

Adaptive Balconies:

An Open Design System for Housing Tower Renewal at 545-565 Sherbourne Street, Toronto

by

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I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including my required final revisions, as accepted by my examiners.

I understand that my thesis may be electronically available to the public.

ABSTRACT

This investigation is based on the renovation and reconsideration of residential tower neighbourhoods, and speculates an open design system as an alternative to current practices prevalent across the city of Toronto. The thesis imagines the future of dense built environments as a mediation between planning and emergence, and speculates a design system that can be adaptable and responsive to the needs of individual units.

The design research is focused on the balcony—defined as the extended threshold of each individual unit—within the context of urban residential neighbourhoods. Specifically, the balconies of the 1970s and 2010 rental housing development at 545-565 Sherbourne Street in Toronto and their occupancy are studied. In addition, the varying demographics, living conditions and informal programs within the site are explored. In this study, the importance of the balcony is highlighted as a platform for participation of the individual within the urban collective, and the relevance of a flexible exterior space is presented. The studies in this research position a need for attending to the significant role of the balcony in shaping urban form, for a reconsideration of its detachment to interior spaces and for addressing its rigidity in responding to the demanding needs of the units.

In order to position the design investigation, the idea of a small-scale and collaborative design strategy is studied through the analysis of informal cities and structures. Instances of un-intended informality formed through time in residential contexts—Ramot Housing in Jerusalem—and intended platforms for informality—such as the Quinta Monroy housing in Chile—are studied amongst others. The potentials of vertical connectivity and communication, between expanded and connected exterior spaces of residential towers, are also investigated through a series of case studies.

Within the design synthesis, strategies are proposed that will primarily address the structural and energy requirements of the balconies under study. These are accompanied by strategies that will serve as the infrastructure for forming adaptive balconies. Secondly, the design proposal introduces structural modules for incremental expansions of exterior spaces of each unit. Lastly, a range of adaptive and interchangeable screen modules—that can begin to modulate and mediate the balcony spaces—are investigated.

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CONTENTS

LIST OF FIGURES	xii		
1.0 INTRODUCTION	01	4.0 THE BALCONY	53
1.1 Adaptability, Connectivity and Communication in Future Urban Environments	06	4.1 Introduction	53
1.2 The Balcony	07	4.2 The Rise of the Residential Balcony	55
1.3 Design Proposal	11	4.3 The Evolution of the Residential Balcony	59
		4.4 The Future of the Balcony	61
2.0 RESIDENTIAL TOWERS	13	5.0 SITE	63
2.1 Re-considering Tower Neighbourhoods	13	5.1 Current Developments	63
2.2 Insulating and the Re-structuring of Existing Balconies	19	5.2 Future Developments	65
2.3 Layering	25	5.3 Site Analysis	67
2.4 The Future	27	6.0 OPEN DESIGN SYSTEM FOR 545-565 SHERBOURNE STREET	95
2.5 Current Investigation: Addressing the Present and Anticipating the Future	29	7.0 CONCLUSION	120
3.0 THE NEED FOR ADAPTATION AND COMMUNICATION	30		
3.1 Introduction	30		
3.2 Adaptability and Connectivity as Strategies	34		
3.3 Adaptability	35		
3.3.1 Informality: Unplanning the Planned	36		
3.4 Connectivity and Communication	49		

LIST OF FIGURES

(all images have been produced by the author unless noted otherwise)

1.0 INTRODUCTION

Figure 1–1 Apartment Neighbourhood in the Process of Renovation: Etobicoke, Toronto

Figure 1–2 **Unintended Informality:** Ramot Housing, Zvi Hecker Jerusalem (1972). The customization, addition and enclosure of exterior spaces in time. Picture Taken in 2001. (http://www.math.toronto.edu/drorbn/Gallery/Jerusalem/DodecahedralHousing_1280.jpg)

Figure 1–3 **top Intended Informality:** Quinta Monroy Housing, Elemental, Chile (2004). The provided framework for adaptation. (http://cdn2.world-architects.com/files/projects/27106/images/tema_7_3.jpg)

Figure 1–4 **bottom Intended Informality:** Quinta Monroy Housing, Elemental, Chile (2004). The adaptation, customization and addition of living and exterior spaces of residential units by residents. Picture taken in 2006.

Figure 1–5 The Residential Tower: The replication of suburban ideals as the balcony replaces the typical suburban porch and the open spaces in between towers form a collective backyard.

Figure 1–6 **L'immeuble Villas - Le Corbusier:** Transforming the block building in to a "porous, sunfilled structure". (Koolhaas, Rem. 2014. Elements. Box Edition ed. Vol. Balcony. Venice: Marsilio,103)

Figure 1–7 Typical Balconies: **1960s**

Figure 1–8 Typical Balconies: **1960s**

Figure 1–9 Typical Balconies: **1970s**

Figure 1–10 Typical Balconies: **1970s**

Figure 1–11 Typical Balconies: **1970s (Renovated)**

Figure 1–12 Typical Balconies: **1970s (Renovated)**

Figure 1–13 Typical Balconies: **2010s**

Figure 1–14 Typical Balconies: **2010s**

Figure 1–15 **Percentage of Balcony Coverages in Residential Towers built from the 1950s to the 21st Century Across the Greater Toronto Area:** The data for this map is gathered from the TO Built database (www.tobuilt.ca), and outlines the increase and decrease in the use of balconies in residential towers in Toronto through the last decades. It can be observed that the pattern of balcony construction on a rise from the 1950's and with a peak before and around the 1970's, is a trend that is clearly repeating with the condo boom that began in the beginning of the 21st century in Toronto.

Figure 1–16 Typical Residential Tower of the 1970s: **40% Balconies**

Figure 1–17 Typical Residential Tower of the 1970s: **60% Balconies**

Figure 1–18 Typical Residential Tower of the 1970s: **80% Balconies**

Figure 1–19 Typical Residential Tower of the 1970s: **100% Balconies**

Figure 1–20 Typical Residential Tower of the 2010s: **40% Balconies**

Figure 1–21 Typical Residential Tower of the 2010s: **60% Balconies**

Figure 1–22 Typical Residential Tower of the 2010s: **80% Balconies**

Figure 1–23 Typical Residential Tower of the 2010s: **100% Balconies**

Figure 1–24 Energy saving and production strategies, strategies for economical empowerment and strategies for improving social interaction within tower neighbourhoods are highlighted (strategies are summarized from the Mayor’s Tower Renewal Project). The overlaps between these strategies are highlighted. It is within the ambition of this thesis to propose an open design system that allows the activation of these strategies at the level of the individual unit through the creating of adaptive and expandable and communicative balconies.

2.0 RESIDENTIAL TOWERS

Figure 2–1 Typical “Tower-in-the-Park” Neighbourhood: Etobicoke, Toronto

Figure 2–2 St. James Town Apartment Neighbourhood, Toronto

Figure 2–3 Diagrams of Current Strategies Being Implemented Across the City of Toronto

Figure 2–4 Extension to 66 Isabella Street, Toronto: Currently Under Construction

Figure 2–5 Image of the Residential Extension at 66 Isabella Street, Toronto and Podium ([http://urbantoronto.ca/forum/showthread.php/14400-66-Isabella-St-\(Rental-condo-tower-Church-St-Mohican-Holdings-23s-Quadrangle\)/page11](http://urbantoronto.ca/forum/showthread.php/14400-66-Isabella-St-(Rental-condo-tower-Church-St-Mohican-Holdings-23s-Quadrangle)/page11)): modified by the author.

Figure 2–6 Case Studies in Context

Figure 2–7 **top** 620 Church Street Development

Figure 2–8 **bottom** 66 Isabella Street Development

Figure 2–9 545-556 Sherbourne Street

Figure 2–10 159 Wellesley Street

Figure 2–11 Case Studies in Context

Figure 2–12 **top** Balconies in the Process of Reconstruction: North York, Toronto

Figure 2–13 **bottom** Existing Conditions of a Typical Residential Balcony

Figure 2–14 **top** Restructuring and Insulating Existing Balconies

Figure 2–15 **left** Proposal of Reskinning and Insulating of Balconies: “Tower Renewal Guidelines” (Kesik, T., and I. Saleff. 2009. *Tower renewal guidelines for the comprehensive retrofit of multi-unit residential buildings in cold climates*. Toronto: Daniels Faculty of Architecture, Landscape, and Design, University of Toronto)

Figure 2–16 **bottom** Closing in and Insulating Existing Balconies

Figure 2–17 **top left** Cluster of Buildings in an Apartment Neighbourhood Undergoing Balcony Reconstruction: Eglinton West, Toronto

Figure 2–18 **top right** Reconstruction Completed

Figure 2–19 **bottom** Reconstruction in Process

Figure 2–20 **top left** Balconies in the Process of Being Restructured: North York, Toronto

Figure 2–21 **top right** Balcony—Not renovated

Figure 2–22 **middle** Balcony—In the process of renovation

Figure 2–23 **bottom** Balcony—Completed

Figure 2–24 Replacing the flat envelope with an extended threshold. Based on diagram by Lacaton and Vassal (<http://www.lacatonvassal.com/index.php>); modified by the author.

Figure 2–25 **left** The Addition of the Extended Balcony and the transformation of the dated tower: Lacaton and Vassal, Paris. (<http://www.lacatonvassal.com/index.php>)

Figure 2–26 Arup's Tower of the Future. Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation: (<http://www.driversofchange.com/projects/its-alive/>)

Figure 2–27 Incorporating Ecological Systems and Various Programs within the Building: Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation : (<http://www.driversofchange.com/projects/its-alive/>)

Figure 2–28 Incorporating Changeability of Function as well as Energy Modulating Systems within Buildings: Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation: (<http://www.driversofchange.com/projects/its-alive/>)

Figure 2–29 Incorporating Infrastructure for Connectivity Between Units and Between a Cluster of Buildings to Reinforce Communication: Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation: (<http://www.driversofchange.com/projects/its-alive/>)

Figure 2–30 **top** Extension to Current Building - University of Applied Arts Vienna by Wolfgang Tschapeller: (<http://www.tschapeller.com/en/#!/uak-wien/views>)

Figure 2–31 **bottom** Section of Added Layers - University of Applied Arts Vienna by Wolfgang Tschapeller: (<http://www.tschapeller.com/en/#!/uak-wien/views>)

3.0 INVESTIGATING THE NEED FOR ADAPTATION AND COMMUNICATION

Figure 3–1 Informal Balcony Alterations at 31 Alexander Street - City Park Co-operative Apts. Inc.

Figure 3–2 **top-right** Cellules Parasites - Installation Diagram

Figure 3–3 **top-left** Cellules Parasite Prototype. Chanéac, 1968. (<http://habitat-bulles.com/wp-content/uploads/2013/03/chaneac-bulle-pirate-700.jpg>)

Figure 3–4 **middle-left** Distribution Diagram. Chanéac, 1968. (<http://laboratoireurbanismeinsurrenctionnel.blogspot.com/2012/10/architecture-mobile.html>)

Figure 3–5 **bottom-left** Cellules Parasite. Section and Plan: Chanéac, 1968.

Figure 3–6 **top** Geometric Structure of Ramot Housing

Figure 3–7 **bottom** Informal Adaptations to the Form of Ramot Housing

Figure 3–8 **top** Ramot Housing: Zvi hecker, 1972 (<http://collabcubed.com/2013/12/06/zvi-hecker-ramot-housing/>)

Figure 3–9 **top below** Ramot Housing: *Dror Bar-Natan, 2001*. (<http://www.math.toronto.edu/drorbn/Gallery/Jerusalem/DodecahedralHousing.html>)

Figure 3–10 **right top** Altered Geometries of Ramot Housing: *Adam Nathaniel Furman, 2011*. (<http://world-bin.blog.com.tr/2011/02/avant-garde-meets-orthodoxy-ramot-polin.html>)

Figure 3–11 **right bottom** Informal Adaptations to the Balcony and the Form of the Building.

Figure 3–12 **top left** Provided Structure (*Elemental, 2003*) & Units After Alterations. *Tadeuz Jalocho, 2006*.

Figure 3–13 **top** Diagram of Initial Structure, Interior Alterations and Exterior Additions

Figure 3–14 **left** Incremental Alterations (*Luke Perry, 2010*)

Figure 3–15 **bottom** Phased Additions to the Structure

Figure 3–16 **top** Extended Threshold within an access gallery structure

Figure 3–17 **&**

Figure 3–18 **top right** Customization of the extended threshold by different residents (*KCAP, 2000*): <http://www.bdonline.co.uk/1-pleasure-garden/1027687.article>

Figure 3–19 **bottom right** Empty Thresholds (*KCAP, 1996*): <http://www.bdonline.co.uk/1-pleasure-garden/1027687.article>

Figure 3–20 **top** The Combination of an Extended Threshold to typical balconies

Figure 3–21 **top left** Informal Use of Extended Balcony: Dining Space (*Lacaton and Vassal, 2011*): <http://www.lacatonvassal.com/index.php?idp=80>

Figure 3–22 **middle left** Informal Use of Extended Balcony: Reading Room (*Lacaton and Vassal, 2011*): <http://www.lacatonvassal.com/index.php?idp=80>

Figure 3–23 **middle left** Informal Use of Extended Balcony: Living Room (*Lacaton and Vassal, 2011*): <http://www.lacatonvassal.com/index.php?idp=80>

Figure 3–24 **bottom left** Informal Use of Extended Balcony: Storage and Bar (*Lacaton and Vassal, 2011*): <http://www.lacatonvassal.com/index.php?idp=80>

Figure 3–25 **Balconies** of Co-Operative Housing at 31 Alexander Street, Toronto (Images to Continue on the Following Pages)

Figure 3–26 **bottom left** Elevation highlighting the main circulation and public programs (*Adrià Goula, 2011*): http://www.archdaily.com/283113/julia-tower-sergi-pons-architecte/507ddabf28ba0d2b46000081_julia-tower-sergi-pons-architecte_04-jpg/

Figure 3–27 **bottom middle** Circulation on the Facade (*Adrià Goula, 2011*): http://www.archdaily.com/283113/julia-tower-sergi-pons-architecte/507ddab828ba0d2b4600007e_julia-tower-sergi-pons-architecte_01-jpg/

Figure 3–28 **bottom** Diagrams Highlighting the Main Public Circulation and Collective Programs. Based on diagrams: (http://commons.wikimedia.org/wiki/File:Mirador_sanchinarrio.JPG)

Figure 3–29 **bottom-right** Details of Circulation and Collective Programs

Figure 3–30 **bottom middle** Circulation and Collective Programs

Figure 3–31 **bottom** Diagrams Highlighting the Main Public Circulation and Collective Programs

Figure 3–32 **bottom-left** Circulation and Collective Programs: (<http://www.architectural.com/aart-as-bikuben-student-residence/>) (*Altered by Author*)

Figure 3–33 **bottom-middle** Detail of Circulation: (<http://www.architectural.com/aart-as-bikuben-student-residence/>) (*Altered by Author*)

Figure 3–34 **bottom** Diagrams Highlighting the Main Public Circulation and Collective Programs

4.0 THE BALCONY

Figure 4–1 Delshad’s Balcony, Toronto

Figure 4–2 Le Corbusier in L’Immeuble Villa (*Le Corbusier, 1925*)

Figure 4–3 Balcony in Residential Buildings (allowing for air, sun and extra space for outdoor activities) Leading to Productivity and a Better Quality of Life

Figure 4–4 **left** Casa Via Dezza Elevation with Varied Balconies (*Carlo Cerchioli, 2010*)

Figure 4–5 **right** Casa Via Dezza Elevation (*Gio Ponti, 1957*)

Figure 4–6 **top left** Gilo Housing, Circulation and Balconies in Between (*Arieh Sharon, 1972*)

Figure 4–7 **bottom left** Private Balconies and Circulation (*Arieh Sharon, 1972*)

Figure 4–8 **top right** Plan Detail, Private and Public Balconies (*Arieh Sharon, 1972*)

Figure 4–9 **bottom right** Circulation in Elevation (*Arieh Sharon, 1972*)

Figure 4–10 Ornamental Use of Balconies in Contemporary Condominiums

Figure 4–11 **top left** Singapore’s Ecological EDITT Tower (*Ken Yeang, 2008*)

Figure 4–12 **top right** Vertical Forest, Stefano Boari (*Daniele Zacchi, 2014*)

Figure 4–13 **below left** Mill Owner’s House in Ahmedabad by LeCorbusier (*studioACKT, 2010*)

Figure 4–14 **below right** Stacking Green by Vo Trong Nghia (*Hirayuki Oki, 2012*)

Figure 4–15 **left** Edible Balcony, Rotterdam (*Alex de Jong, 2009*)

Figure 4–16 **right** Edible Balcony (*Indira Naidoo, 2010*)

Figure 4–17 **left** Cat Balconies (*Jennifer Kingston, 2010*)

Figure 4–18 **right** Chicken Coop for Balconies (*Matthew Hayward, 2014*)

Figure 4–19 **left** Greenerator (*Jonathan Globerson, 2010*)

Figure 4–20 **right** Solar Rallings (*CSEM, 2011*)

Figure 4–21 **left** Water Balcony - Housing Balcony in Bahamas by BIG (*BIG, 2014*)

Figure 4–22 **top** 545-565 Sherbourne Street

Figure 4–23 **bottom left** 545-565 Sherbourne Street: Old and New Developments

Figure 4–24 **bottom** 545-565 Sherbourne Street: New Developments (*IBI Group, 2014*)

Figure 4–25 The Residential Apartment Commercial Zone (RAC) in Toronto and Examples of its Development (*ERA, 2013*)

Figure 4–26 Program Allowances in Condominiums

Figure 4–27 Informal Businesses within Tower Neighbourhoods

Figure 4–28 Use of Balconies in Typical Tower Neighbourhoods (Images to Continue on the Following Pages)

Figure 4–29 **Study of Balcony Uses:** This mapping is based on the study of 355 balconies in Apartment Neighbourhoods across the city of Toronto. Balconies are categorized and analyzed based on the following:
 1) Vacancy 2) Type of Permanent or Seasonal Activity Including:
 Planting, Play, Dining, Lounging and Storage
 3) Transitory Activities

Figure 4–30 **Elevation Detail:** Elevation detail of various programmed balconies

Figure 4–31 Percentage of Programmed Balconies and Balconies Used as Storage from Total Used (59%)

Figure 4–32 **Various Balcony Uses**

Figure 4–33 **customized balconies**

Figure 4–34 **extended balconies**

Figure 4–35 **combined balconies**

Figure 4–36 **565 Sherbourne Street:** East View

Figure 4–37 **565 Sherbourne Street:** East View

Figure 4–38 **565 Sherbourne Street:** West View

Figure 4–39 **Plan Details of Balconies:** Location of Individual balconies in relation to other individual balconies

Figure 4–40 **Various Combination of Balconies on Site**

Figure 4–41 **Informal Alterations of Balconies**

Figure 4–42 **top** Axonometric View of 545-565 Sherbourne Street with New Rental Development and Podium

Figure 4–43 **bottom** Plan of 545-565 Sherbourne Street with New Rental Development and Podium: Highlighting Typical Unit Balconies

Figure 4–44 **Typical Rental Units and Their Balcony Dimensions:**
Units 1-3: 545-565 Sherbourne Street. **Units 4-5:** New Rental Development

Figure 4–45 **545-565 Sherbourne Street**

Figure 4–46 **545 Sherbourne Street Elevation**

Figure 4–47 (following page): Views of Inside a Typical Unit at 555 Sherbourne Street and its Balcony

Figure 4–48 **Living Structure Study:** St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods (District Numbers: 64, 66, 88) in 2011.

Figure 4–49 **Delshad's Unit:** Typical One-bedroom

Figure 4–50 **below** Delshad's Living Room

Figure 4–51 **right** Delshad's Balcony

Figure 4–52 **Typical Two-Bedroom Unit:** One Family Structure with Three Children

Figure 4–53 **Typical Two-Bedroom:** Multi-family Structure

Figure 4–54 **Typical One-Bedroom Unit:** One Family Structure with One Child

Figure 4–55 Percentage of Families With One, Two and Three or more Children in St. James Town in 2011

Figure 4–56 **Change in Family Structure Study:** Percentage of Couples, Couples with Children and Single Parents in St. James Town From 2001 to 2011

Figure 4–57 **Number of Individuals Living in Each Unit:** St. James Town Compared to Surrounding Neighbourhoods

Figure 4–58 **Typical One-Bedroom Unit:** Co-habiting (Two People)

Figure 4–59 **Typical Two-Bedroom Unit:** Co-habiting (Six People)

Figure 4–60 **top** Change in the percentage of Immigrants vs. Citizens in St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods from 2001 to 2011.

Figure 4–61 **top right** Change in the Origins of Immigrants in St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods from 2001 to 2011.

Figure 4–62 **bottom** Change in Average Household Income in St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods from 2001 to 2011. Inflation over the ten year period has been accounted for in this study.

5.0 SITE

Figure 5–1 **top** 545-565 Sherbourne Street

Figure 5–2 **bottom left** 545-565 Sherbourne Street: Old and New Developments

Figure 5–3 **bottom** 545-565 Sherbourne Street: New Developments (*IBI Group, 2014*)

Figure 5–4 The Residential Apartment Commercial Zone (RAC) in Toronto and Examples of its Development (*ERA, 2013*)

Figure 5–5 Program Allowances in Condominiums

Figure 5–6 Informal Businesses within Tower Neighbourhoods

Figure 5–7 Use of Balconies in Typical Tower Neighbourhoods (Images to Continue on the Following Pages)

Figure 5–8 **Study of Balcony Uses:** This mapping is based on the study of 355 balconies in Apartment Neighbourhoods across the city of Toronto. Balconies are categorized and analyzed based on the following:

- 1) Vacancy
- 2) Type of Permanent or Seasonal Activity Including:
Planting, Play, Dining, Lounging and Storage
- 3) Transitory Activities

Figure 5–9 **Elevation Detail:** Elevation detail of various programmed balconies

Figure 5–10 Percentage of Programmed Balconies and Balconies Used as Storage from Total Used (59%)

Figure 5–11 **Various Balcony Uses**

Figure 5–12 **customized balconies**

Figure 5–13 **extended balconies**

Figure 5–14 **combined balconies**

Figure 5–15 **565 Sherbourne Street:** East View

Figure 5–16 **565 Sherbourne Street:** East View

Figure 5–17 **565 Sherbourne Street:** West View

Figure 5–18 **Plan Details of Balconies:** Location of Individual balconies in relation to other individual balconies

Figure 5–19 **Various Combination of Balconies on Site**

Figure 5–20 **Informal Alterations of Balconies**

Figure 5–21 **top** Axonometric View of 545-565 Sherbourne Street with New Rental Development and Podium

Figure 5–22 **bottom** Plan of 545-565 Sherbourne Street with New Rental Development and Podium: Highlighting Typical Unit Balconies

Figure 5–23 **Typical Rental Units and Their Balcony Dimensions:**
Units 1-3: 545-565 Sherbourne Street. **Units 4-5:** New Rental Development

Figure 5–24 **545-565 Sherbourne Street**

Figure 5–25 **545 Sherbourne Street Elevation**

Figure 5–26 (following page): Views of Inside a Typical Unit at 555 Sherbourne Street and its Balcony

Figure 5–27 **Living Structure Study:** St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods (District Numbers: 64, 66, 88) in 2011.

Figure 5–28 **Delshad's Unit:** Typical One-bedroom

Figure 5–29 **below** Delshad's Living Room

Figure 5–30 **right** Delshad's Balcony

Figure 5–31 **Typical Two-Bedroom Unit:** One Family Structure with Three Children

Figure 5–32 **Typical Two-Bedroom:** Multi-family Structure

- Figure 5–33 **Typical One-Bedroom Unit:** One Family Structure with One Child
- Figure 5–34 Percentage of Families With One, Two and Three or more Children in St. James Town in 2011
- Figure 5–35 **Change in Family Structure Study:** Percentage of Couples, Couples with Children and Single Parents in St. James Town From 2001 to 2011
- Figure 5–36 **Number of Individuals Living in Each Unit:** St. James Town Compared to Surrounding Neighbourhoods
- Figure 5–37 **Typical One-Bedroom Unit:** Co-habiting (Two People)
- Figure 5–38 **Typical Two-Bedroom Unit:** Co-habiting (Six People)
- Figure 5–39 **top** Change in the percentage of Immigrants vs. Citizens in St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods from 2001 to 2011.
- Figure 5–40 **top right** Change in the Origins of Immigrants in St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods from 2001 to 2011.
- Figure 5–41 **bottom** Change in Average Household Income in St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods from 2001 to 2011. Inflation over the ten year period has been accounted for in this study.

6.0 OPEN DESIGN SYSTEM FOR 545-565 SHERBOURNE STREET

- Figure 6–1 Elevation of 545-565 Sherbourne Street with Adaptive Balconies
- Figure 6–2 SensFloor - A Smart Flooring Technology developed by Future Shape that is able to detect movement. With the capacity to be programmed to understand human use and patterns as well having an understanding and ability to track changes in the space.
- Figure 6–3 Series of diagrams explaining the large scales strategies for the refurbishing of dated residential towers under study, added infrastructure that will allow adaptation of the interior and exterior spaces, and small scale structural systems that will allow the localized expansion of units and their vertical connection.
- Figure 6–4 Hydroponic Screen: Food Production
- Figure 6–5 Small scale hydroponic technology can be adopted at the residential and balcony scale in order to produce food.
- Figure 6–6 Micro Wind Generating Screen
- Figure 6–7 Micro Wind Turbines developed at Hong Kong University have a compact 25 cm rotor diameter and can be aligned in series to generate energy with low winds. This technology makes it ideal for use in cities.
- Figure 6–8 Algae Textile Water Filtration Screen
Algae Textile - A Water Filtration Textile Designed by Petra Bogias (Bogias, 2014)
- Figure 6–9 Protection and Privacy Screen
- Figure 6–10 **top** Adaptive Knitted Structures with embedded shape memory technology used as a precedent for creating layered shading devices.
- Figure 6–11 **bottom** Shading screens developed by Buro Happold that through the modulation of different layers control exposure effectively.

Figure 6–12 Adaptive Solar Shading Screen

Figure 6–13 Plastic Solar Cell films developed by Georgia Tech’s Bernard Kippelen allows the flexibility of use of solar energy generation within the balcony setting as an added screen. This film with adopted shape memory polymers can allow it to react to different angles of the sun to increase efficiency.

Figure 6–14 Adaptive Solar Screen

Figure 6–15 Pneumatic Thermal Screen

Figure 6–16 Adaptive and pneumatic technology to create modules are able to regulate air and heat flow at small and localized scales (Pneusystem, Velikov and Thun, 2014)

Figure 6–17 Axonometric View with Adapted Balconies:
Units Previously Studied

Figure 6–18 Outline of Various Balcony Activities

Figure 6–19 Summer Plan: Unit with One Individual

Figure 6–20 Winter Plan: Unit with One Individual

Figure 6–21 Neighbouring Conditions: Shared Adaptive Spaces
Summer Plan

Figure 6–22 Detail Plan of
Shared Balcony Space

Figure 6–23 Axo Detail of Units and Adapted Shared Balcony Space

Figure 6–24 Unit with Six Individuals
Summer Plan

Figure 6–25 Units with Six Individuals
Winter Plan

Figure 6–26 Unit with Six Individuals
Axonometric

Figure 6–27 Speculative Podium Plan

Figure 6–28 Speculative Detail of the Podium: 565 Sherbourne Street

Figure 6–29 Speculative Detail of the Podium: New Development

Figure 6–30 Speculative Elevation



Figure 1-1 Apartment Neighbourhood in the Process of Renovation: Etobicoke, Toronto

1.0 INTRODUCTION

This investigation is centered on the study of the renovation and reconsideration of residential tower neighbourhoods, and speculates a design strategy as an alternative to the current practices. The research takes into consideration the current practices, specifically across the city of Toronto, and through its discussions and proposed design strategies aims to critique the current trend and hopes to make an argument for the inherent potential in the reconsideration of the role of the balcony and the exterior space of units. In doing so, enabling towers to not just meet the demands of the present, but also to prepare them for the changing and uncertain demands of the future.



The current practice of residential tower renewal typically involves the focusing on:

“The insulation of facades on the outside, the treatment of hallways, ‘residentialisation’, the so-called urban project, which is usually limited to dotting the built space with paving, curbs, and fencing.”¹

These elements, even though important in the process of renovating residential towers, can be said to leave the qualitative evolution of the dwelling to the side, and to reject the transformational needs of the architecture and its occupants.

¹ Druot, Frederic, Anne Lacaton, and J. P. Vassall. 2007. Plus: Large-scale housing development. Barcelona: Gustavo Gili, 15.

As a response to the needs of tower renewal and as an alternative to the current practices, the design research investigates a need for the development of a renewal scheme consisting of addressing the structural and insulation needs of the exterior skin, as well as incorporating an infrastructure within the building that will allow the development of an adaptive and communicative system over time. Secondly, the design proposal investigates a modular structural expansion to existing balconies and as a way for occupants to alter the composition of their spaces. A series of modular screens with different functionalities are also a proposed strategy in creating mediated, layered and differentiated interior and exterior spaces.

In this way, the extended building structure and the envelope assembly are enabled to become adaptive in a scheme in which the assembly is manipulated based on the family or living structure of the residential unit, or alternatively of the specific program, and is regulated based on environmental conditions and the user group currently activating it. The proposed system formulates a spatial condition which makes constant change possible—a network that is designed to be dynamic, intelligent and reactive in response to the programmatic needs of its users and its surrounding environment.

In this sense, this study and design synthesis hopes to imagine a secondary structural system and a modular layered envelope system for the renewal of tower neighbourhoods. Meanwhile, being in correspondence with the energy demands and the environmental control of the facade systems, hoping to shape a new type of urban experience that is social, sustainable and evolutionary over time. The following essay introduces the concept of renovation and reconsideration of tower neighbourhoods, as well as the importance of the introduction of elements of adaptability, connectivity and communication in dense residential environments. The role of the balcony in 20th century housing and its potentials for shaping dense environments of the future will be explored and a design synthesis will be proposed as an alternative to current practices.

The first chapter of this thesis will primarily outline some of the strategies presently in practice in dealing with the needs for the improvements to dated residential towers that address the revitalization of the economical, social and urban conditions of tower neighbourhoods. These developments mainly cover the need for improving environmental performance and limiting thermal bridging, minimizing health issues associated with deteriorating envelopes and dealing with degraded aesthetics of these towers. These concerns are typically dealt with by re-cladding, increasing insulation as well as restructuring or eliminating balconies. Reconsidering the fabric of tower neighbourhood and their revitalization through the introduction of new programs, increased density and a mix of housing types are also observable strategies in ramping up these neighbourhoods for the future. The chapter later on focuses on the balcony as the primary element of restoration in the renovation of residential towers. An investigation of common strategies for the restoration of balconies includes studies of their restructuring, enclosing and extension. In the last part of this

chapter, the thesis will outline speculations on the future of towers, and the importance of integration of elements that will prepare dense built environments for changing social, economical and ecological conditions.

In the following chapter, the importance of integrating elements of incremental and informal adaptability as well as connectivity, communication and networking within the context of the urban environment are discussed in a theoretical context and explained further through relevant case studies. The study further focuses on the importance of the reconsideration of the role of the balcony—as an extended and projecting living space and a means for social interaction with the urban environment—and an extended and collective social space. Arguing against the thickening of the building envelope and simply re-cladding over the current issues, the design research will further focus on the typical balcony and will outline its potential in becoming a platform for interaction.

The third chapter studies the site of the project—the extended thresholds of residential spaces, their balconies and their use. In the first section, the role of the balcony and its importance in the residential context, its rise in popularity during the last century, the evolution of its role in the residential context as well as an inquiry into the potentials for its roles in the future is studied. In the second section, current and future developments of the site under study—545-565 Sherbourne Street in Toronto—is studied. Further, in depth studies of the balcony use and occupant behaviour in regards to their exterior spaces, as well as the spatial qualities of the extended living spaces across the old and the new development is illustrated. Lastly, an illustrated demographic study of the site primarily investigates the prominent family structures and living arrangements present on site, and compares them to the surrounding neighbourhoods. This study illustrates how different units address, use and alter their limiting exterior spaces in relation to the extreme variation of their interior uses. In the same way, the change over time in family structure, immigrant rates and patterns as well as economical circumstances is illustrated. In this way, the illustrated investigation proposes that due to the density and location of the site under study, it is exposed to a range of changing conditions and living structures over time, making the site ideal for testing the possibility of an informal, incrementally adaptive and communicative extension to units that facilitates social participation.

In the last section, design strategies including 1) a set up of an infrastructure for adaptation and communication within the exterior of the building 2) structural modules for the physical and incremental extension of the exterior space, and 3) the introduction of a range of possible soft adaptive modules that can begin to modulate and mediate the exterior spaces and customize them in relation to the specific needs of the users are introduced. Furthermore, scenarios of the implemented system at the scale of the unit, and the collective realm is investigated.

The modular design strategies introduced within this thesis—at the scale of the infrastructure, extended structure and spatial modulation mechanisms for the balcony—introduces a composition that can be adapted to different conditions with further development. Within the scope of this thesis, the open design systems introduced, can be implemented by designers and developers as an alternative to existing tower renewal strategies. Meanwhile, this study aims to make an argument for the introduction of user-led development of dense urban environments and the set of design languages proposed can be understood as a first step towards the possibility of a social self-built system. Although only providing a form language as an initial step, the thesis will conclude with the hopes of the development of this system, with the empowerment of communication, to be implemented on a large scale. The conclusion will aim to bring light on the technological, political and economical developments necessary in order to make a user-based development in this context a possibility.

1.1 ADAPTABILITY, CONNECTIVITY AND COMMUNICATION IN FUTURE URBAN ENVIRONMENTS

Accelerated processes of contemporary urbanism have been functioning within the static cities that are uniform and generic with no response to new demands of social, cultural and environmental engagement. In the past decades, the discourse of architecture has moved away from viewing a building as an object in a field—viewed today as a limiting framework. The dominance of the object in architecture, the tower in the park and typical tower neighbourhoods which are an example of, create harsh urban divisions and have made urban interaction continually difficult.

Through theoretical reconsiderations for the future of the built environment, the importance of uncertainty and the reality of transformation in the built environment becomes pivotal. The research will primarily investigate ideas of adaptability—encompassing informality and small-scale urban re-workings as design methodologies. Within this investigation, informal cities and their structure, un-intended informality through time (Figure 1–2) and intended platforms for informality (Figure 1–3, Figure 1–4) will be explored within case studies:

“Thanks to the spatial expansion of the existing floor plan, the individual apartments can be connected by galleries in front of them that can be informally programmed by the residents according to their needs.”²

Secondarily, the research will investigate the importance of connectivity and communication in the urban built environment of the future and its implications on the premise of the outlined research. The discussed strategies and concepts will be further investigated through theoretical investigations and case-studies of connective building strategies will be explored.



Figure 1–2 **Unintended Informality:** Ramot Housing, Zvi Hecker Jerusalem (1972). The customization, addition and enclosure of exterior spaces in time. Picture Taken in 2001.



Figure 1–3 **top Intended Informality:** Quinta Monroy Housing, Elemental, Chile (2004). The provided framework for adaptation.

Figure 1–4 **bottom Intended Informality:** Quinta Monroy Housing, Elemental, Chile (2004). The adaptation, customization and addition of living and exterior spaces of residential units by residents. Picture taken in 2006.

² Druot, Frederic, Anne Lacaton, and J. P. Vassall. 2007. Plus: Large-scale housing development. Barcelona: Gustavo Gili, 21.

1.2 THE BALCONY

The third part of this thesis will focus on the role and importance of the balcony and its evolution through the 20th century. Through case studies of built work and theoretical investigations, the essay will aim to bring light to the importance of this element in the mid-20th century and the current conditions—therefore highlighting the importance of the site of the design project, and the focus on the balcony itself.

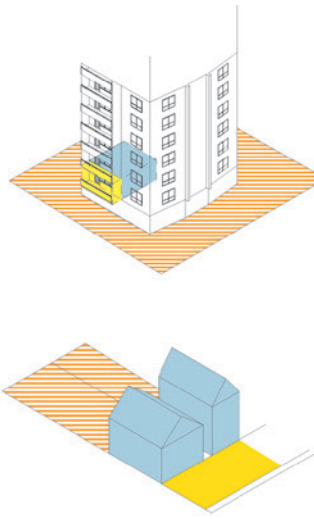


Figure 1-5 The Residential Tower: The replication of suburban ideals as the balcony replaces the typical suburban porch and the open spaces in between towers form a collective backyard.

