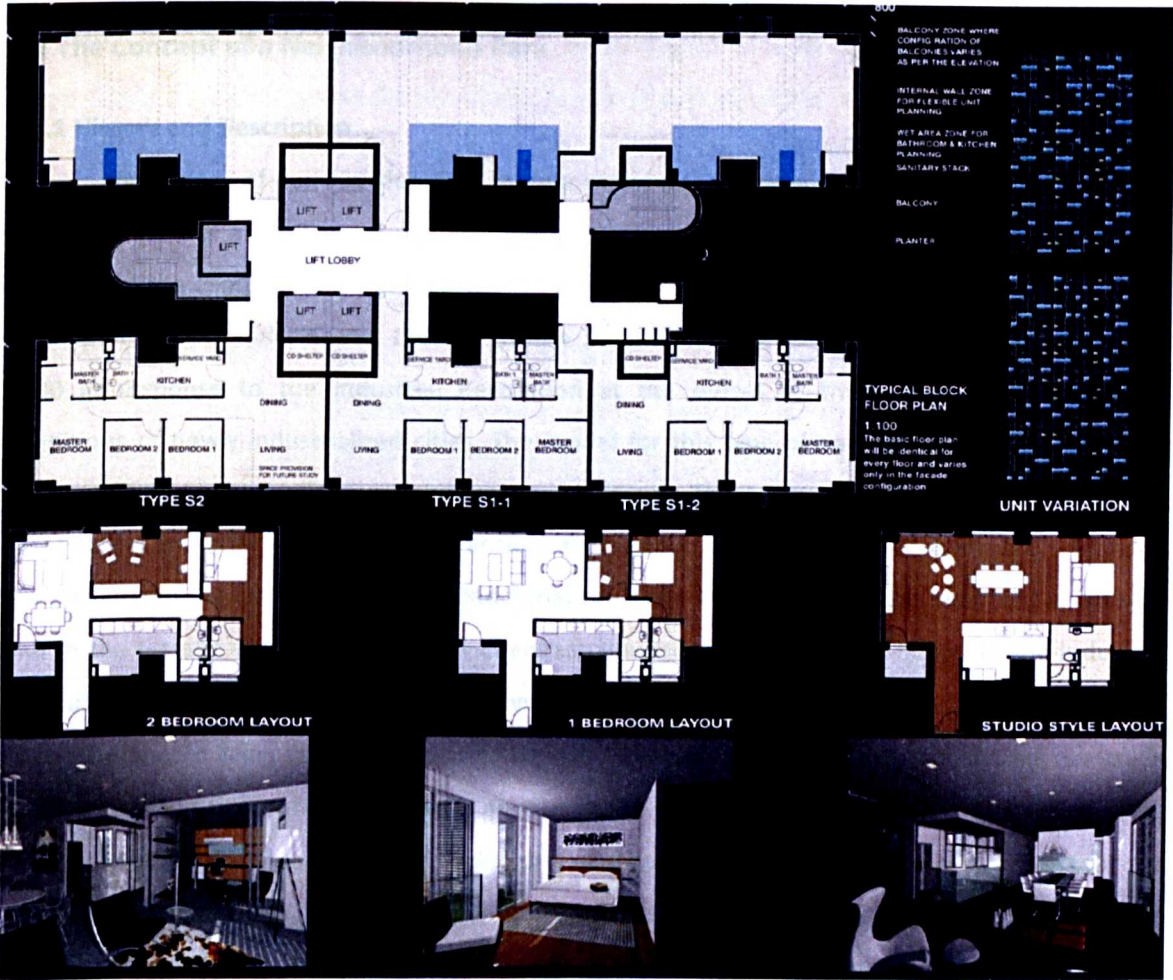


Plan 5.6: The 26th storey final layout. The idea for social and public spaces on this floor is translated into mini-vest gardens. This area is designated only for residents. Picture source: Arc Studio (2011).



Plan 5.7: The 50th storey layout. Like the 26th storey sky deck, the social and public spaces are designed as mini-vest parks, though its purposes are only as pleasure gardens. It is a semi-public space accessible to all, within strict visiting hours. Picture source: Arc Studio (2011).

The third parameter is about quality living. This parameter is translated to maximize each housing unit into having the best architecture quality inside-out, thus giving greater opportunity for quality living.. Each residential unit is designed with maximum flexibility of growth for the occupants. This concept is called 'White Flats', taken from the abbreviation, 'White Canvas' (Yuen, 2009). New apartment units are built without internal partitions to provide owners with the choice and flexibility to fit within any lifestyle choices. The concept also allows residents in each unit to grow from small to large households without moving to other developments. This ensures a sense of permanence in the development. It also creates opportunity for residents to create their sense of place to successive generations, securing social stability within the development.



Plan 5.8: Structurally, each unit is created as a shell. The unit is designed in mind with the growth of its occupants from newly-weds to a family with children, teenagers and finally grandchildren, to the elderly. Toilets can be expanded or merged. Kitchens can be opened up, rooms merged, neighbouring units merged. Source: URA (2005).

Overall these design parameters defined the architecture integrity of the Pinnacle @ Duxton. It is translated into creating a self-contained settlement while connected to the larger

metropolitan framework. The design parameter successfully proposed a neighbourhood structure following the New Urbanism philosophy in the tall and high-rise building typology. Urbanity is translated vertically in the design by making the Pinnacle @ Duxton into neighbourhoods (highlighted by its seven blocks) to form a settlement (the complex) with clear boundaries, yet open to the city. The design also provides a pedestrian-orientated urban structure not dominated by the automobile. This pedestrian pattern went vertically with open spaces for social and public engagement. This initiative proved the Pinnacle @ Duxton by its design ingenuity is an evolving new urban form.

5.2 The Concept of a Neighbourhood Park

5.2.1 History and Description

The history of parks is identified by four major periods nominally referred to the American context since the mid-19th century. The four periods were in correlation to social developments throughout the century. These periods are 'Pleasure Parks', 'Reform Parks', 'Recreational Parks' and the 'Open System Park' (Cranz, 1982). Pleasure Parks date back to the period between 1850 and 1900 in response to the Industrial Revolution at the outset of the overcrowded, unsanitary conditions of newly-industrialized cities. The model for this type of park came from the romantic period, which idealized wilderness and pastoral landscape. These types of parks were modelled from parks found in aristocratic European mansions throughout the period. The park is usually found at the outskirts of the city beyond the old industrial city walls. Pleasure Parks also represent an integral unit in the Garden City Movement that Ebenezer Howard proposed at the height of the Industrial Revolution in 1898. Howard believed that overcrowding deteriorates cities and affects the quality of life of the people living in them. Howard's Garden City concept combined the town and country in order to provide the working class with an alternative to working on farms or crowded unhealthy cities (Kostof, 1993). These Pleasure Parks formed a belt surrounding urban areas as lungs for the city. The use of the park is characterized by large trees, spacious lawns of undulating terrain with meandering walks, and naturalistic or replication of water features. The park was intended for the working and middle classes to maintain their health through the relaxed outdoors. It is also meant as a democratic space as many social groups could associate with each other as they shared this space (Cranz, 1982).

Around 1900, in the outgrowth of progressive and social work movements 'Reform Parks' began to appear in industrial cities. These 'Reform Parks' were located in the inner city concentrating their location around residential areas. 'Reform Parks' were the first true

neighbourhood parks as their primary conditions intended to the need of families and children living in the immediate vicinity of their location (Cranz, 1982). While 'Pleasure Parks' were found in the outlying boundaries of the city 'Reform Parks' were smaller and nearer to neighbourhood areas and quarters within the city. They operated to specific areas and functions for groups of people using them. The notion for making 'Reform Parks' was, as against 'Pleasure Parks', seen by the inner city working-class people as elitist in its design. 'Reform Parks' offer functions that highlight activity areas for children and mingling adults. Its functionalist quality was opposite to the pastoral undulating landscape that signified 'Pleasure Parks'. 'Reform Parks' were laid out in strict geometrical lines defined by their hard paving and symmetrical visual quality. This visual quality is, because of its location, usually bound by density and compactness of the inner city (Kostof, 1993).

The outset of suburbia and increased car ownership into the mainstream American society in the 1930s created a new social movement in sports and recreation. This movement saw the ties between social reform and the city being disconnected as suburban areas concentrated on building parks emphasizing athletic facilities and sports programmes. This movement saw the birth of sports venue parks such as baseball, basketball and football. Private car ownership increased the catchment areas of these parks, no longer bound by pedestrian and public transport. These parks were located outside the city centre. Similar to 'Pleasure Parks', 'Recreational Parks' were huge in size and complexity, though their function is not for rest and contemplation but active sports. 'Recreational Parks' needed huge investment as the construction of specialized sports courts and monthly maintenance is involved. These parks eventually evolved into becoming private gated parks with entry restrained to fees and forms of membership (Cranz, 1982). On the positive side, 'Recreational Parks' stimulate community morale by uniting groups of people in sports allegiances competing against other teams from different parts of the city. 'Recreational Parks' would later evolve into becoming spectator sports venues after the Second World War culminating into specialized sports venues like the Yankee Stadium for the Yankees Baseball Club in New York (Marcus & Francis, 1998).

Post-Second World War saw the social work movement becoming mainstream in urban design and planning. The early modern movement introduced the 'Open Space Concept' in 1965 that combines separated pieces of land, such as mini-parks, playgrounds, urban plazas, and sports venues into one system (Mumford, 2002). The 'Open Space Concept' was derived by The Athens Charter in the idea that it is important that the planning of cities needs to address these issues of health and hygiene. The functional zoning of housing, commercial, culture and industrial areas creates segregation zones of green parkland to be filled with this all-in-one park system. Today, neighbourhood parks embody all elements of its history, though some still retain a pure type. Like

high-rises, neighbourhood parks should not be homogenous. A park should never be designed to only one model but a myriad of considerations and approaches based on different backgrounds and social geographies. Changing residential patterns and urban order in the third modern age needs understanding of what measurements and elements are appropriate for designing neighbourhood parks in different urban conditions. In order to execute this, park policies and design should be based on sensitive analysis of current social conditions and attitudes towards cities (Cranz, 1982).

5.2.2 Neighbourhood Parks in the Third Modern Age

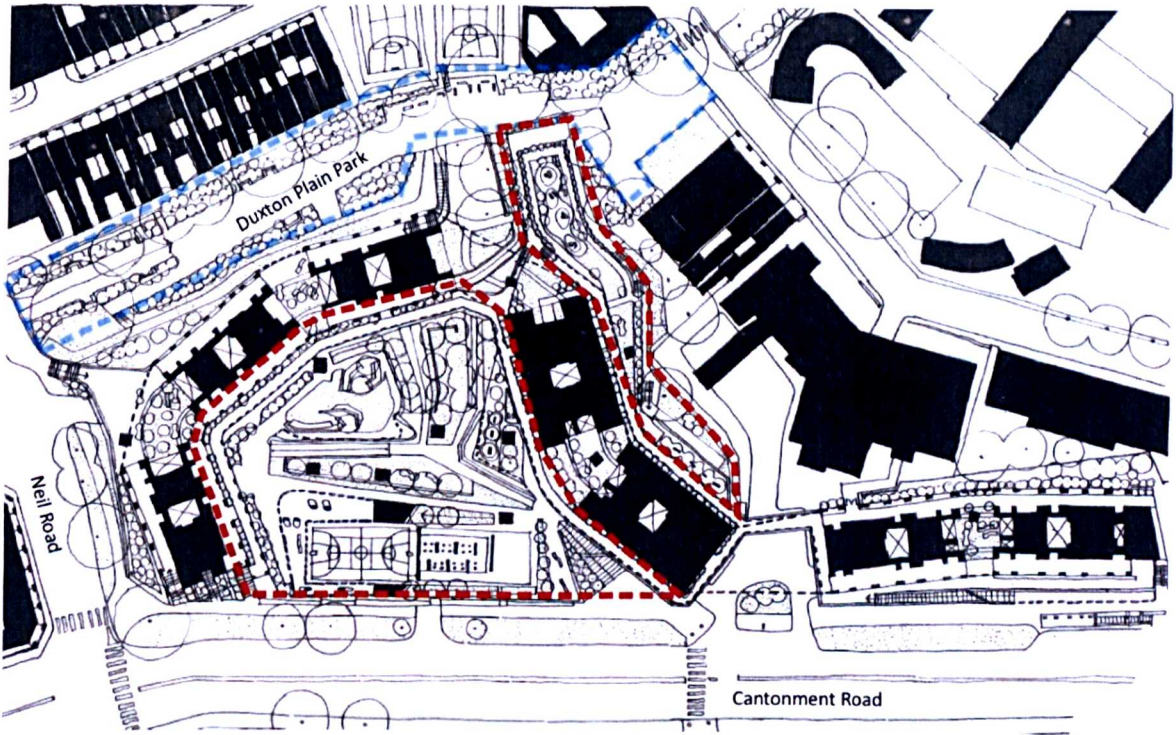
According to Marcus and Francis (1998), there has been little outward change in the design and management of parks. Most parks' designs have still retained their 'Open Space Concept' inherited from the early modern period, while the historical 'Pleasure Parks' are dotted around most industrial cities like Hyde Park, London, and Central Park, New York. All authors about public spaces are in agreement that citizen involvement in all measurements of the park is important. Marcus and Francis (1998) believe that the future of parks demands new activities, institutions and concepts to guide the public development of urban recreation. The balances between public- and privately-owned parks need to be addressed, from rooftop gardens to inner city camp grounds. The early modern movement distinction between functional spaces made planning monotonous. This affects the design of neighbourhood parks also being monotonous, though this distinction is increasingly being blurred as mixed-use takes control in the third modern movement. The increasing densification of cities further adds impetus to encouraging building parks that are placed near commercial centres. Park users are also becoming diverse as cities become more global in representing social conditions and hierarchy.

The concept of a park no longer can be associated with mass-produced and centralized institutional design. The park in the third modern age is becoming more relevant to community life in order to sustain sociability within neighbourhoods in urbanity. Demographic and lifestyle changes with shifting values and attitudes contribute too many public desires for a greater range of leisure settings. Lifestyle is a commodity in the global economy. Market operation in the global phase creates the idea of neighbourhoods, and neighbouring became an important dimension of urban contemporary life. The context of social cohesion and capital began to illustrate how these values are becoming a source of 'commodity' as a domain of safety and secure compatible lifestyle packages sold within the city. The idea of the neighbourhood becomes a 'consumption' niche (Marcuse & Kempen, 2000). Parallel to this, the design of parks is also becoming a 'consumption' niche advocating groups of people that are using it.

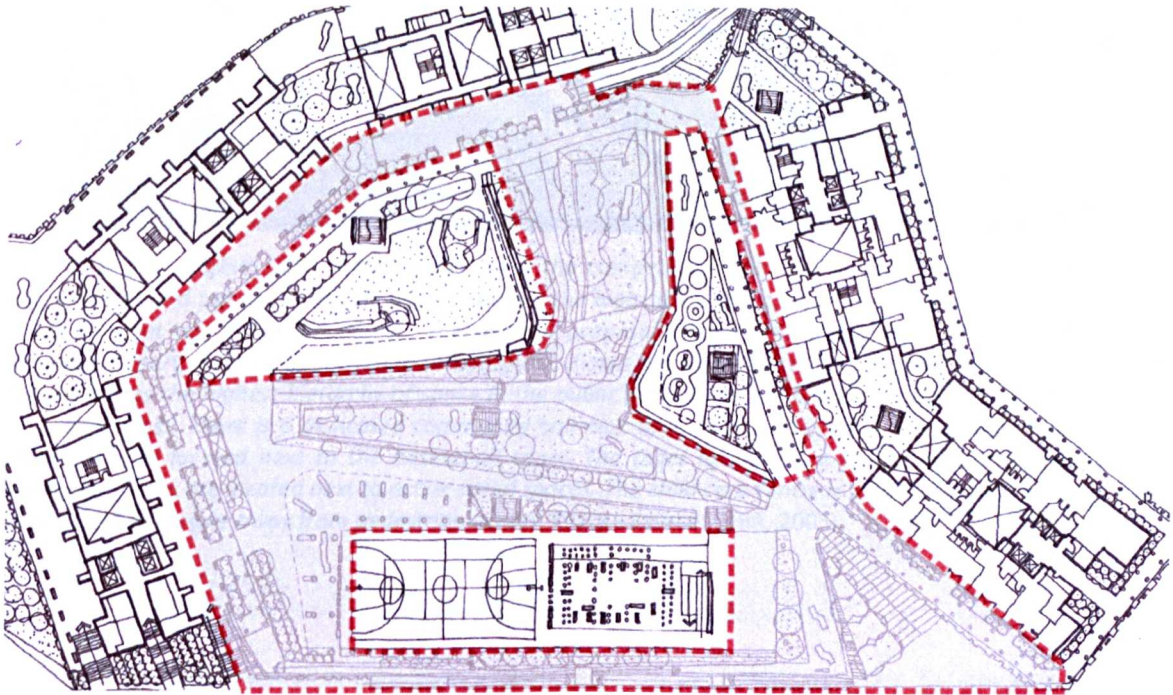
5.3 Neighbourhood Park: The Third-Storey Social and Public Spaces Architectural Observation

5.3.1 Size and Location

The neighbourhood park in the third-storey level is 100 metres in width and 140 metres in length. The form is irregular with open intersecting pedestrian pathways penetrating the space. The dimensions of this park and plaza are dwarfed by the total scale of the whole five high-rise blocks that surround it, though this gives a good sense of closure defining the social spaces as the centrepiece of the development. This principle of organization and coherence is the best recognized feature in the development, which enables the recognition of incomplete or partial elements as a whole. According to Meiss (1990), this grouping and recognition of patterns are principles of 'good' form for making social public spaces. The composition of size of the neighbourhood park resembles this idea. Moreover, the size and coherent configuration of space gives a sense of formality, defining it as 'public rooms' within the development similar to Krier (1990) typology of the urban squares' theory. In essence, the size of the neighbourhood park has good architectural quality in retrospect of classical urban design principles. The park is further divided into enclosures by playing with artificial undulating terrains and walls. These enclosures have many defining programmatic values within the larger 'public room' provided on the third-floor level. The size of these enclosures varies from large to medium, the largest being the basketball court. Other enclosures are medium-sized pleasure spaces with landscape features. These enclosures are usually 10 to 12 metres in depth, often triangular in shape. The architecture limitations inside these spaces are defined by the undulating terrain and careful spacing of walkways. The public park is also by far the largest dedicated open space built in a housing development in the Tanjong Pagar area. It is the second largest in the Central Business District. The largest, called the Duxton Plain Park, is situated next to the development.



Plan 5.9: The architecture limitation of the park is highlighted by the red dotted lines. It is enclosed by five tower blocks facing Cantonment Road. The blue dotted lines mark the boundary line for Duxton Plain Park. The other two blocks are separated away from the public park. Connecting the Pinnacle @ Duxton and Duxton Plain Park is a spill over space behind it. The urban grain top-left of the settlement is denser, represented by the historical Chinese shop-houses built before the Second World War; while at the top-right are housing estates built in the 1960s and 1970s. This figure ground analysis shows the relationship between the Pinnacle @ Duxton and its surrounding context.



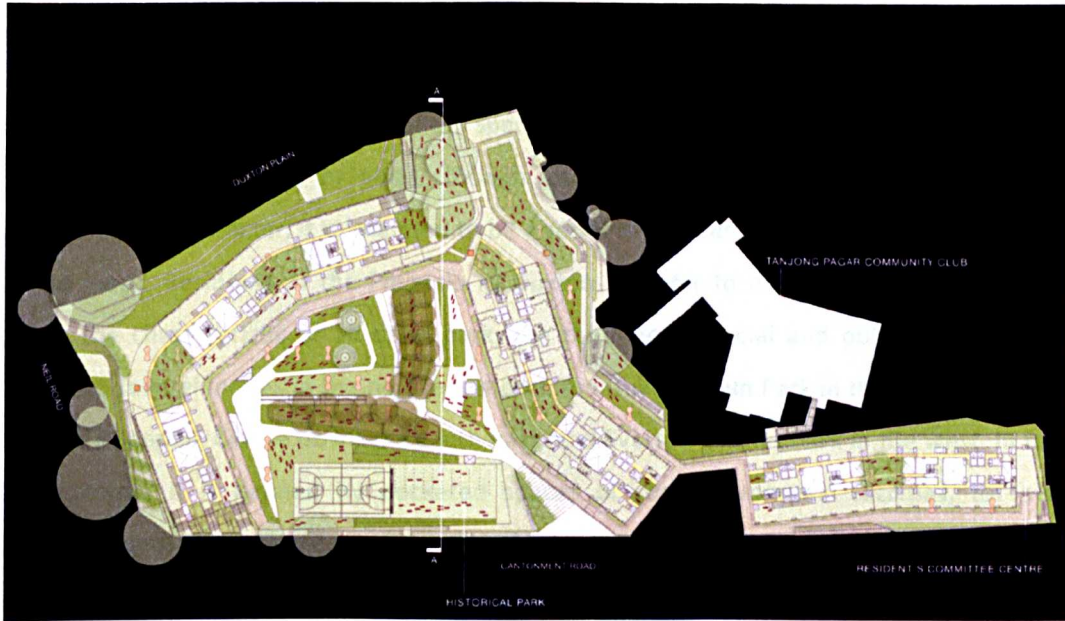
Plan 5.10: The architecture quality of the public park is defined by its massive enclosure of the five tower blocks. The park is further divided into three smaller enclosures. The centre of the park is a 4-metre-high artificial hill.

5.3.2 Programme

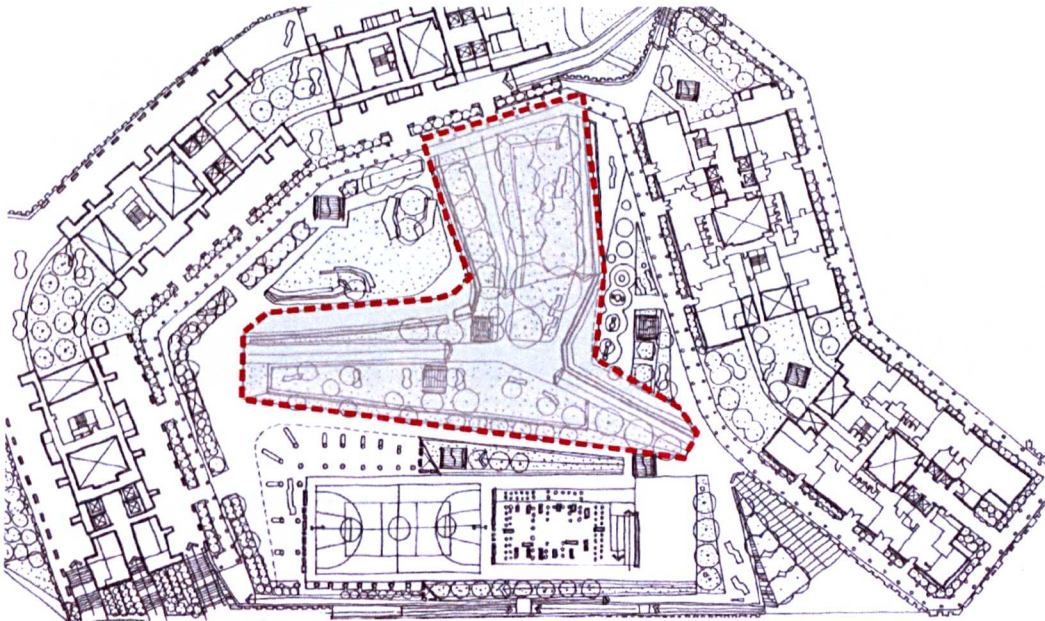
The programme of the park can be divided into three parts: first the enclosed park; second its five small vest-pocket gardens nestled between the tower blocks; and the third, a pocket vest or mini-park behind the development next to Duxton Plain Park. The enclosed park dominates visually as the main social and public space for the Pinnacle @ Duxton. It features undulating terrain designed to look like small mounds. A central mound marks the highest elevation of the park. The mound is accessible by three pathways that converge in the middle of the highest elevation. Programmatically, the central mound is a pleasure ground characterized by its artificial terrain, planted with large trees on spacious lawns, seating and gazebos. The design of this area is reminiscent of a replicated idealized rural wilderness and pastoral landscape. The idea was to imitate naturalistic features which are common in suburban low-density parks of Singapore. The need for a natural setting is created here to express the towers as a concrete jungle while the park is an oasis of greenery in it. The natural element also provides visual relief and a link with the natural world.



Plan 5.11: The original 2001 proposal that won the competition. The two huge circular structures located bottom-right and top of the middle of the plan are the high-speed lifts connecting all three sky gardens to the public without any restricted access. The original proposal dissects the public park into three parts, the Basketball Court, Nutmeg Court and the Playground. Kiosks are located in two of its small gardens. The central mound marks the highest hierarchy of space in the public park. Trees are planted all over the site to replicate an urban forest. There is a dedicated community hall next to it. Most importantly, the ground floor park has toilet facilities located next to the basketball court. The toilet facilities are crucial in any outdoor spaces, especially if they are located next to active social spaces. The child care centre is located next to the playground in a private enclosure away from pedestrian access. Picture source: (URA, 2005).

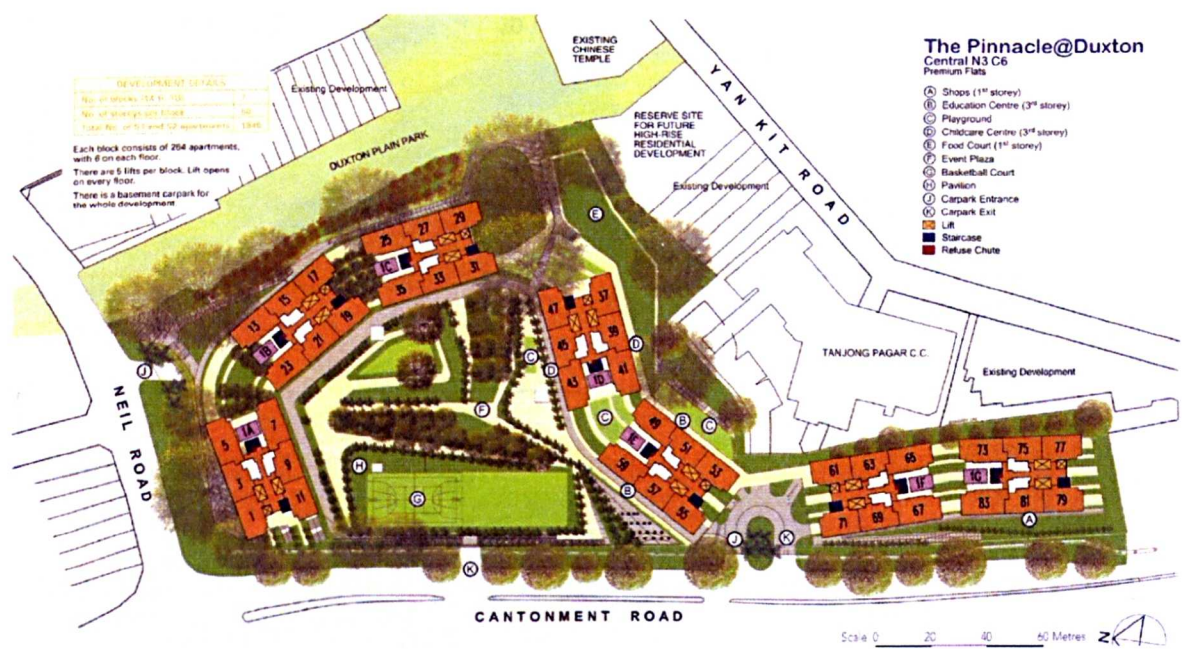


Plan 5.12: This plan of the third-storey public park obtained from Arc Design Studio (2009) illustrates the finalized layout of its social spaces. There are several changes made to the layout if compared to the winning 2001 proposal, though the third-storey public park still manages to retain its original character from the original proposal. The park still retains its three enclosures and the central mound. It has lost the high-speed lifts connecting the park to two other sky bridges above the settlement. The decision to remove the high-speed lifts is unfortunate as it affects connectivity and permeability between all sky parks. The community centre and public toilets were also removed. The child care centre has been incorporated into the tower blocks, opening its enclosed courtyard to pedestrian views. The kiosks, which could potentially have been converted to shops, were removed and replaced by sitting pavilions. Picture source: Arc Design Studio, Singapore (2010).



Plan 5.13: The central mound as the pleasure ground space for the inhabitants of the Pinnacle @ Duxton. The central mound is designed to replicate a natural hill covered with grass and large trees. It anchors all other spaces distributing it surrounding the park. The highest elevation in the park is in the middle where three ramps converge. The mound also acts as a massive ventilation shaft for the three lower levels used for parking and maintenance. Ventilation is provided by cut walls on two sides of its enclosure.

The third-floor social and public space is designed as one unified public park with connections to small plots of gardens in between the seven tower blocks. At a glance, it is difficult to define architecturally the programme of the space as some pocketed spaces in the park reflect some kind of identity as a square or plaza. Though unintentionally the designers did not have any classification of its character, it is intended to be a series of thematic programmes interconnected by strips and loops. Residents of the Pinnacle @ Duxton do refer to it as a park in open interviews. Similar to the characteristic of an open park, the third-storey social and public spaces are interconnected to several locales in the neighbourhood: the Duxton Plain Park in the east, Tanjong Pagar Market and Shopping Centre down the south-east, and Everton Estates Park in the west. In terms of the programme, it is defined by pocketed spaces of social communal facilities, tot-lots, two children's playgrounds, a Heritage Garden, a basketball court, viewing decks and a food court. Several shops are located along Cantonment Road but they are not connected directly with the park. The pocketed spaces are connected intricately by a long continuous covered walkway that runs parallel to all tower blocks defining its inner boundaries. The walkway connects all entrances and lift lobbies to the tower blocks sheltering it from rain and intense midday tropical sunlight.



Plan 5.14: The third-storey floor plan as it is (2010). The plan carefully juxtaposes the buildings to form an enclave in the middle of the settlement focusing it as the main social and public space. Picture source: (URA, 2005).

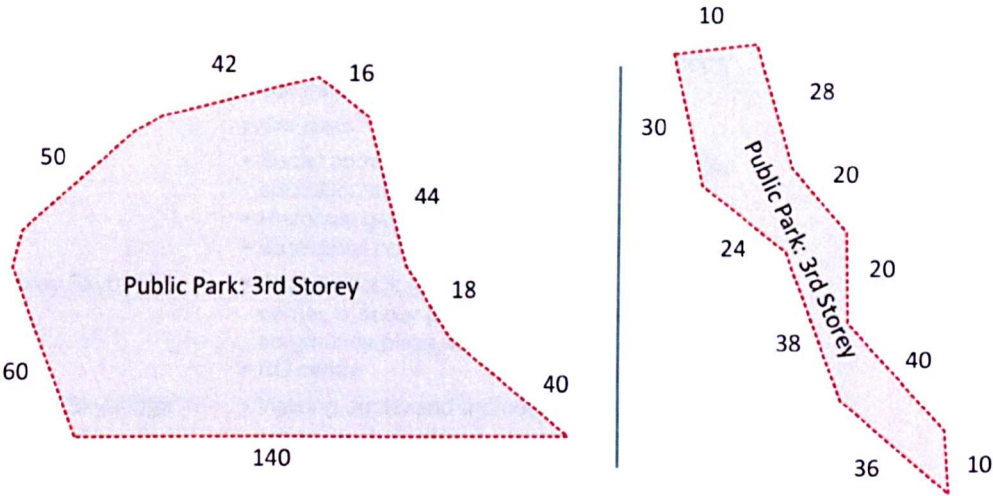


Figure 5.5: The architectural dimension of both public parks on the third-storey floor template. The dimensions are all in metres.

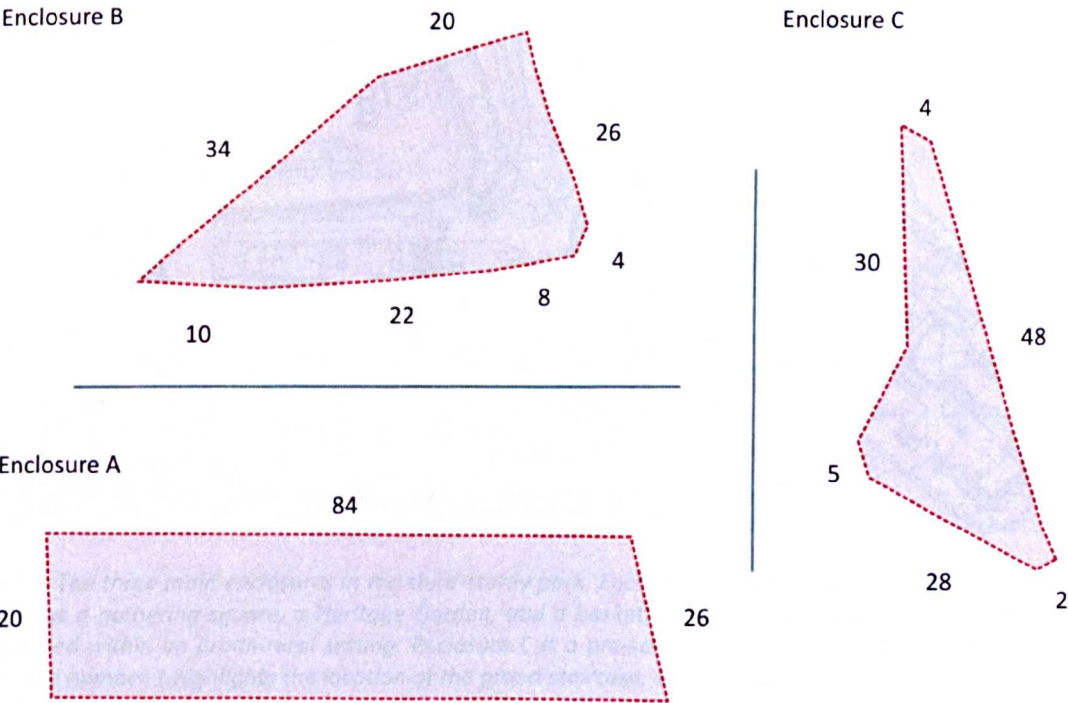
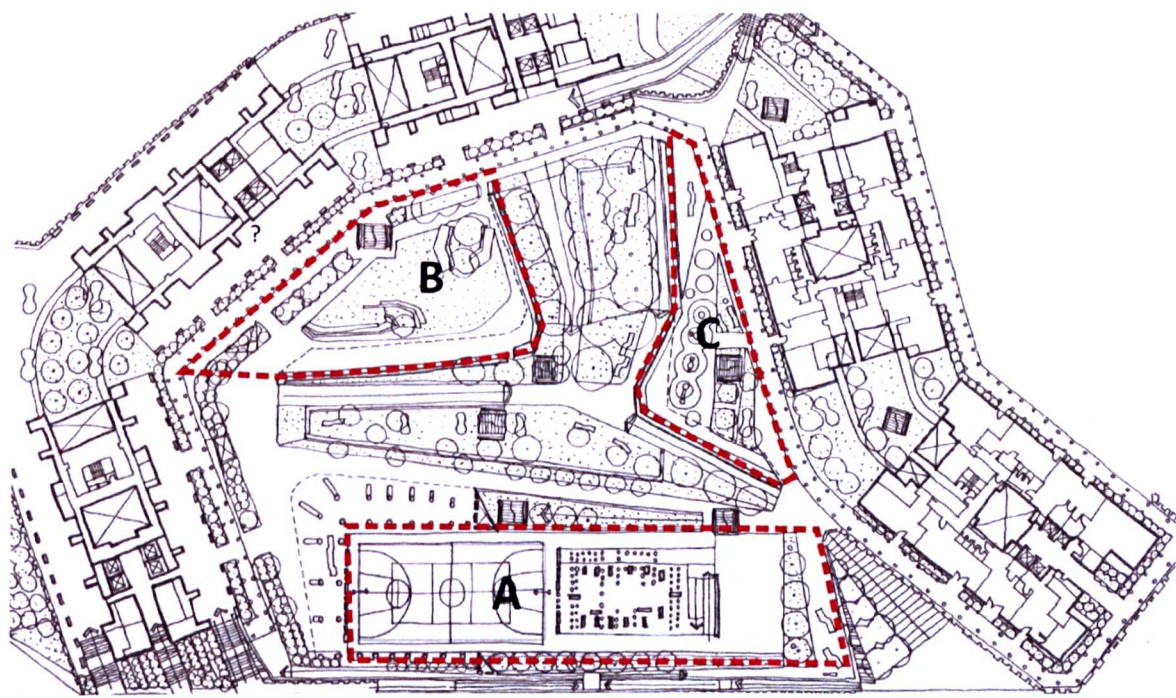


Figure 5.6: The architectural dimension of all three enclosures within the larger public park. These enclosures, although designed as part of a coherent space within the public park, are visually vest-pocket spaces. The dimensions are all in metres.

LOCATION	FACILITIES
Basement	<ul style="list-style-type: none">• Car park
1 st Storey	<ul style="list-style-type: none">• Commercial facilities – 1 food court, 6 shops• Car park
2 nd Storey	<ul style="list-style-type: none">• Car park
3 rd Storey	<ul style="list-style-type: none">• Social communal facilities – childcare centre, education centre, RC centre• Historical garden• Basketball court, playground, event plaza, pavilion
26 th Storey Skybridge	<ul style="list-style-type: none">• Jogging track (800m long), senior citizen fitness corner, outdoor gym, children's playground, community plaza, fitness corner, viewing decks• RC centre
50 th Storey Skybridge	<ul style="list-style-type: none">• Viewing decks and themed gardens
Above 50 th Storey	<ul style="list-style-type: none">• VIP Viewing Gallery

Figure 5.7: The division of facilities on all floors within the Pinnacle @ Duxton settlement.



Plan 5.15: The three main enclosures in the third-storey park. Enclosure A has three prescribed functions: from the right as a gathering square, a Heritage Garden, and a basketball court. Enclosure B is a pleasure garden incorporated within an urban-rural setting. Enclosure C is a pre-school yard. It is situated in front of the pre-school. The number 1 highlights the location of the grand staircase, which functions as the ceremonial entrance to the park.

The advantage of this landscape creates small enclosures of spaces facing the tower blocks humanizing the size and proportion of the spaces. These small enclosures are located facing the corridors layering the space between lift lobbies into the parks. A nursery is located in blocks D and E next to the park. Enclosure C (see Plan 5.15) is designed as a children’s playground, sheltered seating

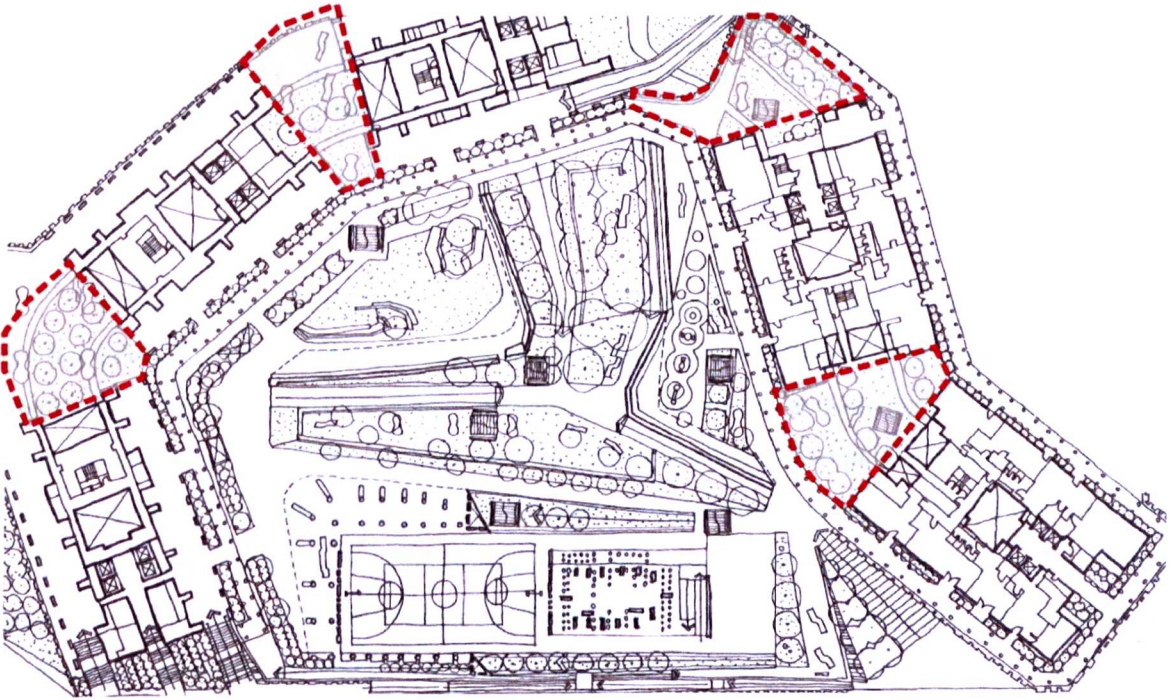
and a gazebo. It is enclosed by a wall and a covered walkway. Enclosure F has no specific programme and is designed just as a pleasure ground. It is also backed by a wall cut into the central mound surrounded by seating with medium and small size trees for shading. Several small gazebos are provided in the space for group gatherings.

Enclosure A is rectangular in form with three programmes: a designated meeting point, a Heritage Garden and a basketball court. Enclosure A is parallel to Cantonment Road. It is accessible from two sides. The meeting point is located near to the entrance staircase. It is an open paved space lined with medium size trees. The function designates the space as a gathering point for visits and outsiders from outside the development. Separated by a wall sits the Heritage Garden. It is designed as an open air gallery with permanent wall fixtures and sculptures celebrating the history of the Pinnacle @ Duxton. Most importantly the rectangular size and shape of the spaces highlights the historical alignment of the latter first generation public housing built in 1963. The park tells a history of housing development in Singapore in the Duxton Plain area. Two ceremonial plaques mark the importance of the Heritage Garden by an important political and social figure in Singapore, Senior Minister Lee Kuan Yew. The two plaques commemorate the laying of the foundation stone on 15 March 1963 and the opening ceremony on 10 April 1964. A wall separates the Heritage Garden with an open basketball court. The court is not visible at eye level for it is surrounded by walls on all sides. The wall forms an elevated linear garden enclosing the basketball court on three sides. This elevated garden is accessible by a ramp from the meeting point area. Shaded areas for spectators are provided underneath the elevated garden looking into the basketball court.

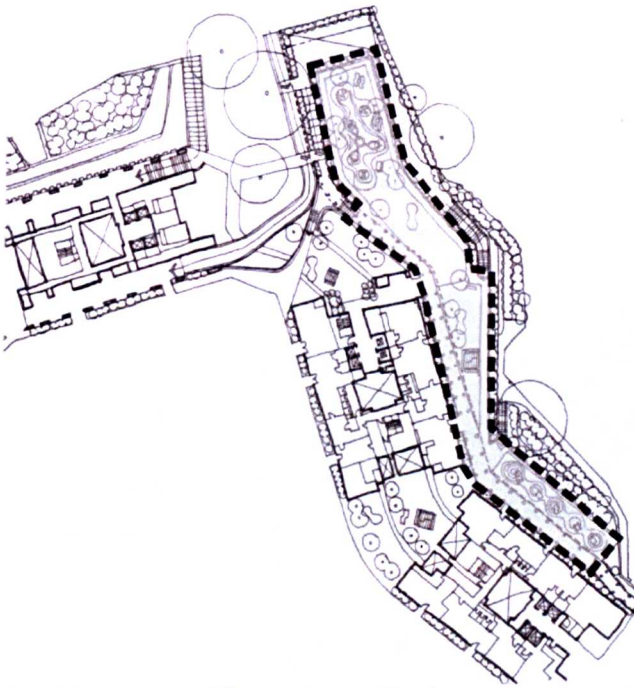
These enclosures suggest usage and programme of the open park. Being closer to the pre-school, enclosure C is a spill over area for the pre-school children in the development. Many seats and benches are available for the use of parental surveillance in the space. Enclosure A suggests active engagement in the park due to the existence of the basketball court that caters to the teenage population in the residential development. It also serves as a formal space for meetings and gathering as the only large open paved space in the park and near accessibility to the main entrance. The presence of the Heritage Garden further establishes its formality signifying the importance of the Pinnacle @ Duxton by the HDB, Singapore.

Nestled between the seven tower blocks are five vested small gardens all identical with lawns, benches, medium size trees and a gazebo. There are no specific suggestive programmes for socializing in these spaces but they are merely spill over garden spaces meant to interconnect the main park. With the exclusion of the garden nestled between blocks F & G all connect the park visually. The logic of its design is as a spill over space from each residential block's fire escape staircase. The garden between blocks C and D towards the Pinnacle @ Duxton's south-east corner is

connected to Duxton Plain Park. It is by this connection that the park established itself into a system that combines important places from Duxton Plain Park to the Tanjong Pagar Shopping Center, Wet Market and the Tanjong Pagar MRT station. This area's most important programme is its food court. However, it is designed not facing inward but outside taking advantage of heavy pedestrian access along Duxton Plain Park and its huge mature trees for shading. The food court serves the area with six cubicles for food and two for drinks. Two-thirds of its space for eating is internal and air-conditioned with a reasonably-sized outdoor covered space. Arc Studio mentioned the importance of highlighting this link as a pedestrian artery to social and public spaces in the Pinnacle @ Duxton. The pedestrian artery is vital in anticipating the success of the open park in the development. This intent will be evaluated in the post-occupational analysis later in the thesis to validate the level of its success as a social space.



Plan 5.16: Four of five vested small gardens sandwiched between the four tower blocks. These gardens are not part of the larger central park but leftover spaces for fire and emergency exits for respective blocks.



Plan 5.17: Another leftover space utilized as a separate park behind blocks C, D and E. Its close proximity to the pre-school located next to it designates it as a children's playground.



Picture 5.10: The pre-school lot midday on a typical weekday.

5.3.3 Use and Activities

Good urban spaces should be informed by awareness as to how people will use them. There are five primary needs that people seek to satisfy in public spaces. They look for comfort, relaxation, and passive engagement with the environment. They also seek to actively participate in the public space, exploring it so as to discover new senses (Carr et al., 1992). The park in enclosure C was the most popular. The covered seating facing the park provides comfort. The enclosure also provides sufficient seating for parents to observe the children using the playground. There is sufficient greenery in the enclosure with separation from vehicular traffic. It is like a pleasant sanctuary where parents can relax while watching their children within its boundaries.

Enclosure C is located along a pedestrian flow that connects Cantonment Road and Duxton Plain Park. Most of its seating is placed facing this flow, allowing observers to watch people while avoiding eye contact. It provides some form of passive engagement with the public entering the enclosure. The quality of the enclosure brings about a sense of security to parents as the space is a prime spot for people watching. The enclosure is adjacent to two pre-schools located on the ground floor of two tower blocks. The space is heavily utilized by parents in between early morning, afternoon and evening, depending on classroom sessions run by the pre-school. Most of them would mingle on the benches and seating provided in the enclosure. This is perhaps, for example, a good

indication of the space in the form of a passive engagement. People attract people and the life and activity they bring add vibrancy to the space (Carr, Francis, Rivlin, & Stone, 1992). It is not surprising that many of the interviews and surveys obtained for this thesis was done in this space. Enclosure C is a catchment area for informal social activities in Pinnacle @ Duxton due to its proximity to a functional daily space: The pre-school.



Picture 5.11: The enclosure is a good space for parents to relax while observing the children in the toddler lot area. The seats are cast naturally into the central mound, thus providing shade. This feature creates a visually cool place to sit and relax while the children actively engage with one another in the park.

Picture 5.12: Adults using the benches in enclosure C while waiting to pick up their children from the pre-school. The benches are sheltered and also provide a means of spontaneous interaction for the community in the park.

Carr et. al (1992) asserts successful social places are always within vicinity to functional spaces that reflected the daily needs of communities in a settlement. Actively it is a great place to strike up new acquaintances if you have children in this enclosure as it is more directly designed to create contact between family and friends. Activities within the enclosure are varied as participants range from mostly a mother/father and child, to a servant and child or a grandparents and child. A grandparent describes her approval of the space as she willingly waited and chats with other grandparents every mid-afternoon. The sheltered benches are comfortable for means of spontaneous interaction. A house servant expressed her likeness for the space to meet with other house servants living in the settlement while observing the children played with each other within the confined space. Initially she did complained how her employer restricted her from using the enclosure too much to mingle with other housemaids. Parents are more likely to be defensive when approached for interviews as the author was easily recognized as an outsider from the settlement. The contact by observation seems to prove most of them knew each other by daily use of this space as a congregational area while sending and picking up the children from school. Interviews conducted within the space with parents are often interrupt by other parents who are acquaintances living in the settlement. On occasion the author had to conduct two interviews at the same time regarding the use of this enclosure.

The space would benefit better if, at occasional times within the year, they provided spectacles on the site. The space might have been successful in its functional quality, its response to use and utilitarian need but lacks 'discovery'. Discovery in urban spaces represents desire for new spectacles and pleasurable experience (Marcus & Francis, 1998). It involves a break of routine and the expected. The unfortunate nature of management and Singaporean utilitarian approach to public space may result in this enclosure becoming dull in the future. Discovery might also involve art exhibitions, street theatre, festivals, parades or markets. Enclosure C has further opportunities to explore its family-orientated activities to nominal pertain to the pre-school sitting right in front of it. The management could allow the pre-school to use the space for children's markets or art exhibits, extending the classroom into the enclosure giving a stronger indication of its use and activities. This concern is shared by some pre-school teachers who expressed their frustration to the rigid management of the space. When asked, the pre-school teachers did express their intent of making used of the enclosure but was often denied because of management. This is because of the main pedestrian artery that runs through it. Management feels that this public pathway is deviant for the safety of the toddlers in the pre-school.

It is also worth mentioning some of the population interviewed about the quality and use of the space is exceptionally positive. When asked, the answers are highly confirmatory. Often the opinions are met with high praise towards the Housing Development Board for providing the design of the enclosure that no fault can be found in its design. Even by highlighting some of the design faults, several interviewees seem to disapprove by putting their faith to HDB prerogative in its design choice. This reception is common as the social and political state relationship in Singapore is very strong that sometimes it is almost impossible to find criticism within the system and the design of its built environment (Grunsvén, 2000). Grunsvén (2000) reiterates how this relationship is the reason why Singapore maintains its winning side in social housing as the Singaporeans are more receptive than other nations. Still, successful social and public spaces need open participation and criticism from its users. Enclosure C might have looked successful by its functional use and well-informed to how it will be use but lacks vibrancy and excitement. There is the danger that this enclosure might fail from use because of its rigid use and management. Social and public spaces need more than functional quality to become successful. The enclosure might benefit its popularity in use because of its novelty. Carr et. al (1992) asserts the use of social spaces can decline when there is no new excitement and vibrancy of its use.



Picture 5.13: The enclosure late in the evening. The pre-school has closed but the space is still being utilized by the inhabitants. It is used as a playground, a reading space, a gossip corner. It is both in duality a good active and passive space for engagement.



Picture 5.14: A pavilion sits in the middle of the enclosure almost like a sculpture. The pavilion is designed to look informal providing many ranges of activities and usage on it.

Enclosure A is located alongside Cantonment Road. Its function is divided into three: first, as a meeting square; second, as the Heritage Garden; and third, the basketball court. The meeting square is designed to function as a meeting place in between the inhabitants and visitors entering the settlement. It is also a designated gathering area in case of fire and emergency. By design, the meeting square does not help its function as people places. It is only a paved surface with two benches. The space is with no relief from sun, wind and rain. It is devoid of any form of temporal or permanent use and activities. Similar attributes conclude the use and activities of the Heritage Garden next to it. Built as public art for passive engagement, the narrative reminds of the history of Singapore's housing development through three decades. Like the meeting square, both are rendered from any form of use and activity in it. The 7 day observation of the square only managed to spot a few people using the space nominally at dusk. A 53 year old resident said:

'I tried to avoid the space because it is very glaring to my eyes. In the afternoon the reflective surfaces is so strong, I can't see where I am walking. There are some seating provisions but it's uncomfortable to use. I can't lie on my back to enjoy the square. It is also devoid of people. I like people watching. Sometimes there are outsiders in the space and I don't like people staring at me. The kids from the basketball court are very noisy and I can hear the cars from the main road'

The reason for this is because of its inhospitable design as it does not provide comfort, shelter or relaxation to its users. Marcus and Francis (1998) argued that the need for social psychological comfort is important in creating the ambience of the space. The design is too totalitarian as there is nothing to engage in this space other than walking through it to get to the basketball court. In fact the location of the Heritage Garden is obstructive for visual access (visual permeability) to the basketball court. What it achieves is unbalanced relationships between the three determined functions set by the designers in the project. HDB often use this space as a meeting spot for toured visits of Pinnacle @ Duxton. When asked, the management concluded this rational because of its far proximity from other enclosures used by the inhabitants. Many visitors failed to find this square or even acknowledge it as meeting place. A visitor expressed her confusion when asked to meet at the square by her relatives as she can't find or identified the space. Visitors would recourse their way to Enclosure C as it is usually filled with people with ample sitting space to wait and meet people. When lost they can always find people to ask for directions in Enclosure C. The meeting square failed to function as meeting place.

