

# DWELLING WITHIN DENSITY

by

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MASTER OF ARCHITECTURE

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TORONTO, 2014

## ABSTRACT

The extrapolation of current population trends indicates that the future will experience a huge influx of population that will return and settle in the city (Gallagher, 2013). This thesis is an investigation that attempts to incorporate the desirable qualities of rural living into the urban living condition and result in an alternative high-density residential solution for the future.

The issue of urban densification and high-density development has become highly debated in the past decade – this thesis engages with the debate through a critical examination of the current status quo approach towards high-density residential development. A comparative study of the living conditions of the glorified rural idyll, the criticized suburban sprawl and the concentrated contemporary urban condition was undertaken in order to identify the advantages and disadvantages of these living environments. This comparison assisted in the creation of a set of design criteria and design elements which emerged from the research and were further investigated through a series of diverse precedent studies.

The critical inquiry into the status quo and the varying living environments was used to define a *humane design* approach in a reinterpretation of high-density residential living in downtown Toronto, Ontario, Canada.

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## TABLE OF CONTENTS

TITLE PAGE .....	i
AUTHOR'S DECLARATION.....	ii
ABSTRACT.....	iii
ACKNOWLEDGEMENTS.....	iv
DEDICATION .....	v
TABLE OF CONTENTS.....	vi
LIST OF FIGURES .....	ix

### PART 1: INTRODUCTION

1.01 Methodology .....	1
1.02 Research Question .....	3
1.03 Outline of Thesis .....	3
1.04 Literature Review .....	3

### PART 2: RESEARCH

2.01 The Rural Living Condition .....	6
2.02 The Suburban Living Condition .....	9
2.03 The Urban Living Condition .....	13
2.04 Density and Concentration – Urban Densification .....	17
2.05 The Status Quo Solution – High-rise Condominiums .....	20
2.06 The Consequences of High-rise Living .....	23
2.07 Rural / Suburban / Urban Living Comparison .....	24
2.08 Critical Context .....	26
2.09 Identifying Desirable Design Elements – Indoor-Outdoor Relationships .....	27
2.10 Identifying Desirable Design Elements – Connectivity to Nature .....	28
2.11 Identifying Desirable Design Elements – Flexibility and Adaptability .....	29
2.12 Identifying Desirable Design Elements – Individuality .....	30
2.13 Design Criteria and Design Elements .....	31
2.14 An Alternative High-Density Solution [Emphasize, Disengage, Integrate] ....	32
2.15 Case Studies .....	33
2.16 Unite d'Habitation, Marseilles .....	34

2.16.1	Site .....	34
2.16.2	Design Principles and Application.....	35
2.16.3	Successes as Alternative High-Density Residential.....	39
2.17	Habitat 67, Montreal.....	41
2.17.1	Site .....	41
2.17.2	Design Principles and Application.....	42
2.17.3	Successes as Alternative High-Density Residential.....	47
2.18	VM Houses, Copenhagen .....	48
2.18.1	Site .....	48
2.18.2	Design Principles and Application.....	49
2.18.3	Successes as Alternative High-Density Residential.....	54
2.19	Mountain Dwellings, Copenhagen .....	55
2.19.1	Site .....	55
2.19.2	Design Principles and Application.....	56
2.19.3	Successes as Alternative High-Density Residential.....	62

### PART 3: DESIGN

3.01	Design Intent .....	63
3.02	Program Analysis .....	64
3.03	The Site.....	65
3.04	Design Evolution / Design Methodology.....	69
3.05	Final Design .....	73
3.06	Design Criteria and Design Elements Manifested .....	94
3.06.1	Density and Concentration .....	95
3.06.2	Disengaging the Status Quo.....	96
3.06.3	Emphasizing Context.....	97
3.06.4	Integrating direct outdoor/indoor access.....	98
	Vertical Circulation.....	98
	Horizontal Circulation.....	100
3.06.5	Re-establishing a connection to nature .....	102
	The Ground Plane.....	102
	The Communal Spaces .....	105
	The Private Gardens.....	107

3.06.6	Designing for adaptability and flexibility .....	108
	Single Unit .....	109
	Studio Unit .....	111
	2 Storey Unit .....	114
	Studio Plus Unit .....	117
3.06.7	Achieving a sense of individuality.....	122
3.07	Conclusion .....	125
BIBLIOGRAPHY .....		126

## LIST OF FIGURES

### PART 2: RESEARCH

Figure 2-1: Rural Living .....	7
Figure 2-2: Frank Lloyd Wright's Broadacre City .....	7
Figure 2-3: Rural Keywords .....	8
Figure 2-4: Suburban Keywords .....	9
Figure 2-5: Family moving into Levittown home .....	10
Figure 2-6: Suburban Development .....	10
Figure 2-7: The homogeneity of the suburban landscape .....	11
Figure 2-8: Lyrics to "Little Boxes" .....	12
Figure 2-9: Urban Keywords .....	13
Figure 2-10: Urban Living, New York .....	14
Figure 2-11: Condominium .....	16
Figure 2-12: Co-operative .....	16
Figure 2-13: Row Houses .....	16
Figure 2-14: Hong Kong High-rises .....	17
Figure 2-15: Dharavi Slum.....	17
Figure 2-16: Toronto High-rises .....	17
Figure 2-17: Toronto Condominium Variety.....	20
Figure 2-18: Condominium Corridor .....	21
Figure 2-19: Gym Amenities.....	21
Figure 2-20: Party Room Amenity.....	21
Figure 2-21: Studio .....	22
Figure 2-22: 2 Bedroom .....	22
Figure 2-23: Condominium Interior .....	22
Figure 2-24: High-rise Living Consequences Keywords .....	23
Figure 2-25: Rural / Suburban / Urban Living Comparison .....	24
Figure 2-26: Rural / Suburban / Urban Units Comparison .....	25
Figure 2-27: Inappropriate Human Scale .....	26
Figure 2-28: Appropriate Human Scale .....	26

Figure 2-29: The Corridor .....	27
Figure 2-30: Front Door Access .....	27
Figure 2-31: Status Quo .....	28
Figure 2-32: Status Quo .....	28
Figure 2-33: Desired Approach .....	28
Figure 2-34: Desired Approach .....	28
Figure 2-35: Nuclear Family .....	29
Figure 2-36: Modern Family Structure .....	29
Figure 2-37: Cookie-cutter houses .....	30
Figure 2-38: Box-like Condominium Units .....	30
Figure 2-39: Dwelling Variety and Individuality .....	30
Figure 2-40: Aerial view of Unité d'Habitation, Marseilles .....	34
Figure 2-41: Units configuration at Unité d'Habitation .....	36
Figure 2-42: Standard interlocked units .....	36
Figure 2-43: Interior of standard unit .....	36
Figure 2-44: Residential access interior street .....	37
Figure 2-45: Shopping Gallery interior street .....	37
Figure 2-46: Sculptural Pool with amenities .....	38
Figure 2-47: Loggia / Personal outdoor space .....	38
Figure 2-48: The structure hovering over the natural landscape .....	39
Figure 2-49: The pilotis .....	39
Figure 2-50: Aerial view of Habitat 67 with downtown Montreal in the background .....	41
Figure 2-51: Panorama view of Habitat 67 from Montreal's Port .....	43
Figure 2-52: Modular Unit Exploded Axonometric .....	44
Figure 2-53: Various Modular Unit Configurations .....	44
Figure 2-54: Pedestrian Streets and Bridges .....	45
Figure 2-55: Roof gardens providing multiple views .....	45
Figure 2-56: Habitat 67 – View of continuous structure from the street .....	46
Figure 2-57: Habitat 67 – Offsetting Unit Configuration .....	46
Figure 2-58: Aerial view of VM Houses alongside Mountain Dwellings .....	48
Figure 2-59: Principles guiding the block configuration .....	50
Figure 2-60: V block and M block unit configuration .....	51
Figure 2-61: Variety of unit configurations available in the M block and V block .....	51

Figure 2-62: Variation in the enclosed access corridors .....	52
Figure 2-63: Variation in the enclosed access corridors .....	52
Figure 2-64: VM Houses complex within the context.....	53
Figure 2-65: Interior materiality within unit.....	53
Figure 2-66: VM Houses complex within the complex.....	54
Figure 2-67: Extruding south-facing triangular terraces.....	54
Figure 2-68: Aerial view of Mountain Dwellings alongside VM Houses .....	55
Figure 2-69: Principles guiding the block configuration.....	57
Figure 2-70: View of the Mountain Dwellings from across the canal .....	58
Figure 2-71: Stepping back of units. Courtesy of BIG.....	58
Figure 2-72: Interior view into David Zahle's unit at the Mountain .....	59
Figure 2-73: Parking lot structure.....	59
Figure 2-74: View towards the eastern suburban development .....	60
Figure 2-75: Entrance to residential units from each level of the parking lot .....	60
Figure 2-76: The north perforated aluminum façade.....	61
Figure 2-77: The luxurious individual outdoor terrace .....	61

### **PART 3: DESIGN**

Figure 3-01: Location of chosen neighbourhood within Toronto .....	66
Figure 3-02: Location of chosen site within the East Bayfront Neighbourhood .....	67
Figure 3-03: Site within East Bayfront and adjacency to St. Lawrence Neighbourhood.....	68
Figure 3-04: Site surroundings and completed projects .....	68
Figure 3-05: Relationship of site to the silos.....	68
Figure 3-06: Using geometry to bring order to the site and identify relationships .....	70
Figure 3-07: Example of one of the design strategies explored .....	71
Figure 3-08: Example of one of the design strategies explored .....	71
Figure 3-09: DNA Breakdown .....	72
Figure 3-10: Schematic extrapolation of two complementing structures.....	72
Figure 3-11: Schematic of final design approach .....	72
Figure 3-12: Site Plan.....	75
Figure 3-13: Second Floor Plan.....	76
Figure 3-14: Third Floor Plan.....	77
Figure 3-15: Third Floor. North-east block detail plan .....	78

Figure 3-16: Fourth Floor Plan.....	79
Figure 3-17: Fifth Floor Plan .....	80
Figure 3-18: Sixth Floor Plan .....	81
Figure 3-19: Seventh Floor Plan .....	82
Figure 3-20: Twelfth Floor Plan.....	83
Figure 3-21: The construction process of the complexes through each level .....	84
Figure 3-22: The construction process of the complexes through each level .....	85
Figure 3-23: South Elevation of the continuous Y complex .....	86
Figure 3-24: South Elevations of the X complex which is composed of two blocks.....	86
Figure 3-25: South Elevation Y complex portion.....	87
Figure 3-26: South Elevation of interweaving backbone complexes together .....	87
Figure 3-27: Site (Commercial, Green Space, Circulation Cores, Interweaving Blocks) .....	88
Figure 3-28: Perspective of X Complex.....	89
Figure 3-29: Perspective of Y Complex.....	89
Figure 3-30: Perspective south view of the complex – in the physical model.....	90
Figure 3-31: Perspective of residential complex from the south-west approach.....	90
Figure 3-32: Perspective of residential complex from the south-east approach.....	91
Figure 3-33: Perspective view towards downtown from Queens Quay East Street .....	91
Figure 3-34: Perspective view on the north side of the complex .....	92
Figure 3-35: Perspective north view of the complex – in the physical model .....	92
Figure 3-36: West Bird's Eye view of the complex .....	93
Figure 3-37: North-east Bird's Eye view of the complex.....	93
Figure 3-38: Sectional physical model.....	93
Figure 3-39: The fluctuating depth of the vertical circulation cores.....	99
Figure 3-40: Isolated vertical circulation cores on site .....	99
Figure 3-41: Horizontal circulation – open exterior street.....	100
Figure 3-42: Transverse Section through units.....	101
Figure 3-43: South view identifying pivotal points within the landscape.....	103
Figure 3-44: Site Plan identifying pivotal points within the landscape.....	103
Figure 3-45: Site Plan identifying space distribution on the ground plane .....	104
Figure 3-46: Site Plan representing pedestrian circulation patterns through the site .....	104
Figure 3-47: Tiered Planting Systems and Wall Planting Systems.....	106
Figure 3-48: Relationship between community space, units and circulation.....	106



Figure 3-49: Private Garden Space in a Studio Unit.....	107
Figure 3-50: Single Unit Plans.....	109
Figure 3-51: Isolated Single Unit perspective .....	110
Figure 3-52: NBK Architectural Terracotta TERRART®-LARGE .....	110
Figure 3-53: Interior Render within Single Unit.....	110
Figure 3-54: Studio Unit Plans.....	111
Figure 3-55: Isolated Studio Unit perspective .....	112
Figure 3-56: NBK Architectural Terracotta TERRART®-MID .....	112
Figure 3-57: Interior Render within Studio Unit.....	112
Figure 3-58: Sectional Render within Studio Unit.....	113
Figure 3-59: Sectional Render within Studio Unit.....	113
Figure 3-60: Interior Render within Studio Unit.....	113
Figure 3-61: Sectional Render .....	113
Figure 3-62: 2 Storey Unit Plans.....	114
Figure 3-63: Isolated 2 Storey Unit perspective .....	115
Figure 3-64: NBK Architectural Terracotta TERRART®-BAGUETTE.....	115
Figure 3-65: Sectional Render within 2 Storey Unit .....	116
Figure 3-66: Interior Render within first floor of the 2 Storey Unit .....	116
Figure 3-67: Interior Render within Master Bedroom of the 2 Storey Unit.....	116
Figure 3-68: Studio Plus Unit Plans .....	117
Figure 3-69: Isolated Studio Plus Unit.....	118
Figure 3-70: Studio Plus Unit Plans.....	118
Figure 3-71: NBK Architectural Terracotta TERRART®-MID .....	118
Figure 3-72: Systems Alignment .....	119
Figure 3-73: Studio Plus Unit Plans.....	119
Figure 3-74: The DNA of units.....	120
Figure 3-75: The shades of TERRART® façades.....	123
Figure 3-76: The shades of TERRART® façades .....	124
Figure 3-77: View of physical model .....	125



## Part 1: Introduction

Dwellings and the process of dwelling are continuously evolving – always entwined to the phenomenon of the moment. In Toronto there is a paradigm shift afoot. Similarly to the suburbanization phenomenon that occurred after WWII – an opposing trend can be observed in the current urban densification. Suburbia has defined the way people live for the latter half of the 20<sup>th</sup> century. It is a movement that has led to sprawling cities without limits, a loss of individuality and a lifestyle that is in limbo – attempting to be both the city and the country but achieving neither successfully. As people have been flooding back into cities the issue of high-density residential development has been in the foreground. The status quo response to providing high-density residential dwelling is in the form of the high-rise condominium. Research data indicates that this residential typology offered to the urban dweller is flawed. This thesis will attempt to uncover an alternative high-density residential solution for the future by studying, identifying and incorporating the desirable qualities extrapolated from the rural, suburban and urban living conditions.

### 1.01 Methodology

Toronto is an extreme example of a modern city that is experiencing urban densification and an urban environment where the status quo response to this trend is predominantly in the form of high-rise condominiums (Dhillon, 2013). As of January 2014 there are 130 high-rise projects under construction in Toronto, an amount that is larger than in any other city in North America. While a ratio of 65% of new development being residential in nature is a typical figure, in Canadian cities such as Toronto, Markham and Burnaby, approximately 92% of high-rises under construction are in the residential market (Evans, 2014). Furthermore the residential high-rise construction in Canada is essentially exclusively defined by condominiums. There has been an exponential increase in favouring high-rise condominium development over any other types of new dwellings since the early 2000s. In 2000, condominiums in high-rise buildings accounted for only 28% of new homes built in the Greater Toronto Area (GTA) – however this figure has grown to account for over 60% of new dwellings since 2011 (TD Economics, 2014). Toronto has been charmed by the economics behind high-rise condominium development and is currently in danger of becoming a city whose skyline is defined solely by countless generic, monotonous and dreary residential towers. The current fabric of the city provides the appropriate platform to

question the future of urban residential living and extrapolate alternative ways of dwelling within urbanity.

The research conducted in this thesis will explore the various ways that people live, the ways in which living conditions have evolved and the major catalysts influencing modern day dwelling. At the core of this exploration is the analysis and understanding of the three living conditions – the rural, the suburban and the urban. The analysis of these conditions will allow for the identification of their key characteristics, both beneficial and detrimental. The issue of urban densification will be explored as one of the catalysts supporting the status quo approach towards high-density urban living. The study and understanding of the predominant and current approach to urban living is a key element in this thesis. The principal objective of this inquiry is to accumulate and filter the knowledge acquired into a more *humane* living condition – which attempts to highlight the advantages of all, while primarily eliminating the downfalls of the status quo.

The exploration and analysis of precedent studies is another important step in the research process as it provides insight into how different architects have attempted to solve similar problems. The case studies chosen for study will be critical projects that offer variety from the past half century and are examples of innovative, typology changing and world renowned developments. The case studies will be projects that are concerned with issues of high-density living, the reminiscence of rural and suburban qualities in an urban environment and the development of an alternative residential solution that juxtaposes the status quo. The analysis of such significant projects will provide comprehension into successful and unsuccessful design methods and strategies and identify opportunities that exist when diverging from the status quo.

The resultant project of this thesis will be an alternative high-density residential solution that demonstrates the inclusion of lost desirable qualities in the urban condition through a more *humane* design approach.

## **1.02 Research Question**

Are there desirable qualities of rural living that could be incorporated into the high-density urban dwelling to make it more humane?

Sub question:

Could the alternative high density response to the condominium be accomplished with the incorporation of the qualities identified by the research findings?

## **1.03 Outline of Thesis**

The thesis is divided into 3 distinct parts. Part 1 is composed of the introduction to the chosen research subject, the methodology behind the research presented, the declaration of the research question and sub question and the literature review.

Part 2 includes the entire body of research – from broad to detailed, it is a written representation of the thinking process. The research contains: definitions and analysis of the rural, suburban and urban living conditions, an examination of density and concentration, an exploration of the status quo response and resulting consequences, the identification and study of design criteria and design elements, and the research topic investigated through comparative case studies.

The thesis concludes with the design process and project in part 3. Site selection, program analysis, design evolution and final design are all critical to understanding the final project. Part 3 culminates with the analysis of the successful manifestation of the design criteria and design elements within the project.

## **1.04 Literature Review**

The research conducted for this thesis included a range of topics that were investigated from a broad perspective into the details. The research included an analysis of the core living conditions (rural, suburban and urban), the current state of the problem of high-density living, appropriate accompanying precedents and a general background knowledge on the scope of the issue. The literature was widespread throughout the past century and provides both historical and current insight. The following literary works are just a selection from the complete catalogue of influential literature.

*Designing for High-Density Cities: For Social and Environmental Sustainability* is a reader on the topic of high density development, it includes over 20 papers with a few being more relevant for this thesis. The papers provide a great background on the issue of density and high density as well as looking at the critical issues that arise from density and urban sustainability through specific case studies.

*DBOOK: Density, Data, Diagrams, Dwellings* is a publication by a+t architecture publishers that acts like a manual for the analysis of density. The book includes a group of 64 collective housing projects that are thoroughly analyzed according to their contribution to the dense city. This reference not only includes two of the precedents explored in this thesis but it also provides a clear method of analyzing and interpreting a density study.

*Density is Home* is another publication by a+t architecture publishers – in this case the book provides an analysis of density developments in a variety of types of city: dispersed, expansive, modern, core and recycled city. While the case studies and analysis presented deals with the issues of density, the book is more focused on comparing the details of the home and discovering the differences between the various types of cities.

*Beyond Habitat* and *For Everyone a Garden* are publications by Moshe Safdie which provide great detail and analysis on Habitat 67. While the books provide great detail on the project, it is the identification of design strategies that influenced the design process and final result that is most critical. *For Everyone a Garden* also includes the many variations of Habitat that followed the original Habitat 67 in Montreal – this analysis is important as it unveils how the design strategies were manipulated by varying parameters.

*Housing and Dwelling: Perspectives on Modern Domestic Architecture* is another reader that provides a vast array of essays on the topic of dwelling, which have been published in the past century. The works are arranged chronologically and provide an insight into the changing nature of the dwelling through time.

*Total Housing: Alternatives to Urban Sprawl* is an Actar Publication which acts as a reference manual for future practices that desire to create the antidote to urban sprawl. The book gathers a selection of projects from around the world that demonstrate the virtues of high density, medium density and multi-family homes. The projects are analyzed in terms of spatial organization, unit aggregation and innovative construction systems.

*inDETAIL: High-Density Housing* is a book published by the renowned Detail Magazine which includes the detailing of several high-density housing developments, as well as three critical essays on the topic of high-density housing.

*Community and Privacy: Towards a New Architecture of Humanism* is a book written by Serge Chermayeff and Christopher Alexander in 1963 and while it was published 50 years ago it addresses the fundamental issues and themes of late modern planning extremely well. The book is particularly successful at articulating the humane aspects of urban and architectural form making and their implications.

*The End of the Suburbs* is a recent publication by journalist Leigh Gallagher that provides a wholesome and complete history and analysis of suburbia. The author uses relevant research and powerful data to express why suburbia has been unsustainable since conception, while also exploring alternative developments which intend to reshape the current way of life. The message of this book is principally concerned with anti-sprawl – what makes the arguments within relevant is the supporting and current data included.

*A Country of Cities* is a recent publication by Vishaan Chakrabarti – an author, partner at SHoP Architects and director at Columbia University's Center for Urban Real Estate. The book is written as *A Manifesto for an Urban America* and argues for that well-designed cities are the answer to America's national challenges – economic stagnation, environmental degradation, unsustainable consumption, etc. The author provides an in-depth background and analysis of cities, suburbs and exurbs – how they have developed, succeeded and failed over the past century. The concluding manifesto promotes the building of *A Country of Cities*, where the *country of highways, houses and hedges* transforms to a *country of trains, towers and trees*.

*The Triumph of the City* by Edward Glaeser is a publication that exposes the reality of worldwide cities. Ultimately the author concludes that despite the negative characteristics of cities, they are humanity's greatest creation and the best hope for the future.

*Architectural Development of Urban Social Capital: Cohousing in Downtown Toronto* is a Ryerson Master of Architecture thesis by Robert Coelho. This thesis is thorough in its background and method when investigating an alternative residential option for Toronto. An analysis of this successful thesis was critical and extremely beneficial in the creation and organization of *Dwelling within Density*.

## Part 2: Research

The manner in which people have been living has changed drastically and frequently in the past two centuries. The industrial revolution, the technical revolution, the scientific-technical revolution and the information and telecommunications revolution have all affected and influenced where and how people live. The industrial revolution modernized the world, while establishing negative notions concerning urban living that would take decades to rectify (Glaeser, 2011). The poor living conditions of the working class alongside the high population density that defined the era changed the way people viewed urban living. The advances in transportation technology (the Model T car) and the unpleasant state of urban living triggered the great urban exodus and reinforced suburbia (Gallagher, 2013). The end of World War II and the promotion of “The American Dream” as the quintessential home in the suburbs, predefined the succeeding decades in North America. While suburban living and suburban development has dominated the latter half of the twentieth century – a renewed interest in urban living has risen as issues of population density, natural resources depletion and sustainability have gained ground and momentum.

The research is looking to explore the various ways that people live – primarily the rural living condition, the suburban living condition and the urban living condition. A thorough analysis of these conditions will allow for the identification of their key characteristics and a consequent classification that will create a solid foundation. The research is also focused on an exploration of the issues within the predominant and current approach to urban living. The goal of this inquiry is to accumulate and filter the knowledge acquired into a new living condition (a more humane living condition) – which attempts to highlight the advantages of all, while primarily eliminating the downfalls of the status quo.

### 2.01 The Rural Living Condition

The rural idyll has remained strongly evocative in most industrialized societies [Figure 2-1]. Since transportation has made it possible, the privately owned “house in the country” has been an escape exercised by city dwellers that wanted to leave the congestion, degradation, and squalor of the industrial city behind (Chermayeff, 1963). Rural living has been glorified in architectural design over the past century, however this glorification is not an indication of an integration of rural qualities in the urban living condition.



“...bring the country to the city and take the city to the country – and I believe there is the city of the future. I think the city of the future is no longer a concentration. I think it is a decentralization.”

- Frank Lloyd Wright (Hession, 2011)

“When every man, woman and child may be born to put his feet on his own acres and every unborn child find his acre waiting for him when he is born – then democracy will have been realized.”

- Frank Lloyd Wright (Fishman, 1990)

Prominent architects like Frank Lloyd Wright supported this rural glorification with his ideas for Broadacre City [Figure 2-2] – where every man, woman and child would deserve their own acres. His ideas promoted a future where the city was brought to the country, where the future was not about concentration but rather about decentralization. Frank Lloyd Wright’s utopian vision for a future America was a thought experiment that placed the automobile at the centre and imagined no end to the availability of open space (Novak, 2014).



Figure 2-1: Rural Living. Courtesy of The Guardian, <http://www.theguardian.com/commentisfree/2010/jul/23/perspectives-rural-life-peoples-panel>



Figure 2-2: Frank Lloyd Wright's Broadacre City. Courtesy of Anti-Vitruv & Super Brunelleschi, <http://relationalthought.wordpress.com/2012/01/24/379/>

There is a plethora of desirable qualities that attract people to rural living [Figure 2-3]. Some of the benefits of rural living include: the prospect of living within nature, the peace and quiet, seclusion and privacy, safety and security, more living space and the flexibility to expand, and the individuality of the dwelling (Public Health Agency of Canada, 2007). In addition, each dwelling unit has specific attributes that are particularly lacking in the urban condition, these being: a front door off a street, a garden or immediate access to nature, multiple vistas, adaptability to growth and a sense of individuality and uniqueness. In terms of economics – rural living is often regarded as a lower-cost living alternative, where a family has the ability to make their monetary income do more. An identical amount of money has the ability to provide a lot more comfort and luxury in a rural condition than in an urban environment. The sense of

community that is associated with rural living is a social component that has dissipated in the suburban and urban environments (Long, 2013). The desire to feel part of a community is often one of the top reasons (apart from living within nature) why people choose to make this great lifestyle change from an urban or suburban environment to a rural way of life.

The disadvantages of rural living are what deem it an unsustainable and unsuitable way of life for future generations. Rural living is accompanied by automobile dependency as the rural environment provides no amenities within reasonable proximity and the serviceability of distant isolated sites is becoming cost prohibitive. Access to services is one of the main issues facing rural communities – critical services such as healthcare, childcare and quality education can become a struggle for rural families due to limited choice and the accompanying travel costs associated with accessing these required services (Public Health Agency of Canada, 2007). The reality of working in a rural community is that while one is allotted with more independence, flexibility and variety in their work – but there is a lack of advancement opportunities, lack of competitive wages and a professional life imbalance. While a lifestyle change from an urban setting to a rural setting is usually spearheaded by a desire to live in nature, live in a secluded safe environment and have the ability to grow and expand – the challenges and disadvantages of rural living have become more relevant in our contemporary and consumerist world. The rural condition is becoming more unsustainable primarily because of world issues such as oil depletion and the resulting high cost of individual transportation.

The many desirable qualities defining rural living are critical because many of them have either been completely eliminated in the urban condition or unsuccessfully manipulated in the suburban condition. This thesis will attempt to highlight and incorporate these lost qualities in a new living condition that will be established through a humane design position.

more living space      sense of community  
individuality living within nature  
peace and quiet **RURAL** variable cost  
minimal air pollution no noise pollution  
privacy and seclusion  
sense of security flexibility to expand

Figure 2-3: Rural Keywords.

## 2.02 The Suburban Living Condition

The suburb is most commonly defined as a residential or mixed use area that is part of a city or is a separate community that is within commuting distance of a city. Suburbs emerged in the 19<sup>th</sup> and 20<sup>th</sup> centuries as a resultant of technological advancements in transportation, both rail and land. In North America the suburban explosion occurred during the post-World War II economic expansion. Returning veterans found a settled and peaceful life in the new suburbs.

Car ownership was another element supporting the urban exodus. As car ownership rose and better roads were built, daily commuting became an attainable goal and living away from cities became the preferred lifestyle – a lifestyle deemed the *American Dream* (Gallagher, 2013).

The expansion of highways, the influx of returning veterans, the creation of the modern-day long-term fixed-rate mortgage and the newfound adoration of the automobile are all critical triggers which moulded and encouraged the suburban condition. The exponential growth in housing and home ownership was staggering. Housing grew from 142,000 in 1944 to almost 2 million a mere six years later in 1950. Simultaneously the percentage of home ownership grew from 44% of American families owning their homes in 1940, to 64.4% by 1980 (Gallagher, 2013). The suburban growth throughout the second half of the 20th century reached a point where it was ten times the rate of growth of the dwindling central cities.

The North American suburbs can be defined by the abundance of adjacent flat land and their prevalence towards detached single-family homes. They are foremost characterized by being much lower density than central cities. The zoning pattern separation within suburbs, which divides residential and commercial development leads to communities where the daily needs are not within walking distance of most homes (Gallagher, 2013). The suburbs were an attempt to provide rural living conditions and benefits – an ideal never realized. The suburbs became the in-between of the rural condition and the urban condition; a state that was too dense to be considered rural but not dense enough to be qualified as urban (Chermayeff, 1963).

**imitation of “living within nature”** **cookie cutter homes**  
more living space **SUBURBAN** variable cost  
manageable air pollution less noise pollution  
adequate privacy  
sense of security **homogeneity**

Figure 2-4: Suburban Keywords.

“The suburb fails to be countryside because it is too dense. It fails to be a city because it is not dense enough, or organized enough. Countless scattered homes dropped like stones on neat rows of development lots do not create an order, or generate community. Neighbor remains stranger and the real friends are most often quite far away, as are schools, shopping and other facilities...The pseudo country house sits uneasily in its shrunken countryside, neither quite cheek by jowl with its neighbor nor decently remote, its flanks unprotected from prying eyes and penetrating sounds. It is a ridiculous anachronism.”

- Serge Chermayeff and Christopher Alexander (Chermayeff, 1963)

The suburb attempts to integrate many of the qualities of rural living that make it desirable – however it falls short from bringing about such a reality [Figure 2-4]. The suburbs are successful at providing dwellings in a peaceful and quiet environment, and one that endures significantly less air and noise pollution than the urban city. The suburbs provide an attempt at imitating the rural condition of living within nature through the front and back gardens, which are sized and hardly reminiscent of the unending rural terrain. As Serge Chermayeff and Christopher Alexander vehemently express in *Community and Privacy: Toward a New Architecture of Humanism* the suburbs attempt to do many things that both the countryside and the city already achieve respectively – privacy is one such rural characteristic that becomes muddled in the suburban lifestyle. The variable cost of suburban versus urban living has completely reversed since the establishment of suburban sprawl. In the post-World War II era when the suburbs were promoted as the fulfillment of the *American Dream*, the cost of this fulfillment was only available for the upper and middle classes [Figure 2-5]. The world has changed drastically in six decades and this can be observed in the fact that the urban city – which was left to the low income classes of society in the 1950s – is now primarily only afforded by the upper-middle and upper classes.



Figure 2-5: Family moving into Levittown home. Courtesy of U. of Illinois at Chicago, <http://tigger.uic.edu/~pbhales/Levittown.html>



Figure 2-6: Suburban Development. Courtesy of Britannica, <http://kids.britannica.com/comptons/article-9310024/Baby-boom>



The disadvantages of suburban living overlap with both the rural and urban living conditions. The suburbs are developments that rely entirely on automobile dependency to get everyday tasks completed – such as going to work, school or shopping [Figure 2-6]. The zoning separation within suburbs indicates that the limited amenities within reasonable proximity are all clustered instead of organically interspersed like in an urban setting. The greatest loss that occurs is the loss of identity and individuality. While the rural and urban conditions manage to maintain a uniqueness and heterogeneity in their architectural landscape – the suburbs are largely defined by their homogenous nature [Figure 2-7]. The North American suburb – from Levittown to the suburban developments of the last decade – have the unfortunate trait of being defined by their cookie-cutter dwellings, which vary according to geographical location but are otherwise identical (Forsyth, 2012). The long commutes and the costs associated with transportation and time are also weaknesses in the suburban living condition.

The promotion of the *American Dream* – as the home for your family in the suburbs – was certainly supported by the television and film industries that blossomed simultaneously with the federal programs endorsing suburbanization. Americans were bombarded by propaganda which had a heavy bias towards the privately owned house, the car and the accompanying appliances. Prominent Hollywood movies such as *It's a Wonderful Life*, *Miracle on 34th Street* and *Mr. Blandings Builds His Dream House* are all examples of the way suburbia was strongly idealized (Chakrabarti, 2013). Enlightened minds recognized the suburban dystopia created – however it would be decades before the media would present it as such. In books or lyrics, artists were not



Figure 2-7: The homogeneity of the suburban landscape. Courtesy of the Institute for Modern and Contemporary Culture, <http://instituteformodern.co.uk/2012/narratives-of-suburbia-programme-announced>

Little boxes on the hillside,  
Little boxes made of ticky-tacky,  
Little boxes on the hillside,  
Little boxes all the same.  
There's a green one and a pink one  
And a blue one and a yellow one,  
And they're all made out of ticky-tacky  
And they all look just the same.

And the people in the houses  
All went to the university,  
Where they were put in boxes  
And they came out all the same,  
And there's doctors and lawyers,  
And business executives,  
And they're all made out of ticky-tacky  
And they all look just the same.

And they all play on the golf course  
And drink their martinis dry,  
And they all have pretty children  
And the children go to school,  
And the children go to summer camp  
And then to the university,  
Where they are put in boxes  
And they come out all the same.

And the boys go into business  
And marry and raise a family  
In boxes made of ticky-tacky  
And they all look just the same.  
There's a green one and a pink one  
And a blue one and a yellow one,  
And they're all made out of ticky-tacky  
And they all look just the same.

Figure 2-8: Lyrics to "Little Boxes". Courtesy of Rock Genius, <http://rock.genius.com/Malvina-reynolds-little-boxes-lyrics>

afraid to expose the suburban developments. The songwriter Malvina Reynolds wrote the famous song "Little Boxes" in 1962 [Figure 2-8] – a song that is a political satire of the development of suburbia and the associated conformist middle-class America (Gallagher, 2013). Author John Keats expressed in the book *The Crack in the Picture Window* his criticism towards suburbia and its plan to create stultifying communities through a landscape of mass-produced housing.

The suburb failed in its ambitions – however the desire to provide people with some of the benefits and luxuries of rural living is an admirable one. The mistake lay in the attempt to apply these qualities outside of the urban condition – this thesis will attempt to do this by incorporating the desirable qualities of rural living into the urban living condition and result in an alternative high density residential based on a more humane design approach.

## 2.03 The Urban Living Condition

In 2007 a United Nations report declared that for the first time in history more than 50% of the world population was urban. In 2014, the urban population accounted for 54% of the total global population – the increase is staggering compared to the 34% urban population in 1960. The succeeding decades are expected to continue to witness an increase in urban living, particularly in less developed regions of the world (WHO, 2014).