3 Koolhaas, Rem. 2014. Elements. Box Edition ed. Vol. Balcony. Venice: Marsilio, 110.

The rise in the use of the balcony in the 20th century was partially due to the interest in the blurring of the inside and the outside, and a way for the suburbanization of the urban environment through the replication of suburban ideals within a dense housing block. In this way, the balcony replaced the typical suburban porch while the open spaces of tower neighbourhoods was publicized as a “collective backyard” (Figure 1-5). It was believed by the utopian theorists of the 20th century that “altering a person’s exterior experience could shape them into a more productive, fulfilled human being”³. By the 1930s, the balcony was widely accepted as a tool for bringing in light, air and openness within dense urban environments, and was promoted within residential towers as a place for informal leisure and sport activities. Ideas of landscaped open rooms within the tower in this way were initially investigated in Le Corbusier’s *L’Immeuble Villa* (1922-29) (Figure 1-6). Therefore, by this time the balcony was viewed by the rising socialists as a tool for the mass public to customize their living experiences within the framework of the tower.



Figure 1-6 *L’Immeuble Villas* - Le Corbusier: Transforming the block building in to a “porous, sunfilled structure”

4 Koolhaas, Rem. 2014. Elements. Box Edition ed. Vol. Balcony. Venice: Marsilio, 150.

5 http://www.tobuilt.ca/php/tobuildings_search.php

Towards the middle and end of the century, the fascination with the “balcony-clad tower block” and potentials of self-expression was quickly replaced with ideas of low-income housing favourable to large populations of new immigrants. The rapid re-urbanization of cities from the suburbs and in the resulting condominium booms in cities such as Toronto, the balcony has transformed from a unifying tool to one that is “playful” and “ornamental”. As a result the balcony, as an architectural element, has degraded in the widespread culture of global cities as an isolating element and a way for the creation of a “signature facade”—with the aim of increasing marketability and a resulting “suburbanization of the urban”.⁴

The following map (Figure 1-15) investigates the proliferation of use of balconies in residential towers, defined as having 13 stories or more, built in the Greater Toronto Area from the 1950’s to the beginning of the 21st century.⁵ The map shows the change in percentages of the building being clad with balconies, ranging from 0%—as a building with no balconies—to 100%—as a building with continuous balconies all around. It can be clearly seen in this map that the 1960’s to the late 1970’s saw an increase in the use of balconies in residential buildings. This pattern, which was minimized in the 1980s and 1990s, is occurring again from the 2000’s onwards, with the increase in the condo construction in the city.



Figure 1-7 Typical Balconies: **1960s**

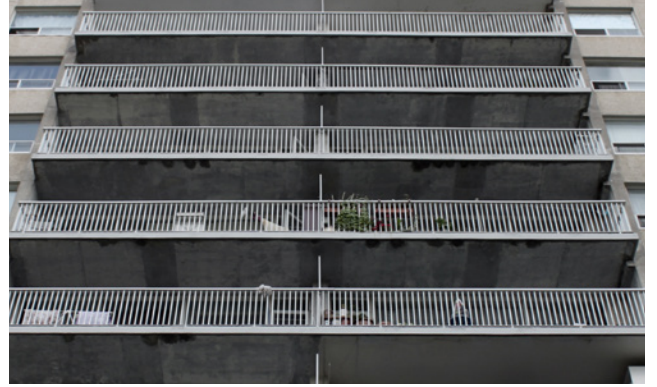


Figure 1-8 Typical Balconies: **1960s**

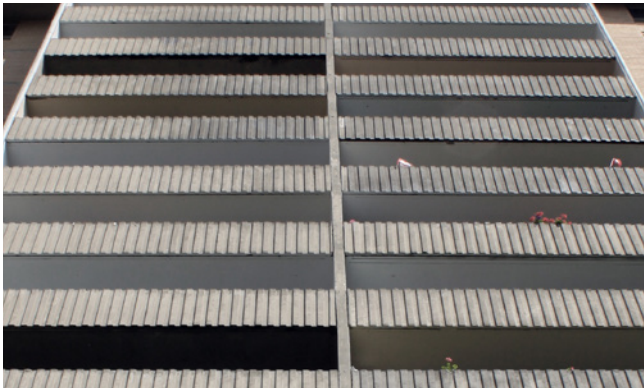


Figure 1-9 Typical Balconies: **1970s**



Figure 1-10 Typical Balconies: **1970s**



Figure 1-11 Typical Balconies: **1970s (Renovated)**



Figure 1-12 Typical Balconies: **1970s (Renovated)**



Figure 1-13 Typical Balconies: **2010s**



Figure 1-14 Typical Balconies: **2010s**

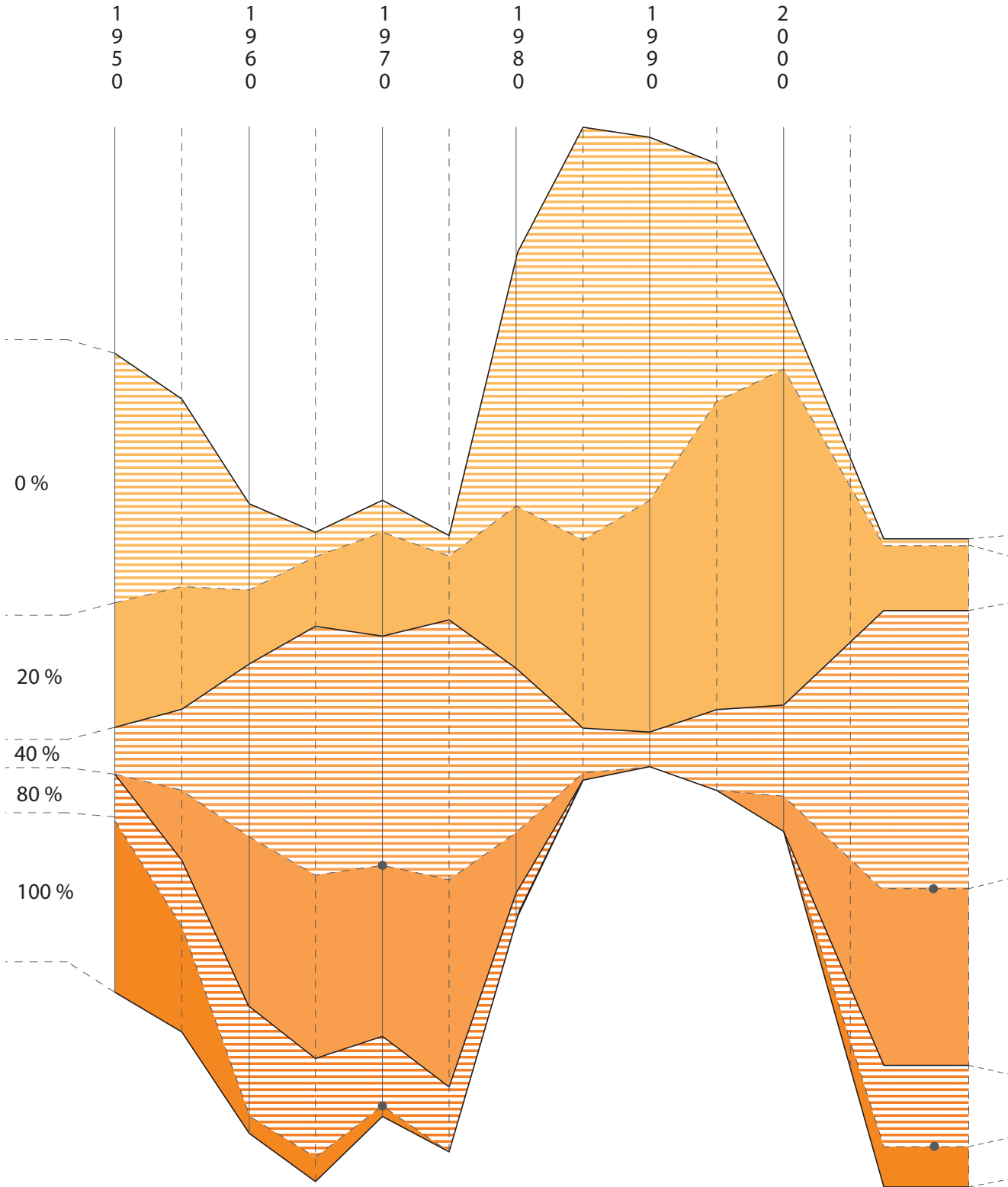


Figure 1-15 Percentage of Balcony Coverages in Residential Towers built from the 1950s to the 21st Century Across the Greater Toronto Area: The data for this map is gathered from the TO Built database (www.tobuilt.ca), and outlines the increase and decrease in the use of balconies in residential towers in Toronto through the last decades. It can be observed that the pattern of balcony construction on a rise from the 1950's and with a peak before and around the 1970's, is a trend that is clearly repeating with the condo boom that began in the beginning of the 21st century in Toronto.



Figure 1-16 Typical Residential Tower of the 1970s: **40% Balconies**



Figure 1-17 Typical Residential Tower of the 1970s: **60% Balconies**

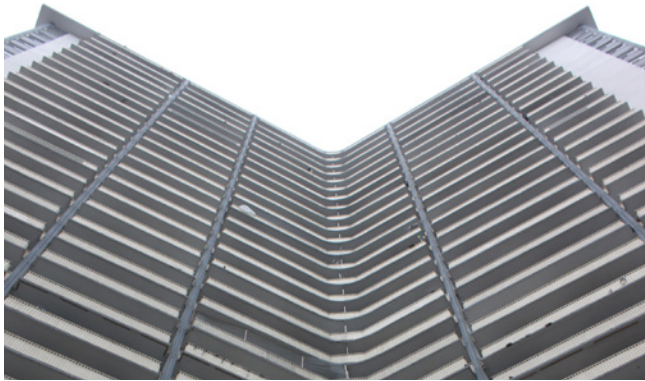


Figure 1-18 Typical Residential Tower of the 1970s: **80% Balconies**



Figure 1-19 Typical Residential Tower of the 1970s: **100% Balconies**



Figure 1-20 Typical Residential Tower of the 2010s: **40% Balconies**



Figure 1-21 Typical Residential Tower of the 2010s: **60% Balconies**



Figure 1-22 Typical Residential Tower of the 2010s: **80% Balconies**

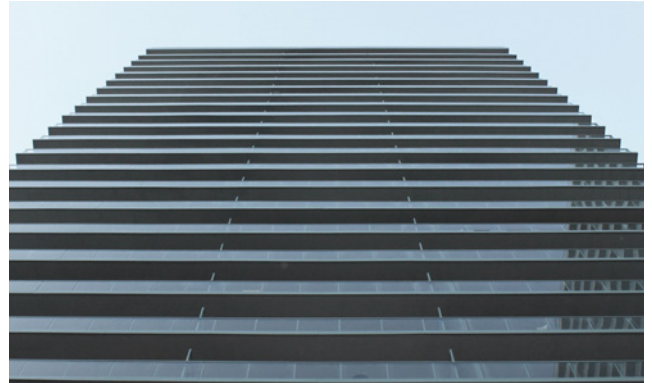


Figure 1-23 Typical Residential Tower of the 2010s: **100% Balconies**

1.3 DESIGN PROPOSAL

The proposed design investigation focuses on the vertical threshold of residential towers—the balcony—and proposes the combination of the ideas of re-skinning with the development of a modular expandable and alterable system. The design research proposes that the urban qualities of the neighbourhood can be improved by reducing its rigidity and investigates the introduction of elements that are versatile, interchangeable and adaptable to different conditions. The design research does not investigate concepts for the environmental re-skinning and the building envelope, but rather the reconsideration the building envelope as an extended threshold with the ability for environmental, social and programmatic mediation.

The redevelopment case studies in this thesis investigate the reconsideration of the relationship of the residential towers to the street level through an integration of a podium in which multi-uses and flexibility is accounted for. This is while the vertical threshold of the building—and life and communication on the facade—is typically undermined, and the role of the balcony as an extension of the interior space into a domain of exterior communication is ignored. The design investigation will propose ways to adapt the structured system of a typical residential tower complex through small-scale strategies. Within a proposed extended balcony, “the communal spaces that already exist ‘informally’ now can be multiplied. It is certain that some of these ‘spots’ escape any traditional classification of public space, but they are there and they possess an undeniable strength linked to their use.” These communal balconies can be seen as spontaneous urban spaces arising out of a “geographical and a social concordance, uses and needs.”⁶

6 Druot, Frederic, Anne Lacaton, and J. P. Vassall. 2007. Plus: Large-scale housing development. Barcelona: Gustavo Gili, 57.

In this manner, imagining a participatory architecture in the future that can be understood as incomplete, the creation of an “architectural field”—the building as a collection of parts responding to various forces in real-time, and a “system of modulation” that can reconsider and re-evaluate itself over time.⁷ The aim of the design exercise will be to propose an open and inclusive system that can be adjusted while being connected—with the aim of extending the duration of the architectural relevance.

7 Hensel, Michael. 2013. Performance-oriented architecture: rethinking architectural design and the built environment. AD primers. West Sussex: John Wiley & Sons Ltd, 11.

As a summary, the design outcome of this thesis will aim to investigate a strategy that can respond to the social, economical and energy requirements of tower neighbourhoods if implemented at a large scale. Through the introduction of an adaptive vertical threshold, the design strategies explored in this thesis will therefore specifically focus on the design of an extended residential balcony. Therefore, the design strategies focus on private spaces of the balcony and the semi-private realm of collective spaces within the building. The application of the designed system to the podium level, to commercial programming and its implications for the public street-scape is outside the scope of this thesis.

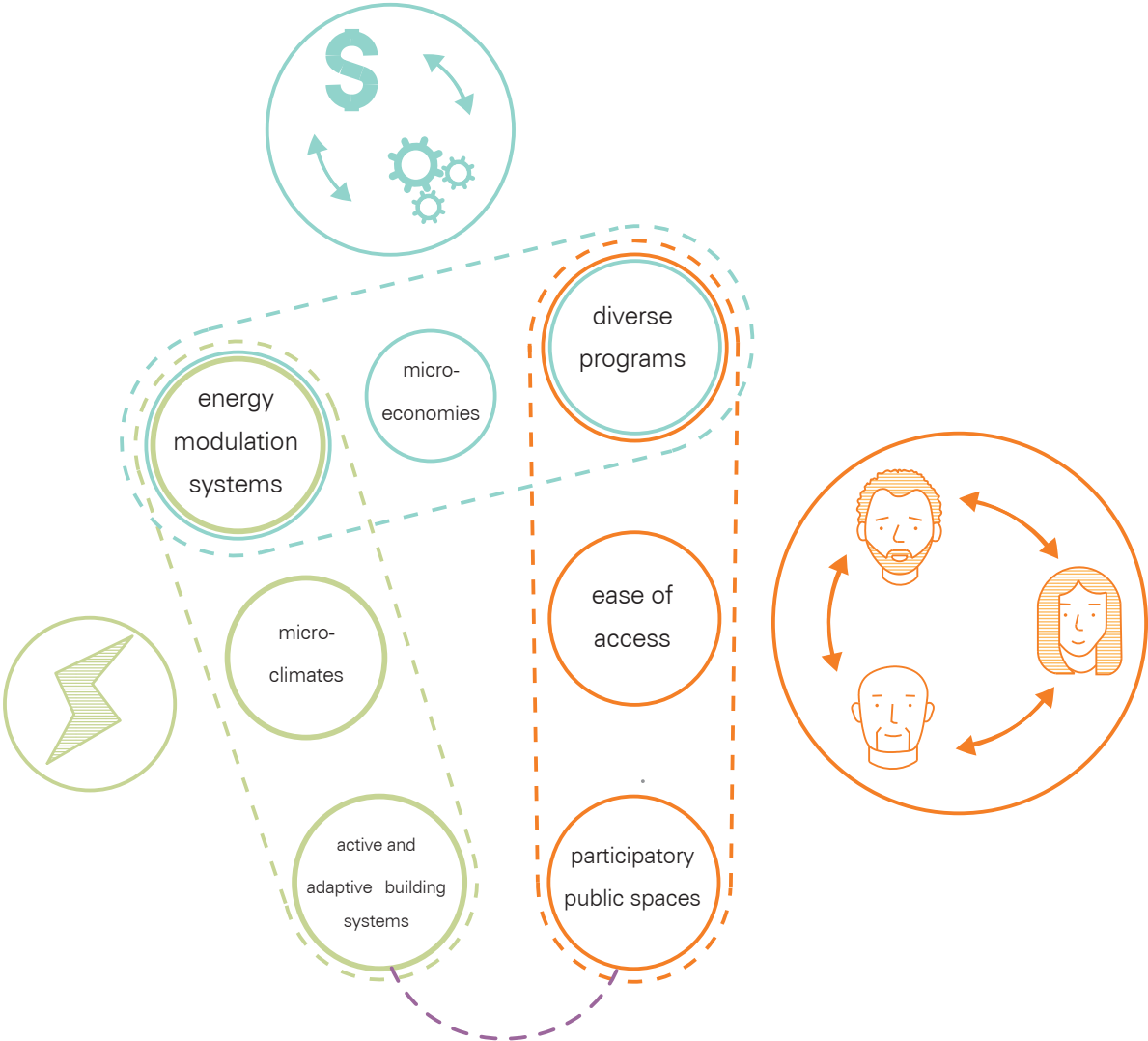


Figure 1–24 Energy saving and production strategies, strategies for economical empowerment and strategies for improving social interaction within tower neighbourhoods are highlighted (strategies are summarized from the Mayor’s Tower Renewal Project). The overlaps between these strategies are highlighted. It is within the ambition of this thesis to propose an open design system that allows the activation of these strategies at the level of the individual unit through the creating of adaptive and expandable and communicative balconies.



Figure 2–1 Typical “Tower-in-the-Park”
Neighbourhood: Etobicoke, Toronto

8 Kesik, T., and I. Saleff. 2009. Tower renewal guidelines for the comprehensive retrofit of multi-unit residential buildings in cold climates. Toronto: Daniels Faculty of Architecture, Landscape, and Design, University of Toronto, 14.

9 *ibid.*

10 Anderson, Chris. 2014. *Makers: The new industrial revolution*. New York: Crown Business.

2.0 RESIDENTIAL TOWERS

2.1 RECONSIDERING TOWER NEIGHBOURHOODS

The rigidity in the residential formation and formal structure of the tower neighbourhoods in discussion have prevented the neighbourhoods from meeting the variable requirements of the inhabitants in terms of public amenities, basic services and cultural programming. Strategies for creating more sustainable and versatile tower neighbourhoods, as outlined by the city of Toronto’s “Tower Renewal Guidelines” can be implemented to break the rigidity of the uniform residential program within the towers. Primarily, with the introduction of new programmatic strategies within the organization of the neighbourhood, it is proposed that these neighbourhoods could be transformed into lively, well-knit and self-sustaining urban-villages. The secondary strategy that could lead to more versatile tower neighbourhoods is the introduction of density and variation within the housing typology—creating flexibility within the housing units.³

Introduction of auxiliary programs within the structure of the towers, with the capacity for adaptation, is a strategy that will allow the residential towers to reciprocate with the needs and expectations of the residents and evolve over time⁹. In this way, creating mixed-use hybrid towers through reprogramming will allow for the creation of self-sufficient neighbourhoods for the future. The introduction of subsidiary programs within the neighbourhood can include commercial, cultural and service programs. These programs will allow for increased density, pedestrian flow and social gathering of occupants—all of which support informal opportunities for community engagement. The addition of social and circulatory programs to the structure of tower neighbourhoods can happen at different scales and throughout the building and accommodating for multiple uses from at-grade retail to small-scale production methods and cottage industries within the residential units¹⁰.



The Secondary strategy for the revitalization of the neighbourhood is to accommodate higher density and variation within the housing typology. Housing guidelines within the downtown core have changed drastically from former requirements of 90% open space.¹¹ The introduction of infill housing within the infrastructure of the towers and creation of variation within the housing typology are also elements that can disrupt the rigidity of the towers. The creation of opportunities for adaptation of the residential units becomes integral to creating a versatile tower. In this way, the vertical threshold can be seen as a place where the mediation between the residential program and the adaptation from one program to another occurs. The increase in density, variation and flexibility within the housing units are seen as a strategies to create multi-faceted and diverse tower neighbourhoods. New infill, providing much needed housing options for current residents and the city at large, provided both at the grade level or as extensions to the towers¹² can give better definition and form to the open areas and in-between voids of the tower in the park morphology of tower neighbourhoods. Extensions integrated within the existing buildings organized in a way to better define the urban realm, create active public spaces and engage occupants and pedestrians through effective pathways and flows. The creation of an extended podium that will help develop a defined street edge and an extension to the balconies, can be examples of adding density and more flexibility to the existing housing stock.¹³

Figure 2–2 St. James Town Apartment Neighbourhood, Toronto

11 Kesik, T., and I. Saleff. 2009. Tower renewal guidelines for the comprehensive retrofit of multi-unit residential buildings in cold climates. Toronto: Daniels Faculty of Architecture, Landscape, and Design, University of Toronto, 10.

12 Druot, Frederic, Anne Lacaton, and J. P. Vassall. 2007. Plus: Large-scale housing development. Barcelona: Gustavo Gili.

13 Kesik, T., and I. Saleff. 2009. Tower renewal guidelines for the comprehensive retrofit of multi-unit residential buildings in cold climates. Toronto: Daniels Faculty of Architecture, Landscape, and Design, University of Toronto.

CURRENT STRATEGIES

14 Mayor's Tower Renewal Opportunities Book:

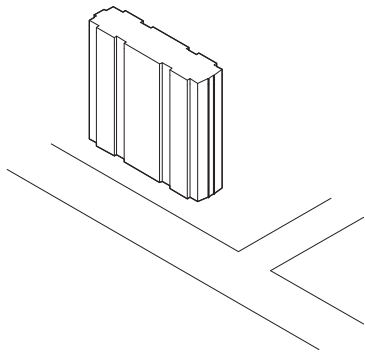
<http://era.on.ca/2008/09/02/mayors-tower-renewal-opportunities-book/>

15 E.R.A Architects: The Tower Renewal Project:

<http://www.eraarch.ca/project/the-tower-renewal-project/>

Some of the ways of restructuring existing monolithic towers and their surroundings can be summarized in the following points. These concepts are extensively presented in the Mayor's Tower Renewal Opportunities Book¹⁴ and have been developed in partnership with the University of Toronto, E.R.A Architects, and the City of Toronto. From 2007 onwards, the City of Toronto has adapted these concepts and has begun their implementation.¹⁵ Examples of development projects currently under construction under these guidelines will be explored later in this chapter.

- ① **The Addition of a Podium:**
Podiums can incorporate amenities, retail and commercial activity in existing structures. The podium structure can also help to create a better street edge and connection to the neighbourhood.
- ② **Increasing Housing Density:**
The addition of housing units to existing structures can respond to the increasing demand of housing in already dense urban areas and to better shape the open areas within apartment neighbourhoods.
- ③ **Addition of Interior and Exterior Amenities:**
The incorporating of interior and exterior amenities within residential towers add variety of programs and use and will greatly improve the quality of life within these buildings.
- ④ **Incorporating Different Types of Housing:**
Integrating rental units, condominium apartment, as well as social housing within one structure increases the diversity of the population and will benefit the structure of the neighbourhoods at large.
- ⑤ **Improving Energy Consumption and Incorporating Energy Production Systems:**
Incorporation of sustainable energy systems and measures in order to improve the efficiency of the building and to participate in energy generation will benefit the energy costs of the building and the overall sustainability of the neighbourhoods.
- ⑥ **Incorporating Ways to Encourage Connectivity:**
Increasing opportunities for connectivity within the structure of one building and between a cluster of buildings increases social connection and interaction.



Typical Condition of Existing Residential Towers

Common Methods for Improving Apartment Neighbourhoods:



Increasing Density



Adding Variety of Programs



Increasing Connectivity



Improving Energy Consumption and Incorporating Energy

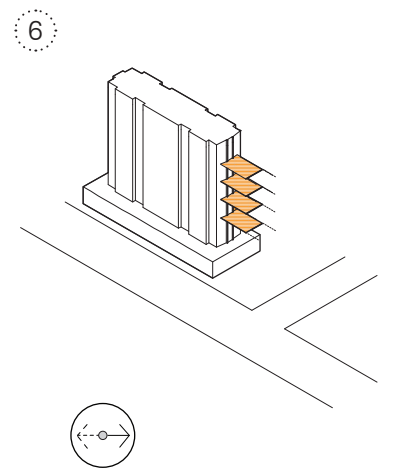
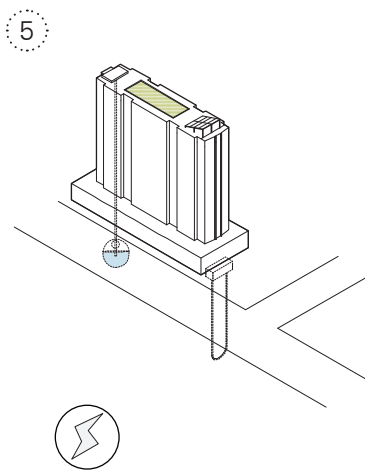
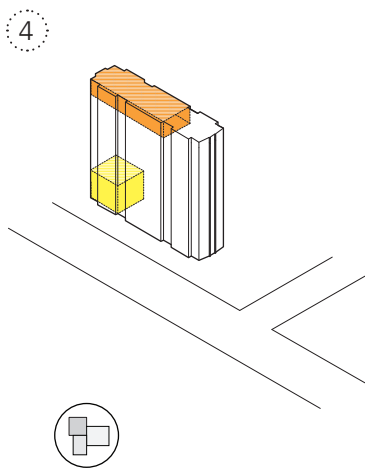
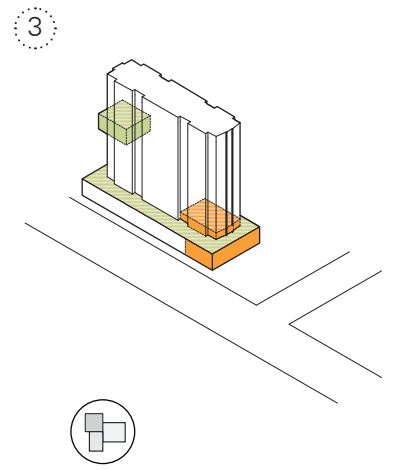
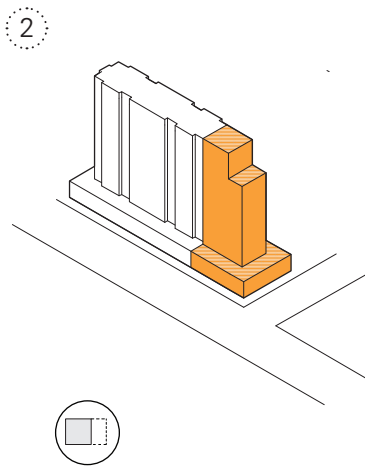
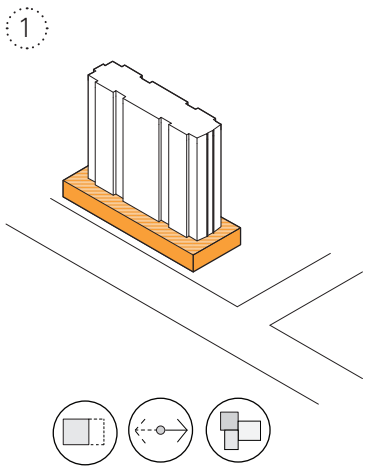


Figure 2-3 Diagrams of Current Strategies Being Implemented Across the City of Toronto



Figure 2-4 Extension to 66 Isabella Street, Toronto: Currently Under Construction

TOWER RENEWAL DEVELOPMENTS
IN TOWER NEIGHBOURHOODS:

66 ISABELLA STREET &
620 CHURCH STREET, TORONTO



Figure 2-5 Image of the Residential Extension at 66 Isabella Street, Toronto and Podium

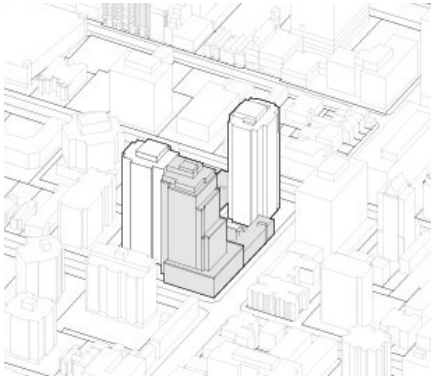
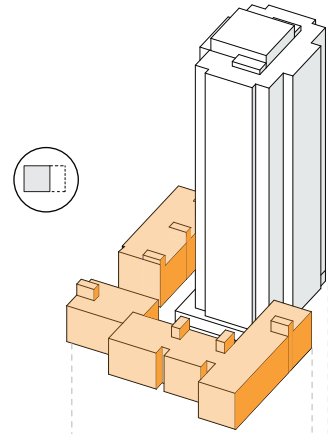


Figure 2-6 Case Studies in Context



- New Developments:
- rental units
 - condominium units
 - interior amenities
 - exterior amenities
 - retail

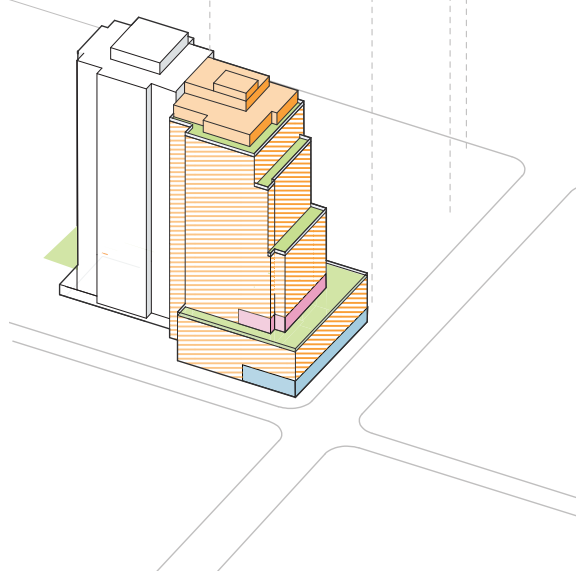
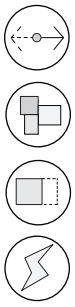


Figure 2-7 **top** 620 Church Street Development
Figure 2-8 **bottom** 66 Isabella Street Development

NEW DEVELOPMENTS IN TOWER NEIGHBOURHOODS:

545-556 SHERBOURNE STREET &
159 WELLESLEY STREET, TORONTO

New Developments:

-  rental units
-  condominium units
-  habitat for humanity units
-  interior amenities
-  exterior amenities
-  retail

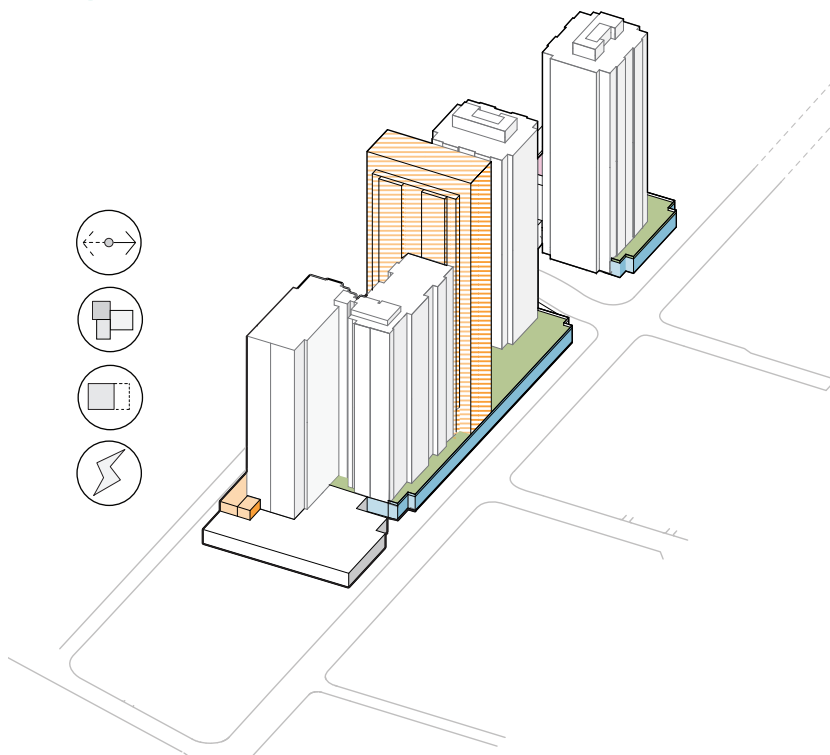


Figure 2-9 545-556 Sherbourne Street

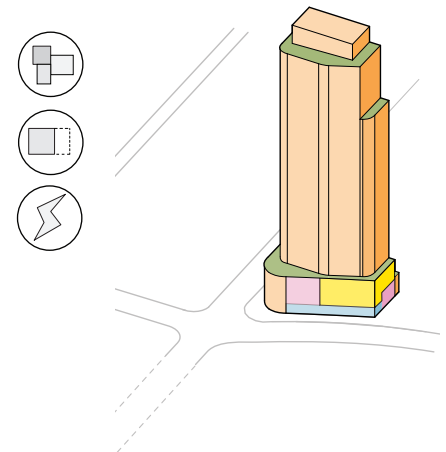


Figure 2-10 159 Wellesley Street

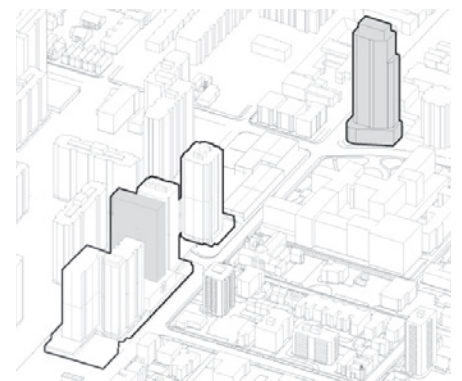
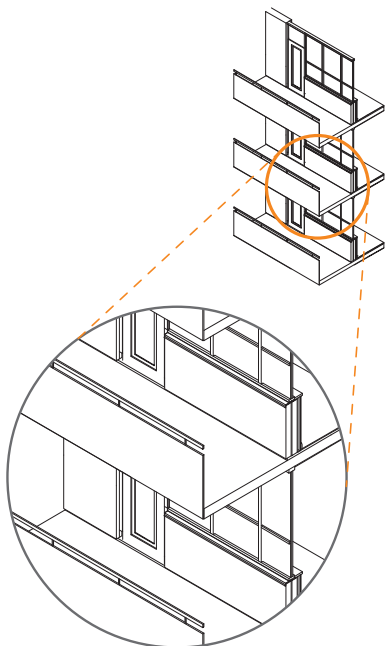


Figure 2-11 Case Studies in Context



Figure 2-12 **top** Balconies in the Process of Reconstruction: North York, Toronto

Figure 2-13 **bottom** Existing Conditions of a Typical Residential Balcony



2.2 INSULATING AND THE RE-STRUCTURING OF EXISTING BALCONIES

While reprogramming and densifying residential towers aim at increasing the urban relevance of tower neighbourhoods¹⁶, reconsidering the building envelopes and balconies of the towers in discussion—as the main contributor to the environmental performance of dated residential towers—are highly important. The introduction of mechanical and electrical systems, within the structure of the towers specifically, has put a stop to the evolution of flexibility that was historically possible through vernacular architecture. The mechanical-electrical interior climatic modulation has flattened the building envelope leading to the elimination of intermediary spaces that were traditionally incorporated as “architectural means of environmental provision and adaptive inhabitation.” This conditioning of the interior has resulted in the dependence on the production of the envelope based purely on technology—a barrier that has limited the creation of urban form and experimentation within it.¹⁸ Typical building envelope systems, as well as common over-cladding systems, have a maximum effective service life of about 50 years. This is while monolithic concrete structures, common to high-rise residential contexts, last 200-250 years when well-protected from environmental weathering. In this manner, re-cladding currently failing envelope systems is viewed as an effective and immediate solution for the prolonging of the life of towers as a whole and the improving of their energy performance. The thermal bridging due to the monolithic and continuous structure of concrete floor slabs can be categorized as a major factor of energy loss and the basis for health issues in these towers (Figure 2-13). This is while,

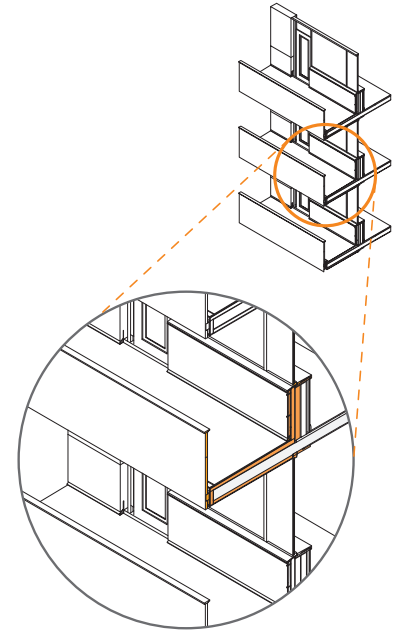


Figure 2-14 **top** Restructuring and Insulating Existing Balconies

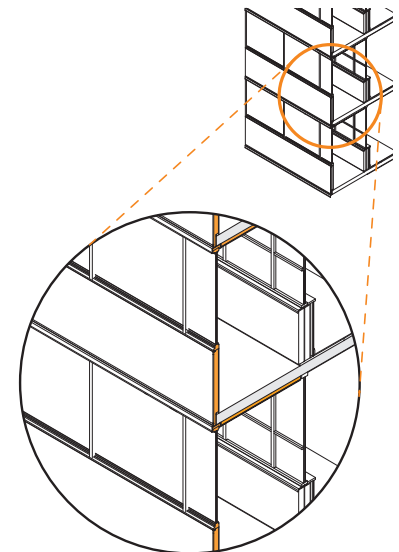
Figure 2-15 **left** Proposal of Reskinning and Insulating of Balconies: "Tower Renewal Guidelines"

Figure 2-16 **bottom** Closing in and Insulating Existing Balconies

16 E.R.A Architects: The Tower Renewal Project: <http://www.eraarch.ca/project/the-tower-renewal-project/>

prevalent and common strategies for re-cladding towers typically undermine the balcony as a major contributor to the energy performance.