The basketball court, however, is highly used and actively engaged by its target users: teenagers. It is used constantly throughout the day from morning to late evening. The undulating landscape envelops the court so it creates shelter surrounding the court, which provides good space for spectating, lacking only benches to sit on. Most teens resorted to sitting on the pavement with their backpacks and drinks. Given the popularity of this space, it is best to provide maximum seating surrounding the court with space for the teens to put their belongings while playing. The covered space underneath the landscape is also used regularly as an exercise space place for the pre-school children. This is because of its sheer size and space, fit for a large congregation of up to 30 people. Annually the basketball court could be transformed into a covered space for large events. The handing over of keys to the occupants was held here in the court in erected tents. Family day events and meetings with political representatives were also held here. Evidently the enclosure has a good indication of temporal and permanent activities done in it. Even without enough seats it is constantly being used by the inhabitants in the Pinnacle @ Duxton. The popularity of its use makes the basketball court exist almost as a separate entity even though it was designed along with the meeting square and the Heritage Garden.

The popularity of the Basketball court extended beyond residents living in Pinnacle @ Duxton themselves. It is quite common that some of the teenagers using the court are from neighbouring housing settlements. The court is sometime a contested space in between groups of teenagers that use it daily. There are two large groups of teenagers using the space representing the neighbourhood from to rival secondary schools within the larger Tanjong Pagar constituency.

Though highly contested there are no cases of fights or tensions. A 16 year old basketball player explained:

'We usually divided the court into two halves so that we can share the space. I love it because it feels like a proper sports facility. It is also enclosed but not set in a sports club or school where we need to get permission to use it. We can use it at night with access free access to electricity without any restrictions at all. Some of my friends are from the neighbouring settlements we used it as a meeting space for sports'

Teenagers further expressed their approval for the space as they sometimes use it as a place to meet after school to study or do cardio-vascular activities. The use is highly evident as observation revealed after school (3pm) the court is used despite the uncomfortable weather. The use would peak around 5-7pm when tropical weather is comfortable for outdoor activities. The court is used till midnight by young adults living in the settlement. At weekends the court is used from 8a, till noon and continued to be use after 2pm till mid-night. The basketball enclosure proves that a permanent form of functional activity is important in the design of good social public spaces in high-rise settlements.



Picture 5.15: Supervised activities are done regularly by children from the nearby pre-school underneath the elevated landscape above enclosure A. This large covered space is protected by the sun and other climatic elements, therefore making it a comfortable space for large gatherings. Still it does not have any provisions of seating in it. The space is also undefined in terms of what activity to do in it. The space is reminiscent of Singapore's first and second generation of housing where ground spaces were left empty for multi-purpose use with many degrees of success in function but lacking identity and character.



Picture 5.16: The basketball court in enclosure A is the most popular place for teens to meet. Regularly used, it is sometimes converted into a large event space. The enclosed shaded courtyard provides excellent space for spectating, though the lack of benches causes teens to sit uncomfortably on the ground. Even the upper floor garden is unused, for there are no places to sit looking into the arena.



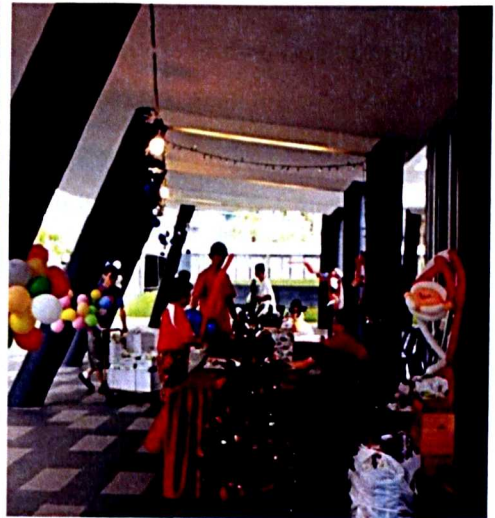
Picture 5.17: View of the Heritage Garden from the meeting square. The Heritage Garden is built to emulate the old grid of the previous housing block situated in it. The garden is psychologically uncomfortable as it does not provide any protection from heat, sun and rain. Furthermore it does not offer any form of active engagement in it. Respectively, the original proposal intended to put water in it but this was omitted due to concerns of anti-social behaviour and management cost by the public authority. The wall, though graphically informing the function of the garden, is poorly designed and obstructive to the park itself. Carr et. al (1992) asserts enclosures need to be open for users to inform activities inside it. Obstructing the view into a park would hide its use therefore alienating the space from its users.



Picture 5.18: View of the meeting square next to park from the top of the grand staircase. There is no indication of the importance of this area as a meeting place architecturally. The meeting space is not protected by heat, sun and rain. There are also no places for seating, benches or shelter. A small patch of grass indicates tree coverage intended for shelter. Most visitors though informed of this as a meeting place, preferred enclosure C as a waiting space which is located nearby.



Picture 5.19: A gathering of residents owning pets within the development is held yearly to share experiences and concerns. The basketball court is converted into the event space.



Picture 5.20: The covered area next to the basketball court is converted into makeshift stalls like this Christmas gathering in December 2011.

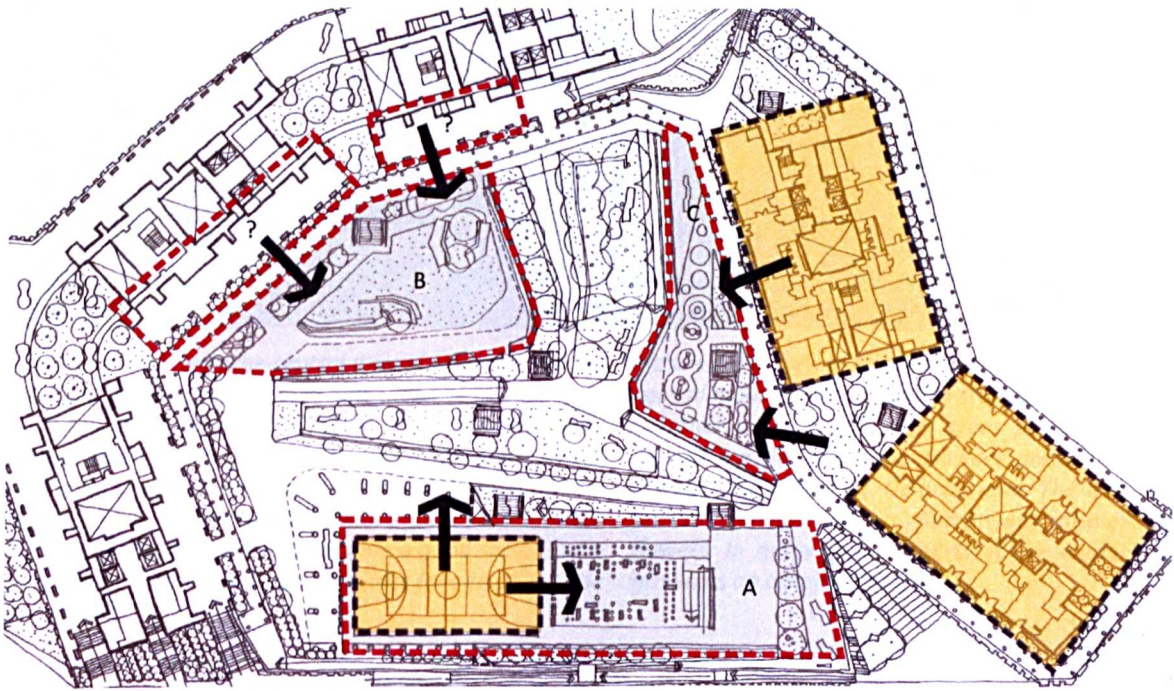


Pictures 5.21 and 5.22: Social gatherings organized in the basketball court. The left picture is the yearly Lantern Festival. The right picture is a Chinese New Year Celebration. These events prove the neighbourhood park is a successful place for social gathering.

Of the three, enclosure B is the least used in the public park even though it has similar characteristics to C with ample seating provisions, shaded canopy and greenery. The 7 day observation only managed to spot few individuals using the enclosure. Casual interviews with residents from Pinnacle @ Duxton also failed to find any significance of this enclosure other than its visual delight. It is not used and is devoid of any activities, temporal or permanent. Compared to the other two, both were programmed with permanent activities that provide stimulus for social engagement. Enclosure B did not have any form of programmatic stimuli in it. It is wholly passive. It is also disconnected by the main pedestrian routes going into the Pinnacle @ Duxton. The enclosure is also hidden behind the central mound. According to (Carr et al., 1992) successful social spaces are always located next to social incentives where people can congregate to do social engagement in it. Enclosure C has an anchor magnet in the form of two pre-schools directly facing the enclosure, while enclosure A has the basketball court to lure teenagers into it. The subsequent lack of purpose to enclosure B or any anchor programmes facing it is albeit confusing for users. Enclosure B is also located on a least popular pathway that weaved into and out of Pinnacle @ Duxton. Interviews revealed the pedestrian artery that runs through Enclosure C is best identified and referred by inhabitants and visitors alike. In an interview with the settlement's managing authority they were aware of this but assert that it is intentional. The empty spaces in front of enclosure B is Pinnacle @ Duxton 'void deck'.

A void deck is typically found under apartment blocks in Singapore that occupies the ground level. Void decks are meant as multi-purpose space for community mingling and functions are often attended by neighbours across the ethnic spectrum. Sometimes, events like Malay weddings, Chinese weddings or funeral wakes are held in such places (Yuen 2004). The management insisted that the void deck will be used by the inhabitants in the future when the population is stabilized.

Observations based from a 3rd visit to the site do confirm the use of this space (see picture 5.27) though its use only offers temporal delight that occurs on a monthly basis in enclosure B. The enclosure remains empty from daily activities that represent social spaces as daily spaces for people to congregate and meet in the settlement. It is based on this conclusion from observation and interviews that of all three enclosures, enclosure B is the weakest as it does not have any daily prominence to the inhabitants in Pinnacle @ Duxton. Whiztman (2001) states good social and public spaces are always in direct correlation to the people who live, use and inhabit them. These spaces inform us of the inhabitant's daily lives. This is how we provide, design and built good social and public spaces for them with respect and responsiveness to their daily needs.



Plan 5.18: Plan showing the relationship between permanent programmes inhabiting next to the enclosures giving social motivations to how it shall be used. The proximity of enclosure C to the pre-school makes it a family place while enclosure A is for teens. The lack of similar attributes to enclosure B left it as a lost space in terms of use and activity despite it having the same quality of comfort and relaxation to C. It is also situated away from the major pedestrian artery in the settlement. Subsequently, the space facing the enclosure is empty and would better be used for additional cafes or other forms of social infrastructure needed by the settlement.

Located in the middle of the third-floor public park is the central mound. It is raised 4 metres higher than focusing all visuals into it. The central mound is in essence a pleasure park. It is designed for use as a place to relax. It is also where the highest concentration of pavilions is located in the third-floor park. There are four pavilions similar in shape and size to others in the park. The central mound also contains the highest concentration of shaded trees. The trees in the mound are projected to grow and give medium coverage to the park. At the time of this observation the trees

had still not matured. It is uncomfortable to perform any activities on the lawn in the mound without any coverage and shade from the sun. The pavilions, however, are in constant use, especially in the late evening by groups of teens and adults engaging in social contacts. The mound has no specific function to suggest its use, but it is adamantly being used as a place for relaxing. Still, without any protection from the tropical weather, it has proved unsuccessful in use and activities. Perhaps, given time, when the trees have reached full maturity, the mound will be popular with the inhabitant of the Pinnacle @ Duxton. The dense planting of trees in the mound would create many forms of foliage in the future.



Picture 5.23: View of the central mound from the highest point of the park. This picture was taken at midday on a weekday. Note the concentration of trees in this area compared to other parts of the park. The idea behind this is to create a sanctuary surrounded by concrete. Though at the moment the trees are not matured, there is potential for this space to become a good social space for relaxing when the canopy provides foliage and shade in the park.



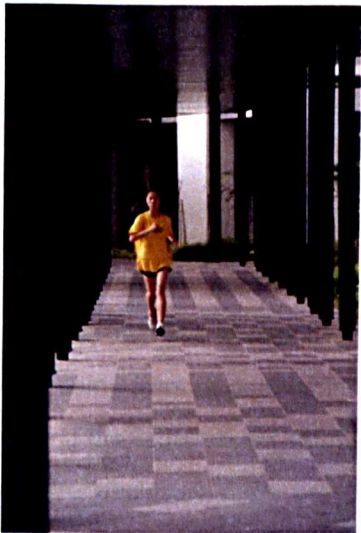
*Picture 5.24: View of the walkway leading up to the central mound from the grand staircase. Compared to other parts of the park, trees planted in the mound are the type that provides greater shade, like this 'fountain tree' *Delonix regia*. The tree will provide foliage and a flamboyant display of flowers. In many tropical parts of the world it is grown as an ornamental tree.*

In addition, the covered walkway is also being used as a track for young adults to jog in the evening, parents and house-helpers to roam in strollers, and children to play on roller blades. It is a large 3-metre walkway in width with spacing of a 3-metre-wide sturdy steel column set 2 metres away from the residential blocks by planted hedges. The walkway on the ground floor envelops the park from end to end giving it a length of 2.47 kilometres. It provides excellent opportunity to turn into an informal jogging track or strolling avenue for these three user types. The walkway is also incremental as a form of protection from falling objects to apartments above. It is a safety feature designed for the third-storey park. According to the Singaporean HDB's living trends report, falling objects from above is the second-most top concern of safety in high-rise housing settlements (HDB, 2000). The walkway is therefore engineered with a roof made of 150mm-thick concrete. Located next to the covered walkways are void decks. A void deck is typically found under most HDB high-rise blocks in Singapore. The void deck occupies the ground level, while apartment units are usually on

the second floor upwards. Void decks are a designated space for communities and functions and are often attended by neighbours across the ethnic and age spectrum. The void deck in the Pinnacle @ Duxton is small compared to older generation housing settlements in Singapore. It was not until the beginning of 2012 that the void deck began to attract users. Events such as a Flea Market and social activities for the elderly were organized by the Tanjong Pagar Community Club. Void decks are common in Singapore as they present a blank space for people to use in high-rise housing estates.



Picture 5.25: Other forms of activities performed on the corridor. Taking advantage of its continuous length surrounding the whole settlement, some teens use it for roller-blading.



Picture 5.26: Adults using the ground floor corridor spaces for jogging.

The Pinnacle@Duxton Residents' Committee presents

THE PINNACLE@DUXTON FLEA MARKET
达士岭跳蚤市场

20 January 2013 (Sunday)
10am - 6pm

2013年1月20日, 星期天, 早上10时至傍晚6时
Level 3 Void Decks of Blocks 1A, 1B & 1C
大牌1A, 1B和1C组屋3楼空地
Open to all! Limited space! Terms and conditions apply.

Book a stall space!
only **\$5*** per stall!

Book your stall space now!
At Tanjong Pagar CC, 9am to 9.30pm daily (except public holidays)
报名处: 丹戎巴葛民众俱乐部
每日早上9时至傍晚9时30分

Booking closing date:
14 January 2013 (Monday)

* For The Pinnacle@Duxton residents only. All others pay \$10. Please bring along NRIC during registration.



Picture 5.27: Poster announcing the Pinnacle @ Duxton Flea Market.

Picture 5.28: Void decks in the Pinnacle @ Duxton are located along corridors on the third-floor neighbourhood park. Flea Markets are organized by the Tanjong Pagar Community Centre with residents living in the Pinnacle @ Duxton taking part in them.



Picture 5.29: Social activities for the elderly organized once a week in the void deck.



Picture 5.30: Food stalls selling candy and popcorn on Flea Market day.

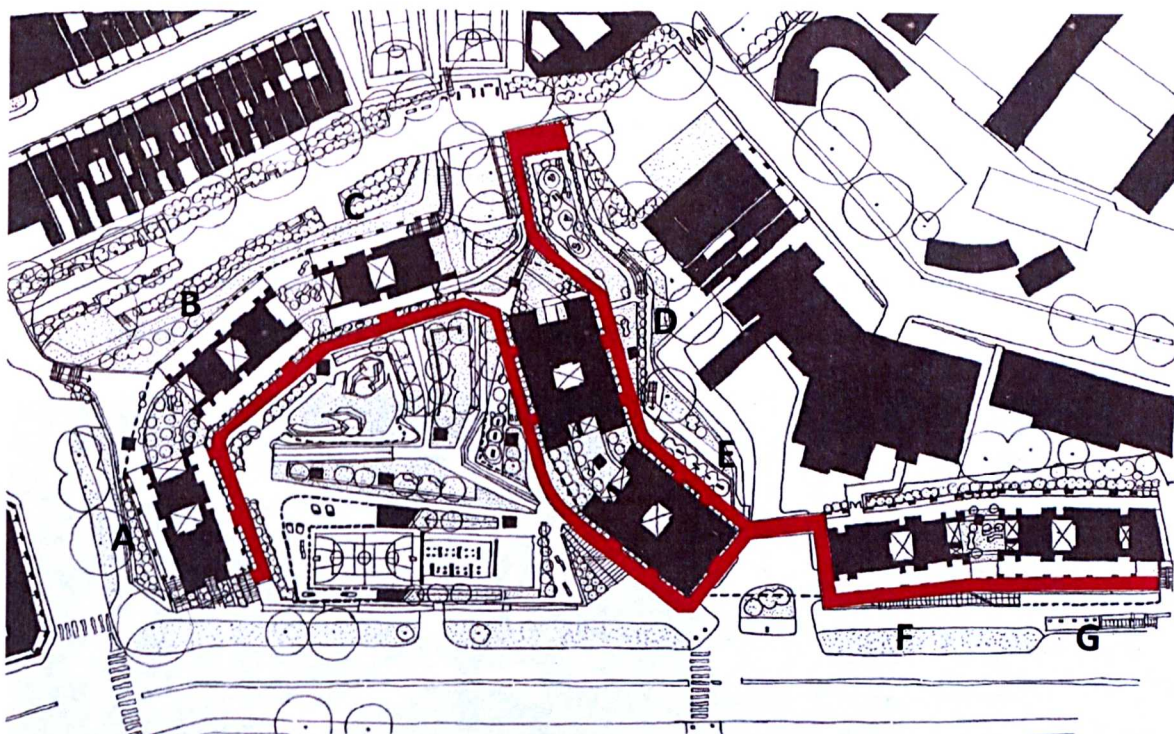
Neatly tucked in between residential blocks are five mini-vested gardens. The gardens function as fire exit spaces for each residential block, hence the minimal design and landscape in them. Each one only features two benches and a few small trees. Only the two sub-spaces near enclosure C have a pavilion in them. The area would be better utilized if some form of permanent programme was introduced in it; it must be left empty as an emergency and fire requirement set by the Health & Safety Standards of Singapore. Of the five, only the two near enclosure C are being used by the inhabitants because of their proximity to the main pedestrian walkway cutting into the park and enclosure C being the centre of use and activities in the development. Forms of activities performed in the gardens are only relaxing with occasional gatherings of teens in the pavilions for study and gossiping.



Picture 5.31: Informal activities done in the small pavilions provided in the sub-spaces in-between blocks.



Picture 5.32: The sub-spaces in-between blocks E & F. The space is dead with hardly any occupants in it. The area would be better utilized with an anchor programme that benefits the settlement since it is located with direct access to ground level. It is a lost space prone to anti-social behaviour.



Plan 5.19: The red illustration highlights the covered walkway in the development. The walkway wraps round the park, connecting it to blocks F & G at the right end of the settlement. The walkway provides uninterrupted shelter and connection from residential blocks A to G. This quality is occasionally taken advantage of by the inhabitants who use it as a jogging path, for pram strolling and for roller-blading. The walkway is accessible by outsiders from four entrances: the first at the junction of Cantonment Road and Neil Road; the second at the Grand Staircase, the third from the far right and the fourth from Pinnacle Park.

5.3.4 Visual Complexity

The public park is raised from the street on the third-level-high platform. It is approximately 6 metres above ground providing a sense of privacy and security for its users. This design is necessary from the viewpoint of the architect taking examples of other social housing programmes that do not have an architectural barrier to defend their public spaces while maintaining a degree of transparency within them. The idea is in response to recommendations made by Newman (1972) for inhabitants living in high-rise development who needed to defend themselves from the urban environment, especially in the footsteps of their settlement. The sense of security at the same time allowed public users to enter the public park with a clear sense of neighbourhood identity as the platform demarks the space exclusively belonging to the Pinnacle @ Duxton. Visitors approaching the Pinnacle @ Duxton from the north or south along Cantonment Road would see a wall clad in concrete blocks with several breaks of vertical planting.

There are three entrances along Cantonment Road. A grand staircase marks a major thoroughfare that connects a pedestrian path linking Cantonment Road to Tanjong Pagar MRT station. Staircases north and south of the complex define entrances to lift lobby blocks. The park is connected by a small entrance from Neil Road and Duxton Plain Park next to the food court. Vehicular access to the site is located between blocks E and F. Entrance to the public car park is located below block E. A sky bridge between blocks E and F architecturally frames the entrance to Tanjong Pagar Community Centre situated behind the development. This is the street-level access to the community centre while residents' access is located behind block F. The community centre, although a prominent context and consideration for the development, was addressed architecturally with no connection to the park as it is surrounded by fences with guarded entrances.



Picture 5.33: The public park is protected by a wall running along Cantonment Road. It is enclosed on all sides. The wall visually separates the settlement from the street but there is access for the public.



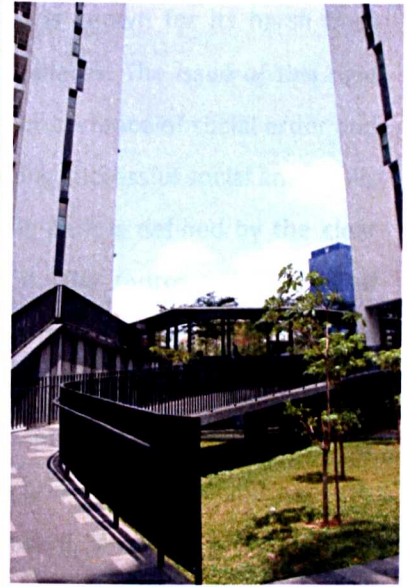
Picture 5.34: The main frontage and entrance to the public park. Vehicular and pedestrian links merge here giving a strong sense of legibility before entering the social spaces in the third-storey park.



Picture 5.35: The grand staircase provides visual impact for visitors entering the park.



Picture 5.36: The grand staircase seen from the sidewalk along Cantonment Road.



Picture 5.37: View from The Duxton Plain Park entrance.

5.3.4a Patterns and Aesthetic Quality

Visual or more precisely the visual-aesthetic dimension in urban design is often described as the forefront of public art forms. Moreover, its translation in urban design is not primarily an object in space but the total form that creates the space (Carmona, Heath, Oc, & Tiesdell, 2003). Visual complexity likeness is valued in five environmental attributes (Nasar, 1998). Naturalness, Upkeep, Openness or Defined Space, Historical Significance, and Order are the five general environmental attributes that give good visual quality in a place. The public park in the Pinnacle @ Duxton has the first attribute of naturalness for the design imitates the natural landscape with undulating hills and tree coverage giving a sense of predominance of nature over built elements. This visual quality softens the concrete podium making it almost natural in a high-rise urban context. The trees and landscaping on the third-floor podium are still young, though by careful upkeep they have the potential to grow creating an oasis of lush greenery surrounded by the five towers.

The patterns and aesthetic order on the third-floor podium is repeated with similarity using the undulating landscape to organize the spatial programme within the large park, layering spaces from open to close. This sense of rhythm and pattern gives information where users progressively explore the park from the three main entrances along Cantonment Road. According to Smith (1980), this continuous rhythm in a public space gives familiarity to users by visual clarity. The attributes here in the Pinnacle @ Duxton are similar but translate differently by the covered walkways and artificial terrain in the park. The second attribute to liked environments is upkeep and civilities. Based on observation and visits spanning 12 months, the public park is well-kept and cared for. The

excellent management of the park is highly Singaporean. Singapore is known for its harsh fines against public disorder and its rigid management of well-kept public places. The issue of this rigid management is already discussed in the previous chapter stating the importance of social order and power relations between state and people as a good practice for making successful social and public spaces in the sky. The third attribute is its defined space. The public park is defined by the clear boundaries of its elevated floor and five tall towers surrounding it. The fourth is its historical significance. The park carries a small gesture of historical significance of an ephemeral ruin remindful about the old 1960s block that used to occupy the site. The Heritage Garden was designed near the grand staircase next to the main pedestrian artery dissecting the settlement. In the Heritage Garden are traces of light wells (ventilation shafts) placed along structural grid lines of the old building. Where the grid crashed with the new building, the old one was erased. With this forest of light shafts it provides a reminder of the old building in its significances of the first Housing Programme built as a triumph to success in Singapore's social national statehood. The resulting installation becomes a modern monument that recalls the scale and space of the old and transforms it into the landscape feature.



Picture 5.38: The centre mound mimics the natural environment psychologically tricking its users from knowing that the park is on a third-floor plane of the settlement



Picture 5.39: The centre mound seen from one of its three ramps. Given ample time to grow, the trees will provide lush vegetation to the park enhancing its 'naturalness state'.

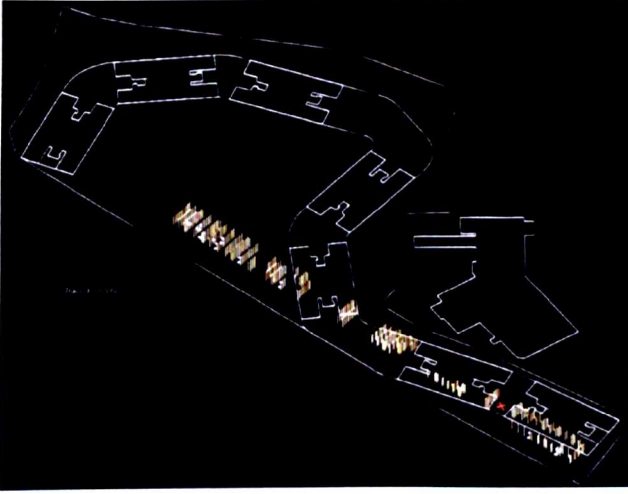


Figure 5.8: The 1960s' block projection as it was overlaid into the new block, thus defining the location of the Heritage Garden.

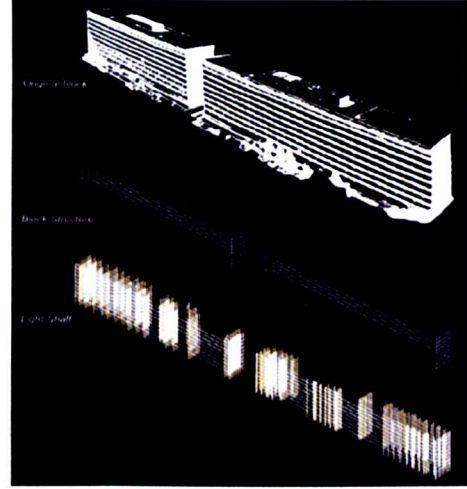
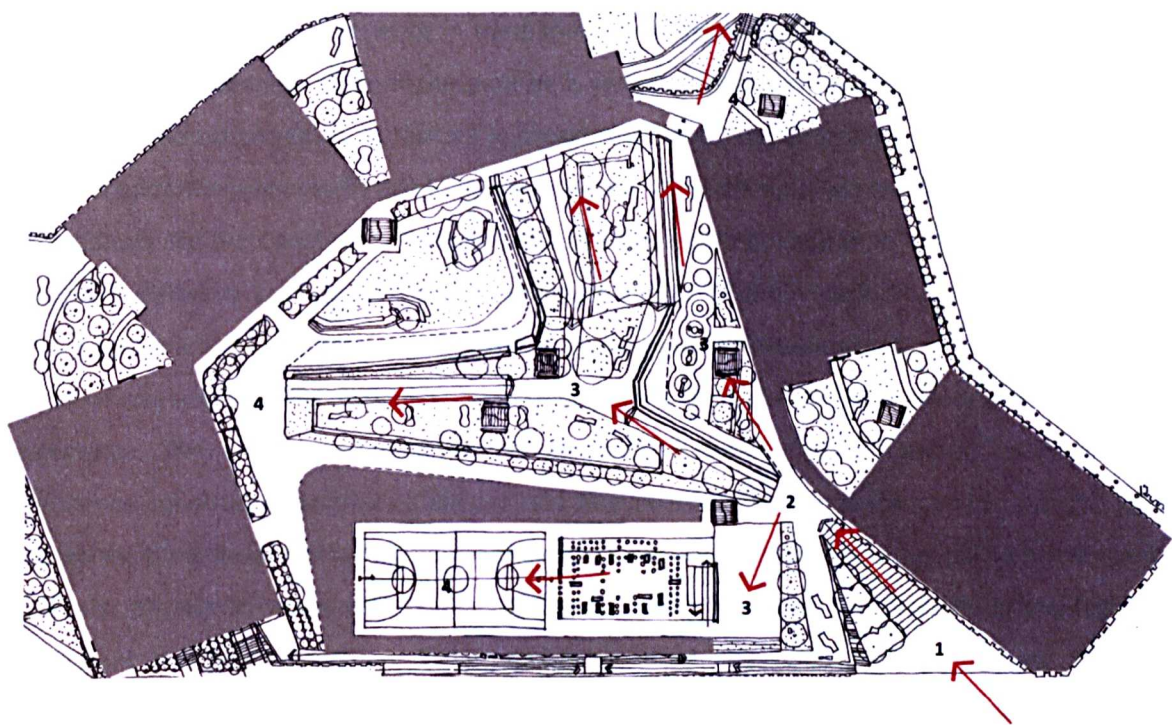
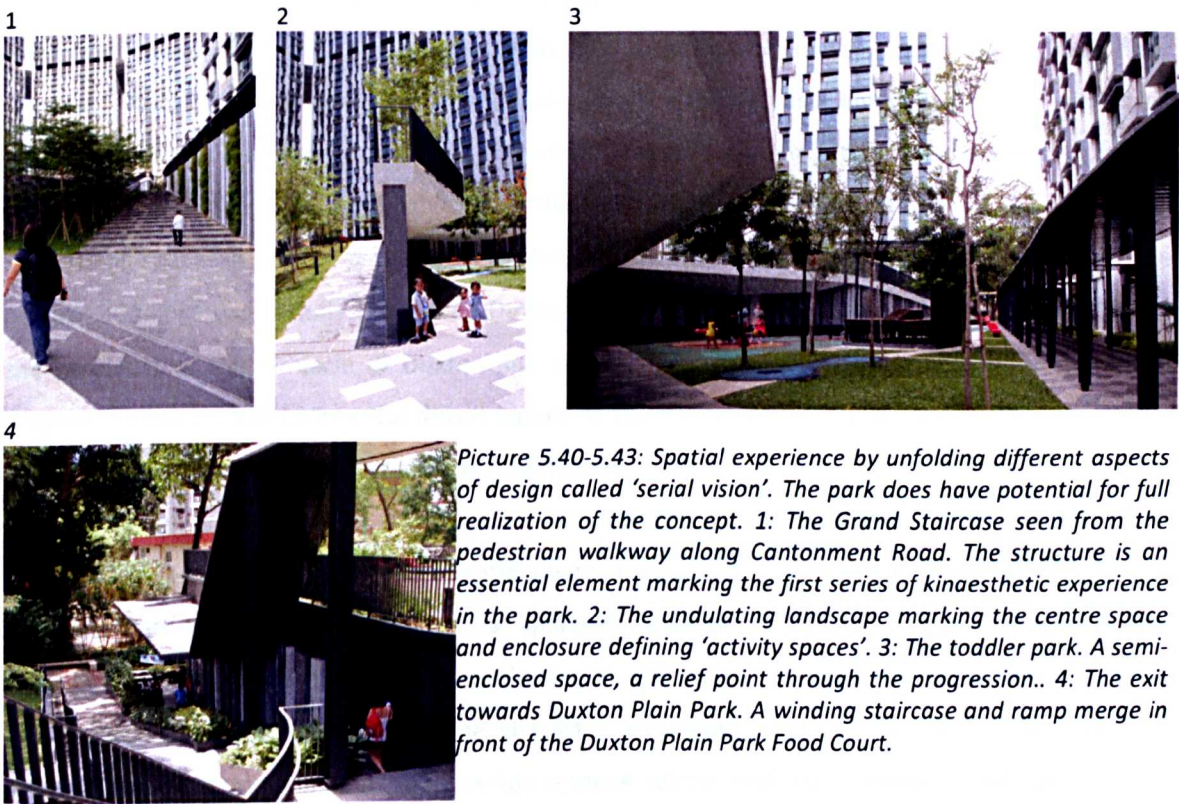


Figure 5.9: The 1960's block exposed from its outer shell focusing on the light shafts as the elemental aesthetic of the Heritage Garden.

The final attribute is order. In terms of visual order, the public park is organized by concept of a common enclosure, i.e. an enclosure or a piece of ground defined as a field or group (Meiss, 1990). The many elements inside the park are distinguished from what lies outside. Any visitors to the park will have the sudden realization and immediate ability to process that they are standing inside the settlement grounds. There is a strong appreciation of rhythm of shapes and forms in the park by strict repetitive elements from benches, choice of colours, intervals of columns and rows of trees. However, the strict repetitiveness on the ground floor is monotonous and sometimes overpowering by the suggested dynamism of its horizontal undulating terrain. One cannot help feeling rushed into moving hastily on its corridors and pathways by its floor patterns and angled aesthetics being placed thoroughly all over the park. The designers extensively placed many kinaesthetic experiences in the development by virtue of creating 'streets in the sky'. Kinaesthetic experience in urban design is an experience of the dynamic, emerging, unfolding temporal sequence by visual aspect of a townscape conceived by 'serial-vision' (Cullen, 1971). Cullen (1971) suggested visual experience is typically one of many series of jerks and revelations with delight and stimulation by contrast and the drama of the 'juxtapositions'. This well-known theory is of important value as to how visual environmental preferences are designed in urban spaces. It provides legibility and coherence in both an immediate and future sense of users exploring and using social public spaces in the urban realm.



Plan 5.20: Serial vision in the Pinnacle @ Duxton by pedestrian movement from the front entrance into and out of the park. The progression is marked in numbers engaging users with objects in space. The middle hill is the focus of the park. The series of smaller enclosures provides revelations to the journey. This significance creates a sense of ‘hereness’ and ‘thereness’ (Cullen, 1971) by visual clarity in the park.



The kinaesthetic experience in the park was thought of in the first proposal of the design. The idea was to connect parts of the park by a series of intervals marking the centre point to its function in the urban realm. As visitors approach the park from Cantonment Road they would be directed upon these spaces by semi-enclosed spaces. The walking experiences are directed into its main spaces like the Community Centre, Cafés and the centre open area in the park. The Cafés are located in-between arching sky-bridges taking advantage of their visual impact. The Community Centre was enclosed in a semi-arc'd elevated green roof. Unfortunately, during construction, this proposal was omitted. The design of the park does have the potential to enhance this kinaesthetic experience. The area surrounding the development is heavily pedestrianized as kinaesthetic experience benefited pedestrians (Cullen, 1971). The kinaesthetic experience is an incremental value in creating good social and public spaces for visual memory contributing to people's preference for particular physical environments (Kaplan & Kaplan, 1982). Moreover, accessibility in any high-rise settlement is highly pedestrian. When designing social and public spaces in these types of development, architects should be more discerning and attentive for pedestrian usage in order to encourage continuous use of it.

There are many examples of similar paradoxes noting the aesthetic/visual experience that 'rhythmic spacing' measures how people walk in the physical environments. The fewer it has to offer, the less the visible information it provides, the less the spaces will be visited by walkers exploring the environment (Bosselman, 1998). The architectural quality design on the third-floor level park does have a similar paradox when users walked through as it engages the mind with some variety of sensation contained within it. The Grand Staircase is an architectural element that invites pedestrians into the settlement whilst also demarking it as a place of gathering. The sequential enveloping spaces inside the park are breaks for users to stop while progressing to other spaces. The progression links successfully the hidden Duxton Plain Park into becoming a popular social space by the residents of the Pinnacle @ Duxton and white collar workers from the neighbouring Central Business District. Until before the development of the Pinnacle @ Duxton, Duxton Plain Park was shunned by users associating it with deviant activities.

Though presented with many varieties of sensations, visual aesthetic character in the urban environment derives not only from its spatial quality but also from colour, texture and detailing of its surfaces. This evaluation of architectural qualities focuses on architecture that responds and contributes to the definition of the public realm. According to Carmona et al. (2003), these architectural qualities contribute to the character and sense of place. The architecture and its landscaping use warm colours to advance into a space, which tends to be smaller, while cool colours retreat, giving a more spatial feel. A space can be harsh and inhuman if the surfaces lack fine detail

and interest in the human scale (Carmona et al., 2003). While most high-rises are free-standing buildings, the Pinnacle @ Duxton is the opposite. The arrangement of its enclosure suggests visually an appreciation of radiance; rather than treating the development like a free-standing sculptural object, the tower blocks are designed to stand together as if they are part of a larger urban block. Users approaching the third-floor park will visually see the Pinnacle @ Duxton as a group of dominating buildings enclosing the space centrally.

This quality could be compared with a closed square. Zucker (1959) described an enclosed square as a complete enclosure usually hidden by one street leading into it. It exhibits regular geometrical forms and repetition of architectural elements around its periphery. It is artistically relevant that the elevated third-storey park parallels to this concept. The repetitive nature of the architecture facades enclosing the park, its use of rectangular forms, and choice of colour creates a pure self-contained space, visually coherent. This attribute provides additional significance to the users.



Picture 5.44: Bedford Square, London. Designed in 1776 as a unified whole where individual houses are treated as one façade. Only tenants held a key to access the garden square in the middle of it. Now it remains open to the public. Designers opting to make future squares in high-rise developments should look into these traditional precedent as they provide clues as to how an enclosed square garden/park could work by reimagining it vertically. Source: Webb (1990).



Picture 5.45: The concept of a private garden shared by a single settlement is not unfounded. Bedford Square is among many London Georgian Squares to hold similar values of a controlled public space. Source: Webb (1990).

5.3.4b Floorscape

Another important element in determining good attributes to places is hard and soft landscaping. Floorscape is essentially hard landscape. Floorscape is an important element in order to create a harmonious and integrated whole of a place. It is substantially determined by the use of material from brick, stone slabs, cobbles or concrete (Carmona et al., 2003). It also interrelates to

soft landscaping and other materials such as building façades that enclose the social or public spaces. Floorscape strategy in the Pinnacle @ Duxton was designed with strict unity in materials, shape and colour. It also focuses on the utilitarian need to differentiate areas for walking and suggestive stops in relation to the programmatic importance of the space: 57% of the third-floor public park is paved with a unified pattern of rectangular 600x1200mm blue grey and light grey stone slabs. The pattern correlates with its façade in form and colour; visually uniform but aesthetically dull because it fails to capture or enhance the character of the space. There is no change of flooring material to indicate change of spatial boundaries or ownership. It is a lost towards creating a sense of vibrancy in the space.

According to Carmona et al. (2003), floorscape patterns often perform an aesthetic function of breaking down the scale of large and hard surfaces into manageable human proportions. Though this is done on the third-floor park by breaking it into smaller enclaves, it does not correlate with the flooring pattern as it is superimposed thoroughly throughout the whole site. Emphasizing change of material could benefit greatly in defining visually these enclosed spaces, not only by the green in the middle but also by the surrounding pathways and breaks. However, positively, the pattern did emphasize linear movement in the park, highlighting the path providing a good sense of direction connecting the front entrance (Grand Staircase) to Duxton Plain Park as the parallel reinforced a sense of movement. The paving strategy lack non-linear qualities, which, if adopted, would give the central mound the highest hierarchy of space in the park. Unfortunately, heavy use of linear shapes failed to emphasize it. The mound only existed visually as a thoroughfare in-between other enclosures in the park. It failed to make an impact to give a strong sense of permanence due to conflicting patterns of its design.



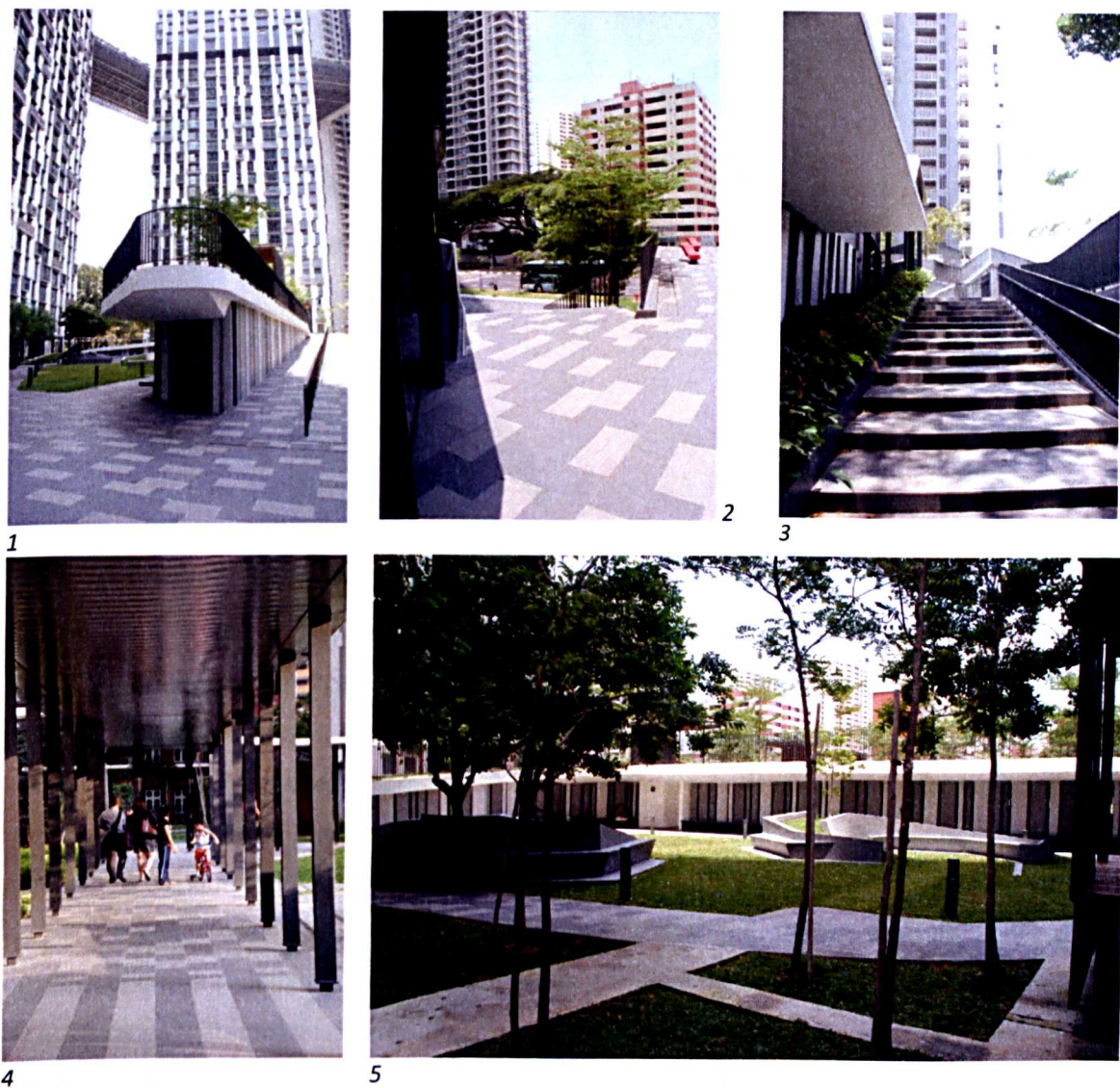
Picture 5.46: The pathway on the right suggests linear movement by floor pattern towards the centre mound, which, in a series of spatial progressions, is the highest location on the park.



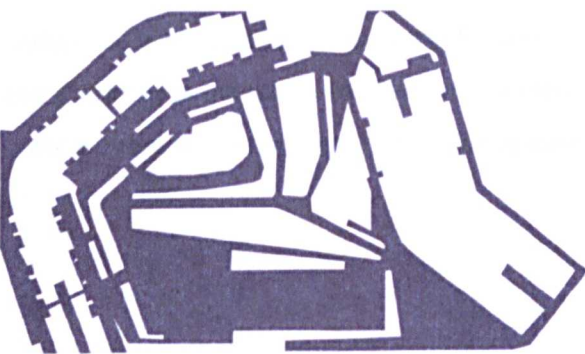
Picture 5.47: The over-emphasizing of linear quality on the paving failed visually to suggest this space bears towards the centre of the park. It also failed to highlight it as the highest hierarchy of space within the whole park.

This attribute could also be applied in the other two enclosed gardens radiating from the central mound. The first enclosed garden is excellent because the basketball court layout highlights the centrality of the enclosed space. The other two enclosed gardens only benefited from their green turf landscape highlighting their quality as an enclosed space. If the designers had used different floor patterns within the enclosed gardens, visually it would have complemented a sense of movement and rhythm to the urban scene. The strong and repetitive geometrical image might work well in organizing the space between the three enclosed gardens radiating from the mound but as an aesthetic whole it is overly visually uniformed. Users felt compelled to perform any unconventional activities in these enclosed garden spaces, likewise the basketball court is constantly being used because the suggestive conventional activity within the space correlates with strong use of the visual and repetitive geometrical qualities of its enclosed space.

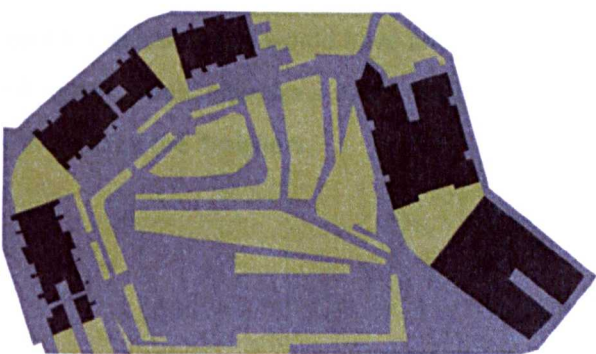
In addition to contributing good use of social and public space in the urban realm, street furniture is also important as it helps to organize and distribute use adding quality to an urban space. Street furniture includes a variety of hard landscape elements other than the floor itself and it is mostly focused on benches, planters, lighting standards, bollards, etc. Street furniture is mostly necessary in the urban realm (Carmona et al., 2003). In the third-storey public park, street furniture is integrated into the landscape as a continuous element. It is designed using five types of items placed to suit the quality of the environment and suggestive programme of an area. These five types are a food kiosk, pavilion, fitness station, fountain and benches. Unfortunately only three out of five were implemented in the design. Concerns of upkeep and anti-social behaviour raised by the municipal council caused the landscape architect to cancel the food kiosk and fountain in the park.



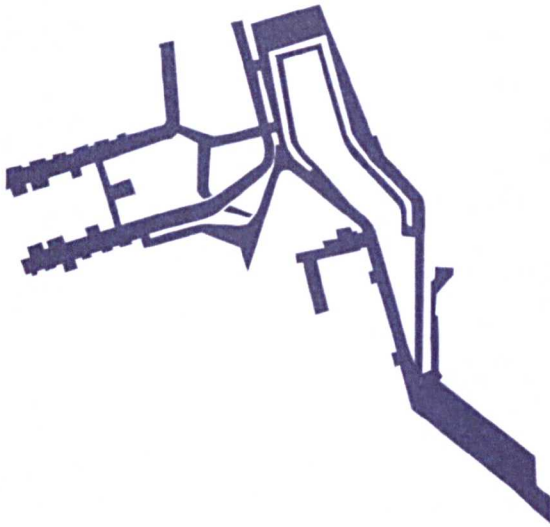
Picture 5.48-5.52: Unity in materials and utilitarian in use. Visually, the aesthetic quality of the floor pattern is dull without any association to areas where people can stop and rest. There is also no sense of visual vibrancy, though the concept succeeded in creating a clear sense of direction when exploring the park.



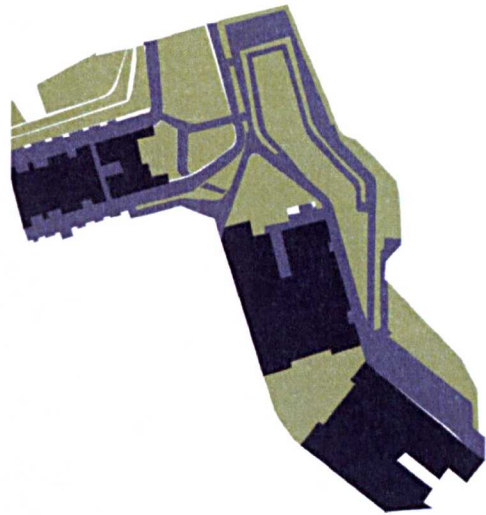
Plan 5.21: An illustration of the paving coverage in the public park.



Plan 5.22: Soft landscaping (green) coverage in the public park.



Plan 5.23: An illustration of the paving coverage in the adjacent park behind blocks C, D and E.



Plan 5.24 Soft landscaping (green) coverage in the adjacent park behind blocks C, D and E.

Nonetheless, the three remaining street furniture types are places all over the park with different degrees of success. A concentration of benches delineates two of its enclosed spaces with success in enclosure C facing the pre-school. The benches are covered by the landscape cutting into the mound, creating a comfortable area protected by rain and sun. Facing these seatings is playground equipment giving an identity as a family space. This quality in one of the enclosures parallels a good strategy of creating a public realm (Gilliespies, 1995). Enclosure B has similar qualities to C with abundant benches and good delineation of the space, though it lacks purpose and by observation therefore tends to be deserted. The placing of the pre-school facing enclosure C gives functional purpose to the space, while in B there is only landscaping. Enclosure A on the other hand is a basketball court, heavily used by the teenagers though no provisions of seating are integrated in the enclosure. Many teenagers resort to sit on the pavement in order to be a spectator to the game. If the landscape designer had considered installing more benches, taking advantage of the undulating landscape surrounding the basketball court for spectating, it would have added identity and character to the space. Furthermore, the street furniture would organize a user's reaction to the space without detracting from its function originally thought by the designers.

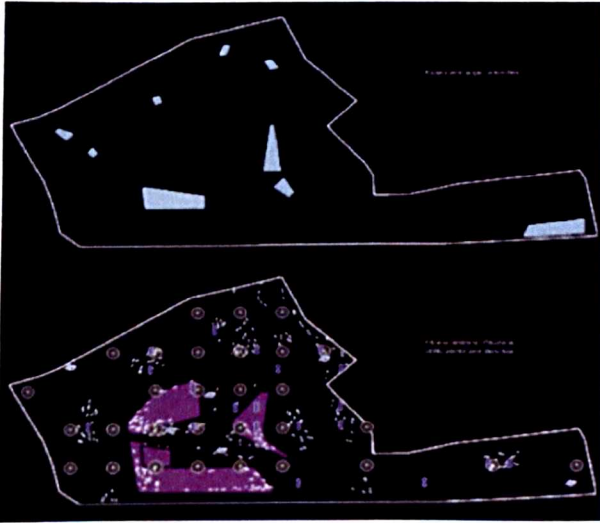


Figure 5.10: The original proposal for the location of street furniture in the third-storey public park. The top diagram highlights the location of water elements in the park. All waterscape proposals were omitted due to concerns of upkeep and anti-social behaviour by the Municipal Council. Picture source: URA (2005).

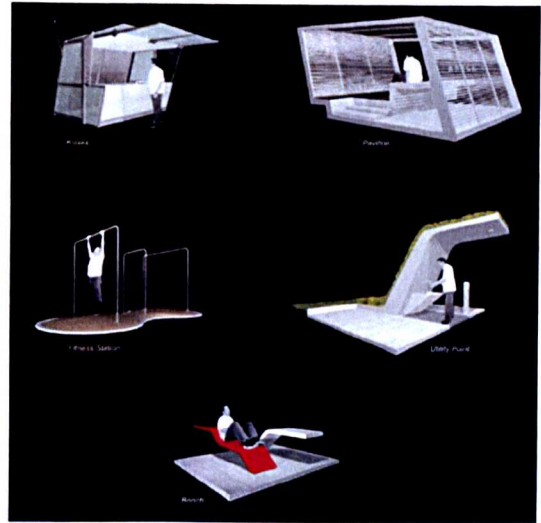


Figure 5.11: The five original proposals of street furniture to be applied in the Pinnacle @ Duxton. Only three were implemented: the pavilion, benches and fitness stations. Picture source: URA (2005).