Urban living is essentially the characterization of city life – the act of living within a city. The city is an urban environment defined by its size, density, heterogeneity and architectural expression, to name a few. Urban living has resurged and blossomed in recent decades after the negative reputation it carried since the age of the industrial revolution. Likewise to the rural and suburban conditions, the urban condition continues to have both advantages and disadvantages.

In stark contrast the urban living condition thrives in all the categories where rural living fails [Figure 2-9]. Living in an urban environment provides easy access to amenities of all sorts – the urban core is often the hub of arts and culture, the centre of entertainment and dining, and provides diverse and accessible shopping for all. The proximity to work, school and most activities imaginable that the urban condition offers is the epitome of urban living. The effects of context are visible in the dominance of public transportation, the adversity towards automobiles and the propensity towards walking. The urban living condition accomplishes heterogeneity through diverse architecture – in terms of typologies, styles and materiality [Figure 2-10]. Living in a very dense environment can often be deemed disadvantageous, however it can also be considered beneficial as sustainability is achieved through density.

A large amount of the benefits of rural living are found to be the hindrances of the urban living condition. The urban environment is plagued by air pollution and noise pollution (traffic, people, nightlife). Urban living is defined by agglomeration and the accompanying limited privacy. The issue of density and agglomeration also affect the sense of safety and security that exists in the

**sustainability through density** **proximity to amenities**  
minimal living space **URBAN** high cost of urban living  
**walkability** air pollution noise pollution  
limited privacy city as centralized hub  
**limited access to nature** **heterogeneity** exciting

Figure 2-9: Urban Keywords.

urban condition. Living in an urban environment leads to a disconnection to nature, due to limited access to public and private natural spaces such as gardens. The cost of urban living has been in an upward trajectory due to the reignited desire to live in cities and the sustainability aspect of urban living.



Figure 2-10: Urban Living, New York. Courtesy of World Property Channel, <http://www.worldpropertychannel.com/featured-columnists/new-york-report/new-york-housing-luxury-residential-market-ny-real-estate-market-reports-2013-6702.php>

In the book *The End of the Suburbs*, the author Leigh Gallagher outlines key data and arguments that not only support why suburbs should end, but rather that suburbs as they exist currently are indeed ending. The arguments don't just indicate the end of the suburbs, but also the much-awaited return to power of the urban living condition. The data includes:

- *"Census data reveals a shift"* – the migration pattern has reversed for the first time since the invention of the automobile, from an outward migration to an inward migration. Cities are now growing at a faster rate than their suburbs for the first time in one hundred years (Gallagher, 2013).
- *"Home valuations have inverted"* – in the response to the Great Recession (2007-2009) the values of homes have fared better in the urban cities than in the suburbs, an unexpected reversal that has provided cities with a great edge (Gallagher, 2013).
- *"Building activity has reversed"* – in the early 1990s a mere 7% of building activity occurred within city limits (New York) and 70% in the suburban fringe, by 2008 more than 70% of new construction was occurring within the city (Gallagher, 2013).
- *"Poverty has invaded the suburbs."*



- *“Cities are resurgent”* – just as poverty has invaded the suburbs, wealth has returned to the city. Young families (which are the main demographic required to sustain suburbia) are opting to remain in the city (Gallagher, 2013).
- *“Our households are shrinking”* – both the marriage and birth rate are on downward trajectories. In 1960 three-quarters of adults were married, while today only half of all adults in the United States are married (Gallagher, 2013).
- *“Millennials hate the burbs ... and they hate cars even more”* – 70% of millennials (born 1980-2000) prefer to live in an urban area and they don't want cars. In 1980, 66% of seventeen-year-olds knew how to drive – by 2010 the interest in having a driver's licence has decreased to 47% (Gallagher, 2013).
- *“The price of oil is still rising”* – the constant increase of oil prices has affected many aspects of society and has enlightened suburbanites about the unsustainability of suburban living (Gallagher, 2013).
- *“We are eco-obsessed”* – while it may have started with Al Gore and the call towards environmental sustainability, it has trickled into the question of how we live and has led to a powerful shift towards: *Less is more* (Gallagher, 2013).
- *“The suburbs were poorly designed to begin with”* – the low-density pattern of development of the suburbs is not a sustainable living model (Gallagher, 2013).

Many of the arguments brought forth by Leigh Gallagher have been previously echoed by urbanist Jane Jacobs and author James Howard Kunstler. There is an overall recognition that the urban living condition is best suited for the needs of the presents and the future.

The urban city is composed of a variety of housing typologies that express the diversity of the inhabitants that live in the urban condition and their needs. The housing typologies include condominiums [Figure 2-11], co-operatives, apartments and detached or row housing.

Condominiums have become the dominant development typology in the past decade. A condominium refers to a type of development where control of a property is shared with more than one person – where a specific piece of the real estate (such as a unit) is individually owned and the amenity spaces are owned by a different entity. While condominiums can be town-homes or mid-rise apartments, they are most often found in the form of high-rise apartments (Coelho, 2010). The typology of the high-rise condominium has been deemed the status quo approach to urban living and will be further explored in a subsequent section.

Co-operative housing developments are very similar in design to condominium developments, their main distinction is in the ownership structure [Figure 2-12]. A co-operative housing development is housing that is actually owned by a legal association formed on co-operative principles – within which the residents share the responsibilities and control their homes (Coelho, 2010). In the most common form of co-operative development, the units are rented at a market rate or subsidized rate and the housing charge is used in the maintenance and mortgage of the development.

Apartments are self-contained dwellings units that are part of a larger building or development. In North America the word apartment denotes a residential unit that is rented as opposed to owned – owned units are referred to as condominium units.

Detached single-family housing and row housing is what can be abundantly found in historic inner city neighbourhoods [Figure 2-13]. These areas of the city have a notably lower density than the newer high-density urban living neighbourhoods but they are reminiscent of a historic time and of the rural living condition. Row houses are deemed medium-density housing as they create more dense neighbourhoods due to their design – they are a row of identical or mirror-image houses that share side walls.

The urban living condition is abundant with variety in terms of housing typologies, however the high-rise condominium has become the dominant approach towards fulfilling the influx of new residents that are returning and settling in cities.



Figure 2-11: Condominium. Courtesy of Urban Toronto, <http://urbantoronto.ca/news/2013/07/photo-day-condos-tower>



Figure 2-12: Co-operative. Courtesy of The Tyee, <http://thetyee.ca/News/2010/07/05/CoOpInYourFuture/>



Figure 2-13: Row Houses. Courtesy of Cabbagetown Toronto, <http://cabbagetowntoronto.com/>

## 2.04 Density and Concentration – Urban Densification

The issue of urban densification and high density development has become highly debated in many fields in the past decade. Jane Jacobs believed that a dense concentration of people was critical in generating diversity in the city (Jacobs, 1961). Le Corbusier is one of the prominent figures supporting density through his high-rise vertical garden cities. However neither of them could have envisioned the way that high density living is manifesting itself throughout the world. In Toronto in the form of high-rise curtain wall condominium towers [Figure 2-16], in Hong Kong in the form of more dauntingly high-rise concentrated towers [Figure 2-14] and in Mumbai in the form of informal shanti towns [Figure 2-15].



Figure 2-14: Hong Kong High-rises. Courtesy of Rudy Owens, <http://www.rudyowens.com/hong-kong/>

Figure 2-15: Dharavi Slum. Courtesy of The Architectural Review, <http://thearchitecturalreview.org/>

Figure 2-16: Toronto High-rises. Courtesy of TCTeam, <http://www.tcteam.ca/good-news-torontos-condo-market>

There are two types of density: physical density and perceived density. Physical density is the numerical measure of the concentration of individuals or physical structure within a given geographical unit: therefore physical density is itself split into people density and building density (Cheng, 2010). People density is an expression of the number of people or household per given area while building density is defined as the ratio of building structure to an area unit.



Both of these densities can be even further broken down for specific calculations. Perceived density on the other hand is defined as an individual's perception and estimate of the number of people present in a given area and the space available – therefore it is subjective (Cheng, 2010).

High density is in fact a matter of perception and culture. The notion of high density depends on the individual or society's judgement against a norm – for this reason different backgrounds that are part of varying contexts have distinct definitions of what is deemed high density. For example in the United Kingdom more than 60 dwellings per net hectare is seen as high density, in the United States more than 110 dwellings per net hectare is high density, while in Israel more than 290 dwellings per net hectare is the benchmark.

While many acknowledge that high density provides certain merits, there is significant criticism against it. High density development has both advantageous and disadvantageous effects on design and planning issues such as: urban land use and infrastructure, transportation systems, environment and preservation, personal and social elements.

In terms of urban land use and infrastructure: high density maximizes the utilization of scarce urban land while reducing the pressure to develop open areas, it concentrates a population into a smaller area and allows for greater use of infrastructural services (roads, sewage, electricity, telecommunication networks), while also assisting the infrastructural systems run more economically. However, achieving high density also has detrimental results – this type of development often manifests in the form of massive high-rise buildings which congest the cityscape and overpower the remainder open space. Another negative consequence can occur when the population exceeds the infrastructural capacity to a point where infrastructural overload and deterioration become inevitable (Cheng, 2010).

The pros exceed the cons when studying the relationship between high density development and transportation systems. A higher concentration of people provides more users and strongly sustains the use of mass public transit. A high density of both people and buildings suggests an agglomeration of people where opportunities for sustainable transit such as walking and cycling increase – the increased proximity of high density also means shorter car trips. The only concern arises at the tipping point of high density – if high density is unrestrained it can produce a reverse effect where the public transportation systems are insufficient and people must continue to rely on personal cars, which would negatively impact traffic congestion (Cheng, 2010).

High density supports environment preservation. Pursuing high building density in the urban environment protects the countryside and valuable agricultural land from being developed. The endorsing of public transit positively impacts the environment as a reduction in personal car use results in a decline of harmful car emissions. While high density is protecting the environment outside the city, within the city it reduces the spaces for greenery (trees and shrubs) which are critical in purifying city air. The urban heat island effect that concentrated buildings create alongside the polluted city air are high density development consequences that lower the quality of urban living (Cheng, 2010).

Finally high density takes a toll on the individual. High density positively provides proximity and convenience to work, services and entertainment – and proper organization of high building density can provide good social interaction. However, frequently the result of high density living is reduced privacy, forceful unwanted social contact and psychological stress and feelings of anxiety due to crowding (Cheng, 2010).

“We’re better off living in dense urban environments that are centered around mass transit. In the U.S. they’re the most economically productive environments; they’re the most sustainable environments; and they’re the most socially mobile environments.”  
- Vishaan Chakrabarti (Bozikovic, 2013)

High density development has become an especially debated and controversial topic in the architecture and planning professions. The most current position of scholars and practitioners alike is an articulated stance that suggests that future cities need to be dense in order to be sustainable. Vishaan Chakrabarti is the director of Columbia University’s Centre for Urban Real Estate and a partner at SHoP Architects and in his paper *Building Hyperdensity and Civic Delight* he explores the pursuit of ideal urban density through analysis of existing precedent cities. His research is a strong proponent of high-density urban living and it identifies key elements for the dense sustainable cities of the future (Chakrabarti, 2013).

High density living is a key element in our present and our future – for this reason its exploration is crucial as it needs to evolve and advance into a more sustainable way of living.

## 2.05 The Status Quo Solution – High-rise Condominiums

The high-rise condominium has become the dominant approach towards fulfilling the influx of new residents that are a resultant of urban densification, and has been deemed the status quo solution to high-density urban living [Figure 2-17]. As previously mentioned, a condominium is a type of development where the control of a property is shared with more than one person – where a dwelling unit is individually owned while the amenity spaces are owned by a different entity.

Condominium developments are composed of two types of spaces – the residential units and the amenity spaces. The average condominium will include amenity spaces such as laundry facilities, exercise rooms, party rooms, conference rooms, swimming pools and rooftop decks with barbeques [Figure 2-19] [Figure 2-20]. While these amenity spaces allow residents to supplement their lifestyles, they are also primarily designed for individual use by residents instead of being focused on the condominium community as a whole. Amenity spaces such as party and conference rooms must be rented and booked ahead of time – therefore indicating a lack of provision for communal activities. The amenity spaces are often found outside of the normal circulation path, they inhabit the basement, penthouse or the spaces deemed inadequate for residential units (Coelho, 2010).



Figure 2-17: Toronto Condominium Variety. Courtesy of Toronto Condos, <http://torontocondos.files.wordpress.com/2011/09/july2011a-035.jpg>



The circulation within condominium developments is known for its efficiency, however there are several shortcomings that are too often overlooked. The vertical circulation is achieved through elevators and mandatory fire stairs, while the horizontal circulation is in the form of single or double loaded corridors that are the highly debated quintessential modern corridor. Circulation spaces do not generate profit in a condominium development and are therefore designed to minimum building code standards [Figure 2-18]. The design strategy towards circulation results in corridors that are minimal, poorly lit, poor spaces for social interaction and areas that residents will not occupy for prolonged periods (Coelho, 2010).

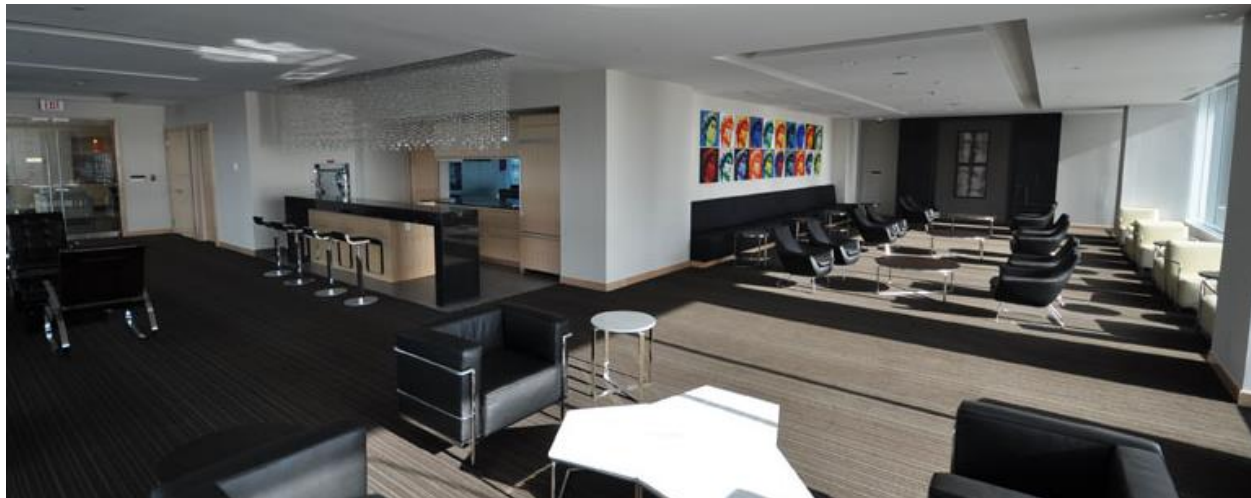


Figure 2-18: Condominium Corridor. Courtesy of CPL Design Interiors, <http://www.cpldesigninteriors.com/>

Figure 2-19: Gym Amenities. Courtesy of Maple Leaf Square Condos, <http://www.mapleleafsquarecondos.com/Amenities.html>

Figure 2-20: Party Room Amenity. Courtesy of Maple Leaf Square Condos, <http://www.mapleleafsquarecondos.com/Amenities.html>

The design of condominium units is highly based on profit and making the most out of every square foot. The units are designed to be as efficient as possible, with the overall design strategy of condominium developments assisting as it is based on maximizing the areas of units since

they are the profit generating portions of the development. The entrance to all the residential units occurs off the corridors and provides an identical experience devoid of any dwelling identity or individuality. The various unit layouts are efficient in their design but they seldom include residential dwellings for families with more than 4 members [Figure 2-21] [Figure 2-22] [Figure 2-23]. The inability for a condominium development to accommodate larger families or multi-generational families exposes the limits of condominium development. The connectivity between the circulation spaces and the units is negligible and leads to a situation where living within a dense environment still leaves one isolated. The opportunities to engage and get to know one's neighbours in a condominium are hindered by poor design strategies such as those for the circulation and the clustering of amenities (Coelho, 2010). Many condominium units also provide an outdoor space in the form of a small balcony – while the gesture of providing the inhabitants with direct access to the outdoors is admirable, the manifestation of the space is often too small to be even enjoyed.

The high-rise condominium is positively promoting sustainability through density however there are many desirable living aspects missing from this dominant typology.

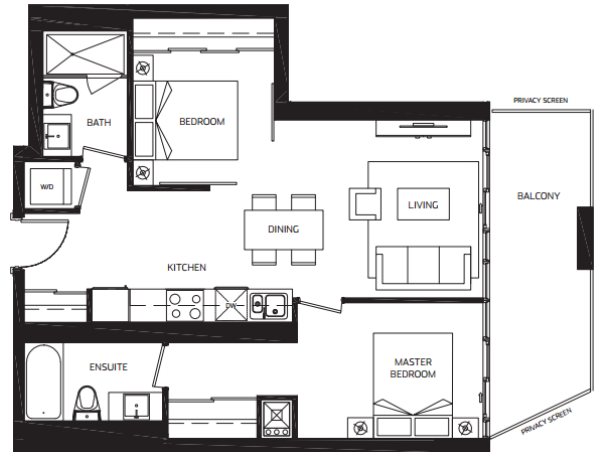


Figure 2-21: Studio. Courtesy of The Yards at Fort York, <http://www.onnifortyork.com/theyards/floorplans/bytype/>

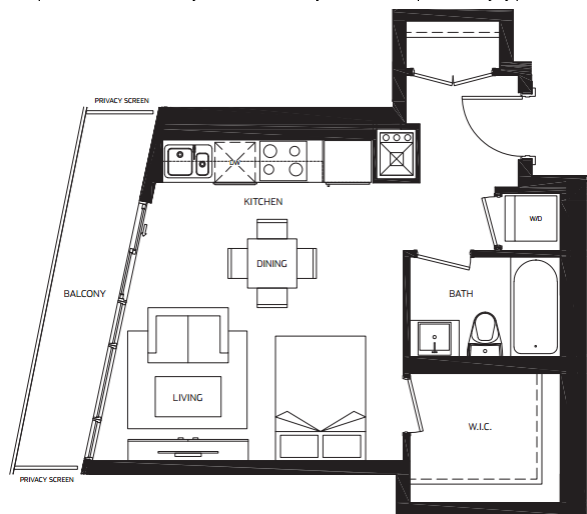


Figure 2-22: 2 Bedroom. Courtesy of The Yards at Fort York, <http://www.onnifortyork.com/theyards/floorplans/bytype/>



Figure 2-23: Condominium Interior. Courtesy of The Yards at Fort York, <http://www.onnifortyork.com/theyards/#/Gallery>



## 2.06 The Consequences of High-rise Living

The status quo - the current response for accommodating high density is the high-rise condominium. High-rises have been deemed to work against nature, against man and against society (Von Eckardt, 2007). Living in a high-rise has been compared to a special kind of encapsulation giving the impression of being alone in an unfriendly world – and most critically has been criticized by Christopher Alexander who vehemently declares that high buildings make people crazy (Alexander, 1977).

Robert Gifford completed an invited review paper for the Department of Psychology and School of Environmental Studies at the University of Victoria in 2007 on the topic of the consequences of living in high-rise buildings [Figure 2-24]. This particular study on the consequences of living in high-rise buildings revealed that: there is a lack of satisfaction that high-rise residents are experiencing (particularly more so in families), there is strain and distress from dissatisfaction with one's high-rise home, issues with dwelling density and the sense of crowding. There are also studies that show that children raised in high-rise homes were manifesting twice as many behavior problems (such as bedwetting and temper tantrums), there is the fear of crime, and the nature of high-rises to support anonymity and depersonalization of one's neighbours – which makes social interaction difficult to regulate and leads to a loss of community and social support (Gifford, 2007).

The extreme of the high-rise high density spectrum and the accompanying consequences can be best observed in the Hong Kong 50+ storey towers. These high rise apartment towers create an unbearable experience both internally and externally. The towers are built in much too close proximity to each other, while having no regard towards the human scale and the undesirable effect they create on the street. However their monotone expression and scale are not the worst characteristics – a look inside these Hong Kong apartments (provided by the Society for Community Organization) exposes the extremely cramped and miserable conditions provided in these *high-rise urban slums* – the extremeness of the situation is exemplified in a dwelling as small as 28 square feet (Torre, 2013).

**strain**  
**dissatisfaction with dwelling** **social relations**  
**HIGH-RISE LIVING CONSEQUENCES** **mental health**  
**effect on children** **distress** **crime and fear of crime**  
**behaviour problems**

Figure 2-24: High-rise Living Consequences Keywords.

## 2.07 Rural / Suburban / Urban Living Comparison

The investigation into the three living conditions – the rural, the suburban, and the urban – has allowed for a very straightforward and fulfilling comparison. The analysis not only categorizes the advantages and disadvantages of living in these conditions but also highlights the most desired benefits and detrimental flaws [Figure 2-25]. Briefly – rural living is defined by the relationship it has with nature and the automobile dependency it relied on to get anything done. The suburban condition is best classified as the in-between of the rural and the urban – not dense enough to be urban and too dense to be considered rural – it failed in its ambitions to provide some of the benefits of rural living (Chermayeff, 1963). The urban living condition thrives where the rural fails – it provides proximity, heterogeneity and promotes the more sustainable method of transport, that being public transportation.

While the comparison of the general characteristics of living within these conditions was a critical part of research process, another more detailed comparison of the qualities of the dwellings within each of these conditions is another logical step in this investigation. This secondary comparison studies the pros and cons of the rural house, the suburban house and the high-rise

	RURAL	SUBURBAN	URBAN
ADVANTAGES	<ul style="list-style-type: none"> <li>• <b>living within nature</b></li> <li>• peace and quiet</li> <li>• seclusion</li> <li>• privacy</li> <li>• safety</li> <li>• security</li> <li>• more living space</li> <li>• <b>flexibility to expand</b></li> <li>• <b>individuality of the dwelling</b></li> <li>• variable cost</li> <li>• no pollution</li> <li>• no noise pollution</li> </ul>	<ul style="list-style-type: none"> <li>• <b>an attempt at imitating the rural condition of living within nature</b></li> <li>• peace and quiet</li> <li>• less noise pollution</li> <li>• less pollution</li> <li>• more privacy than the urban condition</li> <li>• safety</li> <li>• more living space</li> <li>• <b>an attempt at dwelling "individuality"</b></li> <li>• variable cost</li> </ul>	<ul style="list-style-type: none"> <li>• centralized hub of arts and culture, entertainment, shopping, etc.</li> <li>• <b>proximity to amenities</b></li> <li>• walkability</li> <li>• sustainable commuting</li> <li>• eliminate the need for an automobile</li> <li>• <b>heterogeneity</b></li> <li>• diverse architecture</li> <li>• cost of transportation + time</li> <li>• <b>sustainability through density</b></li> <li>• exciting</li> </ul>
DISADVANTAGES	<ul style="list-style-type: none"> <li>• seclusion</li> <li>• too quiet</li> <li>• dull / tedious</li> <li>• automobile dependency</li> <li>• <b>NO amenities within reasonable proximity</b></li> <li>• <b>NO serviceability</b></li> <li>• long commutes</li> <li>• cost of transportation</li> <li>• cost of time</li> </ul>	<ul style="list-style-type: none"> <li>• too quiet</li> <li>• dull / tedious</li> <li>• automobile dependency</li> <li>• <b>limited amenities within reasonable proximity</b></li> <li>• long commutes</li> <li>• cost of transportation</li> <li>• cost of time</li> <li>• <b>cookie cutter homes</b></li> <li>• homogeneity</li> </ul>	<ul style="list-style-type: none"> <li>• noise pollution (traffic, people, nightlife)</li> <li>• pollution</li> <li>• safety</li> <li>• <b>limited access to nature</b></li> <li>• cost of urban living</li> <li>• <b>limited access to suburban amenities (yard, garage, etc.)</b></li> <li>• limited privacy</li> <li>• agglomeration</li> </ul>

Figure 2-25: Rural / Suburban / Urban Living Comparison.

condominium [Figure 2-26]. *The rural house* provides the largest living space, an ability to expand, the ultimate privacy, a sense of individuality and uniqueness and is set in a natural environment which consequently generates a relationship with nature for the dweller. The few weaknesses of the rural house are more shortcoming of the overall rural living condition – primarily being secluded with no amenities within reasonable proximity. *The suburban house* provides adequate living space, a limited ability to expand and attempts to replicate a relationship with nature through the minimal front and back yards. The greatest loss in the suburban house is the sense of individuality, as the typical suburban development is defined by cookie-cutter homes. *The high-rise condominium* provides minimal living space that makes the most out of every square foot and essentially does promote sustainability through density. The negatives of the high-rise condominium are many, including: no individuality as dwellings units are a cut-and-paste design, no design for physical and visual connectivity between units, circulation and amenities, weak social interaction, inability to expand living space and an overall detachment from the urban setting.

When comparing the living units of the three conditions it is easily observed that the high-rise condominium has the most shortcomings and the rural house has the most benefits. This extrapolation will be important in the identification and desirable design elements that need to be reintroduced into the urban living condition and the high-density urban dwelling.

	PROS	CONS
THE HIGH-RISE CONDOMINIUM	<ul style="list-style-type: none"> <li>• provides minimal living space due to insistent minimal area design - makes the most out of every square foot</li> <li>• located within the urban core</li> </ul>	<ul style="list-style-type: none"> <li>• no individuality - cut and paste design</li> <li>• no design for physical connectivity between units, circulation and amenities</li> <li>• no design for visual connectivity between units, circulation and amenities</li> <li>• seclusion / weak social interaction</li> <li>• no ability to expand living space</li> </ul>
THE SUBURBAN HOUSE	<ul style="list-style-type: none"> <li>• provides adequate living space</li> <li>• attempts to provide a relationship with nature, albeit a minimal one through the small front and back yard</li> <li>• limited ability to expand living space</li> </ul>	<ul style="list-style-type: none"> <li>• driving proximity to urban core</li> <li>• driving proximity to amenities</li> <li>• weak sense of individuality - usually sets of cookie cutter homes</li> </ul>
THE RURAL HOUSE	<ul style="list-style-type: none"> <li>• provides the largest living space</li> <li>• ability to expand living space</li> <li>• is set within nature - therefore there is a close relationship between the dwelling and nature</li> <li>• ultimate privacy</li> <li>• most likely has a sense of individuality and uniqueness</li> </ul>	<ul style="list-style-type: none"> <li>• secluded in the middle of nowhere</li> <li>• no amenities in reasonable proximity</li> </ul>

Figure 2-26: Rural / Suburban / Urban Units Comparison.

## 2.08 Critical Context

This thesis is concerned with the issue of urban densification and the importance of developing a more sustainable way of living in the urban environment. The resultant thesis project will be an alternative high-density development set in the urban condition – making context a key design tool. The urban context is critical as it provides advantages over the rural setting – such as proximity to amenities, walkability, centralization and heterogeneity. It is also essential because it is a representation of existing relationships in terms of history, architectural intent, density and scale (Jacobs, 1961).

“The challenge is that the principles of good human scale must be a natural part of the urban fabric in order to invite people to walk and cycle...Neglecting the human scale is never an option. The human body, senses and mobility are the key to good urban planning for people. All the answers are right here, encapsulated in our own bodies. The challenge is to build splendid cities at eye height with tall buildings rising above the beautiful lower stories.”

- Jan Gehl (Gehl, 2010)

The urban context is actually the most diverse environment and from within it many parameters can be extrapolated which will guide a design. The immediate context of a site should have great impact on the design strategies of a development. The density of surrounding neighbourhoods should provide an approximate expectation. The contextual typologies and their architectural expression should provide a sense of the existing community. The existing scale is the one aspect within the urban condition that should be examined and not directly replicated – primarily, the human scale needs to be reintroduced into the high-density urban environment

[Figure 2-27] [Figure 2-28].



Figure 2-27: Inappropriate Human Scale. Courtesy of Michael Wolf, <http://photomichaelwolf.com/#night/1>



Figure 2-28: Appropriate Human Scale. Courtesy Open City Projects, <http://opencityprojects.com/blog/safety/the-human-scale>



## 2.09 Identifying Desirable Design Elements – Indoor-Outdoor Relationships

The rural and suburban living conditions have an indoor-outdoor front door relationship which is absent in the high-density urban living condition. The enclosed, sterile corridor is the sole current approach to one's dwelling in the mid and high-rise residential typologies [Figure 2-29]. Throughout the past half century the modernist corridor has been criticized and has become a constant experimental design element that architects are attempting to improve and revitalize – a fact which will be demonstrated in the precedent analysis (Alexander, 1977).

“...long, sterile corridors set the scene for everything bad about modern architecture. In fact, the ugly long repetitive corridors of the machine age have so far infected the word “corridor” that it is hard to imagine that a corridor could ever be a place of beauty.”  
- Christopher Alexander, *A Pattern Language* (Alexander, 1977)

The resultant alternative high-density development will attempt to provide an indoor-outdoor relationship, where the resident is immediately within the elements, by rejecting the enclosed corridor and opting for open exterior circulation streets [Figure 2-30]. The elimination of the modern corridor allows for a horizontal circulation access that has the ability to thrive as it provides an opportunity for additional openings, increased social connectivity and the opportunity to redefine this space as more than just transient. The ability to enter one's dwelling from an exterior environment on the tenth floor of a high-density development is an uncommon experience – it is also one of the objectives of this thesis.



Figure 2-29: The Corridor. Courtesy of Tumblr, <http://hello--neighbor.tumblr.com/post/82074807121/hello-neighbor-moving-into-your-own-apartment>



Figure 2-30: Front Door Access. Courtesy of Fine Art America, <http://fineartamerica.com/featured/32-front-doors-horizontal-collage-richard-thomas.html>

## 2.10 Identifying Desirable Design Elements – Connectivity to Nature

One of the most desirable characteristics of rural and suburban living is the relationship with nature that is cultivated in those environments. A rural dwelling is often surrounded by acres of natural space, while a suburban homes attempts to replicate that connectivity to nature on a smaller scale through the natural front and back yards. While the historic single-family homes and townhomes found within an urban city do manage to maintain a connectivity to nature – it is the high-density developments where this relationship vanishes. The only private outdoor space incorporated into high-density developments is in the form of balconies that are too small (3-5m<sup>2</sup>) for any real function [Figure 2-31] [Figure 2-32].

“All this demands dwellings close to the ground with easy access to outdoors, an organic whole in which indoors and outdoors are integrated in a single comprehensive shelter.”  
- Serge Chermayeff, Christopher Alexander (Chermayeff, 1963)

One of the objectives of the resultant alternative high-density development is to re-introduce and enforce the relationship urban dwellers have with nature on several levels – private, semi-public, public [Figure 2-33, 34]. The project will attempt to incorporate private urban gardens, communal garden spaces and the promotion of public green space as a key design strategy.

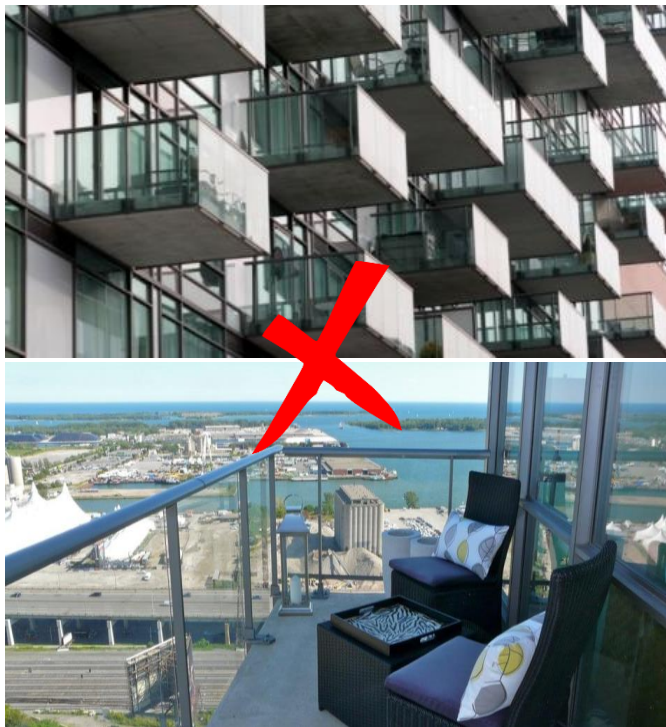


Figure 2-31: Status Quo. Courtesy of 680News, <http://www.680news.com/files/2012/04/8ac795174c81b970e6a52c9629f4.jpg>;  
Figure 2-32: Status Quo. Courtesy of Urban Toronto, <http://urbantoronto.ca/news/2012/08/distillery-penthouse-ever-changing-view-toronto>



Figure 2-33: Desired Approach. Courtesy of Cedar City, [http://weplayunplugged.com/cedarcity\\_unplugged\\_print.pdf](http://weplayunplugged.com/cedarcity_unplugged_print.pdf);  
Figure 2-34: Desired Approach. Courtesy of House & Home, <http://houseandhome.com/design/small-balcony-garden>



## 2.11 Identifying Desirable Design Elements – Flexibility and Adaptability

The structure of the family has become a changing notion – with the nuclear family no longer the norm in today's modern society [Figure 2-35] [Figure 2-36]. With both marriage and birth rate steadily declining in North America and the amount of single-person households on a rising trajectory, the approach towards designing the dwelling must be redirected from the nuclear family (Gallagher, 2013).

“Encourage growth toward a mix of household types in every neighbourhood, and every cluster, so that one-person households, couples, families with children, and group households are side by side.”

- Christopher Alexander (Alexander, 1977)

“Although social structures have changed considerably in the past decades – with the result that the significance of the average nuclear family continues to decline – the typical apartment floor plan is still almost exclusively designed for the need of just such a family, even in new developments. It isn't as if today's variety of lifestyles imposes an imperative for specialized floor plans. Rather, what we need are flexible types that make it possible to react for changing life circumstances by simple means.”

- Christian Schittich (Schittich, 2004)

Dwellings must be conceptualized with flexibility and adaptability in mind. Urban dwellings should be designed to accommodate a range of single and family units, while also being malleable enough to react to changing life circumstances. The influence of culture should also be considered as multi-generational living is a custom in many cultures. Designing dwellings for the multicultural world we live in is of significance. It is important to understand that dwellings should be a reflection of their incredibly varied family structures – a cookie-cutter home designed for a nuclear family is not the correct representation of today's society.