Restructuring the building envelope to increase the environmental performance and to eliminate tenant health hazards primarily include thermally insulating the envelope in order to improve building performance and the elimination of thermal bridging in the balconies (Figure 2-14). A secondary strategy is the enclosing of balconies and creating a unified enclosure over the building facade—with the aim of increasing thermal performance and occupant comfort and the reduction of mold and health hazards (Figure 2-16).¹⁷ Thermally over-cladding the envelope and permanently enclosing balconies as a solution, will strengthen the thermal boundary of the building and will aim at creating a more rigid boundary between the interior and the exterior. This approach is referred to as "the engineer's approach", and contributes to a mainstream and traditional environmental division.¹⁹ This "engineer's approach", as a rigid response, has a finite applicability and mainly involves the "styling of the building envelope"²⁰ and results in the thickening of the boundary between the interior and the exterior. It must be noted that largely, an immediate and common strategy for improvements to the general condition of residential towers is generally through the remediation of the balconies—involving thermal insulation of the balcony and simple aesthetic and structural improvements to the balcony structure and railings (Figure 2-15).



17 Kesik, T., and I. Saleff. 2009. Tower renewal guidelines for the comprehensive retrofit of multi-unit residential buildings in cold climates. Toronto: Daniels Faculty of Architecture, Landscape, and Design, University of Toronto.

18 Hensel, Michael. 2013. Performance-oriented architecture: rethinking architectural design and the built environment. AD primers. West Sussex: John Wiley & Sons Ltd, 32-33.

19 Ibid, 83.

20 Ibid, 32.



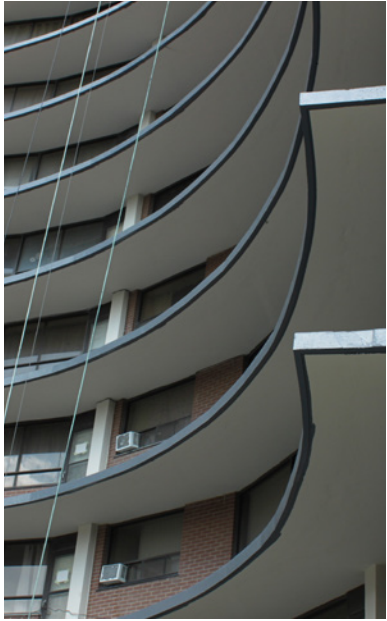


Figure 2-17 **top left** Cluster of Buildings in an Apartment Neighbourhood Undergoing Balcony Reconstruction: Eglinton West, Toronto

Figure 2-18 **top right** Reconstruction Completed

Figure 2-19 **bottom** Reconstruction in Process





Figure 2-20 **top left** Balconies in the Process of Being Restructured: North York, Toronto

Figure 2-21 **top right** Balcony—Not renovated

Figure 2-22 **middle** Balcony—In the process of renovation

Figure 2-23 **bottom** Balcony—Completed

2.3 LAYERING OF THE BALCONY

A third strategy in dealing with issues of re-cladding and thermal bridging is the focus on the reconsideration of the balcony and designing new operable balcony enclosures within the boundary of towers—which resonates with what is referred to as “the architect’s approach”.²¹ In this moderating strategy, contrary to the rigid approach previously mentioned in which “technologically facilitated exchanges” are processed, the result can be the flexibility of use of the space as a more spatial approach to deal with the re-cladding of the towers. This can include new operable balcony enclosures, and the extension of the balconies to cover cladding as an extended vertical threshold.²² The design of these interstitial spaces will create a usable space in the winter while opening to the outside and allowing more environmental engagement between the interior and the exterior.²³ The idea of a three-dimensional façade, and the layering of different systems in order to create an environmental mediation is intended with this approach.²⁴ This flexible, integrated and layered approach is more concerned with gradation, transition through zones and participation in a range of “interlinked environmental and ecological processes.”²⁵ In this strategy, the building envelope and the balcony need to be considered not as a single-layer boundary that will limit variation, but on the contrary, considered as a three-dimensional and layered building envelope can accommodate for variation in the building façade, the creation of micro-climates and the accounting for informal occupant behaviour within its limits.²⁶ Examples of this strategy can be widely seen in the works of Lacaton and Vassal with their numerous projects of re-addressing dated residential towers (Figure 2–24, Figure 2–25).

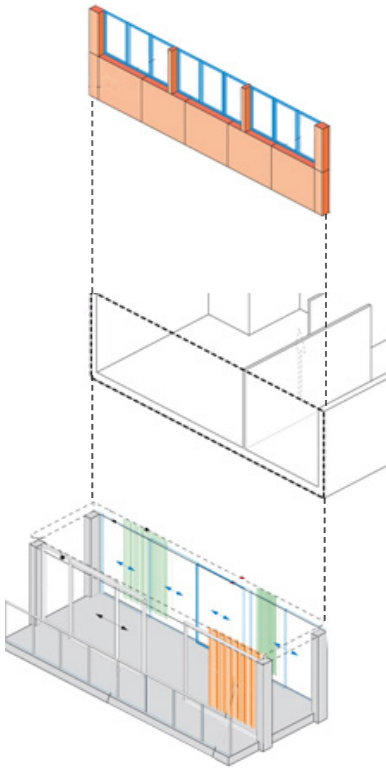


Figure 2–24 Replacing the flat envelope with an extended threshold. Based on diagram by Lacaton and Vassal.

21 Hensel, Michael. 2013. *Performance-oriented architecture: rethinking architectural design and the built environment*. AD primers. West Sussex: John Wiley & Sons Ltd, 83.

22 Druot, Frederic, Anne Lacaton, and J. P. Vassall. 2007. *Plus: Large-scale housing development*. Barcelona: Gustavo Gili.

23 *Ibid.*, 86.

24 Druot, Frederic, Anne Lacaton, and J. P. Vassall. 2007. *Plus: Large-scale housing development*. Barcelona: Gustavo Gili, 15.

25 Hensel, Michael. 2013. *Performance-oriented architecture: rethinking architectural design and the built environment*. AD primers. West Sussex: John Wiley & Sons Ltd, 33.

26 *Ibid.*



Figure 2–25 **left** The Addition of the Extended Balcony and the transformation of the dated tower: Lacaton and Vassal, Paris.

2.4 RESIDENTIAL TOWERS: THE FUTURE

Densification, heterogeneity and the shift towards sustainable structures generally address the current needs of tower neighbourhoods alongside a need for local energy generation and production. These demands are a response to increasing urbanization, the need for walkable neighbourhoods, changing and varied demographics and a need to address environmental concerns. While addressing these mentioned issues rooted in the past, the reconsideration of tower neighbourhoods also need to take into account current shifting paradigms and the future needs of the city and the occupants. According to ARUP, some of the “drivers of change” that will directly affect dense urban factors in the future and which must be addressed in the design of the built environment include: population growth and urbanisation, climate change, new patterns of food production, scarcity of natural resources, environmental consciousness, smart cities and intelligent buildings, nano- and biotechnology revolution, robotics and automation, user-driven design and community and systems integration.²⁷ This speculation is part of a study done by Arup Foresight, a part of the Arup University where:

“The team covers the entire knowledge value-chain, from understanding future trends and identifying areas for development, to delivering collaborative research programmes and pursuing opportunities for innovation.”²⁸

While the current global rate of urbanization surpassed 50% by the end of 2008, it is predicted that by 2050, 64% of the developing world and 86% of the developed world will live in cities.²⁹ In just over two decades (1990-2013), while Canada’s overall population increased by 28%, the urban centers—defined with populations of over 1 million—experienced an average population increase of 45%. Toronto specifically, as the most populous and urbanized city of Canada, has experienced an increase of 40% in population within this time frame.³⁰ While the increase in urbanization will only be on the rise in the next few decades—the depletion of natural resources, rising energy prices, and changes in environmental patterns and its effects on natural disasters are also important considerations in the future of our built environments.

As cities and their functioning will become increasingly pivotal in the future, the demands on the design of urban environments and the pressure to respond to the changing needs of the future will also be inevitable. We are only a few

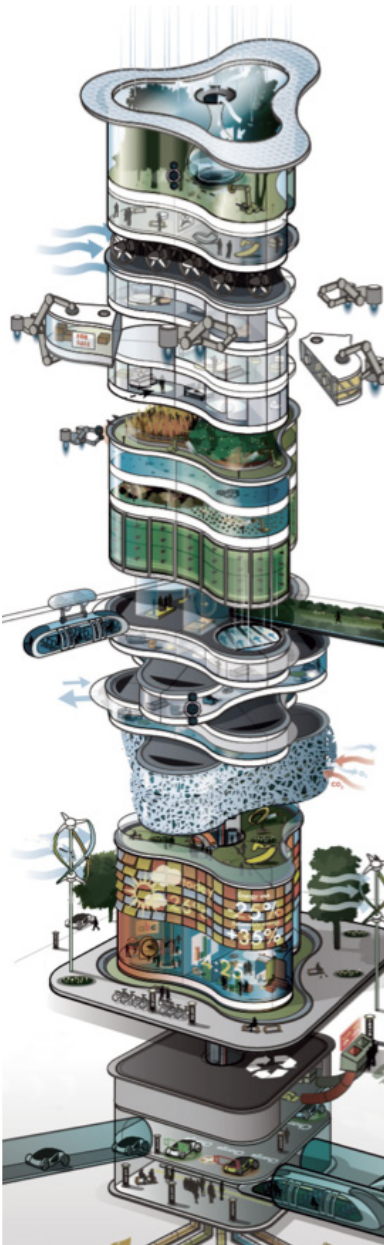


Figure 2-26 Arup’s Tower of the Future. Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation.

27 Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation.

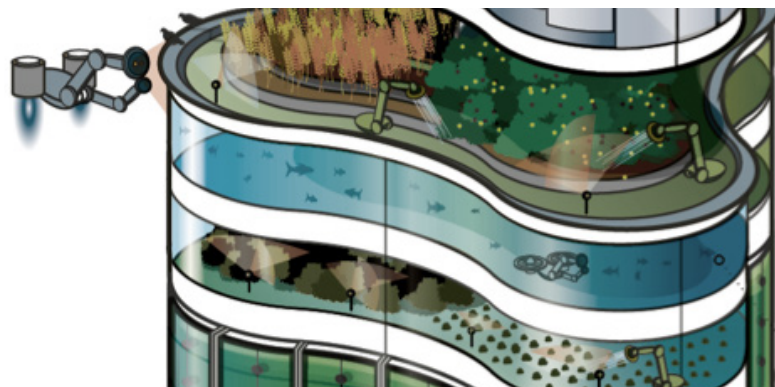
28 <http://www.driversofchange.com/projects/#type=publication>

29 <http://en.wikipedia.org/wiki/Urbanization>

30 <http://data.worldbank.org/country/canada?display=default>

31 Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation, 3.

Figure 2-27 Incorporating Ecological Systems and Various Programs within the Building: Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation.



decades away from “net-native adults”³¹, a generation that has entirely dealt with smart materials, systems and devices, shaping the base of society and drastically changing its ideals. In terms of how our cities will be shaped and function, ARUP believes that by 2050 cities will be a place where:

“Everything can be manipulated in real-time and where all components of the urban fabric are part of a single smart system and an internet of things. These expectations set the tone for an environment that invites adaptation with ease; a place where hard infrastructure, communication and social systems are seamlessly intertwined, with a conscious necessity to integrate and engage in sustainable design practices.”³²

32 Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation, 3.

In the next few decades, it is anticipated that the urban citizen and the environment will be in “constant flux”—needing to adapt and evolve in response to rapidly varying circumstances. The built environment prepared for the future therefore needs to embed the ability to change, adapt and recondition as an inherent attribute—able to respond to external environmental factors and participating with the occupants. Arup extendedly views the future of the urban building as: “a dynamic network of feedback loops characterized by smart materials, sensors, data exchange, and automated systems that merge together, virtually functioning as a synthetic and highly sensitive nervous system.”³³ In this sense therefore, the urban building must be equipped with systems and parts to be able to sense and respond intelligently to its surrounding.³⁴

33 Ibid.

34 Ibid.

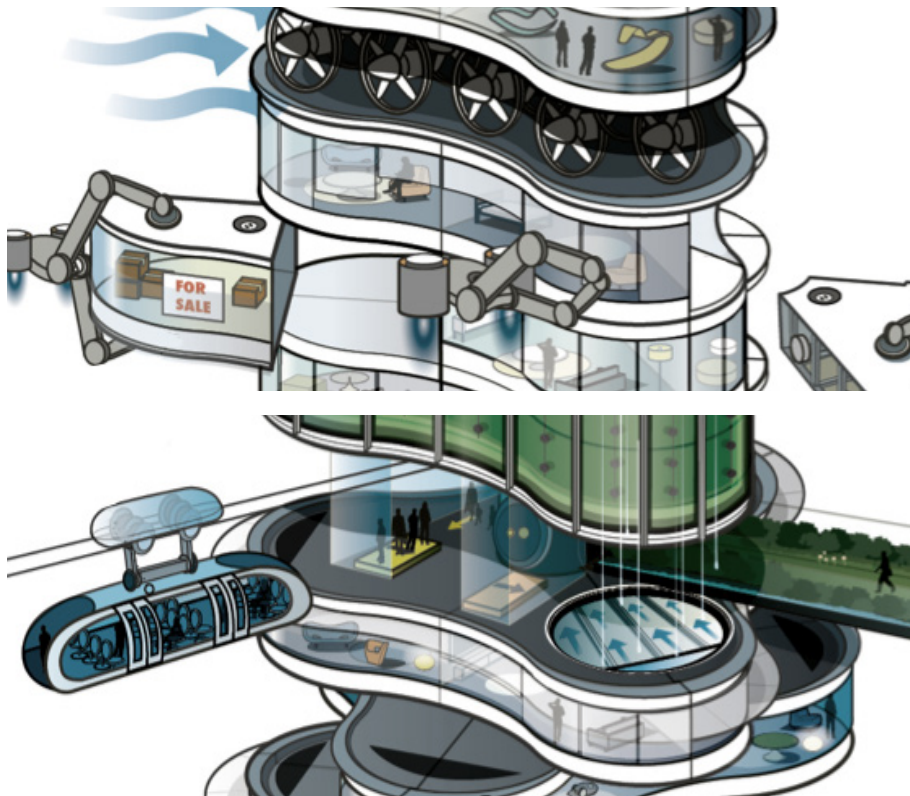


Figure 2–28 Incorporating Changeability of Function as well as Energy Modulating Systems within Buildings: Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation.

Figure 2–29 Incorporating Infrastructure for Connectivity Between Units and Between a Cluster of Buildings to Reinforce Communication: Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation.

2.5 ADDRESSING THE PRESENT AND ANTICIPATING THE FUTURE

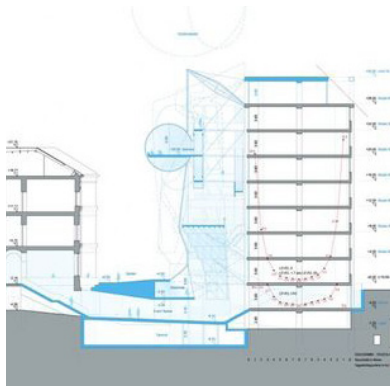


Figure 2–30 **top** Extension to Current Building - University of Applied Arts Vienna by Wolfgang Tschapeller.

Figure 2–31 **bottom** Section of Added Layers - University of Applied Arts Vienna by Wolfgang Tschapeller.

35 Hargrave, Josef. 2013. London, UK: Arup Foresight & Innovation.

Accepting the addressed anticipated future for urban environments as a plausible reality, it becomes important to consider the implications of this future on the existing fabric of cities. Concepts of reviving residential towers, re-skinning and the re-structuring of tower neighbourhoods in order to address the immediate needs of the present, must then be reconsidered. By doing so, equipping existing residential towers for the future requires the reconsideration of their role in participating within the future urban environments. There are many elements necessary for the “Tower of the Future” according to ARUP’s speculations that are directly of interest to the context of this research. These factors address the reconsideration of construction methods, creating opportunities for physical connections, emphasizing community connection and engagement, enabling energy and food production and the investigation of new technologies.

Modular building components that can be easily updated and altered over time, and enabling building structures to be communicative are ways to reconsider the construction of future towers. Physically connecting units, and the creating spaces of interaction between will also enhance the possibilities for community interaction. Creating community spaces, such as exhibition and gallery facilities, and incorporating public programs, such as community health and education centers, promoting social interaction and community engagement. Integrating energy production systems, water collection and recycling systems and urban food production modules will be a necessity for the sustainability and the economy of future towers.³⁵ An extended vertical threshold that encompasses different layers of programming, circulation and collective spaces can be seen in the University of Applied Arts Vienna by Wolfgang Tschapeller (Figure 2–30, Figure 2–31).

The case for reskinning, densification, variation in housing typology and addition of public and social programming—as current needs of tower neighbourhoods therefore need to be combined with elements that will prepare residential towers of the future in order to equip dense built environments for variations in their requirements. The development of towers for the future therefore is in need for an integrated and networked approach. This design research focuses on not simply the building envelope, but the “vertical threshold” of residential towers as an extended exterior space—the balcony—in the re-skinning and reconsideration of the tower neighbourhood. Through the reconsideration of the extended living spaces and their role within the urban fabric, the design research will address the most relevant areas of interest from the ARUP Foresight study regarding the urban building of the future.



3.0 INVESTIGATING THE NEED FOR ADAPTATION AND COMMUNICATION

3.1 INTRODUCTION

Figure 3–1 Informal Balcony Alterations at 31 Alexander Street - City Park Co-operative Apts. Inc.

36 Performance-oriented architecture: rethinking architectural design and the built environment. AD primers. West Sussex: John Wiley & Sons Ltd, 32.

37 Eisinger, Angelus, ed. 2012. urbanRESET: How to activate immanent potentials of urban spaces. Bilingual edition ed. Berlin: Birkhauser Architecture, 239.

The environmental conditioning of the modern building has significantly limited it in form—tower neighbourhoods and the typical residential tower block being a consistent example of this. From the late 1950's onwards, mechanical and electrical conditioning of interior environments led to the flattening of the exterior building envelope, which has resulted in the minimization of environmental exchanges and adaptive habitations.³⁶ The post-industrial buildings under study are therefore not easily resettable or adaptive to change. As mentioned, they are too specialized and monolithic, and "have lost elements of indeterminacy"³⁷, particular characteristic of vernacular architecture of the past and



informal settlements of the present. It is within the exploration of this essay to argue that sustainable urban environments of the future need to account for elements of uncertainty and indeterminacy in order to build resilience through enabling mechanisms for adaptability and connectivity. It is within the understanding of this investigation that social and cultural complexities of the time “demand networked systems that are dynamic, flexible and participatory”.³⁸ The following exploration will aim at exploring strategies and precedents for developing such systems.

³⁸ Spyropoulos, Theodore, John Frazer, and Patrik Schumacher. 2013. *Adaptive ecologies: Correlated systems of living*. London: Architectural Association Publications, 150.

Cities have historically been characterized with transformation—they constantly grow or decay and this uncertainty of development or disappearance has always been a part of the narrative of the city. With modern rates of urbanization however, there is no longer an alternative to the proliferation of urban centers and an urgent need for enabling the healthy growth of our current cities. Understanding the role of uncertainty within the development of cities, and incorporate this as a factor within the design process, is therefore vital in the development and evolution of cities. Meanwhile, the current urbanization and development culture gives prominence to short-term objectives at the cost of long-term ability for adaptation and stability. Indestructibility and permanence can be said to be naturally resistant to the inherent transformational needs of cities. Therefore, the durability of the built environment creates a duality between the desire for permanence and the temporal reality of urbanism. Considering transformation as the only constant trait of urbanity, it is important to facilitate for this change over time through constant adaptation instead of cyclical destruction and reconstruction.³⁹ Within the current short-termism culture of cities therefore, the future lies “between planning and emergence, top-down control and self-organization”⁴⁰, and the ability to account for the factor of uncertainty in the design of the built environment.

39 Verebes, Tom, ed. 2014. *Masterplanning the adaptive city: Computational urbanism in the twenty-first century*. New York: Routledge, 235.

40 *Ibid.*

41 Provoost, Michelle. 2009. *New towns for the 21st century: The planned versus the unplanned city*. Pompano Beach: Sun Publishers, 151.

42 Verebes, Tom, ed. 2014. *Masterplanning the adaptive city: Computational urbanism in the twenty-first century*. New York: Routledge.

43 Pask, G. 2002. “The Architectural Relevance of Cybernetics,” in *Cyber Reader: Critical Writings for the Digital Era*, ed. Neil Spiller. London: Phaidon, 82.

Masterplans are always based on the known present and speculated future needs of society, and disregard the reality that the social and built environments are always in flux. “Urban space is contradictory to any attempt at total control”⁴¹—a control which is fundamental to ideals of planning and design. The reality of inhabited environments is the tendency for customization, and the deviation from strict ideas and picturesque plans of the designer. While discussing design at an urban scale, the practice then become one less “of control than a simultaneous confrontation with and embracing of uncertainty.”⁴² The notion of uncertainty here emphasizes the importance between formal planning and the unpredictable transformation of the city by its own residents and users. Embracing ideas of uncertainty raises questions therefore of how adaptation can be incorporated within design strategies at the urban scale. Aiming to create urban plans that do not serve as blueprints for the future—where everything is static in time—rather environments that can be altered by expected and unexpected inputs therefore becomes a priority. Within this discussed context, the role of the designer then can be defined as being focused on “the interaction between the system and the people who inhabit it” instead of the traditional way of “the interaction between the designer and the system he designs”.⁴³ The designer then is no longer the master-mind behind the design or the controller, but rather the designer of a series of strategies—which through participation and over time builds upon evolving results.

3.2 ADAPTABILITY AND CONNECTIVITY AS STRATEGIES

In order to propose ways to incorporate uncertainty in the built environment, means through which it can be processed and achieved will be discussed through the investigation of concepts of adaptability and connectivity. By investigating the role and importance of adaptability and connectivity in urbanism, strategies will be outlined that deal with circumstances of the city in a small-scale, bottom-up approach. Also, tools for inviting participation within the built environment will be investigated. Adaptability is defined here as an ability for the built environment to facilitate change over time. This is while connectivity, takes into account the importance of collective spaces, mediating thresholds, and the ability for the built environment to reflect the need for the processing of occupant needs based on the flexibility of connections, and allowing it to shape the future of cities and how they are organized.

Primarily in the discussion for adaptability, concepts of informality and urban re-settability and their role in preparing for an uncertain and changing future—this essay proposes these concepts as tools for realizing adaptation within a residential context. Informality, re-settability and uncertainty in contemporary built form are explored in order to bridge between the duality of permanence and transformation, in order to enable real-time adaptation and change over time possible within the context of existing cities. Secondly, concepts of connectivity and communication will be discussed which will outline the importance of connective frameworks, and defining the basis for concepts of intelligent urban environments of the future and considering the role of dated residential buildings within it.

3.3 ADAPTABILITY

In the ever-changing dynamics of the contemporary city, it can be observed that rigidity and vigorously determined designs will not be able to keep up with the changing realities of the built environment.⁴⁴ This can be widely observed in the discrepancies between the ideals of planners and the changing needs of residents over time, which can manifest when formally given a chance—as in the case of Ramot Housing (Figure 3–8 on page 39). As pointed out by Michael Hensel, “architecture is inherently time and task specific”, and therefore pre-qualified designs will prove to be incompetent in the face of time.⁴⁵

As a response, this design research investigates the breaking of this rigidity through the reinforcing of subtle exchanges as a way to deal with contingency. A framework formed by emergent, evolutionary and ever changing interaction can result in an anti-static and anti-masterplanning future formed for the future of cities.⁴⁶ An adaptive system is therefore proposed on the basis of a behavioural approach—based on the reality that occupants are not passive in relation to their environment, and with given opportunities and tool-sets that can begin to participate in the formation and adaption of the built environment. An example of this can be seen in the City Park Cooperative Apartments in Toronto (Figure 2–29 on page 51) where with simple modulations and small scale changes to the balconies, the inhabitants have been able to customize their exterior spaces according to their needs.

In order to investigate methodologies for the design of an adaptive design system in this thesis, it will be the aim to incorporate elements of the “unplanned” within the formally designed and operating tower neighbourhoods. In this manner, creating a hybrid of urban planning—a framework that allows for control and which at the same time anticipates and accommodates change.⁴⁷ In order to be able to propose a design strategy that will incorporate and engage flexibility and changeability, ideas of the informal and participatory architecture will be further investigated.

44 Provoost, Michelle. 2009. *New towns for the 21st century: The planned versus the unplanned city*. Pompano Beach: Sun Publishers, 9.

45 Hensel, Michael. 2013. *Performance-oriented architecture: rethinking architectural design and the built environment. AD primers*. West Sussex: John Wiley & Sons Ltd, 15.

46 Spyropoulos, Theodore, John Frazer, and Patrik Schumacher. 2013. *Adaptive ecologies: Correlated systems of living*. London: Architectural Association Publications.

47 Provoost, Michelle. 2009. *New towns for the 21st century: The planned versus the unplanned city*. Pompano Beach: Sun Publishers, 274.

3.3.1 INFORMALITY: UN-PLANNING THE PLANNED

"Informal urban growth often shows evidence of evolutionary patterns of formation, due to its incremental, grown rather than unplanned nature. The attributes of unplanned or informal urbanism can be understood as the outcome of emergent processes."⁴⁸

It can be easily observed that in the rigid structure of monolithic tower neighbourhoods, the natural self-organizing tendencies of urban formation has been completely neglected and overpowered by planning ideals. In these neighbourhoods, the presence of sensible and self-sustaining urban participation is extremely restricted. This is while, the incremental and evolutionary patterns of urbanism seen in informal settlements have long been the subject of architectural idealization. Without focusing on the "picturesque, small-scale or chaotic cityscape that the term 'informal' tends to evoke"⁴⁹ it will be the purpose of this investigation to extract ideas of participation that can make large-scale self-organization possible. With the aim of enriching existing formally planned built environments with strategies and tools extracted from informal planning and built form, through the understanding its underlying organization order and methods.

Sociologists Manuel Castells and Alejandro Pones define the informality as a process of income-generation characterized by one central feature: it is unregulated by the institutions of society in a legal and social environment in which similar activities are regulated.⁵⁰ It is important to realize that in informal settlements, restricted material resources, and the needed efficiency in the use of limited space determine the organization principles of the built form and the circulations within. The set of design processes that originate from within the system are a set of "small, local actions which accumulate to form a coherent whole."⁵¹ As opposed to top-down planning ideals that create monolithic environments, the design process of informal environments are based on bottom-up, small-scale and local interaction of various factors. The compromised design systems that arise in these circumstances are highly adapted to the needs of the occupants and are highly differentiated. Christopher Alexander interprets informal settlements as "small-scale self-organizing systems with local codes"⁵²— implying that when localized and coherent design "codes" can be understood and implemented in a participatory manner, a different functional mode of planning can develop between "bottom-up self-help and top-down management."⁵³

In order to be able to anticipate for the future of tower living and the built environment, it is anticipated that the rigidity of 20th century master-planning can benefit from exposure to "informal urbanisation". Informal urbanisation in this sense, can be defined by numerous small-scale and bottom-up intervention that manifest at various scales and through different time-frames. They are always evolving and never finite and do not strive for an ideal completeness—challenging the ideals of large-scale masterplanning.⁵⁴ It is within the investigation of this design research to test the ideas of processing complex occupant needs, information sets and preferences—which would be inherently

48 Verebes, Tom, ed. 2014. Masterplanning the adaptive city: Computational urbanism in the twenty-first century. New York: Routledge, 87.

49 Eisinger, Angelus, ed. 2012. urbanRESET: How to activate immanent potentials of urban spaces. Bilingual edition ed. Berlin: Birkhauser Architecture, 23.

50 "The Informal City": <http://contemporarycity.org/2014/04/the-informal-city-2/>

51 Verebes, Tom, ed. 2014. Masterplanning the adaptive city: Computational urbanism in the twenty-first century. New York: Routledge, 87.

52 Shane, D.G. 2011. Urban Design since 1945: A Global Perspective. London: Wiley, 257-258.

53 Hagan, S. 2010 "Performatism: Environmental Metrics and Urban Design," in Ecological Urbanism, eds. M. Mostafavi and G. Doherty. Baden: Lars Muller, 466.

54 Verebes, Tom, ed. 2014. Masterplanning the adaptive city: Computational urbanism in the twenty-first century. New York: Routledge, 89.

55 Provoost, Michelle. 2009. *New towns for the 21st century: The planned versus the unplanned city*. Pompano Beach: Sun Publishers, 270-272.

processed and acted upon in an unplanned city—in a controlled manner. Using these factors within a defined and restricted building system will enable a reconciliation of a middle-ground between the current rigidity of the residential towers under study and a desire to deal with the paradox of the participation process as the following statement suggests: “influence and freedom need strong guidance and control.”⁵⁵

56 Ibid, 270.

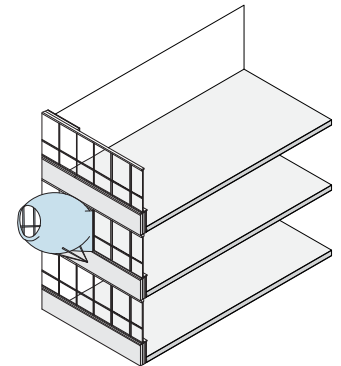
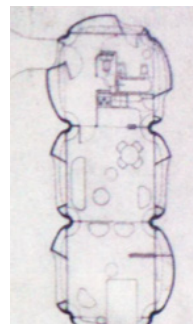
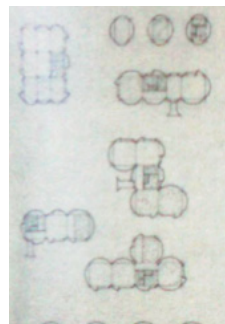
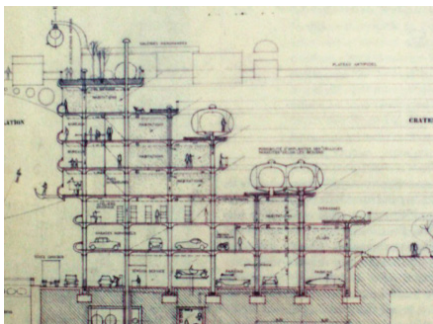
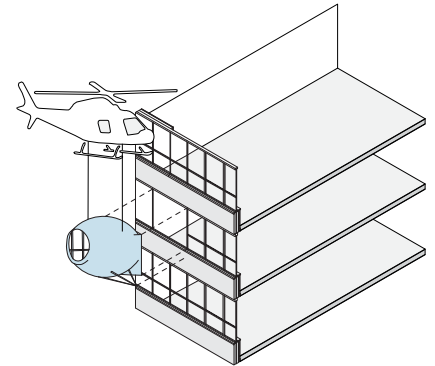
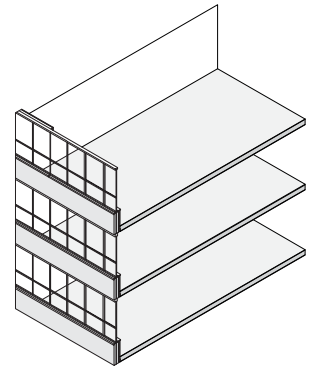
It is hereby suggested that the introduction of an open design system that enables participatory interaction of occupants, as well as small-scale and local customization of the built environment, will enable a continuous adaptation within the rigidity of tower neighbourhoods. Informality in the context of monolithic residential towers therefore, can manifest in the form of the invasion of the rigid grid—as spots and nodes of distortion—responding to the needs of the occupants and the various programs throughout the building.⁵⁶ The role of the designer therefore becomes to introduce a framework through which to guide the process of participation and intervention. In this way, creating a “master-plan” that takes into account various scenarios and is able to constantly re-evaluate its overall formation. Within the case of an extended balcony for example, common in the projects of Lacaton and Vassal (Figure 2–24 on page 51), “the communal spaces that already exist ‘informally’ now can be multiplied. It is certain that some of these ‘spots’ escape any traditional classification of public space, but they are there and they possess an undeniable strength linked to their use.” These communal balconies can be seen as spontaneous urban spaces arising out of a “geographical and a social concordance, uses and needs”.⁵⁷

57 Ibid, 57.

The following will aim to outline precedents and projects explaining different perspectives regarding the notion of informality. “Invasive informality”, as a concept common to avant-garde projects of metabolists in the 1960s will be explored. Further, concepts of “Un-intended” and “Intended” informality in residential projects will be explored, ranging in scale from the collective to the semi-private and private residential scale.



INVASIVE INFORMALITY:
CELLULES PARASITES,
CHANEAC 1960



“Chaneac’s work sought ‘an organic architecture which can evolve and move’ based on individual ‘cell’ implants that operate across multiple scales.” In this series of projects, the flexibility in materials and size, enabled inhabitants to transform their units and the space of each cell according to their personal needs. In this way, “the project gives the city back to the inhabitants by allowing them to participate in the formation of urban space.” The double curvature of the units, the use of simple materials and ease of construction, gave the units “the potential to fill the available space in the urban super-block.” The construction and assembly methods also enabled the units to reproduce “indefinitely and begin to create their own network and collective.”⁵⁸

Figure 3-2 **top-right** Cellules Parasite - Installation Diagram

Figure 3-3 **top-left** Cellules Parasite Prototype Chaneac, 1968.

Figure 3-4 **middle-left** Distribution Diagram: Chaneac, 1968.

Figure 3-5 **bottom-left** Cellules Parasite Section and Plan: Chaneac, 1968.

58 Spyropoulos, Theodore, John Frazer, and Patrik Schumacher. 2013. Adaptive ecologies: Correlated systems of living. London: Architectural Association Publications, 95.