Picture 5.53: The only available bench near the basketball court. Given the popularity of this area, it would benefit greatly if seatings were provided surrounding the enclosure, giving a spectatorish-like quality to the place.



Picture 5.54: The Heritage Garden is designed such that it does not provide active engagement to its users. It is passive and unused by the people in the settlement.



Picture 5.55: Seating provisions in enclosure C. The seats are cast deep into the wall with provision of shade facing the tot-lot.



Picture 5.56: Benches randomly placed next to the Heritage Garden.



Picture 5.57: An example of the many pavilions provided in the park. It serves a dual function: as a place for relaxing, studying and socializing; also as a ventilation shaft for the two floors below.

5.3.4c Soft Landscape

The overall landscape strategy in the Pinnacle @ Duxton is to seamlessly extend the third-storey public park vertically into the development. The third-storey public park will be the catalyst of vertically connecting the other two sky parks above. However, stringent concerns about maintenance and fear of falling branches caused the idea to be abandoned and modified without taking the idea to full effect. The consideration for its landscape strategy was focused only on three concerns: first its landscape element needed to be robust for long-term maintenance; second, the design must be easy for refuse collecting, sweeping, washing and other kinds of specialization requested by the adjunct municipal council maintaining it; and third, the consideration of durable trees able to withstand vandalism or other forms of anti-social behaviour. It is worth mentioning, taking into consideration the site's history as a nutmeg plantation and 'jambu ayer' trees, the designers decided this to be the decisive element to create its soft landscaping character. These two trees were planned to be planted in the park. Again, this idea was abandoned. The result of this is a soft landscape in appearance, frugal and solid.

Nevertheless, the frugality of the design is not devoid of character. According to Carmona et al. (2003), too much soft landscaping can dilute the architectural quality of the site. Soft landscape elements in the park are generally divided into three parts: trees, hedges and turf. Trees in the third-storey park are both ornamental and used for shade. Most the trees are Rain Trees (albizia saman)

and the Yellow Flame Tree (*Peltophorum pterocarpum*). NPB (2009) describes Rain Trees as a wide canopied tree with a large symmetrical crown. It usually reaches a height of 25m (82ft) and a diameter of 40m (130ft). The tree blooms with its crown covered in clusters of pink-white flowers, like small upturned brushes. The leaves fold up before rainy weather and for this reason it is called the Rain Tree. The Yellow Flame Tree can grow up to 15–25m tall with a trunk diameter of up to 1m. The leaves are 30-60cm long, with 16-20 pinnae, each pinna with 20-40 oval leaflets 8-25mm long and 4-10mm broad (NPB, 2009). The flowers are yellow, produced in a large compound of racemes. These trees are planted for their durability, especially the Yellow Flame Tree that can withstand droughts.

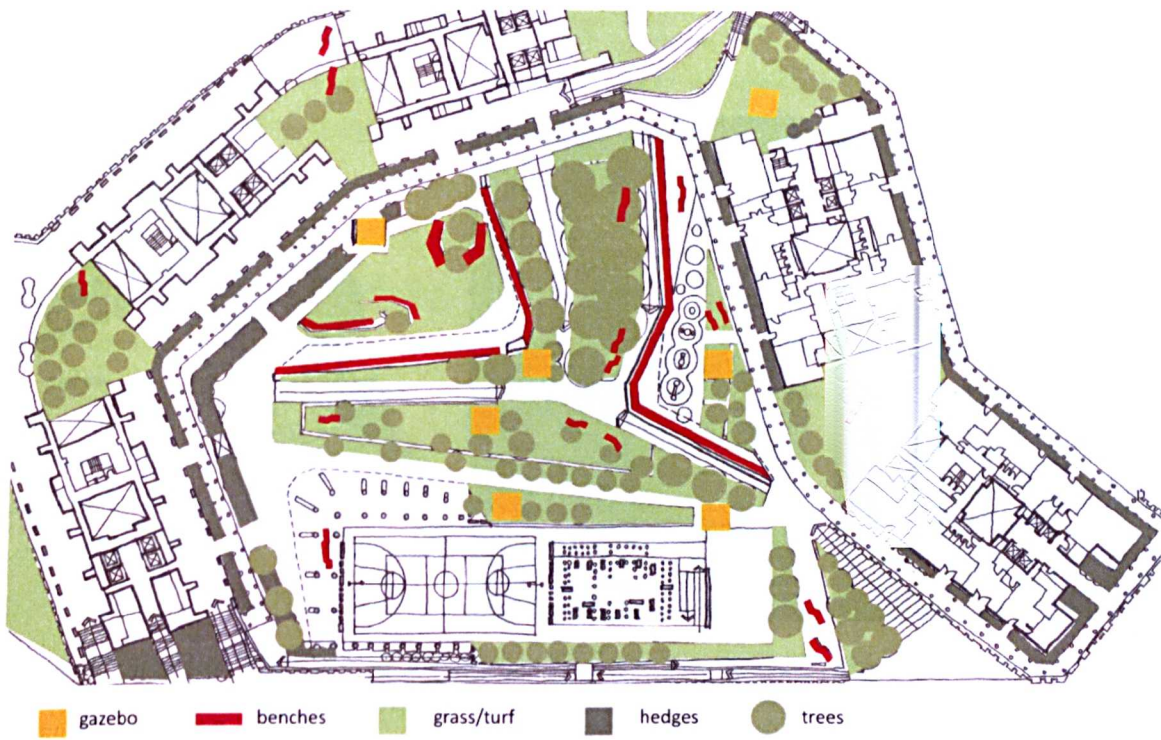


Picture 5.58: An example of a medium size Rain Tree in Singapore. Note the huge crown coverage it provides when mature. The tree is a popular choice in gardens and road-side walkways. Picture source: NPB (2009).



Picture 5.59: An example of a medium size Yellow Flame Tree. The tree has strong durability in a dry landscape, popularly chosen for low-cost maintenance. Picture source: NPB (2009).

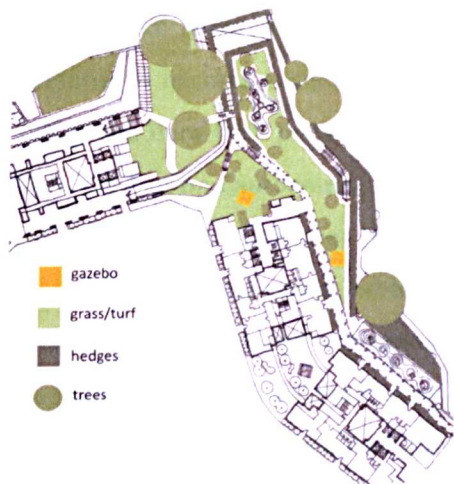
Rain Trees are planted in enclosures B and C while a concentration of Yellow Flame Trees is dotted around the central mound. Rows of Yellow Flame Trees are planted along pathways radiating to the three enclosures. Another form of landscape strategy used in the third-storey park is hedges. The hedges are planted to create barriers between the residential blocks and their public walkway. Hedge concentrations are along corridors. In enclosure C these hedges protect the pre-school from direct visual invasion of any person looking into it. The hedges also function as fences that delineate the public park from the five tower blocks enclosing it. The final form of landscape strategy design in the park is its grass turf. The turf coverage in the public park is extensive: 60% of the park is covered by grass turf.



Plan 5.25: A graphical illustration of landscape strategy in the third-floor park of the Pinnacle @ Duxton with its five types of landscape elements.



Picture 5.60: View of the third-storey public park from above, a few months after its completion. The park aims to have a maximum coverage of grass. Most concentration of trees is in the middle mound. More trees were planted after the development was settled. The trees when at full maturity can grow half the size of the same type on the main street on the right. Picture source: CTBUH (2008).



Plan 5.26: Graphical illustration of the landscape properties in the adjacent park behind blocks C and D.



Picture 5.61: Rain Trees planted relatively distant in anticipation of their crown coverage when fully mature.



Picture 5.62: Based on an interview with the architect, this area is the location for a high-speed elevator connecting all three floors of the Pinnacle @ Duxton's social public spaces.



Picture 5.63: The Pinnacle @ Duxton's food court located next to Duxton Plain Park. Due to its location, it is shaded by large Rain Trees and Yellow Flame Trees. The food court proved to be popular among white collar workers from the neighbouring financial district during lunch and tea breaks.

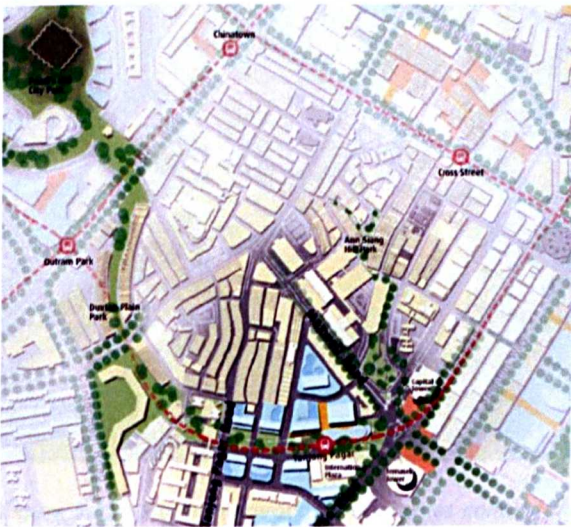


Picture 5.64: This children's park is located above the food court. Aesthetically the park is surrounded by lush greenery due to its location next to Duxton Plain Park. It has seven Rain Trees planted surrounding it to provide shade. The paving surfaces in the park are made of synthetic soft tarmac to absorb impact, safe for any form of activity in it. This park is not extensively used by the children in the development as most of them concentrate on enclosure C. This is because of few benches for surveillance by parents and the lack of shade.

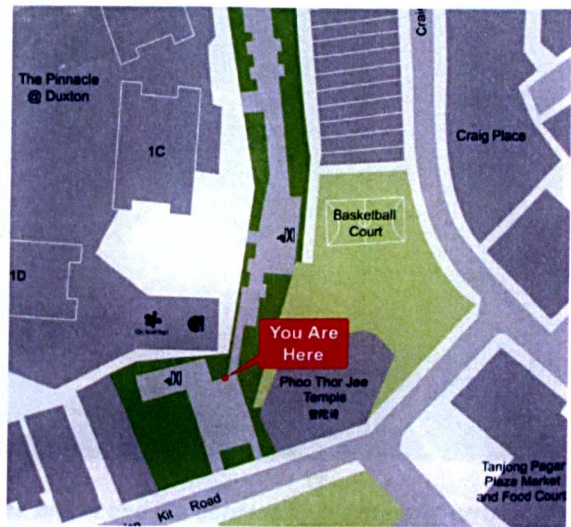
5.3.5 Circulation Patterns

Circulation or movement is an important factor in determining life and activity in the public realm. Social spaces that take opportunities to tap into these pedestrian movements have the potential to become successful as they draw vitality and frequent usage of the spaces (Carr et al., 1992). The third-floor public park in the Pinnacle @ Duxton is connected by two pedestrian artery lines, the first on Cantonment Road, the second along Duxton Plain Park. These pedestrian lines are easily accessible. Moreover, these pedestrian lines have an origin to destination movement connecting two vital nodes in-between. The Pinnacle @ Duxton is sandwiched between the lines, while the public park acts as a connector between both lines. To design successful public spaces, it is essential to understand these movements from the origin to destination studies. Pedestrian lines are excellent opportunities for social interaction.

The connection between places is important, and successful places generally are integrated within local circulation and movement systems (Carmona et al., 2003). The Duxton Plain Park pedestrian artery connects two destinations from the Tanjong Pagar MRT (Singapore's version of the London Tube) to Pearl's Hill public park. Cantonment Road pedestrian artery connects Outram Park MRT station to the Tanjong Pagar Port Authority. This essential origin to destination movement between the two artery lanes is combined by the public park in the Pinnacle @ Duxton, thus creating a new artery line between Outram Park MRT station to Tanjong Pagar MRT. The destination point in this artery is made stronger by the location of the Tanjong Pagar Market along the lane near the MRT station.



Plan 5.27: Plan showing the pedestrian artery line between two important destinations: the Tanjong Pagar MRT station and the Pearl's Hill Park.



Plan 5.28: Diagram of Duxton Plain Park and destination stimuli along the path, like the Phoo Thor Jee Temple and Tanjong Pagar Market.

The artery lane in the Pinnacle @ Duxton is excellent as it complements the two existing links. It runs through into the third-storey public park exiting into another settlement next to the Pinnacle @ Duxton called Everton Park. The location of the Tanjong Pagar Market proved pivotal in drawing people to acknowledge the pedestrian route into the Pinnacle @ Duxton. The pedestrian movement brings people into the third-storey public park. Hillier (1996) argues, by ensuring that origin-destination trips take place past outward-facing buildings blocks, the traditional “urban grid” represents a “mechanism for generating contact”. This impact of exploitation on the origin-destination trips is best applied in shopping complex/mall design where two magnets of retail stores sit at opposite ends with smaller shops in the middle, ensuring movement in-between along the mall. The Pinnacle @ Duxton’s pedestrian movements have the potential to make its social spaces more successful if spaces in the third-floor public park are utilized by this manner. Hillier (1996) also acknowledges how routes that have frequent spatial usage have more potential to generate contact than others because they have more by-products: the in-between spaces passed through on the way or from one another. Originally the architect for the Pinnacle @ Duxton does acknowledge this by placing a high-speed lift at the intersection of the route from the Pinnacle @ Duxton and Duxton Plain Park. The intent of placing this high-speed lift here is to ensure connectivity between two other major social public spaces in the sky gardens above are connected to the two artery lines. But the high-speed lifts were abandoned due to costs and security concerns.

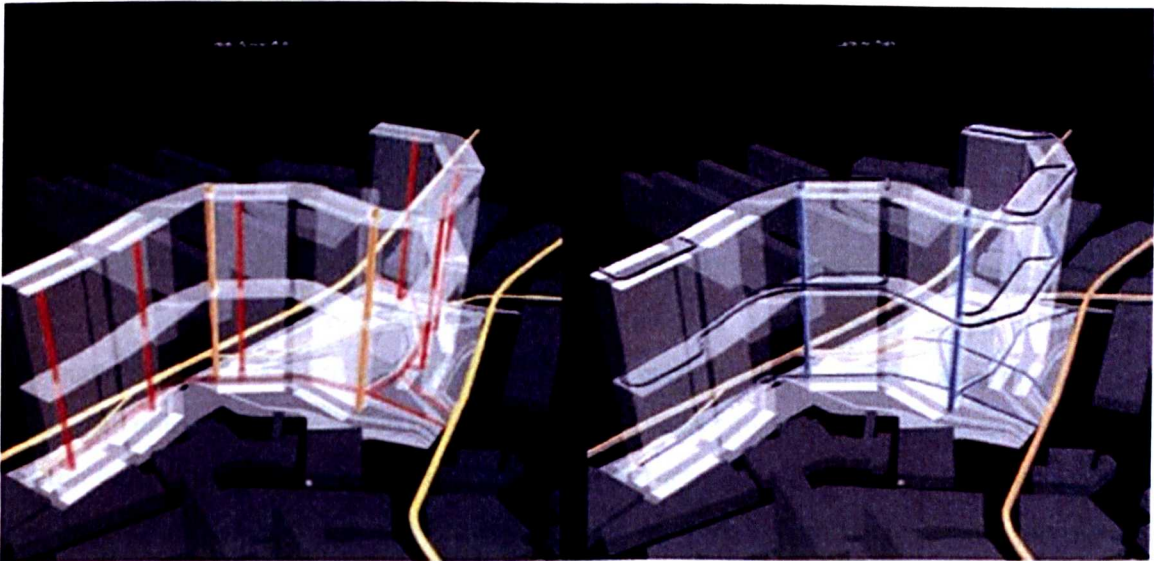
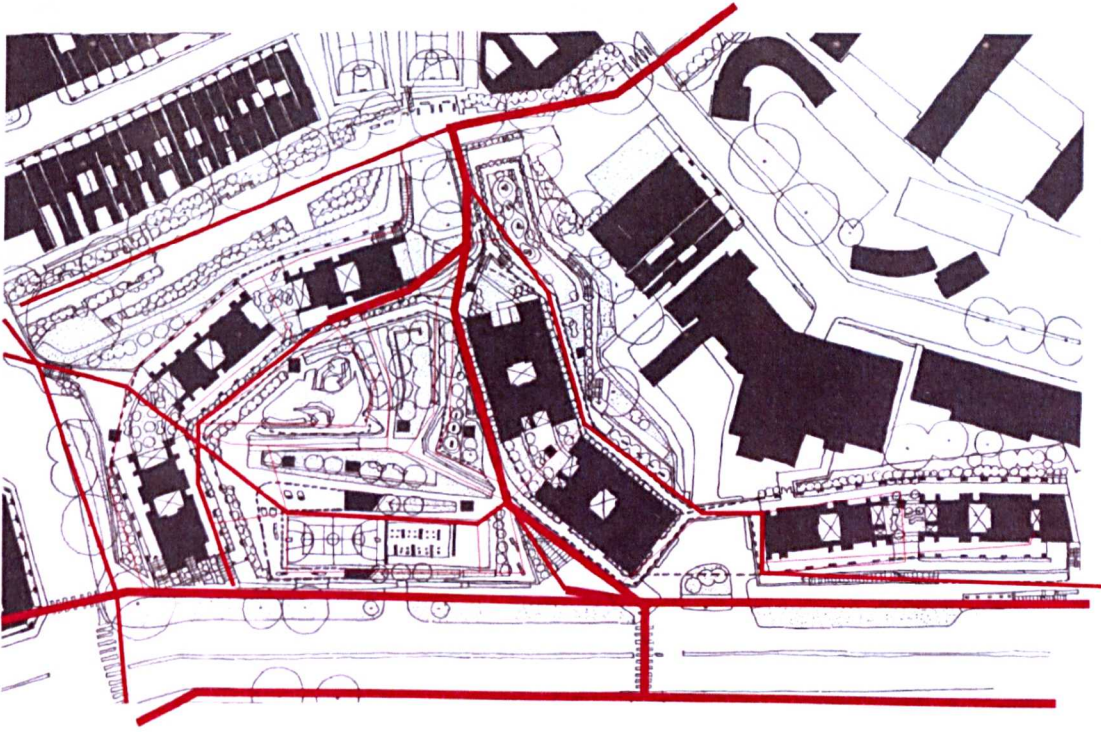


Figure 5.12: Ground network from all sides connecting the blocks and sky gardens by a system of vertical lifts spread along a pedestrian artery. The left picture indicates pathways meant for high-speed access by foot. Two high-speed lifts were proposed to connect the ground to two sky gardens placing it on the main east-west pedestrian artery line. The right picture indicates leisure paths in the system. Picture source: (URA, 2005).



Plan 5.29: Spatial mapping on pedestrian usage surrounding the Pinnacle @ Duxton. The thick line suggests heavy pedestrian use along Cantonment Road (at the bottom) because of bus and taxi routes going in and out of the city-centre by this road. There are several key public buildings located along Cantonment Road from the Singapore General Hospital and The Central Police HQ to public schools, both secondary and primary.

Pedestrian usage was deflected into the park as it connects with Duxton Plain Park in the upper section of the map. Other parts of the park were fairly used as pedestrian lines but the middle proved most popular as it weaves through into Duxton Plain Park towards key destination points like the Tanjong Pagar Market and its MRT station. This pedestrian map indicates the third-storey park is embedded successfully complementing existing pathways, making the park functionally accessible to the public. This is one of the key elements of making successful public spaces in high-rise buildings.

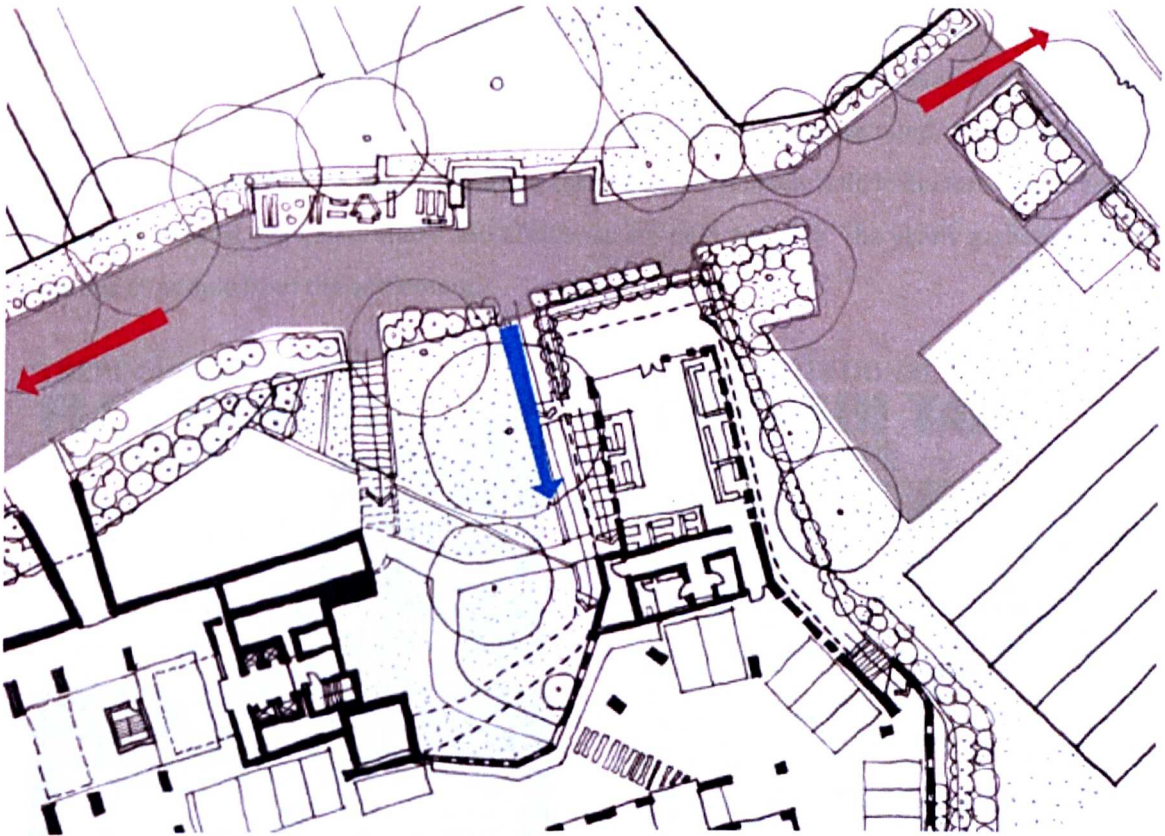
Though the pedestrian artery line in the Pinnacle @ Duxton does represent one of the key elements of making successful spaces, there is the danger that the line into the public park might only be movement from one destination to another. The park itself could fail to become a destination itself. On a micro scale, the public park is partly hidden from view along the pedestrian route. The only destination within the park is the food court situated at the end of its route next to Duxton Plain Park. Most visitors from the business district would only venture into the food court and not explore further into the public park, though the route is being used nominally by residents from Everton Park (a neighbouring public housing settlement) to get to Tanjong Pagar Market. Nonetheless, the function of the public park is for the residents themselves. In particular, the route is a good evidence of permeability. The key message in urban design is well-connected places are likely to encourage pedestrian movement and this affects vitality and viability in its use (Carmona et al., 2003).



Picture 5.65: This food court sits at the intersection of two pedestrian lines. It acts as a destination in the Pinnacle @ Duxton and is a by-product in the larger Duxton Plain Park route.



Picture 5.66: The owner of a food stall in the food court sets up additional tables for the incoming lunch crowd at 12 pm.



Plan 5.30: Plan showing the layout of the food court. The red arrow shows two destination points to Pearl's Hill Park on the left and Tanjong Pagar MRT station to the top right. The blue arrow shows direction to the third-storey public park. The food court sits at the intersection of both pedestrian lines. This plan also indicates the level of the food court three storeys below the Pinnacle @ Duxton's public park. This level is mostly occupied by car parks reserved for residents in the settlement.

The food court contains eight food stalls with only two toilet facilities for different genders. In fact this is the only public toilet available within a kilometre circumference. The location of the toilet is also hidden and designated only for customers at the food court.

5.4 Chapter Conclusion

The neighbourhood park is a good design example of public life in a high-rise environment. Carr et al. (1992) assert good public urban places are defined by three forms of public life: the first, social life is mainly daily activities shared by close neighbouring units; second, functional life, highlighted by weekly social gatherings within a tower block; and third, symbolic life, activities celebrated seasonally by all members of the settlement. Daily life is evident on the park, from parents gathering and picking up their children in enclosure C to the daily use of the basketball courts by teens, and children playing in the tot-lots and playground. It would add more impetus to the sense of place if there were a neighbourhood store near these three enclosures. Neighbourhood stores that sell groceries from vegetables to meat are perfect meeting places for people (Carr et al., 1992). Functional life is highlighted by monthly activities organized by the neighbourhood in the park. A monthly flea market is held along corridors in the empty void decks. Monthly activities like the set-up of games and exercise for the elderly are conducted in the park. Bearing a nation that is highly multi-cultural, the Pinnacle @ Duxton is diverse in its racial background. Symbolic life in the settlement is celebrated by numerous cultural celebrations nominally held in enclosure A. Events like the Lantern Festival, Eid Celebrations and Christmas are held annually. The yearly gatherings attract hundreds of people from the settlement.

THE PINNACLE@DUXTON
FLEA MARKET
达士岭跳蚤市场

Last Sunday
of every month
10am - 6pm

每个月最后一个星期天，
早上10时至傍晚6时

Level 3 Void Decks of Blocks 1A, 1B & 1C
大牌1A, 1B和1C组屋3楼空地
Open to all. Limited spaces. Terms and conditions apply.

Flea market date	Registration begins	Flea market date	Registration begins
31.03.2013	02.03.2013 (Sat)	25.06.2013	03.06.2013 (Sat)
28.04.2013	06.04.2013 (Sat)	23.09.2013	07.09.2013 (Sat)
26.05.2013	04.05.2013 (Sat)	27.10.2013	05.10.2013 (Sat)
30.06.2013	01.06.2013 (Sat)	24.11.2013	02.11.2013 (Sat)
28.07.2013	06.07.2013 (Sat)	29.12.2013	07.12.2013 (Sat)

Book a stall space for only \$5*.
*For The Pinnacle@Duxton residents only. All others pay \$10. Please bring along NRIC during registration.

An On-going Event by

Book your stall space!

Tanjong Pagar CC
(9am to 9.30pm daily, closed on public holidays)
While vacancies last, on a first-come-first-served basis

报名处: 丹戎巴葛民众俱乐部
(每日早上9时至傍晚9时30分, 除了公共假期以外)
先到先得或售完为止

LEARN TRADITIONAL
YANG SHI TAIJI
传统杨式太极招生

Taijiquan is a traditional Chinese martial art and health-promoting exercise. Different styles exist. Yang Style Taijiquan was created by Yang Lu Chan who modified Chen Style Taijiquan by eliminating its explosive movements as a self-defence art. Practising Taijiquan helps improve the circulation of qi (internal energy), which can prevent many ailments. Participants will learn static and dynamic balance, coordination of movements with good bodily control, relaxation and mental discipline.

Mr Kan Toh Hong Sin is passionate in promoting the sport both locally and internationally. Accredited with the Singapore Wushu Federation and National Registry of Coaches, he is also a Taiji Judge with the Singapore Wushu Federation and has been teaching since 2007. He has received training from Yong Nian Yang Shi Taiji Quan Master Zhao You Shi, Singapore and well versed in the traditional Yang Shi Style 05, Yang Shi Style 51 Jian and Yang Shi Zhao Hong Sin has won several gold medals in competitions.

Venue: The Pinnacle@Duxton Basketball Court 地点: 达士岭组屋篮球场

Time 时间	Class term 新班日期	Forms 式	Fees 学费
Saturdays 星期六 7.00pm to 8.00pm	02.03.2013 - 25.05.2013	51 sword 51式	\$60 for 3 months, 12 lessons 3个月, 12节课
Saturdays 星期六 6.00pm to 7.00pm	06.04.2013 - 22.06.2013	28 forms 28式	\$60 for 3 months, 12 lessons 3个月, 12节课
Saturdays 星期六 7.00am to 8.00am	06.04.2013 - 22.06.2013	13, 18 forms 13式, 18式	\$60 for 3 months, 12 lessons 3个月, 12节课
Saturdays 星期六 8.00am to 9.00am	06.04.2013 - 22.06.2013	37 forms 37式	\$60 for 3 months, 12 lessons 3个月, 12节课

Another Healthy Lifestyle Activity by

Registration Venue

Tanjong Pagar CC
(9am to 9.30pm daily, closed on public holidays)
From 23 Feb 2013 on a first-come-first-served basis
Bring along your NRIC for verification

报名处: 丹戎巴葛民众俱乐部
(每日早上9时至傍晚9时30分, 除了公共假期以外)
从2月23日, 先到先得或售完为止

Pictures 5.67 and 5.68: Monthly activities held in the neighbourhood park organized by the nearby Community Club.



Picture 5.69: Poster informing the yearly Lantern Festival held in the neighbourhood park.



Picture 5.70: Resident's Dialogue and High Tea Session concerning the estate.

Maintenance is excellent and the upkeep is done to high standards. The seven-day observation revealed the neighbourhood park is tidy at all times, even under heavy use. The neighbourhood park is not subjected to intense scrutiny and rules or use. The use is mainly free from any 'do's' and 'don'ts' though it is recommended that the management could relax its governance of social spaces with less scrutiny. The plants are mostly heavy duty, they are in need of minor upkeep. Return visits revealed constant care on the plants with some repairs done to damaged landscape elements, especially the artificial mound due to natural erosion by rain. The management also added more planting along pathways to increase the diversity of plants in the park. There are essential budgets for on-going maintenance and, since it has been designed to be vandal-proof and vagrancy is virtually non-existent, the park is beautifully well kept.

As high-rise environments tend to create spaces that segregate their inhabitants from the city, analysis reveals the neighbourhood park has good intelligibility and synergy as a social public space. The many chosen and integrated routes passing through the park bring in users from outside the park. Similarly, all vertical routes from the residential blocks flow into the park. The residential and public routes meet along the edges of the park transgressing into the neighbourhood park. The sizeable entrances opening towards the park are good for encouraging social contact between neighbours while protecting it from unknown visitors. The more comfortable an entrance to a

settlement is, the more likely its inhabitants will stay longer or spend time with others in the space. The neighbourhood park is a good successful example where the settlement meets the ground. How the building meets the ground is equally as important as how it meets the sky. The architect's ground parameter is paramount in creating an urban barrier between the settlement and the city. Furthermore, the compactness of the park encourages many forms of activities, from private contemplating to large social gatherings. Children played outside in the neighbourhood park without any restriction. The Pinnacle @ Duxton is not a gated community but the neighbourhood park design made it as an invisible gated community. The park does not rely on security guards but the park itself provides ample surveillance for parents in fear of their children's safety.

Interviews revealed that residents agree some parts of the park are good places for social interaction and outdoor meetings. Using the park is strongly a reflection of a sense of community. With the exception of the elderly all other user groups feel safe in the neighbourhood park in the day and night. Though, the neighbourhood park does have some misgivings in its design. Some improvement could be done on its landscape: Some of its spaces are dead spaces. Nevertheless, the near home location, frequency of social interaction and maintenance have positively influenced the sense of community and neighbouring in the park. The neighbourhood park in the third-storey podium is therefore a good example of social and public spaces design in residential high-rises.

CHAPTER 6-MINI-PARKS OR VEST-POCKET SPACES: THE 26TH AND 50TH FLOOR SKY DECKS

6.0 Introduction

This chapter builds upon the previous chapter by focusing on the evaluation of the 26th and 50th storey sky decks as a collection of social and public spaces in the settlement. Both sky parks are a collection of “mini-parks or vest-pocket parks” (Marcus & Francis, 1998) inter-connected by a continuous pathway from residential blocks A to G. Situated on sky bridges ranging from small to large, the whole 26th storey is a social space for the residents of the Pinnacle @ Duxton while the 50th floor is open to the public. There are eight designated social spaces located on both sky bridges. A pedestrian pathway connects all social spaces together as one park. Nevertheless, given the size and dimension of each social space, it is difficult to validate this as a park or square but rather as a series of mini-parks or vest-pocket spaces (Marcus & Francis, 1998). This chapter shall focus on validating the use of these pocket parks. It involves a study on how these spaces work using post-occupational analysis on the basis that these spaces are similar in characteristic to mini-parks or vest-pocket parks. Like the previous chapter, the study centres on the functionalist perspectives. The urban environment should always be concerned towards the functioning of the environment and how people use it. It is also important that any form of abstraction of visual beauty and technical requirements from traffic, access and circulation follows the consideration of function first. The chapter is in five parts. The first explains the characteristics of a mini-park or vest-pocket space and its similarities to the social spaces on the 26th and 50th floor sky deck. The second discusses architecture, use and activities on the 26th storey sky deck. The third follows the similar analysis on the 50th floor sky deck. The fourth is a short conclusion of the analysis on all mini-parks in the Pinnacle @ Duxton.

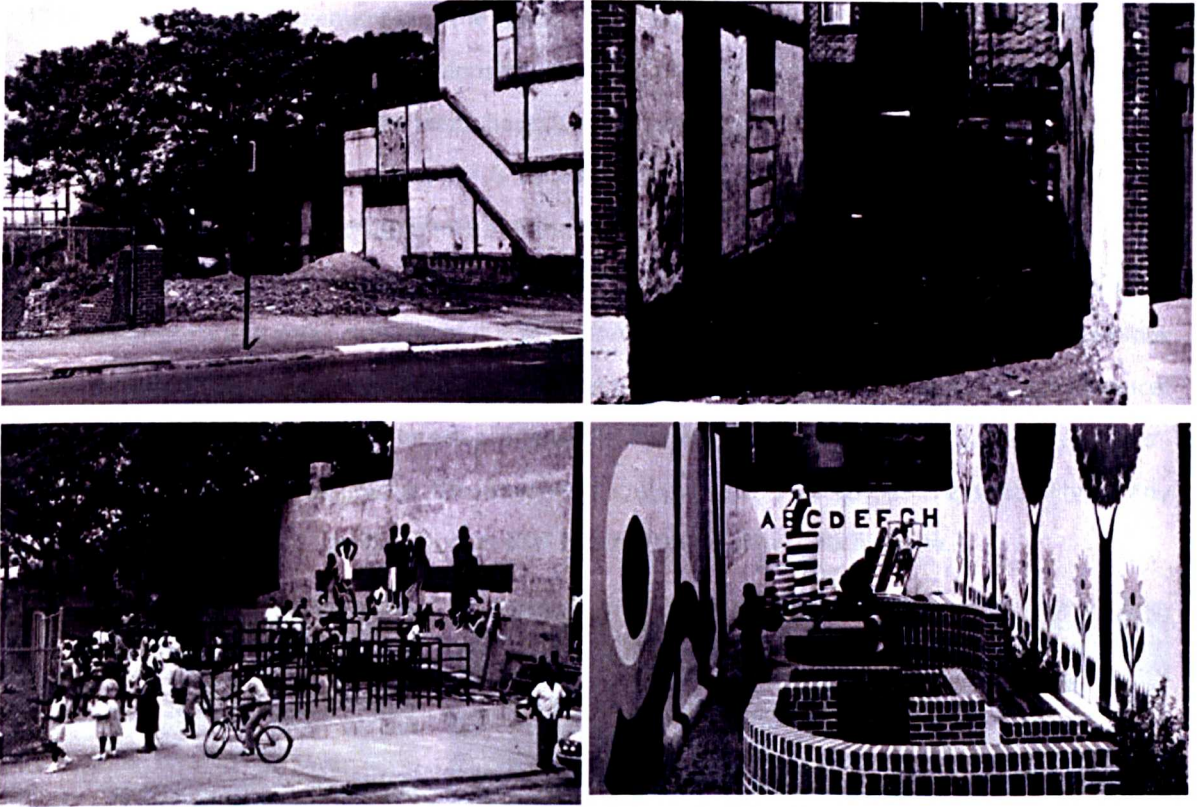
6.1 Mini-Parks or Vest-Pocket Spaces

6.1.1 History and Description

Pocket parks, also known as mini-parks or vest-pocket spaces are urban spaces on a very small scale usually only a few housing lots in size or smaller. Pocket parks can be tucked into and scattered throughout the urban fabric to serve an immediate settlement (Jasprizza, 1999). According to Marcus and Francis (1998) the name ‘mini-park’ is relative. In the big cities of New York and Philadelphia, a mini-park can be only 20 feet (6 metres). In Texas, one mini-park can be three acres,

though the best description is usually one, two or three plots of dense urban land. A mini-park is built from a commercial enterprise on high-rented commercial land, donated by private funds and built with volunteer labour or lands developed by the local authority. The history of the mini-park dates back from the 1960s when students and faculty from the Department of Architecture and Landscape, University of Pennsylvania began a programme called Neighbourhood Commons. The programme aimed at reclaiming trash-ridden vacant lots for gardens, sitting and plays areas. The land would be owned, used and controlled by the neighbourhood (Linn, 1968).

These mini-parks soon found popularity among other municipal councils and commercial developers as social and public spaces in cities around the United States. Soon the idea was applied in other urban centres around the world imitated, though with little evaluation of their use and function. Mini-parks tend to act as scaled-down neighbourhood parks. Mini-parks' function is usually distinctive, with no variation if compared to larger parks that have many programmes within them. Functions usually include small event spaces, play areas for children, and spaces for relaxing or meeting friends. Mini-parks can be a form of refuge against the hustle and bustle of urban life, often defining their character as an oasis for rest and relaxation. For this particular reason most pocket parks tend to be in the business districts or high-density areas (Carmona et al., 2003). They are perfect social and public spaces in locations suffering from congestion, noise and drabness.



Pictures 6.1-6.4: Pictures depicting the development of mini-parks in empty lots at Philadelphia in the 1960s. The transformation of these lots creates social and public spaces in respective neighbourhoods. Picture source: City of Philadelphia & Philadelphia Neighbourhood Park Program (Jasprizza, 1999).

The architectural description of a mini-park usually includes the following attributes: with planting or trees, a place for adults to sit, a place for children to play, identifying logos with a mural, name or colour scheme, a basketball net and areas large enough to play group games (Marcus & Francis, 1998). This architectural description is typical of a metropolitan residential area in the inner North American cities. The difficulty of designing a pocket park is in its size. Including all or many of the mentioned programmes is difficult in a small limited space. The life of a mini-park can also be short. Their liveability depends greatly on the needs of the neighbourhood. Successful examples tend to have local appeal to its location and function. More than any other types of public urban space, the designers of a vest-pocket park must understand the neighbourhood's social and political complexities. It is reported that successful pocket parks were projects where the designer played a facilitator role, providing options for the users to subdivide into many groups, communicating the implications of the design decision, and becoming an advocate for the group (Francis et al., 1984).

There are essentially three basic types for an urban mini-park. There are corner lots, mid-block lots and through-the-block lots (Marcus & Francis, 1998). The corner lot is a pocket park that is exposed to one or two sides by providing access into it. The mid-block is only exposed to one side. The through-the-block lot is connected by two pathways or streets; usually sandwiched in-between

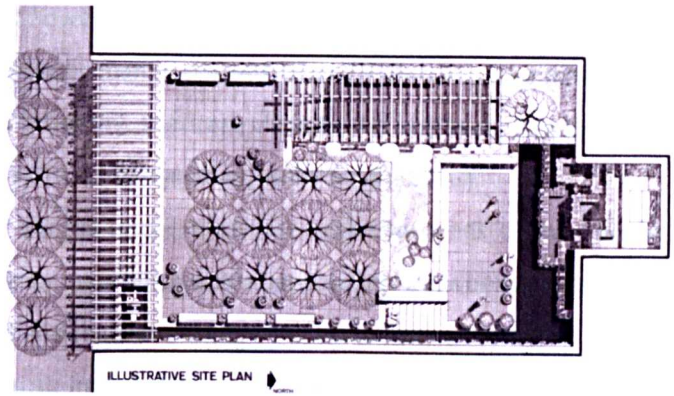
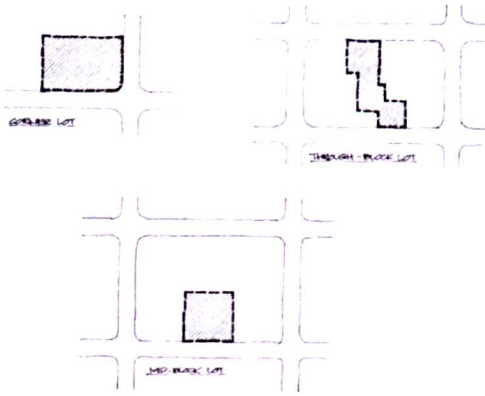
two blocks, it enables movement into the space. These three basic locations provide advantages and disadvantages to the design. The locations also defined its architectural quality based on the location of walls defining its enclosure. The three basic locations of these mini-parks create different settings for how it would be used. A corner lot is excellent for exposure if the designer intends to bring people into contact with the programme and use of the space. A mid-block, usually secluded, can act as quieter places for contemplation. The enclosure provided by the mid-block has the ability to attract older users and small children as it is protected from the environment. The through-the-block pocket parks initiate cross movement into the space by thoroughfares or shortcuts into the space. The through-the-block pocket parks are prone to disadvantages when, instead of becoming 'places', they tend to become thoroughways for movement if simplistically designed. The suitability of any programme or designated use in all pocket parks correlates directly to its location.



Picture 6.5: View of Paley Park in Midtown Manhattan New York in Spring. The dense vegetation creates an oasis of greenery in extremely concrete surroundings. Picture source: Jasprizza (1999).



Picture 6.6: View of the sitting area in Paley Park. This mini-park is a successful example of use as rest and relaxation, lunch area and meeting spot. Despite being 30 years old it still functions well to the need of the neighbourhood and its surroundings. Picture source: Jasprizza (1999).



Plan 6.1: Illustration of three types of location for mini-parks and vest-pocket spaces.
Source: Marcus and Francis (1998).

Plan 6.2: Plan of Greenacre Park in New York City, New York. Built in 1971 it continues to be a successful pocket park till now. The Greenacre Park highlights how the pocket parks work best in high-density environments as people places. Its design is a good example of serious evaluation from needs to behaviour. Source: Jasprizza (1999).



Picture 6.7: Greenacre Park is another good example of a mini-park built in Mid-Manhattan New York. Bigger than Paley Park, this pocket park provides a focal point as it shelters from the noise. The shade provides good seating places in the summer. Picture source: Jasprizza (1999).

Picture 6.8: View of Paley Park seen from the street frontage in winter. Picture source: Jasprizza (1999).

6.1.2 Design Programme

The use and programme of a mini-park depends on analyzing it within the four-block radius of the park's site. Different to a neighbourhood park, the mini-park concentrates its programme within the radius on an interest group that represents the surrounding site. According to Francis, Marcus, Lisa, and Paxson (1984), when providing a programme in a mini-park the designer should weigh up those user groups that most need the recreational spaces. Francis et al. (1984) asserts that the chief users were, in order of importance, six-to-twelve years old, teens, and little children with

parents. The elderly are the least important; however, it is arguable that Francis's observation was based on a demographic standpoint based on suburban areas with younger families. The elderly do moderately use pocket spaces if the location is nearby, seats are close to the entrance, and the park is not used by large groups of teenagers and active children (Marcus & Francis, 1998).

The best approach to design a mini-park is to communicate with the needs of the people target for its use. Due to its small size, the park could cause potential conflicts between user groups. Most conflicts are between the teens and other user groups. Activities done by the teenagers create too much noise and energy which tend to cause irritation towards other groups in the mini-park. If teenagers are known to be a group in need of social space, it is best to provide their setting in a larger park than a mini-park. Teens are more mobile than younger children and the elderly, yet mini-parks located near pedestrian intersections or traffic junctions are good sites for teenage use. Corner sites tend to be noisy and unsecure for parents with children to use it as a playground. It is also too hectic for the elderly to use.

Marcus and Francis (1998) studies on mini-parks in Berkeley, California justify all the considerations above as crucial in determining the function of a mini-park. Designers must recognize that neighbourhoods actively involved in the development of their own park may have strong territorial feelings about it. This territoriality is a sense of place which, according to Schulz (1991), is an attribute of space evolving into meaning and identity to the people that use it. Francis (1998) asserts community involvement in the design process is essential to a mini-park's success. The mini-park is a community facility, and the community generally knows best as to what it needs. Designers should not impose their own value onto it; they should only act as mediators in translating their needs into architectural forms. The more the involvement of the target users in the park, the better the chances of a mini-park being successful. Moreover, the success would ensure the sustainability of the park in use and finance. This testimonial is not exclusive only to mini-parks. Carr et al., (1992), Kostof (1993), and Carmona et al., (2003) all proved successful urban places are those in reflection of the people who built, use and maintain it.

While it is important that the programme needs to be specifically in a mini-park, it is also advisable to prepare for both planned and unplanned consequences of the design. If the design does not function according to its programme by an unanticipated user, accommodate them by adjusting the design to the new user. This usually happens in new developments when it is difficult to determine or anticipate users until the population has reached its full maturity. The design of mini-parks is not exclusively a responsive process that comes after the neighbourhood was established. It can also be included directly in new developments that have to deal with limited spaces for social infrastructure. If there are any unplanned consequences in response to the design, the architect and

those funding the project should accommodate a budget; if at all possible, include funds for later modifications therefore allowing the park to evolve according to the needs of the neighbourhood.

The sustainability of a mini-park also depends on its continuous use. Therefore, it needs continuous feedback from its users. Francis et al. (1984) asserts the management of a mini-park should always retain a semi-permanent small annual fee to modify the park. The modification should come from neighbourhood meetings called two or three times a year. They (management or designers) should conduct user studies on the park annually. If the budget does not permit, casual observations of the park by clients and users are enough with regular reports on maintenance on use and abuse. This would indefinitely prolong the use of the park.

6.1.3 Mini-Parks in a High-Rise Environment

There are few directives or discussions in the professional literature; hence the description of a mini-park tends to focus on the American context. Nonetheless, this thesis sees the similarities of these mini-parks in social and public spaces built in the Pinnacle @ Duxton. Singapore, although different by its geographical location, is a global city with the same evolutionary outcome in its metropolitan culture and needs as its counterparts, New York and Chicago. Chapter 4 asserts how these evolutionary outcomes explored under one urban singularity (high-rise/high-density) create the need for neighbourhoods. Neighbouring became an important dimension of urban contemporary life. Social cohesion and capital began to illustrate how these values are becoming a source of 'commodity' as a domain of safety, security and compatible lifestyle packages are sold within the high-rise complexes. Moreover, this evolution happens in the high-rise and high-density environment pushing ahead greater needs for social and public spaces to be built in tight spaces around the city. Mini-parks or vest-pocket spaces are the answer to making social and public spaces for the community in high-rise settlements around the city.

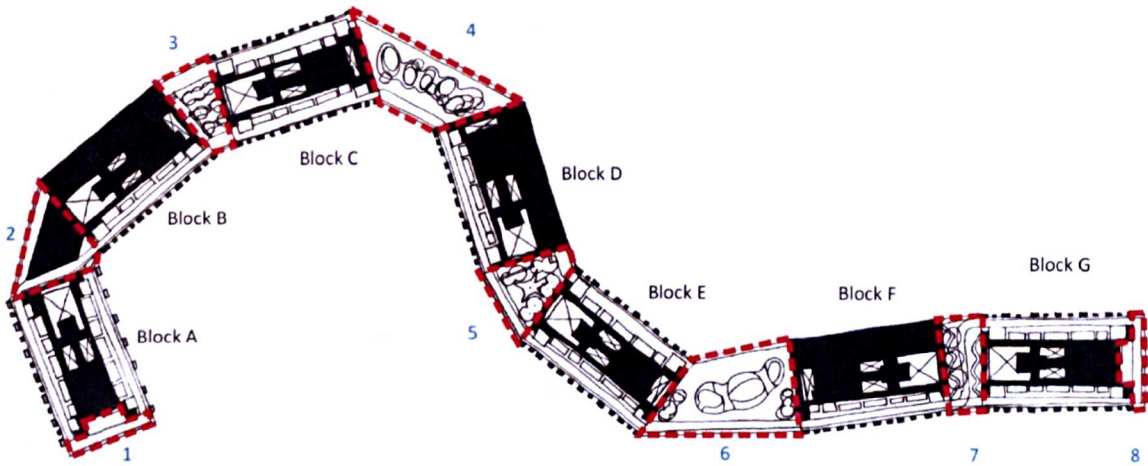
Mini-parks are still uncommon in Singapore as neighbourhood places. Only recently parks are being constructed on car-parking structures adjacent to high-rise settlements (Yuen & Hien, 2004). It is an evolutionary solution that comes from sky gardens designed on car park podiums typical of Singapore's 1980-2000 high-rise styles. But there was no sense of awareness that these spaces are akin to mini-parks. Moreover, these parks are not used as neighbourhood spaces. Typically, most of Singapore's high-rise public housing uses its empty ground floor as spaces adapted for community use (Goh, 2001). Parks on high elevated platforms are only simply referred to as sky gardens. The use is limited for contemplation and visual delight rather than acting as active neighbourhood spaces. Primarily the idea of inserting social infrastructure is still new. Examples like the Newton Suites by WOHA architects only suggest gardens spaces which are privately used with limited access. It is not a social public space but more like backyard gardens stacked vertically.

This thesis suggests that the design of social public spaces in high-rise buildings is similar in theory to how mini-parks are designed in high-density neighbourhoods. The reason for this lies in the effect that most social public spaces built in residential high-rises do not have large platforms to accommodate the size of a neighbourhood park. Applying a full-scale neighbourhood park is difficult enough, without having to build it on a higher floor. A neighbourhood park needs a lot of functions inserted into it. Strategically any notion on building a large neighbourhood park on a sky deck in a high-rise development is unfeasible. However, the thesis does not rule out the possibility of a neighbourhood park being adapted in a high-rise development. This thesis asserts mini-parks are the best choice of an urban social public space typology that could be applied in high-rise settlements. Bearing limited space for social spaces, a mini-park would work well in a high-rise settlement as its small scale would enable it to be inserted in-between blocks. The function of a mini-park can also target user groups that live in the high-rise settlement. As almost exclusively high-rises tend to represent variable living choices, mini-parks would be ideal as they could be designed as places for groups of communities within a larger community. Mini-parks are the answer for massive high-rise public housing developments facing land and spatial issues without side-lining the quality living needed by its target occupants.

6.2 Mini-Parks or Vest-Pocket Spaces on the 26th Floor Sky Deck

6.2.1 Location and Context

The 26th storey sky park is a collection of seven mini-parks or vest-pocket parks interconnected by a continuous pathway from residential blocks A to G. There are seven designated mini-parks located on the sky bridges. A jogging path connects all social spaces together as one park. Because of its location and elevation, the mini-park does not have a street frontage. The closest description of a street frontage is its jogging path that also acts as a pedestrian pathway running from the end of block A to block G. The pocket parks in the Pinnacle @ Duxton are characterized by their location as four through-block-lots and three mid-block lots. The 26th floor is the Pinnacle @ Duxton middle floor. The architect chose this floor because of its central proximity to the ground and top-most floors in the development. It is by effect, according to the architect, *'the maximum distance a user would take an elevator up or down to use a public space'*. The division of all three sky gardens as social public spaces were identified as the best locations to capture users into using it. This theory was implied according to the architect's understanding of people's perception living in a high-rise building. The higher the floors, the less likely people would be to use the social public spaces provided for them on the ground.