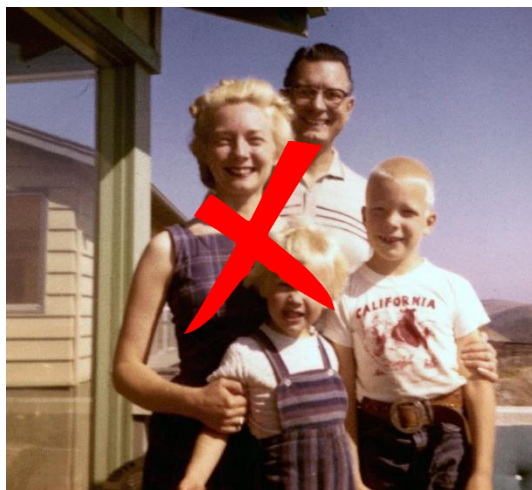


Figure 2-35: Nuclear Family. Courtesy of Philosophie Magazine, <http://www.philomag.com/les-idees/dossiers/pourquoi-fait-on-des-enfants-3674>



Figure 2-36: Modern Family Structure. Courtesy of TV Rage, <http://www.tvrage.com/news/970/abc-renewal-round-up-7-shows-officially-picked-up>

## 2.12 Identifying Desirable Design Elements – Individuality

The rural living condition is composed of unique dwellings that are often an expression of their residents. The suburban condition is known for its homogeneous nature due to cookie-cutter homes and identical lots [Figure 2-37]. While individuality can still be found within the historic low-density urban neighbourhoods, the new high-density urban developments have entirely eliminated the concept of identity and individuality in their design. The status quo high-rise curtain wall condominium towers express a monochromatic and homogeneous façade which does not allow its residents the ability to identify with their own personal dwelling [Fig. 2-38].

“People need an identifiable spatial unit to belong to. They want to be able to identify the part of the city where they live as distinct from others.”

- Christopher Alexander (Alexander, 1977)

The beauty and architectural splendor found within historic low-density urban neighbourhoods is derived from the diversity of architectural styles that can be observed sequentially on the same street [Figure 2-39]. This internal and external variety needs to be incorporated into high-density developments in order to bring back a sense of individuality and identity to the high-density dwelling.



Figure 2-37: Cookie-cutter houses. Courtesy of NY Daily News, <http://www.nydailynews.com/life-style/real-estate/rebuilding-home-resales-highest-2010-article-1.1068578>

Figure 2-38: Box-like Condominium Units. Courtesy of Urban Toronto, <http://urbantoronto.ca/news/2012/03/condo-and-transport-project-spotting-33-storeys-above-toronto>;

Figure 2-39: Dwelling Variety and Individuality. Courtesy of Google Maps (Cabbagetown, Toronto).



## 2.13 Design Criteria and Design Elements

### EMPHASIZE

- 1. The rural idyll has remained strongly evocative in most industrialized societies – its list of desirable qualities is critical.
- 2. The urban densification trend requires investigation in the targeted issue of high-density residential.
- 3. The urban context has several critical advantages over the rural setting – proximity to amenities, walkability, centralized hub of culture, art and entertainment, and heterogeneity. These advantages must be emphasized and should become parameters in the design of a new alternative high-density residential response.
- 4. In the urban living condition, context is critical as it represents existing relationships – in terms of history, architectural language and intent and scale.

### DISENGAGE

- 5. The need for an alternative high-density residential solution. The status quo response to high-density residential living is the cookie-cutter high-rise condominium. This high-density solution has significant fallouts, including – unsatisfactory residences, crime and informal social control, mental health effects, social effects, impacts on families and children, physical health effects and a total disregard to scale.

### INTEGRATE

- 6. Provide the direct outdoor-indoor access to dwelling – rethinking circulation and direct access in the urban environment.
- 7. Provide access to private garden outdoor spaces – reintroduce / enforce the relationship urban dwellers have with nature.
- 8. Acknowledge the constant changing family structure of the current age – design for adaptability and flexibility.
- 9. Individuality is a trait missing in the suburban and urban living conditions – provide the uniqueness [form, materiality and expression] of the rural dwelling in the capacity of high-density urban living.

The investigated design criteria and desirable design elements can be simplified into three general objectives for the thesis: emphasize the advantages of the urban living condition, disengage the existing status quo and integrate the lost advantages of rural living into the urban living condition through a more *humane* overall design strategy.

## 2.14 An Alternative High-Density Solution [Emphasize, Disengage, Integrate]

The research and analysis conducted on this topic intended to identify the best qualities and worst flaws in the existing living conditions. It is illogical to believe that any of these conditions will ever be perfect and be able to provide their inhabitants with the best of both worlds – the rural and the urban. What this thesis attempts to do is to use the research data gathered, in the establishment of parameters for a more *humane design* approach in the high-density urban living condition.

The more *humane design* approach of the resultant alternative high-density solution will attempt to fulfill the objectives of emphasizing the advantages of the urban living condition, disengaging the existing status quo and integrating the lost advantages of rural living into the urban living condition – all the while being perpetually considerate of the dweller. A negative attribute of the status quo approach to high-density urban living is its tendency to neglect critical needs of its inhabitants – too often the resultant development is a bare essentials tower that disregards the diversity and uniqueness of its residents. Designing with a *humane* approach epitomizes a divergence from the status quo and a desire to place the urban dweller's needs in the forefront of the design process.

The resultant project of this thesis is not attempting to establish a new living condition, but rather it wants to demonstrate that through the application of specific design strategies the quality of living in the high-density urban condition can be drastically improved.

## 2.15 Case Studies

Case studies are a crucial tool in investigating how different architects have attempted to diverge from the status quo, create alternative solutions and apply the design principles identified in innovative ways. The four critical projects that have been chosen for investigation provide a wide variety from the past half century of innovative, typology changing and world renowned developments. While the case studies are from France, Denmark and Canada – they are all concerned with issues of high-density living, the reminiscence of rural and suburban qualities in an urban environment and the development of an alternative residential solution that juxtaposes the status quo. The analysis of these significant projects will provide insight into successful and unsuccessful design methods, identify opportunities and provide a deeper understanding into the challenges alternative residential solutions.



Unité d'Habitation [1952]  
Le Corbusier, Marseille, France



Habitat 67 [1967]  
Moshe Safdie, Montreal, Canada



VM Houses [2005]  
BIG + JDS, Copenhagen, Denmark



Mountain Dwellings [2008]  
BIG + JDS, Copenhagen, Denmark





## 2.16 Unité d'Habitation, Marseilles

The Marseilles Unité d'Habitation is the first of a series of similar modernist residential blocks – it is a manifestation of more than twenty years of research by Le Corbusier in the design of dwellings and the relationship of the dwelling to the urban environment. The project took form during the period of 1947-1952, in the aftermath of the Second World War when the need for housing was particularly high. This project is one of the best known housing projects of the period and it brought about catalytic changes in the notion of urban living. The focus of Unité was on communal living – with the goal of creating a *vertical garden city* where all the inhabitants could live, shop, play and gather together. The project was one of the first to reject the impulse to design horizontally, spreading out over the landscape (Kroll, 2010).

### 2.16.1 Site



Figure 2-40: Aerial view of Unité d'Habitation, Marseilles. Courtesy of BBC, <http://www.bbc.com/culture/story/20130423-design-icon-or-concrete-horror>

Le Corbusier's first Unité is located in the city of Marseilles, France – at 280 Boulevard Michelet, approximately 8 kilometers from the city centre. The entire grounds for the project cover nearly 4 hectares of land, which is deliberately designed into three distinct parts that offer a variety of paths, vistas and methods of showcasing the building (Sbriglio, 2004).

"The basic materials of city planning are sun, sky, trees, steel and cement, in that strict order of importance."

- Le Corbusier (Sbriglio, 2004)

The site itself and the landscaping design are a critical part of the overall design and success of Unité as a new alternative for urban living [Figure 2-40]. Le Corbusier placed great importance on the environment – sun, sky and tress – within which the project would take physical form, a fact which can be observed in various types of soils, plants and lighting used in the design of the landscape. Both Ville Radieuse and the Corbusian theorem of the *vertical garden city* place open space and greenery as principle points and the Unité d'Habitation in Marseilles best demonstrates their application and success (Sbriglio, 2004).

Unité is purposefully oriented on the north-south axis due to the individual units design and the desire to allow for wonderful east and west sunlight – however this also positions the building obliquely in relation to the main boulevard and splits the site into different sections. The section to the east of the building is designed as a public garden with path systems that run parallel to the eastern / main façade of the complex. The second distinct section on the grounds is the area by the western façade, which includes within it a children's playground, a small sports area containing a tennis court and the entrance to the building's foyer. The last section is the ground level car park that is sheltered by large trees but is still creating a significant amount of hardscape in the otherwise largely natural environment (Sbriglio, 2004).

## 2.16.2 Design Principles and Application

### *Density and Concentration*

The housing project is an 18 storey block with 337 apartments – with the arrangement of the units making the most of their high-density consolidation. The block is divided into standard compartments 3.66m wide. The large complex has the ability to accommodate approximately 1,600 residents (Kroll, 2010). Le Corbusier's attempt at high density also put emphasis on the importance of efficiency, prefabrication and standardization, through his bottle-rack structure. While his innovative vision of a bottle rack structure that would have prefabricated apartments plugged in like bottles was not entirely achieved in Unité – the ideas connecting density, efficiency and standardization that the project brought forth were critical principles in the development of this residential typology (Sbriglio, 2004). Unité provided Le Corbusier's a chance to experiment with the *Modulor* in a large scale high-density project. Ultimately the dimensions and proportions played a critical part in making the project one of the most successful examples of public housing (Kroll, 2010).

### *Flexibility and Adaptability & Individuality*

The standardization at Unité is manipulated into 23 variations on the basic apartment type, which cater to households from single students up to 10-person families [Figure 2-41]. The standard Unité apartment was designed for families with two children – it is composed of pairs of split-level apartments interlocked around the central access corridor [Figure 2-42]. The bedrooms are designed to be the absolute minimum of an acceptable living space, a design decision which allowed for more space to be dedicated to the open concept kitchen and living room. The kitchen/living areas are the focus of the apartment. The kitchen is centralized within the plan and is in close proximity to the entrance on one side, while connecting to the main double-height living space on the other [Figure 2-43] (French, 2008). The apartments are designed in true Corbusian fashion – with the Modulor as the base for all dimensioning. While the apartments are narrow, the elongated form allows for dual balconies and for sunlight to penetrate both in the morning and afternoon. The standard units (98 m<sup>2</sup>) account for 213 out of the total 337 apartments at Unité – the remaining units are composed of 79 smaller units and 20 larger units (Sbriglio, 2004).



Figure 2-41: Units configuration at Unité d'Habitation. Courtesy of Paul Koslowski through Fondation Le Corbusier, <http://www.fondationlecorbusier.fr>



Figure 2-42: Standard interlocked units. Courtesy of Building.co.uk, <http://www.building.co.uk/Journals/Graphic/f/f/l/CORBGRAPHIC.jpg>



Figure 2-43: Interior of standard unit. Courtesy of Dezeen, <http://www.dezeen.com/2010/06/09/apartment-50-unite-dhabitation-by-ronan-erwan-bouroullec/>



The 337 units at Unité are designed with efficiency, standardization and prefabrication in mind and while their individual design does not promote internal flexibility, the overall Unité complex acts in a flexible and adaptable way in the manner it can provide urban living for such a large variety of family units. Individuality is achieved in the structurally identical units through the use of colour schemes – both on the interior and exterior. Bright primary colours were used in the recessed walls of loggias as a means of distinction as well as bouncing light off bare concrete more efficiently.

### *Indoor-Outdoor Relationships & Connectivity to Nature*

The uniquely proportional units are not the only innovation introduced at Unité – the access system is equally inventive in the manner in which it utilizes corridors only on select levels (2, 5, 7, 8, 10, 13, and 16). Collective housing is known for corridors designed to their minimum requirements, resulting in narrow, hostile environments which act just as a means of access. The corridors at Unité are generously spacious in terms of circulation space and attempt to take the form of a streetscape in the sky. The residential access interior streets are 2.96 m wide and are defined by the shiny black floor, the brightly colored entrance doors and the encompassing darkness only pierced by light at entrance points [Figure 2-44]. The other interior streets are those of the shopping gallery which is set out on two levels. While the gallery was not opened until a decade after the completion of Unité, it represented a shopping center at the core of an urban quarter and included basic provisions and services for the residents. The main difference between the residential access interior streets and the shopping gallery streets is the ability for daylight to penetrate and define these circulation spaces [Figure 2-45] (Sbriglio, 2004). Le Corbusier intended for the corridors to be *streets in the sky*, and while their design is an



Figure 2-44: Residential access interior street. Courtesy of James Burns, [http://www.flickr.com/photos/london\\_from\\_the\\_rooftops/2400865586/](http://www.flickr.com/photos/london_from_the_rooftops/2400865586/)



Figure 2-45: Shopping Gallery interior street. Courtesy of Paul Koslowski through Fondation Le Corbusier, <http://www.fondationlecorbusier.fr>

improvement upon the dreary minimalist modern corridor – they did not re-establish the indoor-outdoor relationship of the individual dwelling.

The residential complex is original not just because of the reformatting of living spaces, but also because the block was a new version of urban space – a *vertical garden city*. The communal spaces and the importance that Le Corbusier placed on these spaces was what brought the project into a league of its own. The communal facilities included laundry, a crèche, a kindergarden, a restaurant, a hotel with 18 rooms, shops, a sick bay and dispensary, a bar, rooftop playgrounds, rooftop paddling pool, a running track and an open air gym. The sculptural and landscaped roof terrace provides a handful of these amenities while also providing spectacular panoramic views [Figure 2-46] (Kroll, 2010). The roof terrace is one of the means of providing connectivity to nature in a high density living environment – and the incorporation of critical communal spaces into the roof is a successful way of populating and giving purpose to an otherwise often neglected space.

“Providing a dwelling that is the perfect family receptacle, set in silence, solitude and facing sun, space and greenery.”

- Le Corbusier (Sbriglio, 2004)

Connectivity to nature is also present in the design of the units themselves, specifically the dual part-terrace, part-balcony loggias present within each unit [Figure 2-47]. These outdoor spaces are meant as pleasure gardens intended to bring nature into the dwelling (Sbriglio, 2004).

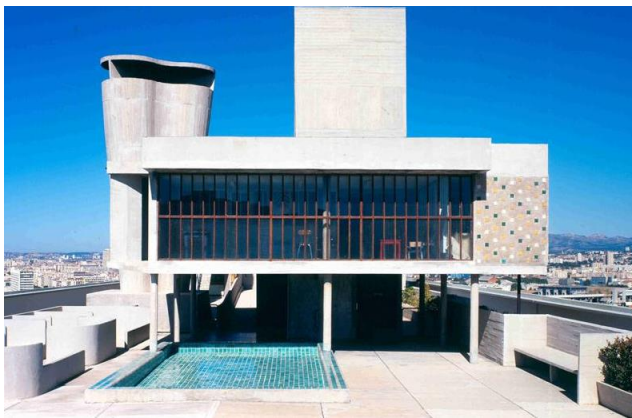


Figure 2-46: Sculptural Roof with amenities. Courtesy of Paul Koslowski through Fondation Le Corbusier, <http://www.fondationlecorbusier.fr>



Figure 2-47: Loggia / Personal outdoor space. From Sbriglio, J (2004), *Le Corbusier: The Unite d'Habitation in Marseilles*, page 89.



### *Context & Materiality*

The block is constructed out of rugged in situ [beton brut] and precast concrete, with self-finished timber windows and internal staircases. The whole block appears to be floating above the land due to the pilotis / concrete legs which raise the massive concrete complex two storeys off the ground [Figure 2-48] (French, 2008). The ground floor comprises a double row of 15 pilotis, with the entrance foyer being one of the few points of contact with the ground [Figure 2-49]. This architectural gesture assures that the pedestrian never loses their relationship with nature as views to the greenery on the other side are created, instead of obstructed.

“Another main aim was to unlock views. That way, pedestrians’ sight lines are no longer channelled between the buildings. They pass beneath the dwelling, completely transforming the overall urban design.”

- André Wogenscky (Sbriglio, 2004)

The natural environment and concrete are Le Corbusier’s materials at Unité. The concrete structure hovers over the predominantly natural landscape, only lightly making contact with the ground plane.



Figure 2-48: The structure hovering over the natural landscape. Courtesy of Paul Koslowski through Fondation Le Corbusier. <http://www.fondationlecorbusier.fr>



Figure 2-49: The pilotis. Courtesy of Paul Koslowski through Fondation Le Corbusier, <http://www.fondationlecorbusier.fr>

### **2.16.3 Successes as Alternative High-Density Residential**

At Unité Le Corbusier made successful strides towards incorporating key principles of rural living and the benefits of the individual dwelling into a high-density living environment. The variety in dwelling units that the complex has to offer represents the flexibility, adaptability and individuality that is concentrated within one building, as opposed to a whole spread-out neighbourhood. The designed interior streets and widespread amenities included in the building are a way to bring

the streetscape of a typical neighbourhood into this *vertical garden city*. The relationship to nature is a quintessential part of rural living and Le Corbusier attempts to allow for this relationship to thrive in a high-density environment by providing personal gardens in the sky as well as communal spaces within which residents can be immersed in nature. These unique design elements targeted by Le Corbusier are a critical part of the success that Unité has as an alternative high-density residential solution, in contrast to the present day status quo solution.

Unité was the conclusion of almost 30 years of research, experimentation and theorizing – the result of which was a model development for a high-density, industrial, urban society. While Unité was Le Corbusier's testing ground for many theories, at the core of it all he still worked around the idea of "*A house is a machine for living in*". Unité d'Habitation, with its 337 apartments in one block, is a machine for an entire self-contained urban community. The desire to provide a plethora of amenities within a functionally optimized residential block allowed for Unité d'Habitation to become "*a city within a city*".

## 2.17 Habitat 67, Montreal

Habitat 67 was designed by architect Moshe Safdie for the World Exposition of 1967. The project was intended as an experimental solution for *high-density housing in dense urban environments* – as well as a major experiment in modular construction. The project was a first as it experimented and explored the possibilities of modular units as a means to reduce housing costs and allowing for a new housing typology. A breakthrough typology which would *integrate the qualities of suburban home into an urban high-rise* (Merin, 2013). The conceptual idea for Habitat arose in Moshe Safdie's architectural thesis in 1961 and evolved into the final built form completed in 1967 after being influenced by his internship in Louis Kahn's studio and his exposure to the metabolist movement / metabolism. Habitat 67 searched for answers to many questions – however first and foremost it was concerned with developing an alternative way of living during a period of time where suburban development was highly regarded and seen as the preferred and most appropriate way of living.

### 2.17.1 Site



Figure 2-50: Aerial view of Habitat 67 with downtown Montreal in the background, Montreal. Courtesy of Safdie Architects, <http://www.msafdie.com/#/projects/habitat67>

Habitat 67 is one of the critical projects part of Expo 67 – a World's Fair Exposition which was held in Montreal, Quebec, Canada. The project is located at 2600 Avenue Pierre-Dupuy – while only 4 kilometers from the city centre, the site of Habitat is truly a unique environment. The site

is located on a landfill peninsula expanding from the Old Port of Montreal in the neighbourhood of Cité du Havre. The narrow peninsula is surrounded by Montreal Harbour, the city and the St. Lawrence River creating a distinctive environment where one is simultaneously surrounded by the sound of the river, the bridges silhouettes and the lights of the city [Figure 2-50] (Habitat 67, 2014).

The location of the site was largely determined according to the requirements of the Exposition, however as decades have passed and Habitat has retained its splendour and success, the site has proved the ideal location for Safdie's new experimental urban living. The landscaping of the site is kept minimal and primarily natural, allowing the monolithic complex to emerge as a sculpture in a natural environment. The pedestrian paths through the complex are defined by the maple, poplar, and oak trees, as well as the natural open spaces available for the residents (Habitat 67, 2014). The simplicity of the natural landscaping is an appropriate and effective juxtaposition to the complexity of Habitat 67.

The site provides spectacular views towards Montreal's downtown area to the north and Île Sainte-Hélène to the east on the ground level as well as throughout the many elevated pathways and private garden spaces (CAC, 2001). The proximity of the site of Habitat 67 to the urban city centre plays a critical contributing factor in the redefinition of urban living – the site provides the opportunity *to live in the rhythm of the city, the suburbs and the country concurrently* (Safdie, 1970).

## 2.17.2 Design Principles and Application

### *Density and Concentration*

The Habitat 67 complex evolved and changed considerably from initial conception to final built form – while the original scheme intended to contain upwards of 950 housing units, the final proposal approved by the Canadian government produced a complex with 158 residential units (Merin, 2013). The residential units were assembled from 354 identical prefabricated modules which were arranged in various combinations to provide diversity in living units [Figure 2-51]. The apartments vary in shape and size due to the fact that they are composed of a group of 1 to 4 modules. The chaotic but ordered mannerism of the stacked modules allowed for the creation of a new tectonic form for residential development – one which diverged from the traditional and ordinary orthogonal high-rises (Safdie, 1974). Although the original density Safdie imagined for the complex was not accomplished, the project still created a higher density way of living while



providing qualities representative of suburban and rural living conditions. Habitat was concerned with achieving higher density and concentration than suburban developments, but it was primarily focused on building a specific vision of what a home should be in an urban environment – without losing the notion of what a home is in the country and in the suburb.



Figure 2-51: Panorama view of Habitat 67 from Montreal's Port, Montreal. Courtesy of Nora Vass, <http://www.archdaily.com/404803/ad-classics-habitat-67-moshe-safdie/>

### *Flexibility and Adaptability & Individuality*

The complex is composed of hundreds of identical modules and yet diversity and distinct individuality is still achieved at Habitat. The houses could be composed of between 1 and 4 modules, varying in size from one-bedroom homes (600 ft<sup>2</sup>) to four-bedroom homes (1600 ft<sup>2</sup>). Within the 158 residential units there are 18 different house configurations that provide a range of options for the constantly evolving family structure [Figure 2-52] [Figure 2-53] (Safdie, 1974). The variable nature of the complex ensures that the community can be vastly diverse – accommodate all cultures in all stages of life.

The essence of the project is *the cube / the module* and the way that Moshe Safdie interlocked the cubes to create the final three-dimensional space structure. The basic modular unit was molded in a reinforced steel cage that measured 38 feet by 17 feet (11.58 m by 5.18 m) – a proportional ratio that is referred to as the root-five rectangle. The costing of this project was a constant battle, however the prefabrication process of the 90 ton modules taking place on site was supposed to bring a reduction cost factor. The preparation of the modules was designed as an assembly line, with the cured concrete module being transferred to the assembly line for installation of the electrical systems, mechanical systems, insulation, windows and finally modular kitchens and bathrooms. The final step in the process was the placement of the module in its designated position by a crane – a perfectly ordered system which allowed for quick assemblage of the complex (Merin, 2013).

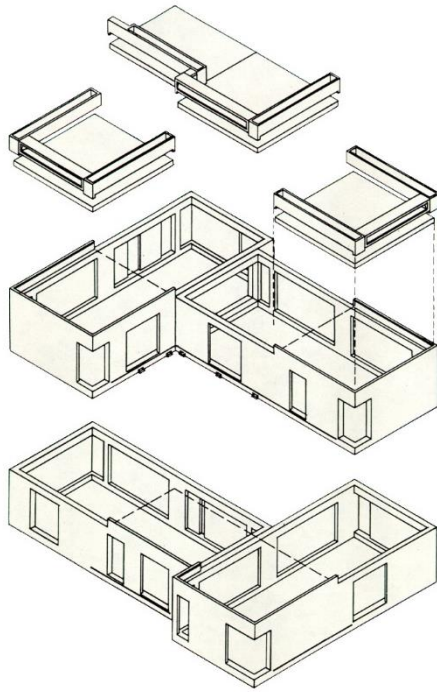


Figure 2-52: Modular Unit Exploded Axonometric. Courtesy of Canadian Architecture Collection (CAC), <http://cac.mcgill.ca/safdie/finalImages/Ms003d02.jpg>



Figure 2-53: Various Modular Unit Configurations. Courtesy of Arch Daily, <http://www.archdaily.com/404803/ad-classics-habitat-67-moshe-safdie/>

The individuality at Habitat is multifaceted as it depends on multiple factors. The various stacking of modules creates as many as 18 different housing configurations, however even identical residential units can be made distinct at Habitat according to their placement and orientation within the complex.

The Habitat 67 units are comparable to the apartments at Unité d'Habitation. The Unité apartments were proportioned according to Le Corbusier's Modulor and appear in comparison to the root-five Habitat modules to be more constrained. In both projects the units are identical, the organization of the units is where the difference lays between these two residential complexes (French, 2008). While at Unité the units interlock seamlessly and fit together into a massive concrete block, at Habitat 67 the units are stacked in a chaotic but ordered manner which creates greater diversity of unit types and benefits such as multiple exposures. The tectonic expression of Habitat 67 articulates a more dynamic and enchanting space.

#### *Indoor-Outdoor Relationships & Connectivity to Nature*

While Le Corbusier desired to create *streets in the sky*, Moshe Safdie wanted to eliminate the concept of the enclosed corridor altogether. The access to the apartments at Habitat is through

a series of pedestrian streets and bridges, as well as the necessary three vertical core elevators [Figure 2-54] (Safdie, 1974). These pedestrian streets are a reflection of the access to one's home in the rural environment and the suburbs, where one has an outdoor-indoor relationship at the entrance, as opposed to the typical apartment block relationship of indoor-indoor created by the corridor effect. Service and parking facilities were provided on the ground floor, distinctly separate from the remaining circulation flow. Moshe Safdie's new take on unit access was an attempt at creating a contemporary vernacular.

"The houses are grouped together along alleys and streets in harmony with the site. Habitat is in the tradition of spontaneous self-made environments, the beginnings of a contemporary vernacular."

- Moshe Safdie, *Beyond Habitat* p.118

The assorted stacking of the units into diverse configurations did more than create a new tectonic residential form – the stepping back and forth of the modules allowed for the creation of roof gardens for each apartment. The roof gardens is where Habitat as a complex thrives – not only do the residents have a front door off a pedestrian street, but they are also privy to one or more private roof gardens [Figure 2-55]. The roof gardens attempt to re-establish the relationship between the resident and nature by bringing it closer. The gardens also provide multiple vistas, a constant flow of fresh air and maximum natural light – which are all unexpected qualities to be found in a typical apartment complex (Safdie, 1970).



Figure 2-54: Pedestrian Streets and Bridges.  
Courtesy of Pierre-Alexandre Garneau,  
<http://cac.mcgill.ca/safdie/finalImages/Ms003d02.jpg>



Figure 2-55: Roof gardens providing multiple views. Courtesy  
of Canadian Architecture Collection (CAC),  
<http://cac.mcgill.ca/safdie/finalImages/Ms003p01.jpg>



## Context & Materiality

“Habitat’s form, which was largely dictated by the relation of houses and gardens, sunlight, and the desire to express the identity of the individual house within the group – was just possible in concrete, but it anticipates materials that are light, stronger in tension, have a watertight surface and are easily mouldable.”

- Moshe Safdie, *Beyond Habitat* p.104

The complex structure of Habitat 67 exposed the shortcomings of the building industry in the 1960s. While materials such as plastics, fiberglass, steel and combinations of materials were considered, concrete was the only reasonable material for the project despite its limitations. Moshe Safdie had described that the material envisioned for Habitat was one that was one fifth the weight of concrete and would possess double the tensile strength of steel. However as such a material was not available, it came down to heavy, porous, tension weak concrete to fulfill the complex requirements of Habitat 67 (Safdie, 1970). Concrete and steel reinforcing are the two main materials responsible for the structural integrity of the complex. All the individual parts (units and streets) at Habitat are essential load-carrying members of the structure – the units are tied together through post-tensioning using high-tension steel rods and cables to create the continuous structure (Safdie, 1974). Due to the intricate organization of the complex it was essential to the project for interior spaces such as the bathroom and the kitchen to come as complete rooms, these contracts were fulfilled by Reff Plastics and Tielemans and Frigidaire respectively.

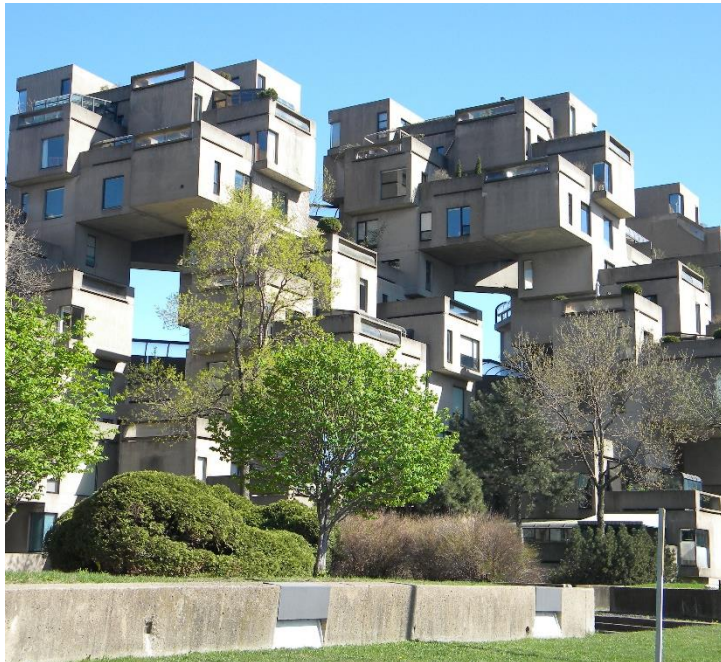


Figure 2-56: Habitat 67 – View of continuous structure from the street. Courtesy of Daniela Cojocariu.

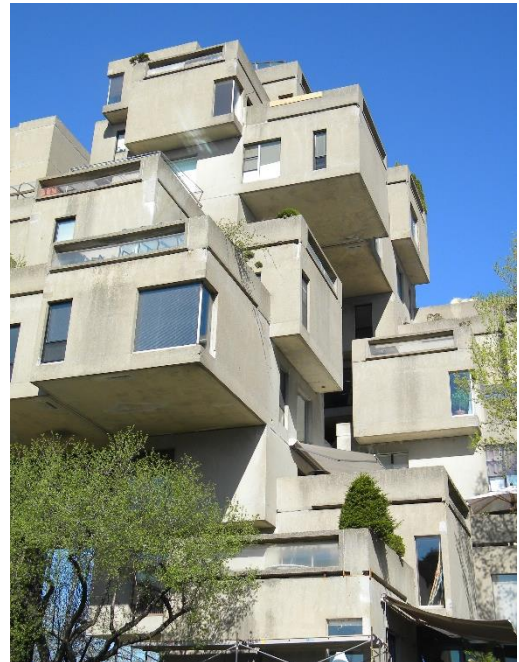


Figure 2-57: Habitat 67 – Offsetting Unit Configuration. Courtesy of Daniela Cojocariu.



Similarly to Unité d'Habitation, the natural environment within which Habitat 67 is set acts as a material. From afar the residential complex appears as a modernist geometric concrete sculpture immersed within the predominantly natural environment (the trees, river and sky).

### 2.17.3 Successes as Alternative High-Density Residential

The 1967 World Exposition gave Moshe Safdie the opportunity to bring to life an experimental project that may have never been otherwise realized. Habitat 67, like Unité d'Habitation, is a project that questioned the status quo living condition and had an agenda of desirable qualities it intended to incorporate within the complex. Habitat is successful at creating variety and flexibility through the multitude of unit configurations that are available for a wide range of family structures [Figure 2-56] [Figure 2-57]. The unit diversity and organizational configuration within the complex is a juxtaposition and response to both the suburban cookie cutter houses, as well as the undistinguishable apartments of status quo high-density housing. The connectivity to nature and re-establishing of indoor-outdoor relationships that is present in the Habitat complex is one of the most successful features of the project. The pedestrian streets connect the entire complex and provide a real entrance to dwellings, while the generous roof gardens allow residents to connect to the encompassing natural environment. The successful implementation of suburban and rural qualities into Habitat 67 are the reason for the project's triumph as an alternative high-density residential solution.

The project is just an initial step in the research towards a cohesive living condition – one which addresses and merges qualities of the rural, the suburban and the urban. Habitat 67 has stood the test of time, and today it is still regarded as the pivotal project tackling the integration of two housing typologies – *the suburban garden home and the economical high-rise apartment building*.

## 2.18 VM Houses, Copenhagen

The VM Houses project in Copenhagen, Denmark provides a unique take on apartment living – as it explores an alternative high density residential solution. The project was completed in 2005 by PLOT – the collaboration of BIG (Bjarke Ingles Group) and JDS Architects (Julien De Smedt). In the Actar publication *Total Housing: Alternatives to Urban Sprawl*, which provides as many as 61 alternative projects, the VM Houses project is referred to as *Unité d'Habitation Revisited*. The project consists of two related structures conceived as a three-dimensional tetris of dozens of apartment types. The configuration of the unique units creates a new urban community for a wide variety of residents (Actar, 2010). The VM Houses presents a redevelopment and improvement upon of some of the principles of the Unite d'Habitation – particularly concerning flexibility and individuality, as well as the relationship between the buildings themselves and the surrounding context.

### 2.18.1 Site



Figure 2-58: Aerial view of VM Houses alongside Mountain Dwellings, Copenhagen. Courtesy of JDS Architects, [http://www.wbarchitectures.be/en/architects/JDS\\_Architects\\_Julien\\_De\\_Smedt/VM\\_Houses\\_and\\_Mountain\\_Dwellings/288/](http://www.wbarchitectures.be/en/architects/JDS_Architects_Julien_De_Smedt/VM_Houses_and_Mountain_Dwellings/288/)

The site of the VM Houses is located in the suburban extension of Copenhagen, Ørestad – approximately 6 kilometers from the city centre. Since the area is under development and the project having been completed in 2005 was one of the catalysts for the neighbourhood, the project was unable to develop according to architectural contextual parameters. The only limiting

parameters for the project were the physical site parameters – the natural stream acting as a barrier to the east, the infrastructural barrier to the west and the residential street bounding the north [Figure 2-58] (Fernandez, 2007). The infrastructural barrier is the elevated rapid transit system line that serves and passes through the neighbourhood. The direct access into the heart of Copenhagen that the Metro line offers makes it a great asset for the site. Since the project was designed in a state of isolation the VM Houses complex gives the impression to be just as much inward looking as it is outward looking. The complex is strongly defined in all four corners, while it opens internally and along the sides.

As one of the catalyst projects of Ørestad, VM Houses responded to the physical constraints of the site but the architectural freedom expressed in the project demonstrates the benefit of being a ground breaker. The VM Houses project is a great deviation from the existing traditional suburban neighbourhood just across the eastern natural stream. The landscaping of the site is divided into three portions – north, south and central. The north and central portions of the site are primarily paved pedestrian paths lined with vegetation, while the southern portion is left as a natural environment. The central courtyard is protected by the two buildings and includes an outdoor playground area for a kindergarten, as well as recreational spaces for the residents (Fernandez, 2007).

The location of the site was intended to easily provide residents with the urbanity of Copenhagen through immediately adjacent infrastructure while also placing them in the openness of the suburban landscape. Considering the fact that this site is primarily considered suburban, the VM Houses project is actually demonstrating an alternative way of achieving higher density in the suburban condition.