UN-INTENDED INFORMALITY:
RAMOT HOUSING,
ZVI HECKER, 1972

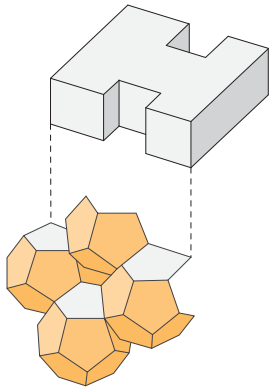
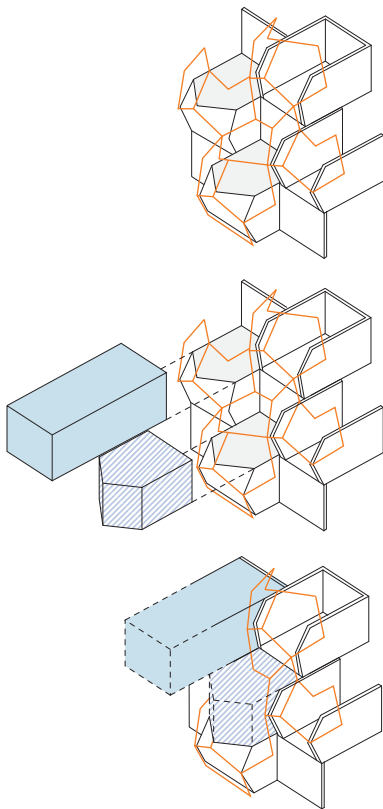


Figure 3-6 **top** Geometric Structure of Ramot Housing

59 Spyropoulos, Theodore, John Frazer, and Patrik Schumacher. 2013. *Adaptive ecologies: Correlated systems of living*. London: Architectural Association Publications, 65.

Figure 3-7 **bottom** Informal Adaptations to the Form of Ramot Housing



- Geometric Enclosure
- ▨ Informal Adaptation: Enclosure of Balcony
- Informal Adaptation: Extending and Modifying Building Form



Within the organization of Ramot Housing, “a clustering both vertically and horizontally creates a terraced housing scheme.” The individual units “have the potential to continue aggregating within the internal logic of the system, making the cluster infinitely adaptable and expandable.”⁵⁹

The units however did not expand as planned as clusters. With the provided geometry, the inhabitants were able to alter the form of the units in order to meet their needs— by informally enclosing balconies, extending the structures and changing the geometry of their spaces as desired.

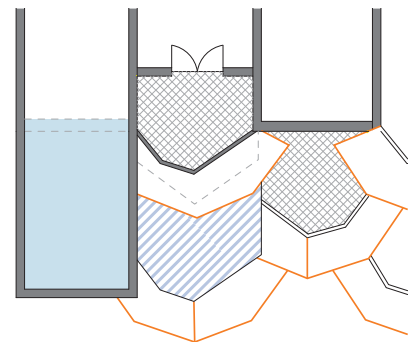
Figure 3-8 **top** Ramot Housing: Zvi hecker, 1972

Figure 3-9 **top below** Ramot Housing: Dror Bar-Natan, 2001.



Figure 3-10 **right top** Altered Geometries of Ramot Housing: Adam Nathaniel Furman, 2011.

Figure 3-11 **right bottom** Informal Adaptations to the Balcony and the Form of the Building.





The residential project is made up of a combination of public apartments and “subsidized do-it-yourself construction projects.” The design of Quinta Monroy is centered around the development and enabling of collective space and to support the occupant participation and social structure.

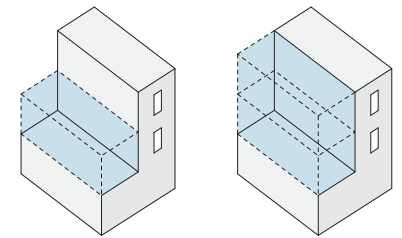
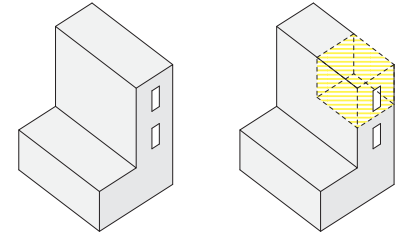
The use of different and distinct threshold spaces within the dense geometry of the complex gives the residents a platform and enables them to customize both their private and collective spaces:

“All of the important functions were already contained in this minimal basic structure—room, kitchen and bathroom—as well as the corresponding infrastructure. The residents very quickly expanded the units on their own accord to the maximum allowed.”⁶⁰

INTENDED INFORMALITY

(COLLECTIVE):

QUINTA MONROY,
ELEMENTAL, 2004



Provided Structure Interior Alterations Exterior Additions

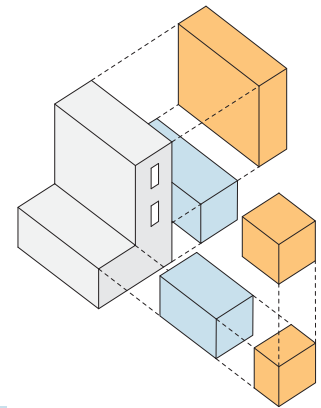
Figure 3-12 **top left** Provided Structure (Elemental, 2003) & Units After Alterations (Tadeuz Jalocha, 2006)

Figure 3-13 **top** Diagram of Initial Structure, Interior Alterations and Exterior Additions

60 Wietzorrek, Ulrike. 2012. *Housing+: Threshold, access and transparency in residential buildings*. Munich: Birkhauser Architecture, 134.

Figure 3-14 **left** Incremental Alterations (Luke Perry, 2010)

Figure 3-15 **bottom** Phased Additions to the Structure



Phase I of Additions Phase II of Additions (Maximum Allowed)

INTENDED INFORMALITY (SEMI-PRIVATE):
HOUSING FOR THE ELDERLY
KCAP, 1996

Residential buildings with access galleries can be categorized as “places that foster a sense of community and encourage exchange”. The access areas are specially important as they connect private units with the community and the surroundings. They in turn have the potential to turn in to “informal meeting places as well as social contact points” that encourage interaction and engagement within the community.⁵⁶

In the case of the Housing for the Elderly by KCAP, an extended threshold for each residence—separated by voids in between—amplify the opportunity for the customization of this semi-private gallery space by each residence according to their needs and preferences (Figure 3–16 - Figure 3–19).

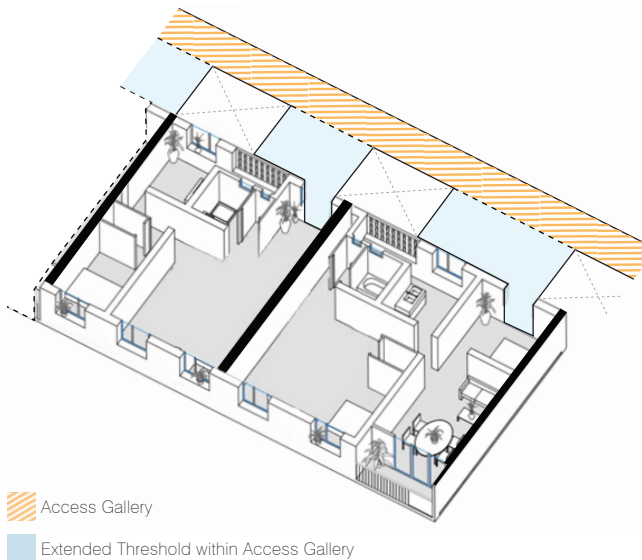
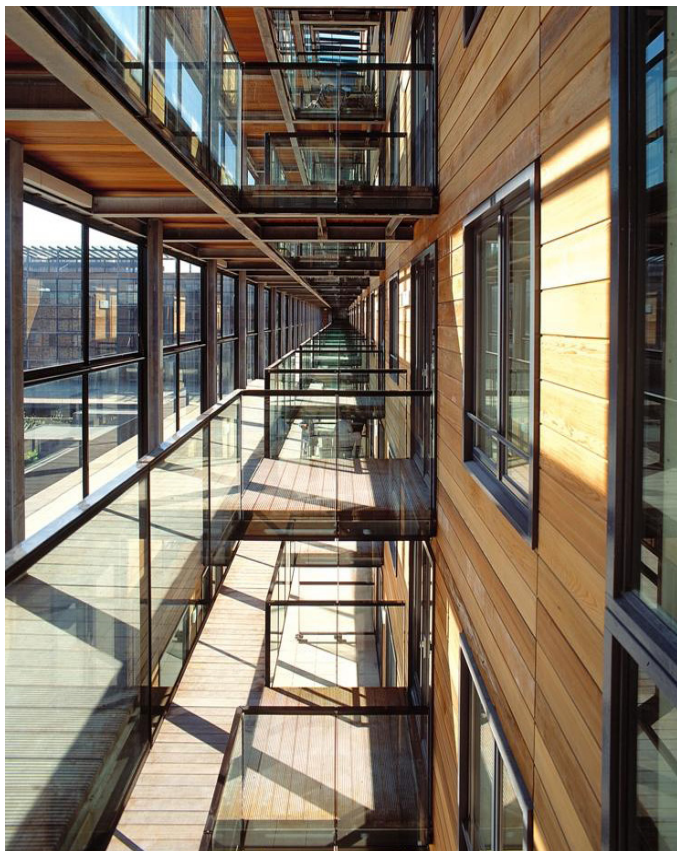


Figure 3–16 **top** Extended Threshold within an access gallery structure

61 Ebner, Peter, and Julius Klaffke, eds. 2009. Living streets - wohnwege: Laubengänge im wohnungsbau - access galleries in residential buildings. Munich: Walter de Gruyter.
62 Fernández Per, Aurora, Javier Mozas, and Javier Arpa. 2011. Density is home: Housing by a+t research group. Alava: a+t architecture publishers, 203.

Figure 3–17 & Figure 3–18 **top right** Customization of the extended threshold by different residents (KCAP, 2000)
Figure 3–19 **bottom right** Empty Thresholds (KCAP, 1996)



INTENDED INFORMALITY (PRIVATE):
TOUR BOIS LE PRETRE
DRUOT, LACATON & VASSAL, 2011

By incorporating a series of layers within an extended enclosure of the building—including an exterior solar curtain, lightweight translucent partitions, sliding glass windows, and tools for indoor modulation—spaces for informal expression have been provided for each unit. This extended space, used as a winter garden and balcony, allows the residents to use the space informally as an extension of their living or dining spaces, formulate them in to separate rooms or use the space to express their individual interests within the building.⁶²

“These balconies expand and improve the things an access gallery offers with its characteristics, a space between private retreat on your own balcony and public life on the street.”⁶³

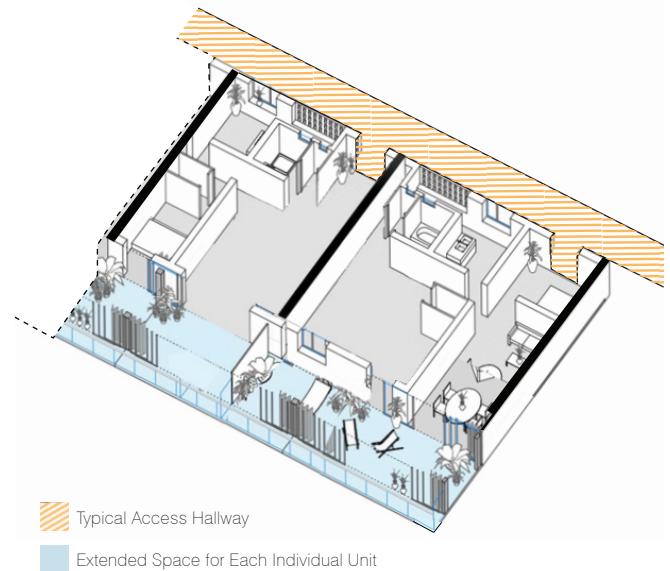


Figure 3–20 **top** The Combination of an Extended Threshold to typical balconies

63 Ebner, Peter, and Julius Klaffke, eds. 2009. *Living streets - wohnwege: Laubengänge im wohnungsbau - access galleries in residential buildings*. Munich: Walter de Gruyter, 123.

Figure 3–21 **top left** Informal Use of Extended Balcony: Dining Space (Lacaton and Vassal, 2011)

Figure 3–22 **middle left** Informal Use of Extended Balcony: Reading Room (Lacaton and Vassal, 2011)

Figure 3–23 **middle left** Informal Use of Extended Balcony: Living Room (Lacaton and Vassal, 2011)

Figure 3–24 **bottom left** Informal Use of Extended Balcony: Storage and Bar (Lacaton and Vassal, 2011)





A CASE OF INFORMAL
OCCUPANT ADAPTATION
OF BALCONIES:
CITY PARK CO-OPERATIVE
APARTMENTS INC., TORONTO

The City Park Co-operative Apartments in downtown Toronto are a prime example in how with a set of basic tools, the exterior facade of the building and the balconies can be customized to reflect the individual occupant use.

Through different layers of exterior enclosure consisting of light curtains, fencing and blinds occupants are able to control the permeability and exposure of their units. Umbrellas providing horizontal sheltering are also a way for the residents to control the atmosphere of their exterior spaces. Tools for the customization of the use of the balconies are ways that enable the residents to express their individuality in the face of the city.

Figure 3-25 **Balconies** of Co-Operative Housing at 31 Alexander Street, Toronto (Images to Continue on the Following Pages)









3.4 CONNECTIVITY AND COMMUNICATION

64 Eisinger, Angelus, ed. 2012. *urbanRESET: How to activate immanent potentials of urban spaces*. Bilingual edition ed. Berlin: Birkhauser Architecture, 83.

65 Provoost, Michelle. 2009. *New towns for the 21st century: The planned versus the unplanned city*. Pompano Beach: Sun Publishers, 10.

66 Eisinger, Angelus, ed. 2012. *urbanRESET: How to activate immanent potentials of urban spaces*. Bilingual edition ed. Berlin: Birkhauser Architecture, 83.

67 Spyropoulos, Theodore, John Frazer, and Patrik Schumacher. 2013. *Adaptive ecologies: Correlated systems of living*. London: Architectural Association Publications, 21.

68 Spyropoulos, Theodore, John Frazer, and Patrik Schumacher. 2013. *Adaptive ecologies: Correlated systems of living*. London: Architectural Association Publications, 61.

69 Provoost, Michelle. 2009. *New towns for the 21st century: The planned versus the unplanned city*. Pompano Beach: Sun Publishers, 198.

70 Spyropoulos, Theodore, John Frazer, and Patrik Schumacher. 2013. *Adaptive ecologies: Correlated systems of living*. London: Architectural Association Publications, 150.

71 Verebes, Tom, ed. 2014. *Masterplanning the adaptive city: Computational urbanism in the twenty-first century*. New York: Routledge, 92.

72 Spyropoulos, Theodore, John Frazer, and Patrik Schumacher. 2013. *Adaptive ecologies: Correlated systems of living*. London: Architectural Association Publications.

Rapidly and rigidly built neighbourhoods of the 20th century under study have been built with singular logics and limited agendas, in which the “complexities of urban networks” were not considered—making them less resilient in time.⁵⁹ In this sense, 20th century tower neighbourhoods can be said to have missed out on social modernization trends that include “individualization, liberalization and increased prosperity”. The trends that were able to have no effect on their overall functioning structure, form and social structure.⁶⁵ It can be said that tower neighbourhoods have been made ignorant to changing cultures, environments, behaviours and economies. This is while information rich environments that make up the contemporary built environment are changing at exponentially faster rates than before.⁶⁶ Future cities need to accommodate for rapid rates of change that are the result of this current connected information society and the new generation that is accustomed to change. In order to investigate the importance of connectivity, ideas of participation and collective behaviour will be explored.

Collective, connected and communicative architecture can be seen as a response to the abundance and the availability of information which has enabled shared and connected networks, systems and structures.⁶⁷ The task therefore becomes of the design “of an information-rich, dense built environment” that works with, organizes and reveals the flows of social interaction and its structure as a part of a collective architecture.⁶⁸ In the design for the shift to an informational economy—incorporating the increasingly popular start-up culture and changing economical values of gen-z—demands new environments and interactions. The new environments must integrate functional differentiation and the emphasis on individuation and variety as concepts that are gaining an increasingly derivative role.⁶⁹ The design of the urban environment therefore can no longer be a standalone and finite entity but rather one that seeks to formulate an urbanism that incorporates data inputs as a basis for real-time analysis, and enabling real-time decision making within the realm of urban design.

Architecture within the information age, will be able to better deal with the contemporary conditions when formed and viewed as a part of larger networks of connections. In this manner, social and cultural complexities of the contemporary urban environment demand “networked systems that are dynamic, flexible and participatory”.⁷⁰ In a participatory and evolving built environment, the architecture and the occupants need to constantly stay in communication. Within well-knit and connected neighbourhoods in which communication and connectedness is fundamental to the organizing structure, feelings of loneliness and alienation are minimized. In this sense, creating a sense of collective agency and communication can be an important strategy in improving the conditions of tower neighbourhoods.

By emphasizing the concept of connectivity, it becomes important to investigate the role of the “urban agents”: the occupant, the ecosystem, the economy and the environment—and how they contribute and play a role in shaping the architecture of the city. In this sense, investigating the idea of architecture not as a self-contained entity solely occupied with its internal functions, but rather an active participant in the urban real, reacting and building upon the conditions of its surroundings. “The most-used planning tools inherently lack feedback mechanisms, or the ability to process information and learn from input-output relationships”⁷¹ therefore adaptive models for living need to engage informational networks that can aid in constructing design frameworks and rule set that will accommodate for change and diversity.⁷²

The following case studies will explore residential buildings in which physical connectivity and occupant interaction plays an important role. Julia Tower, The Mirador and the Bikuben Student Residence are precedents for a connected infrastructure within a residential framework through which ideas of collective behaviour can be pursued.

JULIA TOWER

BARCELONA, SPAIN

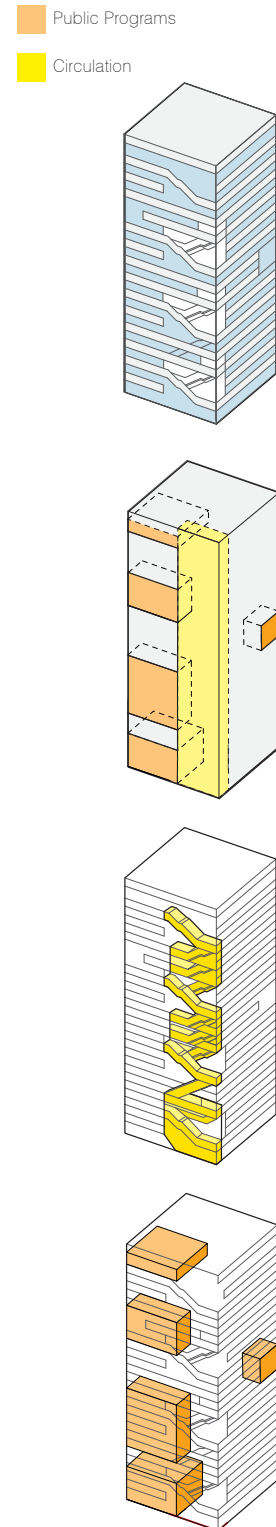
PAU VIDAL + SERGI PONS + RICARD GALIANA, 2011



Figure 3-26 **bottom left** Elevation highlighting the main circulation and public programs (Adrià Goula, 2011)

Figure 3-27 **bottom middle** Circulation on the Facade (Adrià Goula, 2011)

Figure 3-28 **bottom** Diagrams Highlighting the Main Public Circulation and Collective Programs



MIRADOR RESIDENCES
MADRID, SPAIN
MVRDV, 2005

73 <http://www.mrvd.nl/projects/mirador/#>
74 Ibid.

Figure 2–29 **bottom-right** Details of Circulation and Collective Programs

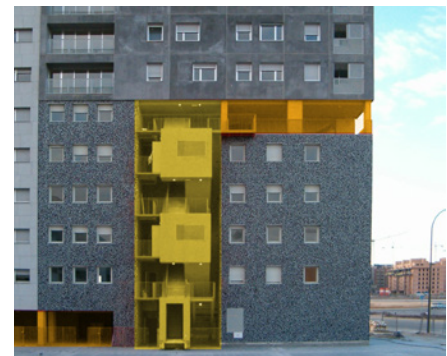
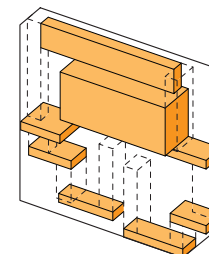
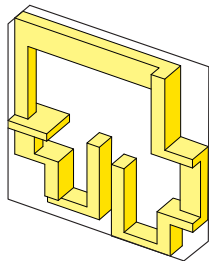
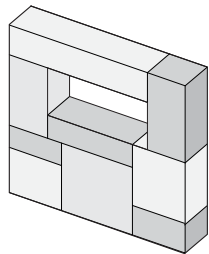
Figure 2–30 **bottom middle** Circulation and Collective Programs

Figure 2–31 **bottom** Diagrams Highlighting the Main Public Circulation and Collective Programs

“The slits in between the blocks act as access zones and are conceived as vertical alleys. Their transformation along each itinerary agglomerates the compendium of typologies that are structured like small suburbs. It leads to a vertical sequence of stairs, halls, platforms, and streets. It creates a vertical neighbourhood. It becomes the reference point of the neighbourhood.”⁷³

The Mirador residences is made up of nine “mini neighbourhoods” placed vertically surrounding a semi-public collective space for the occupants. The collective space provides outdoor spaces and “community gardens” for the occupants and with the network of connected infrastructure creates a fertile circumstance for communications and a series of collective activities.⁷⁴

- Residential Units
- Circulation
- Collective Programs



BIKUBEN STUDENT RESIDENCE
COPENHAGEN, DENMARK
AART A/S, 2006

"The vision behind Bikuben Student Residence is to rethink the social environment for student life and to expand the possibility that communities can arise in a broad social network. By creating an inspiring spatial environment and maximise the opportunities for fellowship, the student residence seeks to avoid the loneliness and lack of social relationships."⁷⁵

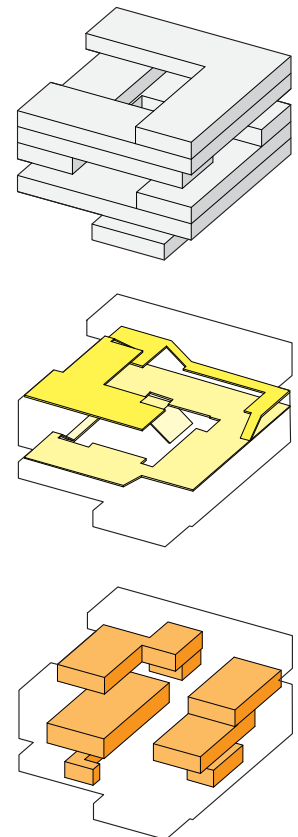
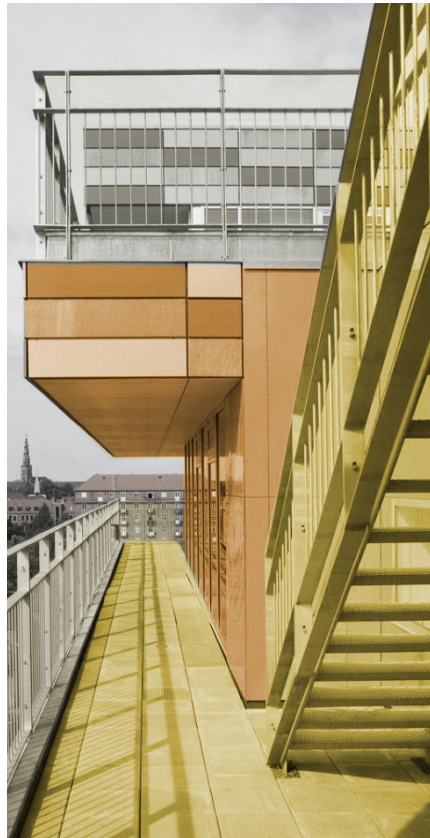
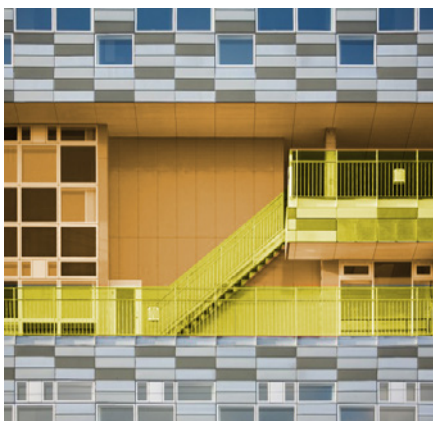
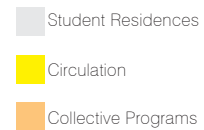
The residence incorporates a spiral circulation around the central axis which creates spaces for indoor and outdoor collective programmes. This main circulation avoids typical "dormitory corridors" and links the social programmes across different floors. In this way, "the spiral structure provides the greatest possible contact between common and private spaces, while ensuring privacy in each dwelling."⁷⁶

75 http://www.scandinavian-architects.com/en/projects/33982_Bikuben_Student_Residence
76 Ibid.

Figure 2-32 **bottom-left** Circulation and Collective Programs

Figure 2-33 **bottom-middle** Detail of Circulation

Figure 2-34 **bottom** Diagrams Highlighting the Main Public Circulation and Collective Programs





4.0 THE BALCONY

4.1 HISTORICAL CONTEXT

Figure 4-1 Delshad's Balcony, Toronto

⁷⁷ http://www.oxforddictionaries.com/us/definition/american_english/balcony

The balcony can be defined as “a platform enclosed by a wall or balustrade on the outside of a building, with access from an upper-floor window or door”⁷⁷, and it is typically a cellular and isolated private extension of living units—projecting and participating in the public urban fabric by levitating above it. Being at the edge of the two poles of private living space and public life, “the balcony serves as a laboratory where sometimes explosive mixtures of public and private, inside and outside” can be tested. It can be said that the balcony as an architectural projection emerged out of military objectives, and throughout history the projection has been associated with the privileged, royals and celebrities in order to self-exhibit, demonstrate power and for extrovert involve-



ments with society. This is while the upsurge of democracy and the rise of the middle class, introduced the balcony to general housing schemes and inclined its definition “towards leisure and urban display, in terms of being seen and of being able to peer over the city.”⁷⁸ Without being particularly focused on the origins of the balcony and the course of its iconographic evolution—as at times politically charged and at times having heavy ornamental value—this essay investigates the ideas of the balcony as a socially-inclined architectural element that was heavily incorporated within the housing blocks of mid-20th century, its evolution to the present condition and possible ambitions for its future.

78 Koolhaas, Rem. 2014. Elements. Box Edition ed. Vol. Balcony. Venice: Marsilio.

79 Kesik, T., and I. Saleff. 2009. Tower renewal guidelines for the comprehensive retrofit of multi-unit residential buildings in cold climates. Toronto: Daniels Faculty of Architecture, Landscape, and Design, University of Toronto.

The current investigation into the development of the balcony in the 20th century focuses on the importance of its role in apartment blocks and their role in this newly introduced typology of the time. The rise in the use of the balcony in the 20th century (see Figure 1–15 on page 9), was partially due to the interest in the blurring of the inside and the outside, and a way for the suburbanization of the urban environment through the replication of the suburban ideals within a dense housing block. In this way, the balcony replaced the typical suburban porch while the open space of apartment neighbourhoods was advertised as a “collective backyard”⁷⁹ (see Figure 1–5 on page 7). With the ambitions of giving voice to the individual within the collective and as a mode of informal self-expression, in many instances ideas of participatory behaviour and the involvement of the collective were experimented with using the balcony. Through the outlining of these processes, the essay will outline the concerns brought upon the balcony, pre-occupations of the contemporary balcony and the possibility of the balcony as a “micropolitical” element in the urban realm. The reconsideration of intended ambitions of the balcony, as the expression of the personal within the public, and the ability for the small-scale collective behaviour to drive the face of the city will also be investigated as ambitions for the future of the balcony.

4.2 THE RISE OF THE RESIDENTIAL BALCONY

80 Koolhaas, Rem. 2014. Elements. Box Edition ed. Vol. Balcony. Venice: Marsilio, 115.

“multiplied over the surface of a building, a democratic mass would now share the elevated vista, looking down upon the city in its everyday use... But more important than the act of looking down is what the new balcony did for the act of looking at buildings, democratically registering, in various ways, the existence of a collective mass on the face of the city.”⁸⁰

81 Ibid., 100.

With a sudden increase in population and urbanization at the beginning of the 20th century, housing started to become an inescapable issue. Within the “utopian ideologies” of the period, “the efficient housing machine of the high-rise is seen as a device ready to meet the challenges of this growth as well as the changing structure of the family.”⁸¹ It was believed by the utopianism theorist of the 20th century that “altering a person’s exterior experience could shape them into a more productive, fulfilled human being”, therefore the balcony is viewed by the “ascendant socialism as a tool for the masses.”⁸² The key roles of the balcony in these post-war housing projects therefore can be summarized as having the aim to articulate the relation “between individuality and collectivity, between the particular and the ordinary, and between the private and the public realm.”⁸³

82 Ibid.

83 Ibid., 115.

This is while towards this time in the beginning of the 20th century, balconies had gained their reputation in architecture for “spreading fresh air, light and visibility to the working and middle class” and were regarded as an advantage to the typical residential unit in the dense urban environment. The ideas of a “porous, sun-filled structure” made possible through “indentations” as large outdoor spaces punctured through the building incorporating plants and seating implying social interactions, and smaller forms were investigated first by Le Corbusier in L’Immeuble Villa (1922-29)⁸⁴ (Figure 4–2). By 1929, the balcony was recognized as a “liberating and universally applicable element that had the capacity to introduce light, air and openness in the modern dwelling”⁸⁵ also allowing for outdoor activities within units, the balcony was seen to increase the productivity and quality of life of residents (Figure 4–3).

“The ‘new architecture’ has unconsciously used these projecting ‘balconies’ again and again. Why? Because there exists the need to live in buildings that strive to overcome the old sense of equilibrium that based only on fortress-like incarceration.”⁸⁶

In these lines, by the 1930s, there was a rapid increase in portraying the balcony as a place for leisure and sport activities in modern culture—representing it as an essential element that made modern life possible within cities.⁸⁷ From the 1950s to the 70’s at the peak of the predominance of the balcony (refer to Figure 1–15 on page 9) two ambitions of the balcony experimented with include firstly, the inhabitation of the in-between space investigated by Gio Ponti in Casa Via Dezza (1957) (Figure 4–5 on page 58). Secondly, the role of the balcony in creating collectives and also “establishing new relations between building and inhabitants” presented the balcony as a place where ideas of sharing and collaboration can be experimented in order to create a “habitat based on the participation of the user”⁸⁸ as seen in the Gilo Housing (1975) (Figure 4–7 on page 58).

84 Ibid, 102.

85 Giedion, Sigfried. 1929. *Befreites Wohnen*. Zurich: O. Fussli.

86 Sigfried, Giedion. 1995. *Bauen in Frankreich: Bauen in Eisen—Bauen in Eisenbeton*, Klinkhardt and Biermann, 1928/ *Building in France: Building in Iron—Building in Ferro-Concrete*, trans., J/ Duncan Berry, The Getty Center for the Study of Art and the Humanities, 147.

87 Overly, Paul. 2007. *Light, Air & Openness: Modern Architecture between the Wars*. London: Thames & Hudson.

88 Coderch. November 1961. “We do not need geniuses right now,” *Domus*, 45.

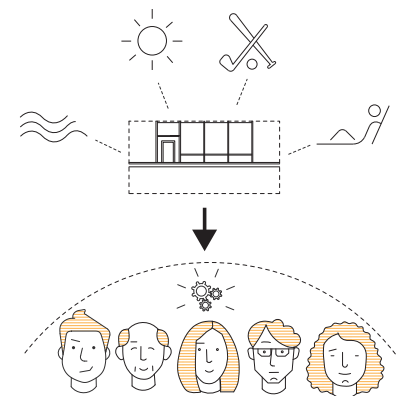


Figure 4–2 Le Corbusier in L’Immeuble Villa (Le Corbusier, 1925)

Figure 4–3 Balcony in Residential Buildings (allowing for air, sun and extra space for outdoor)

CASA VIA DEZZA,
GIO PONTI, 1957:

In the Casa via Dezza concepts of layered systems, the in-between spaces and the relation between the inside and the outside were predominantly investigated. The design of the external threshold of the building was inspired by the subtle screening of the boundary “between the house and the city in multiple layers, through modernizing the mashrabiya, loggias, and oriel windows.” The facade was designed as a set of balconies, referred to by the architect as “inhabitable viewing frames”, which consisted of “a layered system of frames, screens, and surfaces offered a canvas on which various forms of appropriation—through everyday objects, plants, art—could be played out.”

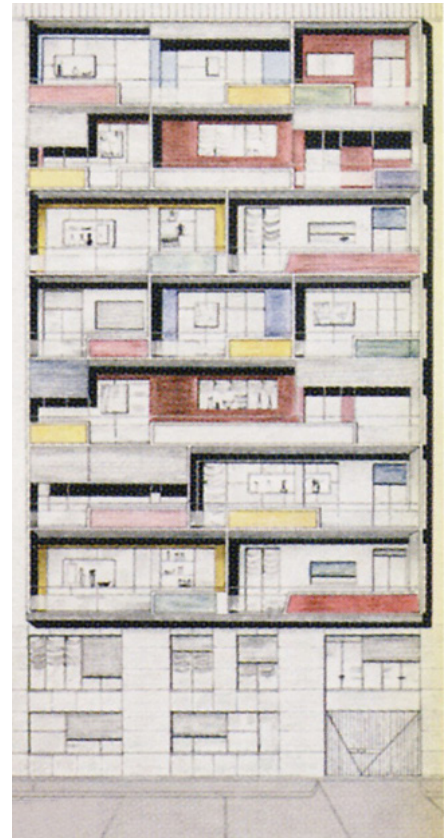
The expanded and “thickened” balconies enabled different sorts of expression of the individuality of the residents. In this way the micro-political dimension of the balcony was investigated—giving occupants the role of participating in the built environment “through intervention at the border of the private and the public domain.”⁸⁹

89 Koolhaas, Rem. 2014. *Elements*. Box Edition ed. Vol. Balcony. Venice: Marsilio, 115.

Private Balconies

activities) Leading to Productivity and a Better Quality of Life

Figure 4-4 left Casa Via Dezza Elevation with Varied Balconies (Carlo Cerchioli, 2010)



GILO HOUSING,
ARIEH AND ELDAR SHARON, 1975

The micro-political role of the balcony were also investigated in the Gilo Housing by focusing on the role of the informal, collective behaviour and active participation. Access to balconies is provided by a series of external stairs that reach the roof from the ground floor, passing through "one of the two balconies, with which each apartment is provided, creating a direct encounter between private and collective domains." In this way, the typically private threshold of the balcony is combined and included here within the collective realm.

Sharon's idea of "self-governance and self-building" in this project was focused on the power of the collective and the potential of co-operative participation:

"Echoing the principles of self-governance and self-building, Sharon conceived the balconies in the Gilos housing as free zones to be appropriated by Israel's new citizen in order to fashion a modern lifestyle of their own."⁹⁰

90 Ibid, 121.

Figure 4-5 **right** Casa Via Dezza Elevation (Gio Ponti, 1957)

Figure 4-6 **top left** Gilo Housing, Circulation and Balconies in Between (Arieh Sharon, 1972)

Figure 4-7 **bottom left** Private Balconies and Circulation (Arieh Sharon, 1972)

Figure 4-8 **top right** Plan Detail, Private and

Public Circulation and Balconies

Private Balconies



4.3 THE EVOLUTION OF THE RESIDENTIAL BALCONY

91 Ibid, 123.

"In the design of dense high-rise housing developments, intermediate architectural elements such as outdoor terraces and galleries largely disappeared. The proliferation of the balcony was an attempt to compensate for this loss of the outdoor realm in architecture; collective spaces were eliminated and replaced by private projections."⁹¹

92 Bruno-Henri Vayssiere, *Reconstruction, Deconstruction: Le Hard French, Ou, L'architecture Francaise Des Trente Glorieuses*. (Paris: Picard, 1988)

In the design of post-war buildings, a decreasing attention was given to intermediate spaces and the relation between the inside and outside.⁹² With this in mind, the paradoxical position of the balcony can not be overlooked as a highly charged architectural element. The balcony could therefore be defined as a linkage and extension, while at the same time being isolating and detached in nature. It can appear as an extended threshold, while the add-on nature "implies a certain neutrality or independence" in comparison to the overall building, making it prone to "a broad horizon of interpretations in various architectural discourses—from reformist to participatory."⁹³

93 Koolhaas, Rem. 2014. *Elements*. Box Edition ed. Vol. Balcony. Venice: Marsilio, 127.

94 JJP Oud, letter to J.J. Vriend, April 14, 1956.

Regarding the architectural position of the balcony in the mid-20th century, Dutch architect J.J.P. Oud writes that "the architecture is fresh, but empty."⁹⁴ This was in part due to the fact that by this time, the balcony was reduced to a singular repetitive element and deprived of a relation to other architectural elements, resulting in criticism as an add-on, and devoid of any inherent character. This is while, the balcony was still believed to function as a means for "achieving a sense of individual self" in the changing automatized society.⁹⁵ This expression of the individual, and the creating of relationships between the inhabitants and their cities became a vital new function of the balcony.⁹⁶ In this way, the balcony was seen as a "projection from the personal realm into the urban" and seemed to be effectively functional in dealing with the ambitions of representing and liberating individual expression.