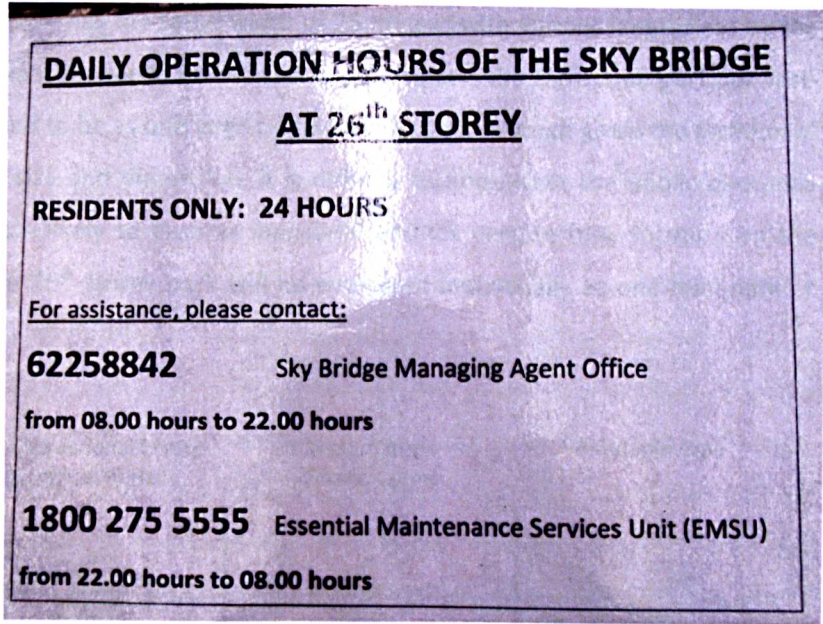


Plan 6.3: Plan illustrating the overall layout of the 26th floor social spaces. There are eight designated social spaces located on sky bridges. Seven of them are mini-parks with one community centre. A jogging path connects all social spaces together as one park. However, given the size and dimension of each social space, it is difficult to validate this as a park but rather a series of mini-parks or vest-pocket spaces (Marcus & Francis, 1998). The mini-parks come in various sizes illustrated by the plan above. Mini-park numbers 4 and 6 are the biggest. Number 2 is the community centre.



Figure 6.1: Illustration comparing sizes and dimensions in-between all mini-parks or vest-pocket and social spaces (community centre) on the 26th storey sky park. Mini-park numbers 1 and 8 are the same in size and shape. Adapted from Kostof (1993).

The justification is valid based on research by Yuen and Hien (2004) regarding the validity of roof gardens using people's perception by post-occupational analysis around high-rise buildings in Singapore. According to Yuen and Hien (2004), most roof gardens were avoided by their target users simply because they were unreachable by people living on top floors. Most users expressed their dissatisfaction of them being too far too reach. This notion is also parallel to Marcus and Francis (1998) suggestion that mini-parks should be located not more than a four block radius in a neighbourhood. Although the suggestion implies the notion on a horizontal plane, it can be accepted vertically. Likewise, the site should always have less obstacles for people to reach it, like crossing roads or a major street. The same principle can be applied that vertically there should be less obstacles in reaching the mini-park, like too many floors, slow lifts or unwelcome lift lobbies.



Picture 6.9: Residents' access to the sky bridge by lifts.

Picture 6.10: Operating hours on the 26th storey sky bridge. The managing agent deals with maintenance while the EMSU is its after hour's security office.

All the pocket parks in the Pinnacle @ Duxton are named respectively by their intended functions, therefore making it easy to characterize some of them by their users. There is no racial segregation by demarcation of use in all pocket parks even though the populations within the settlement are represented richly by its cultural diversity. This is because most Singaporeans are cosmopolitan. The cosmopolitan representation of its inhabitants asserts why the determined location of all mini-parks were for recreational rather than cultural purposes. Cosmopolitanism is a definition of a place, city or society that embraces its existence by multiculturalism. No culture is dominant but the representative value of its society is based on one single morality mainly shaped by the West and consumerism. Cosmopolitan cities are likely to be global cities with ports, like New York, London and Chicago. Singapore is in effect is one of those global cities (Marcuse & Kempen, 2000). It is by this statement that the context of the space is only representational to lifestyle backgrounds nominally referred to Western societies. The distinction of context by race-based culture is difficult to make as it is diluted in most high-rise public housing in Singapore as the focus of the analysis for this chapter is based on post-occupational analysis from a metropolitan viewpoint of social public places. This thesis advocates that good social and public spaces should reflect the cultural references of their users. This issue will be debated in later sub-sections of the thesis.

6.2.2 Architectural Description

The sizes of the mini-parks on the 26th floor are defined by the structural boundary of the building. The spanning of the massive girders gives the distinctive rectangular shape to all vest-

pocketed social spaces. Each space has the same width of 25 metres with various lengths set by the arrangement of residential blocks. Similar to the 3rd storey public park, the eight mini-parks or vest-pocket social spaces are designed to be as one large unified public park. Though given the location of each pocketed social space in size and dimension, it is difficult to appreciate the public park as a whole. The mini-parks are more likely to exist as individual entities despite their location on the same floor. This is because the 26th storey park will be evaluated individually as one mini-park or vest-pock social space.

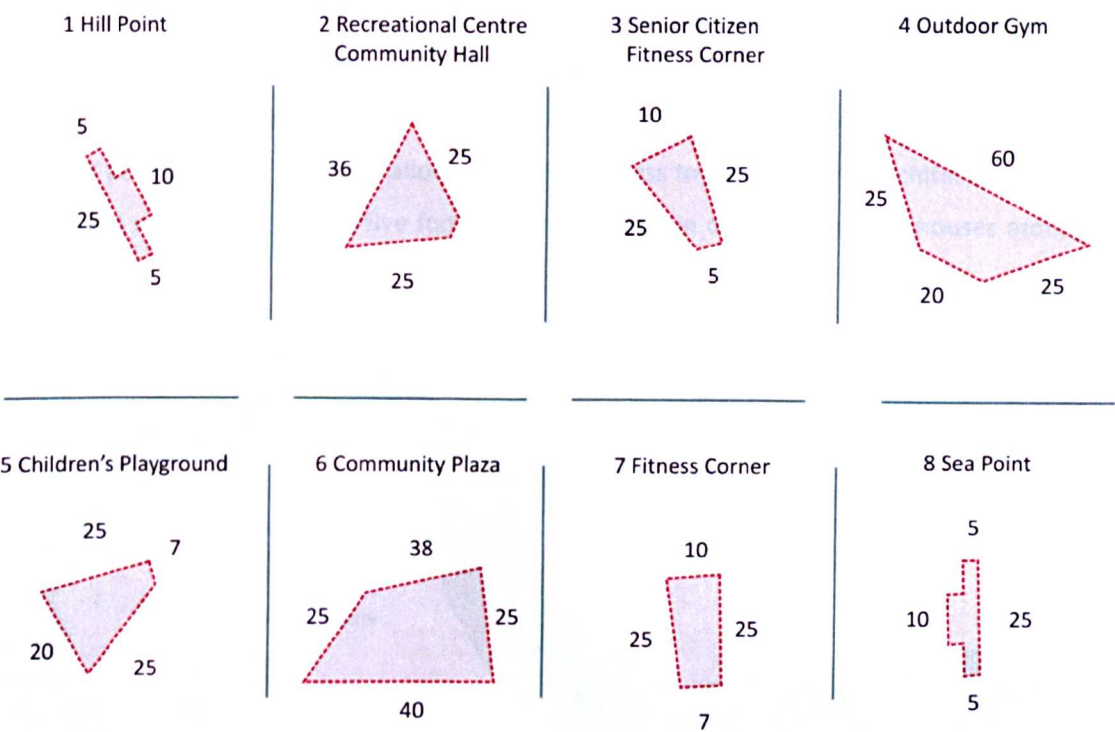
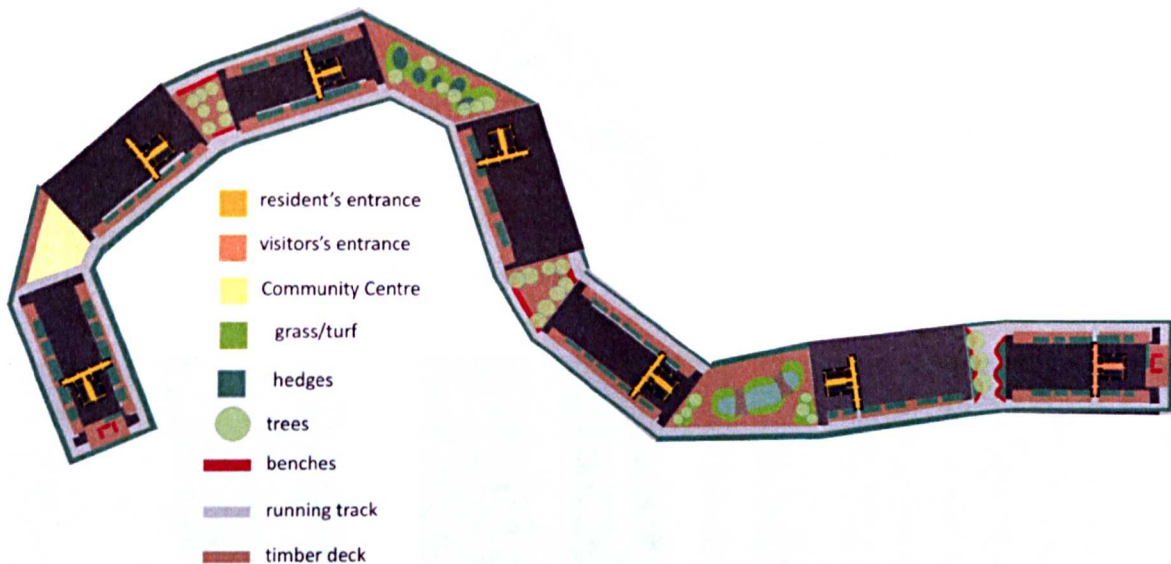


Figure 6.2: The architectural dimensions of all vest-pocket social spaces in the 26th storey sky gardens. The dimensions are all in metres. The approx. square footage of each vest-pocket space is listed below:
Hill Point – 150sq
Recreational Centre/Community Hall – 450sq
Senior Citizen Fitness Corner – 200sq
Outdoor Gym – 1,000sq
Children's Playground – 312sq
Community Plaza – 900sq
Fitness Corner/Paddy Fields – 217sq
Sea Point – 150sq

Based on the location of each mini-park, all of them are bounded in-between residential buildings. All are flat open to the sky on two sides and bounded by a wall on two sides. This wall rises up for two storeys, covering a vertical ventilation shaft behind it. This ventilation shaft is an air well that served as a backyard to apartment units in each residential block. Only the end mini-parks, 'Hill

Point' and 'Sea Point', are bounded by three walls and open to the sky on one frontage. All mini-parks do not have any functional neighbours situated right next to them. The 26th floor is solely used as a park. There are no residential and commercial units on it. Some areas in-between parks are used for building services. Blocks B, D and F have break water tanks enclosed in a room behind each building. The 26th storey also functions as a pedestrian walkway following the shape of the building and its sky bridges. Rows of hedges are planted to separate and define the pathway. More importantly the hedges act as a safety barrier that protects the users from the vertical drop next to it. These rows of hedges are spaced 1 metre from the furthest extent of the façade hidden behind a 1.2-metre fence. This, in effect, according to the designers, also would lessen the effects of vertigo. Most of the walkways are covered when they cut through each residential block. The covered walkways are also lined with hedges back towards the walls in the residential blocks. These lined hedges are arranged with breaks to allow emergency access to fire exits. This architectural quality of this arcade is reminiscent of the 'five foot walkways' found in old Chinese shop-houses around the city.



Plan 6.4: An overall plan illustrating the architecture description of the 26th floor sky park. All parks are open to the sky at least on one frontage prior to its location. The running track that also acts as a pedestrian pathway runs through all residential blocks. The sky park is accessible by seven lift shafts from each tower block. Residents from each tower block are able to access all mini-parks on this floor as all are connected by the long corridor. The walkway does not run around all blocks. It meanders in between the blocks.

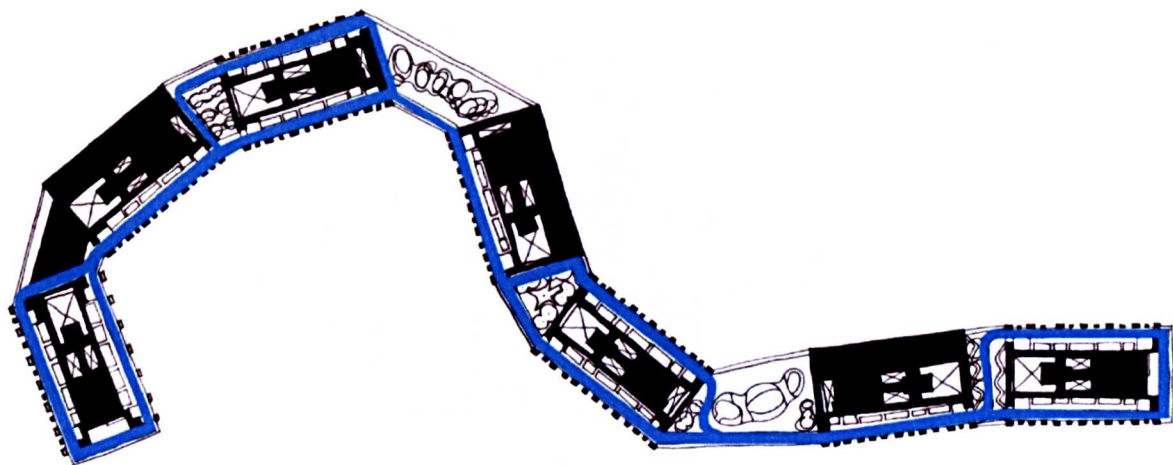


Figure 6.3: Pedestrian circulation patterns on the 26th storey sky park.

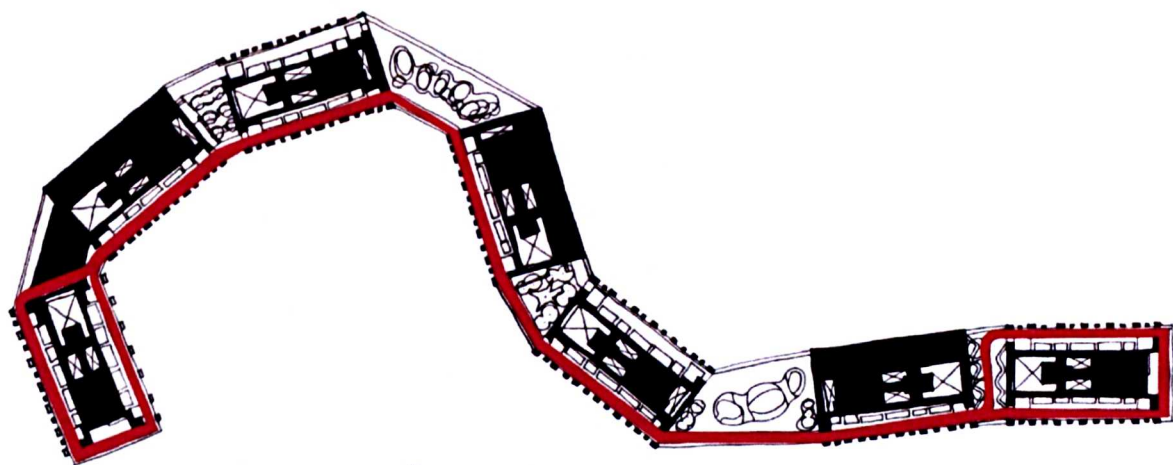


Figure 6.4: Jogging pathway on the 26th storey sky park.



Picture 6.11: The outer boundary wall is spread inward for safety and security. Rows of hedges are planted in-between to lessen vertigo effects.



Picture 6.12: The 26th storey sky deck also functions as a mechanical floor. A mechanical floor is a level of a high-rise building that is dedicated to mechanical and electronics equipment. The 26th floor contains break water tanks for water and sewerage in the settlement.

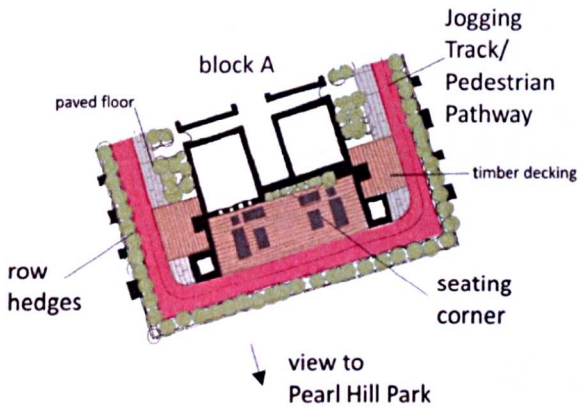


Pictures 6.13 and 6.14: The 26th storey sky decks seen from different angles. The left picture depicts mini-park 'Hill Point' and the R.C. Centre.

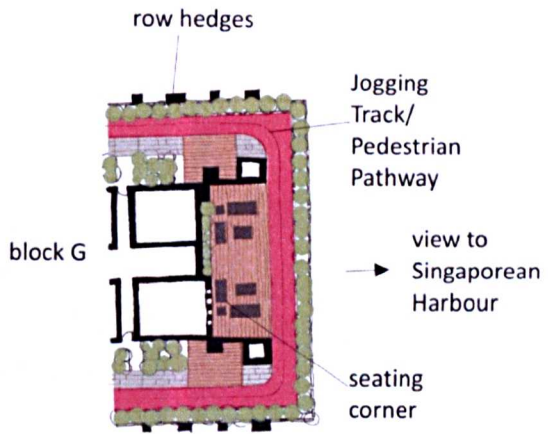
Mini-Parks Hill Point and Sea Point

Corner mini-parks called 'Hill Point' and 'Sea Point' are located respectively at each end of the 26th floor sky deck. They are each 150 square metres in floor space, though the parks can be bigger if taking account of the jogging track in front of them. Both parks are bounded by three walls with an emergency exit located at the back of the mini-park. They are the smallest of all mini-parks such that their designated activity zone can only accommodated limited use. Their small capacity makes them look like 'seating corners' rather than mini-parks. The parks are easily missed when users reach the ends of the pathway. Both mini-parks are open to fantastic views of the surrounding context, though there are no architectural elements that focus both views. The boundary between the mini-park and the view is separated by a low fence spaced a metre away with a row of hedges planted away from the building line. A jogging track cuts across in front of both parks. The jogging track effectively delineates the boundary of both mini-parks. Four benches are arranged in a position that resembles a lounge. All four benches face each other with a big concrete table in front of them. A wall covered in plants sits behind these 'open lounges'.

Hill Point



Sea Point



Plan 6.5: 'Hill Point' and 'Sea Point' are two identical mini-parks located at each end of the 26th floor sky park. Both parks are the smallest among all the collection of mini-parks on the floor. These mini-parks are so small that they look like seating corners. The plan above illustrates the location of each park viewing the sea and hills of Singapore.

R.C. Centre (Community Centre)

The R.C. Centre (community centre) is an enclosed space located in-between blocks A and B. It has a trapezium shape due to the angle that connects the lines in-between blocks A and B. The community centre is narrow and comprises of 450 square metres. By architectural description the community centre is not a mini-park but it is identified as part of the larger 26th floor sky park. This facility is within the park, therefore is part of the park. The community centre sits at an intersection between two jogging tracks and a pedestrian pathway. The entrance to the community centre is located in front of this intersection. The space is substantial enough to hold small community gatherings. The back of the community centre is open with a small deck facing the Singaporean skyline. The size is roughly that of an apartment unit. It has a small kitchen enclosed by a wall that faces the walkway. Its glass door would enable any passer-by to catch a glimpse of activities being performed in it.



Picture 6.15: View of 'outdoor lounges' in 'Hill Point' mini-park. These areas are designed to emulate a living room with concrete seating resembling a sofa set.



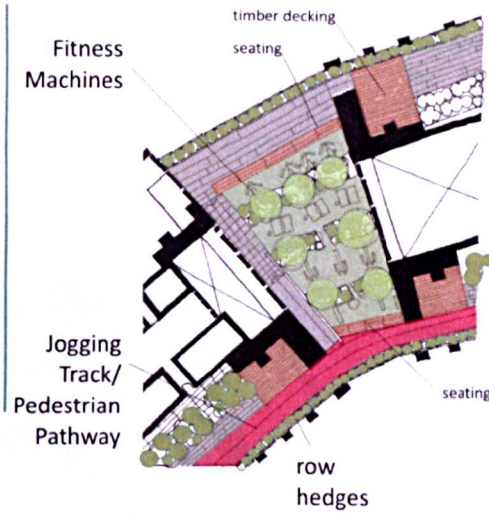
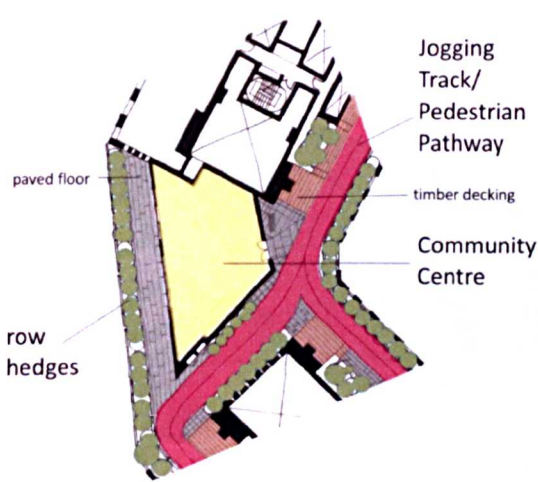
Picture 6.16: The R.C. Centre.

The Elderly Fitness Area

The elderly fitness area is bounded between blocks B and C. It is defined by walls with vertical strips of ventilation covering large air wells behind it. The mini-park is also trapezium in its shape and 200 square metres in size. It has a narrow entrance when approached from the front side of a pedestrian pathway. A small name sign marks the entry of the park. It is elevated from the pedestrian pathway. The elevated platform is at a good height for its boundary to be used as a place to sit. The elderly fitness area has 20% of grass coverage with medium size trees planted parallel in-between fitness machines for the elderly. The park has no dominant architectural features in it but is filled with fitness machines for the elderly: 12 fitness machines are arranged parallel with the pedestrian pathway. The ground coverage in the mini-park is covered with green rubber flooring. The rubber flooring is similar to those found on a running track and children's playground. The park is exclusively for use by the elderly. It does not have any other programmes. The narrow enclosure creates cool shading throughout the whole day as both residential blocks are orientated to block the east-west sun. The mini-park is not easily seen from the pedestrian pathway due to its narrow entrance. It depends entirely on directions and information signs.

Recreational Centre/ Community Hall

Senior Citizen Fitness Corner



Plans 6.7 & 6.8: An illustration of both the 'recreational centre' and the 'senior citizen fitness corner' plan. The recreational centre is not a mini-park. The senior citizen fitness corner faces the pedestrian walkway and is hardly visible until users arrive right in front of it.

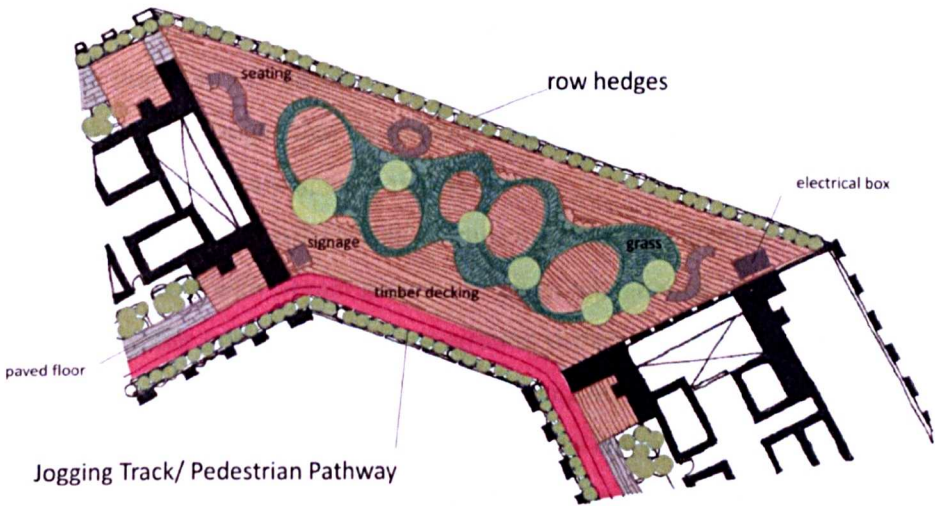
The Outdoor Gym (The Meadows)

The 'outdoor gym' is a mini-park 1,000 square metres in size and forms a large open space in between residential blocks C and D. It is a trapezium with a 25 metre width taking form from connecting both residential blocks. The mini-park opens up a large frontage towards the pedestrian walkway. The running track also passes in front of it. It is the largest among all the mini-parks. Its frontage is 20 metres, opening up to a 60 metre length at its back. This mini-park features an artificial landscape that tries to mimic an undulating landscape resembling a meadow. It is named respectively from its landscape 'The Meadows' on a small signage located at the left end of the park. Small shrubs of grass coverage form the small undulating landscape that creates five small mounds. The park is not paved but decked by timber. The timber decks also cap the top of each mound with a tilted surface that face views outside of the Pinnacle @ Duxton.

The walls bordering the mini-park cover an air well behind it. The length of this mini-park visually dissipates the notion that it is an enclosure. The large extent of open sky and void on its front and back gives incredible views of the Pinnacle @ Duxton's surrounding context. This mini-park is connected to the elderly fitness area through a back pathway behind it. This pathway is not a jogging track but is sometimes used by joggers as an alternative route. The park has few seating areas at the back of it. These sitting areas are small benches made from concrete and placed randomly behind it. Several trees are planted on the grass area in-between mounds. These trees are

still young and do little to provide any form of shelter under them. The length of the park does not protect it from the east-west sun; therefore it is exposed throughout the day.

Outdoor Gym



Plan 6.9: The 'outdoor gym' is the largest mini-park on the 26th floor sky park. Note the landscapes in the middle of the park are small mounds. The timber oval shapes in the middle are slanting platforms for users to lie down and enjoy the view. This park is called 'The Meadows'. It does not have any functions, though it was suggested as an 'outdoor gym'.



Picture 6.17: The outdoor gym is also called 'The Meadows'. The landscape feature in the middle is an artificial mound attempting to emulate a 'meadow'. Its architectural effect is controversial; moreover, the use does not suggest any function as an outdoor gym.



Picture 6.18: The elderly fitness area is small but it is designed on an elevated platform defining its location and use. Both pictures are taken at mid-noon where most of the pocket parks are empty because of the intense heat and humidity.

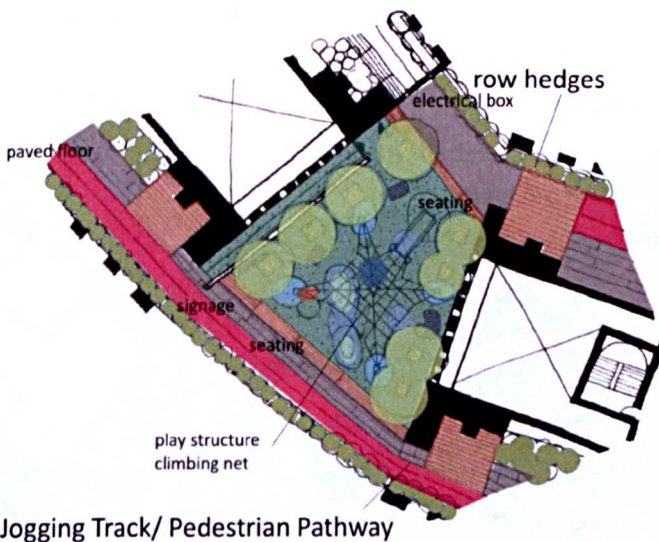
The Children's Playground (Space Net)

The children's playground is exclusively a family mini-park, mainly serving parents and young children mostly from the pre-school and child care centres. It has the same architectural qualities

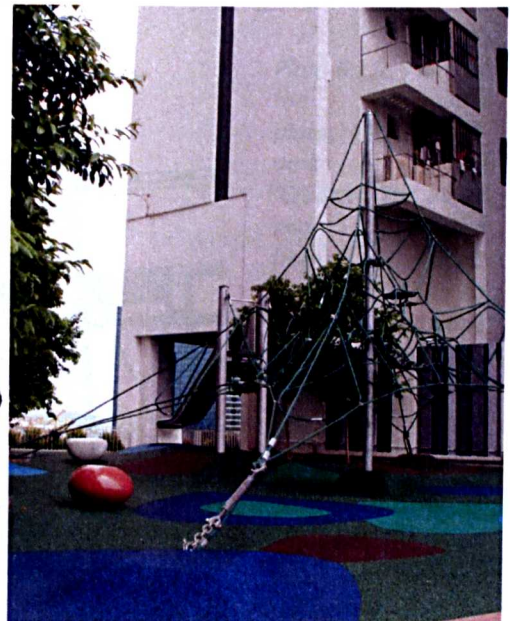
and description as the elderly fitness area. The scale and the size of both parks are also almost the same. The park is bounded by blocks D and E. Its shape is trapezium with 312 square metres of floor space. This mini-park has a narrow frontage but opens up bigger towards the back. The park is protected by the east-west sun. It has a number of trees in it. Though still relatively young, these trees have the potential to be lush. The park may be visually hard to see but its narrow frontage is lopsided, therefore can be seen from pedestrians using the walkway. It is also raised on a platform comfortably to a height that its boundary also acts as seating areas. This seating area faces both sides of the park that are open to the sky.

The park has relatively small shrub coverage set under the tree-planted squares. Most of its surface is covered with vibrant patterns of green rubber mats. This surface is soft, impact absorbent, wet pour rubber normally use on playground surfaces. A steel play structure dominates the mini-park with a slide and climbing net. A narrow ramp leads to the middle of the mini-park with rails for children to grab hold of. The ramp is bounded by a low wall with a sign naming the park 'Space Net'. The name is an abbreviation describing the location of the climbing net, which is in the 'sky'. This ramp marks the entrance to the mini-park from the pedestrian walkway as its frontage. Benches are placed under the trees facing the climbing net. The climbing net is placed away from the furthest extent of the building line for fears of safety in case the children might accidentally jump into the void below.

Children's Playground



Plan 6.10: Plan of the children's playground mini-park. This mini-park is also called 'Space Net' because of the large play structure that dominates the site. This mini-park is clearly defined in space and function. Note that it is elevated and the boundary is designed to also function as seating areas.



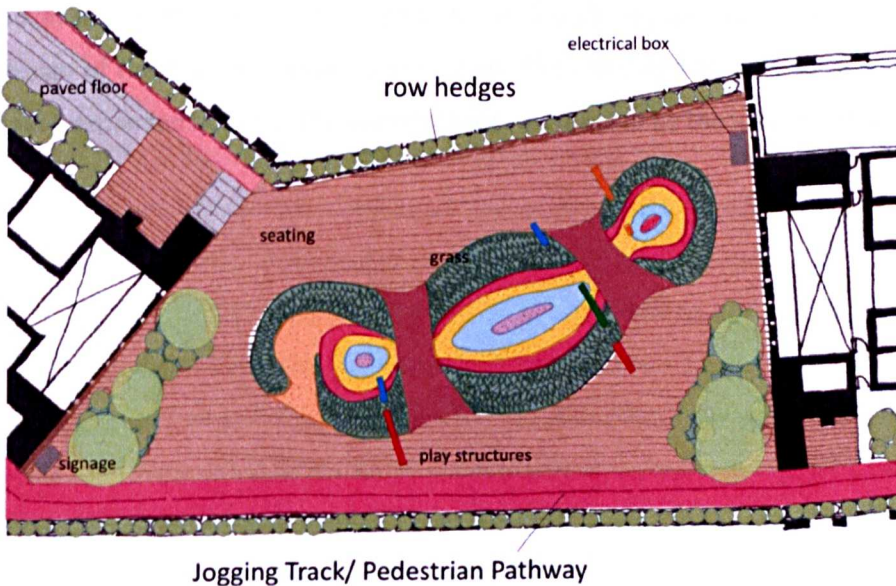
Picture 6.19: View of the play structure at high noon. The play structure is compact. It functions as a climbing net with a small slide at the back. The floor surface is covered with soft rubber that is impact absorbent, relatively safe for young children to play in it.

The Community Plaza (Cradter)

The 'community plaza' is a trapezium shape 900 square metres in size. It is the second largest among all mini-parks on the 26th floor sky deck. The park's length is 40 metres on its frontage and opens up to 38 metres at the back. The park is named 'Cradter' by abbreviation because of its landscape featuring three small craters situated in the middle of the space, though on the pamphlet given to residents and visitors this mini-park is called 'community plaza'. The name might be a mistaken typo for 'crater' while the confusion of use will be discussed in later sub-sections. Nonetheless, the mini-park is bounded by residential blocks E and F. Its long length visually makes it open to the sky, highlighting the massive voids framing views of downtown Singapore and the Tanjong Pagar area.

Like 'The Meadow/outdoor gym', the floor surface in this park is 80% covered in timber. The park does have a small amount of grass. The middle part of it is an artificial landscape mimicking three craters with a 'lake' and two crossing bridges. The 'lake' is just an abstraction as there is no water in it but a wet rubber surface similarly used in the elderly fitness and children's playground mini-parks. This mini-park also has some play structures for children. These structures are listening pipes located in the middle of the park spaced in-between the artificial circles. The park is visible when approached from the pedestrian pathway and jogging track. The wall bounding the park is covered with planting plots filled with shrubs and trees. A pathway behind residential block E leads to the children's playground mini-park. The park does not have any benches or seating area.

Community Plaza



Plan 6.11: Plan of the community plaza. This mini-park is named 'Cradter'. The name might be taken from the word 'crater' referring to the landscape property in the middle. The design has three craters with small play structures between them. These 'craters' are filled with soft rubber surfaces in them in an attempt to mimic water elements like ponds.



Picture 6.20: View of the 'community plaza'. The boundary walls of this mini-park are the backyard of apartment units in upper floors. These apartment units have no direct access to this mini-park. The vertical strips in the middle of this picture hide an air well.

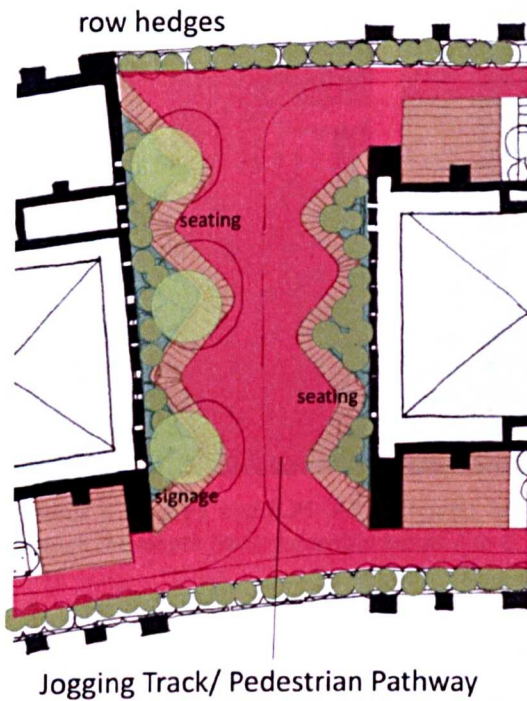


Picture 6.21: Play structures in the mini-park. These small play structures are listening tubes that connect to each other, spread sporadically around the park.

Fitness Corner (Paddy Field)

The fitness corner is a rectangular mini-park. It is 217 square metres. This mini-park is bounded by residential blocks F and G. It is connected to 'Sea Point', which is the last location of a mini-park on the 26th floor sky deck. Though, depending on how users use the pedestrian and jogging track, 'Hill Point' that sits right on the other end of the sky deck could also be referred to as the end point. The sky deck's jogging track cuts through the middle of this mini-park. Large planter boxes frame both sides of the jogging track. The planter boxes are filled with shrubs and trees. The design of these planter boxes is elongated. The elongated form is wavy with continuous a seating space expanded out of it. The seating spaces are backed by the wall of the planter boxes.

Fitness Corner



Plan 6.12: The fitness corner is dominated by the soft rubber surfaces highlighting the jogging track that runs through the whole 26th floor sky deck. It is lined by seating spaces.

Picture 6.22: View of the 'fitness corner' towards the central business district. This mini-park is named 'Paddy Field', supposedly because of the wavy planter box shapes resembling paddy field platforms found in the hill rural countryside around South East Asia.

6.2.3 Use and Activities

The 26th storey sky park in effect resembles a street in its architectural design. The jogging paths that connect all blocks are comparable to pedestrian streets; though unlike the Public Park on the 3rd storey, the 26th storey sky park is only accessible by the residents living in the Pinnacle @ Duxton. The sky deck is only accessible by foot using seven vertical transportation cores located in each residential block. These mini-parks are in close proximity to residential units with a maximum distance of 20 floors above and below. Proximity is important as, if the park is too far, it will deter people from coming into it. Furthermore, if the programmes are not preferable enough to its users, the mini-park will be avoided. These studies are based on Bangs and Stuart (1971), Gold (1972), and Mason, Gary, Alex Forrester, and Herman (1975), who assert the most frequently-cited reason for going to a mini-park is based on its convenience and closeness to home. The location of the mini-parks in the middle of the height of the Pinnacle @ Duxton was to give convenience and closeness for its inhabitants without taking the lifts going 50 floors down to use outdoor social spaces. This affirms the guidelines suggested by the studies above.



Pictures 6.23, 6.24 and 6.25: All mini-parks are connected by a jogging and pedestrian pathway that runs through the length from residential blocks A to G.

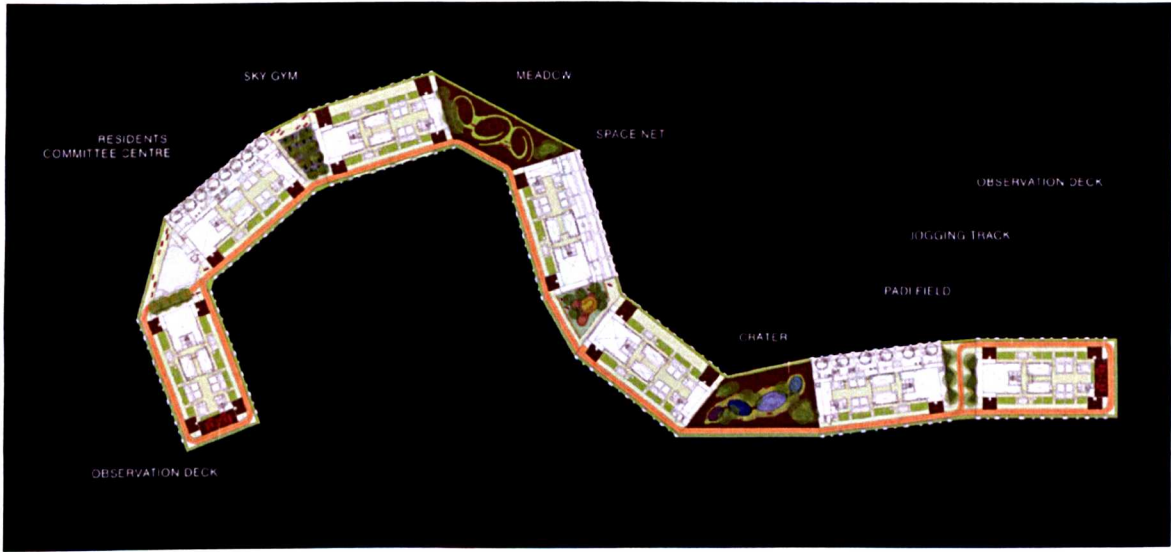
In order to find out who the users might be, designers must analyze the area within a four block radius of a mini-park's site (Marcus & Francis, 1998). The designers' approach into determining the programmes in mini-parks on the 26th floor affirms the general conception of users representing the neighbourhood blocks of the Pinnacle @ Duxton. The Pinnacle @ Duxton is strongly represented by new young families that came from other high-rise settlements around Singapore looking to own homes within the central metropolitan district. There is also a small representation of elderly people living in it. All the users in the Pinnacle @ Duxton are represented in order of importance: first, families with young children; second teenagers; and finally the elderly. While the 3rd storey park is programmed for users within the Tanjong Pagar district, the 26th floor is exclusively for users within the settlement. Fundamentally, these mini-parks are a good approach to providing green and social places in limited space within the high-density environments. According to Abel (2003) making social spaces in the sky especially in a form of a park requires huge investments potentially cutting less profit for rent or buy. Large sky-parks are also highly prospective to the use and needs of the people living in a high-rise settlement. Blanc (2012) further reiterates how smaller, focused programmed mini-parks are easily managed and used by inhabitants in high-rise settlements. Mini-parks can be potentially intimate for the residents when properly designed as sky parks in residential high-rises.

The collection of mini-parks is divided into eight different programmes. Figure 6.13 informs all eight spaces in its architectural programme that won the 2001 Pinnacle @ Duxton Housing Competition. Similar to the 3rd floor park, most of the aesthetic qualities of these spaces are designed to idealize the rural park landscape. This is in effect responding to the spatial use of parks in Singapore, which are usually pleasure gardens for recreation, not socializing or public gatherings

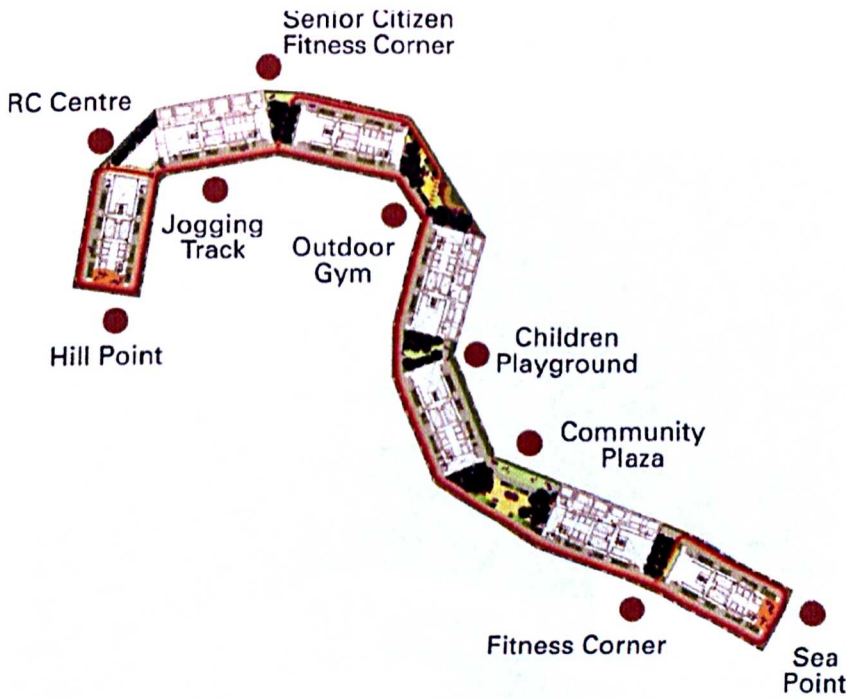
(Yuen, 2009). Three of these mini-parks are named 'The Meadows', 'Cradter' and 'Paddy Field' respectively to reflect this intent of making these spaces as recreational pleasure gardens. Yet, the original winning proposal indicates otherwise as it suggests more programmes for social interaction not recreation. The 2001 proposal indicates these three spaces should be used for multi-purpose events with a large hall, a gymnasium, and cafés, not pleasure gardens (URA, 2005). It is likely that the potential for social engagement is greater by design, according to the original 2001 proposal. Due to costs and fears of anti-social behaviour with rigid views on managing these mini-parks, most of the ideas were downsized.



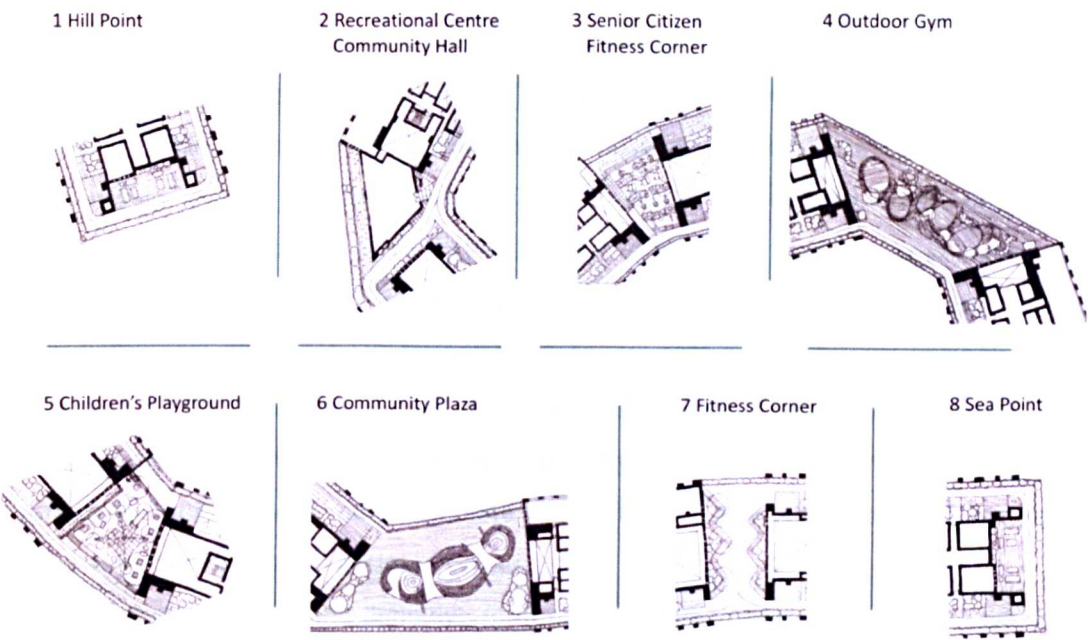
Plan 6.13: The original 2001 proposal that won the competition. The two huge circular structures located down right and top middle of the plan are the high-speed lifts, supposedly connecting all three sky gardens to the public without any restricted access. The sky gardens are also two storeys in height with extra spaces for a large community hall and a café. This original proposal indicates more spaces dedicated to social use with multi-purpose event spaces located thoroughly on the sky deck. These multi-purpose event spaces are supposed to be reminiscent of ground floor decks commonly referred to as social spaces in numerous high-rise public housing in Singapore (Appold, 2011). Picture source: URA (2005). Please refer to appendices for the detailed plan.



Plan 6.14: This plan of the 26th floor sky bridge obtained from Arc Design Studio (2009) illustrates the finalized layout of its social spaces. The programmatic layout changed from places for social events to pleasure gardens, though the architect still retained the community centre and the sky gyms.



Plan 6.15: Illustration of the 26th storey sky bridge plan obtained from the management of the Pinnacle @ Duxton. This plan is the official pamphlet informing residents and visitors alike of name and usage of all pocket mini-vests social spaces. The pamphlet shows a lot of inaccuracies pertaining to the name and usage from the finalized version of the design. Although mentioned in the pamphlet that the intended usage of these spaces was as social places, the signage within the 26th floor sky bridge says otherwise. It follows the same name proposed by the architect, highlighting it as pleasure gardens. This incident suggests some form of clash between the management and designers regarding the actual programme of these spaces.



Plan 6.16: Seven mini-parks on the 26th storey sky bridge. The parks are mono-function spaces spread horizontally, connected by a long winding jogging path. Note that the community centre is not a mini-park. The functions of the park are indicated in the illustration above derived from the information pamphlet.



Pictures 6.26 and 6.27: The whole 26th floor sky deck under surveillance monitored by the management security office located at the ground floor. The apparent choice for soft concrete furnishing will get hot from exposure to sunlight. This avoids users from occupying the space during mid-day.

Mini-Parks Hill Point and Sea Point

Mini-park 'Hill Point' views the north-western part of the city towards Pearl Hill Park while 'Sea Point' views the Singaporean harbour. The name of both mini-parks suggests directly the programme of these spaces as observation decks. Observation decks are elevated sightseeing platforms, usually situated on a tall building structure. They are fitted with railings or fencing for safety. Some observation decks are roofed while most of them are open to the sky. They usually have coin-operated binoculars for viewing distant features towards the target landscape. Both mini-parks do not have any specific social purpose. They also do not have any target user priority in them. Furthermore, both decks do not have any of the facilities mentioned above as an observation deck. The decks are only filled with street furniture resembling a sofa set. The arrangement suggests the mini-park as an 'outdoor living room' complete with coffee and side table tops. Both seating areas are placed away from view in an enclosed corner.

With no target users and definitive form of programme, both mini-parks are empty from use. Daily observation on both mini-parks revealed users often used them for not more than 10 minutes to admire the view and then moved on to visit other mini-parks on the 26th floor sky deck. The mini-park is often missed by joggers and elderly walkers. The seating area does suggest a place for socializing but it does not provide any protection from the climate. Furthermore the benches are uncomfortable as they are made of concrete instead of soft furnishing. The choice of materials used for street furniture is important. Materials that are made from hard furnishing tend to deter people from using them, while soft furnishings that are made from timber may appeal to them more (Carmona, Heath, Oc, & Tiesdell, 2003). Both mini-parks also suffer from intense sun glaring. The current design lacks protection from the intense tropical climate. Mini-park 'Sea Point' has no coverage at all from the east-west sun while mini-park 'Hill Point' suffers only from the intense afternoon sun. Intense glare would deter the elderly from staying long in any open public space (Cartstens, 1998). The same could be agreed upon other types of users in mini-parks. Shade is important, especially in hot climates as essentially people will seek comfort when engaging in social contact in public spaces (Carr, Francis, Rivlin, & Stone, 1992). In addition, even children seek play areas that are protected from the climate, avoiding sun-baked areas in preference to shade and semi-covered areas. Given all three users' considerations, both mini-parks have little to offer for any form of social engagement.



Picture 6.28: View of the Singaporean Harbour in the morning taken from the vantage point of Sea Point in the 26th storey sky garden.



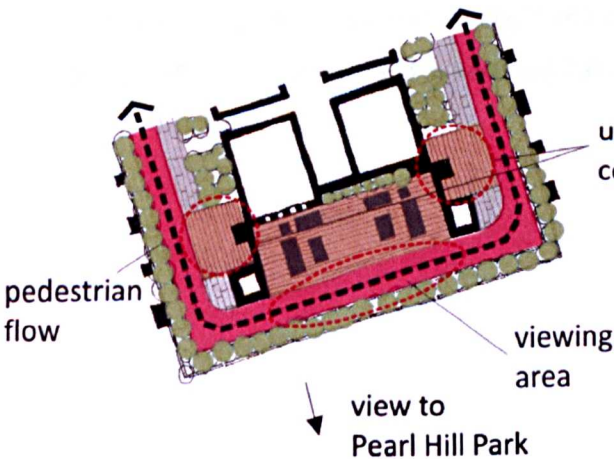
Picture 6.29: View of the central business district taken from the side of Hill Point at dusk on the 26th storey sky garden. Pearl Hill Park is situated on the far left of this picture.



Picture 6.30: Seating provisions in both mini-parks are made of smooth concrete.



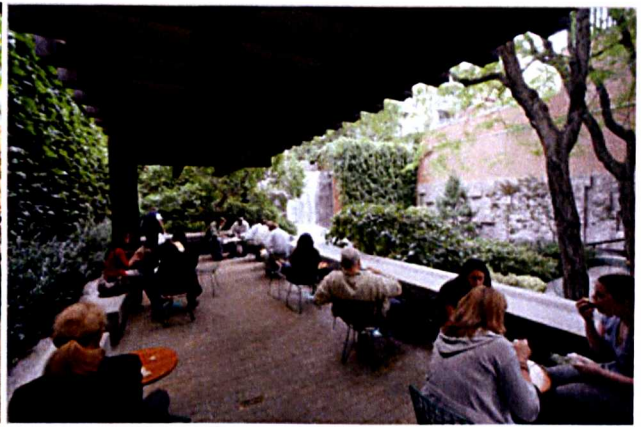
Picture 6.31: Mini-park Hill Point. Seating area is placed away from the view into a corner. The seating area also suffers from intense sun mid-day.



Plan 6.17: The pedestrian pathway clashed with the observation point where users usually stand to see the view. There are also two unused spaces near the mini-park that could function well with extra seating facing the pedestrian flow. The location of the seating area is best nearer to the viewing point, letting the pedestrian pathway flow behind. This mini-park also needs more plant coverage. Note that this mini-park does not have any specific user functions.

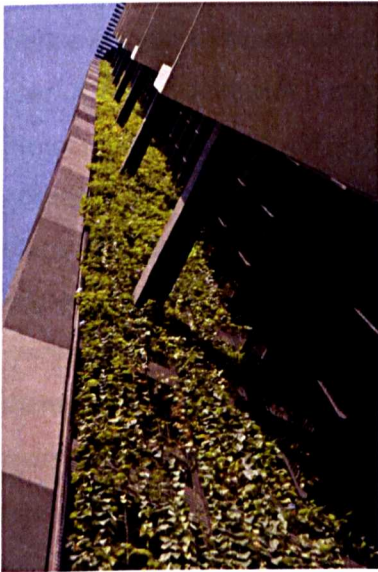
Plan 6.18 illustrates problems in terms of planning of both mini-parks. As an observation deck the viewing area clashes with the deck's jogging track and pedestrian pathway. Observation indicates many user groups stopped on the jogging track to admire the view, obstructing pedestrian and joggers' flow. Some may wish to stop and rest but find the seating area located away from the view. The seating corner would benefit more in use if it were located nearer to the viewing area while letting the jogging path turn behind rather than in front. By bringing the seating area to the front, this would also increase the chance for encounters among residents in the settlement. Both parks also need target users in order to attract use, especially in its seating area. The elderly love places that have views for them to relax and contemplate (Carr et al., 1992). The inherent location of both parks could become good mini-parks for the elderly. This correlates with this thesis's observation, indicating the elderly as the first common users on the 26th floor sky deck. The singular use would also correlate with the size of the park. The smaller the mini-park the more likely its use and programme need to be specified to determine its ability to become successful (Francis et al., 1984).