## 2.18.2 Design Principles and Application

### *Density and Concentration*

The VM Houses introduce higher density and concentration in a new suburban neighbourhood that would have otherwise been doomed to become another cookie-cutter single family home development. The project is composed of two unique structures which work in unison to take full advantage of the benefits of the site. The two related structures represent V-house and M-house – designations according to their formal architectural expression. The structures work together as a complex, responding to each other's forms. In the V-house, the relationship with the neighbouring M-house requires for the slab to be pushed in its centre to respond to its context.

While in the M-house a similar manipulation occurs, however it does so by breaking down in smaller portions. These responsive pushing and pulling manipulations ensure diagonal views for all units to the vast open fields in the greater surrounding context [Figure 2-59]. The building volumes also allow for optimal air, daylight and views to all the apartments. The entire complex is composed of 209 residential units – 114 in the V-House and 95 in the M-House (Actar, 2010).

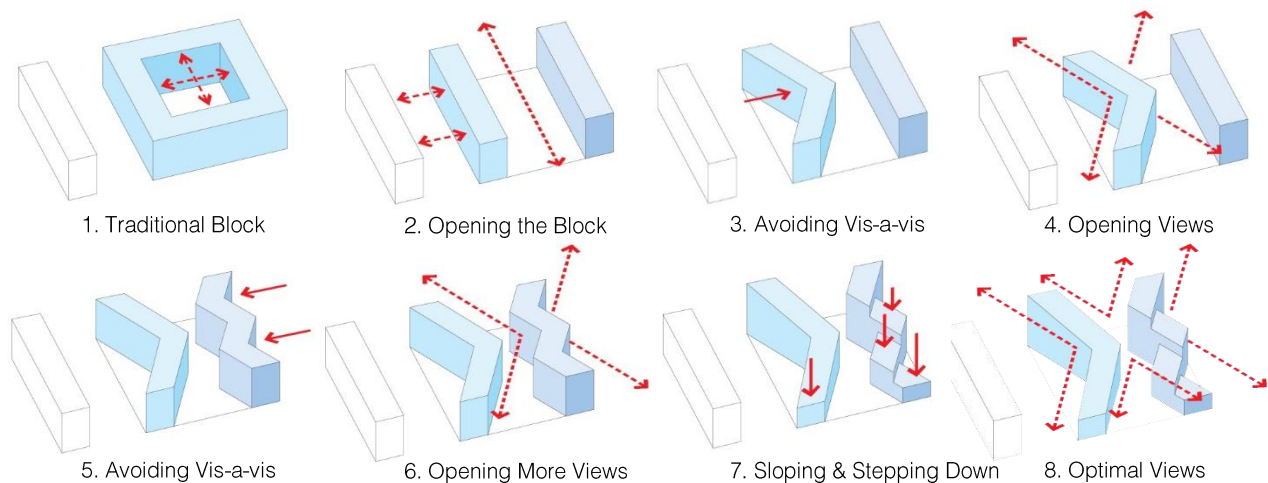


Figure 2-59: Principles guiding the block configuration. Courtesy of JDS Architects, <http://jdsa.eu/vm/>

Unlike the chaotic configuration of Habitat 67, the units at VM Houses are contained within two structures – however the tetris like composition of the units makes this project distinct from the traditional and ordinary orthogonal residential blocks. The project is an example of achieving high-density without compromising principles such as individuality.

### *Flexibility and Adaptability & Individuality*

While the intimate relationship the two structures of the complex have is unique, it is not the most prominent and significant architectural gesture in the project. The diversity and vast variety of unit configurations that the VM Houses offer is the distinctive element of this alternative high density solution. The apartments are characterized by the interaction of mutually complementing rooms – with double height studios near kitchens and living rooms. The apartments range from single-floor studios to triplexes, providing great variety for any family structure. V-house contains 114 units, while M-house is composed of 95, each of the complexes offers more than 40 different types of apartments (Actar, 2010). While internal individuality is achieved alongside complexity, the wide diversity of dwelling units is as much criticized as it is acclaimed. The approach for the units is seen as anti-modular / chaotically modular and it is the most criticized aspect of the project [Figure 2-60] [Figure 2-61].

“We live in a world where individualism has a greater resonance than before. Diversity is well accepted, even desired. People living in a housing project must also have access to individuality.”

- Julien De Smedt (JDS)

The M-house is on the northern side of the site and provides 45% of the units of the complex, while the simpler V-house contains the remainder of the units and benefits from the southern exposure and views. While the exterior facades are composed of flush glazing walls – the interior structure of the building is thoroughly complex in its nature. The apartments are predominantly unique and even the repeating units are ultimately defined by their location within the blocks. The units fit together like three-dimensional tetris pieces which efficiently use their space and unite through the creation of a continuous circulation void (Actar, 2010). The project is in great contrast with the other precedents as it disregards modularity and cost, in order to provide inimitable living spaces.

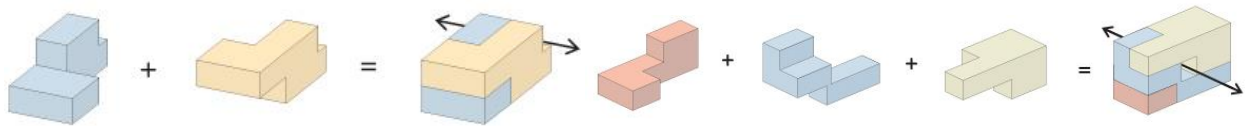


Figure 2-60: V block and M block unit configuration. Courtesy of ArchDaily, <http://www.archdaily.com/970/vm-houses-plot-big-jds/>

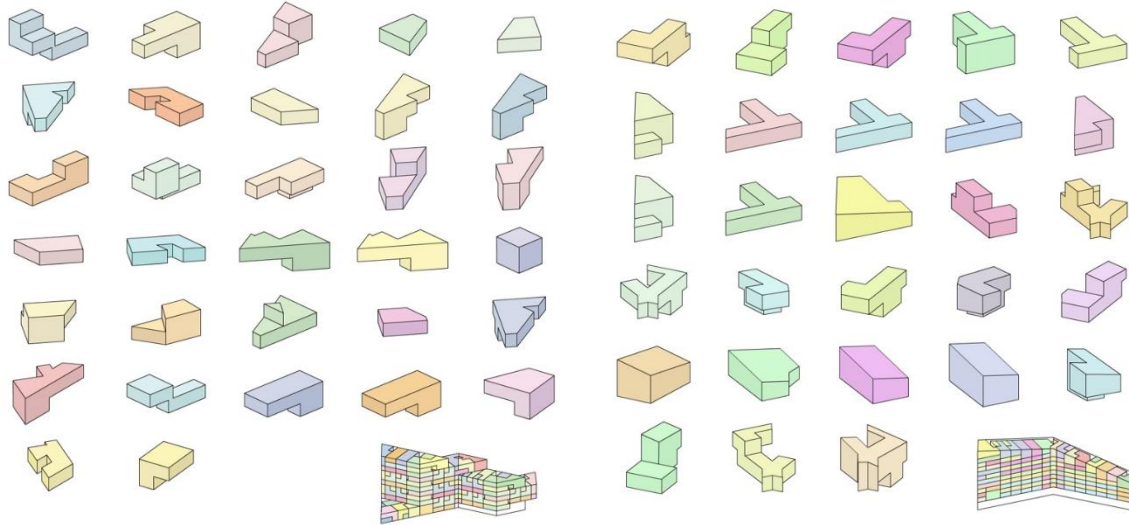


Figure 2-61: Sample of the variety of unit configurations available in the M block and V block, respectively. Courtesy of ArchDaily, <http://www.archdaily.com/970/vm-houses-plot-big-jds/>

The individuality achieved at VM Houses is unparalleled in any of the other precedents. The project provides a high degree of accommodation uniqueness, as more than 80 different types of apartments exist within just 209 units. The distinctiveness of the units occurs in the interior configuration and design – with the apartments appearing quite similar in terms of exterior reference and individual entrance.



The VM Houses is a project that is comparable to both Unité d'Habitation and Habitat 67. The chaotic stacking of modules to create a wide variety of units at Habitat 67 is similar to the internal configuration of the many different tetris-like units within the VM Houses. Similarly to Unité d'Habitation the internally complex units at the VM Houses interlock seamlessly and fit together within their corresponding blocks – drastically different from the dynamic and protruding form of Habitat 67. The formal expression and relationship between the V and M blocks still accommodates diverse exposures from within two structures, without the complexity and chaos of Habitat. From afar the VM Houses project does not express the great complexity, flexibility and individually that it contains within its two unique residential blocks.

### *Indoor-Outdoor Relationships & Connectivity to Nature*

At the VM Houses the architects reinterpreted and optimized some of the principles which distinguished Unité d'Habitation – one of the principles addressed is the issue of the access corridor. While access at this contemporary complex remains in the form of a corridor and therefore maintains an indoor-indoor relationship, the experience of the dark and narrow corridor is improved upon. In the V block the corridor is sequestered to the north façade where it is exposed to no direct sunlight but plenty of daylight. In the M block the circulation corridors are centralized, however they are optimized as they are short and can get light from both sides (Actar, 2010). The enclosed access corridors are designed as opposed to simply providing a means of egress – while they do provide the necessary connections to elevators and staircases they are also spaces where children can play and where neighbours can spontaneously meet. The corridors are luxuriously wide, painted in bright colours and even have seating crevices to facilitate play and communal gathering [Figure 2-62] [Figure 2-63].



Figure 2-62: Variation in the enclosed access corridors.  
Courtesy of BIG, <http://www.big.dk/#projects-vm>



Figure 2-63: Variation in the enclosed access corridors.  
Courtesy of BIG, <http://www.big.dk/#projects-vm>

The connectivity to nature at VM Houses is achieved through the individual terraces available in all the units and the convenient location of this complex within a new development area that is immersed in nature. In both blocks the individual terraces are located on the south facing building façade in order to take advantage of natural light, ventilation and the great panoramic views to the wetlands further south (Fernandez, 2007). In the M-house the individual terraces are protected indentations within the block, while in the V-house the terraces take the form of bold projecting triangular balconies [Figure 2-64] [Figure 2-67]. The extruding balconies characterize the southern façade of V-house and express the desire to reach out and reconnect with nature in a higher-density living environment.

### *Context & Materiality*



Figure 2-64: VM Houses complex within the context. Courtesy of JDS Architects, <http://jdsa.eu/vm/>



Figure 2-65: Interior materiality within unit. Courtesy of JDS Architects, <http://jdsa.eu/vm/>

The two blocks that compose the VM Houses are constructed with typical high-rise residential typology materials – a composition of simple concrete, steel, aluminium, glass and wood. While the structural framework of the buildings is concrete, the aluminum and glass exterior façades dictate the appearance of the complex. When exposed, the white concrete blends wonderfully with the painted white steel members of interior stairs and railings throughout the units. The apartments are modern in their juxtaposition of solid oak flooring and pristine white interior – the wood flooring continuing into the outdoor terraces while morphing into dark hardwood floorboards but maintaining the indoor-outdoor relationship [Figure 2-65]. The interior corridors are painted in bright colors (red, orange, green) that come alive through natural daylight and the repeating fluorescent units that accompany each residential entrance (Actar, 2010). The VM Houses blocks use a combination of materials that is very typical of the high-rise residential typology, however the manner in which these materials are used is exquisite and highlights their best qualities.



Similarly to previous precedents, the context / the natural environment within which the VM Houses complex is set acts as a material in the project. The southern V block is even raised off the ground to allow for easy access within the heart of the project. The residential complex is in great contrast to the typical suburban neighbourhood across the eastern stream and appears as a dramatic sculptural form which challenges the status quo.

### 2.18.3 Successes as Alternative High-Density Residential



Figure 2-66: VM Houses complex within the complex. Courtesy of JDS Architects, <http://jdsa.eu/vm/>



Figure 2-67: Extruding south-facing triangular terraces. Courtesy of JDS Architects, <http://jdsa.eu/vm/>

The site location for the VM Houses project allowed for a lot of creative freedom and the ability to explore alternatives to the residential status quo. The architects were successful at reinterpreting and improving upon some of the principles of Le Corbusier's Unité d'Habitation in their rendition of a modern residential block. VM Houses is most successful at providing great variety, flexibility and bringing individuality back to the dwelling through the assortment of unit configurations available. The three dimensional tetris-like apartments exist in over 80 different configurations – a stark comparison to the typical cookie-cutter status quo high-rise unit. The project also demonstrates an improvement upon the original *streets in the sky* – the corridors at VM Houses being carefully designed to be comfortable, inviting and not entirely enclosed. The connectivity to nature at the complex is expressed in the provision of individual outdoor terraces for all the units – with the dramatic triangular terraces of the southern V block conveying a reaching out desire towards the southern wetlands.

The VM Houses provide an example of how alternative high density residential is achieved in the present. The formal expression of the complex is focused on the north and south facades, with the two complementing housing blocks dance together in the landscape while becoming their own contextual parameters [Figure 2-66]. The suburban and urban principles that the project improves upon are eloquently demonstrated in this contemporary sculptural complex that redefines high-density residential living.

## 2.19 Mountain Dwellings, Copenhagen

The Mountain Dwellings is a project that is referred to as the 2<sup>nd</sup> generation of the VM Houses. The project was completed in 2008 and was designed by the same collaboration of BIG (Bjarke Ingles Group) and JDS Architects (Julien De Smedt). This alternative residential development is also a project for the same client as the VM Houses and the site is directly across the northern boundary street of the former precedent – in Ørestad, a suburban area of Copenhagen. The Mountain Dwellings attempt to combine the splendours of the suburban backyard with the social intensity of urban density. The only difference between the requirements of the VM Houses and the Mountain Dwellings is the program – which is 2/3 parking and 1/3 living for the latter. The programmatic constraint is fulfilled and in its final form the Mountain Dwellings manifest as a suburban neighbourhood of garden homes flowing over a 10 storey building (parking lot) – the project becoming an expression of *suburban living with urban density* (Actar, 2010).

### 2.19.1 Site



Figure 2-68: Aerial view of Mountain Dwellings (right) alongside VM Houses, Copenhagen. Courtesy of BIG, <http://www.big.dk/#projects-mtn>

The site of the Mountain Dwellings project is immediately adjacent to the north of the VM Houses project – the previous precedent [Figure 2-68]. The location of the site is in a recently developed suburban area of Copenhagen, a neighbourhood which is identified as Ørestad and is a mere 6 kilometers from the bustling city centre. The primary contextual parameters influencing the design of the project are the physical site parameters, with the only exception being the previously completed residential development [VM Houses], which abuts the site to the south.

The project is required to respond to two significant barriers – a natural canal to the east which separates the new neighbourhood from the typical small-scale residential development beyond, and the elevated infrastructural metro line which provides easy access into the city (Actar, 2010). The M block of the VM Houses is the only immediately adjacent and therefore defining architectural project which plays a contributing role in the design of the Mountain Dwellings, as the land to the north is undeveloped and wholly natural.

The Mountain Dwellings came into conception closely after their neighbours and can still be considered as one of the catalyst projects of the neighbourhood. The project is not just in juxtaposition to the traditional suburban development across the natural canal, but also with its VM Houses counterpart. The project fills in the site almost entirely – with only the south façade responding to neighbouring VM Houses and pulling back to allow some hardscape. The natural landscaping at the Mountain Dwellings does not occur on the ground level but rather in the large and luxurious individual terraces that define and elevate the project to a league of its own (McGrane, 2009).

The location of the site attempts to provide the best of both worlds to its residents – namely the best of the urban and the suburban. The project brings in the desirable suburban qualities of fresh air, green space and peace and quiet to their units by providing each unit with its own grassy garden and plenty of daylight and fresh air through ideal orientation. The urban qualities of proximity to a city center and efficient urban density are also brought into the equation at the Mountain Dwellings. The adjacent rapid metro line allows for public access into the city in a mere 10 minutes and the density of the project highly exceeds that of a typical suburban development (Yoneda, 2010).

## 2.19.2 Design Principles and Application

### *Density and Concentration*

The Mountain Dwellings introduce higher density and concentration into the new suburban neighbourhood – and while the density is lower than that of the VM Houses counterpart, it is still a substantial improvement over the typical cookie-cutter single family home development. The unique solution developed for fulfilling the programmatic requirements at the Mountain Dwellings was that the parking area became the base upon which the terraced housing was placed. The project became a concrete hillside covered by a thin layer of housing. This formal configuration allowed for the creation of 480 parking spots and for all the dwellings to have optimal sunlight,

fresh air and views. In total there are 80 housing units that step down the building's southern face in a freestanding formation which is only possible because of the structural parking lot base (McGrane, 2009). The residents of those 80 housing units are the first in this new suburb of Ørestad to have parking immediately outside their homes – a feat in itself as this is not a typically conceivable idea in a 10 storey structure (Actar, 2010).

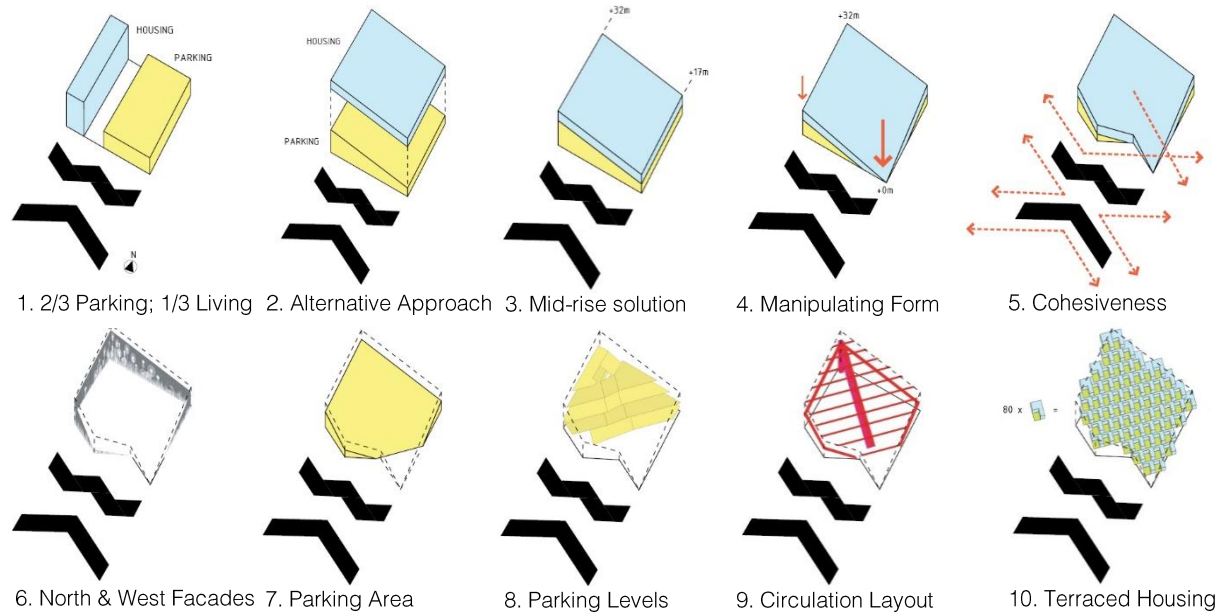


Figure 2-69: Principles guiding the block configuration. Courtesy of JDS Architects, <http://jdsa.eu/mtn/>

The units in the Mountain Dwellings are all contained within one structure. Unlike the VM Houses where all the apartments are perfectly arranged within two seamless blocks, the Mountain Dwellings units are organized in a rising stepped form which causes the building to slope upward from the south-east to the north-west. This arrangement provides ideal orientation for all the dwellings [Figure 2-69].

### *Flexibility and Adaptability & Individuality*

The most criticized design element of the neighbouring VM Houses was the large spectrum of diversity in unit types that the project supplied. The lesson was learned and at Mountain Dwellings out of the 80 housing units, approximately half are unique while the other half are identical. The unique units are on the edges of the complex where the units were manipulated in order to not compromise the overall form of the complex. The apartments vary between 80m<sup>2</sup> and 150m<sup>2</sup> and they are all accessed from the parking deck in north-western orientation. While there is some variation in unit configuration there is also a layout system that can be observed throughout the complex. The flow of the units indicates a movement from the enclosed parking



lot, through the services heavy living areas such as the kitchen and the bathrooms and finally to the restful living areas such as the bedrooms and family rooms. This movement through the apartments allows for the south-eastern façade to be primarily glazing and therefore create an almost seamless separation between the inside and the outside garden [Figure 2-70] (Actar, 2010). The stepping back of the units on each floor allows for apartments to stand alone – with no units above or below – all the apartments are technically penthouses [Figure 2-71] (McGrane, 2009). While the project does not shy away from uniformity and consistency, individuality and flexibility is still demonstrated in the interior configuration and separation of living areas [Figure 2-72].



Figure 2-70: View of the Mountain Dwellings from across the canal. Courtesy of JDS Architects, <http://jdsa.eu/mtn/>



Figure 2-71: Stepping back of units. Courtesy of BIG, <http://www.big.dk/#projects-mtn>

“It’s an urban dystopia...the parking lot emphasizes the brutality of mixing two such alien objects [parking and living] in one function.”

- David Zahle, *Dwell* (McGrane, 2009)

The residential aspect of Mountain Dwellings is certainly important, however the parking does fulfill 2/3 of the programmatic requirements of the project. The more programmatically dominant element of the Mountain Dwellings is the structural base parking lot. The architectural approach towards this parking lot is unique in the world – the architects created more than just a parking lot, they designed and manifested a “high-ceilinged, five-storey, concrete and steel “car cathedral” which celebrates car culture” (McGrane, 2009). The concrete walls were varnished with grey-on-gray murals of wild animals atop piles of wrecked automobiles. The underside of each level of apartments is what the architects referred to as the *sixth façade*. In the case of the car cathedral the underside was brightly painted aluminium symbolizing the ascent from earth to sky (green, yellow, orange, dark orange, hot pink, purple, bright blue) [Figure 2-73]. The architects did not shy away from the programmatic challenge that the Mountain Dwellings project



brought forth, but rather they found an inventive, appropriate and game-changing solution to the problem (McGrane, 2009).

Mountain Dwellings is a rare residential building that does not include a lobby within its design – as the design emphasized car culture, the building was meant to always be entered through the parking lot garage. For those not living in the building, a public staircase was made available along the outside, therefore allowing anyone to “climb” the (Mountain Dwellings) mountain. The innovative parking solution and reimagined density living have made the Mountain Dwellings a popular landmark. The project has received awards such as the World Architecture Festival (WAF) Award in 2008 for Best Housing Project and the 2009 MIPIM Award for Best Housing (Brass, 2009).

The Mountain Dwellings is a project comparable to all the precedents previously investigated – however it seems to reveal more differences than similarities. The fact that the orientation of all the residential units is singular and predetermined is one stark difference from the other projects. The emphasis that is put on the creation of expansive and luxurious outdoor garden spaces is a unifying factor between the Mountain Dwellings and Habitat 67. The ratio of unique units to identical units is another similarity between the project and Unité d'Habitation and Habitat 67 – and in contrast to the approach taken at VM Houses. From afar the project expresses a sense of uniformity and rigidity, however the individuality and flexibility is internally exposed.



Figure 2-72: Interior view into David Zahle's unit at the Mountain Dwellings. Courtesy of Jens Passoth for Dwell Magazine.



Figure 2-73: Parking lot structure. Courtesy of BIG, <http://www.big.dk/#projects-mtn>

### *Indoor-Outdoor Relationships & Connectivity to Nature*

The dwelling units at the Mountain Dwellings are supposed to be a representation of suburban garden homes – therefore the roof gardens symbolize a critical element in the design. The roof gardens consist of a terrace and a garden with plants changing character according to the seasons. The terraces are luxurious in terms of outdoor space provided – as big as 90m<sup>2</sup>. The only barrier between the apartment and the garden is a glass façade with sliding doors that provides maximum light and fresh air. The three foot planter boxes block the view into the terrace belonging to the downstairs neighbour [Figure 2-74]. This architectural gesture concerning privacy came out of the lesson learned at VM Houses where privacy had been an issue due to the large amount of glazing and transparency. The outdoor terrace space is surfaced with wood and fake grass. Due to the fact that structure is lightweight, fake grass was the only possible option (McGrane, 2009). The connectivity to nature at the Mountain Dwellings is not just through the expansive outdoor roof gardens but also through the orientation of the units towards the south-east – towards the natural boundary canal, the sprawling low-rise suburban neighbouring development and the undeveloped natural landscape.



Figure 2-74: View towards the eastern suburban development. Courtesy of BIG, <http://www.big.dk/#projects-mtn>



Figure 2-75: Entrance to residential units from each level of the parking lot. Courtesy of BIG, <http://www.big.dk/#projects-mtn>

The entrance to the residential units at the Mountain Dwellings occurs from each level of the parking lot [Figure 2-75]. The parking deck is protected from the elements but it is not an enclosed space, however there are enclosed corridors on each level from which the residents enter their homes. These corridors were included for security and safety and they manage to maintain the expression of the *car cathedral* through continuous glazing into the bright multi-level parking structure (Actar, 2010). The indoor-outdoor relationship established at the Mountain Dwellings is different from the other precedents and is a direct reference to the established suburban relationship between the garage and the entrance.

## Context & Materiality



Figure 2-76: The north perforated aluminum façade. Courtesy of BIG, <http://www.big.dk/#projects-mtn>



Figure 2-77: The luxurious individual outdoor terrace. Courtesy of BIG, <http://www.big.dk/#projects-mtn>

The Mountain Dwellings are assembled with typical high-rise residential typology materials – a combination of concrete, steel, aluminum, glass and wood. Each significant part of the project (the residential and the parking) is defined and expressed by a particular arrangement of materials. The overall structure of the *mountain* is concrete, however that is a material that is only inwardly expressed, primarily within the parking levels. The residential terraced housing is expressed by the glazing and wood façade when observed from the street, and by the brightly colored corridors from within the parking lot [Figure 2-77]. The parking levels and public climbing staircase are defined on the north and west façades by perforated aluminum plates which allow light and air to penetrate into the parking levels while providing some privacy. What elevates this simple façade to an art piece is the fact that the perforations in the aluminum are a large rasterized reproduction of Mount Everest – the inspiration for the project [Figure 2-76]. Furthermore, when the parking levels are lit from within at night, the façade appears as a photo negative (Actar, 2010). The architects have managed to not only make two distinct programs complement each other but also for two very different facades to effortlessly balance each other.

The context / natural environment within which the Mountain Dwellings building is set acts as a material that strengthens the convictions of the project. This alternative high-density residential block appears in the landscape as a response to the typical suburban development across the eastern stream – proving that it is possible to retain key desirable principles which make suburban and rural living favorable.



### 2.19.3 Successes as Alternative High-Density Residential

“It’s a schizophrenic sensibility...The south is purely organic, and the north is strictly contemporary.”

- Bjarke Ingels, *Dwell* (McGrane, 2009)

The Mountain Dwellings residential complex is different from the previous precedents primarily because it was required to achieve an unusual ratio of 1/3 living and 2/3 parking in its design. The ingenious way the parking structure is used to create a structural *mountain* upon which the individual residential units reside was the key to success in this complex. The Mountain Dwellings is most successful at re-establishing a connectivity to nature through its luxurious individual outdoor terrace spaces. The terrace spaces include both a private and a public area and their orientation towards the south-east allows for optimal light and views. The project also provides a significant amount of individuality and flexibility – both through various unit configurations available, as well as the internal flexibility of units themselves. The unique entrance access to the units from the structural parking lot is reminiscent of the quintessential suburban indoor-outdoor relationship between the entrance and the garage.

The individual entrance off the parking lot, the private terrace, minimal neighbours and the *suburbanesque* exterior garden space are all qualities that demonstrate suburban principles applied in an alternative higher density typology. The structural parking lot that supports the residential exploration of suburban principles is a unique space without which the stepped housing would not have manifested. These two programs have been expressed in very different sensibilities but ultimately work together to demonstrate coveted suburban and urban principles in an alternative high-density residential solution.

## Part 3: Design

### 3.01 Design Intent

The purpose of this thesis was to engage in the debate of urban densification and high-density development through the examination of the current status quo approach and the investigation of the missing desirable qualities in the urban living condition. This design exploration will use the cumulative research to develop an alternative high-density residential solution. The set of design criteria and design elements which emerged from research, the successful principles that arose from the precedent studies and the agenda of the thesis will all contribute to the overall outline of goals and principles for the design project. The outline of the goals and principles for the design study includes the following:

- Locate the project within an urban core
- Achieve a particular level of high-density that is comparable to current high-density developments
- Reject the status quo approach of high-rise condominiums – take a design approach based on horizontality as opposed to verticality
- Implement desirable design elements into this alternative residential solution, principles such as:
  - re-establish and reinvent the relationship between the urban dweller and nature / the natural environment
  - integrate indoor-outdoor relationships into urban living and improve upon the idea of *streets in the sky* by eluding the dreaded modernist corridor
  - flexibility and adaptability are necessary qualities of an urban home in a modern time where the family structure is in constant flux
  - allow individuality to persevere by avoiding cookie-cutter design
  - consider modularity for its sustainability and systems thinking approach but do not allow it to lead into complete uniformity
  - design high-density dwellings with the image of the individual house as a reference as opposed to the two-dimensional apartment
- Emphasize contextual strengths
- Re-evaluate both the physical connectivity in the urban residential typology as well as the social connectivity



- Reinststate a sense of community in an urban development
- Establish alternative and innovative uses for common and necessary spaces as a means of efficiency as well as creating better multi-purpose spaces

These goals and principles are meant to guide and focus the design to ultimately create an innovative alternative to the typical status quo high-rise condominiums, while also influencing the way people live within urbanity.

As the main focus of this thesis is an exploration into the way people dwell in the urban environment, it is blatantly appropriate that more than 80% of the program will be residential in its nature. The fact that this will be an urban project, as well as the knowledge acquired through research mandates that for any high-density residential project to be successful it must also include a public commercial programmatic portion. An essential part of urban development is that all new projects add value to the community at large through the services and amenities they provide in the constantly densifying urban core. The general programmatic intent for the project is 85-90% residential and 10-15% mix of commercial and educational.

### 3.02 Program Analysis

The residential program is the dominant typology in this project, however the very nature of this thesis requires innovation, diversity and a divergence from the uniformity and blandness of typical high-density residential design. The precedents which were analyzed provide a good baseline concerning unit diversity – specifically when a project offers an appropriate amount of variety and when it excesses. Therefore, this project will attempt to identify the needs of the chosen contextual area and the applicable family structures present – and provide a suitable diversity of dwelling configurations in response. The dwelling configurations will vary from studios to three/four bedroom homes to accommodate an array of family types. Included within the residential program will be communal spaces, both necessary residential services as well as recreational spaces.

The commercial program in the project has become a requirement for any high-density residential development in the past few decades – and it is a way for a new development to bring more to a community than just density. The needs of the chosen community are what will ultimately finalize the services and amenities that will be included in the public and commercial portion of the project. The public amenities will be filling in the facility gaps of the neighbourhood

and will include both commercial and educational typologies. The following is a list of potential commercial and educational spaces:

COMMERCIAL	EDUCATIONAL
- Convenience Store / Corner Store	- Community Centre
- Grocery Store / Fresh Market	- Daycare Centre
- Restaurant	- Public Library
- Drycleaner	- Dance Studio
- Hairdresser / Barber	- Yoga Studio
- Gym	- Karate Studio
- Bank	
- Hardware Store	
- Music Store	
- Apparel Store	
- Miscellaneous Retail	

### 3.03 The Site

This thesis deals with the issue of high-density development, an issue of urbanity – therefore the site selection process was narrowed down to dense urban centres. The advantage of living in and being highly familiar with one of the great urban centres in North America, made Toronto the ideal city within which to explore this topic.

Toronto is the fourth largest city in North America – according to Statistics Canada as of March 2013. The city falls behind Mexico City, New York and Los Angeles and it is booming with a population of 2,791,140 and an annual growth rate of approximately 38,000 people (Dhillon, 2013). Toronto is known for being one of the most culturally diverse cities in the world. Therefore, aside from being a thriving urban centre, the city's diversity adds an additional layer of complexity to the potential sites.

Site selection was a widespread process that began with 8 comparable sites within the urban core of Toronto. All the initial sites were located within the constraints of Bloor Street to the north, the Don Valley Parkway to the east, Lake Ontario to the south and Dufferin Street to the west. The sites provided a different sense of urbanity depending on their location – the density expression and context varied between Chinatown, Cityplace, Old Town and Corktown. The four

sites that were researched and analyzed further were located at: Lakeshore Blvd and Bathurst Street, Front Street and Sherbourne Street, Queens Quay East and Parliament Street and Front Street East and Eastern Avenue. After a study of the strengths, weaknesses, opportunities and threats that all these sites offered – the site selected was the one at the intersection of Queens Quay East and Parliament Street, in the developing East Bayfront neighbourhood. The context and the way that density and concentration is achieved within the context played a pivotal role in the final selection of the site.

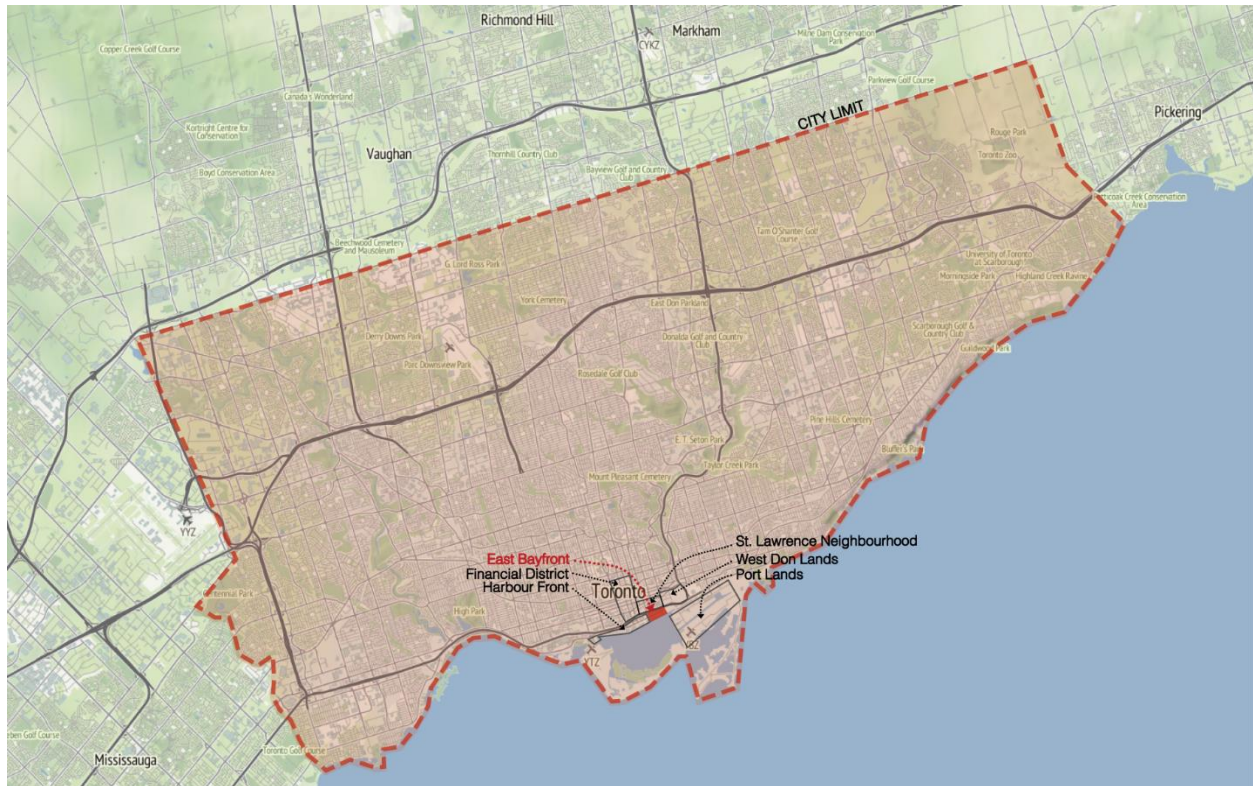


Figure 3-01: Location of chosen neighbourhood within the city of Toronto and adjacent neighbourhoods.