95 Daniel Bell, "The Theory of Mass Society: A Critique," *Commentary*, 22 (July, 1956), 75.

96 Koolhaas, Rem. 2014. *Elements*. Box Edition ed. Vol. Balcony. Venice: Marsilio, 115.

97 Bofill, Ricardo. 1985. *Espaces d'une vie*.

"The balcony is an archetype, which is more than the simple whim of a designer, it belongs to the unconscious of an entire society: it connects the individual to the common bases of its society."⁹⁷

Towards the middle and end of the century, the fascination with the "balcony-clad tower block" and potentials of self-expression was quickly replaced with ideas of low-income housing favourable to large populations of new immigrants. At the same time, towards the end of the century, the rapid re-urbanization of cities from the suburbs and in the resulting condominium booms in cities such as Toronto, the balcony has transformed from a unifying tool to one that is "playful" and "ornamental". After a century of fighting for the good intentions of the balcony within the structure of social housing and mass housing projects, the balconies with the most influence and power are currently

structured within condominiums. In this sense, the balcony has become one of the only means through which designers can slightly alter the forms of residential point-towers. As a result, the contemporary state of the balcony in the wide spread condominium culture “of the gentrifying global city this is either as part of a signature facade to market or, more likely, as an amenity added on as an enticement.”⁹⁸ At last, from a framework for the participation of inhabitants in their cities, the balcony has evolved to a means for the “suburbanization of the urban”. What can be understood from the single-family suburban house, “is the freedom it implies, even if it’s an imaginary freedom.”⁹⁹ The typical green balcony and the luxury balcony of condominiums duplicate the reality of suburban isolation in the sky and the “connection with the fabric of the city becomes purely symbolic, unreal.”¹⁰⁰

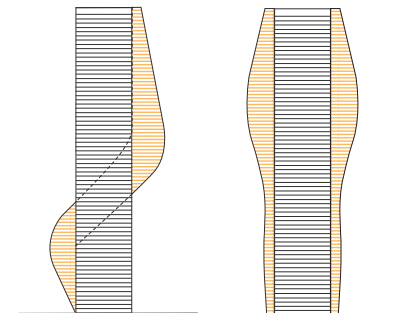
“... [forming] a facebook of the balcony, in which individuals consciously exhibit a selected identity in full view of the city. Cut loose from its lineage of meanings—regal, bourgeois, health-conscious, political, emancipatory—the balcony is susceptible to any and every formal definition, from chiseled niche to transparent platform to undulating fin.”¹⁰¹

98 Koolhaas, Rem. 2014. *Elements*. Box Edition ed. Vol. Balcony. Venice: Marsilio.

99 Druot, Frederic, Anne Lacaton, and J. P. Vassall. 2007. *Plus: Large-scale housing development*. Barcelona: Gustavo Gili, 87.

100 Koolhaas, Rem. 2014. *Elements*. Box Edition ed. Vol. Balcony. Venice: Marsilio, 155.

101 *Ibid*, 156.



Balconies

Public Balconies (Arieh Sharon, 1972)
Figure 4–9 **bottom right** Circulation in

4.4 THE FUTURE OF THE BALCONY

102 http://artpapers.org/feature_articles/feature3_2014_0304.html

"It is generous to be outdoors, watched by a thousand eyes recording us for the future, our actions to be interpreted as an office job. We need a private veranda above ground, a place for a breath of fresh air, out of sight for the casual onlooker, but great for public announcements. The balcony is both public and private, online and offline. It is a space and a movement at the same time."¹⁰²

103 Koolhaas, Rem. 2014. Elements. Box Edition ed. Vol. Balcony. Venice: Marsilio, 152.

The following can be viewed as a gathering of ideas, concepts and case studies in order to address the potentials of the contemporary balcony. In the 21st century, the balcony can be viewed as a "platform on which individuals can try to change the world on a small scale, carving out a personal arcadia."¹⁰³ In the transformational and ever-changing cities of today, the balcony can begin to define a territory within which inhabitants can begin to think at a global scale and alter their spaces at small-scale local modulations.

104 Ibid, 155.

Elevation (Arieh Sharon, 1972)
Figure 4-10 Ornamental Use of Balconies in Contemporary Condominiums
Figure 4-11 top left Singapore's Ecological EDITT Tower (Ken Yeang, 2008)

GREEN BALCONIES:

"The green balcony in all its manifestations a hopeful emblem, of the green future that each of us would like to ensure for later generations. Beyond ideology—or, perhaps, as the last ideology of sustainability."¹⁰⁴

Figure 4-12 top right Vertical Forest, Stefano Boeri (Daniele Zacchi, 2014)

Figure 4-13 below left Mill Owner's House in Ahmedabad by LeCorbusier (studioACKT, 2010)



ACTIVE BALCONIES:

THE EDIBLE BALCONY



Figure 4-14 **below right** Stacking Green by Vo Trong Nghia (*Hiroyuki Oki, 2012*)

Figure 4-15 **left** Edible Balcony, Rotterdam (*Alex de Jong, 2009*)

THE BALCONY FARM



Figure 4-16 **right** Edible Balcony (*Indira Naidoo, 2010*)

Figure 4-17 **left** Cat Balconies (*Jennifer Kingston, 2010*)

THE GENERATOR BALCONY

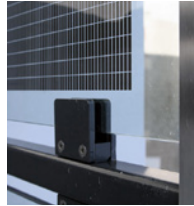
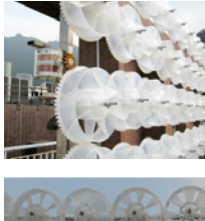


Figure 4-18 **right** Chicken Coop for Balconies (*Matthew Hayward, 2014*)

Figure 4-19 **left** Greenerator

THE WATER BALCONY



(*Jonathan Globerson, 2010*)

Figure 4-20 **right** Solar Railings (*CSEM, 2011*)



5.0 SITE

5.1 CURRENT DEVELOPMENTS

The site for the design project is located at the edge of Toronto's St. James Town neighbourhood. This neighbourhood in the downtown of Toronto is classified as the densest urban center in Canada with 19 residential towers.¹⁰⁵ The site includes the towers and podium of 545, 555 and 565 Sherbourne street, and is currently in the process of a redevelopment in order to revitalize the towers, increase density, add amenities and to reconsider the connecting podium. The project under construction includes the addition of a 38-storey residential tower, 3-storey street-level townhouses along Bleecker Street adding up to 408 new rental units within the complex. The existing podium joining the three existing towers will also be demolished and re-developed to include amenities for the residents, as well as service and commercial programs.



105 http://en.wikipedia.org/wiki/St._James_Town

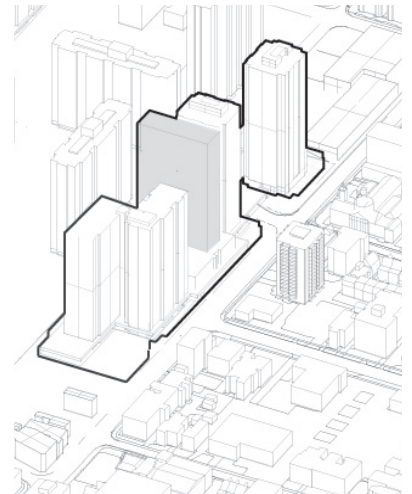
106 —

Figure 5-1 **left** 545-565 Sherbourne Street

Figure 5-2 **bottom left** 545-565 Sherbourne Street

Figure 5-3 **bottom** 545-565 Sherbourne Street: New Developments (IBI Group, 2014)

■ New Developments



The current proposal for the redevelopment of the site is based on the zoning for apartment neighbourhoods defined to be made up of “apartment buildings and parks, local institutions, cultural and recreational facilities, and small-scale retail, service and office uses that serve the needs of area residents.”¹⁰⁶ This designation does not anticipate significant growth within its areas, however compatible infill development may be permitted on a site containing an existing apartment that has sufficient underutilized space to accommodate one or more new buildings while providing good quality of life for both new and existing residents.

5.2 FUTURE DEVELOPMENTS

The current design research investigates the future developments to be made to the towers of 545-565 Sherbourne Street and investigates the integration of the RAC zoning and the integration of this new zoning at small scales throughout the development. The new Residential Apartment Commercial zone will permit:

“a number of small-scale commercial and community uses on apartment building sites, providing opportunities for new ventures which will contribute to the vibrancy and diversity of apartment neighbourhoods. The new uses may include, for example, small shops, food markets, cafes, learning centres, barbershops, doctor’s offices, community centres and places of worship.”¹⁰⁷

The RAC was developed in response to the need to create various services within the structure of apartment buildings of high density and to respond to the commercial activity that was widely happening across residential towers.¹⁰⁸ The RAC zoning does not generally limit the distribution of the commercial activity throughout buildings, but does however limit certain uses such as the “performing arts studio” or “production studio” to the main level or the basement in order to control noise levels. The RAC applies to larger residential complexes of 100 dwelling units or more, and limits the total area devoted to non-residential use in order to ensure that the buildings remain compatible with the primary residential uses intended. This is while the provision of the RAC zoning in apartment neighbourhoods allows the flexibility for different uses to occur, and in this way improves the access and convenience to needed services in the neighbourhood.¹⁰⁹ The ideas of the extended threshold and the reconsideration of the balcony will be a useful tool in investigating the means through which to express the future of RAC zoning in the face of the city.

107 <http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=0ebf562c381c4410VgnVC-M10000071d60f89RCRD>

108 Vertical Poverty, United Way 2011; Toward Healthier Apartment Neighbourhoods, Toronto Public Health 2012; and Apartment Neighbourhood Zoning Study United Way 2012)

109 Ibid.



Figure 5-4 The Residential Apartment Commercial Zone (RAC) in Toronto and Examples of its Development (ERA, 2013)

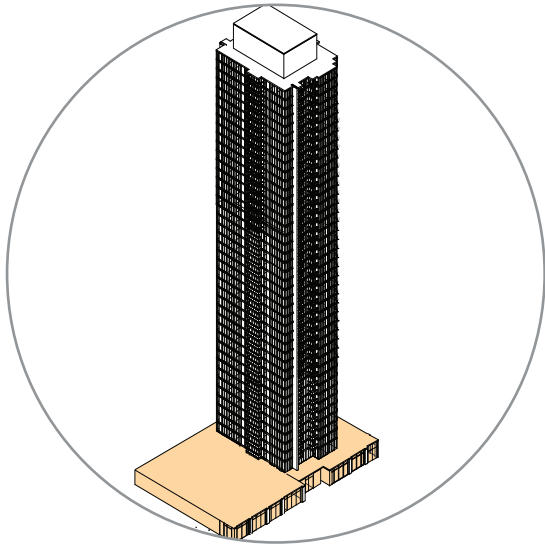
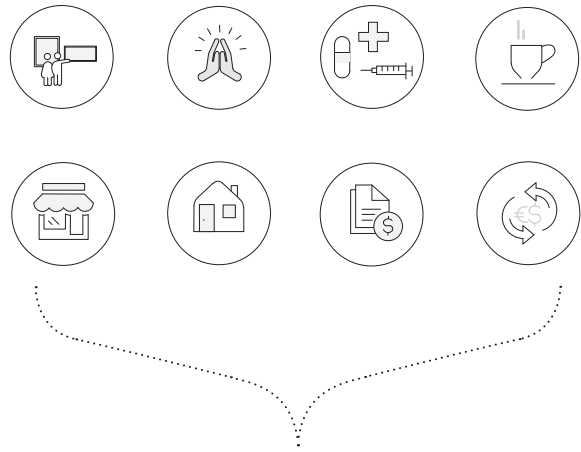


Figure 5-5 Program Allowances in Condominiums



RAC ZONING

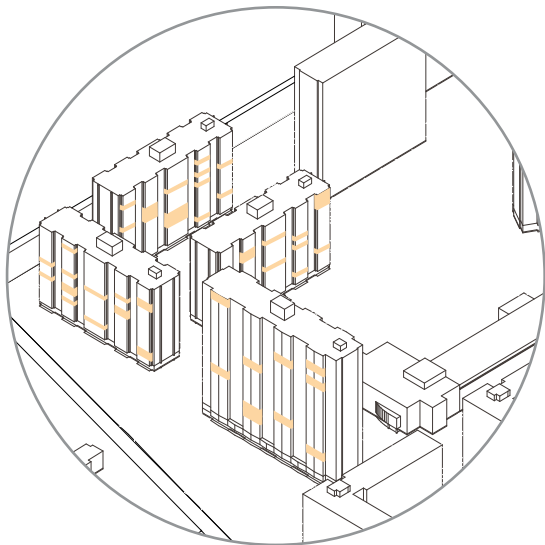
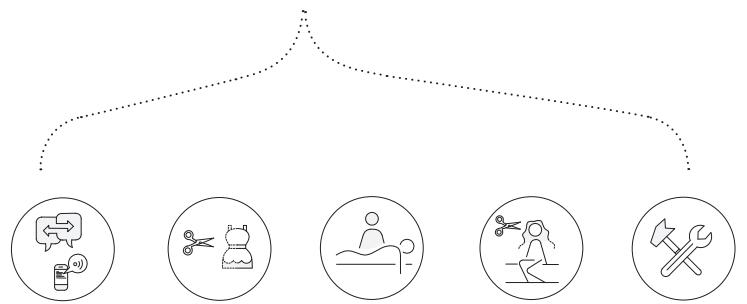


Figure 5-6 Informal Businesses within Tower Neighbourhoods



5.3 SITE STUDY

USE OF BALCONIES IN TYPICAL TOWER NEIGHBOURHOOD UNITS:

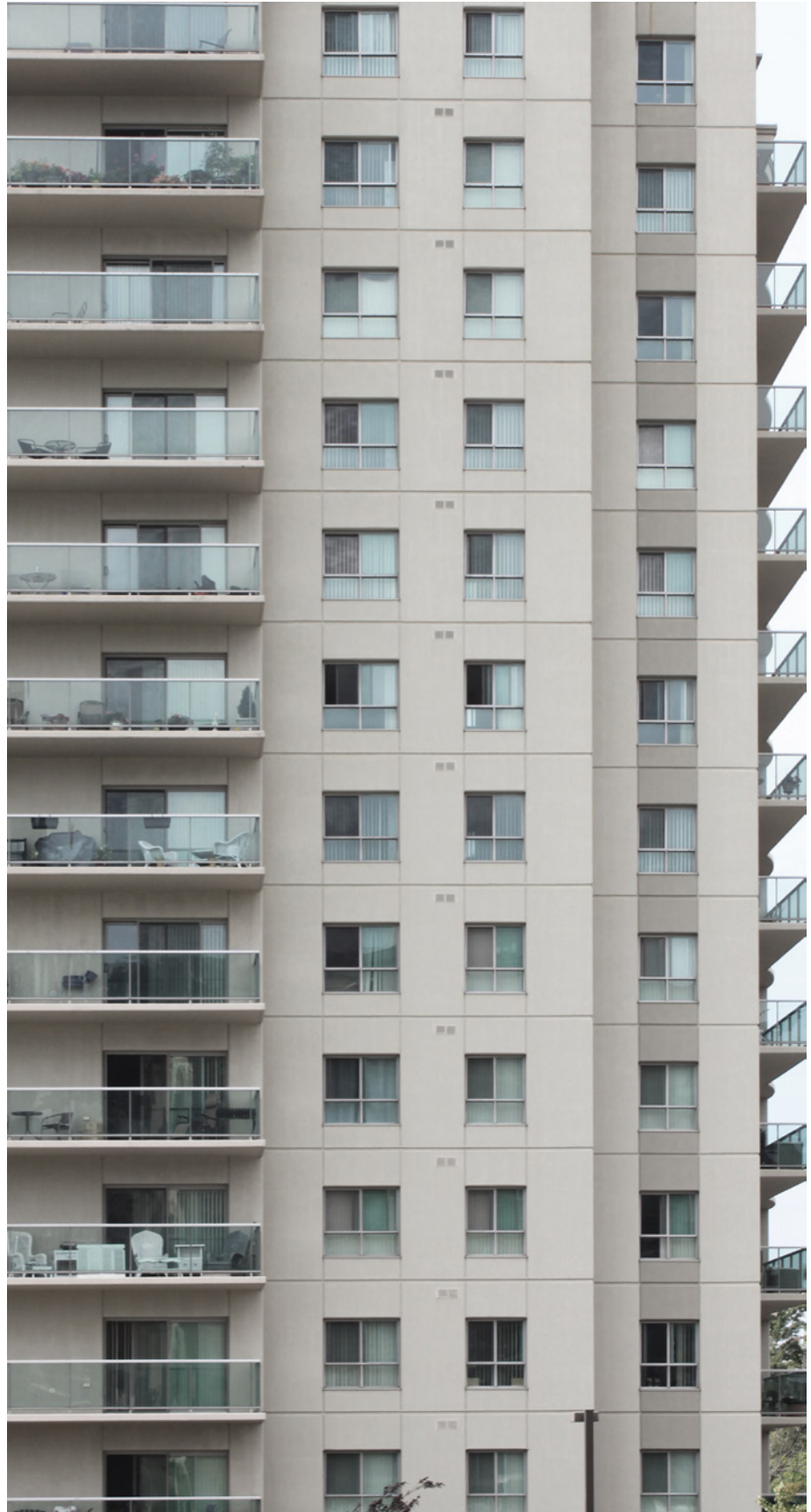
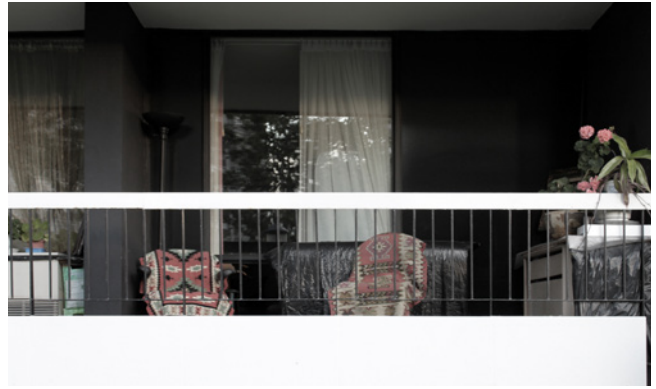


Figure 5-7 Use of Balconies in Typical Tower Neighbourhoods (Images to Continue on the Following Pages)





Adaptive Balconies



565 SHERBOURNE STREET
EAST ELEVATION:

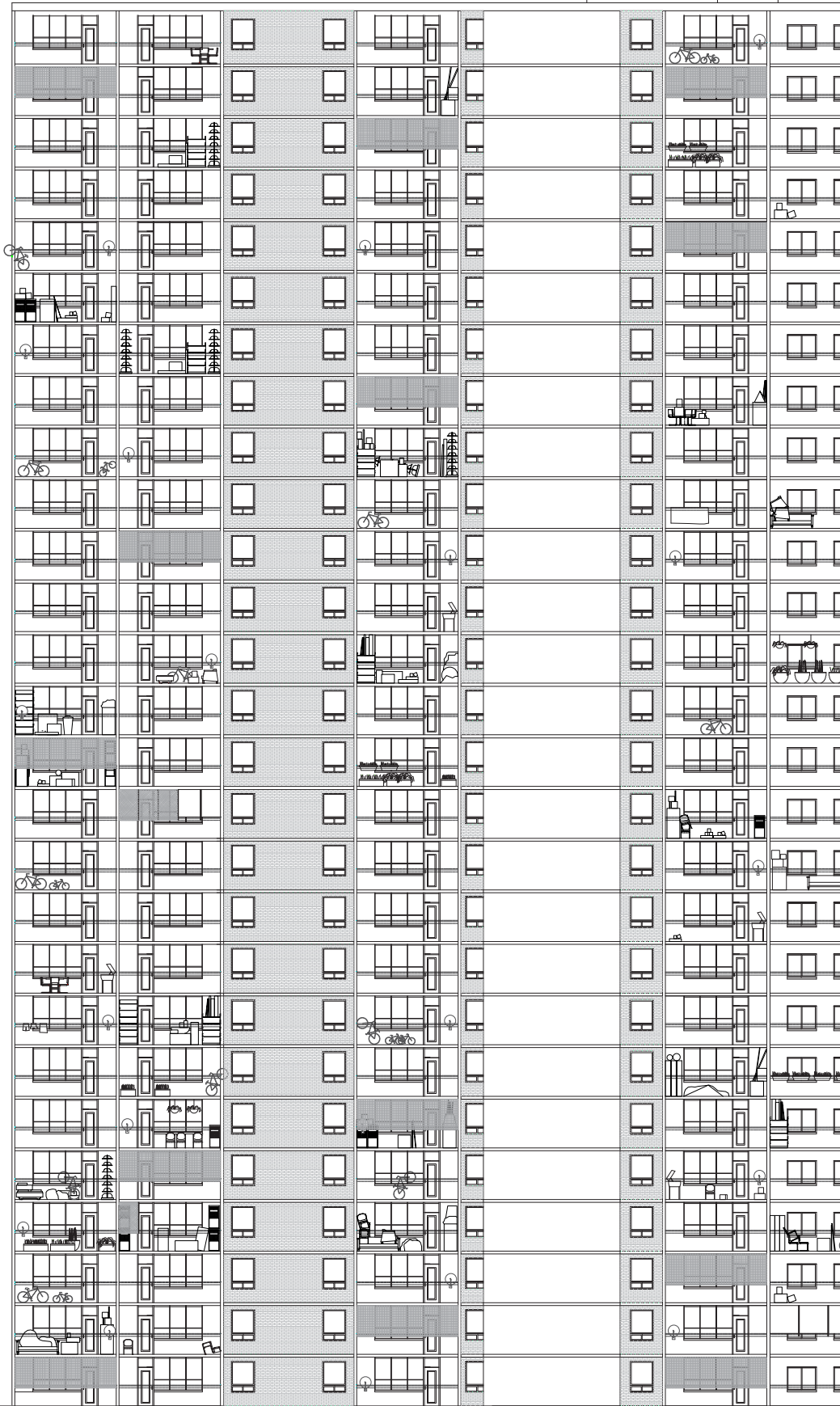


Figure 5-8 Study of Balcony Uses:

This mapping is based on the study of 355 balconies in Apartment Neighbourhoods across the city of Toronto. Balconies are categorized and analyzed based on the following criteria:

- 1) Vacancy
- 2) Type of Permanent or Seasonal Activity Including: Planting, Play, Dining, Lounging and Storage
- 3) Transitory Activities

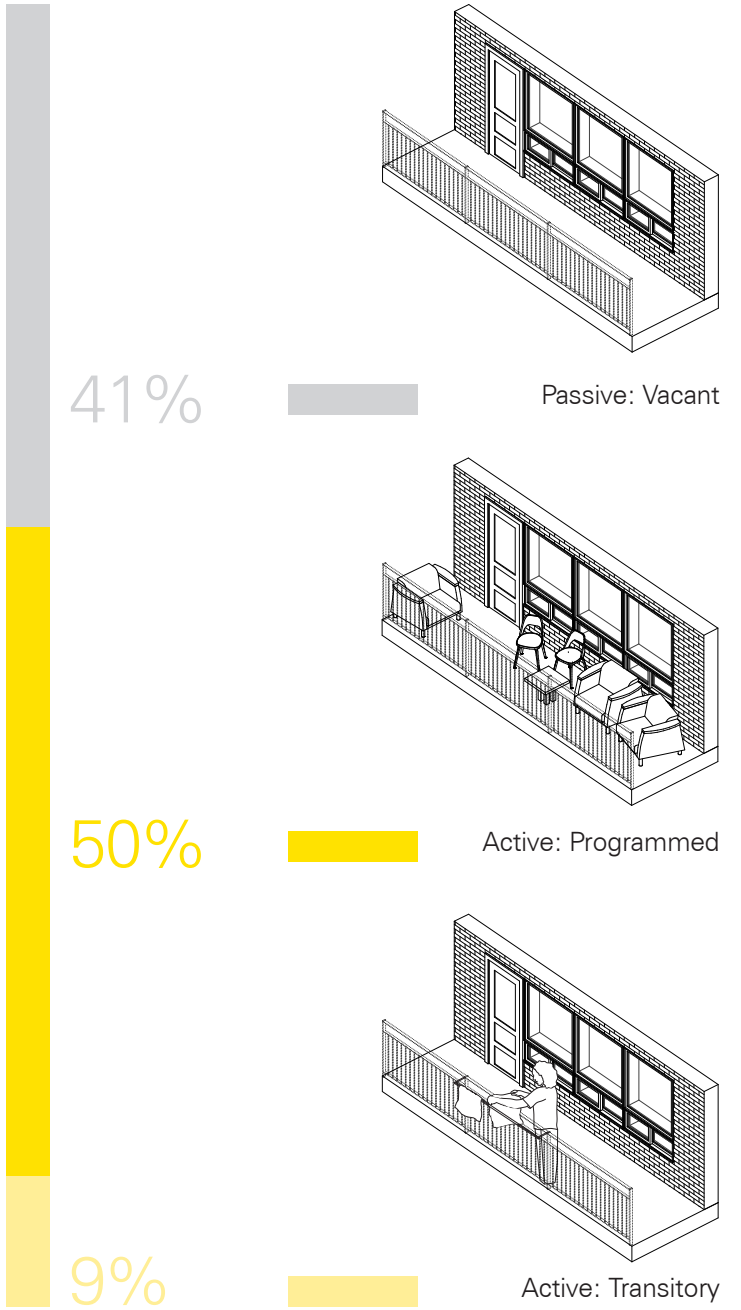
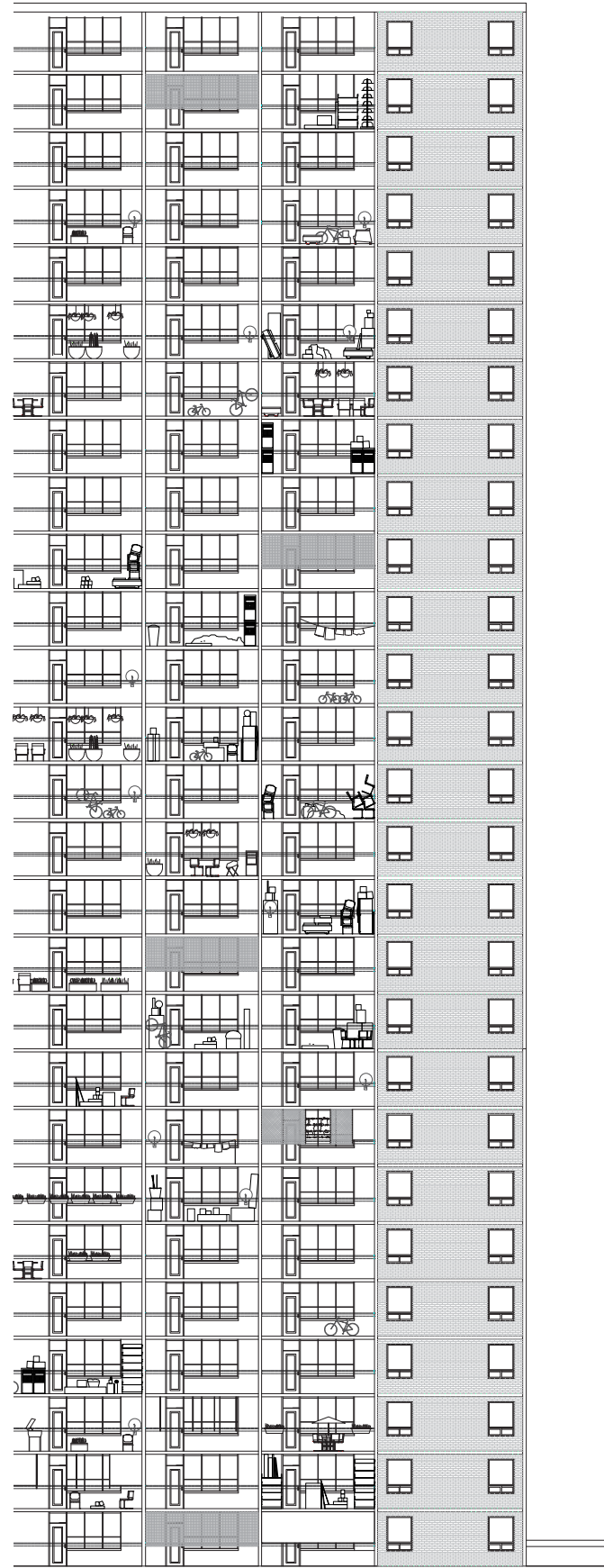




Figure 5-9 **Elevation Detail:**
Elevation detail of various
programmed balconies



Programmed Balconies:

- Lounging
- Dining
- Play
- Planting
- Transitory Activities
- Seasonal Storage
- Permanent Storage

Figure 5-10 Percentage of Programmed Balconies and Balconies Used as Storage from Total Used (59%)

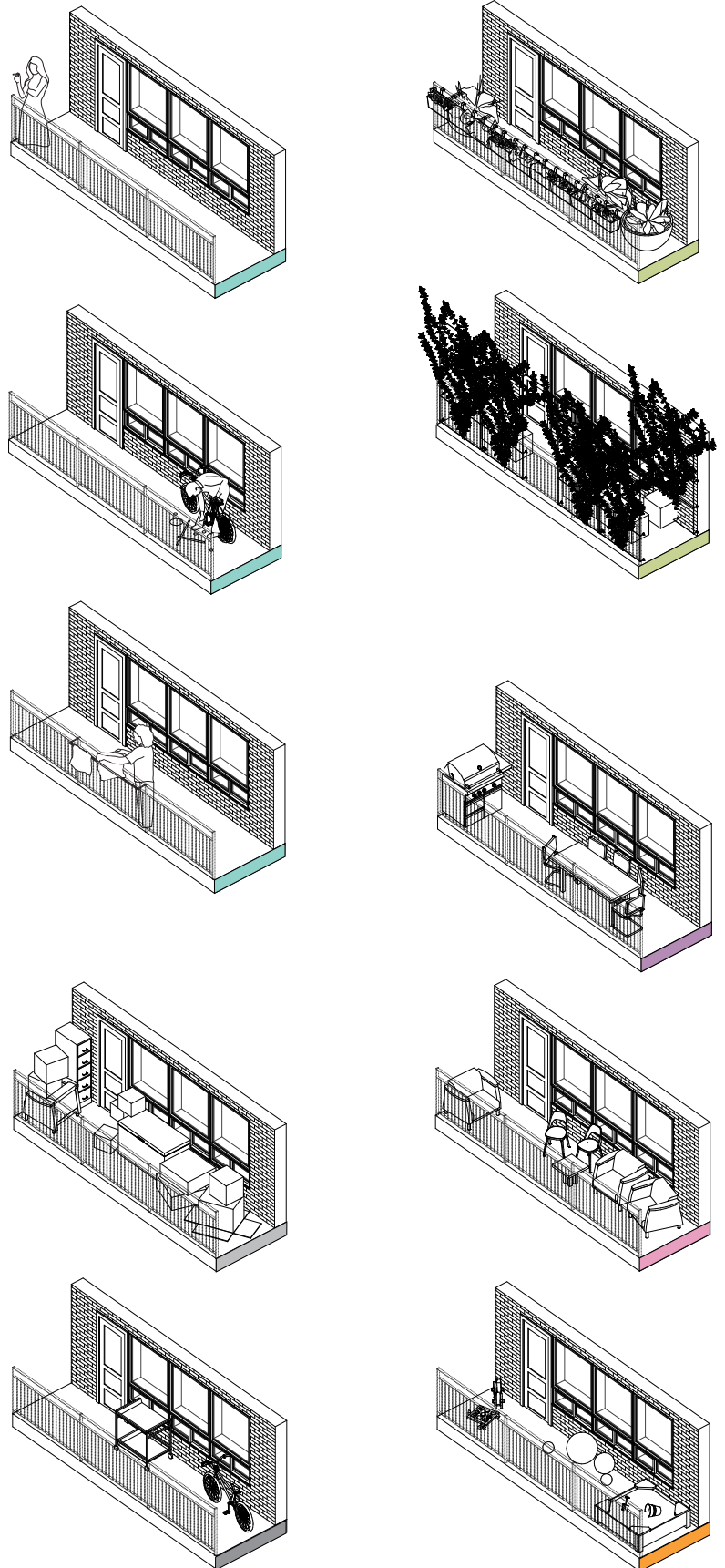


Figure 5-11 Various Balcony Uses

CUSTOMIZATION, EXTENSION AND COMBINATION OF BALCONIES IN TOWER NEIGHBOURHOODS:

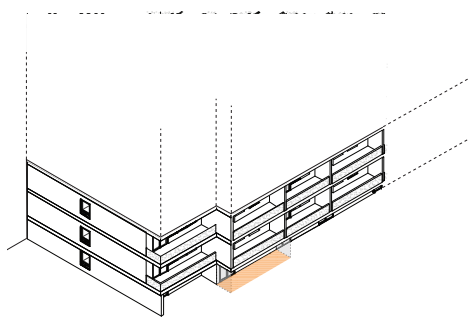


Figure 5-12 customized balconies

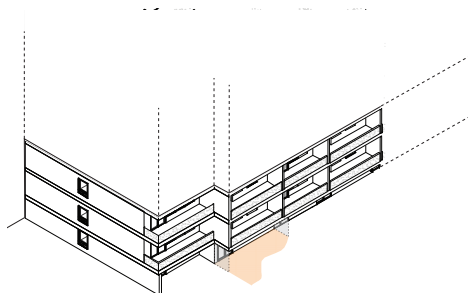


Figure 5-13 extended balconies

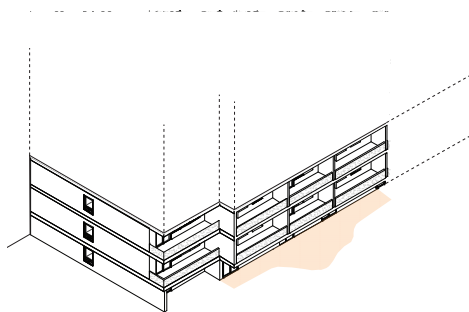


Figure 5-14 combined balconies





RELATIONSHIP AND PLACEMENT
OF INDIVIDUAL BALCONIES:



Figure 5-15 **565 Sherbourne Street:** East View



Figure 5-16 **565 Sherbourne Street:** East View



Figure 5-17 **565 Sherbourne Street:** West View

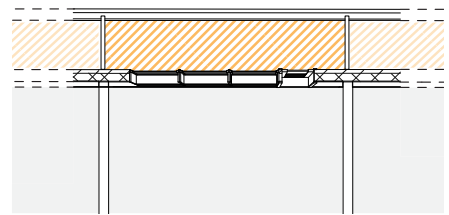
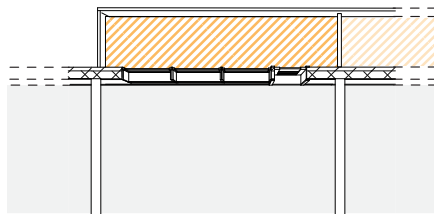
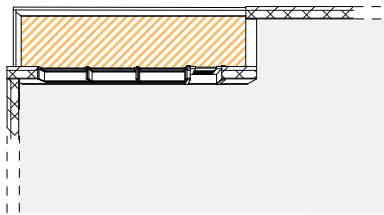


Figure 5-18 **Plan Details of Balconies:**
Location of Individual balconies in relation to other individual balconies