The only compensation is that both mini-parks need more protection from the climate in order to accommodate use for the elderly. Both parks are corner types. They are open to one side, and are therefore in need of trellises or awnings to cover the seating areas from the sun. Both parks also need more greenery. Delicious vine covers over trellises are good recommendations as they screen out the sun and provide greenery in the park. There is too little shade and density in both current designs. Shade and more density of greenery add intimacy to the spaces. Pictures 6.32 and 6.33 are examples of trellises applied on successful mini-parks that provide shade for their users. Pictures 6.34 and 6.35 are examples of how the vertical walls can be applied with green. As both mini-parks are small, designers need to capitalize every square metre space without succumbing to too much passive landscape that deters the number of users in it. These recommendations would encourage attraction and use in both parks that they currently lack. These recommendations are also supported by post-occupational analysis and observations made by Francis et al. (1984) and Cartstens (1998) to mini-parks used in Berkeley, California.



Picture 6.32: An example of trellises applied in a successful mini-park. The trellises provide shade and a defined space. The principle if applied on both mini-parks would give greater attraction to use. Picture source: Jasprizza (1999).

Picture 6.33: This trellis in Greenacre Park, Manhattan New York overlooks an enclosed garden. This successful element could be applied to both Hill Point and Sea Point in the Pinnacle @ Duxton if they were closer to the barriers with seating areas overlooking the views. Picture source: Kugel (2008).



Picture 6.34: Vertical wall planting found in Newton Suites by WOHA. This same principle could be applied to the wall backing both mini-parks, maximizing green within the space. Picture source: WOHA, Breathing Architecture (2012).

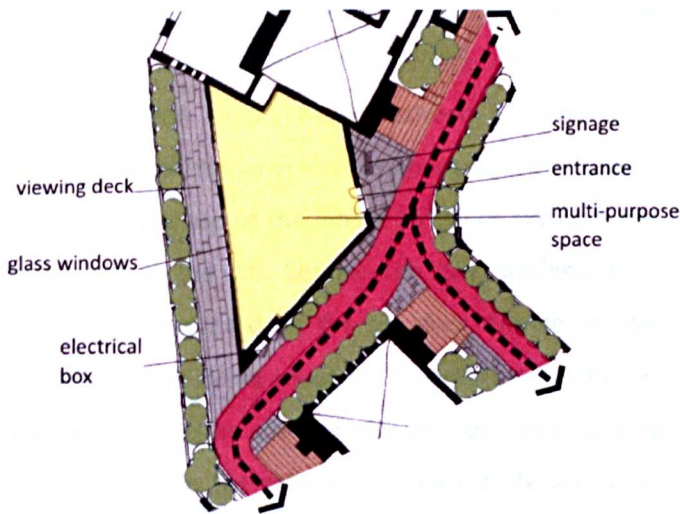
Picture 6.35: Vertical wall plantings are found on the third floor neighbourhood park. The same effect could be applied on walls in mini-parks Hill Point and Sea Point, which are both bare from any greenery.

Successful Features	Unsuccessful Features
<p>Whole site highly visible and secure.</p> <p>Clear and simple layout.</p> <p>Excellent viewpoint as observation decks.</p>	<p>Benches are group together; not good for private use.</p> <p>Pedestrian pathway obstructs location of user standing observing the view.</p> <p>Little shade and protection from the sun. Mini-park is sun baked during the day.</p> <p>To little plants and trees in the mini-park.</p>

Table 6.1: Mini-parks Hill Point and Sea Point’s successful and unsuccessful features.

The R.C. Centre (Community Centre)

The R.C. centre is not a mini-park but is a social space within the 26th storey sky deck. This thesis views the R.C. centre as a social space, part of the 26th storey collection of mini-parks. Its evaluation of use and programme will be looked into only as social space, not a mini-park. The R.C. centre is a short abbreviation from the word ‘recreational’. The R.C. centre does not have a target user. It is a medium size room able to fit 40 people, with a small kitchen in it. It is always locked, inaccessible for direct usage, with residents needing to inform the management for its usage. According to an interview conducted on 17 March 2011 with the management governing the Pinnacle @ Duxton, the R.C. centre is meant as a multi-purpose area for inhabitants intending to engage in indoor social activities. The management envision these indoor social activities akin to a weekly club or social interest gatherings organized by the inhabitants of the Pinnacle @ Duxton themselves. The management stated that the settlement has not yet appointed any community representative body nor formed any clubs of interest. Returned visits to the Pinnacle @ Duxton in 2012 revealed the settlement has appointed a representative body.



Plan 6.18: Plan of the recreational centre. The centre sits at an intersection. The entrance door faces the intersection with its signage.

The interview stated all events and activities on the 26th and 50th floors are managed and organized by the Tanjong Pagar Community Club. However, due to the management's stringent rules, most social activities are held in the 3rd storey neighbourhood park. This managing rule subjected to the space makes the R.C. centre restrictive. The architectural design of the R.C. Centre further implies its restrictiveness. It is enclosed by walls with few openings or windows, making it hard to view any social activities in it. It is unfortunate, as small spaces that are often hidden away from views of the general public need to be open for passers-by to see activities being performed in them. People conducting social interaction will attract more people if they are able to witness the event from afar (Jasprizza, 1999; Marcus & Francis, 1998). Given the numbers of the inhabitants in the Pinnacle @ Duxton, the R.C. Centre is too small though it can satisfy smaller activities reflected by the diversity of lifestyle choices and cultural background of the inhabitants.

The R.C. centre was supposed to sit on the biggest plot of the mini-park next to four high-speed lifts connecting all sky parks. The idea asserted by the architect in the beginning of the project was to place the R.C. Centre as a node to the 26th floor sky park. It was supposed to sit in-between residential blocks E and F connected to the 3rd floor public park pedestrian artery. When the high-speed lifts proposal was abandoned, it affected the location of the R.C. centre thus in effect moving it to its current site. The move made the R.C. centre no longer a node in the programmatic layout of the 26th floor sky garden. This impacted towards the value of movement as there are no interesting nodes for pedestrians to venture or use in the 26th storey sky park. Social infrastructure needs spaces that act as magnets to form centres either at the end or the middle of the street (Carmona et al., 2003; Kostof, 1993; Moughtin, 2003). This move proved to be flawed in the overall planning of the 26th floor sky park. The sky park is no longer seen as a continuing series of pocket parts programme being distributed from a centre point.

Observation in March 2011 indicated the R.C. centre was empty and devoid from any use. A return visit made four months later in August also revealed no usage. There are no bulletin boards at the R.C. centre. Bulletin boards are important as they inform planned activities, and aid communication among neighbourhood residents and groups (Marcus & Francis, 1998). Bulletin boards are only found in the basement near the residential post boxes. The subjected stringent rules applied to the use of the whole 26th floor sky deck are the reason why it is hard to conduct social gatherings in the R.C. Centre. The 'Sky Gardens House Rules' specifies no form of social events should be conducted on the sky deck. During interviews with three different user groups, they expressed their dislike especially towards the 'no food and beverage' policy. User group families with children wish to be allowed to bring food and beverage because the toddlers tend to get thirsty when playing in the mini-parks. The elderly user group wants to socialize in the R.C. Centre by

engaging in cultural activities like playing chess, checkers or other Chinese table games. The rules do not allow outside furniture on the 26th floor. The R.C. Centre on the other hand needs furniture to function. The teenagers express no interest in using the R.C. Centre. The management replied that the rules are in place because of fear towards anti-social behaviour that could result in objects being thrown outside the deck endangering people in the neighbourhood park below. The management also fears users would resort to drinking alcohol in the mini-parks. The rules are further implicated by how users access the mini-parks. Residents are subjected to enter through steel revolving doors by card. The revolving doors are made of chrome steel bars. It is obstructive as revolving doors restrict entry to a single person at a time. The spacing between the doors is small, preventing users from bringing medium to large objects onto the sky deck. Furthermore, only one card is given to one household. This very rule is a deterrent, implicating the user to comply with the control and having less freedom to use the mini-parks.



Picture 6.36: The outdoor sitting decks with doors opening to the R.C. Centre.



Picture 6.37: The entrance to the R.C. Centre. The signage only indicates the R.C. Centre. It does not have a bulletin board informing the activities and use of the R.C.

Successful Features	Unsuccessful Features
<i>Clear and simple layout.</i> <i>Excellent viewpoint as observation decks.</i> <i>Good location at an intersection of two pathways</i> <i>The size is good to cater small user groups of special interests to cultural activities.</i>	<i>The R.C centre is always close, not encourage use.</i> <i>There is no bulletin board informing activities and how to access the R.C Centre</i> <i>Subjected to stringent rules of using the Sky-Deck hence deterred social activities.</i> <i>No kitchen</i> <i>No windows and little openings to view activities being performed in it.</i>

Table 6.2: The R.C. Centre’s successful and unsuccessful features.

The Elderly Fitness Area

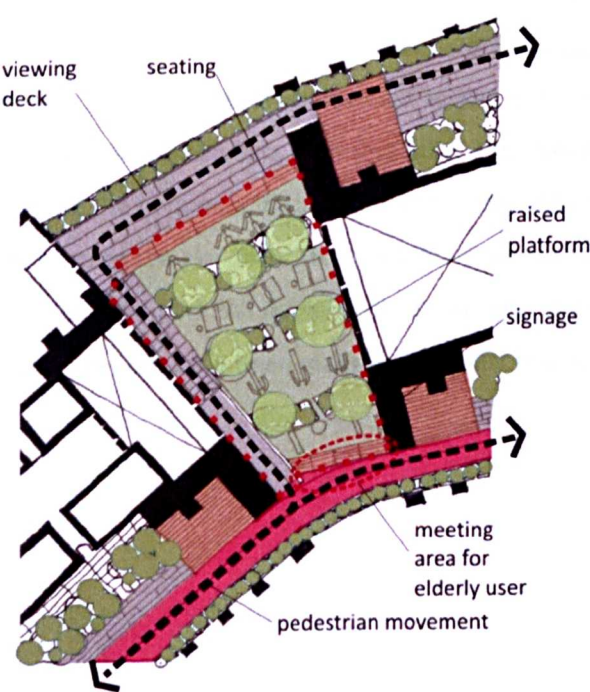
The fitness area is a design in response towards the need of the elderly population in the Pinnacle @ Duxton. The HDB issued the need for every high-rise development to include facilities for the elderly and those with disability. The elderly fitness area was not initially thought about in the early proposal. The winning proposal only mentioned common gymnasium space. However, 7% of the population living in the Pinnacle @ Duxton are the elderly living with their extended family units. The proportion of the elderly aged 65 years and over was generally high for older estates, especially in the Tanjong Pagar with an estimated proportion of between 16% to 19% (Wong, 2011). There are numerous fitness machines in the pocket park catering for the elderly. They cater for a diverse range of cardiovascular activities needed by the elderly for physical health. The arrangement of the machines and benches can be suited to group exercise. This pocket park is one of two places in the 26th floor sky park that have a specific user focus. The use benefits the need of the people living in the Pinnacle @ Duxton. The planning of social spaces always works best when designers take into account the living lifestyles of its people. This argument is vital in order to maintain the sustainability of public housing, especially in the high-rise form (Thompson, 2000).

Outdoor spaces for the elderly are becoming valuable in ageing societies. For the elderly, comfort, safety and security, ease of access to the outdoors and opportunities for meeting others are beneficial. Socializing is an important aspect of their outdoor use. Equally important is also the opportunity to enjoy nature. The elderly need to exercise by taking a long walk or just feeling the sun’s warmth (Cartstens, 1998). The 26th storey sky deck has attributes to comfort as most of its mini-parks are protected from the sun. The walkway is covered with few areas of openings. The height and location makes it airy and well-ventilated. In terms of security and safety it is protected and only accessible to the residents. These three considerations make the sky deck appealing to elderly users. The elderly fitness area is the place that they frequently use and where they

congregate. Observation made at the elderly fitness area revealed frequent use from 7am to 9am and from 5pm to 7pm. The use is reflective to climatic conditions as outdoor social life in Singapore usually happens early in the morning and early evening (Yuen, 2009). Table 6.1 illustrates the three categories of the elderly with ability and types of activity related to them. The elderly fitness area is representative of users from approximately 55 to 70 years of age who are mobile and independent.

	Young-Old	Old	Old-Old
Housing	Retirement communities, adult communities	Congregate care, continuing care centers, residential care	Nursing homes, residential care, personal care
Age	Approximately 55 to 70 and over	Approximately 70 to 80 and over	Approximately 80 and over
Ability	Independent, mobile	Semidependent, semimobile (in groups)	Dependent, limited mobility, greater need for health care
Types of Activity	Self-initiated, leisure, recreation, social, health/wellness-related	Self- and group-initiated, more sedentary, social, health/wellness-related	Limited (staff-initiated), group, sedentary, social, therapeutic

Table 6.3: The three types of elderly people. Picture source: Cartstens (1998).



Plan 6.19: Plan of the elderly fitness area. There are 12 fitness machines fitted towards a framed view of the central business district. This arrangement is also ideal for group exercise.

Picture 6.38: View of the elderly fitness area during midday. The pocket spaces are clearly defined with informed awareness of their usage.

Interviews with elderly users at the mini-park reveal satisfaction in location and use. Most elderly feel the park offers appropriate levels of challenge and support that permit an older person to function in spite of disabilities or short mobility. Furthermore the mini-park is within a short walking distance from their apartments. The vertical transportation (lifts) reduces mobility effort that usually hindered the elderly from going to outdoor social spaces. With a secure environment it encourages autonomy without their nuclear family worrying about their safety. However, the elderly do wish for more choices in activities within the 26th floor sky deck. This response is congenial as the fitness area is only subjected to one function. There are opportunities for socializing at the entrance of the mini-park. The raised platform creates a seating area facing the pedestrian walkway frontage. This architectural feature is welcomed as elderly users gather here to socialize and meet every day after their exercise. The location is parallel to Greene (1998) recommendation of mini-parks bearing distances of no more than residential blocks. Though her recommendation is horizontal it could be applied vertically. The elderly like their seating area to face outside of the mini-park towards the pedestrian pathway (Greene, 1998).

Observation revealed most of the users knew each other by acquaintance. They represent different racial backgrounds. There are no dominant racial groups using the space. On some occurrences it is used by the other user groups, though most voiced dissatisfaction towards the equipment provided in the mini-park. This dissatisfaction is tenuous as the park is planned for a specific user: the elderly; other users are not meant to use the mini-park. Subsequently their mini-park is located at another location within the sky deck called 'The Meadows'. Overall, there are considerations for users with disability. This means that elderly with limited and assisted mobility can use the mini-park. Each residential block does have a controlled entrance gate that allows wheel chairs onto the sky deck. There is a ramp with a non-slippery surface and a railing to aid the elderly into the mini-park. All equipment has signage and instructions on how to use it. Overall some good considerations have been made in designing this mini-park addressing the needs of its target user.



Picture 6.39: ‘Elderly corner’. This seating area is a popular spot for the elderly to socialize. Despite the uncomfortable seating, the spot is still being utilized by them. Placing chairs with a back that comfortably respond to their anthropometrics would improve the spot.



Picture 6.40: The fitness equipment is permanent. Therefore this mini-park cannot be used for any other form of activities. The raised platform defines the space. The space is visible from the pedestrian walkway from entrance. The sub-space behind it does offer spots for privacy but with no bench there is no chance for any social interaction happening. Nonetheless, this mini-park is well-received by its target user. It is a good example of social spaces in a high-rise settlement. However, it can be further improved, thus giving more quality to place.

Successful Features	Unsuccessful Features
<p>Good use of a very small site.</p> <p>Site is protected from glare and the sun. Shade is provided all day by the building shadow.</p> <p>Seating provided at entrance facing pedestrian walkway.</p> <p>Park is elevated in a defined space.</p> <p>Excellent viewpoint.</p> <p>Target user friendly (the elderly).</p> <p>Variety of surface, texture, materials and levels.</p>	<p>Benches are anthropometrically uncomfortable for the target user.</p> <p>Park not very visible because of narrow entrance.</p> <p>Plants and trees insufficient</p> <p>Limited use. Only for exercising not for socializing.</p>

Table 6.4: The elderly mini-park’s successful and unsuccessful features.

The Outdoor Gym (The Meadows)

The outdoor gym is the largest pocket park on the sky deck. According to the interview with a representative from the HDB and the Architect, this pocket park is an open exercise platform for all the residents of the Pinnacle @ Duxton. The mini-park does not have a specific user function. The function of the outdoor gym is an enigma. Its architectural design does not have any representation of the notion as an outdoor gym. There are neither exercise equipment nor any sports venue on it. A

small landscape feature dominates the middle of the park with benches spread sporadically all over. Subsequently this mini-park is named according to the landscape element 'The Meadows'. A majority of the respondent from interviews viewed this mini-park as a pleasure garden, not an active space for exercising. This view supports this thesis's observation, when no user performed any kind of exercising activities in the park. There are no forms of activity performed in the park, passive or active. There are also no social gatherings representing any of the three user groups in the Pinnacle @ Duxton.

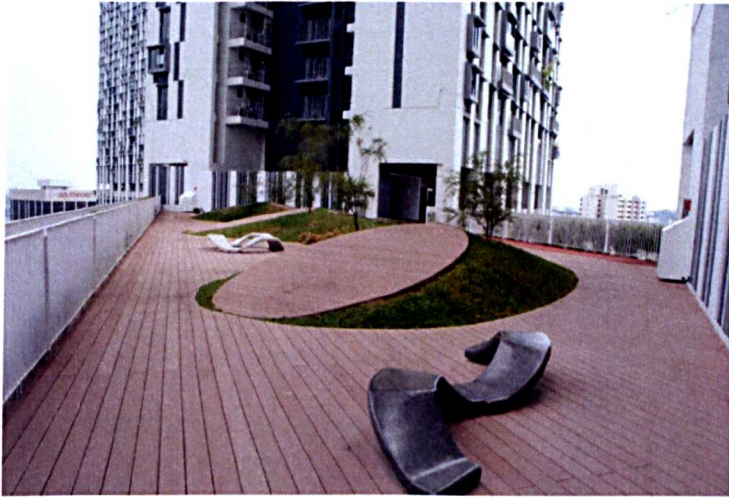
The mini-park does not have any informed function that should be facilitated by its architectural quality. Worst, its architectural quality as a pleasure park contains only a limited amount of green. The vegetation coverage failed to capture any imagination of a 'meadow'. The reason for this is again due to the downsizing of ideas from its winning proposal. The landscape proposal for pleasure gardens on this mini-park was supposed to encompass lush greenery with canopy trees. The idea was cancelled as the HDB and the Municipal Council expressed concerns of high winds that may uproot the trees, thereby falling onto people on the ground level. The notion of a function should always inform, support and facilitate the activities, thus giving awareness to people on how to use it (Appold, 2011; Bacon, 1992). There are no outdoor cardio or weight machines typically found in parks with gym facilities. It does not fulfil any indication of how it should be used. Nonetheless, either as a pleasure garden or an outdoor gym, the mini-park failed in both attempts to function as good social space. The main reason for this is because of the apparent absence of target users in the park. Without any target users the design is subjective. Its subjectivity prompted the placing of benches that does not allow socializing and a landscape element that does not give delight to any of its users. Marcus and Francis (1998) stated how social spaces tend to be less successful if the programme does not affirm to the needs of the people it serves or, moreover, when the programme creates confusion on how it should be used. There are no preferences of interests in the park.

Given the size of the park, there is a lot of potential to make it into a successful social public space. The mini-park can accommodate more than one user group. As in for the Pinnacle @ Duxton, the user groups can be the elderly, adults, and young and older children. With the special positioning bearing near to the un-built high-speed lifts, this mini-park could function as a node for meeting and exploring the 26th storey sky deck. Note that conferring to the interview with Arc Studio and the HDB, the high-speed lifts possibly will be built in the future if the budget and need arise from the people of the settlement. These lifts would greatly make the 26th floor accessible to visitors. The current security measures dictated no access for visitors onto the whole 26th floor sky park. This in effect made the whole area restrictive to outsiders. An interview with 10 residents reveals that most

of them feel the security measure is unnecessary. In many incidents, they were told off by security not to bring visitors into the park. A 34-year-old Chinese lady expressed her disapproval to the rules by saying: "I feel very secure socializing up here but I am not allowed to bring visitors in. I have a lot of friends from neighbouring settlements who want to spend their evenings here on the sky deck."

Some do bring visitors into the park but they need to be accompanied by the residents. The controlling mechanism at the turning gate only allows one user with one access card through. Residents would resort to passing the card to another user in order to enter the park. This act is considered illegal by the management. Subsequent notices were put up at bulletin boards with security pictures revealing offenders caught doing so. Management stated the rules are to protect the residents from undesirables using the park for anti-social behaviour. However, observation made throughout the whole floor reveals no anti-social behaviour. Interviews pertaining to anti-social behaviour on the 26th floor reveal a security concern in controlling access within the settlement. A 37-year-old Chinese man with two children said: "If the management wants to protect us from undesirables in the development they should stop them from getting into the corridors of our apartment units, not the park." The respondent argued that their flats are not protected from anti-social behaviour occurring in the corridors. He believes security should be controlled from the lobby at ground level, not at the 26th storey sky park. Moreover, he expressed more freedom is needed in using the mini-parks on the 26th floor storey sky-deck. The respondent appreciates the level of security provided in the settlement, though he feels its restricting use in the park. In addition to the design of the mini-park 'The Meadows', he expressed the need for more space for children to play and use. The landscape quality in the mini-park offers little to the imagination and use for his two young children. They cannot use the space as a play area. His arguments are parallel to five other user responses with a similar profile background.

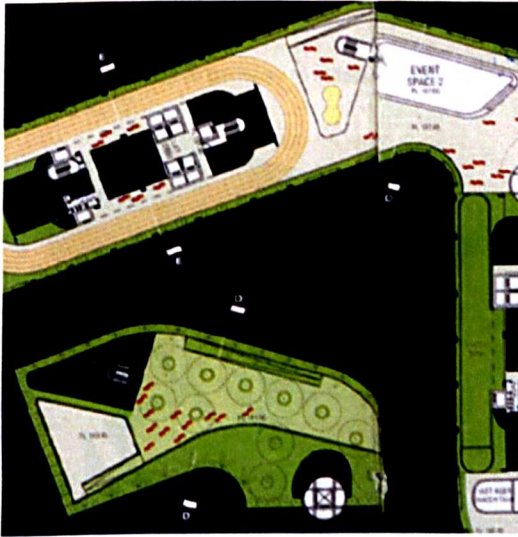
It is by merit that chief users in mini-parks are usually children and teenagers (Greene, 1998). Traditionally, based on data from the use of neighbourhood parks, young children tend to afflict more injury while playing on equipment for older children. Plus the size of a neighbourhood park would mean parents have less control and visual ability to look after their young children. The neighbourhood park would benefit older rather than young children. These recommendations would justify why 'The Meadows' will function successfully with a specific user function for young children. Even if in future the HDB would build a high-speed lift connecting all three sky decks, this mini-park would still provide security from undesirables outside of the settlement. In conclusion, to use this mini-park is minimal. Its design only encourages passers-through and lingering adults. The apparent location and design of its benches further discourage people from using it.



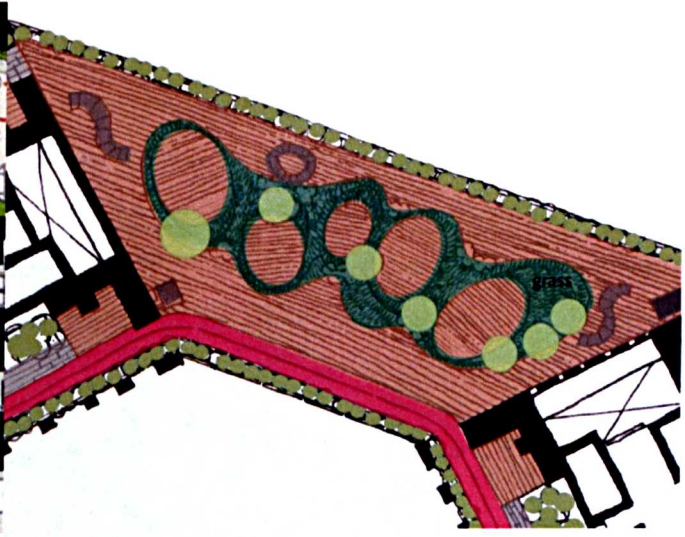
Picture 6.41: The 'Outdoor Gym' is also called 'The Meadows'. This pocket park is confusing as both names do not indicate how to use the space. The pocket park is poorly designed to be a pleasure park as there is little greenery to suggest it as a 'meadow'. Likewise, if this is an outdoor gym, it has no equipment or ample space to perform any cardiovascular activity. It is an example of a space that is neither sociofugal nor sociopetal which ends up into becoming a pointless behavioural setting.



6.42: The lush greenery was downsized only to planting a few trees in 'The Meadows'.



Plan 6.20: Plan based on the original winning proposal. The pocket park was supposed to be two storeys with a multi-purpose hall below. A garden sits above. The park is connected by high-speed lifts highlighted by the large circular form next to it.



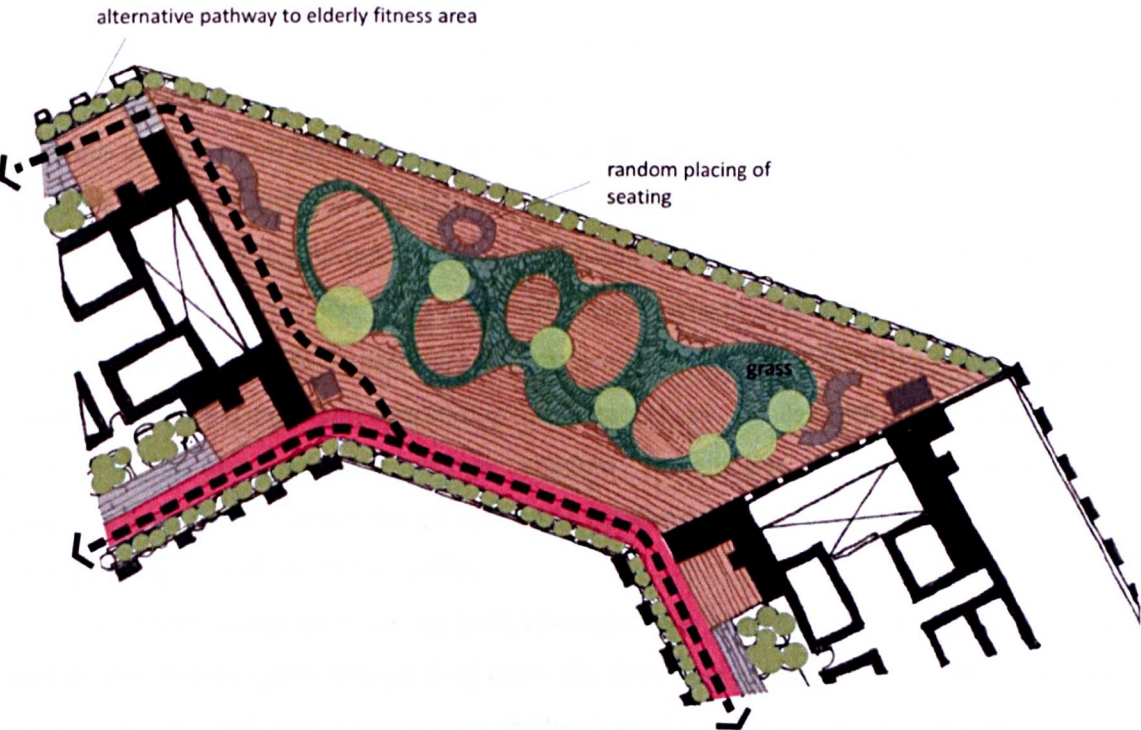
Plan 6.21: Plan of the 'outdoor gym' or 'The Meadows'. Many of its original features were downsized and abandoned. The pocket park is no longer two storeys. The multi-purpose hall was moved to another sky deck. The lush greenery was downsized to meagre patches of green and a few trees.



Picture 6.43: The landscape detail of this mini-park is an abstraction of a meadow. The slanting timber platform suggests nothing as to how it should be used, while its grass coverage does little to the effect of suggesting a garden.



Picture 6.44 User responses to the design of the benches are with mixed results. Usually none use it for seating but as a vantage point to capture images of the surrounding skyline. Note that the child is attempting to play with the structure, using it as a slide.



Plan 6.22: Outdoor gym mini-park.

Successful Features	Unsuccessful Features
<p><i>Whole site highly visible and secure.</i></p> <p><i>Excellent viewpoint as observation decks.</i></p> <p><i>Located vertically at a pivotal point connecting all sky decks.</i></p> <p><i>Large ample space to support many varieties of uses and activities.</i></p>	<p><i>Benches do not serve purpose or function.</i></p> <p><i>Conflicting use of name and design.</i></p> <p><i>No trees for shade in hot weather.</i></p> <p><i>The design of the park is too abstract. Users do not know how to use it.</i></p> <p><i>No target user.</i></p> <p><i>Function is arbitrary to its design.</i></p> <p><i>Subject to stringent rules and regulation on how to use it.</i></p> <p><i>Lacking a variety of equipment. Too few seating areas and benches.</i></p>

Table 6.5: Outdoor gym/'The Meadows' successful and unsuccessful features.

The Children's Playground (Space Net)

The major users of this mini-park are neighbourhood children aged approximately from six to twelve. The children are accompanied by parents or other supervising adults. They are not allowed to come and use the park on their own. This pocket park is named 'Space Net' for its large climbing net dominating the site. Like the elderly fitness area this mini-park is well received by the inhabitants as the programme clearly supports and facilitates its purpose. Its initial success is in direct response to families with older children living in the Pinnacle @ Duxton. It is better represented to the needs of a large user group than inhabits the settlement. According to a representative from the Singaporean HDB, almost 80% of residents living in the Pinnacle @ Duxton are young families with at least two children in the nuclear family unit. The Singaporean social networks are always heavily family orientated (Yuen, 2009). This validates the reason why mini-parks with programmes focusing on family-orientated outdoor spaces are well received by the inhabitants of the Pinnacle @ Duxton. However, the park is small only specializing to one target use, families with older children. It has no extra room in accommodating younger children. Nonetheless, its architectural programme correlates to its size; therefore mini-parks tend to work and function best when they are focused on one user (Greene, 1998; Jasprizza, 1999) .

Mini-park playgrounds are separated between two children's user groups, the young 3-6 years of age and the older children 6-12 years old. Both user groups need surveillance; therefore, parents were also included in designing a children's mini-park though their needs are minor. They only required a seating area for surveillance into the park (Greene, 1998). The children's mini-park on the sky deck has few seating areas for parent surveillance. Like the elderly fitness area, this mini-park is elevated from the sky deck floor defining its boundary and space in-between two residential

blocks. The design creates an opportunity to sit on the boundary platform of the park. This feature may complement the elderly, as they tend to like looking out on the pedestrian pathway, but parents need seating priorities facing the playground towards the children. The children also need constant sustenance which parents tend to bring to parks. There are benches in the playground area but the location is too close to the climbing net. Furthermore, the benches are placed sporadically as solitary objects. The placing is unfortunate as research reveals parents do actually use playgrounds as meeting areas while letting their children play in them (Marcus & Francis, 1998)

Greene (1998) asserts the separation between two children's user groups is necessary when designing play areas in mini-parks. The mini-park design strategy in focusing on one user group is a good approach. Observation reveals this mini-park is used between the hours of early morning (7-8am) and late afternoon (5-7pm). The use is reliant on user school hours, depending on morning or afternoon school sessions. There are no large groups of children congregating into groups to play; most of them usually are solitary or with siblings. Note that this is because of the few seating provisions for parents to use the mini-park. The seating area would help parents to meet, with each letting the children play thus populating the mini-park. As the older children are not allowed to use the 26th storey without an accompanying adult, most of the children's group activities take place on the 3rd level neighbourhood park. The behavioural constraint is apparent that it is too focused on a fixated target of group in Pinnacle @ Duxton.

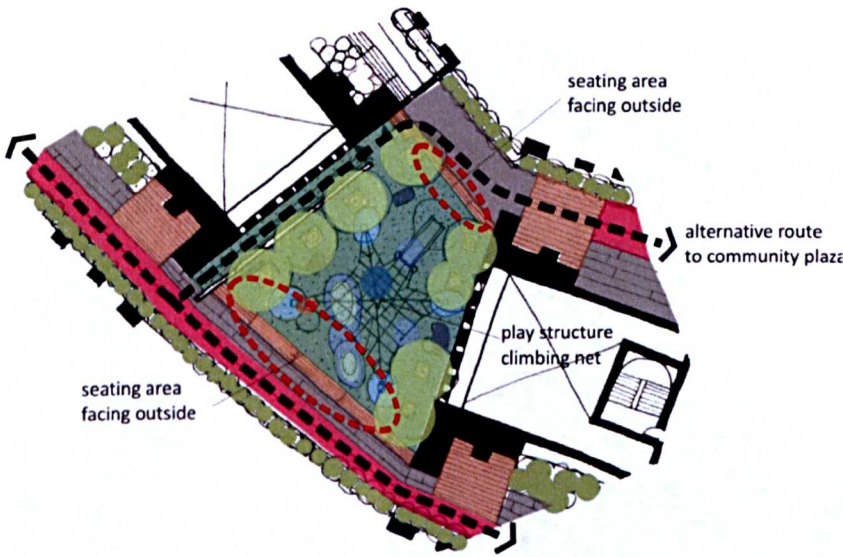
Parents respond to the use of the park with good remarks, though some wished the mini-park could accommodate smaller and younger children as users. Currently, there are no playgrounds for young children on the 26th floor sky deck. The secured environment on the 26th storey sky deck is ideal for parents taking their children into the outdoors. The need for play areas for young children was unexpectedly revealed during an interview when the management expressed disgruntlement over children playing and removing sand at the base of the play area planter box. They view this as an act of vandalism, being afraid of them throwing it off the platform; though, according to Greene (1998), young children love sand pits in play areas. A good sand pit with a tree covering from the sun is a perfect spot for them to play. It is not anti-social behaviour or an act of vandalism. It is a sign that some user groups are neglected and they are only making amends with what the mini-park has to offer to them. Continued visits to the park reveal the sand was removed. This thesis believes that the management should build another mini-park for young children, focusing this mini-park on older ones. Rather than reacting unsympathetically by removing the sand they should address the matter by making a sand pit for the young children to play in. Personal freedom should not be frowned upon. The management should be less constraint in addressing behavioural activities within the mini-park.



Picture 6.45: The 'Children's Playground' on pocket park 5. Because of the climbing net, this space is called 'Space Net'. The name is not confusing as it affirms the use of this park. Young families make up mostly the inhabitants of the Pinnacle @ Duxton. This pocket park clearly addresses the need of that user group.



Picture 6.46: Seating provisions in the mini-park. Uncomfortable and unnecessarily an art object. It does not encourage extended usage.



Plan 6.23: Mini-park 'Space Net', a playground for the older children in the settlement.

The mini-park is subjected to rules for use, in addition restraining its potential success as a social space. Parents argue that their children often needed beverages and food to play in the outdoors. The house rules for using the 26th storey sky deck do not permit any food or beverages in it. Users also articulate their irritation as to the unnecessary need to travel back to their apartment unit in order to use the toilet. This deterred users from staying long on the sky deck. Moreover, in the mini-park 'Space Net', it prompted parents to leave the park, often opting to stay in their homes after the children finished using the toilet. There are no nearby toilets for the children to use. This

missing public space facility is apparent on the whole sky deck. In addition, management should also provide water coolers in the park to quench thirstiness. The subsequent hot and humid tropical climate creates a lot of sweat. The advent of water coolers is inconvenient for users on the 26th storey sky deck using the jogging path. Active usage of the climbing net may be complemented by a nearby water cooler for the children.

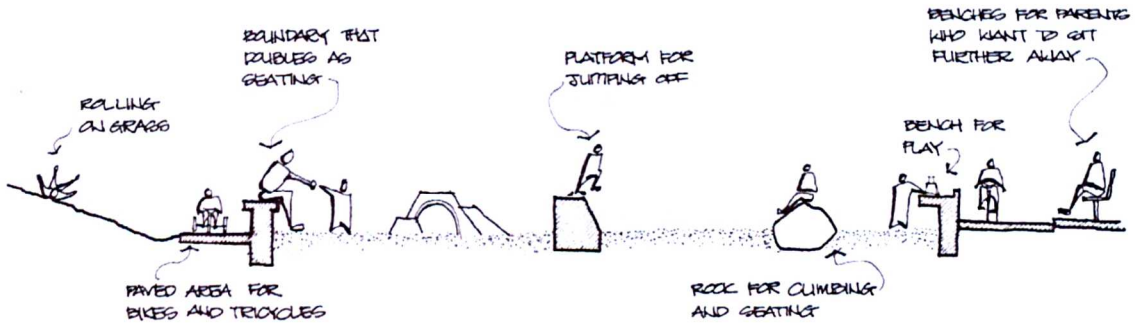
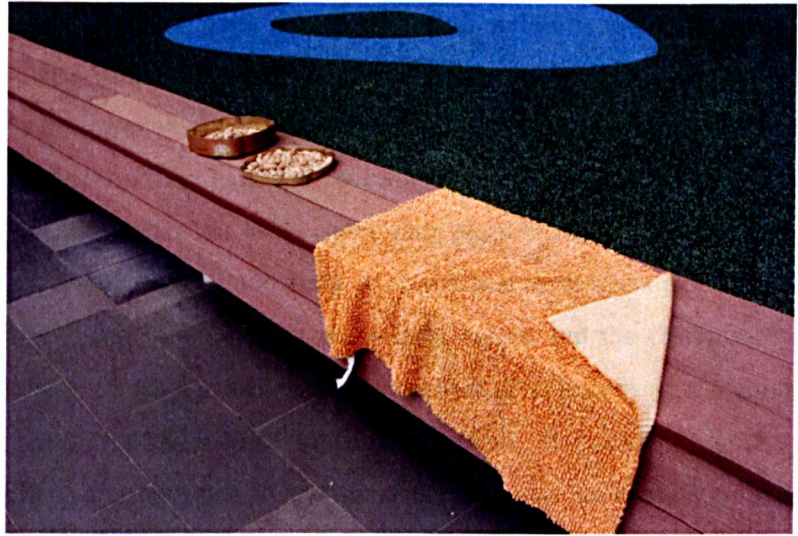


Figure 6.5: Play area recommendations by three user types. Parents, and old and young children. Parents should always have surveillance into the mini-park. Young children need to be near to them while the older children occupy the centre. Picture source: Greene (1998).



Picture 6.47: The entrance to the 'Space Net' mini-park.



Picture 6.48: The seating area used as a place to dry peanuts and floor mat. This is not allowed according to the rules and regulations on using the sky deck. This belongs to a parent who accompanied her child using the playground. Security came 30 minutes later telling her to evacuate the premises. She was displeased with the incident but came back later to use the space with her child. This issue of over regulation will be discussed in the last chapter concluding good and bad practices of making social public spaces in the sky.

Successful Features	Unsuccessful Features
<div>Good use of a very small site.</div> <div>Site is protected from glare and the sun.</div> <div>Shade is provided all day by the building shadow.</div> <div>Variety of surfaces, textures materials and levels.</div> <div>Park is elevated in a defined space.</div> <div>Excellent viewpoint.</div> <div>Target user friendly (6-12 years old).</div> <div>Variety of surface, texture, materials and levels.</div>	<div>Seating area does not face the play structure in the mini-park.</div> <div>Benches are anthropometrically uncomfortable for the parents.</div> <div>Limited use. Only for old children.</div> <div>No areas for young children to play.</div> <div>Subjected to stringent rules of use.</div> <div>No food and beverages allowed.</div> <div>Children must be accompanied by adults.</div> <div>Limited seating areas for parents.</div> <div>No toilet facilities for children and adults</div> <div>Over regulation/dictatorial approach of space usage</div>

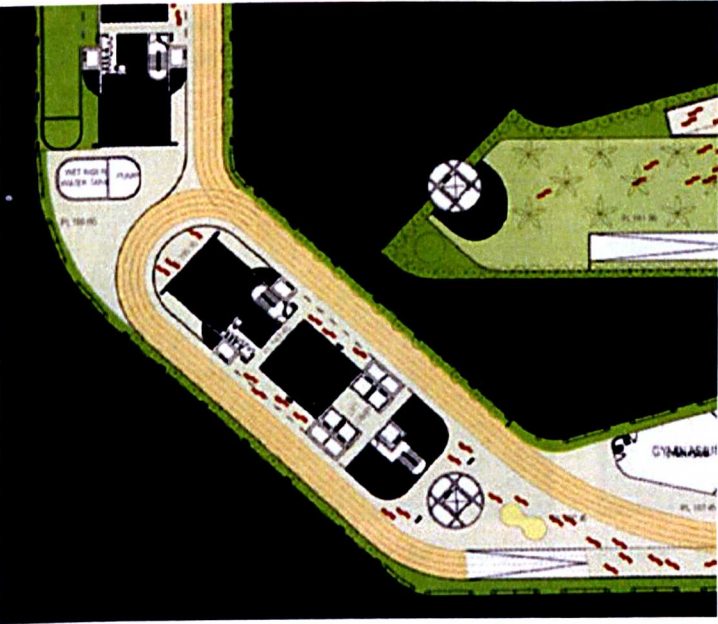
Table 6.6: The ‘Space Net’ mini-park’s successful and unsuccessful features.

The Community Plaza

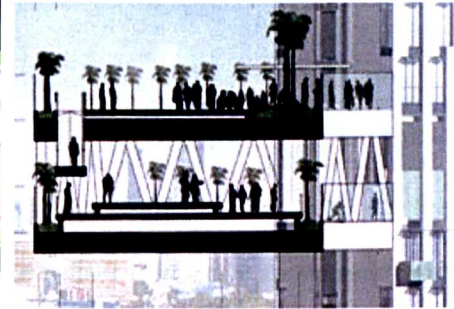
The ‘community plaza’ is located in between residential blocks E and F. The HDB indicates this area as a place for residents to organize large events, hence its name ‘community plaza’. Unfortunately, this pocket park also suffers the same condition as the ‘outdoor gym’. The architecture of the mini-park does not support or facilitate how users should accomplish activity in it. Worst, the architectural quality of this pocket park does not inhibit the quality of a good public place. Like the outdoor gym its indication looks less like a community plaza but more of a pleasure garden. Potentially this pocket park can become a good plaza or square due to its size and location. This pocket park sits vertically next to the Tanjong Pagar community centre and the Cantonment Road pedestrian artery. The winning proposal did adhere to this potential by proposing a second high-speed public lift core connecting this space in-between all sky parks. The original proposal intended to create this pocket park as another node to diverge all programmes horizontally on the 26th storey sky park. The conveying lines in-between horizontal (sky park) and vertical (high-speed lifts) would meet on this pocket park. Critically any programme on this pocket space would influence exploration into other pocket spaces within the settlement.

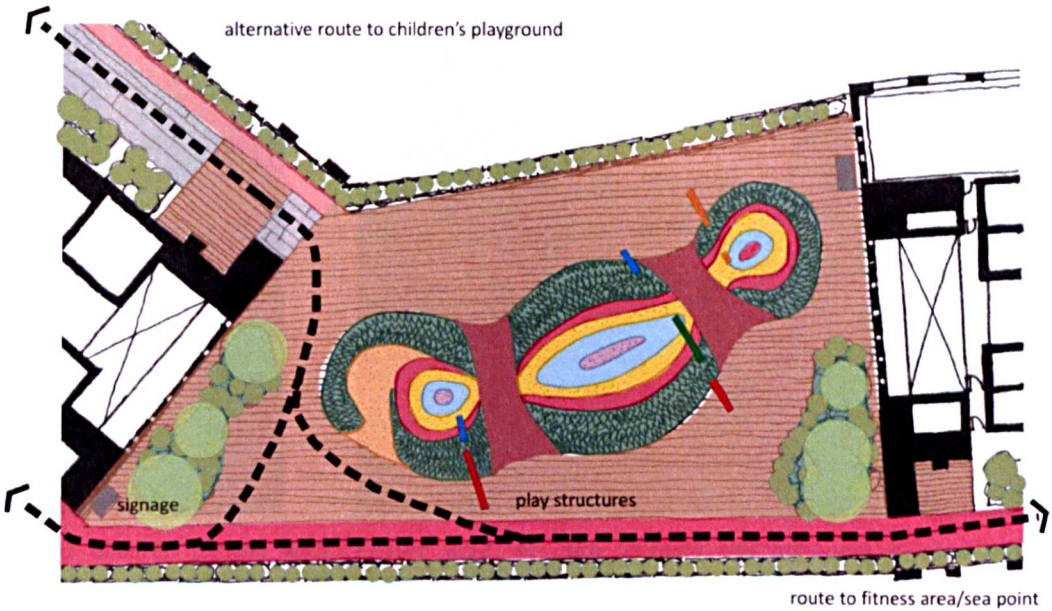
The original proposal for this pocket space is two storeys in height. The lower floor is reserved for a large gymnasium and public toilet facilities. The high-speed lifts would open towards a large open space intended for a place to host events. A large ramp connects the floor above set in lush greenery with large canopied trees (URA, 2005). The result to date has created the confusing name and activity on this pocket park. The remnants of the lush greenery proposed earlier are

expressed by the small undulating terrain with fake bridges and water. Instead of inserting real water elements on the landscape, the designers have replaced it with blue rubber surfaces. Furthermore, this mini-park failed to make any impression as a successful themed garden. The name 'Cradter' is even more confusing with no coherency to purpose and awareness as to how people should use it. Note that the name indicated on the sky deck's signage might be misspelled incorrectly from 'crater'. The outcome of the programme planned for this mini-park is therefore not responsive to the needs of the inhabitants of the Pinnacle @ Duxton. There was no resident's participation in the design of these spaces. This thesis was informed that the design was severely omitted to fulfil strict safety requirements by the HDB that hinder a lot of potential for social use in this mini-park. Subsequently, casual interviews with people using this mini-park revealed less appreciation as a gathering place.



Plan 6.24 (left) and Figure 6.6 (below). Plan and section showing the original winning proposal. Similar to the 'outdoor gym' this pocket park was supposed to be two storeys with a multi-purpose hall below. A palm grove sits above. This park is also connected by high-speed lifts highlighted by the large circular form next to it.





Plan 6.25: Plan of the downsized mini-park 6 ‘community plaza’. Note that the space does not carry any significance as a place for gathering. Moreover, as a pleasure garden it failed in making any impression of a lush green meadow. Observation reveals the mini-park is often missed as pedestrians walked past it to go to the children’s playground.



Picture 6.49: The Meadows on the 26th storey sky park. This image of the mini-park shows the confusing state of its function indicated by the management.



Picture 6.50: The Meadows at midday. The characteristic of this mini-park resembles more of a playground. It neither works as a community plaza nor a pleasure garden.



Picture 6.51 Children playing with the listening tubes on the ‘community plaza’ mini-park.



Picture 6.52: At early evening the mini-park is used more as a playground for older children than a ‘community plaza’. Adult users mostly jogged or walked past the mini-park.

Successful Features	Unsuccessful Features
<p>Large in size, able to fit more than two user groups.</p> <p>Good views of the city.</p>	<p>Mini-park does not have any place to sit.</p> <p>Conflicting program versus design.</p> <p>Too little plant coverage.</p> <p>Mini-park is sun-baked.</p> <p>Does not have any shade</p> <p>Play equipment is minimal.</p> <p>Theme landscape failed to ignite imagination</p> <p>The design of the park is too abstract. Users do not know how to use it.</p>

Table 6.7: The ‘community plaza’ mini-park’s successful and unsuccessful features.

Fitness Corner (Paddy Field)

The final mini-park is the ‘fitness corner’. This is the smallest of all mini-parks. The space, although stated as a fitness corner, is nothing more than an in-between space with a jogging path running in the middle of it. This space does not contain any form of fitness equipment to perform fitness activities in it. The winning proposal also does not indicate any specific programme for this pocket park. Furthermore, the space is named ‘Paddy Field’ derived from the stepped paddy fields image of an Indonesian Balinese landscape. This explains the semi-arc planting box with seating framing the pocket space in-between residential blocks F and G. The park is also another themed park or pleasure garden. Observation reveals no social gatherings in this mini-park. The park is also devoid from daily use. On occasion, throughout the 7 day survey, the seating area was used as a

place to study by teenagers. The use is solitary not in groups. The mini-park 'fitness corner' exhibits the same problem as the 'community plaza' and 'outdoor gym'. It is the most severe out of the three as the space is a blank canvas for use and activities. There is nothing to suggest any form of social engagement to be conducted in this mini-park. It is being used only as a thoroughfare to get to other mini-parks. There is nothing to manipulate or stimulate use. However, it is not sun-baked and is protected from the sun all day; hence this is why, on occasion, individuals used the space as an outdoor space to study. An interview with a user in his teens shows that he wishes for comfortable tables like those found on the 3rd storey park to be installed on the 26th storey sky deck. The claimant likes the security and seclusion of the mini-park, though he struggles to study comfortably on the seating area. He only uses the space as a retreat from his room above just as a place to read.

This thesis suggests this mini-park should be aptly converted as an area for teens to study in outdoor spaces. Tables could be spaced in-between the curved seating areas. The mini-park is already located in a quiet area with shade. Students love outdoor spaces with study tables protected from the sun and with shade (Greene, 1998). This programme would fill this space gap in use and function. There is a considerably large number of young teenagers living in the Pinnacle @ Duxton. As most of their active spaces are located on the 3rd floor neighbourhood park it is appropriate that the 26th storey could cater for their passive needs. There are no dedicated spaces for teens on the 26th storey sky park. Clearly the spaces are intended to create settings that are sociopetal and sociofugal in their effect. Unfortunately the effect does not convey its message for social use as the setting is lost in translation because of the rigid rules from access to food on the whole 26th storey sky deck. Sommer (1998) and Lawson (2001) both argues that whether a space is determine to be sociofugal or sociopetal may not just be simply a determined function or matter of style. It is the aspect of space seen to reflect the social values and lifestyles of those controlling it. Social values in Pinnacle @ Duxton do suggests social groups wanting social spaces for them to occupy with a degree of control over it. Unfortunately, again the recurring theme of management overriding freedom of use deters this from happening.

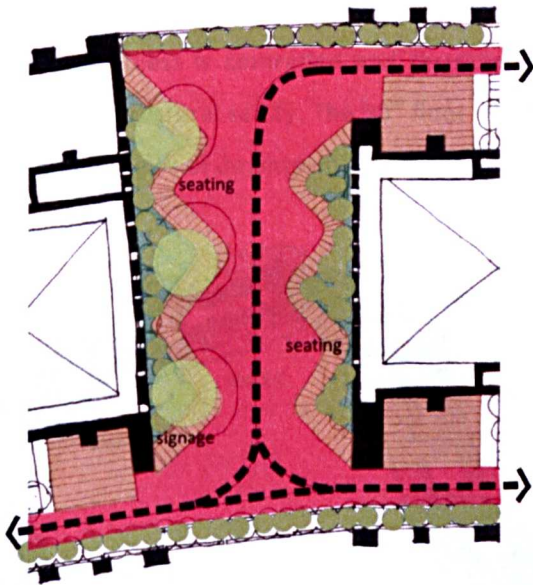
Mini-Parks or Vest-Pocket Spaces on the 26th and 50th Floor Sky Decks



Picture 6.53: View of the mini-park. The spaces in-between the curved benches would function better if study tables were placed to give this mini-park a sense of purpose. The space is well shaded for occasional use by teens as a study area.



Picture 6.54: Planter boxes and benches placed on both side of the walls.



Plan 6.26: Plan showing the fitness corner located in between blocks F and G. This plan indicates no facilities to suggest its use and function. The line in the middle shows the route of the jogging path cutting through it. This pocket park is named 'Paddy Fields'.