The East Bayfront Neighbourhood is huddled within the heart of Toronto. The neighbourhood is cocooned between: the Financial District, the Harbourfront, St. Lawrence Neighbourhood, the Distillery District, West Don Lands and the Port Lands [Figure 3-01]. As Toronto's shoreline has been changing for the past two centuries, filling in southwards from Front Street to Queens Quay – the selected site and neighbourhood did not come into existence until after 1930. The neighbourhood is bound on the north by the infrastructural barrier of the Gardiner Expressway and Railway Lands, the water on the south, Lower Jarvis Street on the west and Parliament Street on the east. In its 80 year lifespan the East Bayfront area has been predominantly defined as a heavy and light industrial area filled with factories and oversized surface parking lots. While the entire East Bayfront Neighbourhood is in a state of redevelopment, the western portion already

has several notable projects completed. Sugar Beach, Sherbourne Park, Corus Quay Entertainment and the George Brown Waterfront Campus are the established projects that act as catalysts for the revitalization of this area [Figure 3-04]. The majority of the work thus far has been focused on projects directly on the water – the land to the north of Queens Quay East has projected planning but is presently untouched. The selected site is in the north east corner of the East Bayfront Neighbourhood [Figure 3-02].



Figure 3-02: Location of chosen site within the East Bayfront Neighbourhood.

The St. Lawrence Neighbourhood to the north of the site was a critical factor in the site selection process [Figure 3-03]. It is a representation of both a high density concentration that is not in the form of a high-rise condominium, as well as providing contextual reference in terms of the architectural expression and most importantly – desirable scale. St. Lawrence became an example for large scale residential developments because of the unique approach it took – primarily its avoidance of high-rise point towers to achieve its very high density objective. As a *municipally planned and developed, inner city, high density, socially mixed neighbourhood* – St. Lawrence has plenty to teach and extrapolate from (Hulchanski, 1990).

The Distillery District is the neighbouring area to the north east of the site. The district is a historic and entertainment precinct which contains cafes, restaurants and shops, all housed in the heritage buildings of the former Gooderham and Worts Distillery. This area has undergone



redevelopment due to a desire to increase the residential capacity of the neighbourhood. Since the essence of the neighbourhood lays in the history and heritage the densification occurred in the form of high-rise condominiums which minimally disturb the desirable existing fabric.

To the east of the selected site and across the Parliament Slip, is one of the two remaining silos from Toronto's industrial port era – the Victory Soya Mills Silos [Figure 3-05]. The historic grain silos hold a culminating presence at the end of Queens Quay East. The silos are the only structure in vast undeveloped land to the east of the site and they provide contextual aesthetic and scale. While the derelict silos have been given heritage status there are no current plans for renovation or reuse – however their presence is something to be considered in the future development of the selected site.



Figure 3-03: Site within East Bayfront Neighbourhood and adjacency to St. Lawrence Neighbourhood to the north. Courtesy of Waterfront Toronto, [http://www.waterfronttoronto.ca/image\\_galleries/east\\_bayfront/?12041#10802](http://www.waterfronttoronto.ca/image_galleries/east_bayfront/?12041#10802)

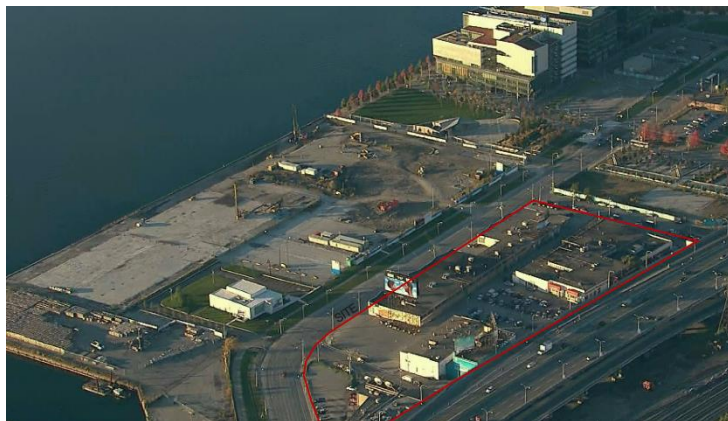


Figure 3-04: Site surroundings and completed projects. Courtesy of CTV, <http://toronto.ctvnews.ca/toronto-considers-purchase-of-71-condo-units-for-affordable-housing-1.1518426>



Figure 3-05: Relationship of site to the silos. Courtesy of Waterfront Toronto, [http://www.waterfronttoronto.ca/image\\_galleries/east\\_bayfront/?12041#10799](http://www.waterfronttoronto.ca/image_galleries/east_bayfront/?12041#10799)



### 3.04 Design Evolution / Design Methodology

The site analysis examined and uncovered proximity relationships to adjacent neighbourhoods and attractions, zoning regulations, issues of neighbourhood context and sensory barriers. A thorough investigation of the site also revealed there is a close affinity in terms of size and proportion between the selected site and the site of Habitat 67 – one of the aforementioned precedents. Both sites share the characteristics of being long and narrow, at approximately a ratio of 3 to 1. Habitat 67 is also one of the precedents that is closely related in terms of overall scope. The actual dimensions of the site are 290m by 101m – at the largest spans. The site study also identified relationships between residential complexes and proportional breakdown, namely through a comparison to the adjacent St. Lawrence neighbourhood [Figure 3-06].

While the contextual relationships to neighbouring residential areas and the theoretical comparisons made to the studied precedents were critical in the design process – it was the previously explained design criteria and design elements derived from research that spearheaded this thesis project. The design evolved out of the desire to *emphasize* the advantages of the urban living condition, *disengage* the existing status quo and *integrate* the lost advantages of rural living into the urban living condition. The design criteria was concerned with the identification and application of the benefits of rural living, the maintenance of density and concentration, and the rejection of status quo approach to achieving density. The design elements include: provision of direct outdoor/indoor access, re-establishing the relationship between the urban dweller and nature, designing for adaptability and flexibility, and maintaining a sense of individuality. These design elements became targets for the smaller scale / detail design throughout the design process, while the broader design criteria was responsible for maintaining the overall intention of the project.

The use of geometry as a design tool is a common strategy, one that was certainly apparent in the investigated precedents. Using geometry from the initial conception of the design allowed for it to have a critical role, as well as identify important relationships with surrounding developments and precedent projects. Geometry is concerned with shape, size, relative position and the properties of space – it is also what brought order to the site. The site was initially broken down into three smaller and more manageable portions, followed by a geometric analysis that culminated in the discovery and application of the root-five rectangle as the key unit of measurement [Figure 3-06]. The root-five rectangle is a rectangle where the side proportions are

$1:\sqrt{5}$  (1:2.236) and is part of the series of root rectangles, a subset of dynamic rectangles (Hambidge, 1967). The dynamic rectangle is part of the dynamic symmetry described in Jay Hambidge's book *The Elements of Dynamic Symmetry* – which is a proportioning system and natural design methodology. What is notable about the root-five rectangle is that it can be split into a square and two equal golden rectangles. Another remarkable detail is that it is a unit of measurement deeply intertwined within architecture – in fact it is the same unit of measurement that defines the modules of Habitat 67. The use of the root-five rectangle was a means of bringing order to design – it was a system that broke down elements to understandable units. This geometry was something used in plan studies, elevation studies and section studies, and it attempted to create harmony.

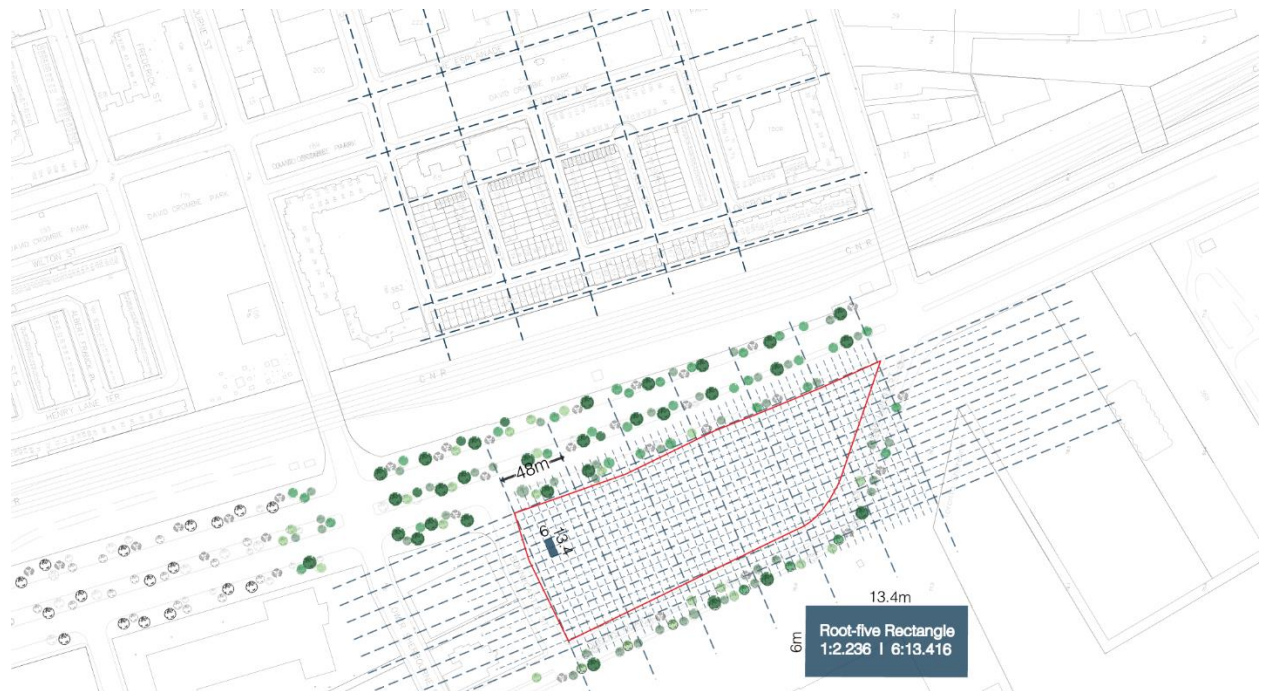


Figure 3-06: Using geometry to bring order to the site and identify relationships to adjacent neighbourhoods.

The initial conceptions for the site varied in strategies, however they were all envisioning this alternative residential development as a massive singular complex. The initial proposed concepts aimed at the successful application of the desired design elements: providing an outdoor-indoor relationship, re-establishing the urban dwellers relationship with nature, designing with flexibility and adaptability in mind and providing a sense of individuality. The architectonic form expressed the creation of exterior layers of streets in the sky, which provided access to a large variety of interlocking units. The streets and dwelling unit placement were designed to have a stepping effect from the western side of the site to the culminating east [Figure 3-07] [Figure 3-08]. The complex arose from 4 storeys at the west to 12 storeys at the

east – where it respected the scale of the historic adjacent silos. The arrangement of the units allowed for all access to occur from the interior streets, a gesture which permitted for the units to have access to multiple vistas. The reestablishment of a relationship with nature was an important objective – the project aimed to do this by providing both private garden spaces as well as the public internal stepping streets. The fact that the site is quite vast allowed for the internal stepping streets to be manipulated in such a manner that light could penetrate through the massive complex.

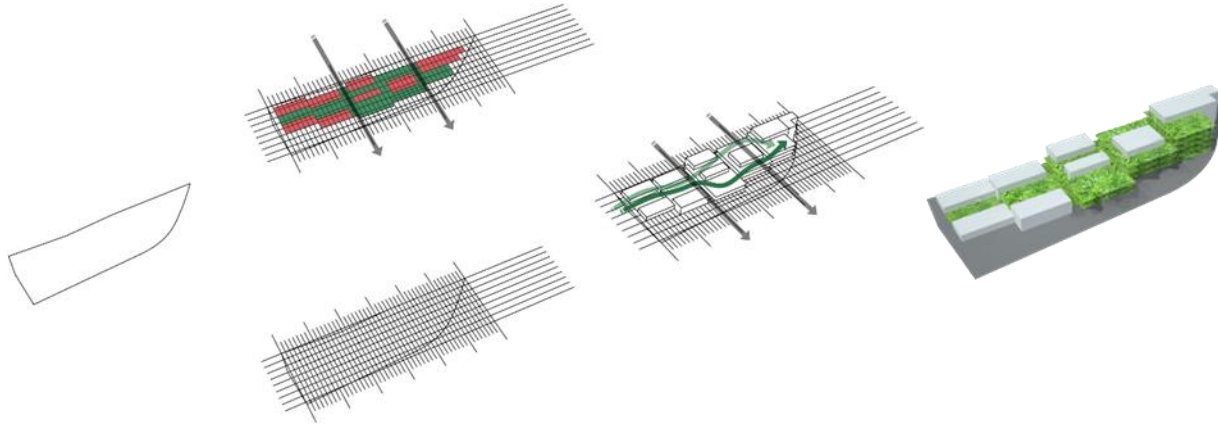


Figure 3-07: Example of one of the design strategies explored.

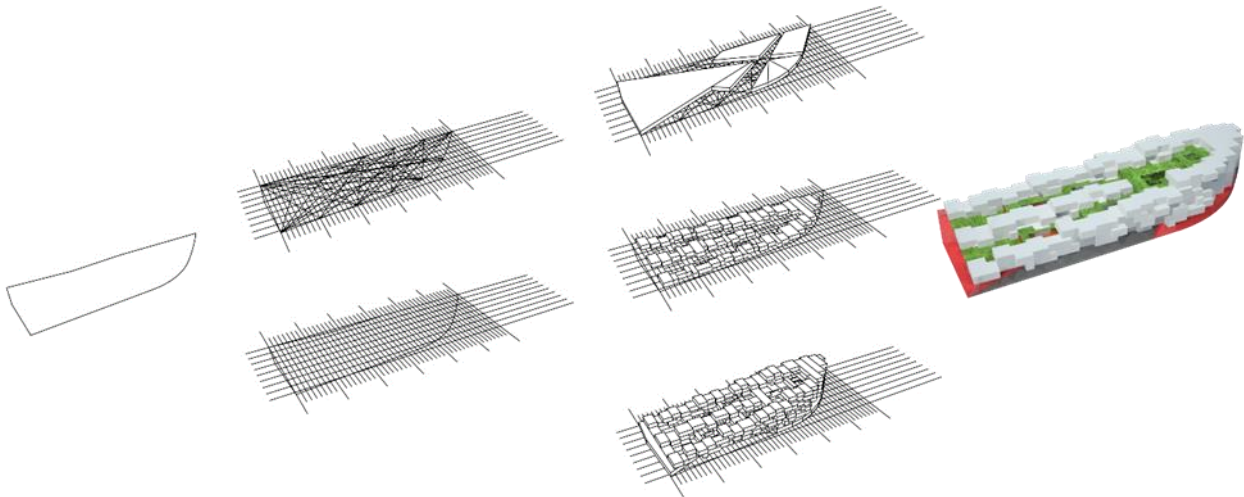


Figure 3-08: Example of one of the design strategies explored.

The iterative process of design narrowed down the project requirements and eventually dwindled the variety of design strategies that were conceived at the start of this design exercise. The final design manifested out of the desire to find harmony, geometry and order in an already successful natural process and extrapolate the essentials into the architectonic domain. The design process led into an inquiry into the biological nature of DNA and its ability to fluidly create order out of complexity [Figure 3-09]. The study into this different subject was concentrated on

understanding the composition and relationships between the strands of DNA that run anti-parallel and identify how simplicity and order is achieved through a unifying element. DNA is the basic building block of nature and its configuration shows how something incredibly complex can be reduced to simple units. DNA manifests itself as a double helix that is held together by nucleotides which base pair together. Ultimately DNA is composed of 4 units that are in perfect order. Understanding how harmony and order is achieved within such complexity provided critical insight into the final design strategy.

As opposed to the initial conceptions for the site, the final approach is exploring division of the site into smaller and more manageable portions, while attempting to preserve a strong bond within the complex. The formal expression of the complex is informed by the biological study of DNA structure and uses the idea of a double helix to create two structures that complement each other and move together in the landscape. This organization of units creates a complex that interweaves together while detaching itself from the ground plane and allowing nature and landscape to dominate [Figure 3-10] [Figure 3-11].

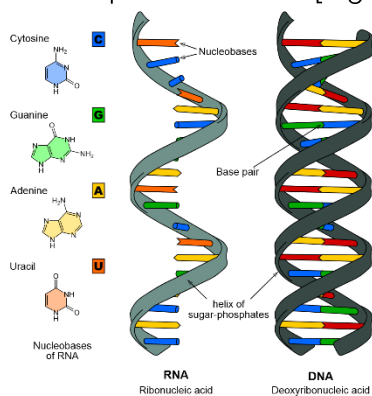


Figure 3-09: DNA Breakdown. Courtesy of Wikipedia Commons, [http://upload.wikimedia.org/wikipedia/commons/3/37/Difference\\_DNA\\_RNA-EN.svg](http://upload.wikimedia.org/wikipedia/commons/3/37/Difference_DNA_RNA-EN.svg)

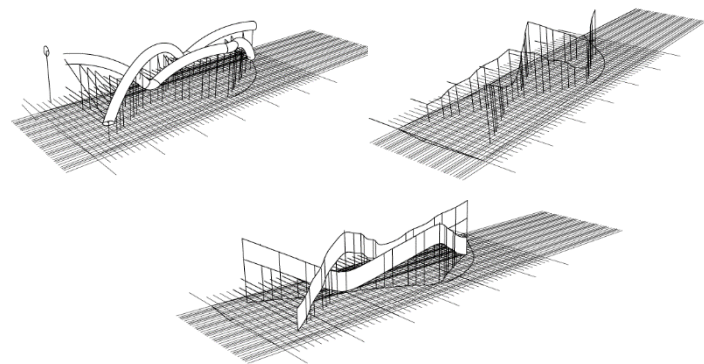


Figure 3-10: Schematic extrapolation of two complementing structures.

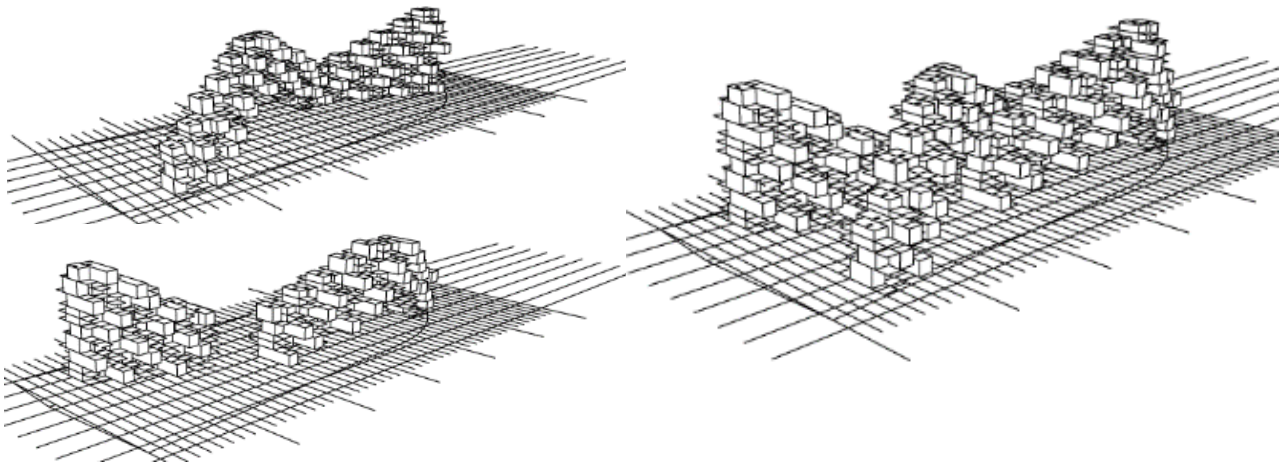


Figure 3-11: Schematic of final design approach – separate structures (left), whole complex (right).

### 3.05 Final Design

There are numerous influences that shaped the design process of this housing development, however three main concepts acted as guiding pillars throughout – the *emphasizing* of the urban living condition, the *disengagement* of the status quo response to urban living, and the *integration* of the lost advantages of rural living. This section will provide an overall explanation of the design and configuration of the complex while also briefly identifying the design elements which will be further investigated in the following sections.

The resultant alternative high-density residential development is a project that is distinctive not just because of its formal expression and unique configuration – but also because of everything the project disengages from. The residential complex may appear as one distinct entity, however it was designed as two complementing structures. The initial conception of this duality was ignited by the research done into understanding the order and harmony of DNA structure. The two structures expand the length of the site, interweave at designated locations and move together in the landscape as one. The buildings move and relate to each other in a helical manner which means they lightly touch the land and make space for each other in terms of access and views. The relationship between the structures is best understood when observed in three-dimensional space.

For a better understanding of the complex the structures need to be further described and fragmented. The uninterrupted and continuous structure that extends from the south-west corner to the north-east corner is the Y complex. The X complex stretches from the north-west corner to the south-east corner and is actually composed of two structures, as its continuity is terminated at the place of intersection with its counterpart. Apart for the formal organization of units in the two complexes – the sheared structure of the various unit typologies creates a façade that is in perfect opposition to the flat curtain wall status quo. The façade of this alternative residential development is best defined as an extruded/intruded undulating exterior, which is the resultant of a sheared structural design and vertical unit alignment.

A study of the floor plans of the development will provide an understanding of the changing nature of the structures as one moves vertically through the complexes. The site plan of the development identifies the locations where the structures meet the ground plane, the various commercial and educational uses planned and the multitude of vertical circulation access points throughout the vast site. The site plan also reveals the openness that is created by lifting the



southern portion of the X complex off the ground [Figure 3-12]. The second floor identifies the commercial and educational amenities that expand into the second floor, it also presents the initial residential units and the accompanying horizontal circulation that manifests itself an exterior street on the northern exposure [Figure 3-13]. The third floor is the first fully residential floor within the development and it begins to show the way in which the two spines of the complex are being filled in with residential units and communal spaces [Figure 3-14] [Figure 3-15]. Each additional floor of the development completes the structures more and informs the changing form of the complex [Figure 3-16] [Figure 3-17]. The sixth and the seventh floor are both interesting as they represent two different relationships within the development. The sixth floor is the location within the development where there are only two continuous circulation paths that connect all the units on that level [Figure 3-18]. The seventh floor is the location where the Y complex becomes entirely continuous, as well as where the southern portion of the X complex becomes complete [Figure 3-19]. The following levels begin to express the outdoor roof gardens as the complexes begin to shrink and rise to a point [Figure 3-20].

The individual elevations of the two complexes, as well as the cumulative southern elevation of the entire development also aid in understanding the horizontal and vertical movement that occurs in the form of these structures [Figure 3-23 to Figure 3-26]. Unlike regular residential developments where all the units have identical ceiling heights (and therefore unit elevations), the various unit typologies in this alternative residential development fluctuate between three unit elevations. The elevations follow the  $\sqrt{5}$  geometry established and also applied in plan – 3.7m, 7.4m, 13.4m, 17.1m, 20.8m, 26.8m, etc. – a grid within which the four unit typologies fit seamlessly. The elevations also provide an insight into the changing materiality within the development and the establishment of horizontal neighbourhoods throughout the structures.

The perspective approaches towards the development provide the best grasp on the immensity of the project, the relationship the complexes have with the human scale and the street, and the effect of the structures being elevated off the ground plane [Figure 3-28 to Figure 3-38].

The many critical design elements and criteria that were identified through the research and deemed to be principles that would lead towards an urban residential development that is designed with the human in mind (highlighting the best of the urban and rural) will be analyzed in greater detail in the following sections.



Figure 3-12: Site Plan. The commercial and educational amenities are clearly identified on the ground floor plane as well as the numerous vertical access points that will bring the residents or visitors into the desired portion of the residential complex.

[R] Restaurant  
[C] Café  
[ID] Independent Grocer / Business  
[CS] Convenience Store

[YS] Yoga Studio  
[M] Management Office  
[DC] Daycare Centre

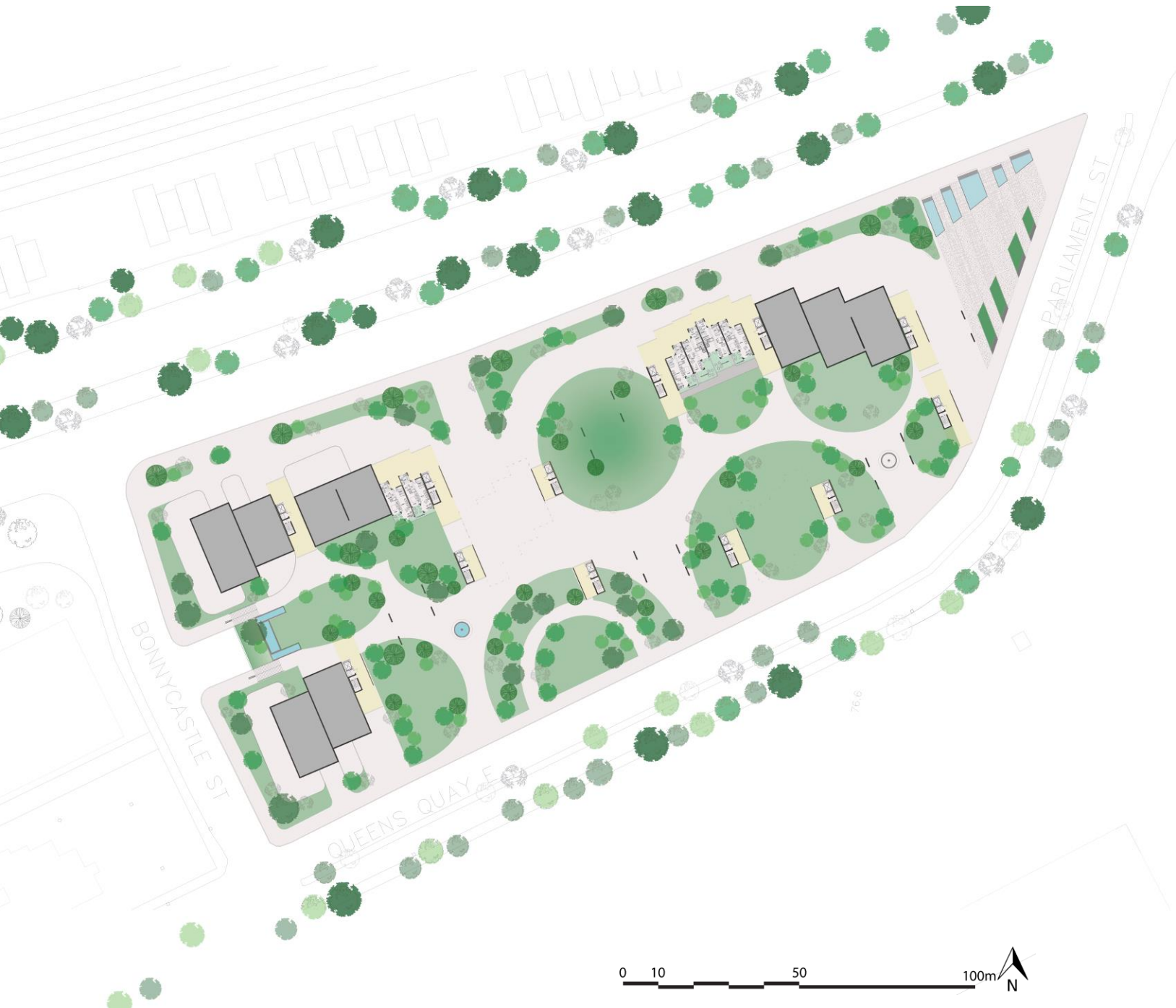


Figure 3-13: Second Floor. Many of the commercial and educational amenities expand into the second floor. The vertical access points are clearly identified, as well as the initial residential units and the horizontal circulation which manifests itself as an exterior street on the northern exposure.



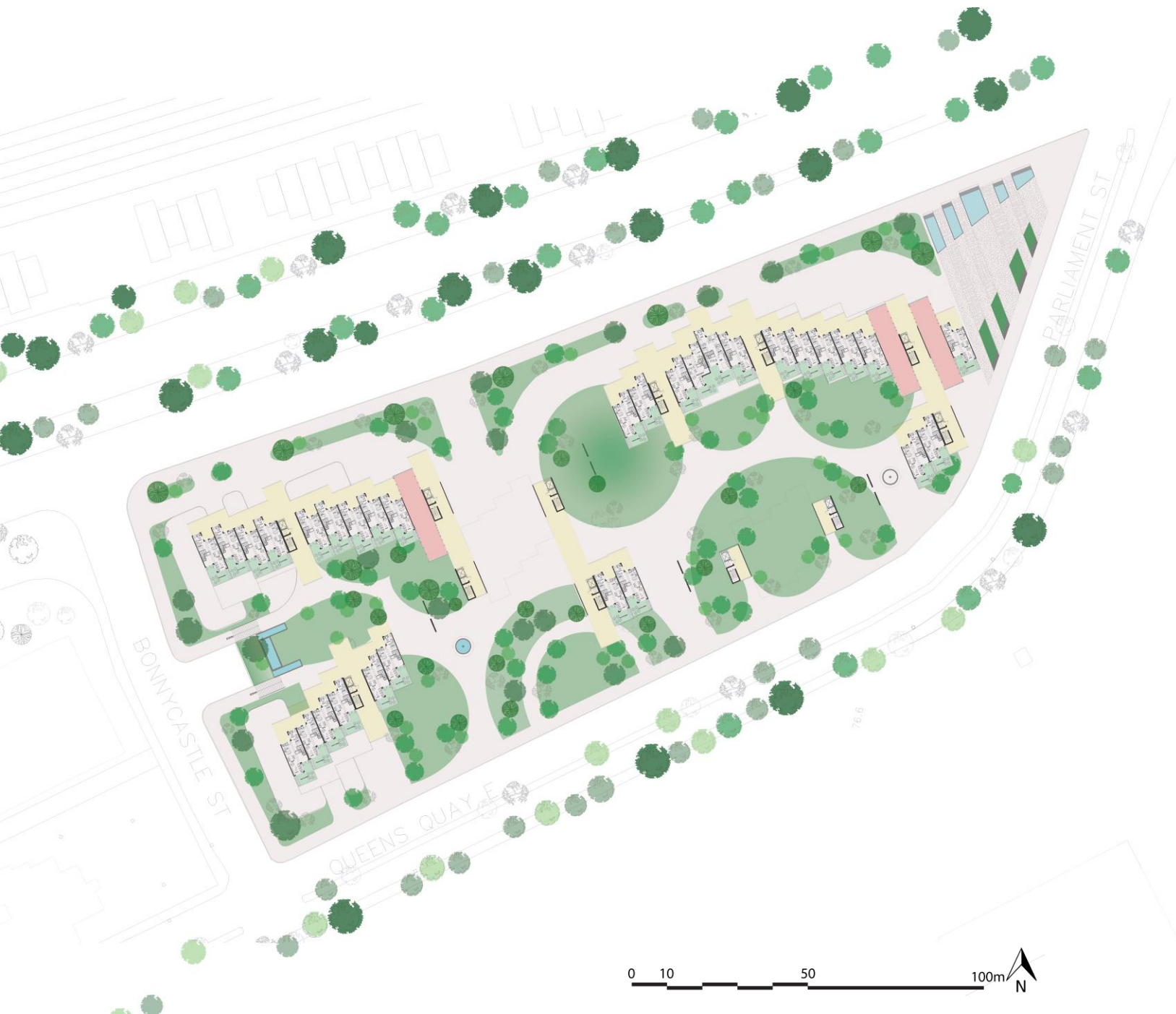


Figure 3-14: Third Floor. The two spines of the complex begin to be filled in with residential units and communal spaces. Each additional floor completes the structure more and informs the changing form of the complex.





Figure 3-15: Third Floor. North-east block detail.

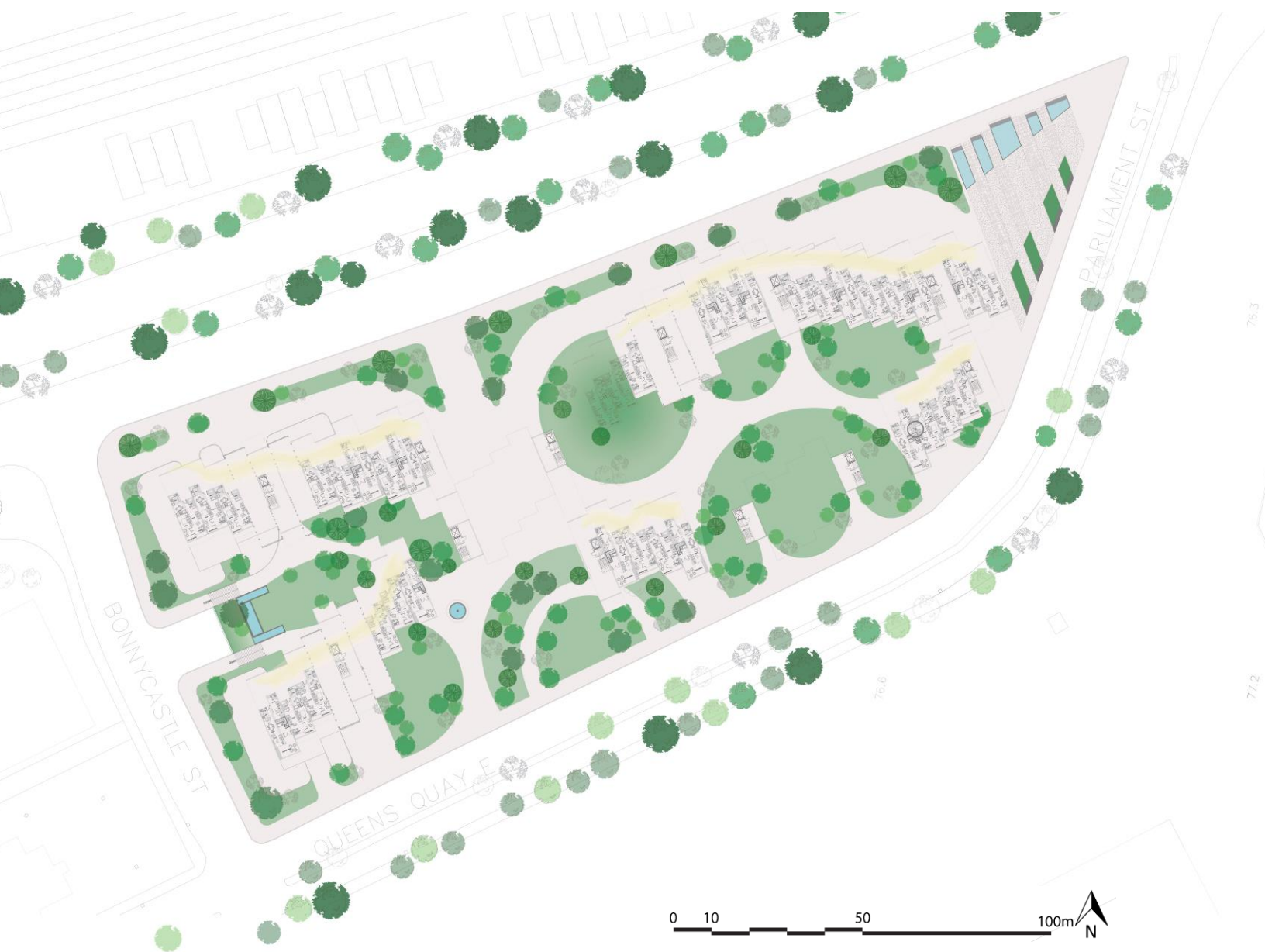


Figure 3-16: Fourth Floor. The two spines of the complex begin to be filled in with residential units and communal spaces. Each additional floor completes the structure more and informs the changing form of the complex.