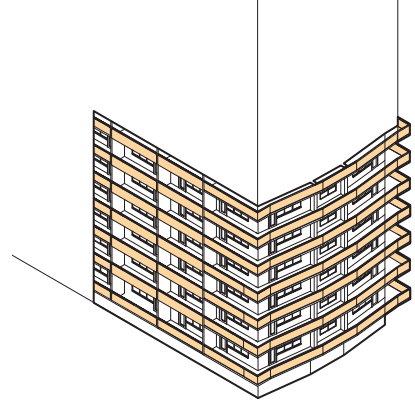
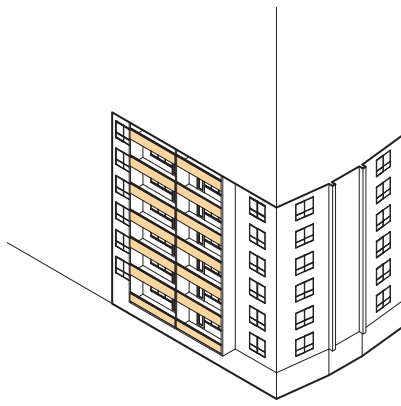
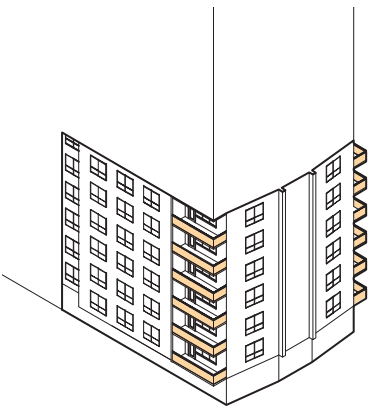
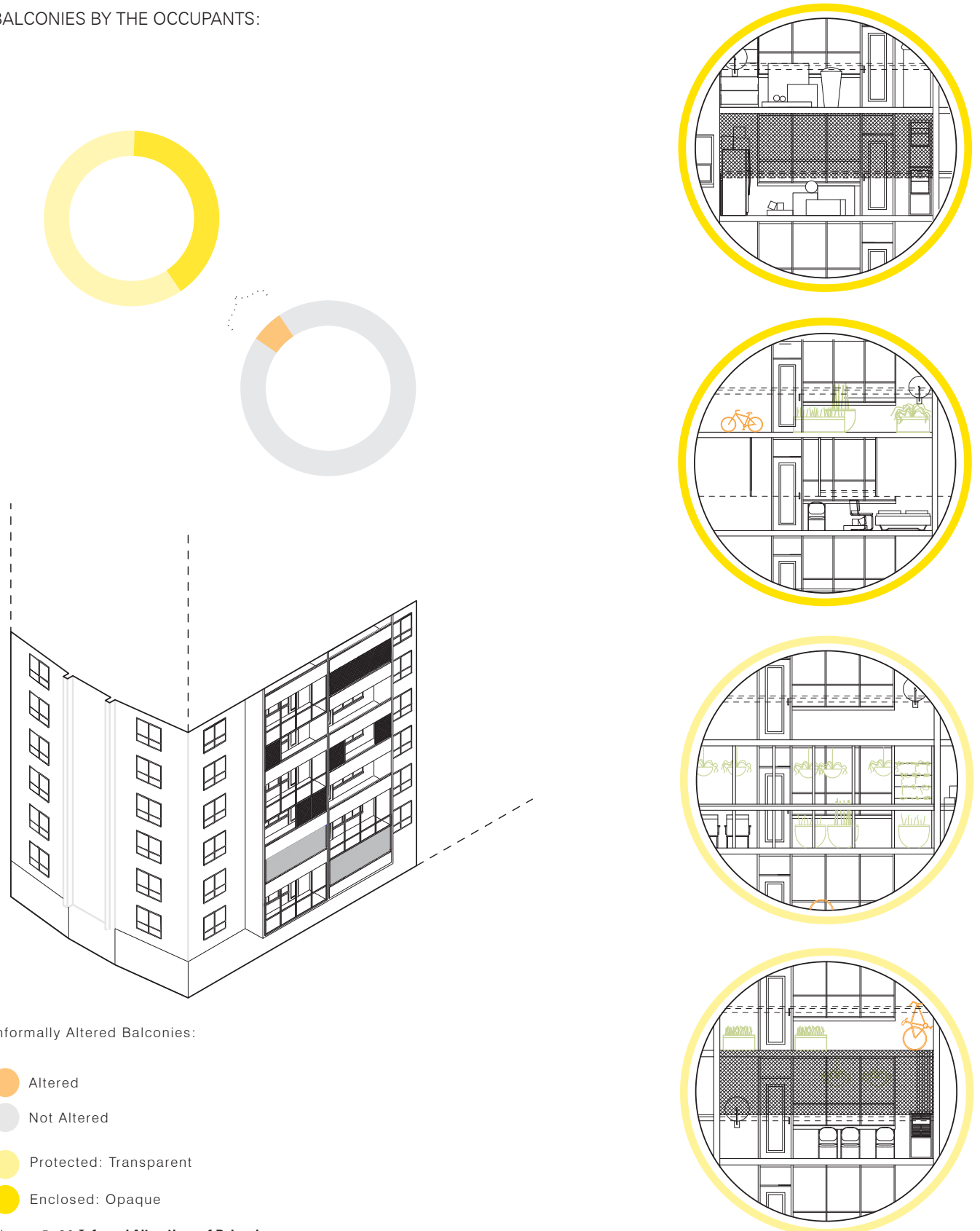


Figure 5-19 **Various Combination
of Balconies on Site**

INFORMAL ALTERATION OF
BALCONIES BY THE OCCUPANTS:



Informally Altered Balconies:

- Altered
- Not Altered
- Protected: Transparent
- Enclosed: Opaque

Figure 5-20 Informal Alterations of Balconies

BALCONY SIZES:

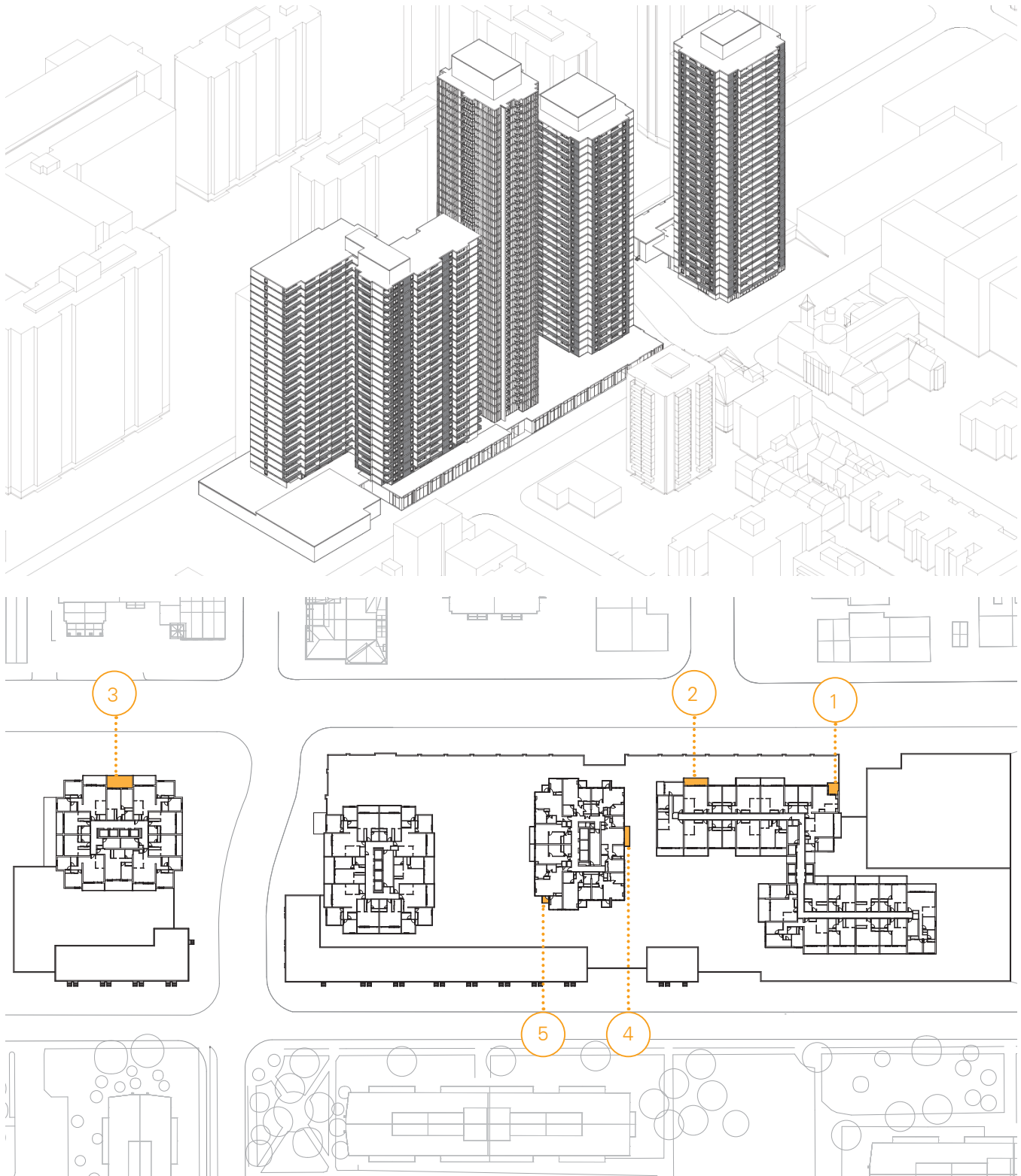


Figure 5-21 **top** Axonometric View of 545-565 Sherbourne Street with New Rental Development and Podium

Figure 5-22 **bottom** Plan of 545-565 Sherbourne Street with New Rental Development and Podium: Highlighting Typical Unit Balconies

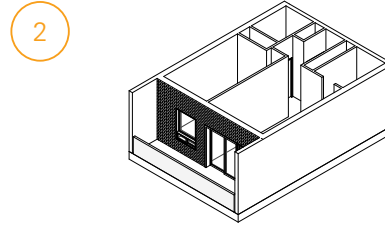
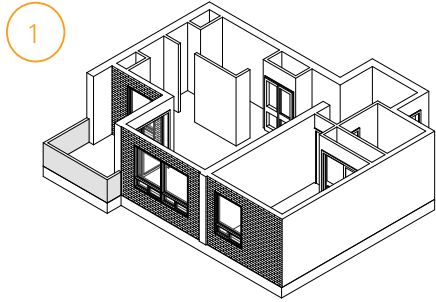


Figure 5-23 Typical Rental Units and Their Balcony Dimensions:

Units 1-3: 545-565 Sherbourne Street.
 Units 4-5: New Rental Development

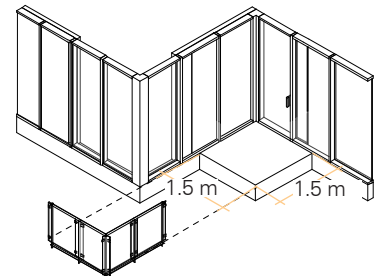
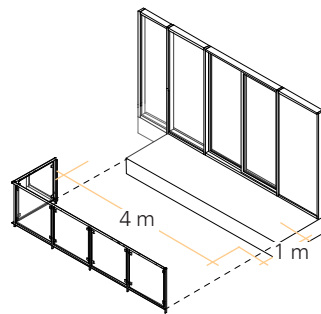
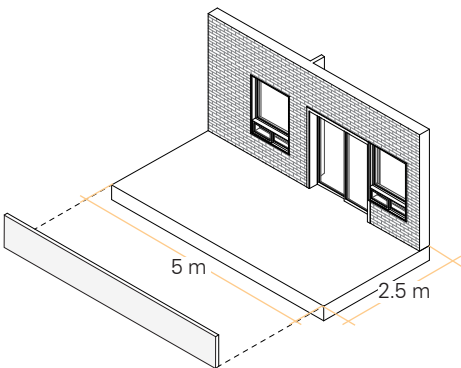
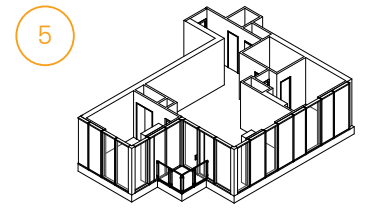
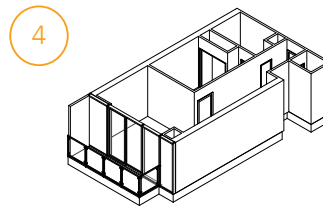
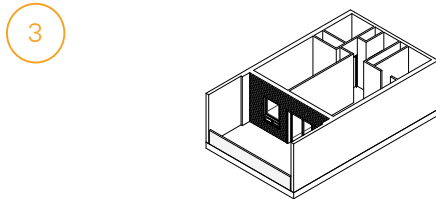
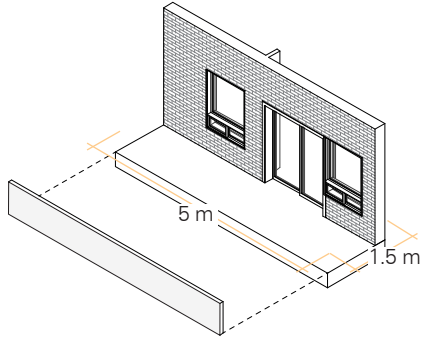
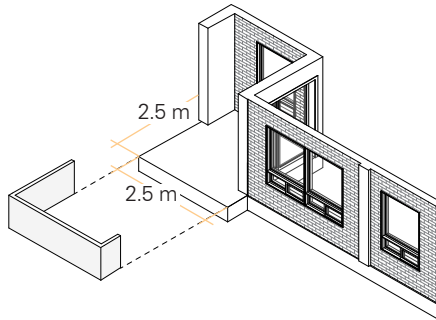






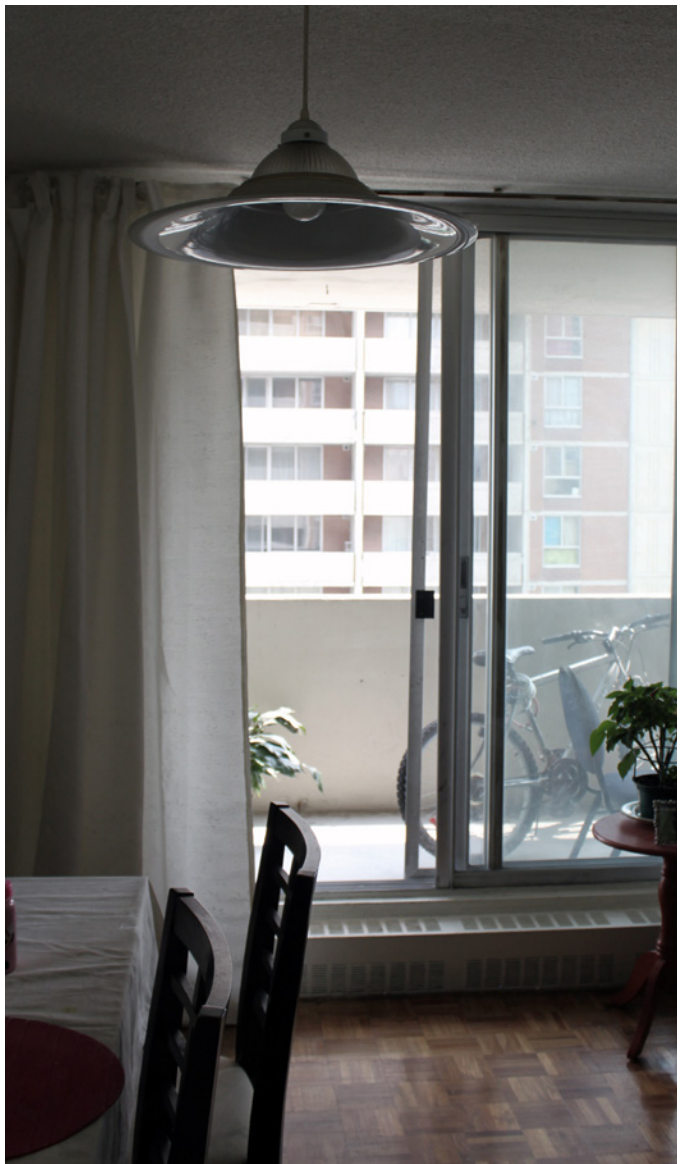
Figure 5-24 545-565 Sherbourne Street





Figure 5-25
545 Sherbourne Street Elevation

Figure 5-26 (following page):
Views of Inside a Typical Unit at 555 Sherbourne
Street and its Balcony

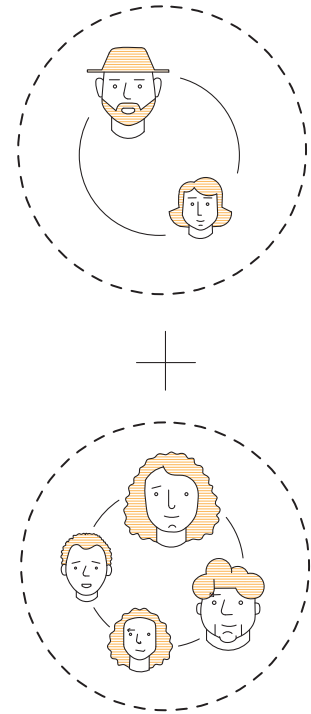
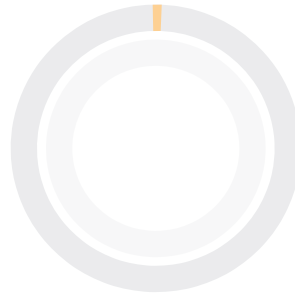


Adaptive Balconies



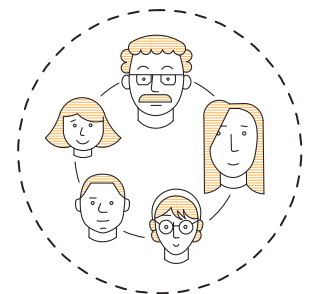
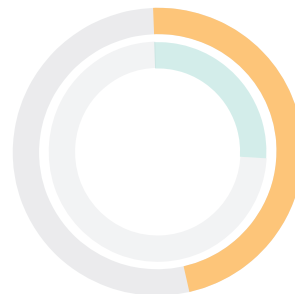
DEMOGRAPHIC STUDIES:

3%



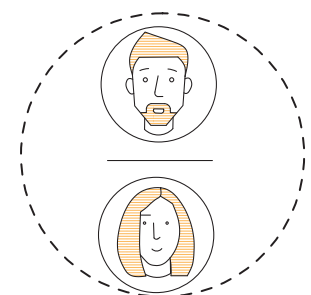
Multi-families Living in a Single Unit

39%
27%



One Family Living in a Single Unit

58%
73%



Non-family Individuals Living in a Single Unit

Figure 5-27 Living Structure Study:
St. James Town ((Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods (District Numbers: 64, 66, 88) in 2011.

- St. James Town (Including 545-565 Sherbourne Street)
- Surrounding Site (District Numbers 64, 66, 88)

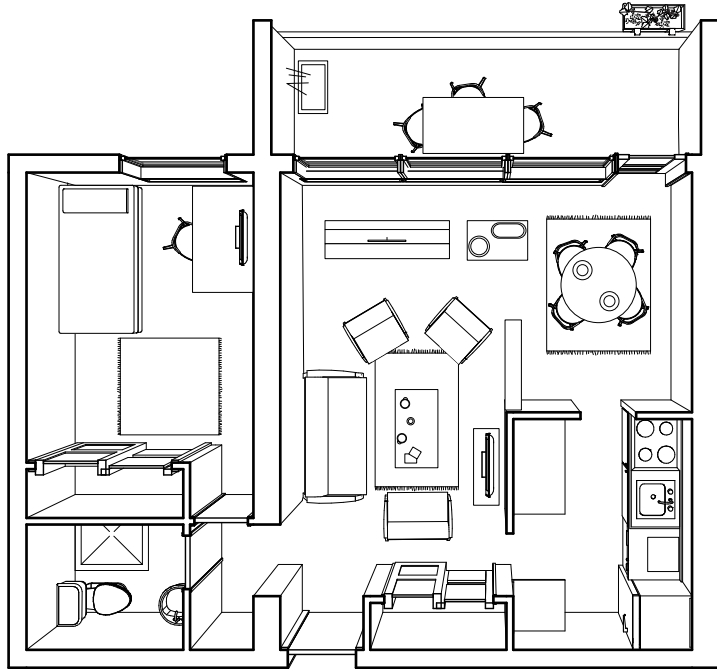


Figure 5-28 **Delshad's Unit**. Typical One-bedroom

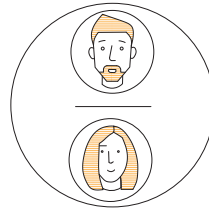


Figure 5-29 **below** Delshad's Living Room

Figure 5-30 **right** Delshad's Balcony



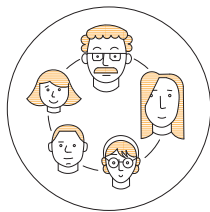
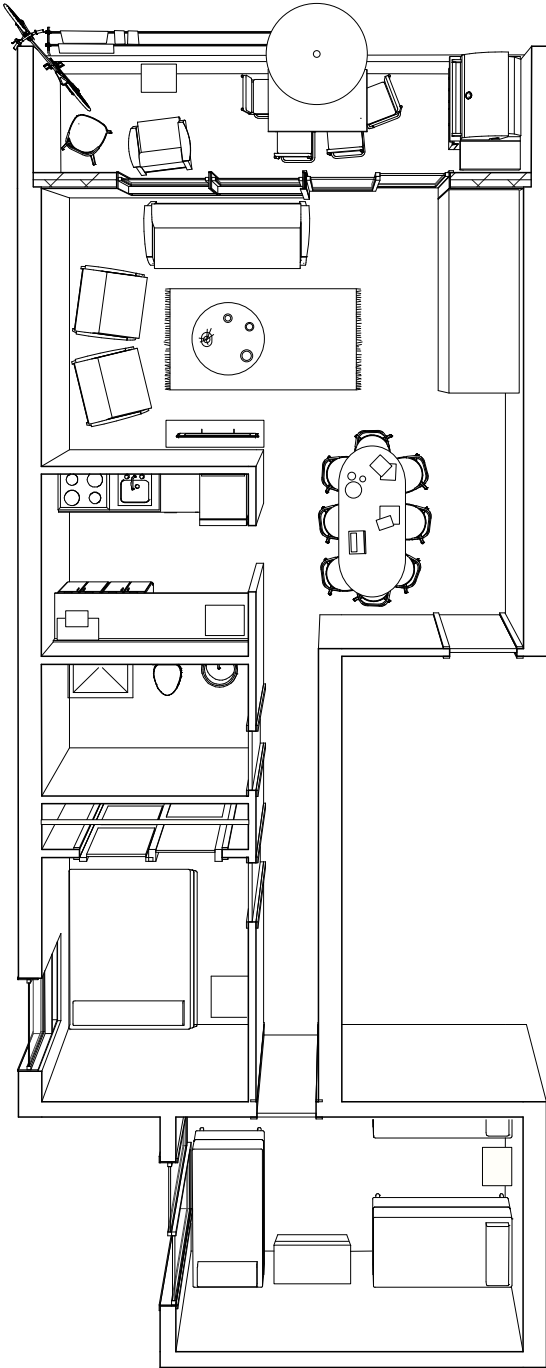


Figure 5-31 **Typical Two-Bedroom Unit**. One Family Structure with Three Children

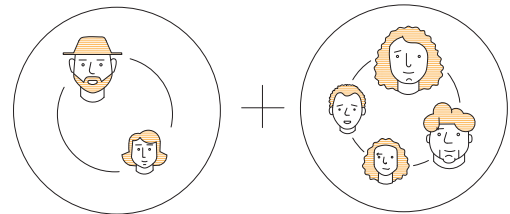
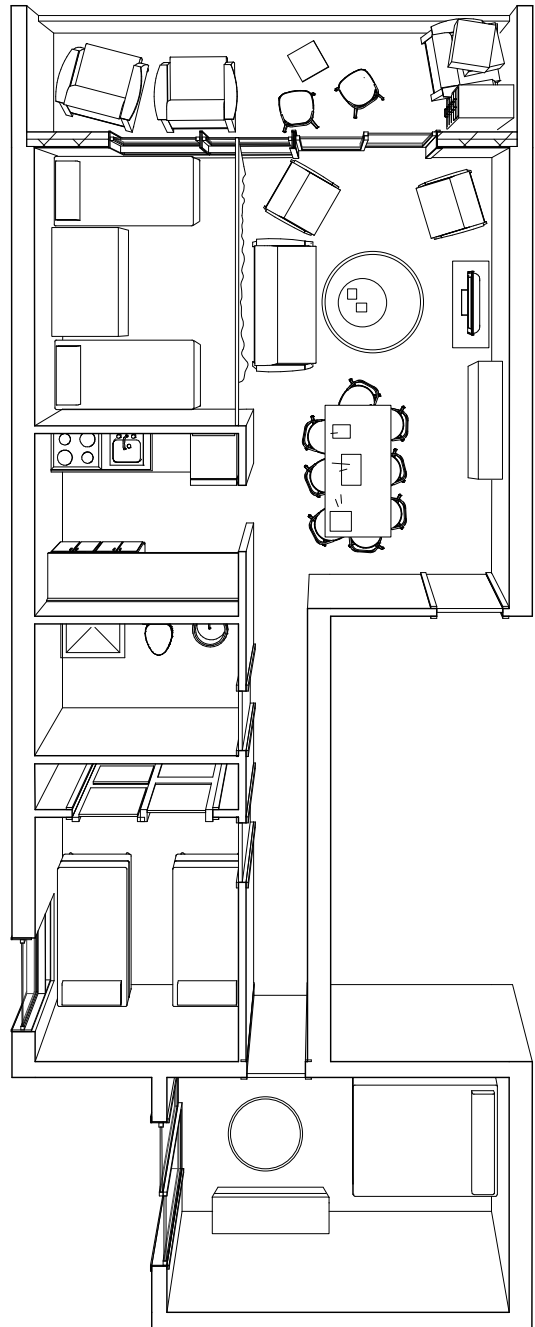


Figure 5-32 **Typical Two-Bedroom**: Multi-family Structure

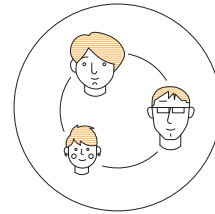
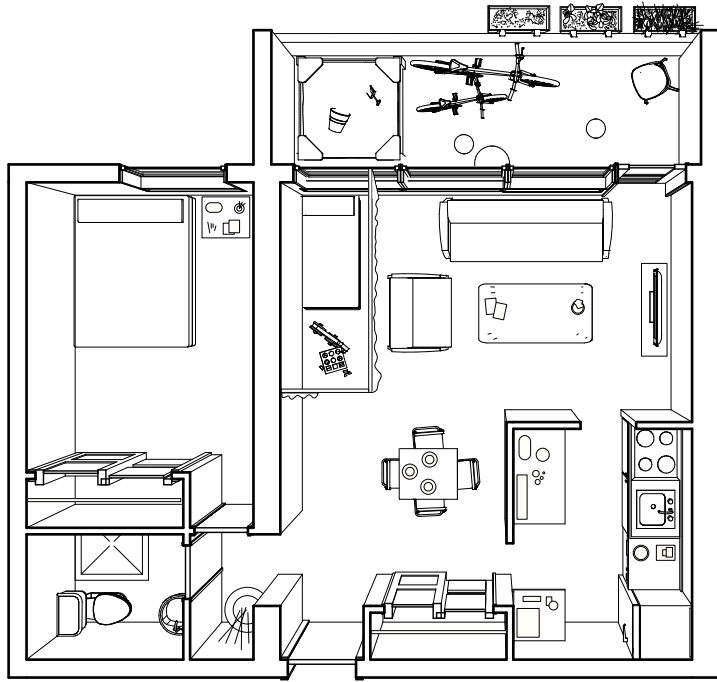


Figure 5-33 **Typical One-Bedroom Unit**. One Family Structure with One Child

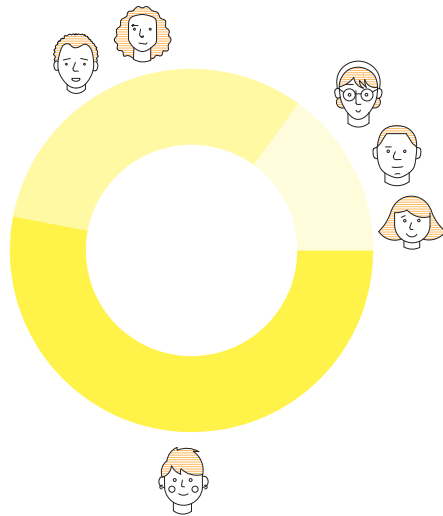


Figure 5-34 Percentage of Families With One, Two and Three or more Children in St. James Town in 2011

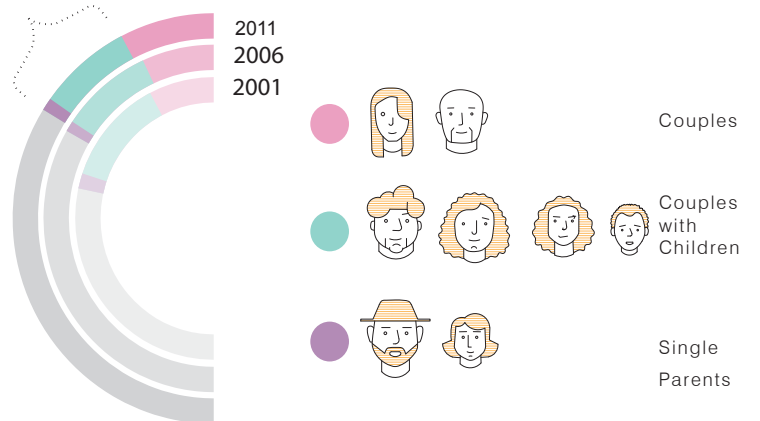


Figure 5-35 **Change in Family Structure Study**: Percentage of Couples, Couples with Children and Single Parents in St. James Town From 2001 to 2011

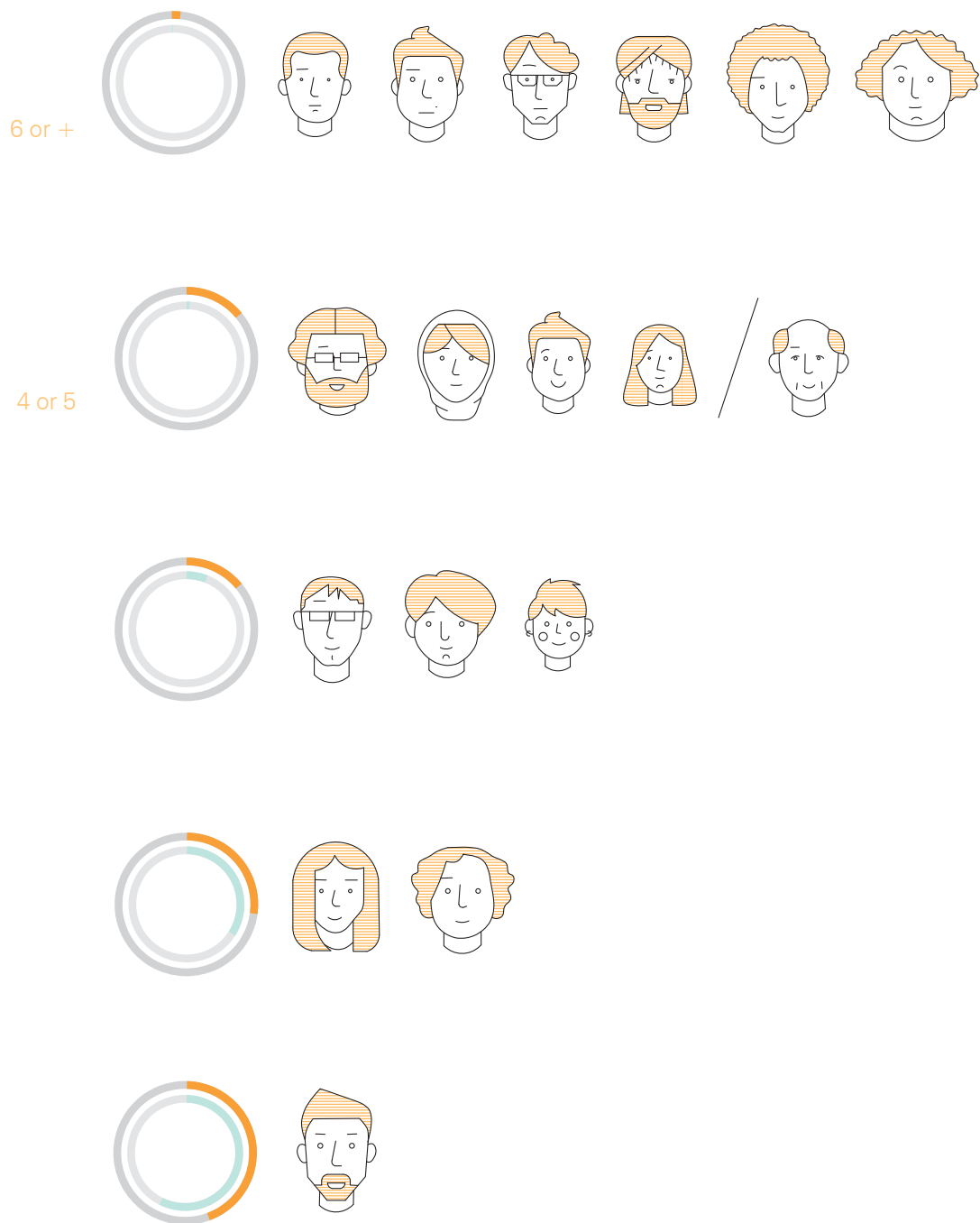


Figure 5-36 **Number of Individuals Living in Each Unit:** St. James Town Compared to Surrounding Neighbourhoods

■ St. James Town (Including 545-565 Sherbourne Street)
■ Surrounding Neighbourhoods (District Numbers 64, 65, 88)

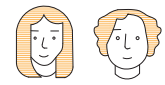
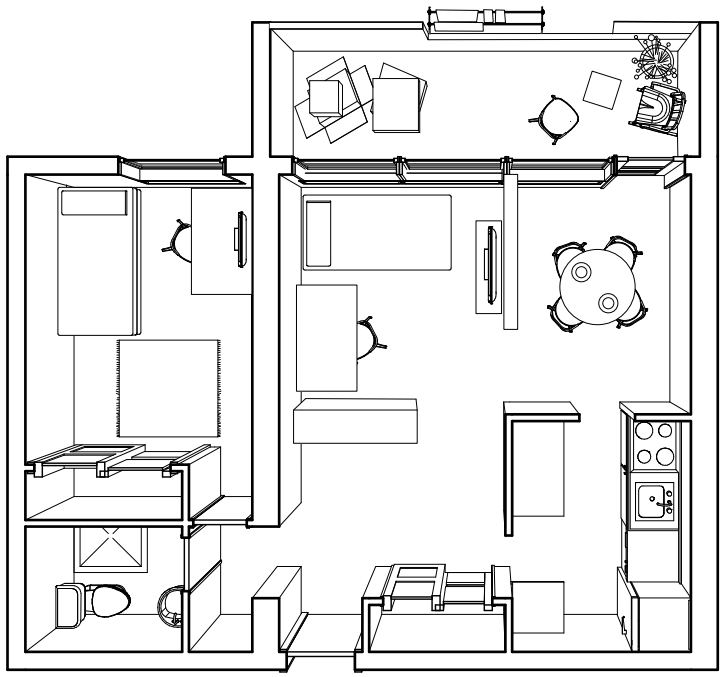


Figure 5-37 **Typical One-Bedroom Unit:** Co-habiting (Two People)