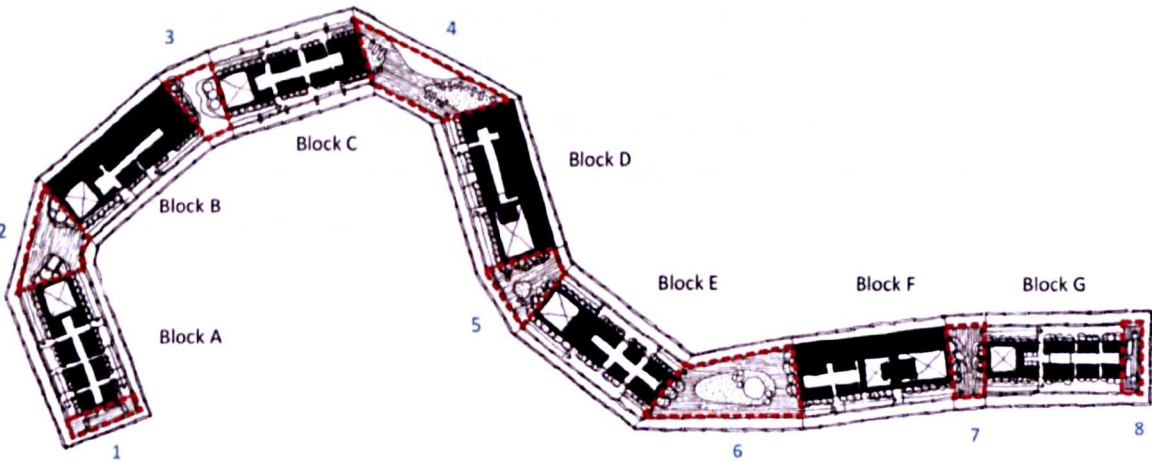
Successful Features	Unsuccessful Features
<div>Ample place for seating</div> <div>Mini-park is shaded and protected by the sun</div> <div>Mini-park is quiet and secluded</div> <div>Used by students as a study area</div>	<div>Mini-park does not have any purpose.</div> <div>Mini-park is use as a public thoroughfare.</div> <div>The landscape design failed in providing greenery on site.</div> <div>Function does not relate to design.</div> <div>Limited use of surface texture and materials.</div>

Table 6.8: The ‘Paddy Fields’ mini-park’s successful and unsuccessful features.

6.3 Mini-Parks or Vest-Pocket Spaces on the 50th Storey Sky Deck

6.3.1 Location and Context

Similar to the 25th storey the 50th storey sky park is also a collection of ‘seven mini-parks or vest-pocket parks’ inter-connected by a continuous pathway from residential blocks A to G. There are seven designated mini-parks located on the sky bridge. All mini-parks are pleasure garden types with no specific user groups to use each space. This sky bridge is accessible to the public from block G, though the access is controlled and restricted to hours with limited numbers of people only allowed due to structural safety. The 50th floor sky deck is Singapore’s biggest and tallest public park with impressive views of downtown Singapore and its sea port.



Plan 6.27: Plan illustrating the overall layout of the 50th floor social spaces. There are eight designated social spaces located on sky bridges. All of them are mini-parks.

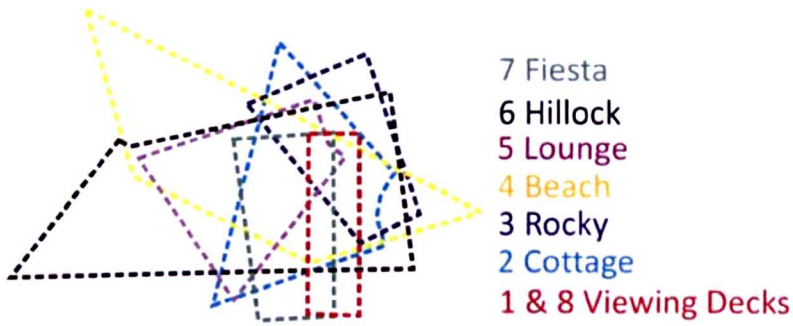


Figure 6.7: Illustration comparing sizes and dimensions in-between all mini-parks or vest-pockets on the 50th storey sky park. Mini-park numbers 1 and 8 are the same in size and shape. Adapted from Kostof (1993).

6.3.2 Architectural Description, Use and Activities

The sizes of all mini-parks are defined by the structural boundary of the building. The size is however smaller than the 26th floor sky deck. This is because the boundary that separates the edge of the building is deeper and wider. There is a continuous trench separating the total length and width of the park to dissipate vertigo and encourage safety for users in the park. The trench also functions as a service gondola for the settlement. Similar to the 26th floor sky park, the spanning of the massive girders gives the distinctive rectangular shape to all mini-parks. Each space has the same width of 20 metres with various lengths set by the arrangement of residential blocks. The 50th storey sky deck is easily appreciated in its dimension and size as a big public park even though it is distinctively being divided into smaller mini-parks. This is due to its openness, unlike the 26th storey sky deck which is enclosed. The locations of all mini-parks are bounded in-between service blocks like lift machines, water tanks and ventilation shafts. End mini-parks are bounded by one wall facing outside as a viewing deck for the public. The 50th floor is solely designed as a park. Similar in plan to the 26th floor sky park, some areas are used for building services. Blocks B, D and F have break water tanks enclosed in a room behind each building. A pedestrian walkway runs following the shape of the building and its sky bridges.

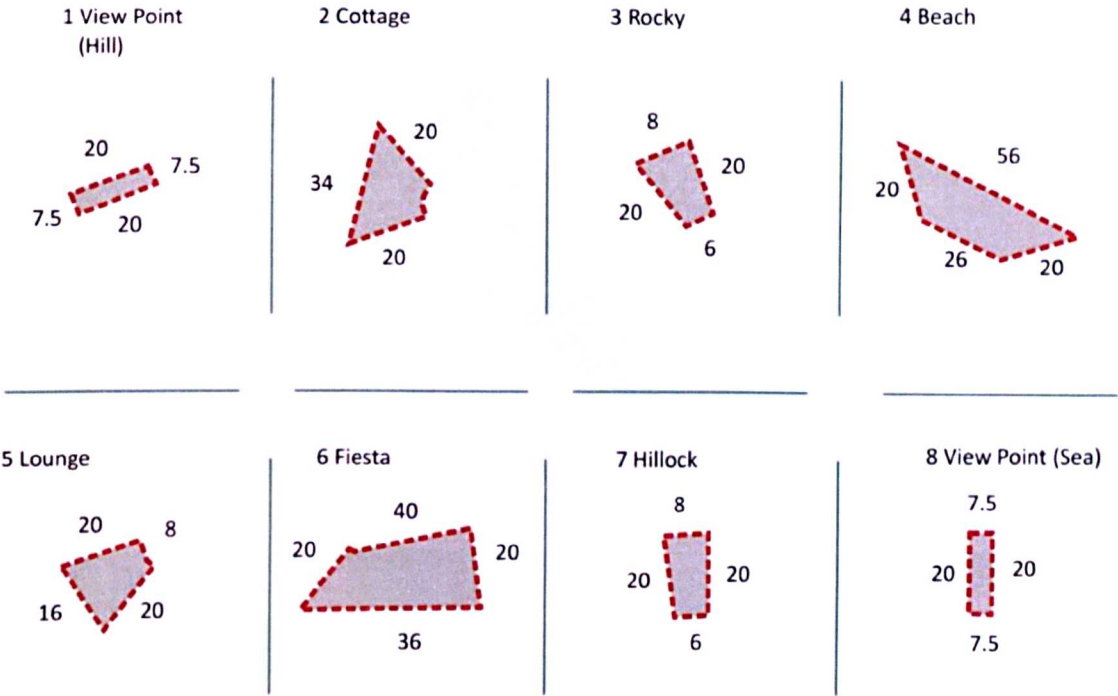
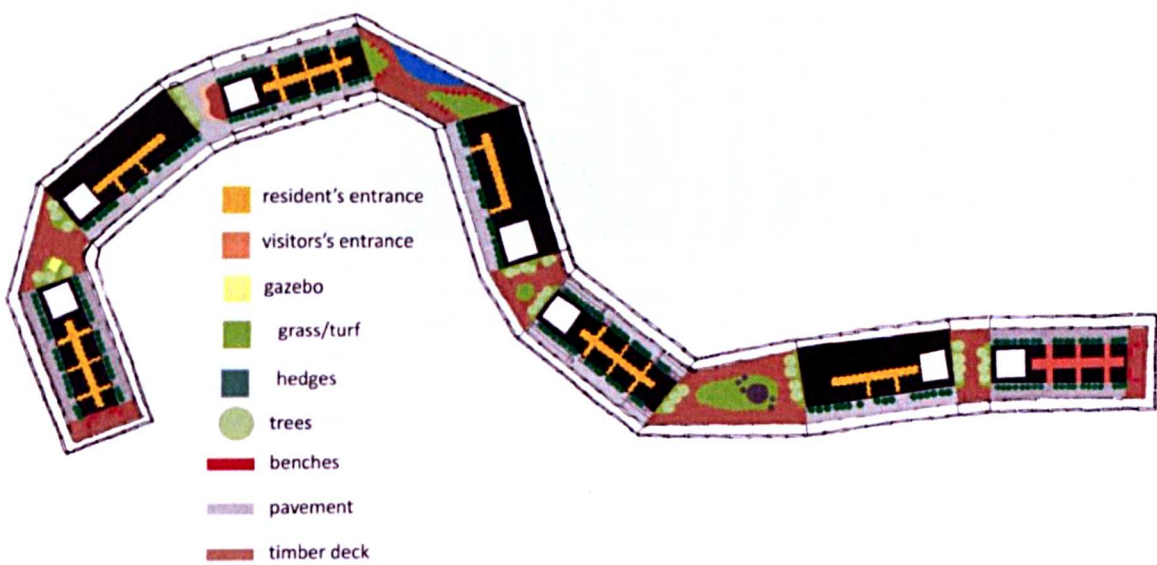
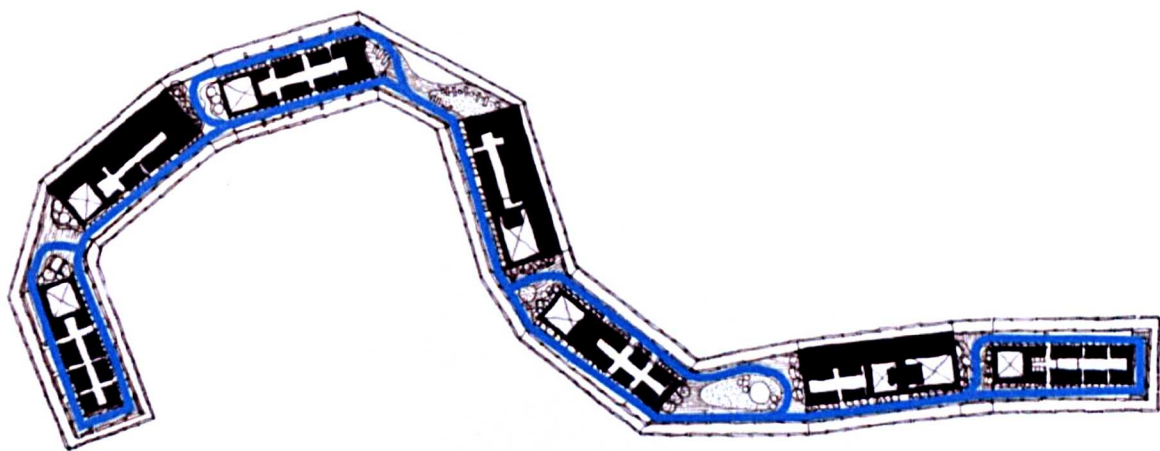


Figure 6.8: The architectural dimensions of all vest- pocket social spaces on the 50th storey sky gardens. The dimensions are all in metres.



Plan 6.28: An overall plan illustrating the architecture description of the 50th floor sky park. All parks are open to the sky on at least one frontage prior to its location. The sky park is accessible by seven lift shafts from each tower block. Residents from each tower block are able to access all mini-parks on this floor as all are connected by the long corridor. Public access is from tower 7.



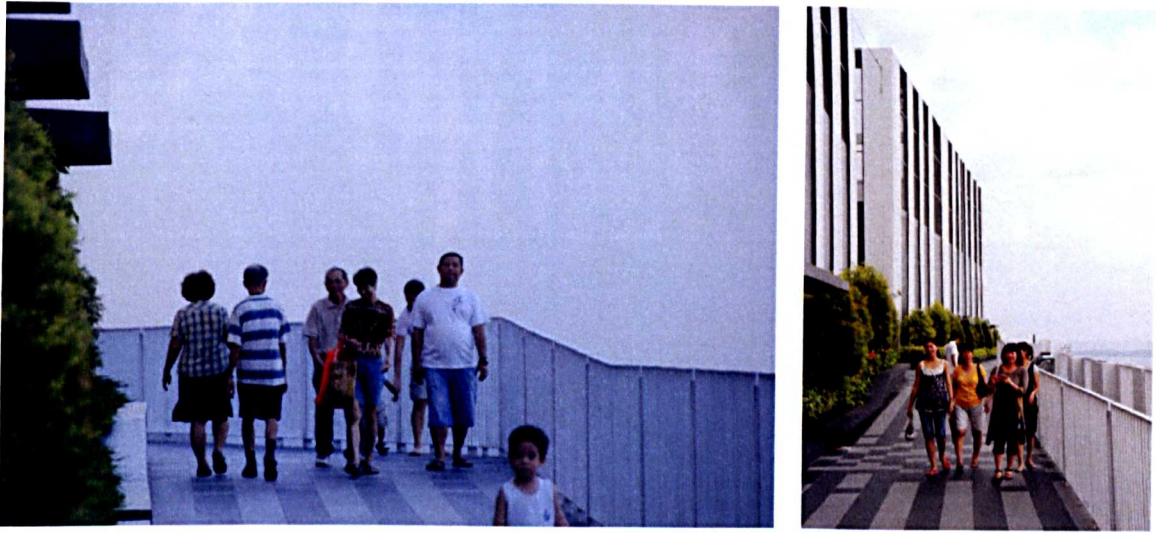
Plan 6.29: Layout of the pedestrian pathway pattern on the 50th storey sky park connecting all mini-parks.



Picture 6.55: The outer boundary trench for safety and security. The trench also functions as a track for the service gondola. The height of the double railings further provides security to users within the park.



Picture 6.56: The extruded core forms the block separating each mini-park on the sky deck. The extruded core does not have any usable spaces in it as it is only used as a mechanical floor.



Picture 6.57 and 6.58: Residents taking a stroll on the pedestrian walkway in the late evening.

The pedestrian pathway on the 50th storey sky deck is popular for strolling amongst the residents in the Pinnacle @ Duxton. Observation reveals residents using the pathway in the late evening to avoid the intense tropical sun as the decks are not covered. The majority of the users are families with children. Few elderly would venture onto this deck, with some teenagers using the viewing deck as an area to socialize. The elderly prefer to use the 26th floor sky deck as it is covered from the sun and glare. Moreover, it is enclosed giving a sense of security for the users. Teenage respondents would prefer it if the 50th storey sky park had more covered seating gazebos found in the 3rd storey neighbourhood park. As access to the 50th storey park is limited, they cannot use it to meet up with friends from other settlements to socialize. Public access to this level is by payment of 10 Singaporean Dollars (£2) per visit. Visitors' access to the park is located on the ground floor facing Cantonment Road. The entrance is not well designed and is hard to locate. It is marked by a narrow 2-metre corridor in-between two residential shops. Based from interviews tourists have complained about the location of the entrance and ticket office to access the 50th storey sky park. Most of them assumed that it is located within the 3rd storey neighbourhood park.

The entrance to the park is a let-down as it feels like entering a service floor. The entrance is not located along heavy pedestrian lines or nodes within the settlement. Visitors arriving from Tanjong Pagar and Outram MRT all have difficulties in finding the ticket office. On the other hand, visitors arriving on buses, taxis and cars have no problem in locating the entrance as they were dropped off in front of the entrance. Nonetheless, based from interview visitors express satisfaction when arriving on the 50th storey sky deck due to its fantastic view of the city and sea port.



Picture 6.59: Visitors' access to the 50th floor sky park is situated at the far end of block G. Note that the entrance is the small corridor in front of the pedestrian bridge and behind the bus stop. The entrance's location is a problem as it is hard to find.

Picture 6.60: Ticket machine for visitors.



Picture 6.61: Entrance gate to the sky deck.

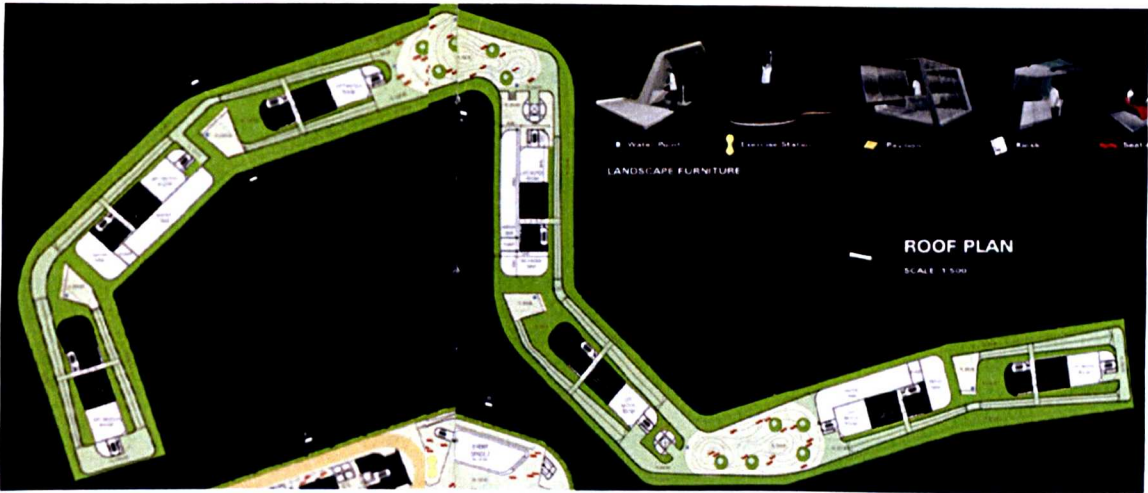


Picture 6.62: A close-up view of the pedestrian pathway connecting all mini-parks on the sky deck.

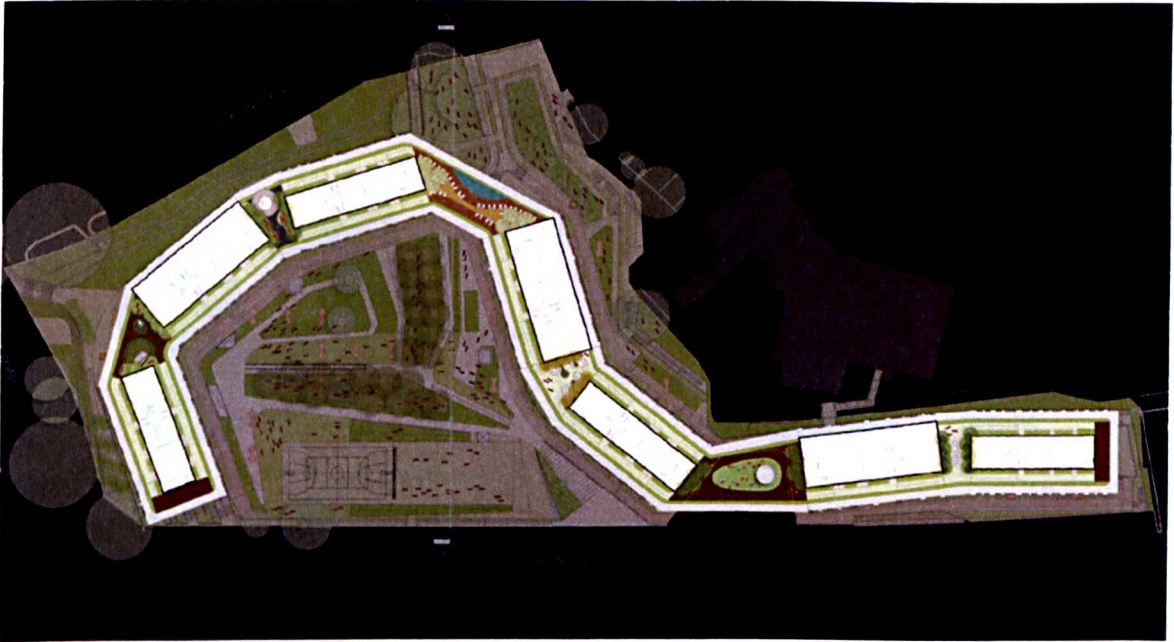


Picture 6.63 and 6.64: Illustration depicting the park in its early stages of the design development.

The collection of mini-parks is divided into seven different thematic designs. Similar to the 3rd floor park, most of the aesthetic qualities of these spaces are designed to idealize the rural park landscape. Six of the mini-parks are called 'Cottage', 'Rocky', 'Beach', 'Lounge', 'Hillock' and 'Fiesta'. In retrospect these mini-parks are down-scaled architecture designs from its original winning proposal in 2001. The original design proposed a substantial amount of lush greenery on the sky deck. The plan also included social spaces, shops and a restaurant. Each of the in-between spaces are landscaped with undulating terrain. Plan 6.29 illustrates the original proposal showing ample greenery in the design. The whole floor plan is treated as a large park rather than its current state of collection of mini-parks. A lot of changes were made before entering the final stages of the design. The lush greenery depicted by palm trees and lawns was scrapped for a utilitarian approach in design: 20% of the footprint was given away to create a safety trench. This thesis views the safety trench as necessary for the safety of the users. The reason behind this is similar to design cuts done on areas in the 26th storey sky park. Greater emphasis on the height of this park and the climatic threats it receives caused the HDB to be stringent in making social and public spaces on this level. No trees are to be planted in the middle of the mini-park for fear of high winds. Water is not allowed as it might hurt people walking on the ground. HDB insists that people might splash water over the sky deck falling onto people below. Tall trees are prohibited by being used in the landscape design. These are the necessary measurements taken by HDB to ensure the safety of the users and residents in the park. In effect, this reduces the sky deck's functionality into only becoming a large viewing deck.



Plan 6.30: The original 2001 roof plan. The original Picture source URA (2005).

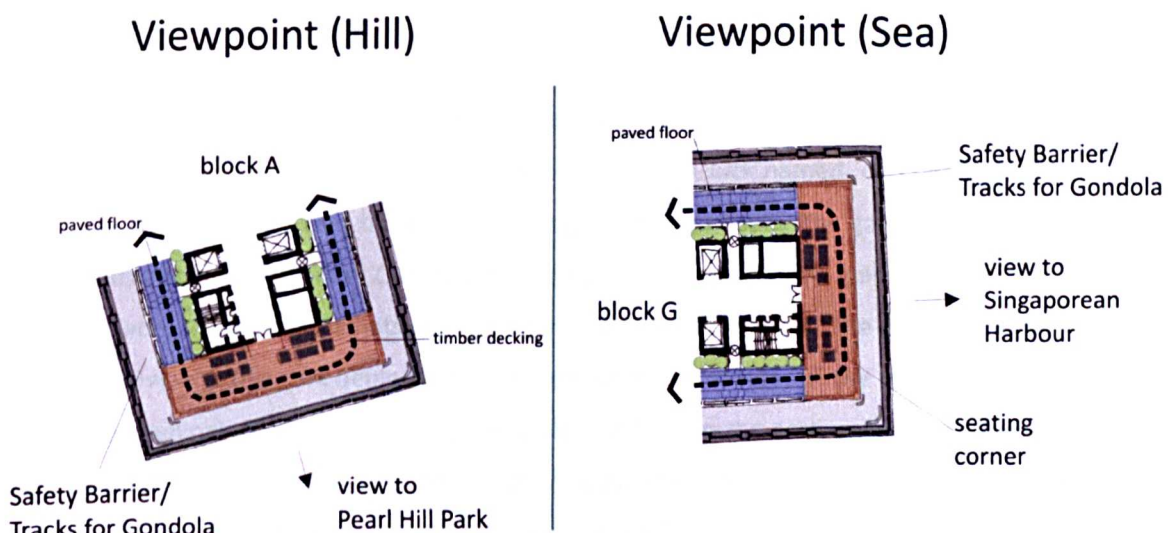


Plan 6.31: This plan of the 50th floor sky bridge obtained from Arc Design Studio (2009) illustrates the finalized layout of its social spaces. The programmatic layout changed from places for social events to pleasure gardens.

Hill Point and Sea View Point

Both mini-parks are located respectively at each end of the 50th floor sky deck. They are each relatively small, having 140 square metre floor space. The boundary between the mini-park and the view is separated by a medium high fence spaced 2.5 metres away from the building line. Six smooth concrete benches are arranged in a position that resembles a lounge. Both mini-parks are very minimal, with architectural features arranged in them. There are no plants in both mini-parks. The mini-parks follow the same design principle as their 26th storey counterpart. Neither has any specific social purpose nor target user priority. Furthermore, both decks do not have any of the facilities

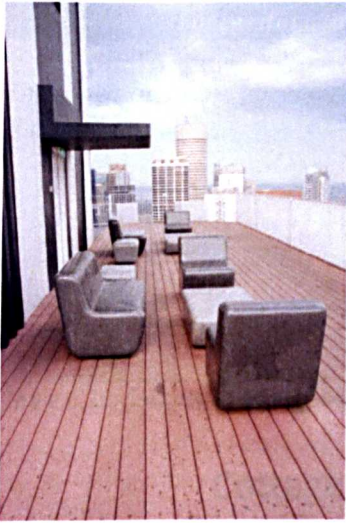
mentioned above as an observation deck. Daily observation on both mini-parks revealed users often used it for not more than 10 minutes, to admire the view, and moved on to visit other parts of the sky deck. Occasionally some of their users do use the sitting lounge but never to congregate for social activities. Users would use the sitting lounge in the late evening when the weather is tolerable. The sea port view proves more popular than the hill view. From interviews a German ex-pat expressed the likeness to the viewing point as a reminder of her home town of Hamburg. She regularly visits the park once a week for contemplation and relaxation. With the same design principle as its 26th storey counterpart, both mini-parks therefore suffer the same user setback. Its benches are uncomfortable as they are made of concrete. Lacking any form of protection or roof, the sitting area suffers from intense glare from the sun. Given all three users' considerations (families, teens, elderly) both mini-parks have little to offer for any form of social engagement.



Plan 6.32: Both mini-parks located at the end of the 26th floor sky park. The plan above illustrates the location of each park, viewing the sea and hills of Singapore.

Successful Features	Unsuccessful Features
<p>Clear and simple layout.</p> <p>Excellent viewpoint as observation decks.</p>	<p>Benches are group together; not good for private use.</p> <p>Little shade and protection from the sun. Mini-park is sun baked during the day.</p> <p>No target users, the park is devoid from any social use.</p> <p>There are no plants in both mini-parks. The design is too utilitarian.</p>

Table 6.9: Successful and unsuccessful features for both viewpoints.



Picture 6.65: View of 'outdoor lounges' on the sea viewpoint.



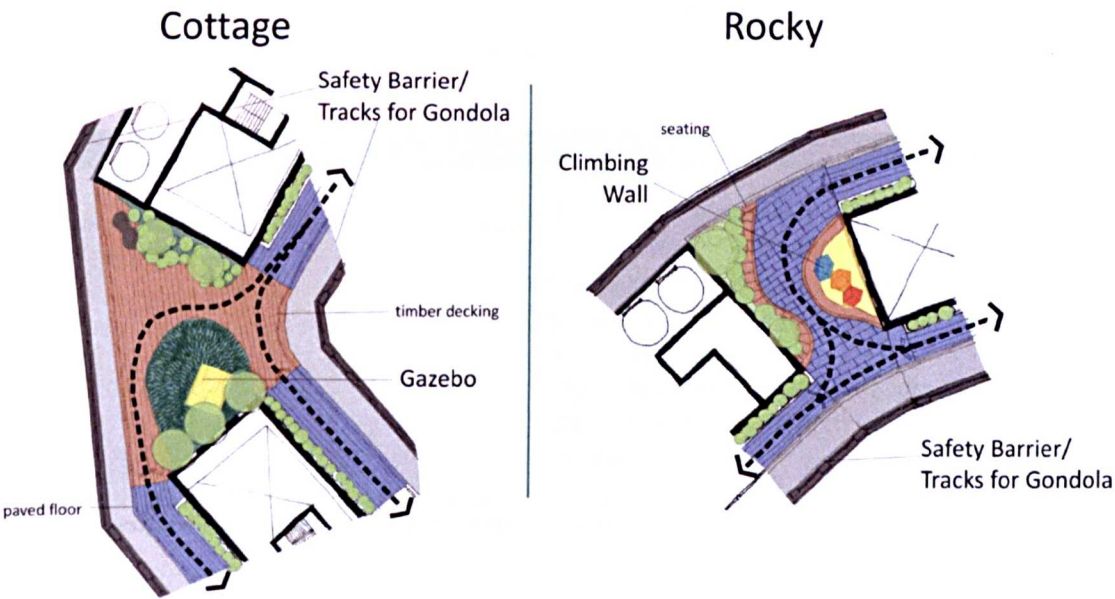
Picture 6.66: Late evening use of the gazebo in the mini-park 'cottage'.

Cottage

Mini-park 'Cottage' is located in between blocks A and B. The name of this park is derived from a gazebo structure that sits in the middle of the park nick named 'cottage' by the designers. This is the only mini-park that has a covered seating area for users. The gazebo is placed facing the central business district area. Observation reveals some use in the park by teenagers seeking outdoor places to study and adults conversing in pairs for private time. The park has no target users. The use is low with the park being empty throughout the remainder of the day. It is only being used in the late evenings. Vegetation in the park is planted back to the core wall. The park is carpeted by grass and timber decking that softens its look visually. The design of the mini-park is minimal. With no target users there is little to expect for any form of social activities. The current state of the design with its bare minimum vegetation and seating provisions deters any form of use during the day as it does not offer any shade or pleasure. Worst, the name is too abstract for users to understand its function and use. The park is limited in use and offers little to the imagination in its design.

Successful Features	Unsuccessful Features
<p>The provision of the gazebo provides shelter from the sun and rain.</p>	<p>Benches are placed sporadically. Little shade and protection from the sun. Mini-park is sun baked during the day. No target users, the park is devoid from any social use. The pedestrian pathway that cuts through the space is a disadvantage as users did not stop to use park.</p>

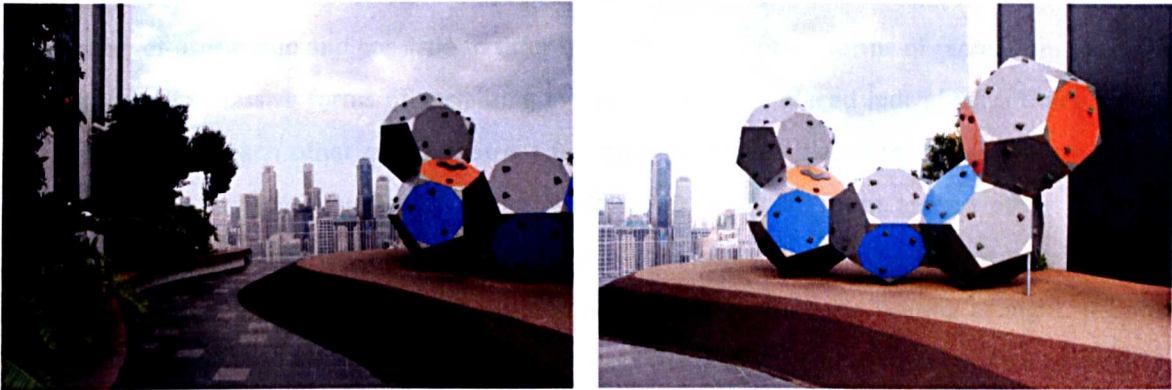
Table 6.10: Successful and unsuccessful features of the mini-park ‘cottage’.



Plan 6.32 & 6.33: Plan of both ‘Cottage’ and ‘Rocky’ mini-parks.

Rocky

‘Rocky’ is the name of the mini-park bounded by blocks B and C. The name is derived from a climbing wall in the middle of the park. This mini-park is well planted by lush vegetation concentrated along the block B core wall. It is a middle block mini-park with pedestrian access going through the park. According to the designers ‘Rocky’ was only derived as an active mini-park late in the design process. The design programme tried to target high-intensity forms of recreational activities like wall climbing. Wall climbing is a popular indoor sport in Singapore. The equipment is not substantial but it does provide function and activity in the mini-park. This mini-park is almost exclusively used by teenagers and young adults who are involved with the type of sport. The seating area provides good spectator view of the climbing area while its soft surface is suitable for climbers to fall on.



Picture 6.67 & 6.68: The curved seating and raised platform define the use and function of the mini-park. The name 'Rocky' suits the design of the park without over-abstracting it. The climbing structure may be small but it is sufficient for active use among the park's target users.

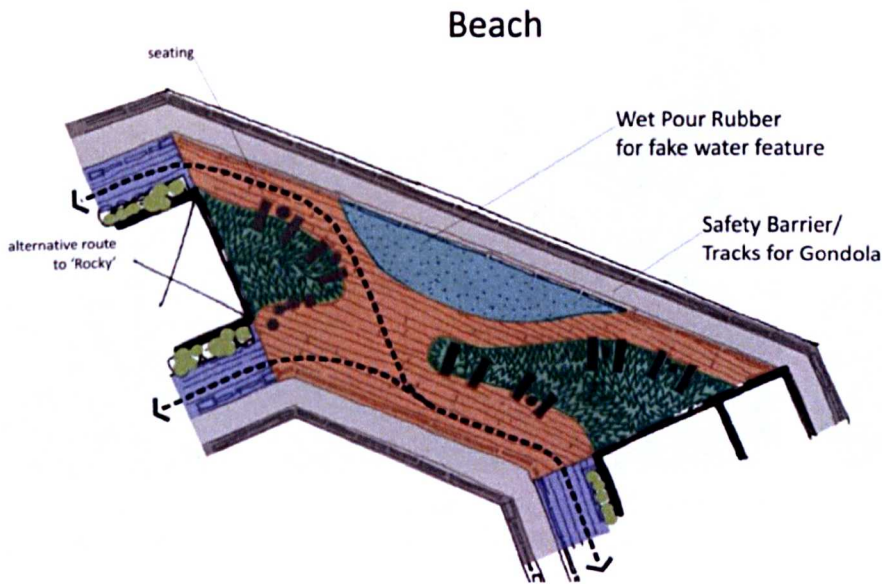
Successful Features	Unsuccessful Features
<p>The provision of the gazebo provides shelter from the sun and rain.</p>	<p>Benches are placed sporadically. Little shade and protection from the sun. Mini-park is sun baked during the day. No target users, the park is devoid from any social use. The pedestrian pathway that cuts through the space is a disadvantage as users did not stop to use park.</p>

Table 6.11: Successful and unsuccessful features of mini-park 'Rocky'.

Beach

'Beach' is the most iconic of all mini-parks in the Pinnacle @ Duxton. This mini-park is the Pinnacle @ Duxton's cover image for reviving the 'streets in the sky' concept in architecture publications and magazines. The mini-park is the biggest among all on the 50th storey sky park. The park is designed to emulate a tropical beach, hence its name 'Beach'. Two strips of grass mounds cover one-third of the whole park while a large patch of blue rubber forms an infinity pool facing the central business district. The park is partially covered by a meeting hall located above block C. The meeting hall is not accessible for public and residents of the Pinnacle @ Duxton. Originally the meeting hall was meant to be used as a community gym. To date, the hall was only used formally once in September 2011 as a dinner hall for celebrating Independence Day by prominent members of the ruling government elites. The hall is accessible and reserved for official group visits of dignitaries formally visiting the development. There are no current plans for the hall to be converted for public use by HDB. Reclining concrete seats are spread all along the two strips of grass facing both sides of the views. The subject matter to this peculiarity is also inaccessible. HDB insists that it

is a matter of national security for the space is reserved for 'special occasions'. The park has no specific target user group and has little to offer for socializing or other forms of recreation. The park is solely used for passive forms of socializing as the benches are placed individually. There are no benches that face each other or other street furniture to suggest places for groups to meet. It is fixed and can't be move. Furthermore, the landscape is minimal. There are no other forms of vegetation other than the lawn itself. Observation reveals users only mingle for not more than 10 minutes on site. It is sun-baked during the day while there is minimum lighting at night. Despite being the most iconic image on the Pinnacle @ Duxton, the park is a bad example of how to design a social space in high-rises. It is unappealing in its landscape with nothing to manipulate or stimulate social activities in it. The only form of use is just as a viewing deck which is prevalent throughout the whole deck. In total, there are no chances for any individual or groups to personalize any space in the whole deck. It is very totalitarian.



Plan 6.34: The 'Beach' is the Pinnacle @ Duxton's most iconic mini-park; though, despite its image, the park is barely used during the day. The landscape is unimaginative and the benches do not offer any chance for users to socialize.



Picture 6.69 and 6.70: The iconic image of the sky garden in the Pinnacle @ Duxton. The most prevalent form of use in the park is only for relaxing and covert socializing. Picture source: Arc Studio (2009).



Picture 6.71: A close-up view of the mini-park. This picture was taken after a thunderstorm. The park offers great views of the sea on the horizon.



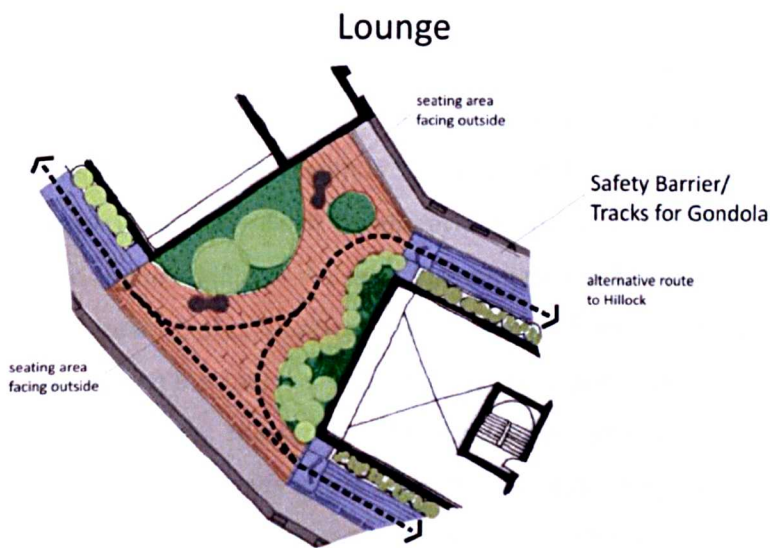
Picture 6.72: The steel signage is hard to read as it reflects light and glares under the sun.

Successful Features	Unsuccessful Features
<i>Excellent viewing point.</i> <i>Large in size.</i>	<i>Benches only allows covert form of socializing</i> <i>The park is sun-baked, not protected from the climate.</i> <i>No target users</i> <i>Limited use. The most prevalent form of use is only as a viewing deck</i> <i>The seating provision is uncomfortable</i> <i>Landscaping is minimal. No large plants or shrubs.</i>

Table 6.12: Successful and unsuccessful features for mini-park ‘Beach’.

Lounge

Mini-park ‘Lounge’ is similar in size and location to the children’s playground on the 26th storey sky park. The park is a mid-block type with a pedestrian pathway that runs through it. The park is as an outdoor lounge with its benches resembling couches and sofas. This mini-park is well designed with sufficient plants and shrubs that create a small oasis of greenery in-between blocks D and E. There are plenty of seating areas for socializing as the arrangement faces each other. The width of the park visually is pleasing as it is not too big or too tight. The only compensation for the park is its response to the climate. Seating areas are not covered from the sun and rain. Due to its top-most location, the park does not receive any shadow from either block. It is sun-baked during the day, hence no prevalent use for socializing by the inhabitants and tourists alike. In terms of landscaping, the ‘Lounge’ has a lot of large trees planted in it. According to the architect, this is possible because of its narrow size that enables the medium size trees to be planted and backed to the wall. The park is used by teens as a place to study in the late evening or is cool after rainy weather conditions. Nominally, it is only being used as a throughway for users strolling throughout the whole deck.



Plan 6.35: The 'Lounge' is trapezium in shape. The design is divided by a thoroughfare in the middle and two patches of green backed to the core wall.

Picture 6.73: Signage indicating the name of the mini-park.



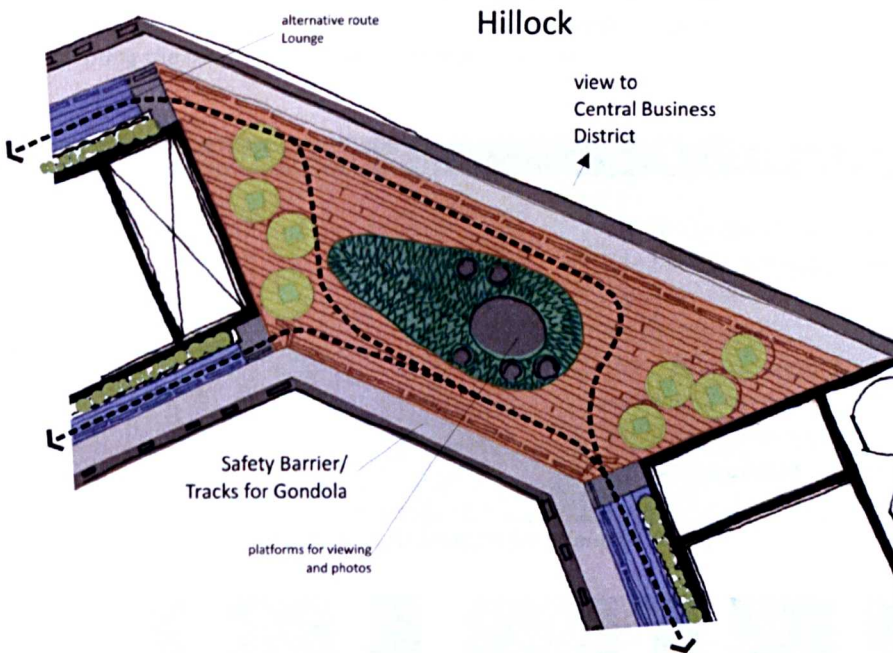
Picture 6.74 & 6.75: The 'Lounge' has two separate seating areas. Each seating area is designed to resemble a sofa and a chair with a coffee table in the middle. The trees in the park could potentially grow, providing shade for the seating areas.

Successful Features	Unsuccessful Features
<p>Seating corners good for socializing</p> <p>Lots of trees that could grow into providing shade for the park</p> <p>Sufficient length and width that provides visual comfort.</p>	<p>The park is sun-baked, not protected from the climate.</p> <p>No target users.</p> <p>Limited suggestion for use.</p> <p>The most prevalent form of use is only as a viewing deck</p> <p>The seating provision is uncomfortable</p>

Table 6.13: Successful and unsuccessful features for mini-park 'Lounge'.

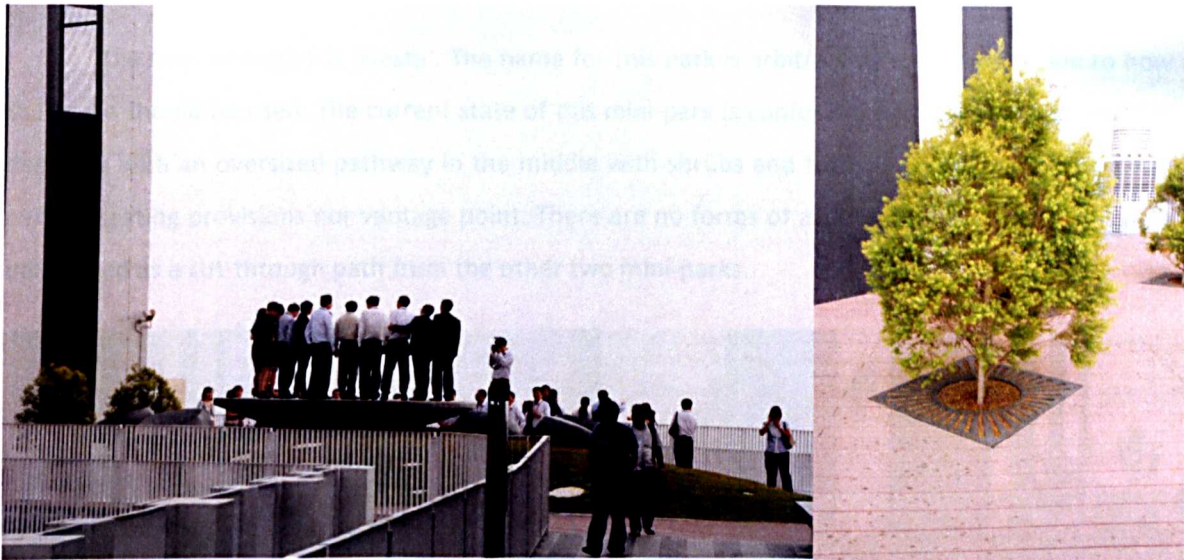
Hillock

'Hillock' is a trapezium-shaped mini-park, 800 square metres in size. It is the second-largest among all mini-parks on the 50th floor sky deck. The plot is similar in size and shape to its 26th storey counterpart. The park's length is 36 metres on its frontage and opens up to 40 metres at the back. The park is named 'Hillock' by abbreviation because of its landscape featuring a medium size hill located in the middle of the park. The mini-park is bounded by residential blocks E and F. Its long length visually makes it open to the sky, highlighting the massive voids framing views of downtown Singapore and the Tanjong Pagar area. Like mini-park 'Beach', the floor surfaces in this park are 80% covered in timber. The park only has a small amount of grass and few trees in it. A pathway behind residential block E leads to the 'Lounge' mini-park. The park does not have any benches or seating area. 'Hillock' is often used as a vista point for tourists and visitors within the park.



Plan 6.36: The name 'Hillock' implies the medium size mound located in the middle of the park. A circular platform sits in the middle of the mound that functions as a vista point. The park is 80% covered in timber decking.

The large circular platform in the middle of the medium size hill provides an excellent area for taking pictures. The platform is sought after by photographers on two important occasions annually. The first is during Independence Day and the second on New Year's Eve. The platform provides uninterrupted views of the Singaporean skyline during fireworks' displays. However, observation reveals no form of socializing in the park. The park is purely used as a vista point. Like the rest of the sky deck it is only being used as a throughway for users strolling throughout the whole deck. The design is unsuccessful as a social space. The ample size is not well used as vast spaces of the park seem empty. Given the length and size, the park could manage many forms of activities. The 'pleasure park' concept does not seem to hold any benefit to users, both residents and public.



Picture 6.76: Visitors taking pictures on the platform. The group is one of many officials visiting from foreign countries due to the Pinnacle @ Duxton's popularity as a high-rise social housing model. This group is representing the Municipal Council of Shenzhen, China.

Picture 6.77: Landscape element in the park.

Successful Features	Unsuccessful Features
<p>Excellent vantage point.</p> <p>Large size.</p>	<p>Limited suggestion for use.</p> <p>The park is sun-baked, not protected from the climate.</p> <p>No target users.</p> <p>The most prevalent form of use is only as a viewing deck</p> <p>No seating provisions</p> <p>Landscape design is minimal</p>

Table 6.14: Successful and unsuccessful features for mini-park 'Hillock'.



Picture 6.78: The landscape element in the park is only dotted by a few trees that do not do any justice in providing a good ambience.

Picture 6.79: The design of the park may highlight its location as a good vantage point but its abstract design has little use for other forms of socializing.

Fiesta

The final mini-park is ‘Fiesta’. The name for this park is arbitrary as it hold little clue to how the space should be used. The current state of this mini-park is confusing. Architecturally the park is designed with an oversized pathway in the middle with shrubs and trees in-between. The park has neither seating provisions nor vantage point. There are no forms of activities in the park as it is only being used as a cut-through path from the other two mini-parks.

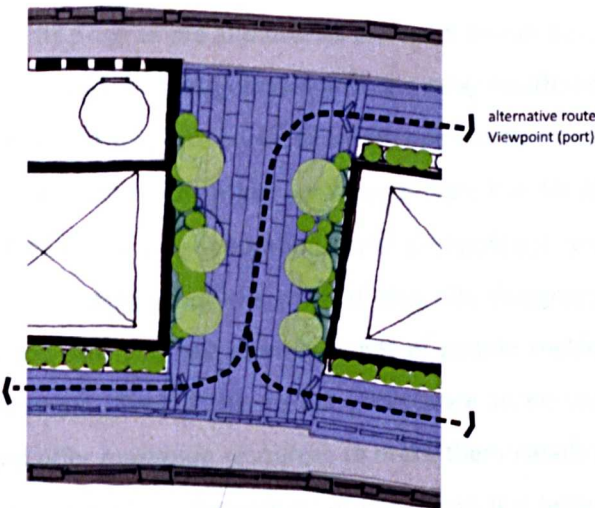


Picture 6.80: View of the mini-park.



Picture 6.81: Planter box placed on both sides of the walls.

Fiesta



Plan 6.37: Showing mini-park ‘Fiesta’ in-between blocks F and G. This plan indicates no facilities to suggest its use and function. The line in the middle shows the pedestrian route cutting through it.

Safety Barrier/
Tracks for Gondola

Successful Features	Unsuccessful Features
None	<i>Mini-park does not have any purpose.</i> <i>Mini-park is use as a public thoroughfare.</i> <i>No function</i> <i>Limited use of surface texture and materials.</i>

Table 6.15: Mini-park ‘Fiesta’ successful and unsuccessful features.

6.3 Chapter Conclusion

The 26th storey sky park is built exclusively for the residents living in the Pinnacle @ Duxton. It was designed as an end product from a top-down process that does not involve any participation from its general user. The mini-parks on the 26th storey sky park are both good and bad examples of social and public spaces in a high-rise settlement. Good examples of mini-parks, like the ‘elderly fitness area’ and ‘children’s playground’, correlate directly to user needs in the settlement while the rest of its five mini-parks are a misinterpretation in design. This thesis’s observations and interviews reveal inhabitants requesting more mini-parks like the ‘children’s playground’ in other areas of the 26th storey sky deck. Mini-park ‘children’s playground’ caters for the needs of parents who want a nearby playground with a sense of intimacy and security. Like the ‘elderly fitness area’, these two mini-parks are good examples of social spaces inserted into the 26th floor sky park. Even the jogging path is a good example of needs complementing the function and use of the whole sky deck. Unfortunately, the rest of its five mini-parks are totalitarian and under-designed, thus having little role to its programme and use. As indicated earlier by evaluation of its programme, these spaces are unusable and in no conjunction with the neighbourhood needs. The use of these pocket parks seems redundant as pleasure parks; likewise they function best with specific use reflected by the other two parks. More than any other open space plan, the designers of a vest-pocket park or mini-park must understand the neighbourhood social and political complexities (Marcus & Francis, 1998). Though faced with downsizing the original idea, the designers should not over-abstract these spaces but focus on satisfying the primary needs of people seeking comfort, relaxation, and passive or active engagement. Even if the pocket parks were to be used as themed pleasure gardens, the design should offer maximum resources to make them ideally practical to the theme the name suggests on the site. Though, in the interest of this thesis, it is believed that the pocket parks should function as people places focusing on programmes that reflect more towards the elderly, teens, children and families. The totalitarian aspect of the design seems to suggests inhabitants have little role in the design and use of these pocket parks. A recurring theme always highlights that people are discourage to personalize the spaces individually or in groups.

The main underlying conclusion from this chapter is the issue of ownership. There is a sense of contested ownership in between the residents, the block managers and the state on both sky decks that it highlights several key bad practices nominally associate with making social and public spaces in the urban realm. The same notion is also applied on the 50th storey sky park from the over-abstracting of design against function and use to the totalitarian ways of managing the space. The 50th floor sky park is not a good example of social public spaces in the settlement. The park does not take into account its potential users by breaking it down into demographic needs. The Pinnacle @ Duxton was planned by the HDB as a family settlement. The architects and designers should focus on the function and use of the park, not making themed pleasure gardens. The themed gardens on the 50th storey sky park were over-stressed in their making such that they lost many possibilities in encouraging social contact. Though lauded as a good example of 'streets in the sky', the top-floor sky gardens are a deterrent from Le Corbusier's original idealism underlined by Unité d'Habitation. The top roof of Unité d'Habitation has a swimming pool with specific spaces that target social activity surrounding the needs of the nuclei family. Though barren from any form of vegetation, the function of the roof on Unité d'Habitation in Marseilles offers opportunity for social contact that encourages a sense of community. The mini-parks on the 50th storey sky park offer no stationary activities. Users only engage in walking as there are not any places to spend time within the park. The mini-parks would be better used if the design were to focus on specific activities in it. There is a danger that the 50th storey sky park might be repeating mistakes made by older iconic high-rise settlements in the West. The 50th storey sky-park is an example of over-assumption of social and public spaces cited by Whitzman (2001) that deterred users in the long run.