Figure 3-17: Fifth Floor. The two spines of the complex begin to be filled in with residential units and communal spaces. Each additional floor completes the structure more and informs the changing form of the complex.



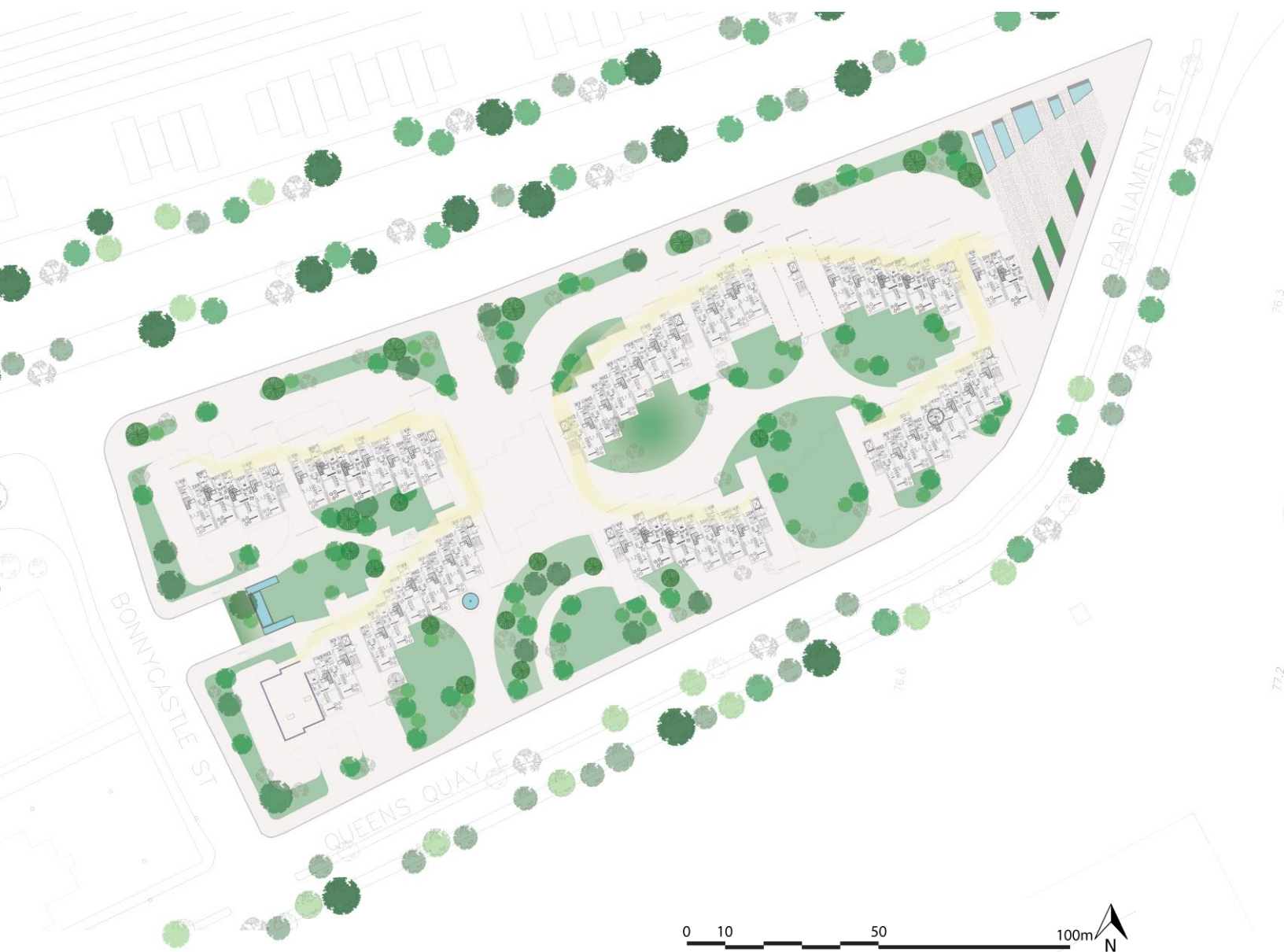


Figure 3-18: Sixth Floor. The two spines of the complex begin to be filled in with residential units and communal spaces. Each additional floor completes the structure more and informs the changing form of the complex. The sixth floor is the location within the development where there are only two continuous circulation paths that connect all the units on that level.





Figure 3-19: Seventh Floor. The two spines of the complex begin to be filled in with residential units and communal spaces. Each additional floor completes the structure more and informs the changing form of the complex. The seventh floor is the location where the Y complex is entirely continuous.

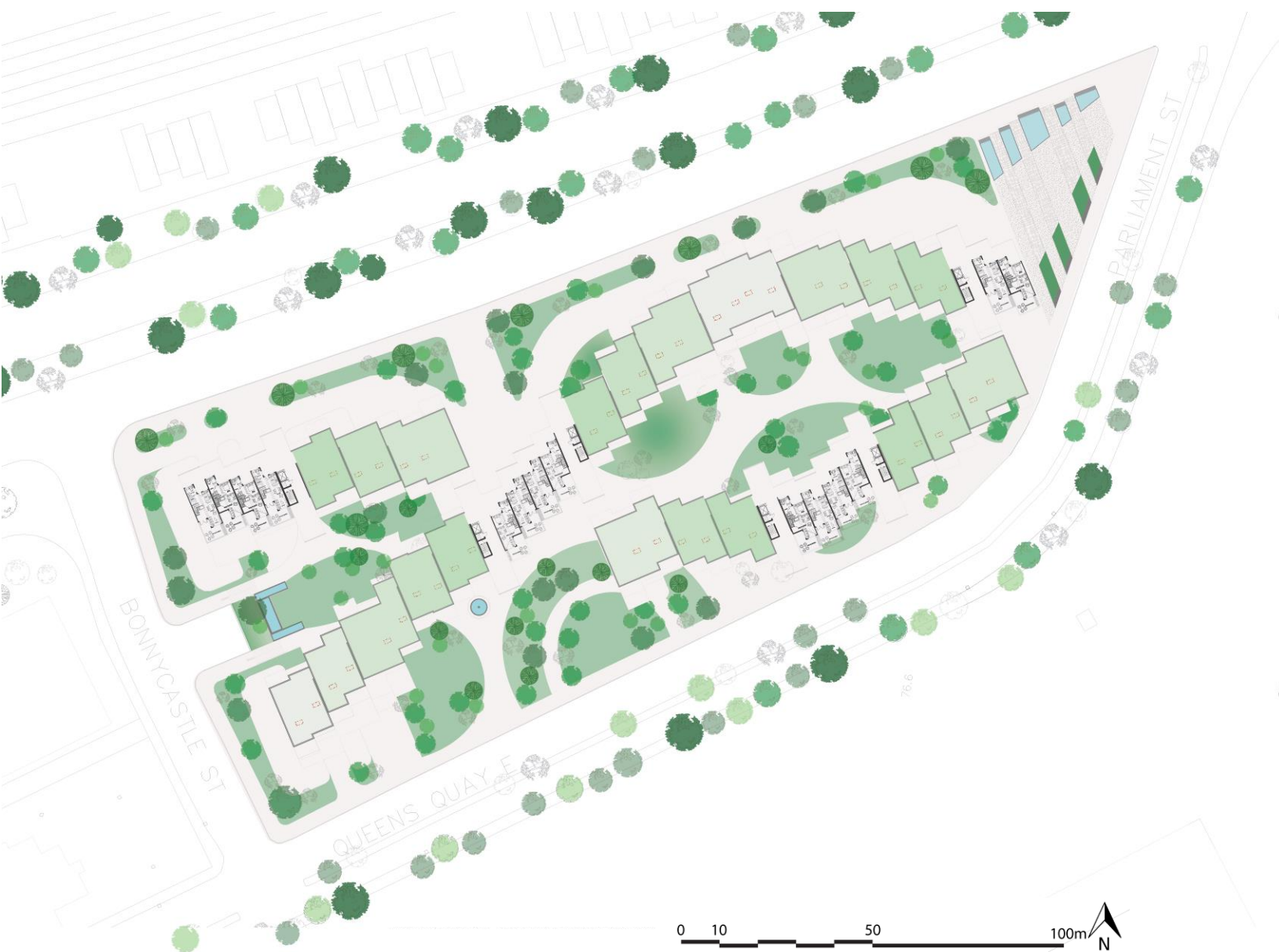
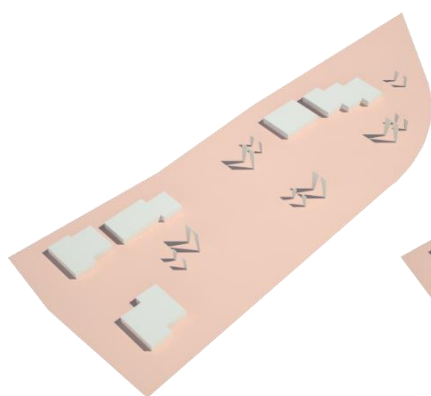
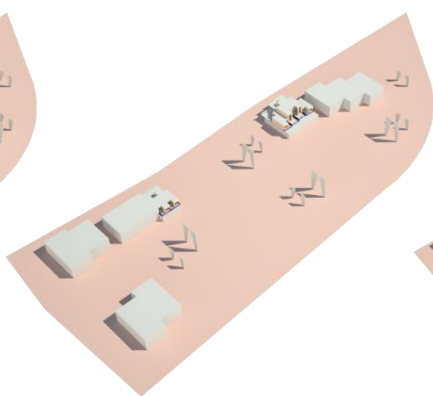


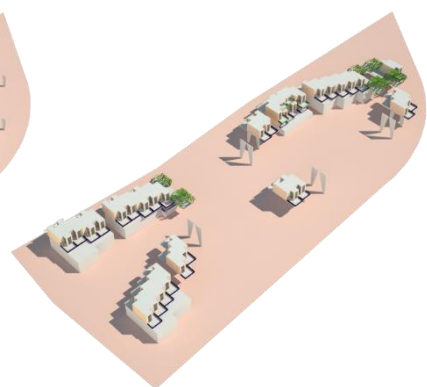
Figure 3-20: Twelfth Floor. The twelfth floor identifies the highest peaks of the complex while also displaying the stepping effect of the communal roof gardens that the complex achieves.



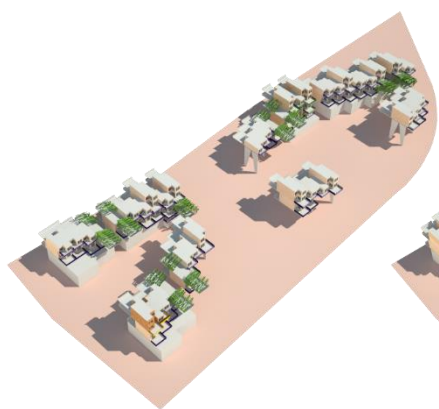
Ground Floor



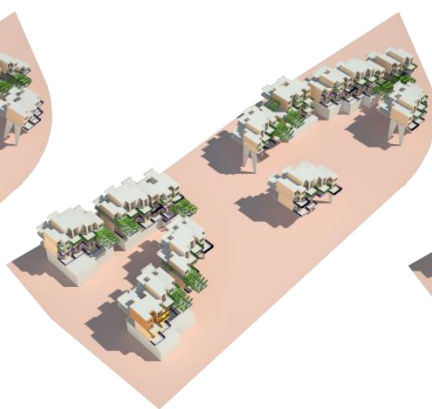
Second Floor



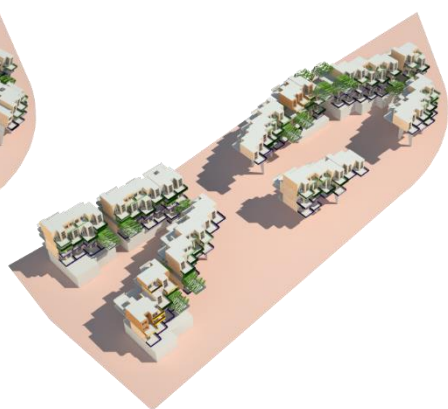
Third Floor



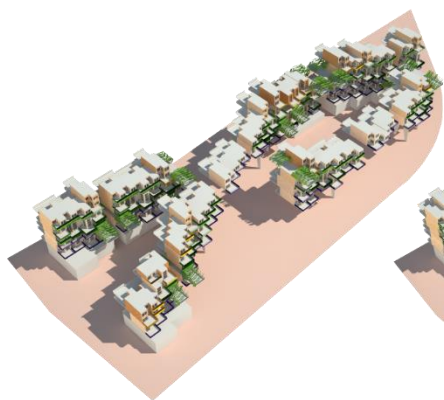
Fourth Floor



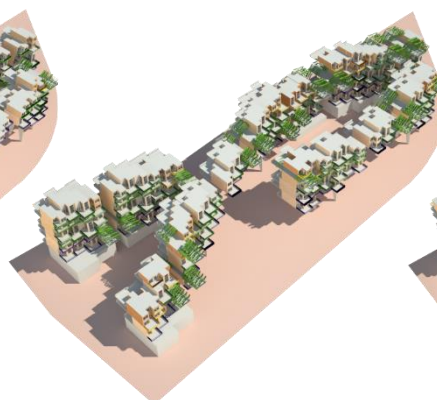
Fifth Floor



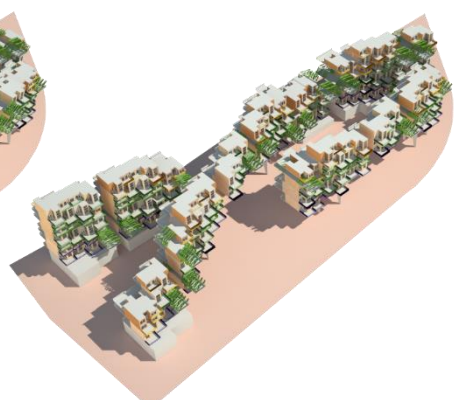
Sixth Floor



Seventh Floor



Eighth Floor



Ninth Floor

Figure 3-21: The construction process of the complexes through each level.



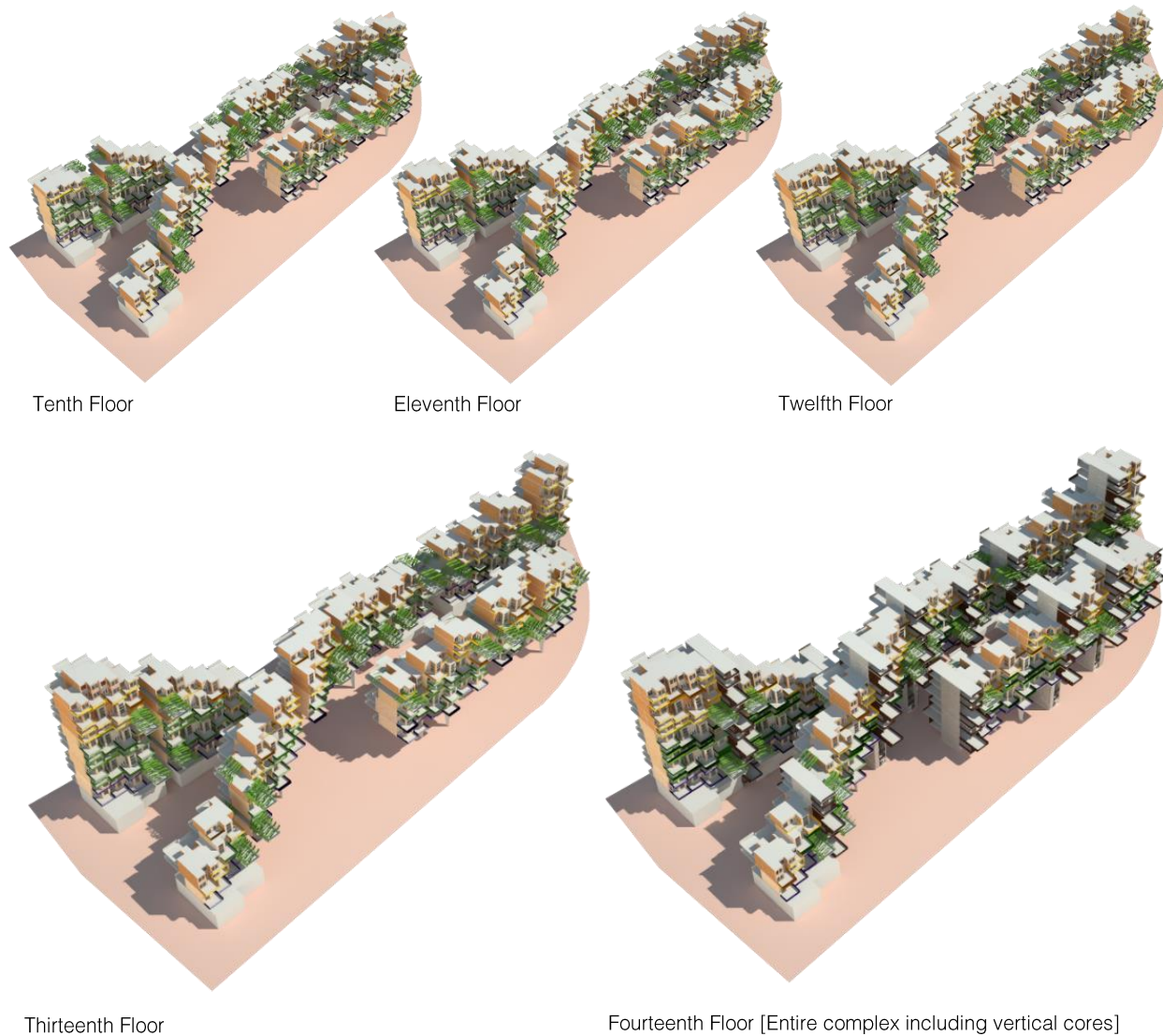


Figure 3-22: The construction process of the complexes through each level.

These south-west bird's eye view perspectives of the complex express the construction process of this development and the coming together of the various structures [Figure 3-21] [Figure 3-22]. The process is able to highlight the locations where the continuity of the structures is achieved, where the northern exterior circulation streets are most united or dispersed and the overall lightness that can be achieved of such a vast development on the ground plane. The uncharacteristic relationship between the complexes and the edges of the site is clear and it expresses the desire that the development has to attract and bring in people into the site [Figure 3-27].





Figure 3-23: South Elevation of the continuous Y complex.



Figure 3-24: South Elevations of the X complex which is composed of two blocks.



Figure 3-25: South Elevation Y complex portion.



Figure 3-26: South Elevation of interweaving backbone complexes together.





Figure 3-27: Site (Commercial and Green Space, Vertical Circulation Cores, Interweaving Blocks)



Figure 3-28: Perspective of X Complex [Composed of two structures] from south-west corner.



Figure 3-29: Perspective of Y Complex [Composed of one continuous structure] from south-west corner.



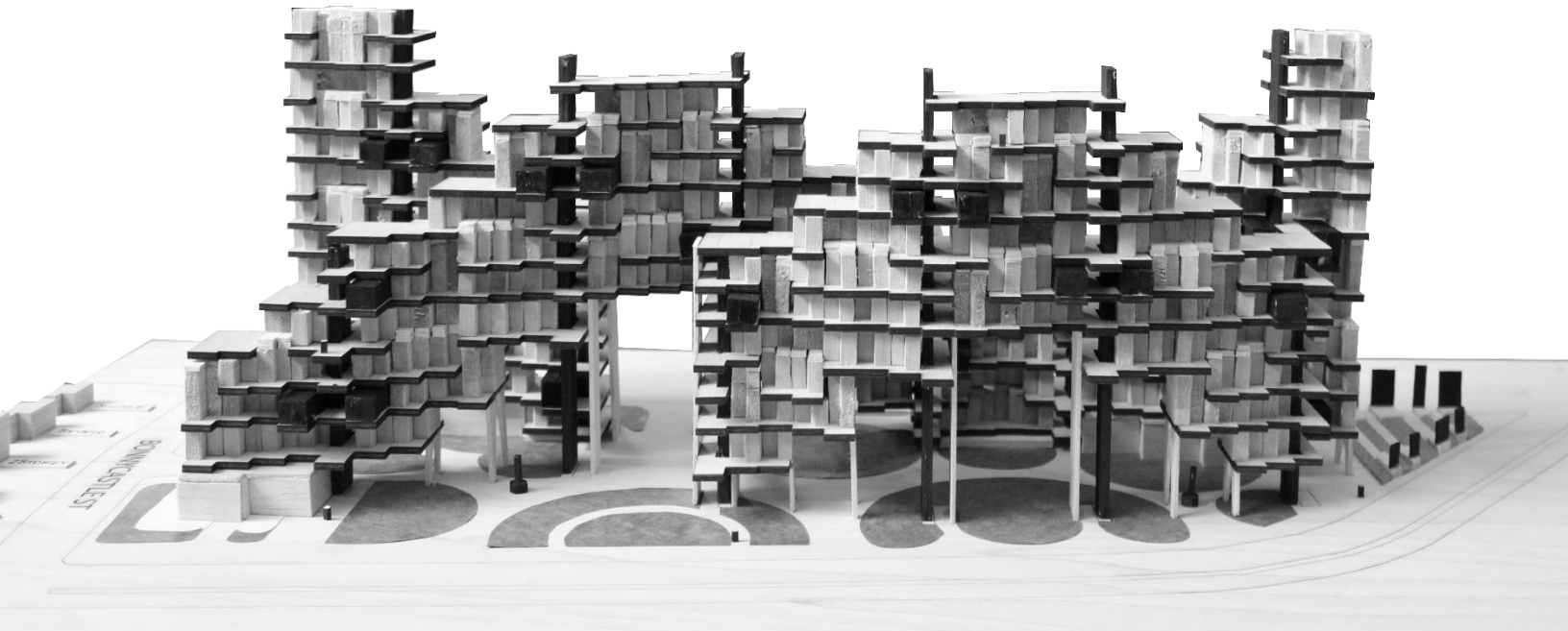


Figure 3-30: Perspective south view of the complex – in the physical model.



Figure 3-31: Perspective of residential complex from the south-west approach.





Figure 3-32: Perspective of residential complex from the south-east approach.



Figure 3-33: Perspective view towards downtown from Queens Quay East Street.





Figure 3-34: Perspective view on the north side of the complex.



Figure 3-35: Perspective north view of the complex – in the physical model.



Figure 3-36: West Bird's Eye view of the complex.

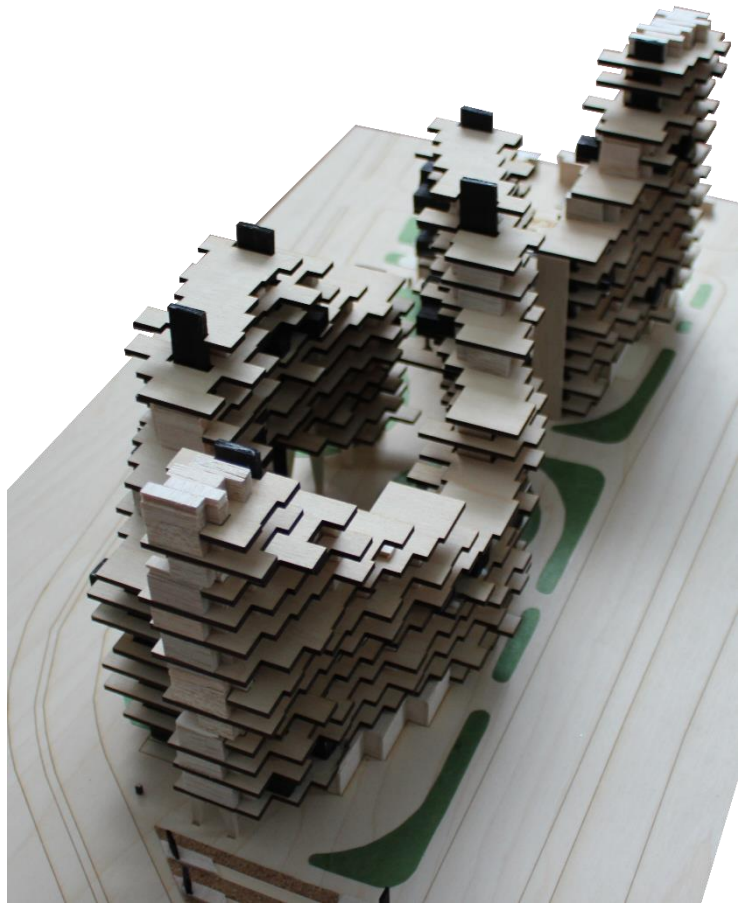


Figure 3-37: North-east Bird's Eye view of the complex.



Figure 3-38: Sectional physical model expressing alignment, vertical circulation and communal spaces.



### 3.06 Design Criteria and Design Elements Manifested

The intent within this thesis was for the culminating design to reflect a manifestation of the design criteria and design elements that were identified through the research. The following sections will explore many of the aspects of this alternative high-density residential development in greater detail and will highlight how these principles have been tackled and plaguing issues have been resolved.

#### *Density and Concentration*

This alternative residential development achieves a level of density that is comparable to the neighbouring alternative and successful St. Lawrence Neighbourhood.

#### *Disengaging the Status Quo*

The project disengages from the status quo approach to urban living through the many design strategies employed: highlighting horizontality as opposed to verticality, avoiding the flat façade, incorporating a variety of materials, elevating the importance of community, etc.

#### *Emphasizing Context*

The context greatly influences the design strategies applied throughout the development and creates a project that is responding to its site and surroundings while enhancing it.

#### *Integrating direct outdoor/indoor access*

The project incorporates direct outdoor/indoor access on both the individual dwelling scale, as well as within the larger scale horizontal and vertical circulation throughout the development.

#### *Re-establishing a connection to nature*

The connection to nature aspect of the design is handled in three ways: as a relationship established on the ground plane, the relationship created within the communal spaces and the relationship to nature within the individual private gardens.

#### *Designing for adaptability and flexibility*

The adaptability and flexibility is demonstrated in the design and variety of unit types available and their ability to provide urban housing to a wide range of family structures.

#### *Achieving a sense of individuality*

Individuality within the dense environment of this residential development is achieved through unit typology materiality, orientation, façade and garden space barrier color schemes.

### 3.06.1 Density and Concentration

The core of this thesis project is primarily concerned with finding an alternative method of living within a dense urban environment – therefore the density and concentration achieved within the development was an important design factor. The precedent studies were all projects that achieved an alternative way of living within the urban condition – and they all exhibited specific methods of diverging from the status quo approach to urban living. While density comparison studies could be made between this alternative residential development and any of the numerous high-density condominium projects in downtown Toronto – the most relevant and critical comparison to be made is with the neighbouring St. Lawrence Neighbourhood.

As previously mentioned, the St. Lawrence Neighbourhood is the neighbouring development to the north of the site (across the Railway Lands) and it played a key role in the selection of the site. The St. Lawrence neighbourhood is a world renowned development for its high density design and unique approach towards achieving said density. The development provides an example of the ability to provide a high density concentration while avoiding the use of high-rise point towers to achieve its objective. The St. Lawrence development encompasses a site area of 44 acres and provides a total of 3,520 units – units which are provided in a range of housing types and tenures (39% condominium apartments, 30% non-profit co-operatives, 27% non-profit rental and 4% ownership townhomes)(Hulchanski, 1990). Gross density is the number of residential units divided by the acreage of the entire site area, while net density is the number of residential units divided by the acreage of residential land area. The St. Lawrence development accomplishes a gross density of 78 units/acre and a net density of 123 units/acre (Hulchanski, 1990).

The resultant alternative residential development is designed on a site with an area of 5.5 acres. The residential development produces 284 diverse units and the residential land area occupied by the development is only 2.25 acres.

GROSS DENSITY:     284 units / 5.5 acres = 51.6 units/acre ~ 52 units/acre

NET DENSITY:         284 units / 2.25 acres = 126.2 units/acre ~ 126 units/acre

The alternative residential development manages to achieve a comparable level of density to St. Lawrence with a gross density of 52 units/acre and a net density of 126 units/acre – while similarly avoiding high-rise point towers and focusing on a horizontally directed design.

### 3.06.2 Disengaging the Status Quo

The high-rise condominium has become the dominant approach towards fulfilling the influx of new residents that are a resultant of urban densification, and has been deemed the status quo solution to high-density urban living. The high-rise condominium has several flawed key design strategies that the alternative residential development disengages from in order to create a better urban living condition through a more *humane* design. Here are some of the methods of disengagement from the status quo:

*Horizontally focused design instead of vertically focused* – One of the main objectives of this thesis is demonstrating that high-density can be generated without the quintessential high-rise tower. The design of the development is very horizontally focused, a fact best observed in the horizontal circulation patterns throughout the development which sometimes span the entirety of the vast site. The resultant form of the development expresses horizontality in its undulating structures that extend all through the site.

*Rejection of the modernist enclosed corridor* – The corridors of the status quo condition are minimal monotonous spaces designed to building code restrictions and they only serve as access to units. The alternative development of this thesis places great importance on both vertical and horizontal circulation and makes it a goal to create spaces that are multifunctional and pleasant. The modern corridor is replaced by luxuriously wide and open exterior streets in the sky that provide access to dwellings.

*Creation of real opportunities to engage with nature and the elements* – As opposed to the miniscule balconies provided in the status quo approach, the alternative development provides a series of opportunities to reconnect with nature. The project encourages the establishment of such relationships on the ground plane within the natural landscape, in the communal areas designed to be urban gardens and within the dwellings with the private garden spaces.

*Dispersal of amenities* – Instead of clustering all amenities within one or two locations in the development, they are dispersed throughout and in the midst of all the constant horizontal circulation, but primarily at the intersection between the vertical and the horizontal access.

*Creation of an identity through individuality* – The materiality and the formal expression of the diverse residential units, alongside the intruded/extruded architectural mannerism of the development worked together to bring an identity to the residential dwellings.

### 3.06.3 Emphasizing Context

The location of the development is within the East Bayfront area – in its 80 year lifespan the area has been predominantly defined as a heavy and light industrial area filled with factories and oversized surface parking lots. In the past decade massive redevelopment has begun in the East Bayfront Neighbourhood, development which promises to change the nature of this region into an area focused on residential, commercial and educational typologies. While the immediate context of the site does not provide characteristics relevant towards the design of a residential development, the surrounding St. Lawrence Neighbourhood and the Distillery District easily do. These adjacent residential developments are located just north of the site, across the Railway Lands. What can be extrapolated from these neighbourhoods are key attributes that can help in the emphasizing of context – attributes such as desirable scale and architectural expression and materiality.

*Desirable Scale* – The St. Lawrence Neighbourhood and the Distillery District both achieve high density communities, however their different approaches lead to developments which exhibit very different scales. The St. Lawrence Neighbourhood displays the desirable human scale that needs to be reintroduced into the high-density urban environment. The Victory Soya Mills Silos across the Parliament slip also provide a reference scale. The development uses St. Lawrence for scale influence and the Victory Soya Mills Silos as the highest points in the development, purposely choosing to honour and not overpower the historic monument.

*Architectural expression and materiality* – The Distillery District is known for maintaining the historical architectural expression and materiality of the former Gooderham and Worts distillery facilities at the ground plane – but the residential additions to the neighbourhood are in the form of typical curtain wall high-rise towers. The St. Lawrence Neighbourhood was largely completed in the 1980s and exhibits an architectural expression and materiality palette reminiscent of historic inner city neighbourhoods – primarily masonry. The primary materiality of the residential units is a modern terracotta which is reminiscent of masonry construction.

Emphasizing the context is about respecting neighbouring communities and projects and echoing positive traits. However it is also about accentuating the natural elements surrounding and on site. The proximity to the edge of Lake Ontario, the views and opportunities it provides plays a critical role in the orientation and design of the development.



### 3.06.4 Integrating direct outdoor/indoor access

This thesis project attempts to negate the design strategies that influence and form the current high-density residential status quo. One of the strategies that is being challenged in this alternative residential complex is the concept of enclosed access in the form of the modernist corridor. Christopher Alexander is the author of *A Pattern Language* and a well-known architect known for his theories about design – he has referred to the long sterile corridors as a representation of everything bad about modern architecture. Many of the precedents studied attempted to envision and create alternatives to the modern corridor, similarly this complex refutes the status quo corridor and reimagines movement and access in both the vertical and the horizontal planes.

Movement refers to the access of residents and pedestrians onto the site as well as the circulation throughout the complex. The vast site required a cohesive circulation pattern both on the horizontal plane as well as the vertical. The alternative approach towards both the vertical and horizontal circulation integrates direct outdoor/indoor access.

#### *Vertical Circulation*

Vertical circulation cores are distributed evenly throughout the various blocks of the complex [Figure 3-40]. The cores are multifunctional as they provide circulation access through both stairs and elevators, egress access, waste and recycling disposal chutes and are a critical part of the structural system. While the cores are identical in content they vary in elevation throughout the complex according to their location within the fluctuating organic blocks.

The dominant horizontality of the explored residential complex demanded a significant amount of vertical circulation cores – a strong contrast to the minimal vertical core requirement that defines the status quo high-rise developments. This project explores the possibility of a vertical circulation core being more than just a necessary means of vertical transportation within a building. The cores are designed to provide more than just the necessary requirements of the building code – they are meant to act as pivotal points in a community hub and provide space for vertical communal gardens. While the status quo approach to vertical circulation cores is to be closed off and hidden within the building, this project elevates their status by designing open vertical circulation cores which create an outdoor-indoor access relationship and transform the cores into multifunctional spaces.