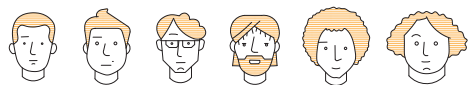
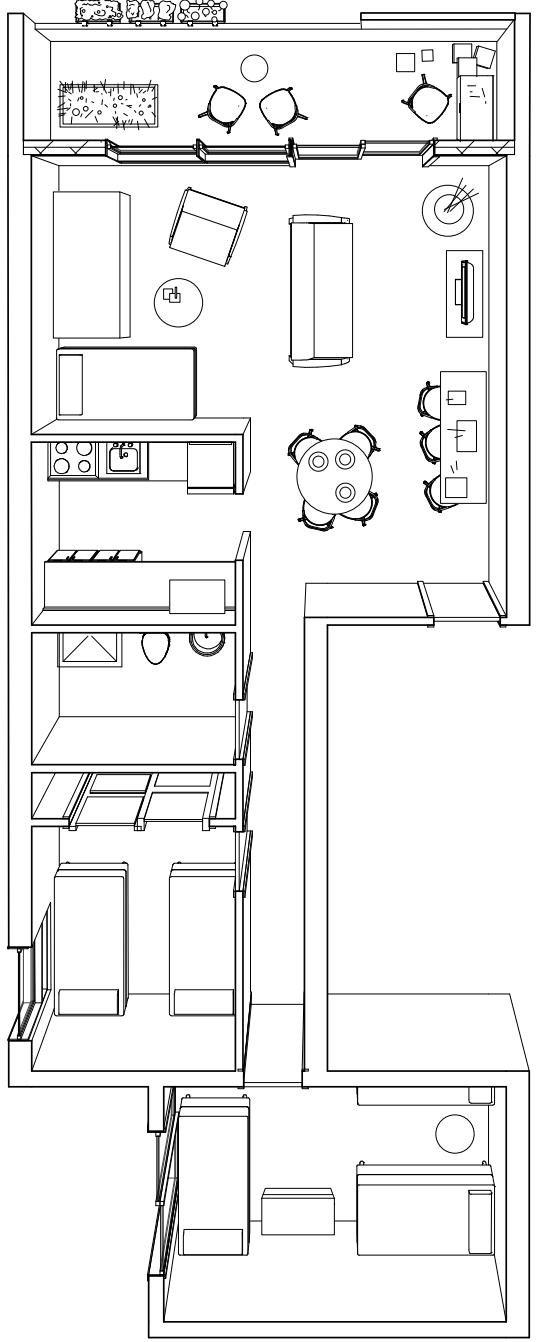
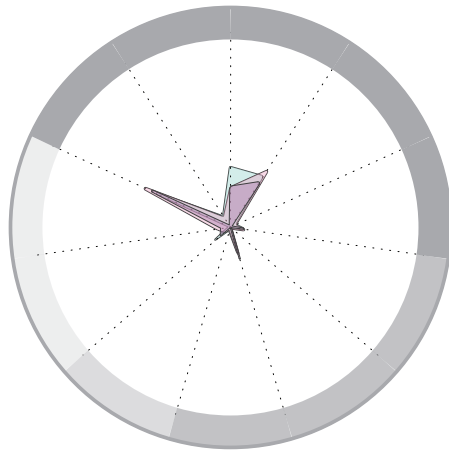
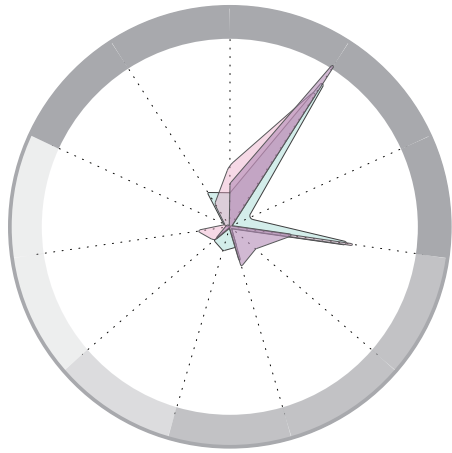
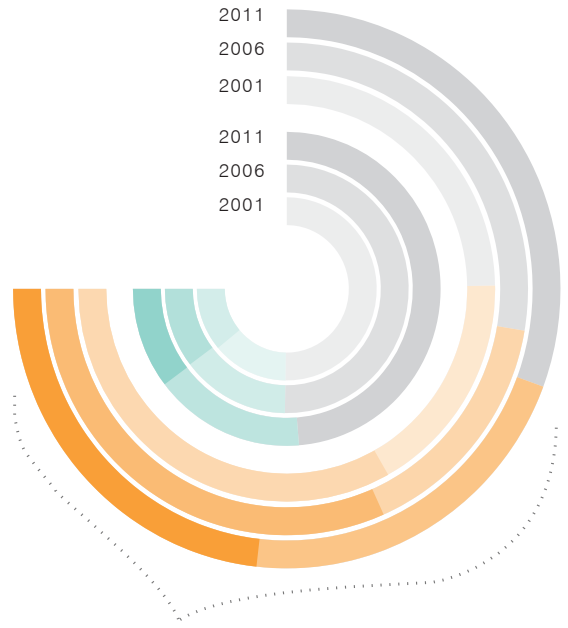


Figure 5-38 **Typical Two-Bedroom Unit:** Co-habiting (Six People)



■ Immigrants in St. James Town*
■ Immigrants in surrounding neighbourhoods*

*The darker shade in each ring represents the percentage of immigrants from the most significant countries of origin

Immigrants in St. James Town

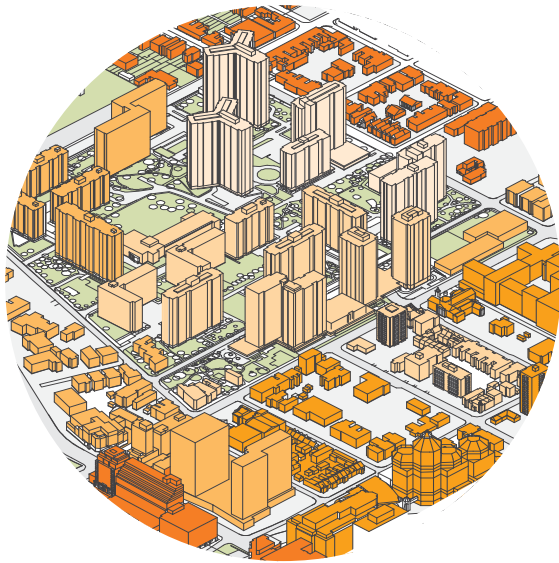
● 2011
● 2006
● 2001

Immigrants in Surrounding Neighbourhoods

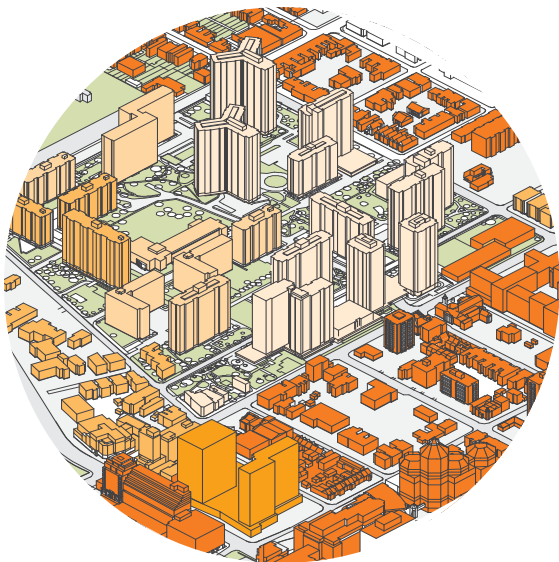
● East Asian
● South Asian
● South American
● European

Figure 5-39 top Change in the percentage of Immigrants vs. Citizens in St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods from 2001 to 2011.

Figure 5-40 top right Change in the Origins of Immigrants in St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods from 2001 to 2011.



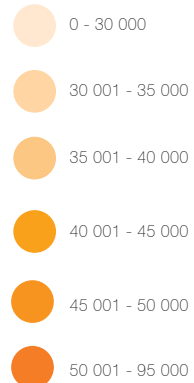
2001

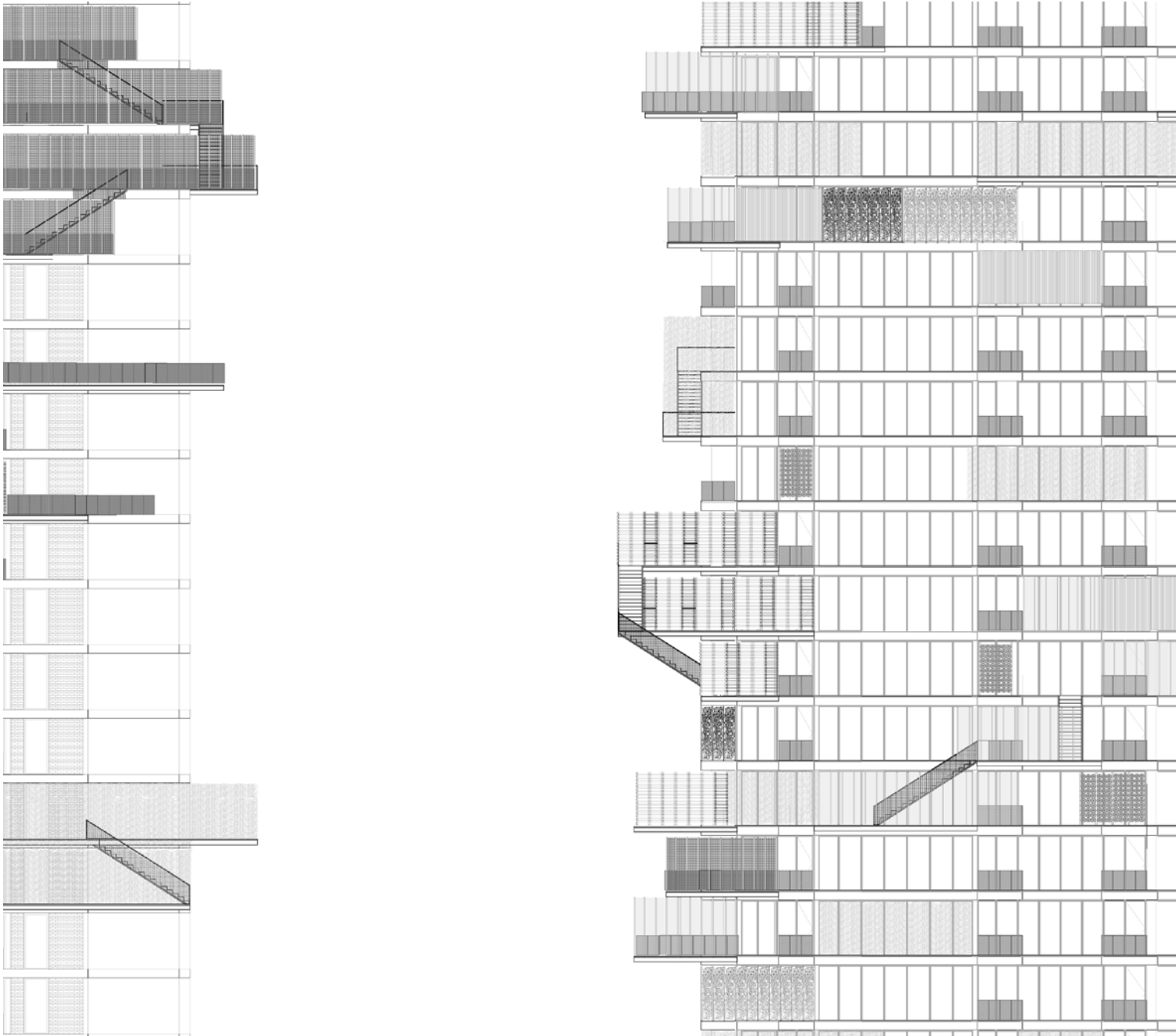


2011

Figure 5-41 bottom Change in Average Household Income in St. James Town (Including 545-565 Sherbourne Street) and Surrounding Neighbourhoods from 2001 to 2011. Inflation over the ten year period has been accounted for in this study.

Average Household Income (\$)





6.0 OPEN DESIGN SYSTEM FOR 545-565 SHERBOURNE STREET

Figure 6-1 Elevation of 555-565 Sherbourne Street with Adaptive Balconies

110 Hensel, Michael. 2013. Performance-oriented architecture: rethinking architectural design and the built environment. AD primers. West Sussex: John Wiley & Sons Ltd, 10.

It can be said in regards to the buildings under study that “the way the buildings communicate with the environment is constrained to (their) rigidity” not only through their use and interaction but also through the rigidity of their form. In this process, shifting the idea of the building from an object to a system that is “indeterminate”¹¹⁰ is an objective for the design proposal. This will include introducing elements in the existing balcony space and an expansion beyond its limits, that can investigate the finished work could be incomplete and evolving. The design therefore aims at integrating elements of informal and unplanned



urbanism, including the provision of small-scale interventions and the enabling a future of self-organization. This is proposed through a flexibility in the expansion of the exterior spaces of each unit and through the provision of small-scale, modular and dynamic elements. The design proposal does not advocate a lack of control through the investigation of informality, but rather will focus on the development of a hybrid between the planned and the unplanned, through the enabling of small-scale local decisions which can be viewed as an initial step towards the development of an interconnected and evolutionary urbanism at the scale of the residential tower.

The open design system proposed for the renewal of residential development of Sherbourne Street, Toronto are presented at two scales:

- 1 A refurbishing of the exterior including improvements to the structural and environmental performance of balconies is proposed at the scale of residential tower. This process includes the addition of elements and frameworks that will make future small-scale additions and adaptations possible.

Some of the strategies to be implemented include:

- Structural and environmental improvements to the structure of the balcony
- Adjustable glass enclosure for the balcony
- Flexible and adaptable railings
- Structural framework for the expansion of the balcony space
- Structural railing for the addition of an expandable tensile roof
- Railing infrastructure in the floor system to accommodate for the placement of various screens and their modulation
- Smart floor tiles – with embedded sensors to track the organization and functioning of the balcony. The extent of this investigation is outside the scope of this thesis, and speculations for its future development are presented in the conclusion.

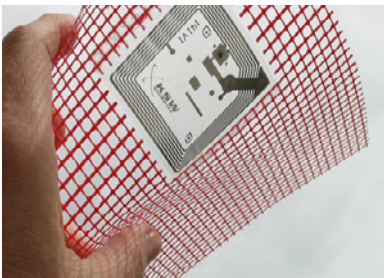
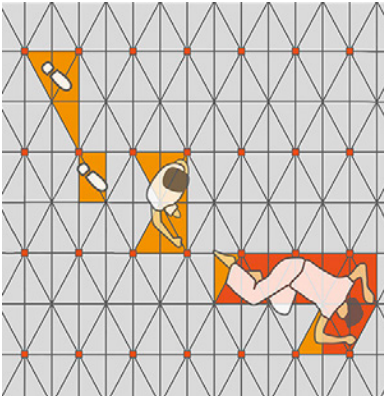
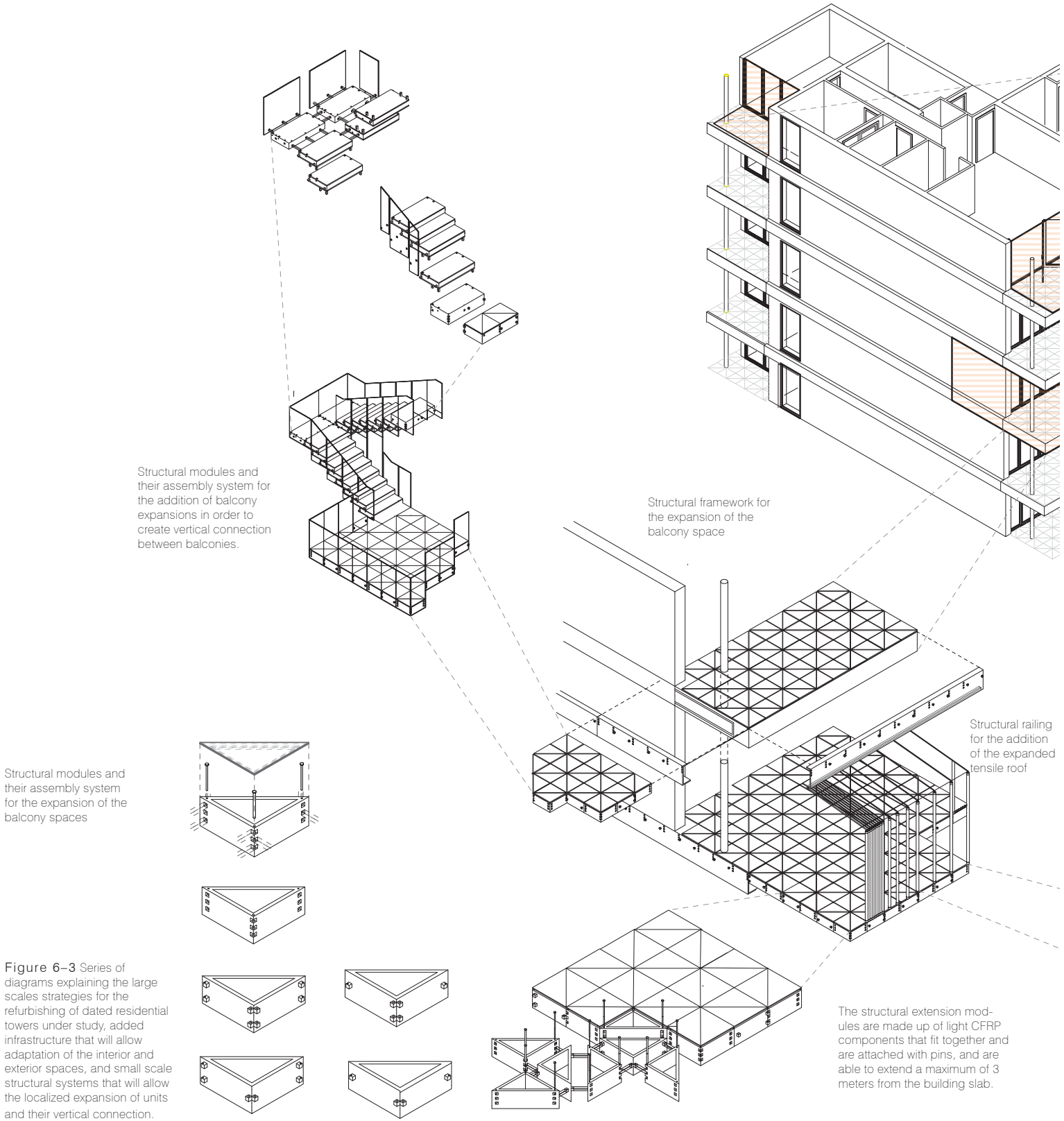


Figure 6–2 SensFloor - A Smart Flooring Technology developed by Future Shape that is able to detect movement. With the capacity to be programmed to understand human use and patterns as well having an understanding of and ability to track changes in the space.

- 2 At the unit scale, primarily a modular structural system for the expansion of the balcony spaces as well as the possibility for vertical connection between units is proposed. Secondly, a series of flexible screens, as a way to create a layered system in the exterior threshold is visualized. A series of possibilities are proposed for the functionality of these screens. It is within the scope of this thesis to propose examples of this, and to propose the possibility of the implementation of new technologies and systems in the future. Some examples of systems and technologies that are adopted to screens and used as examples within this thesis include the following:

- Adaptive Knitted Structures: An adaptable knitted structure is developed by Janes Scott at Textile Futures Research Center at the University of Leeds with embedded shape memory polymer technology and customized knitting techniques that allows the fabric to be responsive in different conditions. This knitted fabric, when used in different responsive layers can act as an effective shading device in an overlapping manner, similar to the workings of shading screens developed by Buro Happold.
- Pneumatics: Pneumatic responsive technology is used to create a thermally insulating freeform structure using small-scale modules in Kathy Velikov and Geoff Thun's Pneusystem at the University of Michigan. This technology is adopted and similar modules have been design to form thermal and breath able screens that can aggregate in layers.
- Hydroponic technology for growing food and growing plants vertically have been fitted within the typical screen framework.
- Modes of energy generation, such as tiny wind turbines and flexible solar films have also been incorporated within the system.



Structural modules and their assembly system for the addition of balcony expansions in order to create vertical connection between balconies.

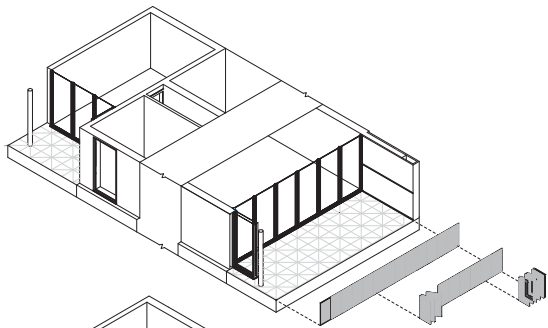
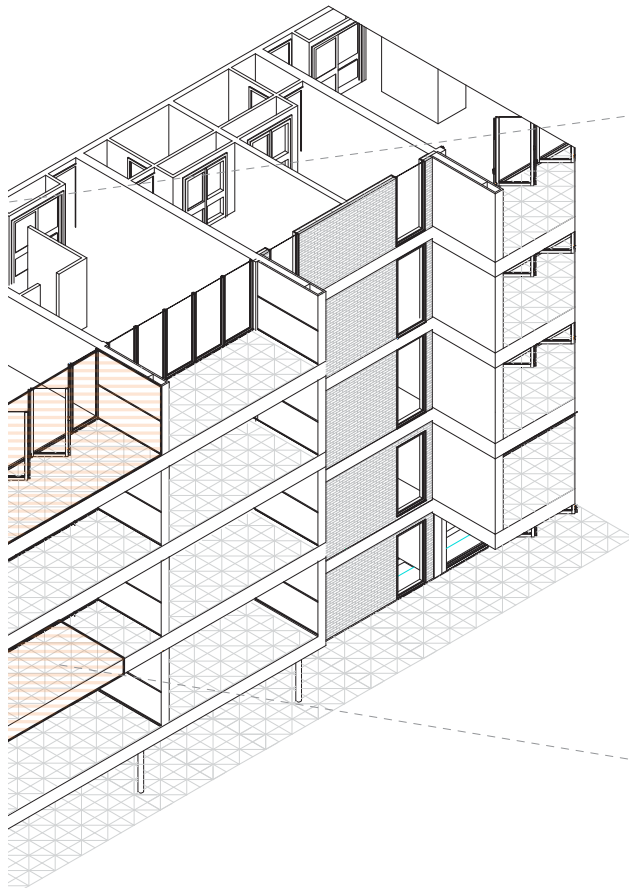
Structural framework for the expansion of the balcony space

Structural railing for the addition of the expanded tensile roof

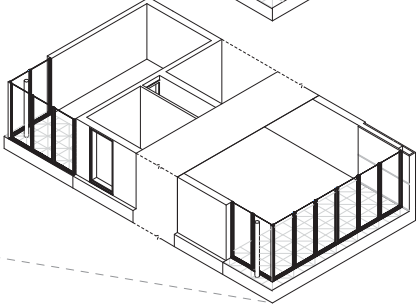
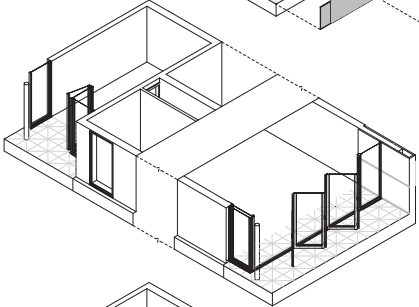
Structural modules and their assembly system for the expansion of the balcony spaces

The structural extension modules are made up of light CFRP components that fit together and are attached with pins, and are able to extend a maximum of 3 meters from the building slab.

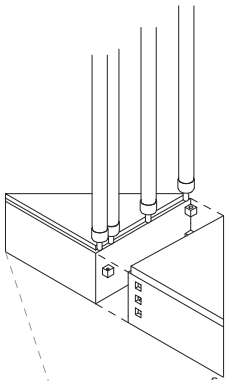
Figure 6-3 Series of diagrams explaining the large scales strategies for the refurbishing of dated residential towers under study, added infrastructure that will allow adaptation of the interior and exterior spaces, and small scale structural systems that will allow the localized expansion of units and their vertical connection.



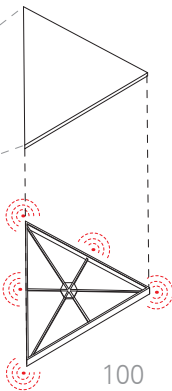
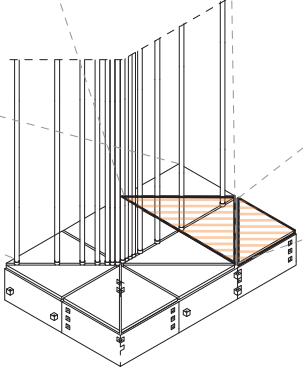
Flexible railings, to accommodate for the added screens



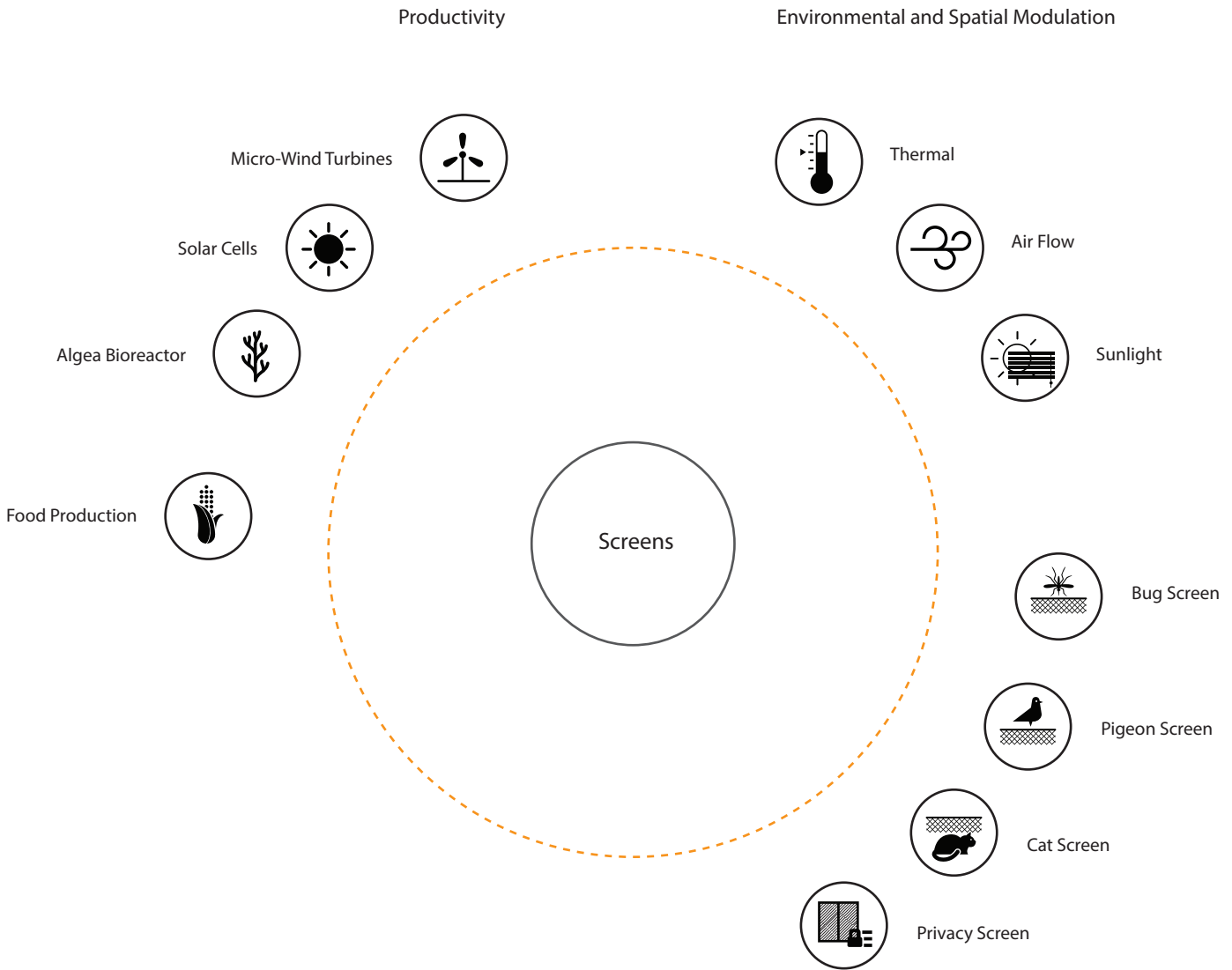
Adjustable glass enclosure for the balcony: will allow the ability to extend or enclose the units according to the occupant needs and seasonal changes.



Railing infrastructure in the floor system to accommodate for the placement of various screens and their modulation



Smart floor tiles, with embedded sensors to track the organization and functioning of the balcony can keep track of the location and placement of each screen. Therefore, allowing an understanding of how the balcony is functioning within its different layers.



VARIATION OF PROPOSED SCREENS
FOR THE ADAPTIVE BALCONY:

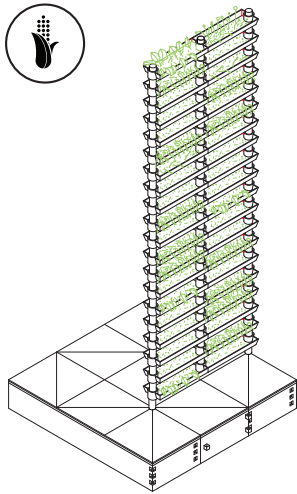


Figure 6-4 Hydroponic Screen: Food Production



Figure 6-5 Small scale hydroponic technology can be adopted at the residential and balcony scale in order to produce food.

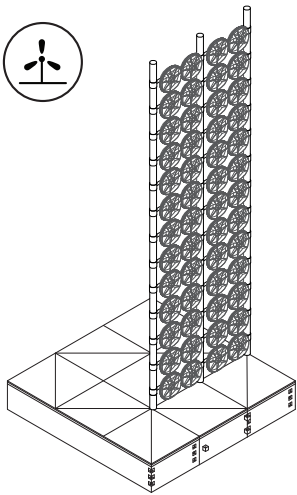


Figure 6-6 Micro Wind Generating Screen



Figure 6-7 Micro Wind Turbines developed at Hong Kong University have a compact 25 cm rotor diameter and can be aligned in series to generate energy with low winds. This technology makes it ideal for use in urban

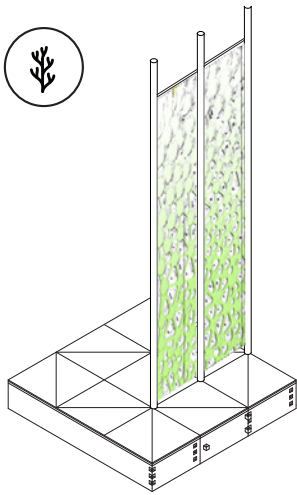


Figure 6-8 Algae Textile Water Filtration Screen

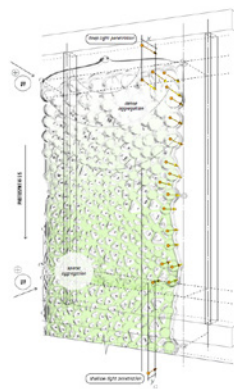


Figure 6-9 Algae Textile - A Water Filtration Textile Designed by Petra Bogias (Bogias, 2014)

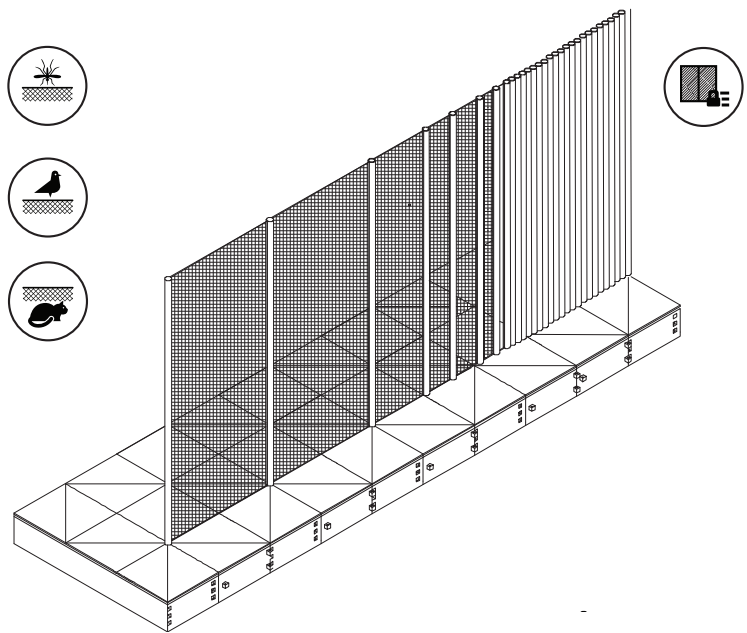


Figure 6-10 Protection and Privacy Screen

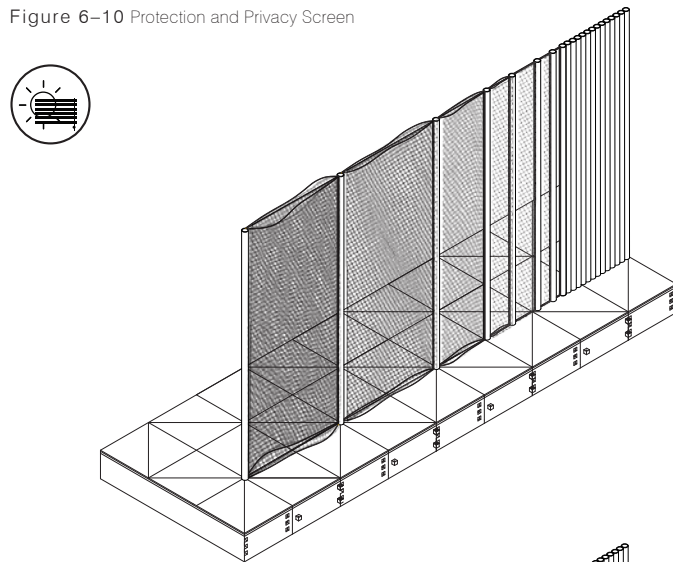


Figure 6-13 Adaptive Solar Shading Screen

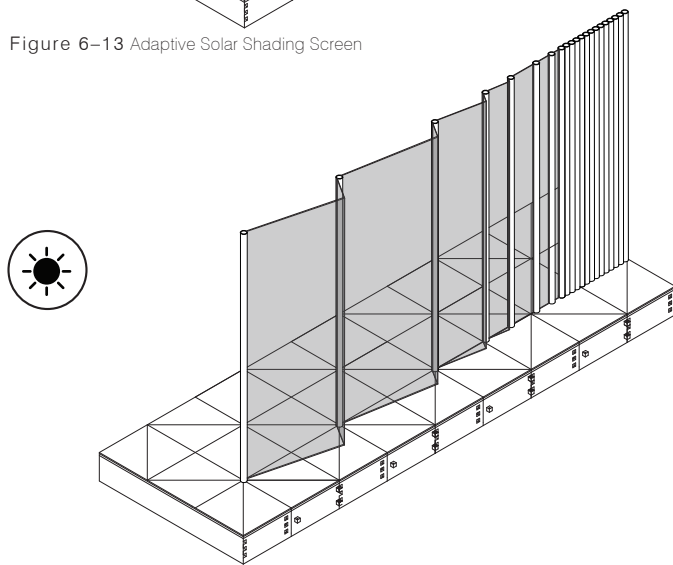


Figure 6-15 Adaptive Solar Screen

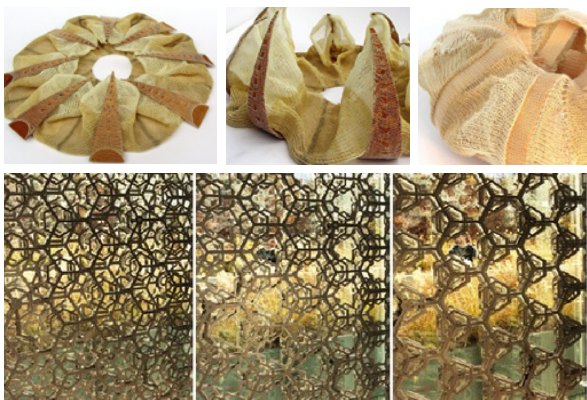


Figure 6-11 **top** Adaptive Knitted Structures with embedded shape memory technology used as a precedent for creating layered shading devices.
 Figure 6-12 **bottom** Shading screens developed by Buro Happold that through the modulation of different layers control exposure effectively.



Figure 6-14 Plastic Solar Cell films developed by Georgia Tech's Bernard Kippelen allows the flexibility of use of solar energy generation within the balcony setting as an added screen. This film with adopted shape memory polymers can allow it to react to different angles of the sun to increase efficiency.