CHAPTER 7-THESIS CONCLUSION: KEY APPLICATIONS AND MEASUREMENTS FOR MAKING SUCCESSFUL SOCIAL AND PUBLIC SPACES IN RESIDENTIAL HIGH-RISES

7.0 The Three Dimensions of Planning for Successful Social and Public Spaces in Residential High-Rises

The theoretical value tested in the Pinnacle @ Duxton seeks to study how and why its spaces are designed and managed to serve the needs of its users. Since January 2010 32,505 members of the public have visited the 50th storey sky park up until July 2011 (refer table 7.1). Residents living within the settlement visited the 26th floor 206,334 times and the 50th storey 233,572 times respectively. A total of 17,195 residents used the 26th storey sky deck with 574 people using it daily. Twenty-one per cent of the population in the Pinnacle @ Duxton used the social spaces on the 26th floor sky deck daily. Meanwhile, on the 50th floor sky-park, 19,465 residents used it monthly with 648 people using it daily. Twenty-three per cent of the population used the sky park daily. Overall, one-fifth of the total population in the Pinnacle @ Duxton used the social and public spaces on the sky park daily. Bearing a place that provides a vantage point for Singapore's skyline and sea port, the 50th storey sky park received numerous visits by special groups yearly. The settlement is an icon that is listed as a tourist hot spot by the Singaporean Tourism Board. Table 7.1 breaks these visits into four different groups. In total 9,782 special groups have visited the settlement since January 2010.

These breakdowns of numbers demonstrate use in both sky decks that positively state the viability of making social and public spaces on higher levels in residential high-rises. This evidence is however not substantial enough to conclude the social spaces are successful. In most designed settings, the process of design follows a sequence of preliminary studies, programming, alternative design, final design, working drawings and construction. After the completion of a building, the process ends and typically the design team move to another project. It is important for clients and architects to return back to the site after a year or two to conduct a systematic objective evaluation. If this kind of practice is taken routinely, individual designers could learn from their mistakes and successes. This thesis is the systematic evaluation of the social spaces built in a high-rise environment. Moreover, the findings would benefit the design community illustrating the mode of approach and necessary measurement that could ensure the success of the investment made by clients experimenting in such endeavours. By disseminating knowledge found from this thesis, students and professionals can be educated in the process of looking more critically at how design works for their users and so have the tools that will be useful in future projects. How can public

spaces in high-rise/tall buildings be made successful? And why is it important for high-rise/tall buildings to have social spaces as a pre-requisite factor to deem it as a successful sustainable social development? Moreover, to what motivation can designers build good and successful public/social spaces in the urban realm?

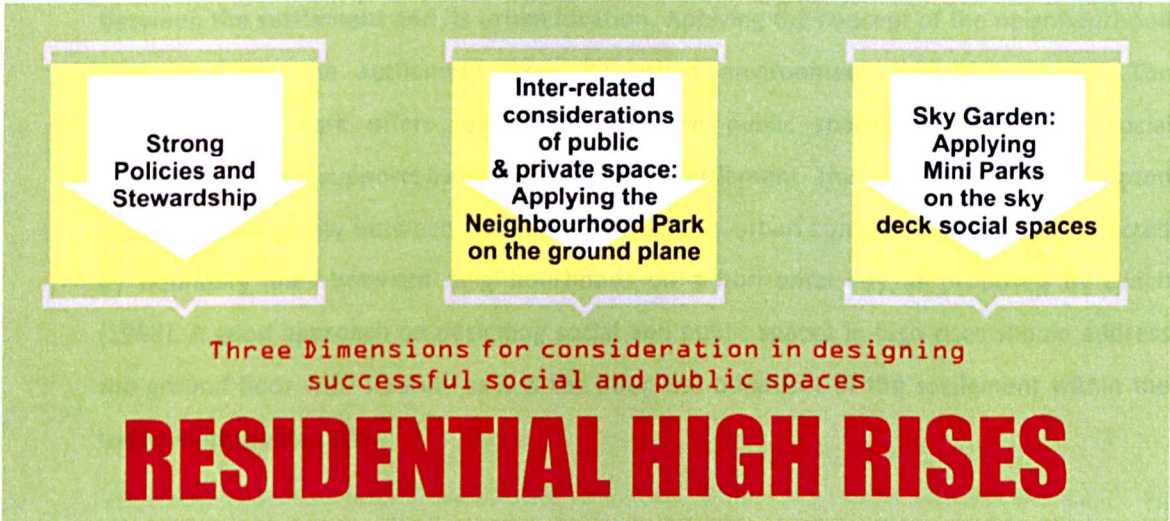


Figure 7.1: An illustration of three dimensions needing to be considered when designing social and public spaces in residential high-rises. These dimensions are good urban design guidelines that could ensure successful social and public spaces in the typology.

Key application and good measurements for making successful social and public spaces in residential high-rises are divided into three parts:

- **The first is strong policies and democratic stewardship.** It is necessary that any implementation must come under a comprehensive policy or framework that covers social, political and economic backdrop of the inhabitant meant to use the space to ensure the development of the idea is practically executed. Without policies that are backed by important agencies such as the planning department or housing provider, the implementation of the idea will not be possible. The necessity of policies and stewardship means that the development can be incorporated fully to the policy controller's perspectives. It is important to recognize that improvements in environment quality cannot be left entirely to the actions of the development industry or individual business or householders (Punter & Carmona, 1997). The Singaporean Government does recognized the need for improvements in its housing market stock by supplying social and public spaces with Pinnacle @ Duxton bearing the front of the new experiment. Though the stewardship tend to be too totalitarian when it comes down to the use and management of the public space. Whilst while it is important to recognize improvements, it is also important to

recognize freedom of expression. Public space at the end, belongs to the public, as in for Pinnacle @ Duxton, it belongs to the residents. Good practices of stewardship in making successful social public spaces is a mutual endeavour that represents both sides of the process.

- **The second approach is making social and public spaces that mediate private and public between the settlement and its urban location.** Applying the concept of the neighbourhood park mediates the settlement from its urban environment in which it sits. The neighbourhood park offers residents social and public spaces as a form of social infrastructure that supports living in the high-rise settlement. This meditation creates a good sense of territoriality between the settlement and its urban context. This is often reflected by boundary lines between neighbourhoods on a horizontal city as proposed by Lynch (1968). A good approach on designing social and public spaces in high-rises should address the ground floor with scrutiny as it is the door and boundary of the settlement within the larger metropolitan city.
- **The third approach is addressing the sky gardens on the top floors as mini-parks or vest-pocket spaces.** As the sky gardens are limited in size and location it is best that their design should carry the same recommendations proposed on how to design mini-parks nominally found in tight urban high-density areas. The inherent premier value of open space on any high-rise development makes it difficult for developers to invest and manage it. Mini-parks presents future developers with an opportunity to make urban realms in the sky within a controlled sustainable investment.

These three dimensions are presented in good and bad considerations that will ensure the social and public spaces designs in high-rises under the same analogy can achieve better success in their use, thus having the ability to become 'Urban Places in the sky'.

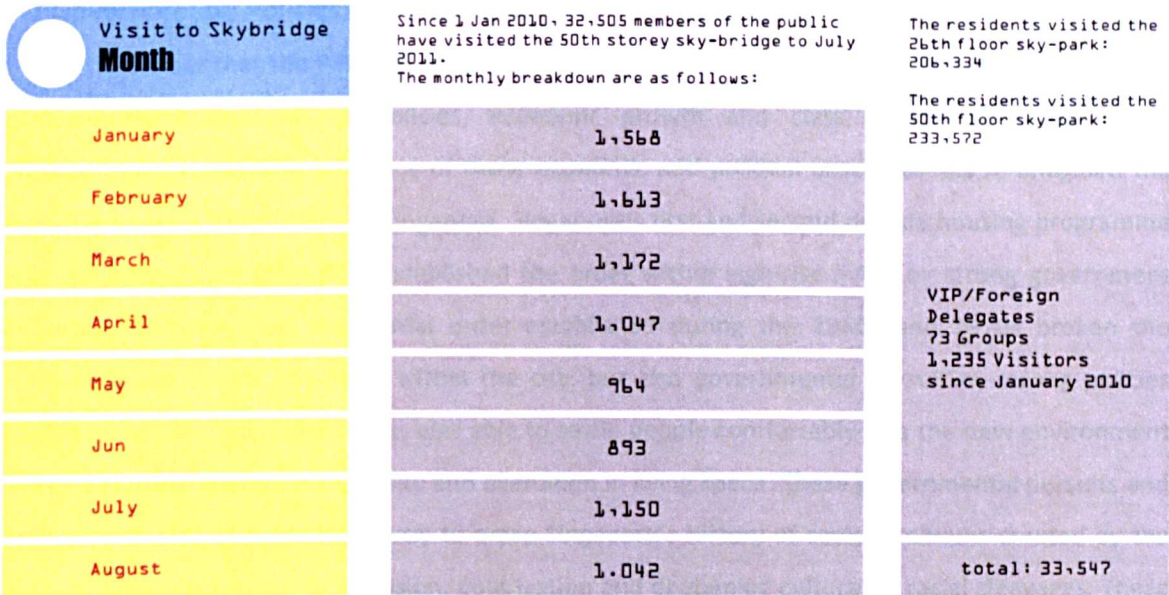


Table 7.1: Data illustrating numbers of users in the Pinnacle @ Duxton since January 2010. Table source: The Pinnacle @ Duxton management, 2009.

According to Arc Studio Architects, the Pinnacle @ Duxton was made possible because of its meta-architecture approach. From interviews, Arc Studio asserts that meta-architecture is a system that was developed by HDB over the years that integrates the financial, technical and strategic master-planning requirements. This inherently transformed the public housing typology. Many concerns of the past are taken into consideration. For all premises of future high-density housing, it is critical to find a design solution that has a feeling of airiness and lightness, and also a good sense of home and community. The design in the Pinnacle @ Duxton addresses the physical design parameters as well as intangibles that create a liveable, safe and sustainable environment (Beng & Huang, 2012). This thesis proposed a method in making social and public spaces in residential high-rise building. As mentioned in the research background and methodology of this thesis, the study proposed that informed suggestions taken from the urban design theoretical framework provide the fundamental basis of the proposition as analysis and theory. It suggests many arrays of criteria to good practice of designing social and public spaces. It serves as a guideline for designer’s intent on creating social spaces in the urban environment. Informed human behaviour and social activities in the Pinnacle @ Duxton create a general conclusion to how designers should take their approach in designing social spaces as public places in high-rise buildings. *People Places* (Marcus & Francis, 1998) provides the fundamental background for this theoretical proposition, for it presents a testable real setting with a description of how it works.

7.1 Governmental Policies and Stewardship

It is clear that the Pinnacle @ Duxton is a new spatial order that has risen from critical and controversial anthologies in policies, economic growth and class restructuring within the Singaporean context. The influence of these economic and political processes has re-imagined the high-rise housing programme in Singapore. Singapore's first and second decade housing programme was the operational force that established the order within high-rise living by strong government influence. Not only has the spatial order established during the 1960s and 1970s broken the traditional settlement of people within the city, but also governmental pursuit by strong policies guided by specific goals and tenets was able to settle people comfortably into the new environment without causing too much animosity and alienation in living space. These governmental pursuits and endeavours were pursued rigorously to erase Singapore's history of social problems created by the old urban form subjected to exclusion, polarization and deepening cultural or racial cleavages. These significant pursuits in rearranging the social-economic spatiality proved successful to transform the city into the Post-Fordist state ensuring capitalist development of the high-rise typology. Grunsven (2000) argued that Singapore is intrusive. However, with confronted future changes of ethnic and spatial heterogeneity, this success is still a matter of speculation as to whether the residential landscape would remain in its status quo. Nonetheless, strong governmental pursuits and stewardship in the programme are a good measurement for success in creating social and public spaces in the sky.

7.1.1 Social Mobility and Positive Changes in Class Structure

The establishment of its people into the high-rise settlement was further positively complemented by the dynamic changes of its class structure. The Post-Fordist phase of capitalism resulting from economic change caused the general household living standards to rise substantially in the 1980s and 1990s. Rising affluence affects household aspirations towards living as well as their socio-cultural inclinations. This social-cultural inclination generates cultural capital within the urban form as its inhabitants demand spaces that symbolize quality living. This impact validates the need to create more social and public spaces within the development. Most importantly, trapped within a singular form of urbanity, these social and public spaces evolved around the high-density environments. By 1990, drawn by rising needs, expectations and lifestyles, the consequential outcome of high-rise living, Singapore became synonymously referred to in general as middle-class housing, far from its initial working-class objectives early in the 1960s. The people living in it are also no longer reluctant tenants. Instead, the majority of its residents gave positive feedbacks for high-rise living; 82.5% of the population expressed contentment about the idea of always living in a high-rise apartment (HDB, 2000). While the unattractiveness of blocked views and natural ventilation

seems to hinder great expectations of living in these high-rise buildings, many households still expressed willingness to live on high floors if the design can compensate with better social and public spaces (Belinda Yuen, 2009). This fact puts Singapore on the winning side of high-rise living considering its economic factor managed to support the growth of this typology.

7.1.2 Targeting Sustainable Urban Growth

Due to the size of the city-state being only 700 square kilometres, it is not a surprise that the URA created its planning agenda to encompass more than physical building but also issues of sustainability. By the end of the millennium, the concerns over climate change, peak oil, water, waste, biodiversity and urban quality of life became greater, especially within a city depending on the global economy and limited natural resources. The focus towards biodiversity pushed the idea of going green vertically possible even extending to consider putting parks in high-rise buildings. Growing innovative ideas of vertical greenery launched the Sky-rise Greenery initiative that promotes roof and wall greening to the public. Eventually this innovative idea became widely accepted among developers, government planners and architects. Urban design and many future developments are constantly being re-evaluated to fit into this idea. The Pinnacle @ Duxton benefited from this idea in its making as an emerging paradigm in its residential high-rise typology. Positive acceptance forced by the realization of sustainability issues is a prime factor why there is the need to design new high-rise residential complexes with careful scrutiny so that they will survive generations ahead guaranteeing the state investment in them.

7.1.3 Lifestyle as a Commodity in Re-Imagining the High-Rise Typology

Furthermore, with its market operation entering the global phase, the idea of neighbourhoods and neighbouring became an important dimension of urban contemporary life. The context of social cohesion and capital began to illustrate how these values are becoming a source of 'commodity' as a domain of safety and security compatible lifestyle packages sold within the high-rise complexes. The idea of the neighbourhood becomes a 'consumption' niche. What we consume and who we consume it with are increasingly important parts of the social cement of contemporary urban life and this is reflected in the increasingly sophisticated classification of neighbourhoods in terms of consumption patterns and lifestyle groups (Forrest & Kearns, 2001). This particular evolution is discussed in the form of gentrification and diversification of its social group in the city, resulting in spatial reconfigurations and re-imagination of the high-rise typology. While historically the division of people in the city was from ethnicity, in the new waves of changes new high-rise complexes are built to capture the cosmopolitan profile of its inhabitant who choose to inhabit the spaces. Addressing this, residential high-rise complexes need to expand choices in lifestyles of living

creating less homogenous designs among the middle, middle-high and high-income earners in the city. It is yet to be decided if the Pinnacle @ Duxton managed to fit this new wave of changes. However, by planning and design, the Pinnacle @ Duxton does carry the intention of bringing in the concept of social capital, thus maintaining the social cohesion of the neighbourhood.

These important correlations of incidents assert the necessary measurements that should be taken into consideration to make good social and public spaces in residential high-rise buildings. The role of state development is important in shaping and structuring the socio-economy of the residents. Planning of good urban spaces in the global era is no longer limited to the typical physical planning but also includes the economic issues of employment and wealth creation. Planning also should include issues concerning the social fabric like identity and sense of belonging (Thornley & Rydin, 2002). Though considering the range of factors and processes indicated in the overall narrative, some would only be applied uniquely to the Singapore context. The ordered and obedient society presented from interviews and observation in Pinnacle @ Duxton proved that the social spaces are not free for democratic use and freedom of expression. Nonetheless, the manner of which Singapore turns its residential high-rise development into a leading programme that creates social and public spaces in the sky offers lessons for other cities facing similar challenges in the future. It is up to policy makers, city councils or developers to assume the role of playing 'big brother' in managing these social and public spaces. The author of this thesis however disagree with the excessive role HDB is taking in controlling public rights on these public spaces in the sky. As Carr et. al(1992) asserts, good social and public spaces will always be analyses on three important values: its responsiveness, democratic use and meaningfulness. This thesis asserts that, if other cities want to invest in projects concerning social and public spaces in the sky, they need to understand how it is important to value the social construct of its inhabitants. The success of a concept cannot be evaluated without the knowledge of how it was put into action.

7.2 Mediating between the Ground and the Sky: Applying Neighbourhood Parks in the High-Rise Typology

Neighbourhood parks located on the ground level within the residential high-rise settlements are important intermediation points where private meet public places. These intermediation points are places where the inhabitants of the settlement could meet on the ground level providing a connection to the greater urban environment where the high-rise sits. Neighbourhood parks are a good public space typology that could be applied as mediation spaces between the settlement and the city. Tall high-rise settlements will create deeper psychological barriers between its inhabitants and the urban environment. These barriers are represented by

stress living in an unnatural environment with threats of security and too much human contact. The neighbourhood park creates a psychological barrier that protects a high-rise settlement where it is most vulnerable: the ground. The design of a neighbourhood park no longer can be associated with mass-produced and centralized institutional design highlighted by the first modern age. Neighbourhood parks in the third modern age should be more relevant to community life in order to sustain sociability within neighbourhoods in urbanity. The changing demographics of people with shifting values and attitudes contribute too many different public desires for a greater range of leisure settings. The creation of neighbourhood parks in high-rises should take into account 'lifestyle niches' as a commodity in its design as the idea of neighbourhoods and neighbouring is an important measurement of successful urban contemporary life. The key principle in making the ground floor a successful social and public space is achieved by two measurements. Studies made by Marcus and Francis (1998) cited two measurements, which are the park's natural setting and levels of human contact. These recommendations are not directives but discussions on how neighbourhood parks are designed to suit different localities and users. In the case of the Pinnacle @ Duxton these factors are suited as recommendations based on post-occupational analysis done on the third storey neighbourhood park.

7.2.1 The Natural Setting

The neighbourhood park in the Pinnacle @ Duxton is a decent consideration of creating an oasis of greenery in a concrete world. Its natural elements provide visual relief to its inhabitants living in the settlement. Metropolitan users frequently cited their reason for park use was 'contact with nature'. When interviewed, the users in the Pinnacle @ Duxton associated their reason for the neighbourhood park use was as a retreat and relaxing in nature. The need for a park as a retreat oasis is pressing in high-density sectors of the inner city. (Marcus & Francis, 1998) assert that the amount and type of vegetation strongly influence park users' degree of satisfaction. Singapore's hot and humid climate dictates the use of parks needs shading from the sun and rain. In effect, when designing parks in a tropical setting, trees with the potential to grow huge crowns prove popular as they provide ample shade against the sun. Tropical parks are prone to insects and bugs, hence they need careful selection to avoid irritation to users (NPB, 2009). All these settings and considerations are applied in the neighbourhood park in the Pinnacle @ Duxton. Applying the natural setting is different to the geographical location of neighbourhood parks within different high-rise settings. A high-rise settlement located in the Middle-East might need their ground floor neighbourhood park to be constantly shaded with vegetation that survives well in the desert climate.

According to Gold and Sutton (1980), neighbourhood parks need to be varied in their aesthetic quality. The greater the variation, the more likely the user's desired feeling to use the park.

Approaches in maximizing this effect can be done by planting a variation of colours, textures, shapes and fragrances. The idea is to create maximum effect of the natural environment in an urban environment. The use of falling water is highly effective in diffusing urban noise that creates a sense of well-being and calm. It is a pity that there is not much variation in the aesthetic quality of the Pinnacle @ Duxton's third floor neighbourhood park. Nonetheless the design is comfortable enough to provide tranquillity and a comfortable urban sanctuary surrounded by its high-rise blocks. The artificial mound and meandering pathways in the park is a successful feature. Marcus and Francis (1998) indicate meandering pathways with varied views and alternate settings of enclosures and openness with opportunity to sit and rest are the most pleasing elements in a park. The provision of tables in the gazebos provides opportunities for those wanting to eat, read and study outdoors. Some of the locations of these gazebos provide privacy away from main pedestrian paths but are not visually isolated. The consideration of the micro-climate is highly commendable. The neighbourhood park has ample shading from the sun in small enclosures and pathways surrounding it. The immense shadow cast by the huge tower blocks gives shade from the evening sun but provides ample sunlight for vegetation in the morning.

7.2.2 Balancing Human Contact

The dominating function of a neighbourhood park is to encourage human contact within the community it is situated, as what people do in parks is social contact (Marcus & Francis, 1998). Social contact in parks is divided into two ways: covert or overt. A good park design would have both qualities for social contact. The Pinnacle @ Duxton is a neighbourhood park located in a high-density area. Conversely, it is established in a residential neighbourhood area where its programme and functions are family orientated. Naturally the park is designed for getting together in picnics, games, sports and so on. Its seating patterns, circulation system and recreational facilities are designed and affected by these measurements. The careful segregation of the three enclosures separates human contact in the park between overt and covert forms of socializing. Enclosures situated near to pedestrian routes are the best examples of both overt and covert socializing. Enclosure C, located away from popular pedestrian routes, has quiet zones for self-contemplating. There are good examples of seating arrangements to support this type of social contact desired by the designers. The concave arrangements found in enclosure C encourage contact, while the convex arrangements found at the edges of the enclosure discourage contact. Both arrangements are forms of overt and covert socializing.

Similarly, all over the park long convex benches are placed along meandering pathways for people watching. Unfortunately these benches are left open to the elements with no form of shading. Hence benches located in the enclosures proved popular by use, even in the afternoon sun,

for overt and covert socializing. The gazebos placed sporadically provide desirable places to be used by families and groups of teenagers. Although the walk through in the park is not attractive, it is wide enough not to disturb human contact at the benches. The park has no claim to regular groups of users claiming certain areas. There are no claims to specific gazebos or benches. Marcus and Francis (1998) assert that claim to a particular territory or seating area may encourage a group cohesion and identity. Although there are some elderly people living in the settlement, they do not frequently use the neighbourhood park. The elderly user group prefers the 26th floor sky deck to the third floor neighbourhood park. Only on certain occasions, when there are public gatherings, would they venture down to the third storey park. Recurrent use of the park by teenagers might annoy the elderly who prefer contemplating and relaxing in quiet secluded areas of the park (Greene, 1998). Enclosure B might be appropriate for their use but with no adjacent functional space for surveillance nearby it was avoided by the elderly in fear of security.

7.3 Sky Garden: Applying Mini-Parks in the High-Rise Typology

Architecturally mini-parks in high-rises are determined by nine important factors that validate their design as successful. The nine factors are entrance, boundaries, functional areas, play areas, surfaces, plant materials, site furniture, maintenance, and stewardship. These recommendations are not directives but discussions on how mini-parks could be designed to suit different localities and users. In the case of the Pinnacle @ Duxton these factors are suited as recommendations based on post-occupational analysis done on the 26th and 50th storey sky deck series of mini-parks.

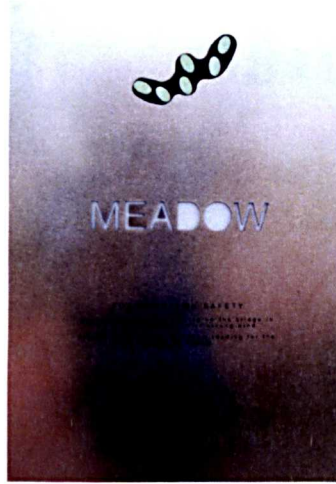
7.3.1 Entrance and Boundaries

Of all the seven mini-parks only two have a well-designed entrance and boundaries, the 'Elderly Gym Area' and 'Children's Playground'. Although located in-between two pathways and they are by location a through-the-lot type, neither pocket park is used as a thoroughfare. Both pocket spaces are elevated on a raised platform. The platform gives a good sense of boundary for each park, defining its boundary. The raised platform also functions as benches on its boundary, marking the entrance while allowing its users to watch pedestrians walking in front of it. This configuration is greatly encouraged as the elderly enjoy sitting on sidewalk benches (Marcus & Francis, 1998). A small entrance highlighted by a ramp and low wall faces the walkway. This small entrance announces the location of the pocket park. It also interrupts the circulation in-between two pathways that run parallel to both sides of the park. This prevents direct access for circulation, especially by joggers. This feature doubles as a boundary and controlled access into the pocket spaces. The controlled

access creates a sense of privacy for the user in both parks. This feature addresses the need of its target users for the elderly and families with children.



Picture 7.1: Boundary lines in mini-park 'elderly fitness centre'.



Pictures 7.2 and 7.3: Signage indicating location and name of mini-parks. The signs are made of stainless steel. Its shiny surface creates glare and is difficult to read.

The other mini-park does not fare any better as it is not defined with clear boundaries and has no significant architectural elements to indicate ingress. Although the mini-parks 'Meadows', 'Cradter', 'Sea Point' and 'Hill Point' do have different floor surfaces indicating their boundaries from the pathway, the effects are weak. The problem is prevalent on the 50th storey sky park as all have weak indications of boundary and entrance. The sizes of the mini-parks 'Beach', 'Hillock', 'Meadows' and 'Cradter' are huge. Compared to the compactness of other mini-parks such as 'Space Net' and 'Elderly Fitness Area', as both are filled with play structures, fitness machines and benches, 'Meadows' and 'Cradter' are barren and empty. Their landscape element may suggest the use as pleasure gardens but their practical application is not to full architectural effect by their suggestive theme. Although the sign of each mini-park suggests landscape features depicting the rural countryside, they have little to offer in imagination. Both mini-parks only have little more than shrubs and trees, not full-scale greenery. With no clear boundaries and weak architectural quality these parks are left unused. These parks are easily mistaken as only walking thoroughfares. Mini-parks should be clearly defined by the extent of their territory by clear boundaries (Marcus & Francis, 1998) to avoid confusion in use. Consequently, many badly-designed mini-parks failed to indicate clear boundaries within their play area, function and circulation. The need is not only for visual purposes but also a practical one.

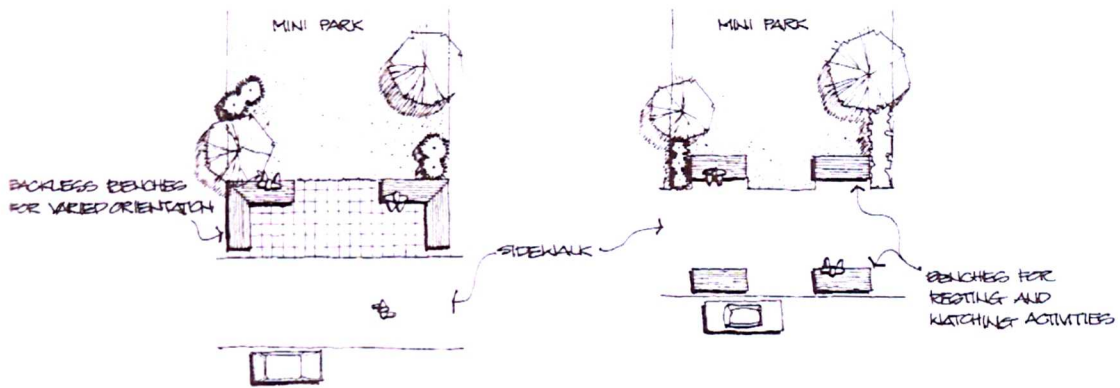


Figure 7.2: Mini-parks entry guidelines. Picture source: Greene (1998).

The architectural qualities in these spaces hinder its users for social interaction. All pocket parks 'The Meadow', 'Cradter' and 'Fitness Area' are through-the-lot types of pocket spaces. Without any indication or boundary to define the space, they turn into becoming mere pathways connecting the two circulation bands on the 26th and 50th floor sky decks. An entrance is crucial to a mini-park for it informs passers-by the location and the suggestive activity in it. With no indication, users venture into both pocket parks without any intention to stop and rest, so the pocket park fails in its use and activities. The setting is also different when compared to the 'Elderly Gym' and 'Children's Playground' as the elevated surface delineates the pocket space from its pathway. Observation indicates that all three pocket parks 'The Meadow', 'Cradter' and 'Fitness Area' are not used as people places. Occasionally, families or visitors do venture into a park but never stay long enough to use it. All three spaces suffer from lack of seating provisions. Benches are provided in those pocket parks but are arranged poorly without any suggestion for social interaction.

All vest-pocket parks on the 26th floor are interconnected by a jogging path that serves its duality as an active space and pedestrian pathway. The jogging path is also considered as a social infrastructure; more importantly it functions like a street. Though the scale is small and in comparison less complex to the larger urban realm, it has the potential to generate quality public and social places like its successful contemporaries on the ground. The subsequent nature of its design is also a reminder of Le Corbusier's controversial adaptation of 'Streets in Sky'. The jogging path capitalized on the total length of the whole 26th storey floor template. The use of this jogging path is not subjected to an origin point nor does it have an arrival or end point. This missing feature made the programme of the 26th storey sky park confusing, as it does not have a suggestive point of origin to explore the floor. Critically, if the jogging path is to represent the notion of a street in the sky, it should have a starting point that delineates movement on the whole floor.

This argument of a missing starting point relates back to the scheme being downsized to its current state. Nonetheless, the pathway is being used constantly by the residents nominally in early morning and late evening. The use correlates with the programme. Most users of this space are joggers. The elderly would use the jogging path to perform walks while families with toddlers would use it for strolling. The length of the jogging path provides a protected active space for the users in the settlement. The users expressed their satisfaction because the jogging path is within a short radius to where they lived. The same could be agreed upon for the eight mini-parks as they are sited in the settlement without users walking more than a two-block radius or crossing a major street. Jasprizza (1999) asserts that nominally the two-block radius (300 metres) is the accepted area for accessibility to a pocket park. Though it was only mentioned in the horizontal sense, it is acceptable also to assert that vertically social spaces beyond a 300 metre radius will attract fewer users. According to Belinda. Yuen and Hien (2004), the higher the floor, the less its inhabitants will go down to use its social and public spaces. The 26th floor sits perfectly within the radius of all residential floors.

The only compensation of the pedestrian path on both sky decks is in its design. Though its primary need satisfied the use for active engagement highlighted by its jogging track (26th floor), the path offers minimal use for other functions. This is unfortunate as the width of the pathway can accommodate different ranges of use. Undefined spaces are littered along the pathway as it punctures through the residential blocks. These undefined spaces may have the potential to enhance passive engagement within the pathway. As mentioned earlier, the demographics of the Pinnacle @ Duxton are not just limited to young adults but also to the many families living in it. The corridor or arcade alongside the pathways would have a more pleasing ambience if they were to have a variety of equipment like long benches and tables. Essentially, because a mini-park is approached by foot, a small entrance demarking its entrance is needed. Marcus and Francis (1998) observations on mini-parks in the San Francisco Metropolitan Area assert the demarcation of an entrance would define the park, thus informing a passer-by of its use. There should be a name plate that identifies the use of the park as a public space with a community bulletin informing those in charge of the park. As Carr et. al(1992) asserts, good social and public spaces will always be analysed on three important values: its responsiveness, democratic use and meaningfulness.. All mini-parks on the 26th floor have name plates but they do not have suggestions of how to use them. Only the elderly fitness mini-park has machines that instruct the elderly how to use them. Mini-parks 'Space Net' and 'Elderly Fitness Area' have clear definitions of their areas; both are elevated from the surface of the floor. This clear demarcation separates both mini-parks from the pedestrian walkways. Moreover, both parks have entrances that inform any user passing by of their use and

function. Since mini-parks are small, they cannot make an impact visually in the urban realm. The inhabitants living within the catchment area should be alert to the park's existence with signs for the user to find the park (Francis, 1998). These guidelines are found on both mini-parks, hence with their appropriate architectural features making them popular among the inhabitants of the Pinnacle @ Duxton.

Mini-parks should also be less like pleasure parks as they tend to function with hybridization between parks and a small square or piazza. Too many landscape elements in the park would limit the use. Too little landscaping would be unappealing. Landscape in mini-parks should be designed as functional elements for boundary, function and use, not visual embellishments. Though, in creating good public places, it is undeniable that the visual dimension is important, in the case of a mini-park the body of its trees, planting and architectural embellishment should always contribute to the functional use of the park. Good design of a mini-park needs to address the vertical wall planes that sandwich it. Numerous writings and books agree that the visual quality of a place is in its 3-dimensional quality (Smith, 1980); (Carr et.al, 1992); (Kostof, 1993); (Carmona et.al, 2003). Often the walls surrounding a mini-park are left bare. To a greater extent, if permitted by the owners surrounding the mini-park, designers should unify the visual quality into one architectural unity. This sense of architectural unity would define the boundary of a mini-park, hence giving a sense of visual grounding to the site. This visual groundmass would add character, hence implying identity to the site. In correlation to the entrance, the park's boundary to its adjacent pedestrian pathway should be defined as it also addresses the location of the mini-park.

Because of its size, a mini-park will always have at least two walls defining its enclosure. The buildings sitting next to mini-parks are usually residential or private properties. Some form of protection is needed if the use of the mini-park is subjected to noise and activities. A clear definition of boundary by hedges or low wall would protect neighbouring lots from these activities. Though, this is not needed on the 26th floor sky deck as there are no neighbouring functions surrounding it, either residential or commercial. The mini-parks do have neighbouring residential apartment units situated on the 26th floor plane on the boundary walls of blocks B and C: 'The Elderly Fitness Area', blocks C and D: 'The Meadows', blocks D and E: 'Space Net', blocks E and F: 'Cradter' and finally blocks F and G: 'Paddy Fields'. These neighbouring units have windows opening from the side of the apartment. Their backyards face these mini-parks with their kitchens and dry-yards overlooking the mini-parks. However, it would benefit more if some spaces on the 26th floor were to have neighbouring functions facing these mini-parks as there is little to offer in terms of activity. Public spaces do depend on programmatic incentives that would inject activity into them. It is an important consideration to put important functions next to a public space, such as a post office, café or even an

institutional space reflective of a neighbourhood cultural and religious practice (Carmona, Heath, Oc, & Tiesdell, 2003).

7.3.2 Function and Play Areas

Mini-parks needed to be purposive in their programme and design. Careful planning is needed to make these mini-parks as the tendency is to focus on small specific needs of the people using them. Designers must work with a delicate balancing act to vary use throughout the day without making the spaces too rigid or too unrestricted, otherwise ending up in becoming a dead space (Jasprizza, 1999). One of the unique and exiting characters of mini-parks is that they can be created out of vacant spaces or lots on forgotten spaces. With smart programmes catering to the needs of the settlement and resourceful solutions to design, the results can sometimes be better than large public parks. Unfortunately, the interview with Arc Design Studio indicates no knowledge of detailed theory in implying pocket parks' design in both sky parks. Arc Design Studio only summarizes the fundamentals of making these spaces as sky gardens to serve only as social foci. The primary notion of making it as sky gardens validates the reason why some of these mini-parks do not have any clear or purposive social functions. Only two of them are indicated clearly with functions that reflect the nature of their suggestive activity. The rest of the spaces may have names indicating their suggestive purpose but the design and use do not reflect their purpose.

This thesis recognizes that, if the mini-parks were more purposeful in their function, their use would be more successful than they are now. The functional aspect of a mini-park asserts user spaces taking priority over visual spaces in its design. This correlates with the argument that, due to its size, every single square metre needs scrutiny when planning its function and programme. Always consider that the use of aesthetics in a mini-park should always be functional. The functions represented by its architectural form should also be in direct view from the entrance for people to use and reach them. If the mini-park should serve a variety of functions, the location of each sub-space needs to be positioned according to the characteristic of each user. According to Francis et.al (1984), this positioning is crucial in order to clearly suggest the use of the park. The demographic background of the Pinnacle @ Duxton suggests the priority and use towards young families, teenagers and the elderly on the 26th floor sky deck. Since the size of space for mini-parks is small and near to residences, it is appropriate that the programmes are to exclude activities that create too much noise. The location of the basketball court on the third floor public park is ideal. According to Carr et.al (1992), teenagers are highly mobile and therefore would not mind travelling a short distance to get to their social spaces. Likewise, users like families with young children and the elderly would prefer their social spaces to be nearby. Marcus and Francis (1998) assert that, if teenagers are known to be the group in need, it is appropriate to provide their active games at a neighbourhood

park rather than in a mini-park. The designer's approach to put most of the active space at the neighbourhood park below on the third floor is a good design judgement. Nonetheless, teenagers should not be excluded in having social spaces for them on the 26th floor sky deck. Observation reveals they do use mini-park 'Paddy Field' as a place to study. Potentially, if this mini-park is equipped with study tables, it might appeal to teens, giving this space a sense of purpose. The purpose would also not be in conflict to noise as the outdoor study area is passive.

Currently, both sky decks are focused only towards two dominating programmes, rest and recreation. It is common for social spaces in high-rise settlements around Singapore to be inclined towards rest and recreation rather than socializing (Appold, 2011; Yuen & Hien, 2004). This justifies why five out of fourteen mini-parks on the sky decks are pleasure gardens. Though these themed gardens do imply some suggestive functional use, the architectural design of the mini-parks is impractical. In all five mini-parks their functional aspect does not encourage social interaction. Programmes planned on the 26th and 50th floor sky parks represent mostly a missed opportunity to create these mini-parks as people places. Nonetheless, two of the pocket spaces do reflect successfully their function from design. The two mini-parks, 'Elderly Fitness Centre' and 'Children's Playground' reflect the need for families and the elderly living in the settlement without over-abstracting the programme in them. The function clearly informed its users in awareness to use the space. It fits perfectly to the design philosophy of a mini-park which is typically focused in function and use. This functional dimension is important as social spaces need to be responsive to their target population (Marcus & Francis, 1998). The least could be said towards the remaining five mini-parks in their respective programmes and functions. The problem faced by all five mini-parks is in their confusing function verses the design. The outcome of this result is because of the intense negotiating between the designers and owners of the development in issues pertaining to maintenance, safety and anti-social behaviour. The final design seems to negate many of its winning elements from proposals into making social and public spaces in the sky.

Though the outcome may negate away from its original design programme, unexpectedly these mini-parks are well-received by the elderly as pleasure parks. These themed gardens are in fact good for quiet use and contemplation. The themed gardens, though not to full architectural effect and quality by their location's name, are able to compensate enjoyment for the elderly as their intermediate sensory level appeals to the elderly. These themed mini-parks enable them to become autonomous within a secure environment without intermingling with the crowds on the lower neighbourhood park. Nonetheless, this notion is directed towards the whole 26th floor sky deck, not individual mini-parks in particular. As the proportion of older persons in the Singaporean

population began to increase, aging issues began to grow especially in the design of high-rise housing. Planners assert the need for social interaction, privacy, personal space safety, security and mobility in old and new housing estates. Based from interviews most of the elderly living in high-rise settlements around Singapore are in their retirement age of approximately 55 to 70. They have the ability to be independent and mobile. The types of social activities they usually engaged in are self-initiated hobbies, leisure, recreation, social with health and fitness related (Marcus & Francis, 1998; Belinda. Yuen & Hien, 2004). The 'elderly gym area' caters for the need of leisure, health and fitness programmes. The design of this mini-park is best described as a 'prosthetic environment'. A prosthetic environment is one that permits the older person to function, in spite of disabilities, by offering support when needed but allowing for independence and learning (Marcus & Francis, 1998). Prosthetic elements such as the abundance of handrails are available on the 26th floor deck. The elderly user group response reveals the need to make more mini-parks on the 26th sky deck that adhere to their needs. 'The Meadows', 'Cradter' and 'Fitness Area' are mini-parks that might benefit better as places for the elderly to use. Rather than designing these mini-parks with abstract representation of nature, they might function well as private garden lots for the elderly. An elderly lady expressed her disapproval of these mini-parks by stating:

"I think these spaces are a waste of public money. They offer little value to how I could use it. I would like the management to think about changing these obsolete pretty landscapes into vegetable plots or personal gardens. I would love to have a personal garden. I love gardening. I would not mind paying monthly to the management in having a small lot for gardening." (interview, 14 April 2011)

Her proposal is in correlation with the fact that the elderly do love to do gardening. Numerous scholarly articles and books support the idea that individual planting beds allow for personal gardening to enrich the lives of the elderly in urban settlements (Cartstens, 1998). Furthermore, the idea of providing garden plots on sky decks in a high-rise settlement has never been attempted. It would be ideal if the Pinnacle @ Duxton would steward this in response to the needs of an elderly population who usually finds high-rise living oppressive to their well-being.

The post-occupational analysis done on the 26th floor sky deck concludes that five of the mini-parks need minor re-programming. After two years of occupation, the mini-parks' use has stabilized revealing different aspects of user needs. It is recommended that mini-parks should be evaluated in their use and programme by post-occupational analysis two years after their completion (Greene, 1998). Since the Pinnacle @ Duxton is a newly-built settlement, there is no community participating in the programming and design of the mini-parks on the 26th storey sky deck. This is probably because the designers opted to put pleasure gardens in most of the mini-parks without any indication of a programme. Though most of the programming has been given priority for neighbourhood residents to have recreation, the design does not specify who is most in need of

those spaces. The approach is subjective without any user objective. This approach might have its silver lining as the management does not need to spend more in altering the mini-parks according to the user needs. The management does express willingness to alter and modify the mini-parks according to the needs of its inhabitants. They confirmed that there is small budget allocated for further additions and modifications. The positive feedback from the management and HDB is reflective of the governing body's views towards good up-keep of high-rise settlements around Singapore.

Apart from expanding the elderly spaces, this thesis proposes creating more play areas for smaller children on the 26th storey sky deck. The current play area only caters for older children. There are no areas for small toddler's lots. There is no scaled-down equipment important for children of ages three years and below. Mini-parks like 'Community Plaza' and 'The Meadows' are large enough to support more than two user groups. In addition, any of these mini-parks can accommodate both children's user groups. It is important that these additions must also be supported by public toilet facilities and water coolers on the 26th storey sky deck. Children especially may need to use the toilet if they stay in the park more than an hour or so. The toilets need to be heavily constructed and located nearby mini-parks for children (Greene, 1998). Litter cans are also necessary. Children will not go far to throw away candy wrappers and allow picnic tables to be located nearby play areas for parents to put food while observing their children playing. These recommendations would turn these mini-parks into welcoming spaces for children and parents to spend their outdoor activities in a secured environment away from the third storey neighbourhood park. Although the Singaporean HDB did recognize change by the emergence of new high-rise residential developments following changing household demographics, there are no specific programmes on supplying specific child-friendly environments in tall buildings. Existing programmes only highlight the need to provide playgrounds for older schemes but no articulate or deep understanding of children's environmental preferences in newer developments like the Pinnacle @ Duxton. Proactively the high-rise environment should be child-friendly. Their sense of belonging in high-rise flats develops the sense of up-bringing into positively accepting high-rise living. This thesis would like to bring up the work of Carolyn Whiztman (2010), questioning whether tall buildings can be child-friendly in the city of Melbourne, Australia. Whiztman's (2010) research tries to explore the built and social environment determinants of children's independent mobility in central Melbourne's high-rise housing. Children's independent mobility is defined by the freedom of those under 18 to explore public space without adult accompaniment. Whiztman (2010) recommends high-rise public housing in Melbourne to have play spaces on ground level decks for children to play and explore, like those found in Singaporean flats. In contrast to Singapore, high-rise housing in Melbourne does not

have these spaces for children to explore and play. Whiztman's (2010) recommendations are retrospective to the importance of inserting social infrastructure for children in high-rise environments. More importantly, her reference is based on the success of ground level decks found at older generation housing schemes.

The older housing schemes are not super-high in density. There are no garden decks on the 26th floor of the Pinnacle @ Duxton for rest and recreation. Continuing with the idea of providing child-friendly environments, the Pinnacle @ Duxton should take full advantage of making the mini-parks on the 26th floor sky deck into spaces for children to explore and play. The current design is in contradiction to the idea of creating 'a sense of place' among children and other user groups in the Pinnacle @ Duxton. The subsequent fear of people living in the Pinnacle @ Duxton reacting defiantly towards the mini-parks on the 26th floor is halting these spaces' potential to function properly as people places. This research reveals programming flaws in the mini-parks. More importantly, the responses from three user groups living in the Pinnacle @ Duxton reveal sky gardens could work as social places in super high-rise developments stewarding social sustainability in this typology. However, the implementation is still in its early stages and is therefore in need of articulation and nuanced understanding. Adapting guidelines and resources researched from urban design can make social spaces into public spaces in high-rise buildings.

7.3.3 Plants, Furniture and Surfaces

The small characteristic needs the mini-park to take advantage of every single space of its square metre into use. Tactical use of ground cover and shrubs is needed to subdivide use and define boundaries of use within the mini-park. It is best that the use of ground cover like grass be minimally used as it tends to limit function variations in the mini-park. This guideline is important when considering landscape in mini-parks on high-rise buildings. With limited floor space for use and activity, designers should concentrate less on providing ground landscape. Though, given the characteristic of a high-rise settlement that is confined within the boundaries of the settlement, the need for people to have access to nature and green coverage is important. Conway and Adams (1977) assert that people living in high-density environments need green open spaces to lessen the effects of over-crowding and stress.

This notion is supported by Yuen & Hien (2004), as high-rise settlements with more provision of green gives greater appeal for people to live in them. This statement is not only reflective on Singapore but also other areas of high-density environments around the world. Appold (2011) further asserts that, when planning for social and community development, parks with extensive coverage of greenery are important as residents in high-rise buildings consider greenery as their substitute for backyard gardens found in low-rise suburban gardens. In order to balance function in

tight spaces, designers should plant more vertical plantings than ground coverage in mini-parks in high-rise buildings. This would not compromise the ground into limited use because of grass and shrub coverage. Furthermore, vertical planting could define the mini-parks' platform on four sides. The impact of vertigo would be lessened if vines were planted on openings. This could also protect the mini-parks against the wind and sun. This thesis asserts the architectural quality of a mini-park should always be concerned towards the functioning of its environment in effect from how people use it. It is also important that any form of abstraction of visual beauty and technical requirements from traffic, access and circulation follows the consideration function first.

Centre-piece landscapes found in 'Community Plaza' and 'Outdoor Gym' should be avoided as they limit functions in the mini-park. The design of mini-parks in vertical settlements should focus on creating vegetation along its boundary line to minimize its openness to the sky. Creating an enclosure in a high elevation is essential as it creates security and safety for users to engage in social contact in the park. Smaller mini-parks like the 'Elderly Gym Area' and 'Children's Playground' are comfortable to use because of their enclosure. The vegetation in both parks is secondary to function. It complements the function defining the boundary of both parks. Greene (1998) further asserts that mini-parks should be approached with the same intent of designing a Mediterranean Plaza, with interesting paving, sitting places and gazebos. Being located in a high-density urban environment, the problem with greenery is not its growing but keeping it pruned. It is impossible to grow anything large between buildings, with large shadows moreover on the 26th storey deck. Nonetheless, tiny lots can grow small plants able to give thick foliage with minimum upkeep, rather than large trees. Picture 7.4 illustrates how these small florals can be a better option to trees in mini-parks on vertical settlements. These green walls can be manipulated to create enclosures disseminating hard landscape on the mini-park floors. Moreover, users – especially children – need shaded areas. This approach would make mini-parks on the 26th floor available for use even during midday. Because mini-parks tend to function like small plazas or squares, it is best that tree wells are kept to the minimum. Tree wells should be set on hard-surfaces with dirt that does not spill out and create a messy appearance (Greene, 1988). This is also in correlation to the notion that every square metre space in a mini-park is valuable.

It is advisable that site furniture should be designed, bought and constructed for specific user groups. Greene (1998) asserts that uses in mini-parks usually are reflective of user groups that frequently visit and occupy the park. Furniture placed at mini-parks 'Elderly Fitness Area' and 'Children's Playground' is not suitable for each user group. Seating areas in mini-park 'Hill Point' and 'Sea Point' need to be relocated to fit their purpose as a viewing deck. Designers should avoid using abstract seating designs as they tend to deter use. Most of the seating provisions on the 26th floor

sky deck resemble standalone art installations rather than serving the purpose for seating. The sky deck also needs more furniture. The empty corridors would function much better than passing thoroughfares if benches were placed along them. The benches would appeal to the elderly as they like sitting while watching people passing by. Drinking fountains are very desirable in the mini-parks. The fountains would be a great addition to the landscape as they are also a functional design element. This thesis disagrees with the current state of the design that does not have any water element on the whole 26th storey sky park. The missing element is a missed opportunity as water elements are desirable in a social space. Replacing it with fake rubber surfaces coloured in blue is not recommended as a substitute for water.

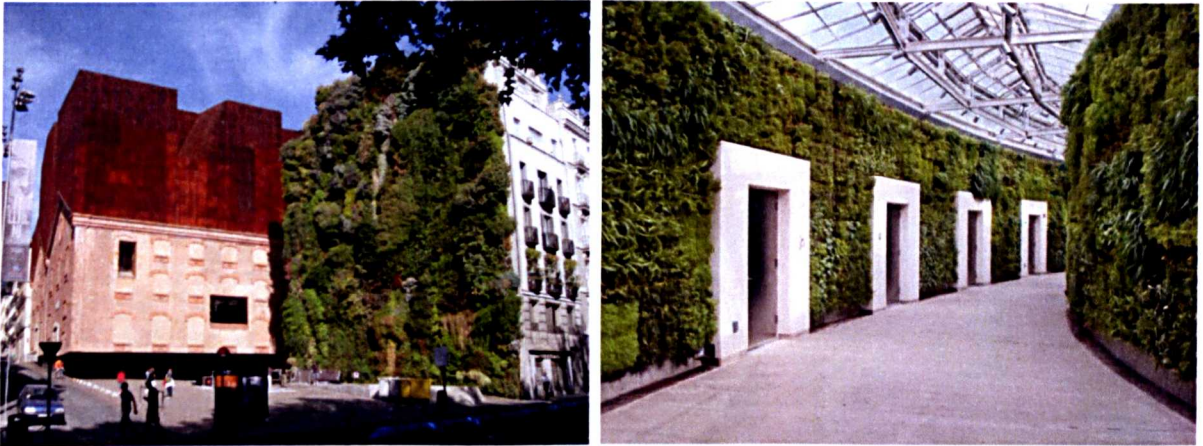


Pictures 7.4 and 7.5: Examples of vertical planting applied to create thick foliage without compromising space. These green walls could create enclosures in the mini-park as an alternative to trees. Picture source: Blanc (2012).



Picture 7.6: Tree wells should be limited in mini-parks as they use most of the floor space.

Picture 7.7: Placing benches along this empty corridor would add use and function as it appeals to the elderly who like to sit and watch people passing-by.



Picture 7.8 (left) and 7.9 (right): Vertical landscape on walls can create alternative solutions for achieving maximum greenery in mini-parks located in high-rise buildings. In comparison to the corridor in the Pinnacle @ Duxton, this pathway succeeds immensely in creating vertical green within tight spaces; an approach that clearly gives more ground space that could be filled with furniture for social activities. Picture source: Blanc (2012).

7.3.4 Management and Stewardship

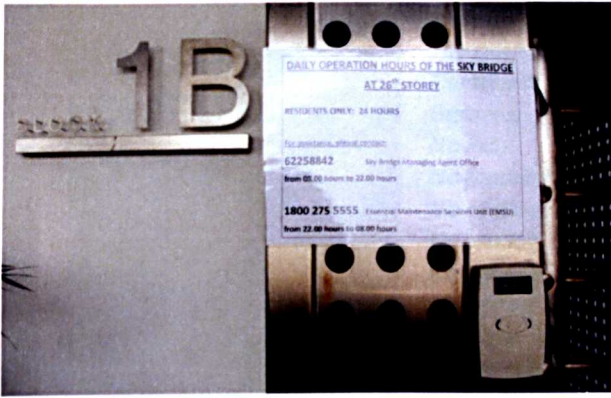
Maintenance on the other hand is excellent. Daily maintenances are exercise in keeping the whole 26th storey sky deck clean. Like the neighbourhood park below, the upkeep is done to high standards. The seven-day observation revealed the mini-park clean and tidy at all times, though this also implies that all the mini-parks are not heavily used. This is also because of the house rule permitting food and beverages on the sky deck. Plants on the sky deck are watered by an automatic system that sprinkles water three times a day. The plants are mostly heavy duty and in need of minor upkeep. Return visits revealed constant care of the plants. Some repairs had been done to damaged landscape elements, especially the artificial mound, due to natural erosion by rain. The management does have a budget for essential ongoing maintenance. The mini-park is designed to be vandal proof, though this thesis views that the vandal-proof design may defeat its own purpose as a social space as it offended users for whom it is intended. Mini-park facilities that are constructed with heavy and immutable materials may make users feel that the park is unfriendly; users may feel offended by the use of the park, or the park planner views users as opponents. Usually in this case equipment is inflexible, uncomfortable and unattractive (Greene, 1998). The 26th storey mini-park does inherit this design problem as most of its materials are heavy immutable materials.