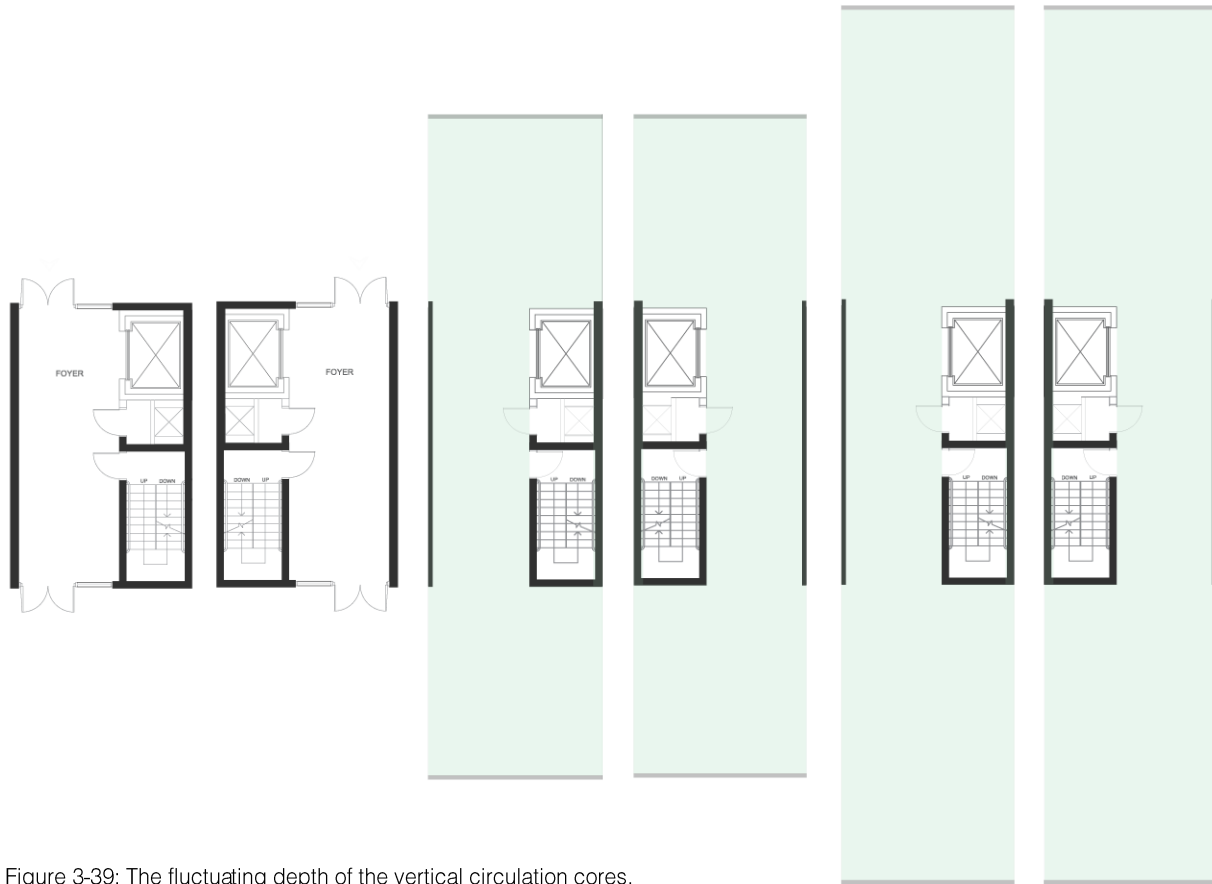


Figure 3-39: The fluctuating depth of the vertical circulation cores.

The vertical circulation cores fluctuate in depth and therefore create different opportunities for communal gardens or communal spaces [Figure 3-39]. As they are designed to be open and exposed, materiality is an issue which was not previously considered for vertical circulation cores. Concrete, wood and glass are the materials working together and attempting to rebrand the notion of the dreary vertical circulation core. The use of wood which has appropriate fire-resistance, such as charred wood, is an architectural design decision that finds a way to extrude a natural material vertically and allow nature to expand upwards.

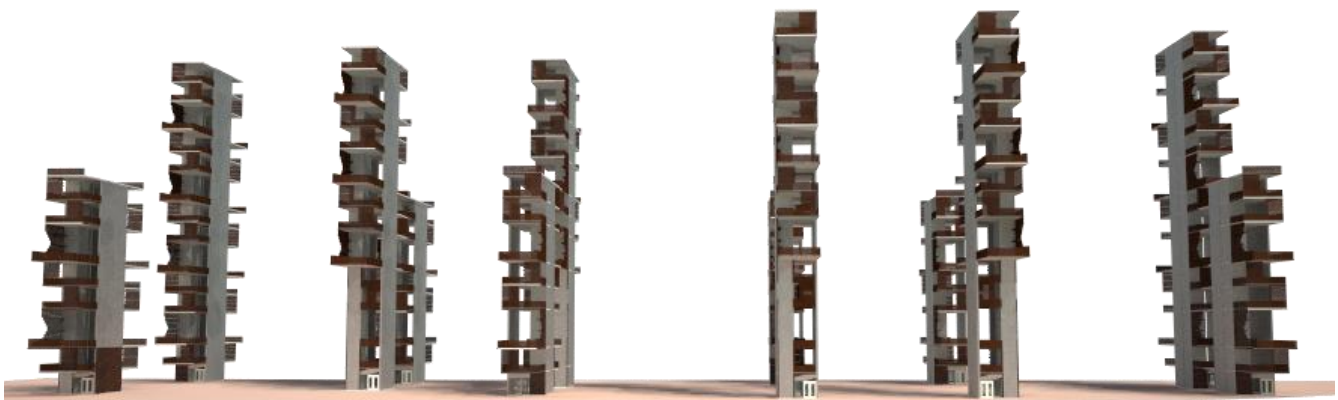


Figure 3-40: Isolated vertical circulation cores on site.

### *Horizontal Circulation*

In a typical high-rise condominium horizontal access to units occurs through an enclosed corridor. This means of access to units presents an indoor-indoor relationship from a space which can be characterized as: narrow, artificially and dimly lit, depressing, potentially dangerous and overall undesirable space. The alternative residential complex derived within this thesis rejects the modern enclosed corridor and attempts to bring back the outdoor-indoor access relationship reminiscent of suburban and rural homes – where one has direct access from outside into their dwelling.

The horizontal circulation occurs only on the northern elevation of each block and manifests itself in the form of an open exterior street [Figure 3-41]. This architectural strategy allows for southern exposure for all the units and the integration of an outdoor-indoor access relationship in a high-density complex. As the horizontal circulation is not enclosed within a corridor there are also openings on the northern exposure. The primary reasoning for the northern openings is closely correlated with the unit layouts and the desire to encourage a rural style community engagement – another design strategy blatantly missing from status quo developments. The exterior access streets follow the organic arrangement of the units and therefore have an extruded and intruded formal quality. Each floor of the various blocks partakes in movement, which means that there are areas of the exterior access streets which are covered and areas which are entirely exposed to the elements. The opportunity for immediate interaction with the elements that is provided for the residents of the complex is another resonant rural quality manifesting in an urban project.



Figure 3-41: Horizontal circulation – open exterior street.

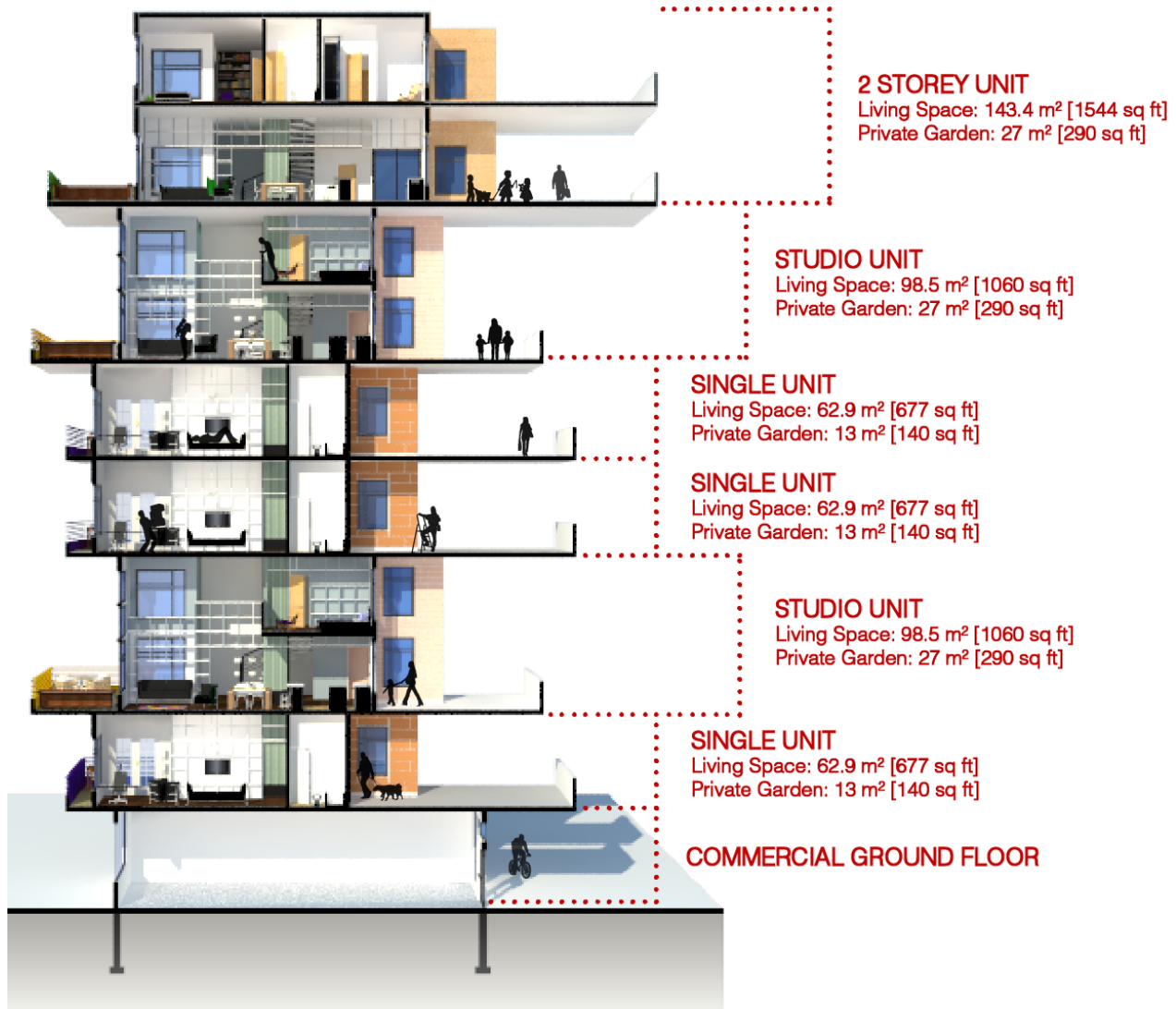


Figure 3-42: Transverse Section through units – clearly identifying the variety, alignment and the northern open exterior streets.

The preceding transverse section provides greater understanding of the extruded and intruded formal quality of the exterior access streets within the complexes [Figure 3-42]. The vertical alignment of the various units is greatly guided by the centralized hearth – this alignment of the differently sized units creates a horizontal circulation that fluctuates throughout the structures. The open exterior streets are luxuriously wide (varying between 3 to 7 meters) and alter between being covered and entirely open to the elements. The desired immediate access between the dweller and the exterior environment is re-established when using exposed horizontal circulation as the means of access for the residents.

The vertical and horizontal circulation systems within this alternative residential development are in strong juxtaposition to the current status quo approach – they are open, exposed, comfortable and make these space more than just the fundamental needs they provide.



### 3.06.5 Re-establishing a connection to nature

The iterative process of design deemed the design element of re-establishing the relationship between the urban dweller and nature to become more prominent and central to the design. While nature dominates the rural landscape, it is a scarce and highly demanded commodity in the urban setting. As urban cores densify the need for nature and the relief it represents in a high density environment is stronger than ever. The question of “*How does one bring nature (more nature) into the urban environment?*” became central in the design process.

“Nature is no longer natural; on the contrary, to survive, nature will need to artificially constructed, man-made and mass produced. Landscape architecture interacts in a complex continuum between man and nature, town and country, land and architecture.”  
- Eelco Hooftman in *Design against Nature*

In the article *Design against Nature* published in the Harvard Design Magazine, Eelco Hooftman argues that in order for nature to survive, it must be designed, constructed and mass produced by man. Within this alternative residential complex the concept of allowing nature to manifest in an unconventional manner within the urban residential development was pursued.

The manifestation of nature within this development can be characterized into three categories: the ground plane (public), the communal spaces (semi-public) and the individual garden spaces (semi-private). The manner in which nature naturally occurs or is encouraged to develop varies throughout the categories.

#### *The Ground Plane*

The fact that the three structures leave their mark lightly on the ground allows for the ground plane to be purposed towards public open spaces and for natural landscape to dominate. The vastness of the site demanded for the design of the landscape to bring order to the space – an order that was achieved by focusing the landscape design towards establishing a journey through the ground plane [Figure 3-43] [Figure 3-44]. Inspiration for the landscape design and landscape elements came from wanting to exhibit the classical elements that define and mould the natural environment – fire, air, water, earth. The elements were distributed throughout the site according to their cardinal designations. Within the vast site pivotal entrance points were identified and became beacons representing the classical elements. Fire, air, water and earth are exhibited in the sculptural landscape features which create the journey through the site and provide guidance through the ground plane. The form of the structures also creates a separation of public, semi-public and semi-private spaces on the ground plane that are further defined by

the varying degrees of vegetation [Figure 3-45]. While the landscape was designed with several key markers and entrance points, there are a multitude of pedestrian circulation paths through the site which highlights the porosity and openness of the residential complex to the surrounding community [Figure 3-46].



Figure 3-43: South view identifying pivotal points within the landscape.

1. [EAST] Landscape featuring natural materials (charred wood) and water.
2. [SOUTH-EAST] Sculptural piece featuring charred wood and earth.
3. [NORTH] Sculptural wind chimes.
4. [SOUTH-WEST] Sculptural piece featuring earth and water.
5. [WEST] Sculptural piece featuring water.



Figure 3-44: Site Plan identifying pivotal points within the landscape.

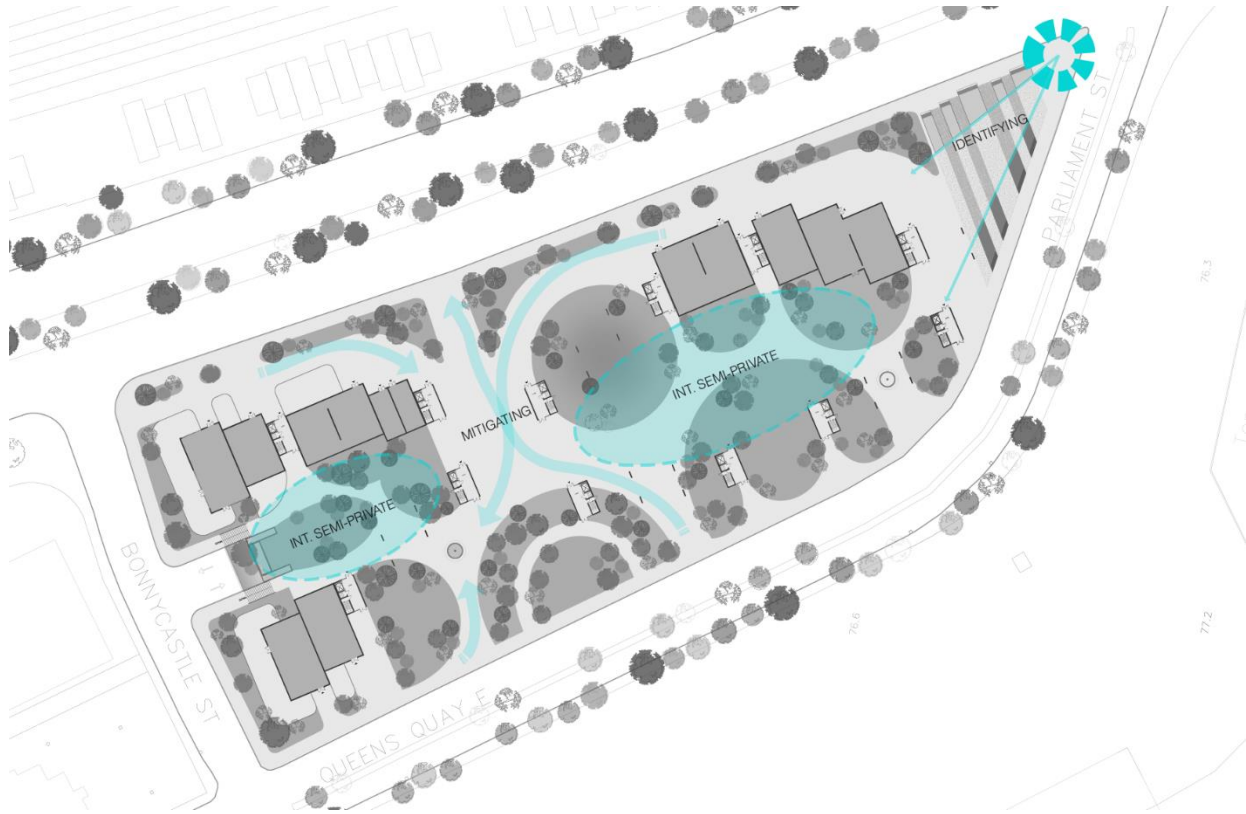


Figure 3-45: Site Plan identifying space distribution on the ground plane.

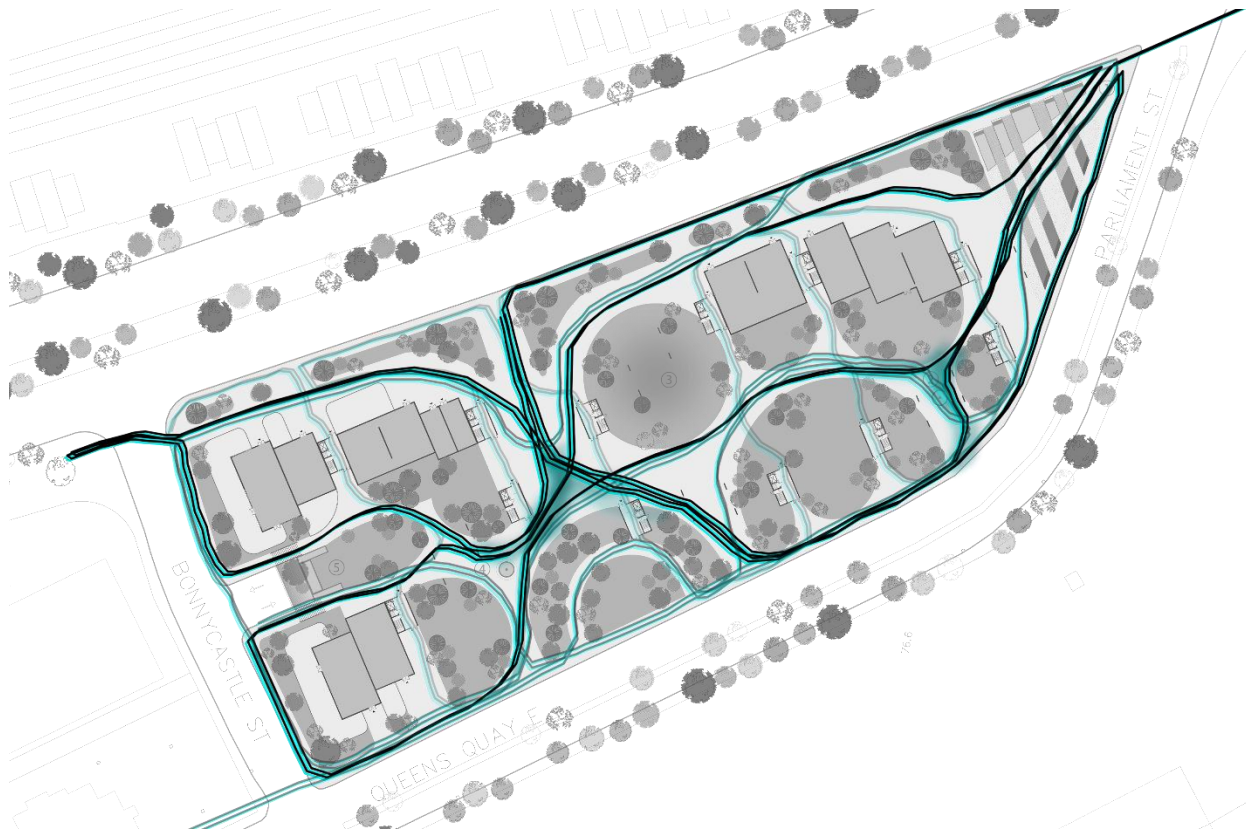


Figure 3-46: Site Plan representing pedestrian circulation patterns through the site.

### *The Communal Spaces*

There are 27 communal spaces distributed throughout the three structures that make up this residential development. These spaces are located adjacent to the vertical circulation cores and the resulting duos or trios of spaces that are created act as community hubs on various levels. These spaces are characterized by their size, extruded form and the geometric lattice structure that allows for maximum sunlight penetration. The vertical circulation cores and the communal spaces share apart from openness, their materiality – the use of charred fire-resistant wood is another way to bring a natural element (albeit properly prepared) into urbanity. The communal spaces are designed to be freeform in order to allow each neighbourhood to purpose the spaces for their greatest needs – be it a community garden, a communal children's play space, a communal terrace, a community meeting space, etc.

These communal spaces were a primary way of encouraging nature to interrupt the dense urban environment. A principal envisioned use for the communal spaces was to turn them into community gardens – a space where the community can come together and benefit as a whole from the work they put in. Some of the communal spaces are more ideal than others to act as community gardens due to their location within the complexes and their access to desired sunlight. These urban gardens would come to life through the use of tiered planting systems and wall planting systems and would have the ability to produce herbs, small vegetables, berries and flowers [Figure 3-47]. A community garden benefits the community not only through the goods it provides but also through the social connectivity and community building it delivers.

The relationship with nature that is established with the dweller in these semi-public community garden spaces is very different from the typical relationship with nature that occurs in the natural environment. However dense urban environments are in need of reliefs such as these small urban garden spaces that allow one to reconnect with nature through an activity such as gardening [Figure 3-48].



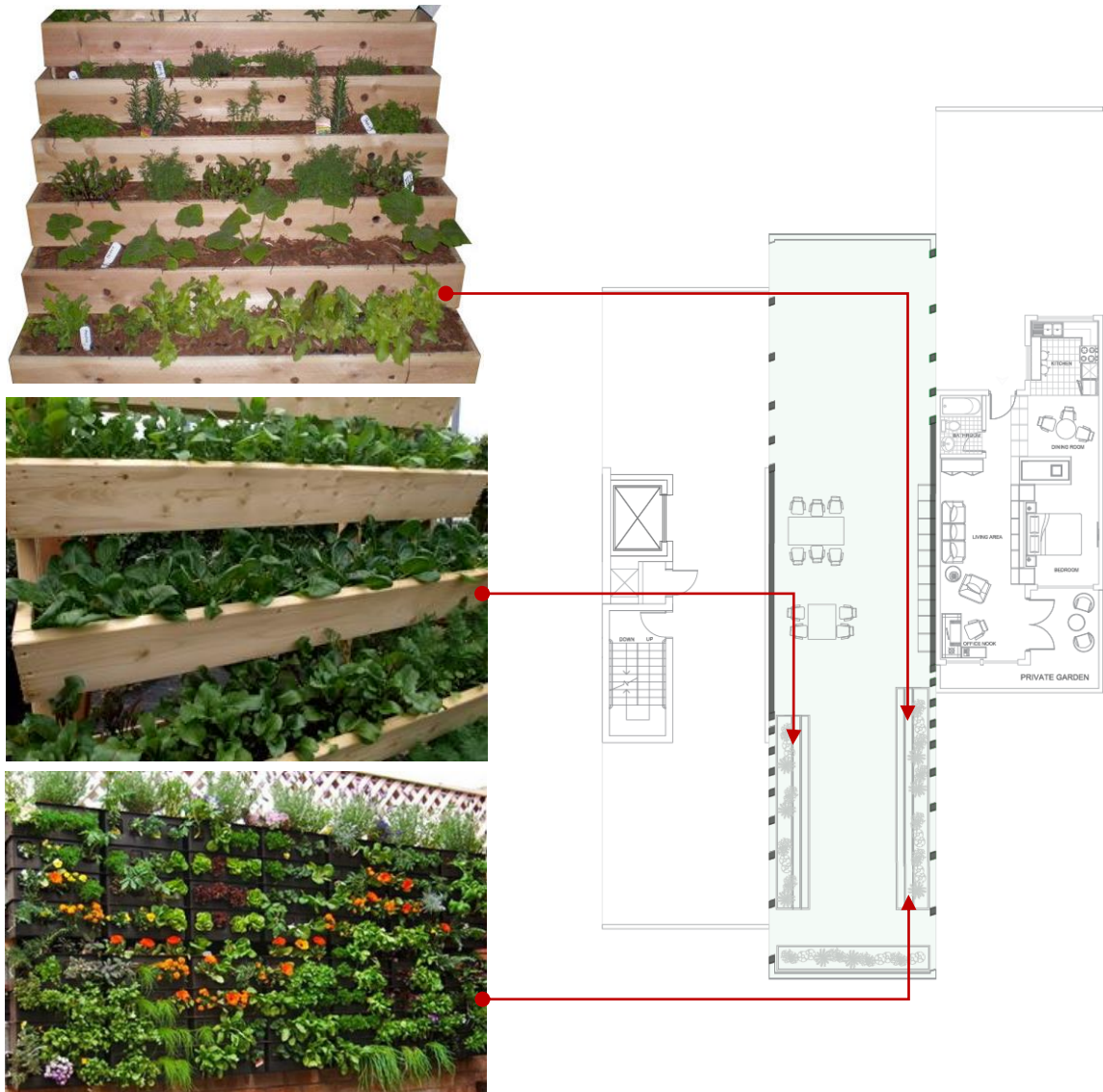


Figure 3-47: Tiered Planting Systems and Wall Planting Systems imagined for the communal spaces / communal gardens.



Figure 3-48: Relationship between community space, units and circulation.

### *The Private Gardens*

The private garden is a critical element within each of the residential units – it is also further discussed within each typology. This individual garden is the final and private relationship that is re-established between the dweller and nature [Figure 3-49]. These outdoor spaces attempt to maximize the contrast between what an outdoor space in the current residential status quo is and what it has the potential to be. The private gardens provide ample space with the smallest being 13m<sup>2</sup> and the largest 27m<sup>2</sup>. These outdoor spaces are designed to provide enough space for a small family garden of herbs, flowers and small vegetables and luxurious space for a family to dine and relax outdoors. The concept of being able to pick herbs and vegetables from your own garden to use for dinner is one that has been absent in the urban living environment and is a crucial step in re-establishing the individual's relationship to nature.



Figure 3-49: Private Garden Space in a Studio Unit. [Plan and perspective respectively]

### 3.06.6 Designing for adaptability and flexibility

The alternative high-density residential complex that has emerged from this thesis attempts to oppose the reality of the status quo design strategies. In the case of adaptability and flexibility of dwellings, the past two decades has witnessed a continuous decrease in condominium sizes and even the elimination of larger size dwellings, such as three-bedroom apartments. The way that the design of condominium apartments has evolved has led to the current state of affairs – where high-rise residential living is not family friendly and targeting a very specific market as opposed to providing dwellings for as wide a variety of people as possible. The modern family structure is a constantly evolving factor which had to part of the design process, and can be observed in the ability of the residential complex to adapt and provide urban living for any type of family. The need for adaptability is even greater in a multicultural city such as Toronto, where the definition of family varies from culture to culture. The complex aims to allow families of any size to find the unit or units which best suit their situation. The way in which the units interlock provides an opportunity for extended families to potentially join units together while maintaining individual access.

The complex provides a variety of four different units, which in turn are available in various orientations and manipulations according to their location within the blocks. The units consist of *Single Unit*, *Studio Unit*, *2 Storey Unit* and *Studio Plus Unit*.

While the units present different internal and external configurations they also share several unifying elements. The dimensioning of the units follows the overall  $\sqrt{5}$  geometry both in plan and elevation. The units are a sheared form, a strategy which is critical in the movement and formal expression of the X and Y backbone blocks. The shear/offset that occurs within each unit creates more glazing surfaces, an initial interior space separation and a specific orientation. Another unifying factor is the consistent private gardens which accompany each unit – however their sizes varies between 13 m<sup>2</sup>, 27 m<sup>2</sup> and 42.8 m<sup>2</sup>. All the units are accessed through an entrance on the intruded north façade and share a flexible and open ground floor design. A unifying element brought into this urban project from the rural and suburban dwelling is the notion of *the hearth*, a centralized fireplace. *The hearth* acts as more than just a central element within each unit, it also plays a critical part in the vertical alignment of units and the necessary systems.

## Single Unit

The Single Unit is the smallest residential dwelling within the complex with a GFA (Gross Floor Area) of 62.9 m<sup>2</sup> (677 sq ft) and a private garden that is an additional 13 m<sup>2</sup> (140 sq ft). This one bedroom dwelling is ideal for a single resident or a couple, with a maximum capacity of a young family of three. The unit is available as typical (including stairs) and as accessible (excluding stairs) [Figure 3-50] [Figure 3-51].

*Kitchen* – The kitchen is located on the northern exposure within the extruded portion of the sheared form. This location allows for glazing on two walls (north and east / north and west) and is a critical part in promoting community life and involvement. This design strategy allows for residents to easily connect with neighbours as they are leaving or returning home.

*Dining Room* – The dining room is immediately adjacent to the kitchen and is separated from the bedroom by the hearth, which also provides the ambiance for the space.

*Bedroom* – The bedroom is tight and efficient. It is entered from the north and it also has the benefit of the hearth. The bed is set into the division wall with the living room which acts as a continuous storage separator and extends along the entire centre. The bedroom also benefits from southern glazing and views onto the private garden.

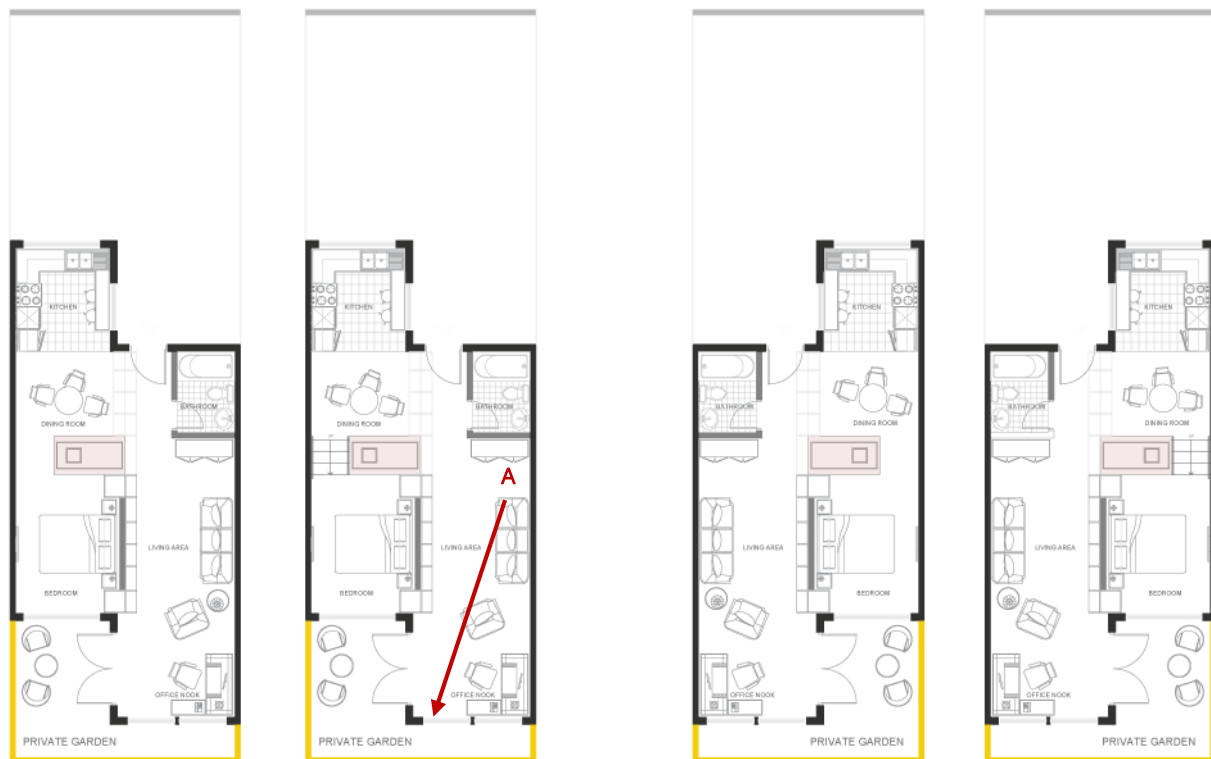


Figure 3-50: Single Unit Plans. Typical and accessible units in both orientations.



*Living Area* – The living area extends from the southern extrusion to the northern entrance. The centralized and dividing storage wall is a key feature which can act as a bookcase, an entertainment centre, simple storage, etc. The area is open and flexible and can be arranged to incorporate a small office nook or play area. The access to the private garden is from the living area [Figure 3-53].

*Bathroom* – There is one full bathroom in this dwelling – it includes a lavatory, sink and shower/tub combo – and it is located immediately adjacent to the entrance on the intruded northern exposure.

*Private Garden* – The private garden for the single unit is the smallest in the complex, however it is still larger than any private outdoor space provided in a typical high-rise condominium development. The space allows for a small herb or flower garden and a space to dine or relax outside.



Figure 3-51: Isolated Single Unit perspective.



Figure 3-52: NBK Architectural Terracotta TERRART@-LARGE



Figure 3-53: Interior Render within Single Unit. [A]

## Studio Unit

The Studio Unit is the next residential dwelling within the complex with a GFA of 98.5 m<sup>2</sup> (1060 sq ft) spread over ground floor and a mezzanine and a private garden that is an additional 27 m<sup>2</sup> (290 sq ft). This two bedroom + den dwelling is ideal for a young family of three, with a maximum capacity of a family of four, as the ground floor den could be used as small bedroom [Figure 3-54] [Figure 3-55].

*Kitchen* – The kitchen is located on the northern exposure within the intruded portion of the sheared form and immediately adjacent to the entrance. Within this unit the kitchen, dining room and living area unfold in a linear manner from north to south. The northern glazing of the kitchen still allows for residents to easily connect with neighbours.

*Dining Room* – The dining room is continuous to the kitchen, with the hearth laterally adjacent providing the ambiance for the space and creating separation from the staircase.