Pictures 7.10 (left) and 7.11 (middle): The revolving steel door entrance secures the whole 26th floor against intruders. Its design, however, restricts users in the space. Picture 7.9 (right): Disabled access.



Pictures 7.12, 7.13 and 7.14: The 26th storey sky deck is fully equipped with surveillance cameras monitoring all angles on site. Each mini-park is equipped with at least one camera monitored by the security office located at the ground floor of the settlement.

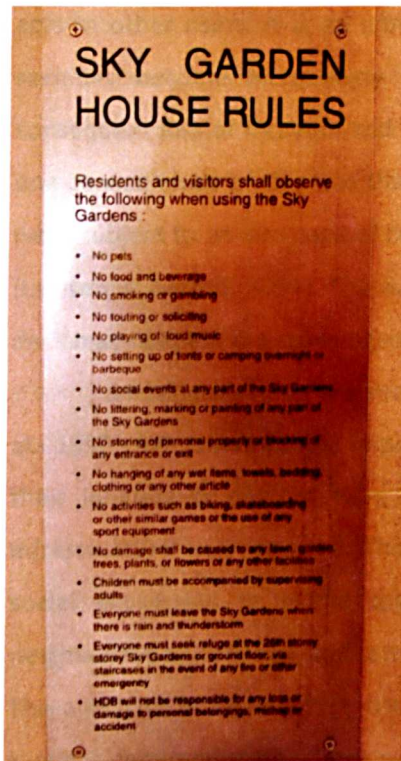


Picture 7.15: The park entrance door mechanism. Users need to swipe the door upon entering and exiting the sky deck. The mechanism only allows one person through the door at a time.



Picture 7.16: Signage warning users not to smoke or attempt to create a fire in the mini-parks.

In light of the current regulations, management should consider instigating less strict rules on how to use the sky deck. Rules like 'no social gatherings' kills any form of usage in the mini-park. In order for the people of any settlement to feel a sense of ownership towards the park they need to have freedom in using it. People will be more likely to take care of their park and see it respected if they have a sense of ownership in it (Carmona et al., 2003; Carr, Francis, Rivlin, & Stone, 1992; Gottlieb & Glaeser, 2006). That sense of ownership comes when they have the say and right on how to use the space. Observation reveals all user groups want participation in how they could use the mini-parks on the 26th floor sky deck. Though most are adamant about the current state of the mini-park, many feel they are entitled to rights as they pay monthly maintenance fees on the up-keep of these spaces. When the management was asked about the concerns, they felt residents wanted too much out of a small fee paid to a public housing development compared to facilities in a private gated condominium.



Picture 7.17: The Sky Garden House Rules.

The rules are depicted as follows.

"Residents and visitors shall observe the following when using the Sky Gardens:-

No Pets

No food and beverage

No smoking or gambling

No touting and soliciting

No playing of loud music

No setting up of tents or camping overnight or barbeque

No social events at any part of the Sky Gardens

No littering, marking or painting in any part of the Sky Gardens

No storing of personal property or blocking of any entrance or exit

No hanging of any wet items, towels, bedding, clothing or any other article

No activities such as biking, skateboarding or other similar games or the use of any sports equipment

No damage shall be caused to any lawn, garden, trees, plants or flowers or any other facilities

Children must be accompanied by supervising adults

Everyone must leave the Sky Gardens when there is rain and a thunderstorm

Everyone must seek refuge at the 26th storey Sky Gardens or ground floor, via staircases in the event of any fire or other emergency

HDB will not be responsible for any loss or damage to personal belongings, mishap or accident"

The laws setting up 'how to use the space' were conceived because of the bureaucracy prediction of avoiding inappropriate situations towards the usage of the space that may become dysfunctional. Block management considers the rules and regulations necessary to the well-being and safety of the inhabitants. The interview below mentioned safety as the main apprehension to the rules.

"There are things that we have implemented not according to the first general plan. We decided to put barrier doors to stop undesirables coming into the settlement to conduct deviant activities on the 26th floor. We viewed by bringing food and beverages, some residents might drink alcohol. When they are drunk, these people might endanger themselves and others on the sky deck. Furthermore, food would make the spaces dirty. Styrofoam containers might get blown by the wind onto the neighbourhood park below. Children without supervision is dangerous and they might climb over the park walls and fence. Social activities on the park are dangerous. We cannot guarantee the safety of people on it" (Interview with HDB, 11th August 2010).

The research in this thesis disagrees with the management as the objection is not asking for more recreational luxuries in the settlement but a set of composed rules as to how the spaces should be used on the sky deck. Based on observation, the usage of public and social spaces is subjected to a lot of bureaucratic 'do's and don'ts' set up by the management and authority of the Pinnacle @ Duxton. The rules set up on 'how to use the space' were conceived by prediction of avoiding inappropriate situations towards the usage of the mini-parks that may cause hurt and libel

acts to other users. It is an unnecessary bureaucratization. Bureaucratization is a process where societies become increasingly subject to the control of bureaucratic organizations, with a consequent loss of freedom and individualism. The concept is distinguished by rationality, and then one consequence of this was the dominance of bureaucracy. The result was that modern societies were subject to an iron cage of bureaucracy with stifled freedom, controlling the lives of individuals (Lawson & Garrod, 2004). The subjected bureaucracy towards social spaces on the 26th storey sky deck may result in the space becoming dreary for use.

Social spaces that are subjected to stringent rules of use will not become successful (Carr et al., 1992). Whitzman (2001) implicates how high-rises in Vancouver sunk into social disorder when their inhabitants did not have the freedom to practise their social rights even though social infrastructure was provided. Though Singaporeans tend to be subservient to rules pertaining to social expression in public spaces, the rules are damaging if the HDB wants to nurture neighbourhood cohesion and sense of place in new housing settlements like the Pinnacle @ Duxton. The aim is to build new high-rise high-density seventh generation housing that builds, grows and sustains community life. These rules would not benefit any social interaction in these new high-rise settlements. Though the concerns are valid, management should opt for controlled freedom in these public spaces. It is unlikely that these spaces would be fully free but the inhabitants should be allowed to practise their social rights. Moreover, the presence of security cameras throughout the floor should help in preventing deviant activities before they happened. It is important that the Pinnacle @ Duxton should steward more freedom in use on the 26th storey sky deck as it asserts the validity in making other social spaces in the sky to other future developments.

7.4 From Case Study to General Conclusion

Marcus and Francis (1998) assert that POA (post-occupational analysis) is enriched data via observation and one-on-one interviews with key informants (original designer, park administer, maintenance, users) that allows an understanding of the site's history, previous designs or remodelling, security records, site users and etc. This understanding is the reiteration of steps, methods and measurements giving back what is learned from POA as the basis of redesigning or designing social and public spaces in residential high-rises. **The findings are worth future elaboration as the subject is still new for making social public spaces on the scale and design similar to the Pinnacle @ Duxton as it is still a new territory.** The next generation of high-rises must support and not hinder the strong social ties that form the basis of robust communities. Cities in general are often blamed by traditionalists for many social problems. Designers must embrace this problem. With a great degree of responsibility, with more people within the urban population

destined to live in high-rise environments, it is arguable that the quality of social interaction will play an important role for the structure to be viable and sustainable in the long run. Whilst there are many attempts to insert social infrastructure in the form of sky gardens, the approach does not take into account who are the users nominally succumbing to the aesthetic drive of the design. According to Ward (2012), shifting cultural habits informed how people relate to social spaces and also call for new priorities in high-rise design. These cultural changes affect how living habits in particular relate to the typology. Considering most of today's environmental, community and living values, the traditional high-rise is constrained by disadvantages of its own design. Constructed from identical stacked floor plates wrapped in an impermeable envelope, the monolithic form of the conventional historical typology limits interaction between its occupants, and between the building and its surrounding natural or urban environment. It is essential that further studies need to be done to look more critically at how to improve and recognize tools or agenda to assert into the design.

The Pinnacle @ Duxton proposed a new model that reconceived the rise as a critical and powerful response to environmental and social challenges that integrate social spaces breaking the conventional high-rise hindrances of the past. When other parts of the world stopped experimenting ideas of living in high-rise housing, Singapore continued the progressive values of early modernism tailoring to the needs of its political, geographical and social location. Their planners and architects adopted the vision of the idealistic predecessor but learnt from the mistakes of the past. More importantly, Singapore represents a radical rework of the failed earlier typology from the first modern age. To a macro extent, the recognition of past problems was adhered to and applied in the typology. It is an attempt to bridge urban design into the high-rise typology, though part of the problem that is prevalent in urban design is often seen as a superficial phenomenon. If it is not a matter of visual appearance, the validity of a good social space is only measured from the number of people using it. The social spaces in the Pinnacle @ Duxton stand between mistakenly designing social public spaces for visual affects and some of its spaces brilliantly adhering to the needs of many types of users typically found in a metropolitan society. The social and public spaces in the Pinnacle @ Duxton give an insight on how future measurements and considerations could be applied to new high-rises bearing the same progressive idealism pursued by other developers, municipal councils and governmental agencies.

The insight that can be agreed is integrated high-rise housing with social services connected to the urban fabric and the wider community is the best approach for social sustainability in the typology. The Pinnacle @ Duxton demonstrates this progressive idealism bearing good integration within its public realm and having good provisions for social interaction, though its approach needs to be more all-embracing, dealing with social, economic and ecological

contexts. It needs to deal with activities and flows of people that the settlement generates, the spaces it creates, its impact on ecology and the natural processes of the city, and finally the aesthetic affect it produces. The summary of the main outcomes of this thesis is as follows. The following figures illustrate an understanding of the whole system (high-rise ecology) and subsequently its sub-unit:

The concept of place is closely related to the social construct of societies, generally divided by different levels of needs. This bar summarizes the needs conceptually related to high-rise & tall building structures.

Place in urban design are spaces for public realm-both physical & sociocultural

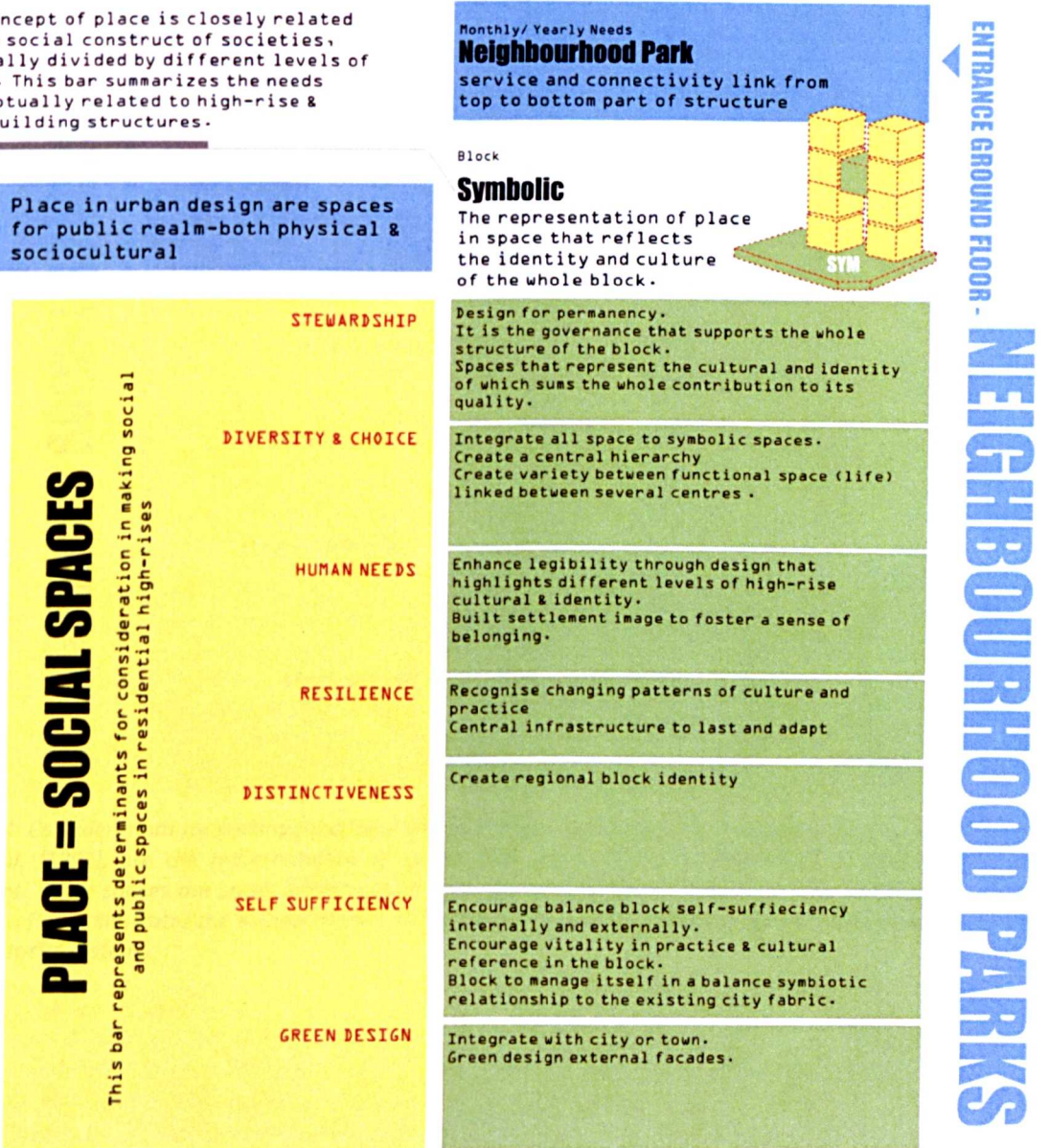


Figure 7.3: Considerations for making symbolic spaces in the high-rise settlement. The ground floor is the mediator between the settlement and its urban location. The ground makes the symbolic social spaces that tend to the needs of the settlement as a whole within the neighbourhood park. Adapted from Carmona M., in Layard et al. (2001), pp.179-81.

The concept of place is closely related to the social construct of societies, generally divided by different levels of needs. This bar summarizes the needs conceptually related to high-rise & tall building structures.

Place in urban design are spaces for public realm-both physical & sociocultural

PLACE = SOCIAL SPACES

This bar represents determinants for consideration in making social and public spaces in residential high-rises

STEWARDSHIP

DIVERSITY & CHOICE

HUMAN NEEDS

RESILIENCE

DISTINCTIVENESS

SELF SUFFICIENCY

GREEN DESIGN

Monthly/ Yearly Needs

Neighbourhood Park

service and connectivity link from top to bottom part of structure

Block

Symbolic

The representation of place in space that reflects the identity and culture of the whole block.



Design for permanency. It is the governance that supports the whole structure of the block. Spaces that represent the cultural and identity of which sums the whole contribution to its quality.

Integrate all space to symbolic spaces. Create a central hierarchy. Create variety between functional space (life) linked between several centres .

Enhance legibility through design that highlights different levels of high-rise cultural & identity. Built settlement image to foster a sense of belonging.

Recognise changing patterns of culture and practice. Central infrastructure to last and adapt

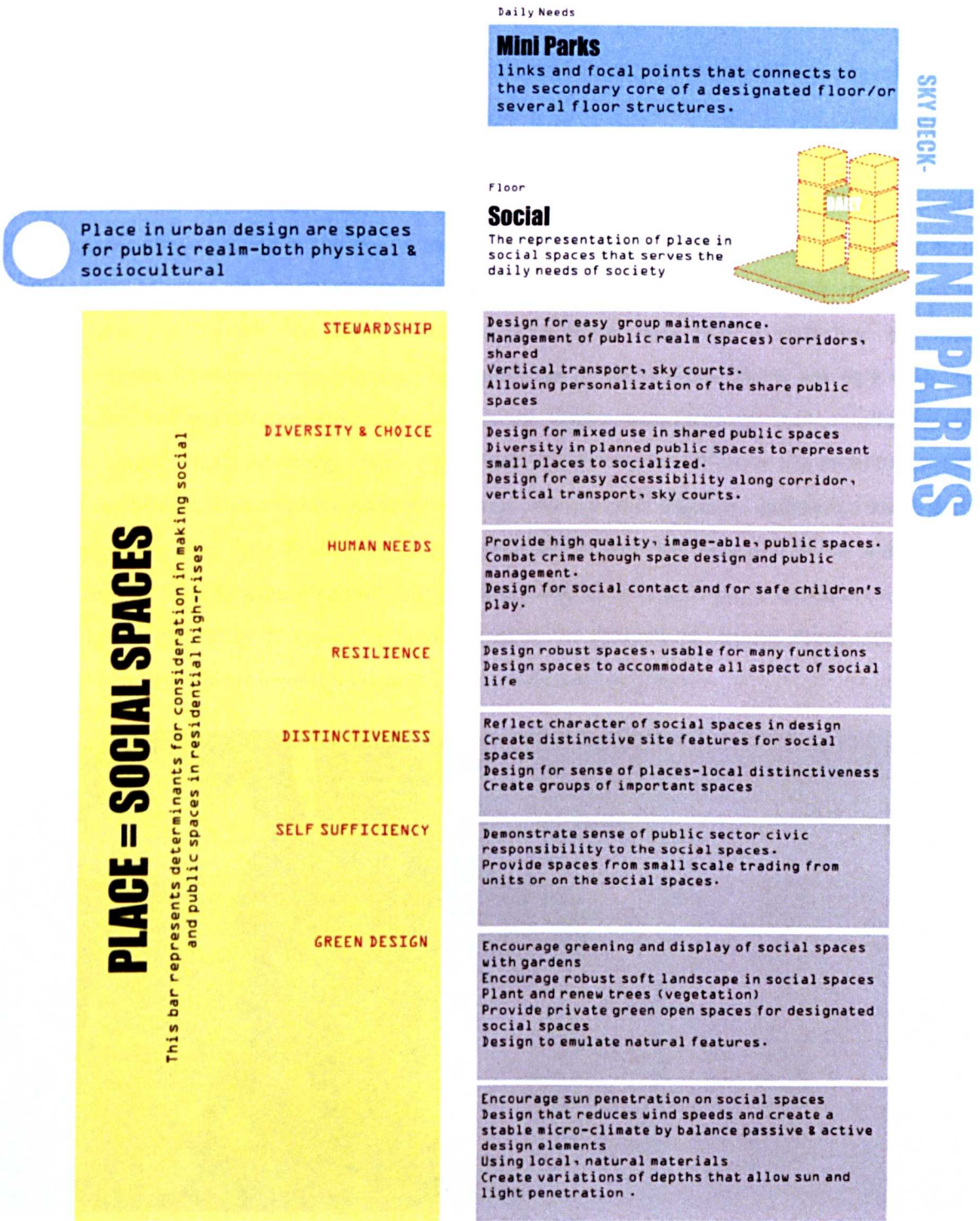
Create regional block identity

Encourage balance block self-sufficiency internally and externally. Encourage vitality in practice & cultural reference in the block. Block to manage itself in a balance symbiotic relationship to the existing city fabric.

Integrate with city or town. Green design external facades.

ENTRANCE GROUND FLOOR - NEIGHBOURHOOD PARKS

Figure 7.4: Considerations for making functional spaces in high-rise settlements. Functional places, according to Carr et al. (1992), are the representation of spaces that make up the weekly needs of people within a settlement. These spaces are social infrastructure links like neighbourhood shops, nursery, markets or eating areas. This figure illustrates the measurements for consideration when applying these ‘functional public’ spaces in the high-rise systems.



7.5 Future Research

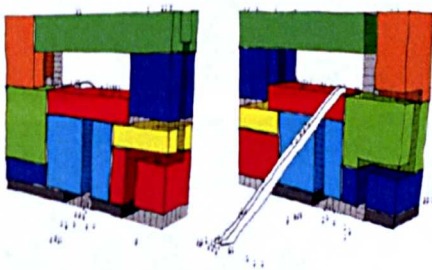
The Singaporean Housing Program since 2010 has entered its fourth decade of evolution. It has already addressed a consideration of not providing banal apartment blocks but building a new generation of green, higher-density housing, with creating communities central to its aim. In other parts of the world from China to Spain, similar typologies are being built that cater for social and public spaces above ground in the sky. In Madrid, Spain, MVRDV, a Dutch-based architecture firm designed the Mirador with social spaces inserted on the 1st, 12th and 21st floors. The circulations in the building are treated like vertical streets. Each route runs into a collection of small neighbourhoods typified by the housing typologies that it represented. There are nine types of housing identified and differentiated from others in the small neighbourhoods. Steven Holl designed the iconic Linked Hybrid in Beijing, China, which from the 12th to the 18th floor is a multi-functional series of sky bridges with a swimming pool, a fitness room, a café, a gallery, auditorium and a mini salon connecting the eight residential towers. Meanwhile, back in Singapore in an area called Dawson, not far from Singapore's down-town, HDB planned three large projects to replace a low-rise housing estate. Similar in its aim to the experiment at the Pinnacle @ Duxton, these projects are groups of high-rise towers linked by massive sky-decks on the top floors.



Pictures 7.18 and 7.19: The Linked Hybrid Housing Project in Beijing, China, by Steven Holl Architects. The project is not a form of public housing like the Pinnacle @ Duxton but a form of private housing project aimed at the new affluent urban Chinese. The project illustrates a growing theme in making social and public spaces over ground level by connecting the building using a series of sky bridges. Picture source: Steven Holl Architects (2009).

The Sky Terrace @ Dawson by SCDA Architects comprises five 43-storey high-rise towers sitting atop a parking podium with a series of landscape gardens stacked on top. A series of sky

bridges will connect the towers at various heights offering elevated gardens to residents who begin occupying the settlement in early 2014. In addressing different types of users and the nuclei family, SCDA designed studio apartments that attached to larger duplexes so aging parents can live next to their children. This in effect is an encouragement to a sense of permanence in the typology. Right next to the Sky Terrace @ Dawson, WOHA's version of the Sky Ville @ Dawson offers a different perspective to housing. While SCDA tackles issues of multigenerational and permanency in public housing, WOHA looks at ways to encourage a sense of community within a huge complex with 960 dwelling units. According to two of WOHA's principles, from the start of the project they realized the need to break the enormous scale of their project into humane pieces. WOHA created the concept of 'Sky Villages' where 11 floors of residential units are orientated around a communal garden on four angled sides. Each sky garden has 80 units looking into it and sharing use of the space in the hope of encouraging interaction among neighbours. WOHA stacked four 'Sky Villages' on top of each other with a base that offers a variety of outdoor spaces where residents can socialize and enjoy the lush tropical setting.



Pictures 7.20 and 7.21: Edificio Mirador, Madric by MVRDV Architects. Figure 7.4 Illustrates the conception of making social spaces in the sky within the settlement. Picture source: MVRDV (2009).



Pictures 7.22 and 7.23: WOHA's version of the Sky Ville @ Dawson. Picture source: WOHA (2012).



Above pictures 7.24 and 7.25: Both are the Sky Terrace by SCDA Architects and WOHA's version of the Sky Ville @ Dawson. Both settlements are under construction and will be occupied by early 2014. The building of both settlements is prevalent in that social and public spaces in the sky will become a norm in the Singaporean housing market. The question is, will these social and public spaces work with similar qualities to their counterparts found on the ground? Picture source: Pearson (2013).

Left: An illustration of the Sky Terrace @ Dawson by SCDA Architects. Picture source: SCDA Architects (2012).

Both Sky-Ville and Sky Terrace generate interest by creating high-density communities attuned with the tropical setting and, furthermore, addressing the need for making social spaces in the sky (Pearson, 2013). WOHA's and SCDA's approach in a sense is reminiscent of the New Urbanism approach to planning, though not necessarily similar in style and scale. In contention to the earlier common negative discourse presented to high-rise living nominally presented by New Urbanism, the typology may yet offer residents a satisfying dwelling environment. The same qualities aimed by urban designers are applicable to the typology. The high-rises of recent projects show the importance of offering social and community services to the residents and locating them wisely to the needs of living in the high-density urban environment. The narratives that describe the design on all four projects have similar references to the three dimensions of designing social public spaces in the sky. These newly-built settlements may inherit the same repeated mistakes on designing social and public spaces according to the dimensions of urban design. Post-occupational studies from the Pinnacle @ Duxton can be applied to these settlements to further affirm the validity of designing these spaces in the sky.

Different geographies relate differently to how social spaces are designed. For example, in a temperate climate social spaces need to be protected by wintery elements. The subsequent strong wind needs these spaces to be enclosed. In a hot and dry climate social spaces need shading, not sunlight. Culturally, different locations may have different impacts on how to design social spaces in the sky. An even different housing range income affects what type of spaces to be designed in residential high-rises. Finding the different correlations and indices on different geographical settings and contexts may expand an understanding of a widening urban phenomenon that will affect a growing number of the world's urban population. It is too early to conclude if the Pinnacle @ Duxton is a successful typology in making social and public spaces in the sky. The fanfare and iconic idealism it represented mirrors other early modernist high-rise housing that ended up in oblivion. Critically it is worth referring to research that has been conducted within these issues. Much potential remains to be studied and explored.

BIBLIOGRAPHY

Abel, Chris. *Sky High: Vertical Architecture*. California: Royal Academy of Arts, 2003.

Ali, Mir. Mohammad., and Aksamija. Ajla. "Toward a Better Urban Life: Integration of Cities and Tall Buildings." *The 4th Architectural Conference in High Rise Building*, (2008).

Ali, Mir. Mohammad., and Paul J Armstrong. "Green Design of Residential High-Rise Buildings in Liveable Cities." In *IBS/NAHB Symposium Orlando, Florida: School of Architecture, University of Illinois at Urbana-Champaign*, 2008.

Anderson, Stanford. *On Streets: Based on a Project for the Institute for Architecture & Urban Studies*. Cambridge, Mass. : MIT Press, 1991.

Appold, S.J. "Community Development in Tall Residential Buildings." In *High-Rise Living in Asian Cities*, edited by Belinda Yeun, 149-177. London: Springer, 2011.

Bacon, Edmund. *The Design of Cities*. 4 ed. London: Thames & Hudson, 1992.

Banerjee, Tridib., and Anastasia Loukaitou. Sideris. *Companion to Urban Design*, Edited by Tridib. Banerjee and Anastasia Loukaitou. Sideris. Oxford: Routledge, 2011.

Bangs, Herbert., and Mahler Stuart. "Users of Local Parks." *Journal of American Institute of Planners* 5, no. 36 (1971): 330-334.

Banham, Reyner. *Age of the Masters - a Personal View of Modern Architecture*. New York: Harper & Row, 1987.

Barr, Michael D., and Jevon Low. "Assimilation as Multiracialism: The Case of Singapore's Malays." *Asian Ethnicity* 6, no. 3 (2005): 161-182.

Beamish, Jane, and Jane Ferguson. *A History of Singapore Architecture*. Singapore: Graham Brash (Pte) Ltd, 1989.

Bell, A Paul.; Thomas C: Greene, Jeffrey D: Fisher, and Andrew. Baum. *Environmental Psychology, Fifth Edition*, Edited by Michele Tomiak. Orlando: Harcourt College Publisher, 2001.

Bell, David., and Mark Jayne. *City of Quarters, Urban Villages in the Contemporary City*, Edited by David. Bell and Mark. Jayne. England: Ashgate Publishing Limited, 2004.

Beng, Koo Peng., and Belinda Huang. "Singapore, Capital City for Vertical Green." *Architecture and Urbanism* 2012, 100-101.

Bently, Ian.; Alan Alcock, Paul Murrain, Sue McGlynn, and Graham Smith. *Responsive Environments: A Manual for Designers*. Oxford: The Architecture Press, 1985.

Besset, Maurice. *Notes from Architecture: Le-Corbusier, to Live with the Light*. New York: Rizzoli International, 1987.

Bharne, Vinayak. "Humanizing the High-Rise Urbanism." *CTBUH Journal*, no. IV (2011): 18-23.

Blanc, Patrick. *The Vertical Garden: From Nature to the City*. Sussex: W. W. Norton & Company, 2012.

Block, David. *Multilingual Identities in a Global City: London Stories (Language and Globalization)*. London: Palgrave Macmillan, 2008.

Bosselman, Peter. *Representation of Places: Reality and Realism in City Design*. Berkeley: University of California Press, 1998.

Bourdieu, Pierre. "The Field of Cultural Production, Or: The Economic World Reversed." *Poetics* 12, no. 4-5 (1983): 311-356.

BPF, British Property Foundation. *Planning for Social Infrastructure in Development Projects: A Guide to Tackling the Key Challenges*. London: British Property Foundation, 2010.

Breheny, M.J. *Centrist, Decentrist, and Compromisers: Views on the Future of the Urban Form Compact, Cities and Sustainability*, Edited by M. Jenks, E. Burton and K. Williams. London: E & FN Spon, 1997.

- Browne, E.M. "A Survey of Singapore of Low Income Level Housing in Relation to Health of Infants." *Medical Journal of Malaya*, no. 8 (1954): 15.
- Buchanan, Peter. "Towards a Complete Architecture." *Architecture Review*, March 2012 2012.
- Burdett, Ricky., and Phillip. Rode. "The Urban Age Project." In *The Endless City, the Urban Age Project* by the London School of Economic and Deutsche Bank's Alfred Herrhunsen Society, edited by Ricky. Burdett and Phillip. Rode, 8-31. London: Phaidon Press Ltd., 2007.
- Burridge, R. *Unhealthy Housing: Research, Remedies and Reform*. London: Taylor & Francis, 2011.
- Burtenshaw, David.; M. Bateman, and G.J. Ashworth. *The European City: A Western Perspective*. London: John Wiley & Sons Inc, 1991.
- Canter, David. *The Psychology of Place*. University of Michigan: Architectural Press, 1977.
- Carmona, Matthew,; Tim. Heath, Taner. Oc, and Steve. Tiesdell. *Public Spaces, Urban Places*. Great Britain: Architectural Press, 2003.
- Carr, Stephen,; Mark. Francis, Leanne G. Rivlin, and Andrew M. Stone. *Public Spaces Cambridge Series in Environment & Behaviour*, Edited by Daniel Stokols and Irwin Altman. Cambridge: Cambridge Press, 1992.
- Cartstens, Diane. "Outdoor Spaces in Housing for the Elderly." In *People Places, Design Guidelines for Urban Open Spaces*, edited by Clare Cooper Marcus and Carolyn Francis, 209-257. Canada: John Wiley & Sons, Inc., 1998.
- Castells, Manuel. *City, Class and Power*. London: Palgrave Macmillan, 1978.
- Chevalier, Louis. *Labouring Classes and Dangerous Classes in Paris During the First Half of the Nineteenth Century*. New York: H. Fertig, 1973.
- Ching-Hwang, Yen. "Class Structure and Social Mobility in the Chinese Community in Singapore and Malaya 1800-1911." *Modern Asian Studies* 21, no. 3 (1987): 29.
- Chiu, S.W.K., Ho, K.C., and Tai-Lok Lui. *City States in the Global Economy: Industrial Restructuring in Hong Kong and Singapore*. Boulder, California: Westview Press, 1997.
- Chua, S.C. *Report on the Census of Population 1957, Singapore*. Singapore: Federated States of Malaysia, 1964.
- Clancey, Gregory. "Towards a Spatial History of Emergency: Notes from Singapore." *Asia Research Institute, Working Paper Series* 1, no. 8 (2003).
- Colquhoun, Ian. *Riba (Royal Institute of British Architects) Book of British Housing -1900 to the Present Day*. London: Architectural Press, 2008.
- Conway, J., and B. Adams. "The Social Effects of Living Off Ground." *Habitat International* 2, no. 5/6 (1977): 594-614.
- Corbusier, Le. *The Athens Charter*. University of Michigan: Grossman Books, 1973.
- Cranz, Gale. *The Politics of Park Design*. Cambridge, Mass: MIT Press, 1982.
- CTBUH. "Tall & Urban, an Analysis of Global Populations & Tall Buildings." edited by Council of Tall Buildings and Urban Habitat. Chicago, Illinois: Council of Tall Buildings and Urban Habitat, 2011.
- Cullen, Gordon. *The Concise Townscape*. London: Architectural Press, 1971.
- Douglas, Mary. *Purity and Danger: An Analysis of the Concepts of Pollution and Taboo*. London: Routledge Classics, 2002.
- e-architect. 2010. "Pinnacle @ Duxton, Singapore : Architecture Information," (accessed 25 Jun 2012).
- Ewing R, and Kreutzner R. *Understanding the Relationship between Public Health and the Built Environment.: A Report Prepared for the LEED-ND Core Committee* 2006.
- Firley, Eric., and Julie. Gimbal. *The Urban Towers Handbook*. United Kingdom: John Wiley & Sons, 2011.

- Fischer, C.S. "Towards a Subcultural Theory of Urbanism." *American Journal of Sociology* 6, no. 80 (1975): 21.
- Fishman, R. *Bourgeois Utopias: The Rise & Fall of Suburbia*. New York: Basic Books, 1987.
- Foges, Chris "Renewed Promise: New Models on Social Housing." *Architectural Record* 2013, 114-119.
- Forrest, Ray., and Ade. Kearns. "Social Cohesion, Social Capital and the Neighbourhood." *Urban Studies* 38, no. 12 (2001): 2125-2143.
- Frampton, Kenneth. *Modern Architecture: A Critical History* London: Thames & Hudson Ltd, 2007.
- Francis, Carolyn, Claire Cooper Marcus, Cashdan Lisa, and Lynn Paxson. *Community Open Spaces: Greening Neighbourhoods through Community Action and Land Conservation*. Convela, California: Island Press, 1984.
- Fulcher, James, and Scott John. *Sociology, 3rd Edition Cities & Communities*. Oxford: Oxford University Press, 2007.
- Garreau, J. *Edge City: Life on the New Frontier*. London: Doubleday, 1991.
- Gilliespies. *Glasgow City Centre Public Realm, Strategy & Guidelines*. Glasgow: Strathclyde Regional Council, 1995.
- Glaeser, Edward L., and Joseph. Gyourko. "Urban Decline and Durable Housing." *Journal of Political Economy* 113, no. 2 (2005).
- Goh, Keng Swee. *Urban Incomes and Housing: A Report on Social Survey of Singapore (1953-54)*. Singapore: Department of Social Welfare Singapore, 1956.
- Goh, Robbie. "Ideologies of 'Upgrading' in Singapore Public Housing: Post-Modern Style, Globalisation and Class Construction in the Built Environment." *Urban Studies* 38, no. 9 (2001): 1589-1604.
- Gold, Seymore. "The Use of Neighbourhood Parks." *Journal of American Institute of Planners* 6, no. 38 (1972): 369-378.
- Gold, Seymour, and J.R Sutton. "User Satisfaction and Landscape Quality in Neighbourhood Parks." 1980.
- Goldthorpe, J.H. "Social Stratification in Industrial Society." *Sociological Review Monograph* 8, (1964).
- Gottlieb, Joshua D. , and Edward L. Glaeser. "Urban Resurgence and the Consumer City." *Urban Studies* 43, no. 8 (2006): pp: 1275-1299.
- Greene, Nanine Hilliard. "Miniparks and Vest Pocket Parks." In *People Places: Design Guidelines for Urban Open Spaces*, edited by Claire Cooper Marcus and Carolyn Francis, 149-174. Canada: John Wiley & Sons, 1998.
- Grunsvan, Leo Van. *Singapore: The Changing Residential Landscape in a Winner City Globalizing Cities: A New Spatial Order*, Edited by Peter Marcuse and Ronald Van Kempen. Oxford: Blackwell Publishing Ltd, 2000.
- Grusky, D., and C Manwai. *Social Stratification: Class, Race and Render in Sociological Perspective*. Boulder, Colorado: Westview Press, 2008.
- Guan, Kwa Chong. *Tanjong Pagar, the Cradle of Singapore's Development: Tanjong Pagar Consultative Committee*, 1989.
- Hanion, Micheal. "Skyscrapers." *The Times Eureka* May 2012 2012.
- Hanson, J. "Urban Transformation: A History of Design Idea's " *Urban Design International* 5, (2000): 97-122.
- Harper, T.N. *The End of Empire and the Making of Malaya*. New York: Cambridge University Press, 1998.
- Hart, Sara. *Eco-Architecture: The Work of Ken Yeang*. Chilcester: John Wiley & Sons, 2011.
- HDB, Housing Development Board. *Housing Development Board Annual Report*. Singapore: Housing Development Board, 1963.
- HDB, Housing Development Board. *Facts on Public Housing in Singapore*. Singapore: Housing & Development Board Singapore, 2000.

Hillier, B. *Space Is a Machine*. Cambridge: Cambridge University Press, 1996.

Hollow, Matthew. "Governmentality on the Park Hill Estate: The Rationality of Public Housing." *Urban History* 37, no. 01 (2010): 117-135.

Housing-Development-Board. *Annual Report 1961*, Housing Development Board Singapore., 1961.

Huff, W.G. *The Economic Growth of Singapore: Trade and Development in the Twentieth Century*. Great Britain: Cambridge University Press, 1997.

World Economic Outlook Database April 2012.

Irving, A. "The Modern/Post Modern Divide in Urban Planning, University of Toronto Quarterly Summer." In *The Regional City, Planning for the End of Sprawl*, edited by P. Carthroe and W. Fulton, 477-484. Washington: Island Press, 1993.

J.S. "Why the Pruitt-Igoe Housing Project Failed." In *American Public Housing*, edited by The Economist, April 2012. New York: The Economist Newspaper Limited, 2011.

Jacobs, Jane. *The Death and Life of Great American Cities*. New York: Knopf Doubleday Publishing Group, 1961.

Jasprizza, Roger. "Small Spaces Makes the Difference." *Landscape Australia* 21, no. 84 (1999): 292-294.

Jenkins, David. "Unite D Habitation." In *20th Century Classics by Walter Gropius, Le Corbusier and Louis Kahn: Bauhaus, Dessau, 1925-26, Unite D'habitation, Marseilles, 1945-52, Salk Institute, La Jolla, California, 1959-65*, edited by Beth Dunlop, 163. London: Phaidon Press Ltd, 1999.

Jenks, Charles. *Signs, Symbols and Architecture*, Edited by Richard. Bunt and Geoffrey. Broadbent. New York and London: John Wiley & Sons, 1980.

Jenks, Charles. *What Is Post-Modernism? Fourth Edition* ed. London: Academy Press, 1996.

Kaplan, S, and R Kaplan. *Cognition and Environment: Functioning in an Uncertain World*. New York: Preager, 1982.

Katz, Peter. *The New Urbanism: Toward an Architecture of Community*. New York: McGraw-Hil, 1994.

Kaye, Barrington. *Upper Nankin Street, Singapore: A Sociological Study of Chinese Households Living in a Densely Populated Area, Singapore*. Singapore: University of Malaya, 1956.

Keivani, R., and E. Werna. "Modes of Housing Provision in Developing Countries." *Progress in Planning* 55, (2001): pp 65-118.

Ker, Liu Thai. "Reflections on Problems and Prospects in the Second Decade of Singapore's Public Housing." In *Planning in Singapore: Selected Aspects and Issues*, edited by Chua Peng Chye. Singapore: Chopmen Enterprises, 1973.

Knox, P.L. "The Social Production of the Built Environment: Architects, Architecture and the Post-Modern City. ." *Progress in Human Geography* 11, (1987): 364.

Koolhaas, Rem. *Delirious New York, a Retroactive Manifesto for Manhattan*. London: Monacelli Press, 1978.

Koolhaas, Rem. *S,M,L,XL*. Second ed., Edited by Bruce Mau. United States: Monacelli Press, 1995.

Koolhaas, Rem, Stefano Boeri, Sanford Kwinter, Nadia Tazi, and Hans-Ulrich Obrist. *Harvard Project on the City*. University of Michigan Press: ACTAR, 2000.

Kostof, Spiro. *The City Shaped: Urban Patterns and Meanings through History*. Boston: Bulfinch Press, 1993.

Krier, Rob. "Typological Elements of the Concept of Urban Space." *New Classicism* 1990 1990, 212-19.

Kugel, Seth, "Small Parks, with a Bit of Peace in Every Nook", *The New York Times* (accessed 15th February 2013).

Lawson, Tony., and Joan Garrod. *The a-Z Sociology Handbook, Second Edition*. Tonbridge, Kent: Hodder & Stoughton, 2004.

- Li, Tze Ling. "A Study of Ethnic Influence on the Facades of Colonial Shophouses in Singapore: A Case Study of Telok Ayer in Chinatown." *Journal of Asian Architecture and Building Engineering* 6, no. 1 (2007): 8.
- Linn, Karl. "Neighbourhood Commons." *Architectural Design* 38, no. 8 (1968): 379-382.
- Loh, Kah Seng. "'Black Areas': The Urban Kampongs and Power Relations in Post-War Singapore Historiography." *Sojourn* 22, no. 1 (2006): 29.
- Lund, B. *Housing Problems and Housing Policy*. New York: Longman, 1996.
- Marcus, Claire Cooper, and Carolyn Francis. *People Places: Design Guidelines for Urban Open Space Canada*. John Wiley & Sons, Inc, 1998.
- Marcus, Peter. *Lessons from the Hulme*. Manchester: Joseph Rowntree Foundation, 1994.
- Marcuse, Peter. *The Urban Lifeworld: Formation, Perception, Representation The Layered City*. New York: Routledge, 2002.
- Marcuse, Peter, and Ronald Van Kempen. *Globalizing Cities, a New Spatial Order*, Edited by Peter Marcuse and Ronald Van Kempen. Oxford: Blackwell Publishing, 2000.
- Mason, Gary, Alex Forrester, and Robin Herman. *Berkerly Park Use Study*. Berkerly: City of Berkerly Parks Department, Berkerly California., 1975.
- Maurice, Freedman. *Chinese Family and Marriage in Singapore*. London: HMSO, Department of Health, Singapore, 1957.
- Meiss, Von *Elements of Architecture: From Form to Place*. London: E & FN Spoon, 1990.
- Montgomery, J.R. "Making a City: Urbanity, Vitality and Urban Design." *Journal of Urban Design* 1, no. 3 (1998): 93-116.
- Moughtin, Cliff. *Urban Design: Streets and Squares, Third Edition*. United Kingdom: Architectural Press, 2003.
- Mukhija, V. "Upgrading Housing Settlements in Developing Countries: The Impact of Existing Physical Conditions." *Cities* 18, no. 4 (2001): pp 213-222.
- Mumford, Eric *The Ciam Discourse on Urbanism, 1928-1960*, Edited by Kenneth Frampton. Boston: MIT Press, 2002.
- Mumford, Lewis. *The City in History, Its Origins, Its Transformation, Its Projects*. London: Secker and Warburg, 1961.
- Musiatowicz, Martin. "Hybrid Vigour: The Art of Mixing." In *A+T: Civilities Iii*, edited by Martin Musiatowicz, pp. 4-17. Boston: MIT Press, 2008.
- Musiatowicz, Martin. *Hybrids I: High-Rise Mixed-Use Buildings*. Vitoria-Gasteiz, Spain: a+t ediciones, 2008.
- Mutalib, Hussin. "Singapore's Ethnic Relations' Scorecard." *Journal of Developing Societies* 28, no. 1 (2012): 31-55.
- Nasar, J.L. *The Evaluative Image of the City*. London: Sage, 1998.
- Natrasony, SM., and D Alexander. "The Rise of Modernism and the Decline of Place. Case Study: Surrey City Centre, Canada." *Planning Perspectives* 20, (2005).
- Newman, Oscar. *Defensible Space; Crime Prevention through Urban Design*. Pennsylvania: Diane Pub Co, 1972.
- Newman, Peter. "Green Urbannism and Its Application to Singapore." *Environment and Urbanization Asia* 1, no. 2 (2010).
- Nicolson, Adam. "Boom Town." *The Guardian*, 13 February 2006 2006.
- Norberg-Schulz, Christian. *Architecture: Presence, Language, and Place*. Skira Architecture Library Milan, Skira, London. : Thames & Hudson 2000.
- NPB. *Trees of Our Garden City*. Singapore: National Parks, Singapore, 2009.
- O'Connor, Phillip. *Britain in the Sixties: Vagrancy*. Middlesex: Penguin Books, 1963.

- Odeleye, W., and D. Jogun. "Some Social Significance of High-Rise Living in Lagos, Nigeria in High-Rise." In *High-Density Living SPC Convention, 203-207*. Singapore: Singapore Professional Centre, 1983.
- Oppenheim, A. *Questionnaire Design, Interviewing and Attitude Measurement*. London: Pinter Publishing, 1992.
- Parson, Talcott, and Alfred Schütz. *The Theory of Social Action: The Correspondence of Alfred Schutz and Talcott Parsons*, Edited by Richard Granthoff. Bloomington & London: Indiana University Press, 1978.
- Pearson, A Clifford. "Gardens in the Sky: Skyville & Skyterrace, Singapore." *Architecture Record*, March 2013 2013, 80-91.
- Perry, M, I Kong, and B Yeoh. *Singapore: A Developmental City State*. Chishester: John Wiley & Sons, Ltd, 1997.
- Philiber, Schwab, and Samsloss. *Social Research: Guides to a Decision Making Process*. Itasca, Illinios: Peacock, 1980.
- Pui Huen, P Lim, and Diana Wong. *War and Memory in Malaysia and Singapore*. Singapore: Institute of Southeast Asian Studies, 2000.
- Punter, John. "Participation in the Design of Urban Space." *Landscape Design* 200, (1991): 24-27.
- Punter, John. *Design Guidelines in American Cities: A Review of Design Policies in Five West Coast Cities*, Liverpool, University of Liverpool Press, Series Tpr Special Study. Liverpool: Liverpool University Press, 1999.
- Punter, John, and Matthew. Carmona. *The Design Dimension of Planning: Theory, Content and Best Practice for Design Policies*. London: E & FN SPON, 1997.
- Rapoport, Amos. *Culture, Architecture, and Design*. Chicago: Locke Science Publishing Co., Inc, 2005.
- Reports., British Straits Settlement Colonial. *Annual Report on the Social and Economic Progress of the People of the Straits Settlement 1938*. York House, Kingsway: HIS Majesty Straits Settlement Crown Colony, 1938.
- Rodan, Garry. *The Political Economy of Singapore's Industrialisation: National State and International Capital*. Basingstoke: Macmillan, 1989.
- Rodan, G. *The Political Economy of Singapore's Industrialization: National State and International Capital*. London: Macmillan, 1989.
- Sandercock, L. *Towards Cosmopolis: Planning for Multicultural Cities*. Chicester: Wiley 1998.
- Sassen, S. *Cities in the Global Economy*. Thousand Oaks, California: Pine Forge Press, 2000.
- Scheeren, Ole. "Asia Agenda." In *Asia Ascending: The Age of the Sustainable Skyscraper City*, edited by Wood Antony, Johnson Timothy and Qiang Li Guo. Shanghai: Council of Tall Buildings and Urban Habitat (CTBUH), 2012.
- Schulz, Christian Norberg. *Genius Loci: Towards a Phenomenology of Architecture* New York: Rizzoli, 1991.
- Siew Eng, Teo, and Lily Kong. "Public Housing in Singapore: Interpreting 'Quality' in the 1990s." *Urban Studies* 34, no. 3 (1997): 441-452.
- Silverman, David. *Doing Qualitative Research*, Third Edition. London: SAGE Publications, 2010.
- Singapore Department of Statistics. *Collection of Yearbook Statistic Singapore, 1965-2009*.
- Singapore-Welfare-Department. *A Social Survey of Singapore: A Preliminary Study of Some Aspect of Social Conditions in the Municipal Area of Singapore*. Singapore: Singapore Welfare Department, 1947.
- Smith, P.F. "Urban Aesthetic." In *Architecture and People*, edited by B Mikellides, 74-86. London: Studio Vista, 1980.
- Soh, Emily Y. X., and Belinda Yuen. "Singapore's Changing Spaces." *Cities* 28, no. 1 (2011): 3-10.
- Stephan, Dobbs. *The Singapore River: A Social History 1819-2002*. Singapore: Singapore University Press, 2003.
- Stokols, Daniel. "A Typology of Crowding Experience." In *Human Response to Crowding*, edited by A. Baum and Y. Epstein, 219-255. Hillsdale, New Jersey: Erlbulm, 1978.

- Takahashi, Kakao. "Evolution of the Housing Development Paradigms for the Urban Poor: The Post War South East Asian Context." *Journal of Asia-Pacific Studies*, no. 13 (2009): 16.
- Thompson, S. *Diversity, Difference and the Multi Layered City Urban Planning in a Changing World: The Twentieth Century*, Edited by R Freestone. New York: E & FN Spoon, 2000.
- Thornley, A, and Y Rydin. *Planning in the Global Era*. Ashgate: Aldershot, 2002.
- Toh, Jason. *Singapore through 19th Century Photographs*, Edited by Audrey Perera. Singapore: Didier Millet Edition, 2009.
- Toh, Mun Heng;, and Boon Nga Tay. *Households and Housing in Singapore*, 1995.
- Ulrich, R.S. "Visual Landscape and Psychological Well-Being." *Landscape Research* 4, (1979): 17-23.
- URA, Urban Redevelopment Authority. *National Archives of Singapore*, 1970.
- URA, Urban Redevelopment Authority "Duxton Plain Public Housing International Architectural Design Competition." edited by Urban Redevelopment Authority. Singapore: Urban Redevelopment Authority, 2005.
- Vischer, J.C. "The Adaptation and Control Mode of User Needs: A New Direction for Housing Research." *Journal of Environmental Psychology* 19, (1985): 287-298.
- Ward, Jonathan. "The Synergy Tower." In *Asia Ascending: The Age of the Sustainable Skyscraper*, edited by Wood Antony, Johnson Timothy and Qiang Li Guo, 376-383. Shanghai: CTBUH, 2012.
- Waterson, Roxana. *The Living House: An Anthropology of Architecture in South-East Asia*. Singapore Oxford University Press, 1990.
- Webb, Michael. *A Historical Evolution, the City Square*. New York: Tamse & Hudson, 1990.
- Whitzman, Carolyn. "Social Infrastructure in Tall Buildings: A Tale of Two Towers." *Tall Buildings and Urban Habitat: Cities in the New Millenium* no. 1 (2001).
- Wong, A., and Stephen. Yeh. *Housing a Nation*. Singapore: Maruzen Asia, 1985.
- Wong, Tai Chee, Belinda Yuen, and Charles Goldblum. *Spatial Planning for a Sustainable Singapore*. Singapore: Springer Science & Business Media B.V., 2008.
- Wong, Wee Kim. *Population Trends*. Singapore: Department of Statistics, Ministry of Trade & Industry, Republic of Singapore, 2011.
- Wood, Anthony. "Sustainability: The New High-Rise Vernacular." *The Structural Design of Tall and Special Buildings* 16, (2007): 401-410.
- Wood, Anthony, Timothy Johnson, and Guo Qiang Li. "Recent Global Trends in Tall Buildings: Asia Ascending." In *Asia Ascending; the Age of Sustainable Skyscraper*, edited by Anthony Wood, Timothy Johnson and Guo Qiang Li. Shanghai: Council of Tall Buildings & Urban Habitat (CTBUH), 2012.
- Yahaya, N. "Housing in Malaysia 1955-1990." *Habitat International* 13, no. 4 (1989): pp. 63-69.
- Yeang, Ken. *The Skyscraper: Bioclimatically Considered*. London: Academy Editions, 1996.
- Yeang, Ken. *Reinventing the Skyscraper: A Vertical Theory to Urban Design*. Chichester: Wiley-Academy, 2002.
- Yeh, Stephen H.K. *Homes for the People: A Study of Tenant's Views on Public Housing in Singapore*. Singapore: Housing and Development Board, Singapore, 1972.
- Yin, Robert K. *Case Study Research, Design & Methods Applied Social Research Methods Series*. United States of America: SAGE, 2009.
- Yuen, Belinda. "Reinventing the Highrise Housing in Singapore." *Cityscape: A Journal of Policy Development and Research* 11, no. 1 (2009): 3-18.

- Yuen, Belinda, and Wong Nyuk Hien. "Residents Perception and Expectation of Rooftop Gardens in Singapore." *Landscape & Urban Planning* 73, no. 2005 (2004).
- Yuen, Belinda., Anthony. Yeh, Steve. Appold, George. Earl, John. Ting, and Kwee. Kurnianingram. "To Live High or Low: Case Study of Singapore Public Housing." In *CIB-CTBUH International Conference on Tall Buildings*, edited by CTBUH, 141-148. Kuala Lumpur, Malaysia: CIB Publication 2003.
- Zucker, P. *Town & Square, from the Ancient Agora to Village Green*. New York: Columbia University Press, 1959.
- Zukin, Sharon. "Socio-Spatial Prototypes of a New Organisation to Consumption: The Role of Real Cultural Capital." *Sociology* 24, (1990): 37-56.