*Living Area* – The living area extends from the dining room to the southern extrusion. The centralized and dividing storage wall is a key feature within the Studio Unit also, as it can act as a bookcase, an entertainment centre, simple storage, etc. The access to the private garden is from the intruded portion of the living area [Figure 3-57] [Figure 3-60].

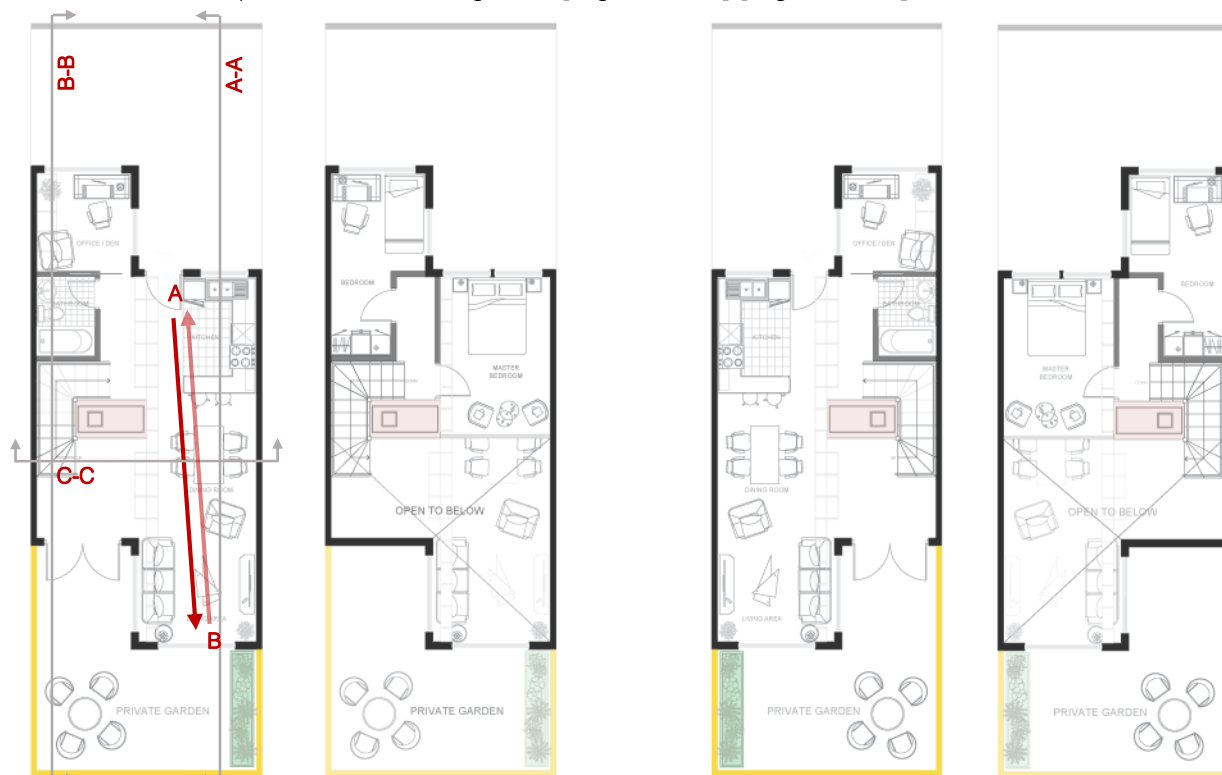


Figure 3-54: Studio Unit Plans. Ground Floor and Mezzanine Floor respectively.

*Bedrooms* – The bedrooms are located on the mezzanine floor of the Studio Unit. The master bedroom overlooks into the living area below and receives both northern and southern light. The master also takes advantage of the centralized storage wall which extends onto the mezzanine floor. The second bedroom is tight but efficient and features glazing either on the north and east or north and west.

*Den/Office* – The den is located on the northern exposure within the extruded portion of the sheared form. The den is tight, receives double exposure and provides a good working space.

*Bathroom* – There is one full bathroom in the Studio Unit – it includes a lavatory, sink and shower/tub combo – and it is located adjacent to the entrance on the ground floor.

*Private Garden* – The private garden for the Studio Unit is the average size for the complex. The space allows for a small family garden and luxurious space to dine or relax outside.

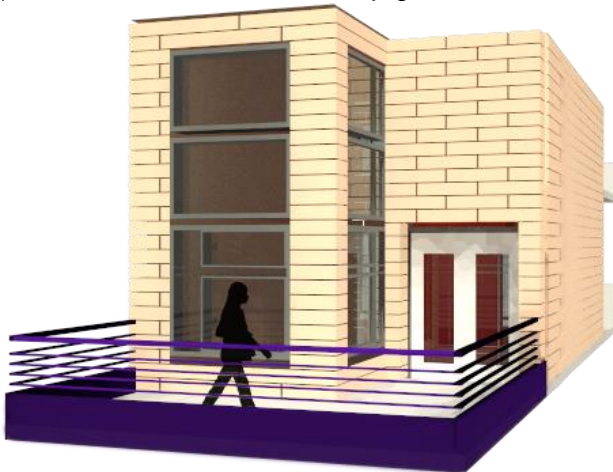


Figure 3-55: Isolated Studio Unit perspective.



Figure 3-56: NBK Architectural Terracotta TERRART®-MID



Figure 3-57: Interior Render within Studio Unit. [A]



The Studio Unit is defined by its open concept (both horizontally and vertically) and the double-height living space that is resultant in this interior space arrangement . The subsequent sections provide a better understanding of the open, light-filled and harmonious space that is created in this small unit through the use of a mezzanine floor [Figure 3-58] [Figure 3-59] [Figure 3-61].

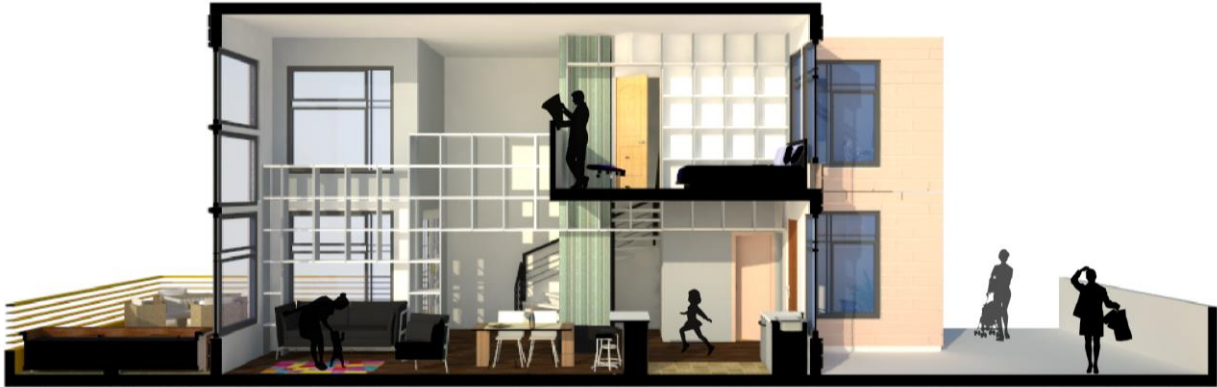


Figure 3-58: Sectional Render within Studio Unit. [A-A]



Figure 3-59: Sectional Render within Studio Unit. [B-B]



Figure 3-60: Interior Render within Studio Unit. [B]



Figure 3-61: Sectional Render. [C-C]



## 2 Storey Unit

The 2 Storey Unit is the largest residential dwelling within the complex with a GFA of 143.4 m<sup>2</sup> (1544 sq ft) spread over two floors and a private garden that is an additional 27 m<sup>2</sup> (290 sq ft). This three bedroom + den dwelling is ideal for a family of four, with a maximum capacity of a family of five, as the ground floor den could be transformed into a bedroom if necessary [Figure 3-62] [Figure 3-63].

*Kitchen* – The kitchen is located on the northern exposure within the intruded portion of the sheared form and immediately adjacent to the entrance. Similarly to the Studio Unit, the kitchen, dining room and living area unfold in a linear manner from north to south. The northern glazing of the kitchen still allows for residents to easily connect with neighbours.

*Dining Room* – The dining room is more spacious than within other units and is continuous to the kitchen, with the hearth laterally adjacent providing the ambiance for the space and creating separation from the staircase.

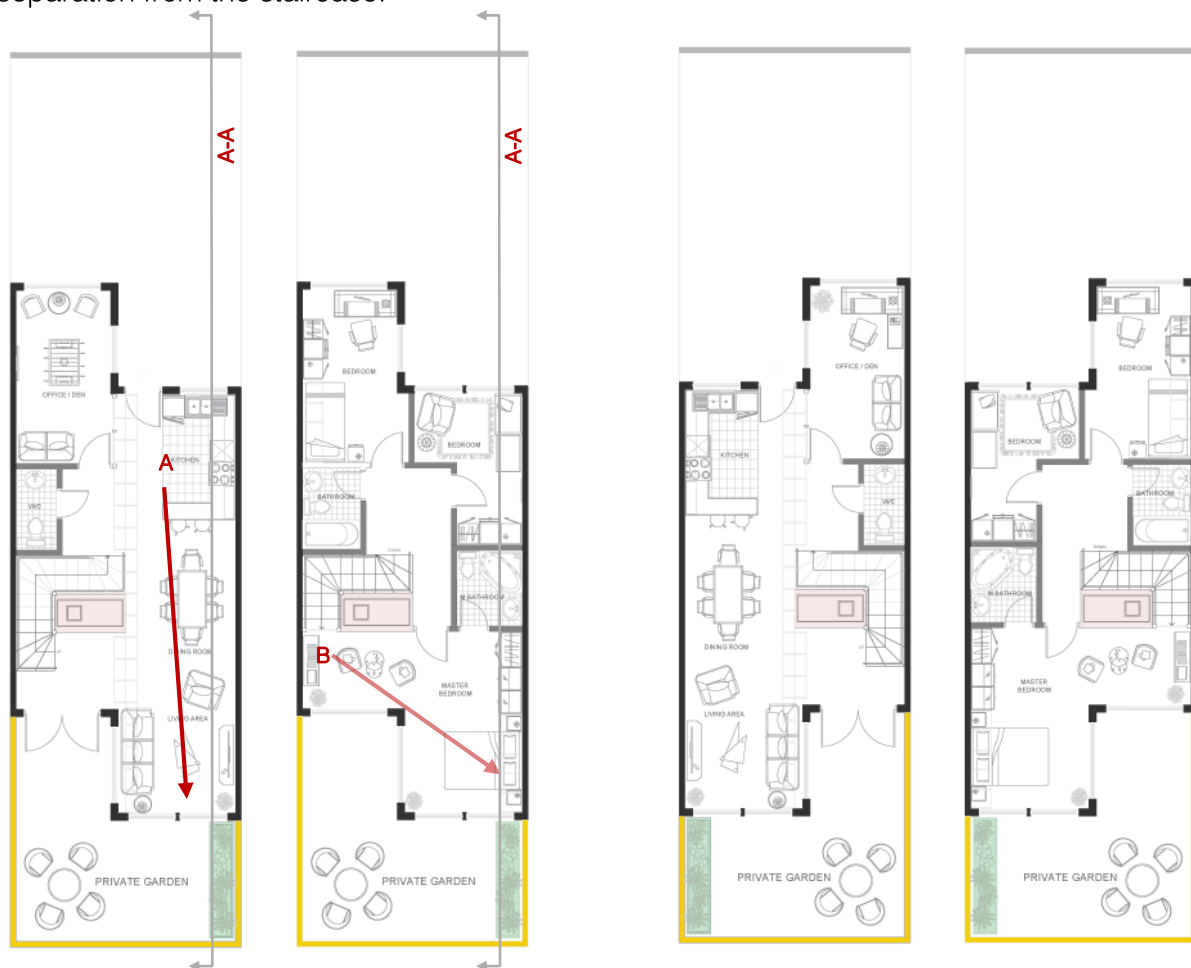


Figure 3-62: 2 Storey Unit Plans. Ground Floor and Second Floor respectively.

*Living Area* – The living area extends from the dining room to the southern extrusion. The centralized and dividing storage wall is a key feature within all the units, as it can act as a bookcase, an entertainment centre, simple storage, etc. The access to the private garden is from the intruded portion of the living area [Figure 3-65] [Figure 3-66].

*Bedrooms* – The bedrooms are located on the second floor of the 2 Storey Unit. The master bedroom is large and luxurious, receives the southern exposure, has the benefits/ambiance of the hearth, and an ensuite bathroom. The other two bedrooms are designed as tight and efficient and obtain as much daylight as possible from the northern exposure [Figure 3-67].

*Den/Office* – The den is located on the northern exposure within the extruded portion of the sheared form. The den receives double exposure and provides a good working space or even an ideal playroom/game room.

*Bathrooms* – The 2 Storey Unit includes two full bathrooms and one powder room. The powder room is on the ground floor between the den and the staircase, while the two full bathrooms are on the second floor where the bedrooms reside.

*Private Garden* – The private garden for the 2 Storey Unit is the average size for the complex – 27 m<sup>2</sup>. The space allows for small family garden and luxurious space to dine or relax outside.



Figure 3-63: Isolated 2 Storey Unit perspective.



Figure 3-64: NBK Architectural Terracotta  
TERRART®-BAGUETTE



Figure 3-65: Sectional Render within 2 Storey Unit. [A-A]



Figure 3-66: Interior Render within first floor of the 2 Storey Unit. [A]



Figure 3-67: Interior Render within Master Bedroom of the 2 Storey Unit. [B]

### *Studio Plus Unit*

The Studio Plus Unit is the second largest residential dwelling within the complex with a GFA of 142.6 m<sup>2</sup> (1535 sq ft) spread over two floors and two private gardens that are an additional 42.8 m<sup>2</sup> (460 sq ft) cumulatively [Figure 3-68 to Figure 3-73]. This three bedroom + den dwelling is ideal for a family of four, with a maximum capacity of a family of five. There is more variety within this dwelling unit type as the location of the hearth and the orientation of the unit both affect the interior arrangement of the spaces.

*Kitchen*– The kitchen is sometimes located on the northern exposure within the extruded portion of the sheared form and sometimes located within the intruded portion. This location allows for glazing on two walls (north and east / north and west) and is a critical part in promoting community life and involvement. This design strategy allows for residents to easily connect with neighbours as they are leaving or returning home.

*Dining Room*– The dining room is similarly spacious to the 2 Storey Unit and is continuous to the kitchen, with the hearth laterally adjacent providing the ambiance for the space and creating separation from the staircase.



Figure 3-68: Studio Plus Unit Plans. Ground Floor and Second Floor respectively.



*Living Area* – The living area sometimes extends from the dining room to the southern extrusion and sometimes extends diagonally from the dining room. The centralized and dividing storage wall is a key feature within all the units, as it can act as a bookcase, an entertainment centre, simple storage, etc. The access to the private garden varies from the intruded portion and the extruded portion of the living area.

*Bedrooms* – The bedrooms are located on the mezzanine and the adjacent second floor. The bedrooms vary in size and location depending on the orientation of the unit, as well as the unit beneath the second floor of the Studio Plus Unit. All the bedrooms surpass the minimum size requirements and attempt to take advantage of their various exposures.



Figure 3-69: Isolated Studio Plus Unit.



Figure 3-70: Studio Plus Unit Plans. Ground Floor and Second Floor respectively.



Figure 3-71: NBK Architectural Terracotta TERRART®-MID

*Den* – The den is located on the mezzanine overlooking the living area and within all the bedrooms. It acts as a communal space and could be used as a game room, play area or an open office.

*Bathrooms* – The Studio Plus Unit includes two full bathrooms, one on each floor. The bathroom on the ground floor is located close to the entrance, while the upstairs bathroom is tucked away at the end of the corridor.

*Private Garden* – The private garden for the Studio Plus Unit is actually composed to two outdoor spaces. The larger of the spaces is the typical 27 m<sup>2</sup> private garden on the ground floor of the unit, the secondary outdoor space is 15.8 m<sup>2</sup> and is accessed by two of the bedrooms. The spaces allow for small family garden and luxurious space to dine or relax outside.

The alignment of the diverse units occurs flawlessly due to the alignment of the mechanical vertical shafts and the centralized fireplace (hearth) – exhaust occurs on the north elevation [Figure 3-72].

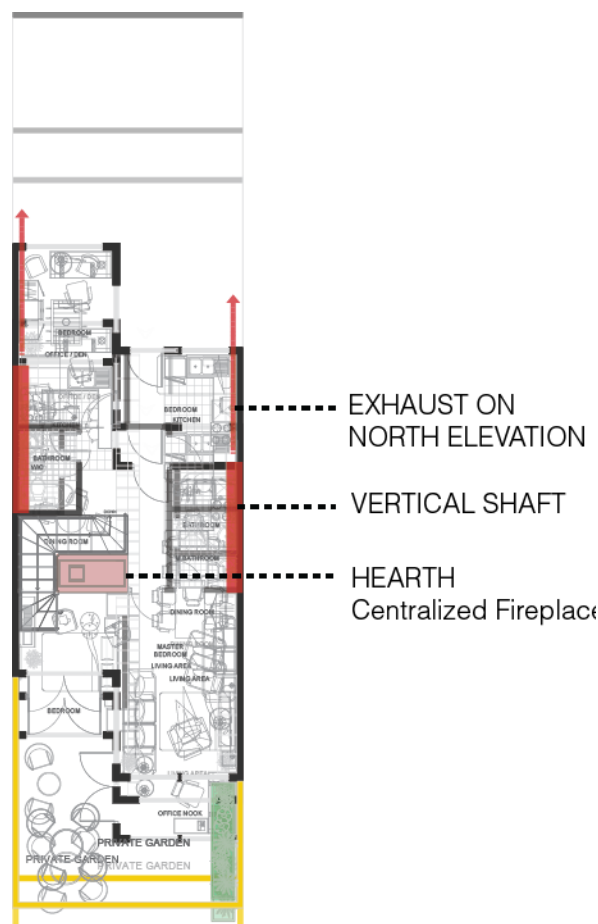


Figure 3-72: Systems Alignment.



Figure 3-73: Studio Plus Unit. Ground Floor and Second Floor.

### MODULAR STORAGE / SPACE SEPARATION UNIT

Each unit is equipped with linear modular storage that also acts as a space separation system. This system provides needed storage and greatly contributes to the keeping of units as small and efficient as possible.

### NORTHERN ENTRANCE

The entrance to all the units in the complex occurs on the less desirable northern exposure. The entrance into units is from an exterior raised street as opposed to an enclosed hallway. These access streets are wide, primarily have kitchens and offices looking out onto them and welcome neighbourly mingling and socializing.

### HEARTH

A critical alignment element within all the units is the heart of the home - the hearth. This modern fireplace is centralized and prominent within the living spaces. In the Single Unit the hearth is a part of the dining area, living area and the bedroom. In the Studio and 2 Storey Units it is aligned with the dining area and has a close relationship with the vertical circulation. Within all the units it enhances the place of gathering and brings an element only found within the suburban/rural realm into the urban.

### SOUTHERN EXPOSURE

Southern exposure (as well as south-eastern and south-western) is the predominant way of allowing sunlight to penetrate within the units.

### PRIVATE GARDEN

The majority of the private outdoor spaces of the units are 27 m<sup>2</sup>, with the single units at 13 m<sup>2</sup>. This space is luxurious for an urban setting and allows for the possibility of cultivating a small herb or flower garden.

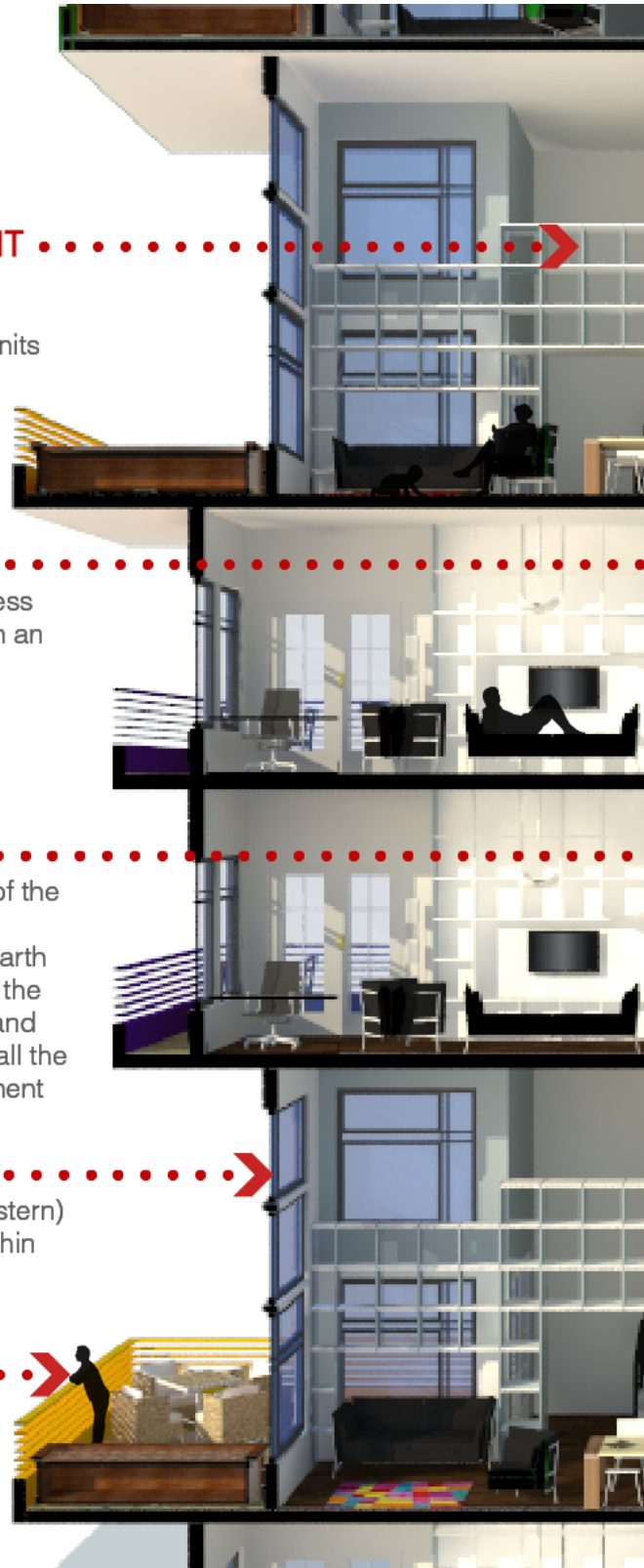
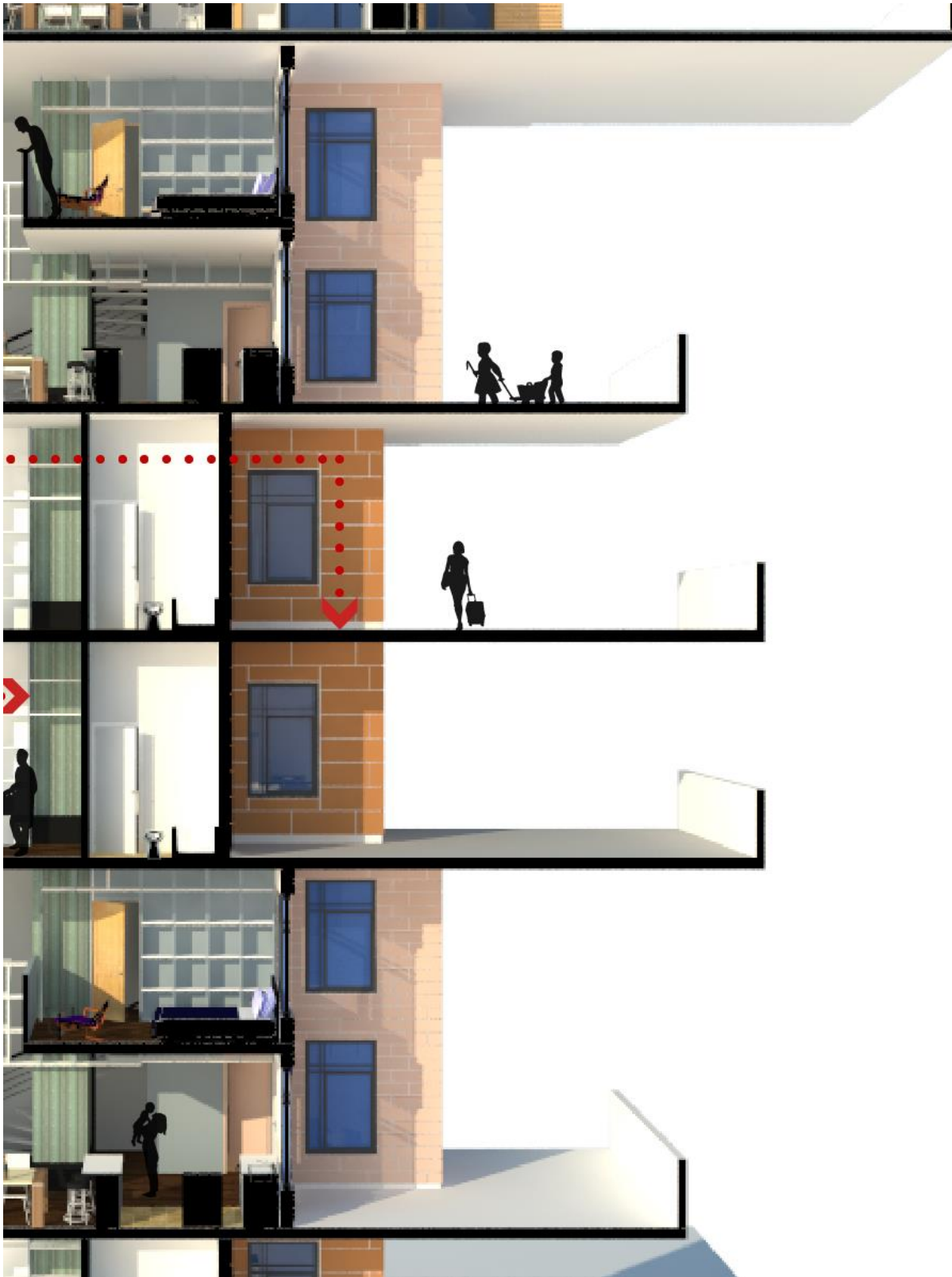


Figure 3-74: The DNA of units, highlighting the common attributes that define the diverse unit typologies.





### 3.06.7 Achieving a sense of individuality

A critical design strategy that the alternative high-density residential complex is attempting to refute is the loss of identity and individuality which occurs in the status quo high-rise condominiums. Identity is lost both internally and externally in the case of the modern day high-rise condominium. The internal identity loss is caused by the shoebox design of units and the identical access into dwellings from the narrow and enclosed modernist corridor. The external identity loss is primarily due to the monotony brought on by the typical materiality of condominiums, glass and steel – the common envelope being a curtain wall. The high-rise curtain wall residential towers that have become the status quo over the past decade don't allow for a resident to externally identify their home or achieve any sense of individuality from their dwelling. In order to bring back a sense of identity and individuality within a dense urban configuration, materiality became a critical strategy used in the resultant residential complex.

The materials at work within the intricate complex include concrete, steel, glass, wood and terrart. In comparison to the exclusively steel and glass status quo condominiums, the amount of glazing is conservative as curtain wall envelopes are avoided in the residential portion of the complex. As a way of incorporating and evoking the essence of rural dwellings, the primary façade materials are terrart (terracotta components) and wood – materials echoing the masonry and wood construction typical of low-rise residential dwellings.

NBK Architectural Terracotta, more specifically the TERRART® ventilated curtain wall / rainscreen system is the main façade material for the residential portion of the complex. This material was chosen because of its reminiscence to masonry, its physical abilities as an envelope systems and the wide variety of systems and colors available. The large, mid and baguette systems were selected for the project and assigned to the different unit typologies. The Single Units use the TERRART®-LARGE where the system is composed of large-format elements with a width of 400 mm. The Studio Units and Studio Plus Units use the TERRART®-MID where the system is made up of medium-format ceramic elements with a width of 200 mm. The 2 Storey Units use the TERRART®-BAGUETTE, for which the panel system is composed of ceramic pipes with a cross section of 50 x 50 mm. The variation that this envelope system offers is the first step in achieving a sense of identity – residents would be able to identify their type of dwelling according to the respective façades. Furthermore, the TERRART® systems have the ability to

produce any colour and surface texture, allowing for the notion of individuality to be further explored.

Two color schemes were used in the project in order to add to the identity of the units and to enhance the formal movement quality of the complexes – one scheme is for the façades and the other is for the garden space barriers. The colors selected for the TERRART® façades are reminiscent of masonry construction and are three shades of beige (dark, medium, light) [Figure 3-75]. The distribution of the units in the various shades available occurs in a manner that allows for horizontal neighbourhoods to form throughout the different complexes. The vertical sequencing of the horizontal neighbourhoods ensues from the light TERRART® façades, to the medium TERRART® façades and finally the darkest of the beige TERRART® façades. All the façades are represented throughout the complexes – even within the vertical displacement and detachment of the complexes from the ground plane, the neighbourhoods are continuously embodied throughout [Figure 3-76].

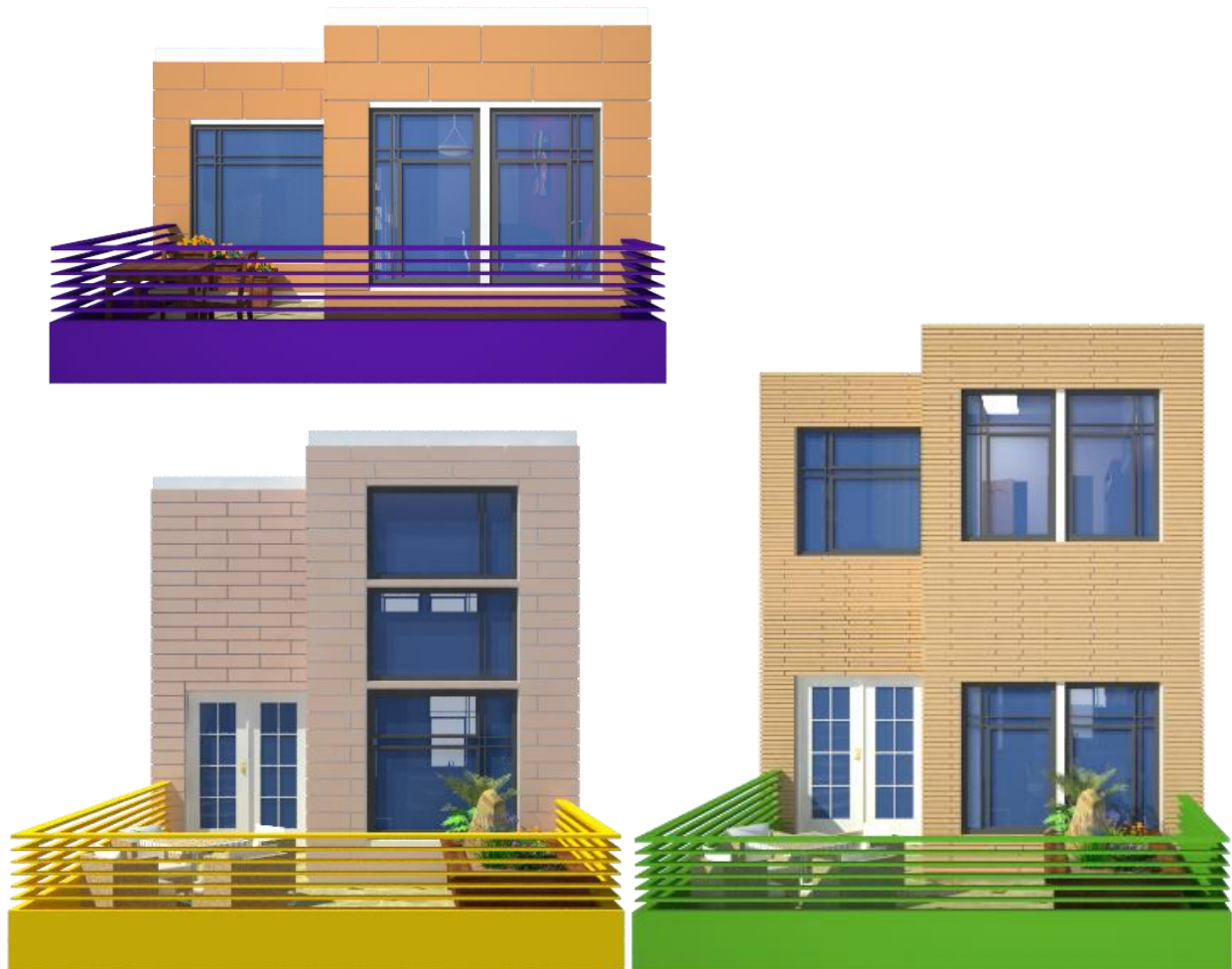


Figure 3-75: The shades of TERRART® façades expressed within the Single Unit, the Studio Unit and the 2 Storey Unit.

The second color scheme within the project is the one for the garden space barriers and is entirely interrelated to the TERRART® façades color scheme. Each of the TERRART® façade neutral shades is paired with a bright counterpart in their minimal garden space barrier.

TERRART® façade LIGHT → Vivid Violet

TERRART® façade MEDIUM → Blooming Green

TERRART® façade DARK → Bright Yellow

The relationship created between the façades and the garden space barriers can be easily observed in the elevations. As the neighbourhoods flow with the organic movement of the complexes, the color schemes of the materials are a primary vessel for bringing individuality, identity and life into this dense environment.

Individuality and identity is achieved through design strategies such as: unit typology / unit typology materiality, orientation, façade color scheme and garden space barrier color scheme. The 284 units present a multitude of resultant combinations depending on the location (both vertical and horizontal) of the dwelling within the complexes.



Figure 3-76: The shades of TERRART® façades and complementing garden spaces expressing horizontal neighbourhoods.

### 3.07 Conclusion

The goal of this thesis was to explore an alternative high-density residential solution for the future by studying, identifying and incorporating the desirable qualities extrapolated from the rural, suburban and urban conditions. The resultant design project has attempted to include the acknowledged desirable characteristics in an urban high-density residential development that exhibits a more *humane* design approach than the existing status quo.

The design elements included in the development are attributes that have been absent in the urban living condition and whose addition can improve the overall quality of life. The integration of direct outdoor/indoor access to one's dwelling is a concept omitted in current high-density residential developments, but was incorporated into this alternative development through the use of open exterior streets in the sky. The feeble relationship between the urban dweller and nature is established and supported in multiples states – the public ground plane, the communal gardens and the private garden spaces. The dwelling units are provide diversity and achieve a level of individuality through form and materiality that is uncommon in high-density residential developments.

As a test case, this design shows a direction towards achieving high-density with the integration of the desirable design elements identified through the research process. The ultimate intent of this proposed alternative high-density residential development has been to explore a *humane* approach to design in the urban condition.



Figure 3-77: View of physical model.



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