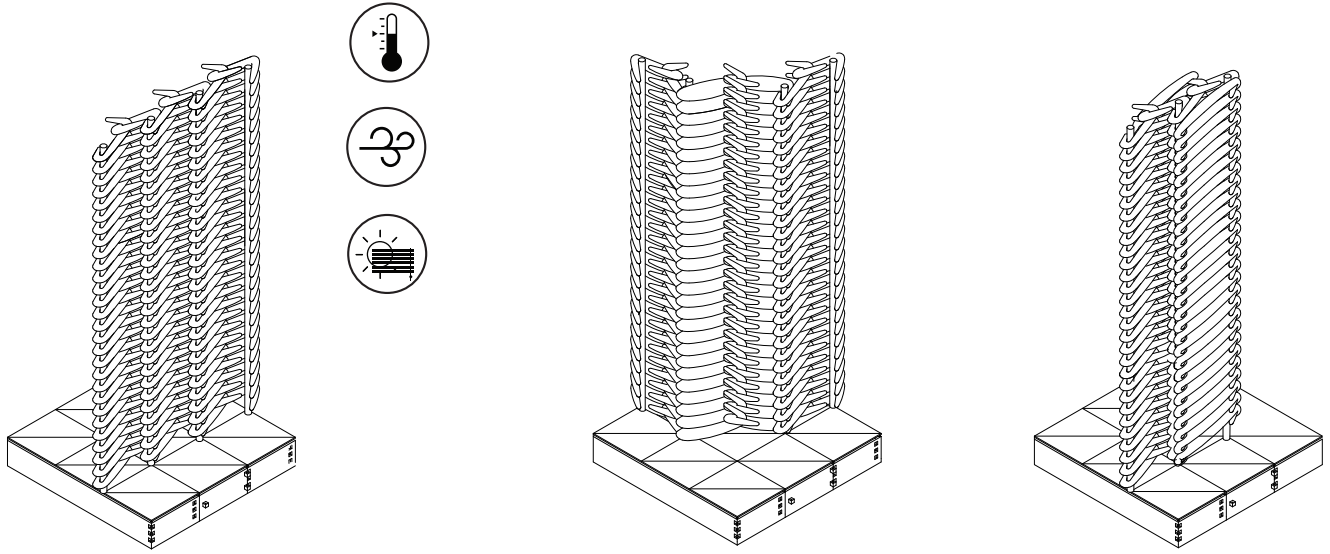


Figure 6-16 Pneumatic Thermal Screen

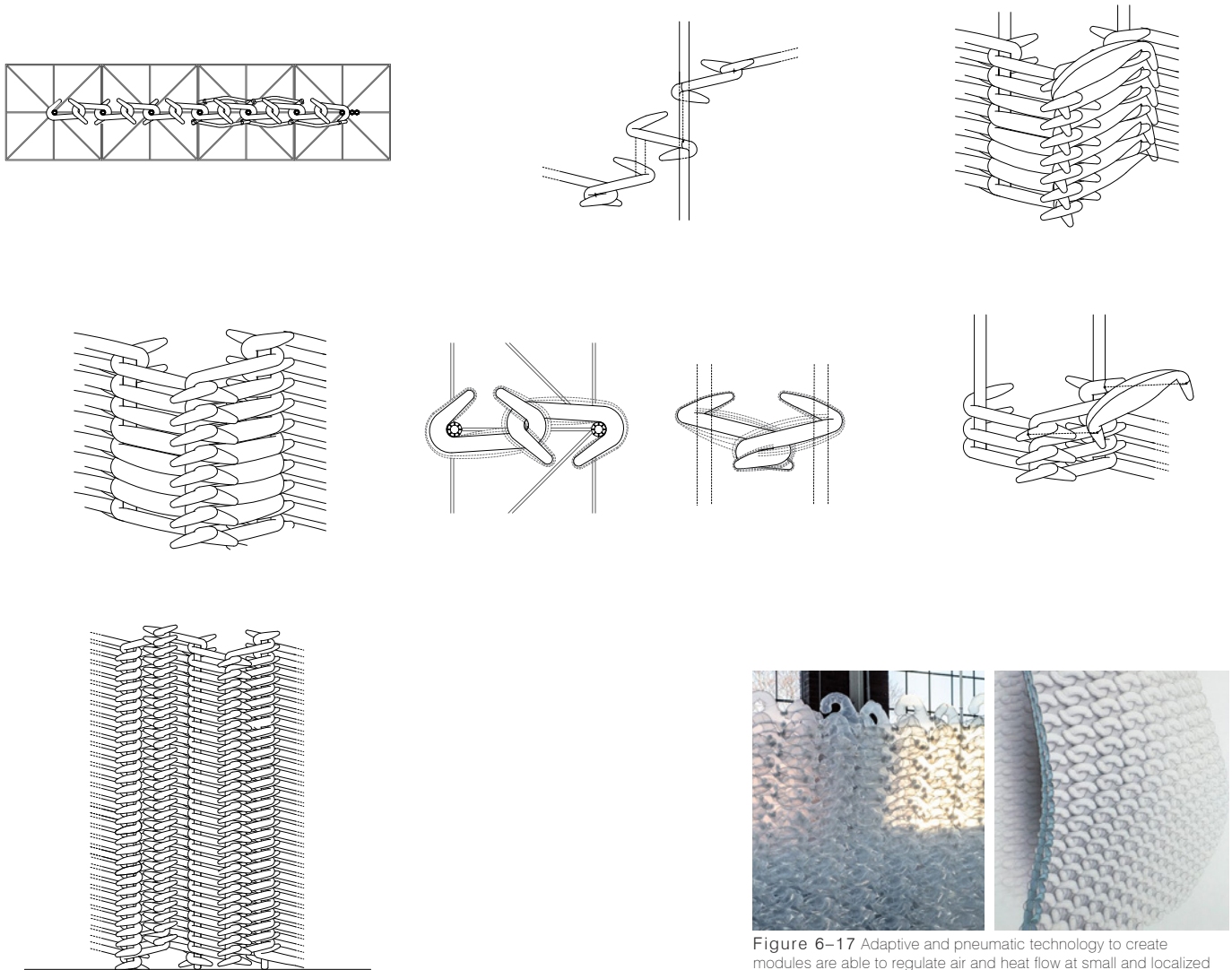


Figure 6-17 Adaptive and pneumatic technology to create modules are able to regulate air and heat flow at small and localized scales (Pneusystem, Velikov and Thun, 2014)

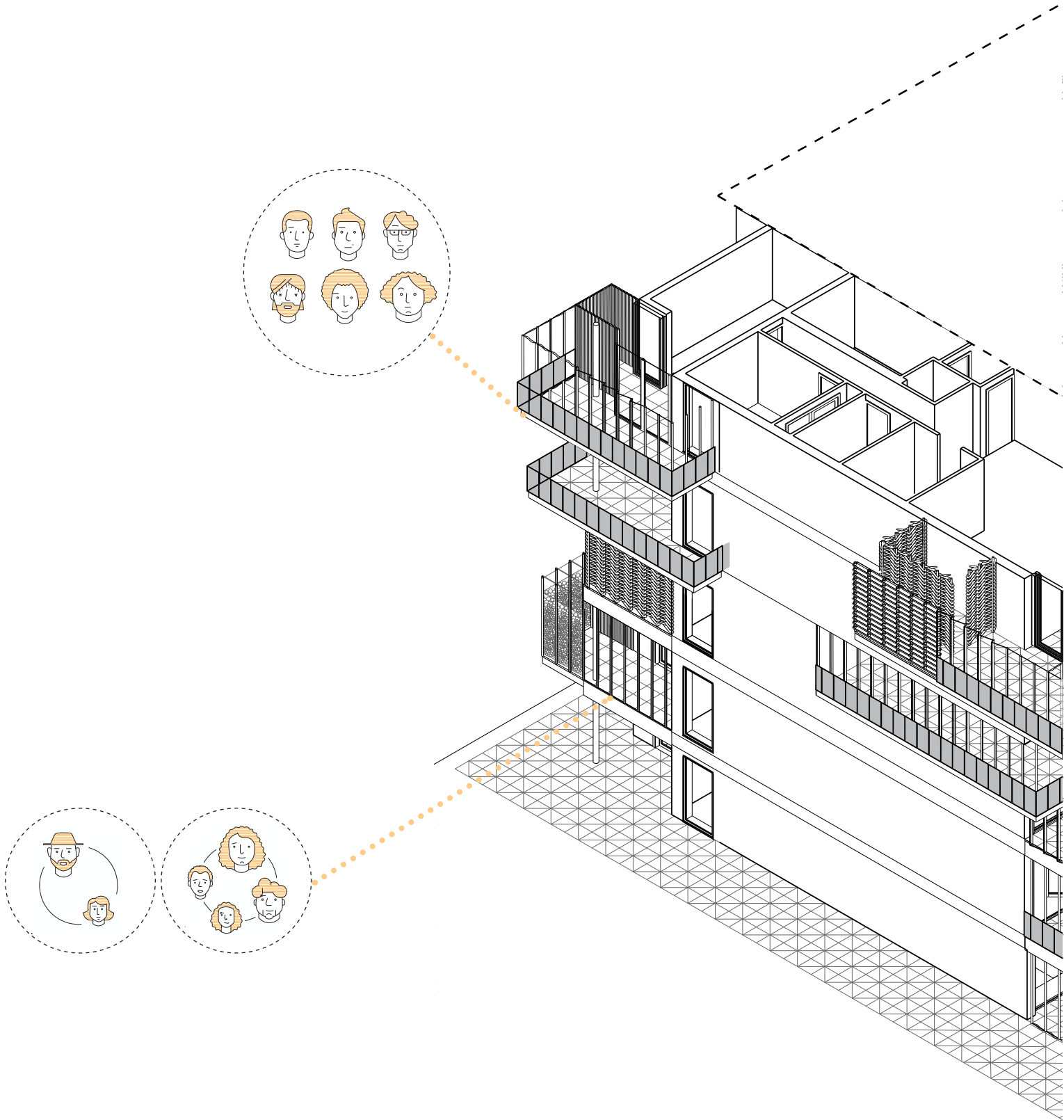


Figure 6-18 Axonometric View with Adapted Balconies:
Units Previously Studied

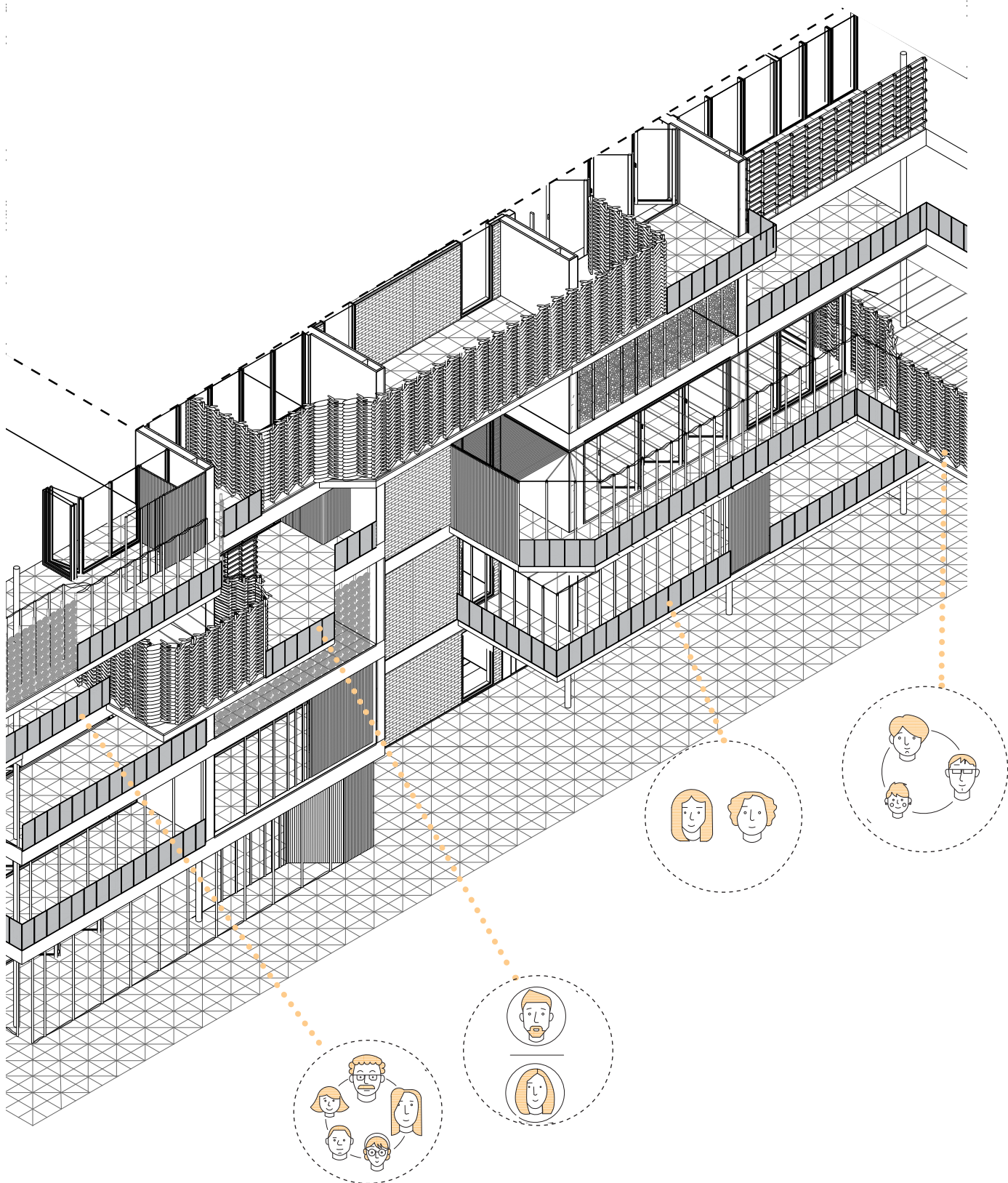




Figure 6-19 Outline of Various Balcony Activities

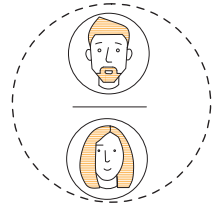
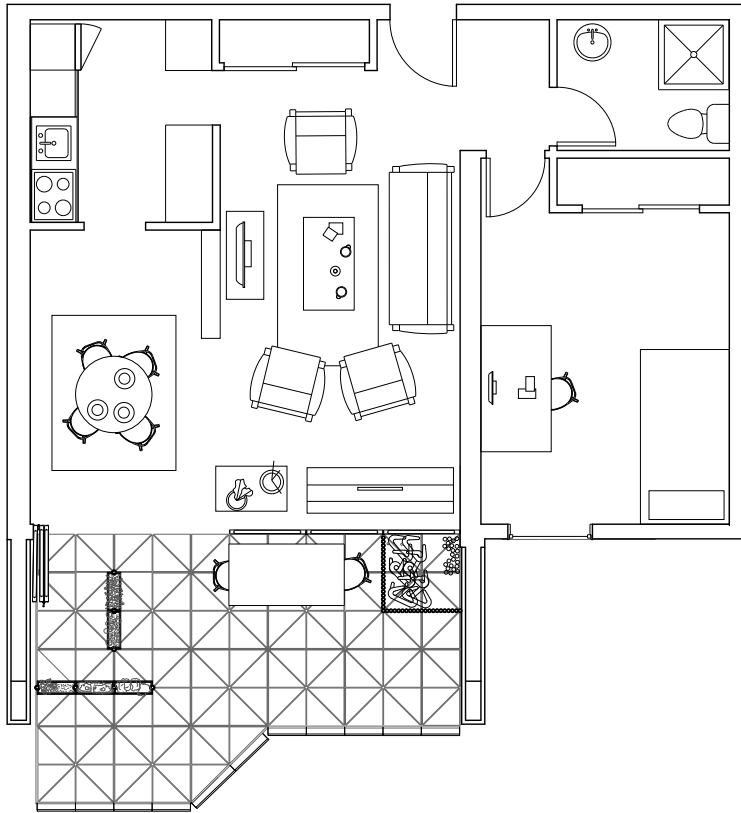


Figure 6-20 Summer Plan: Unit with One Individual

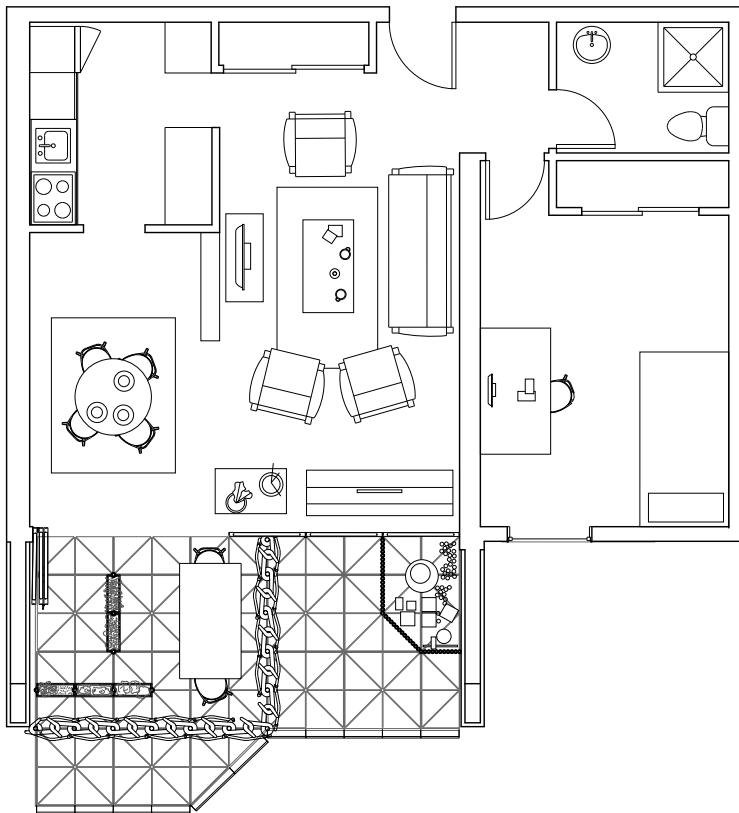


Figure 6-21 Winter Plan: Unit with One Individual

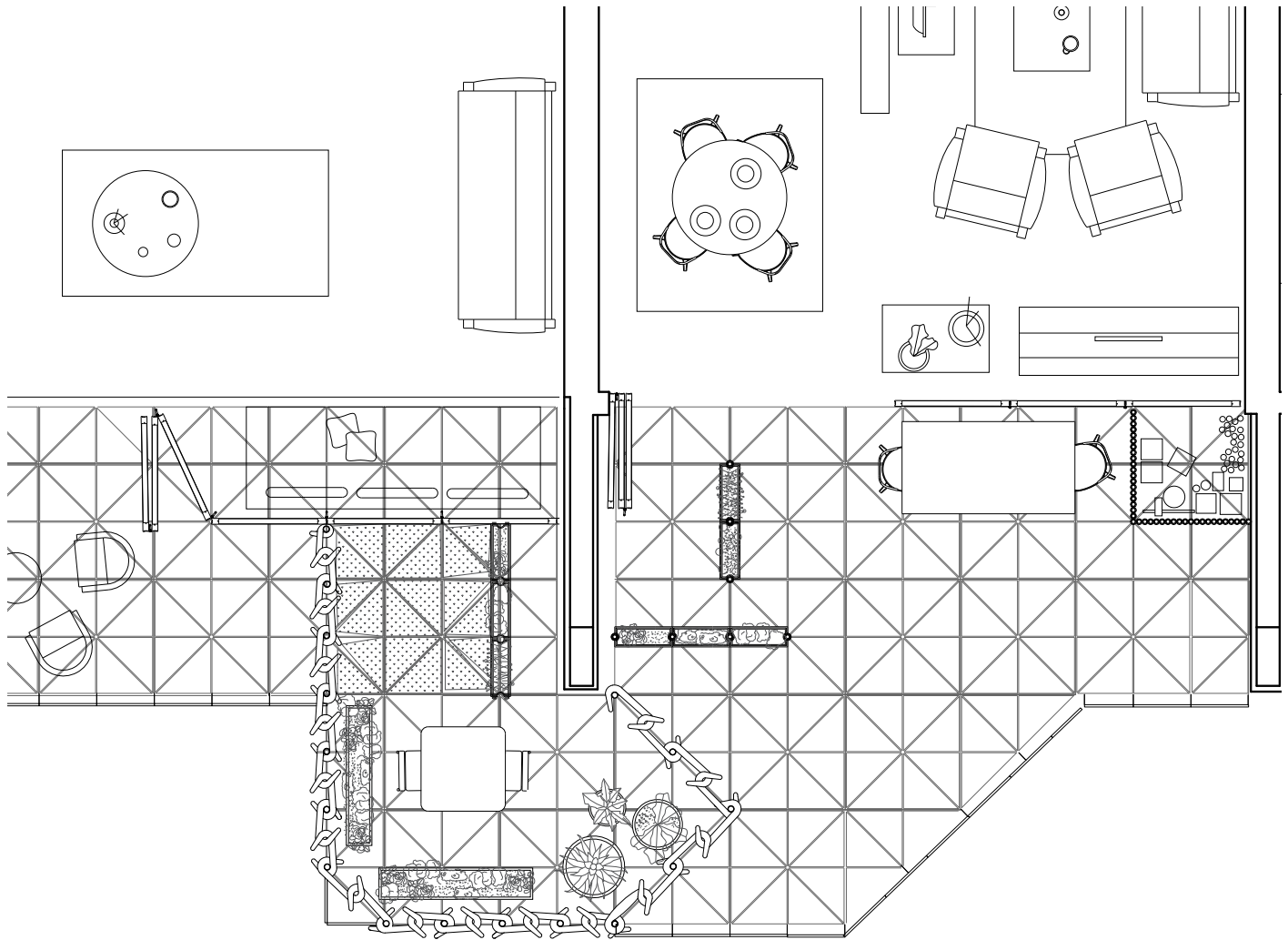


Figure 6-23 Detail Plan of Shared Balcony Space

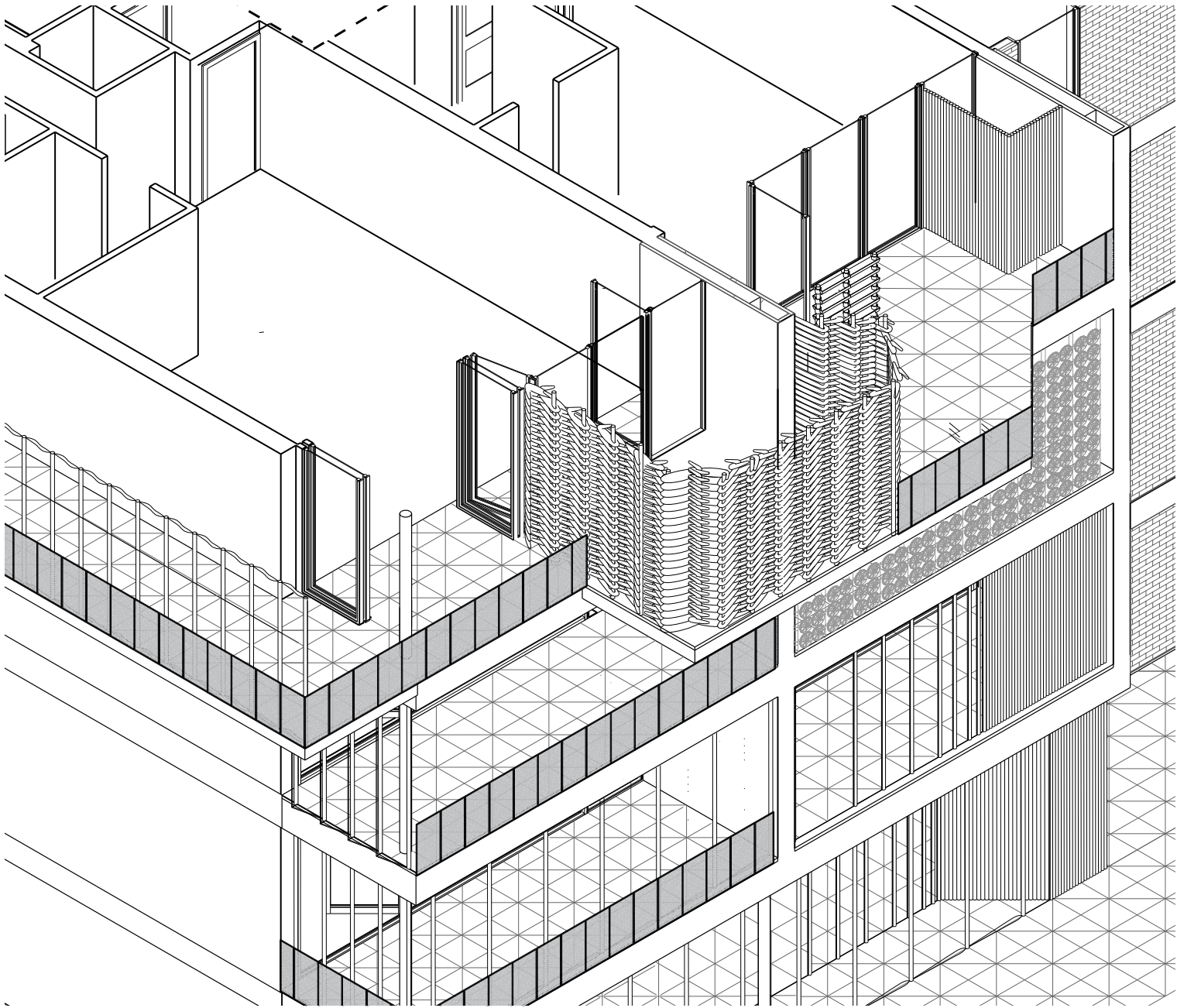
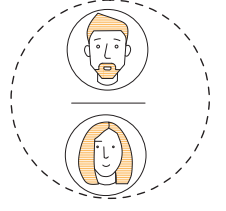
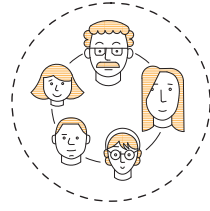
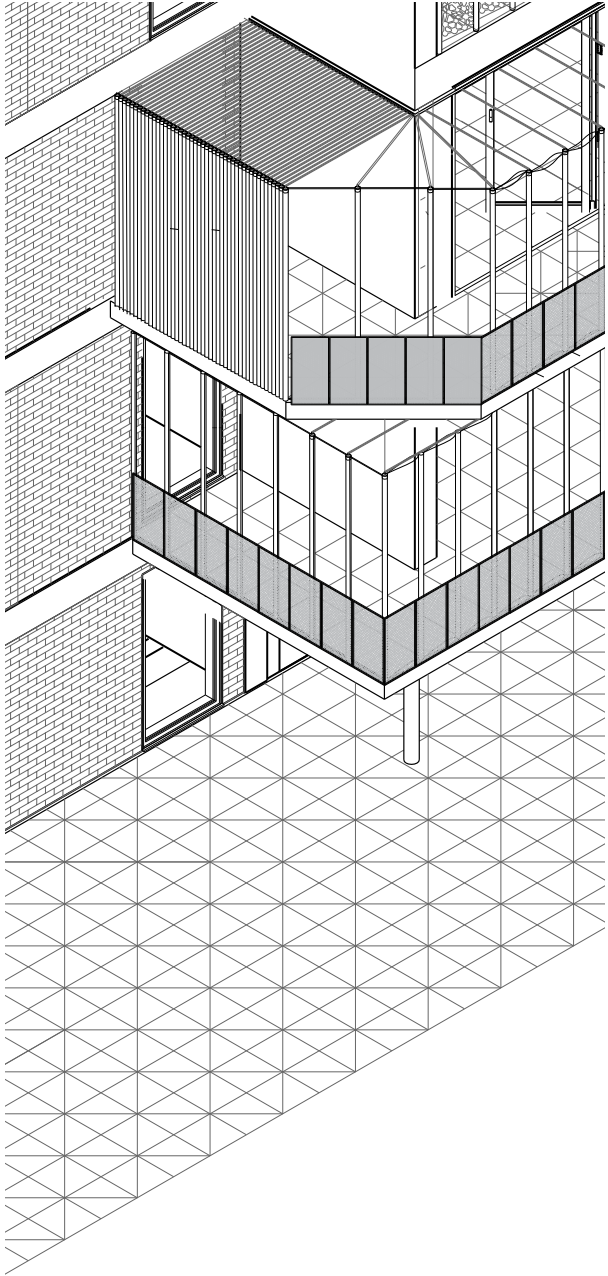


Figure 6-24 Axo Detail of Units and Adapted Shared Balcony Space



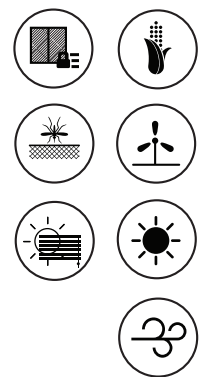
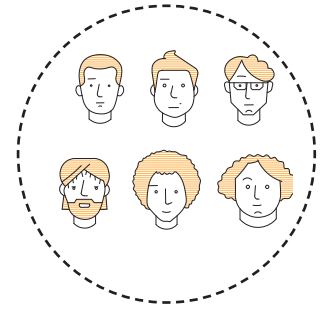
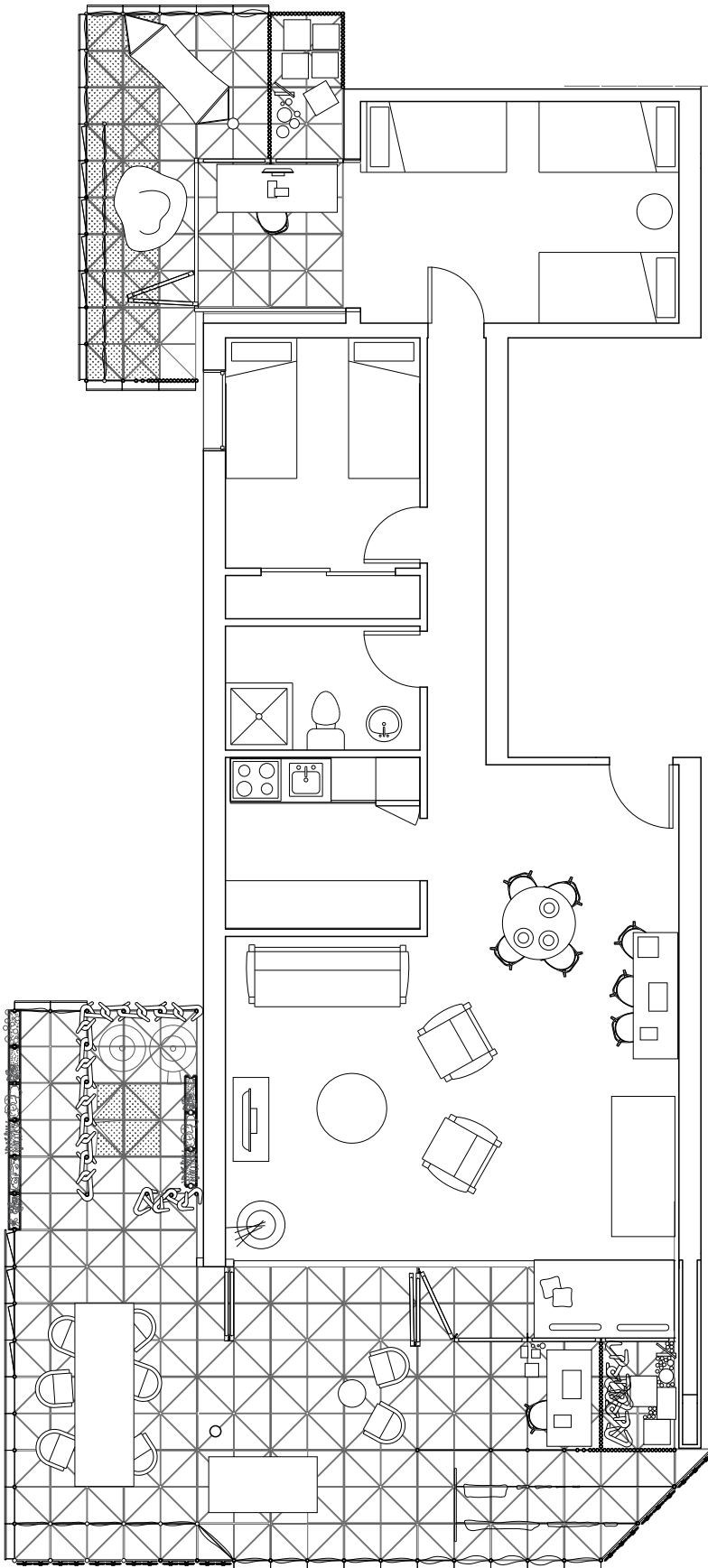


Figure 6-25 Unit with Six Individuals
Summer Plan

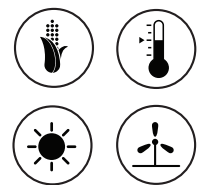
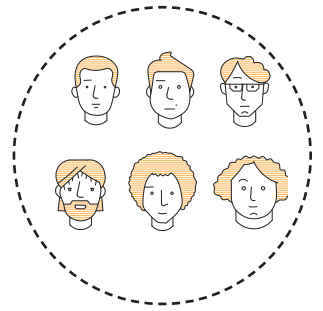
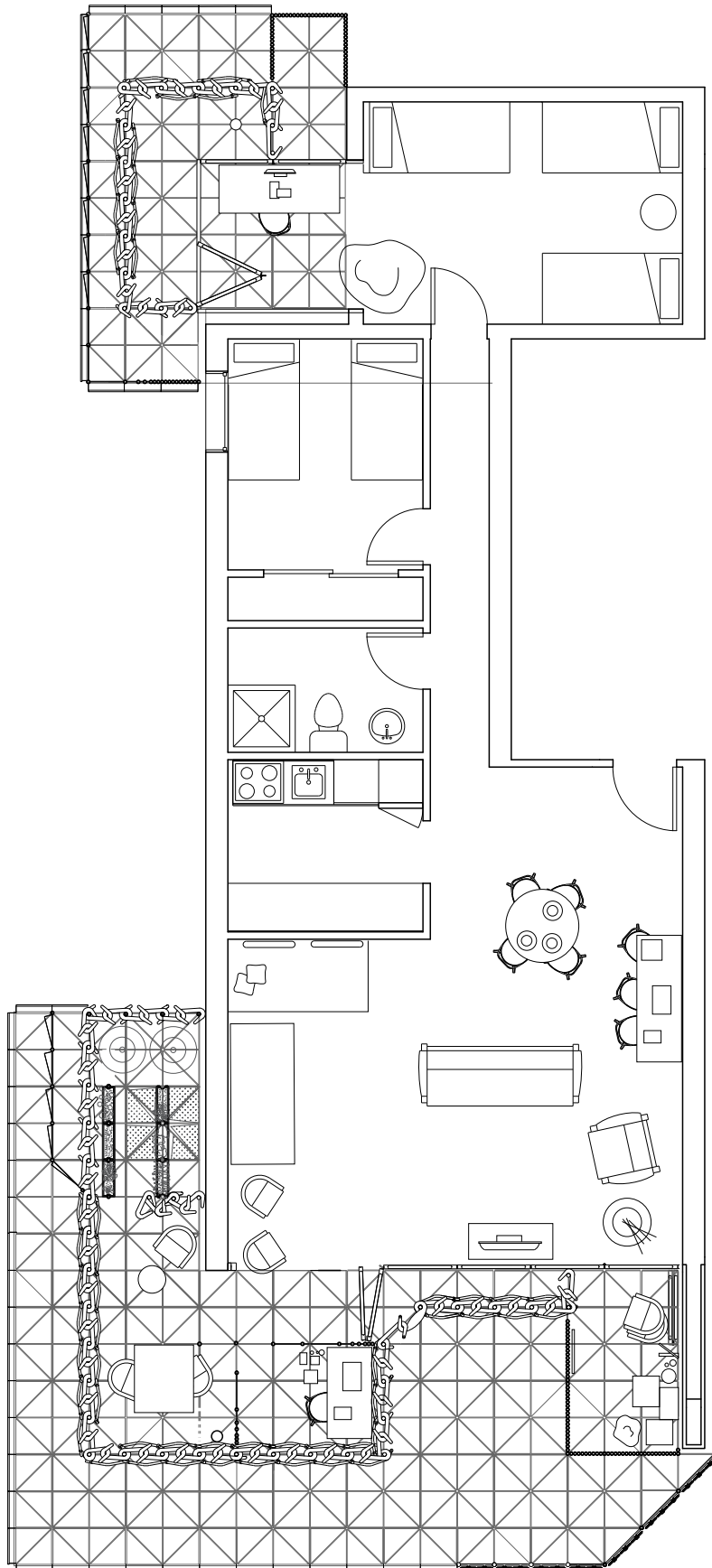
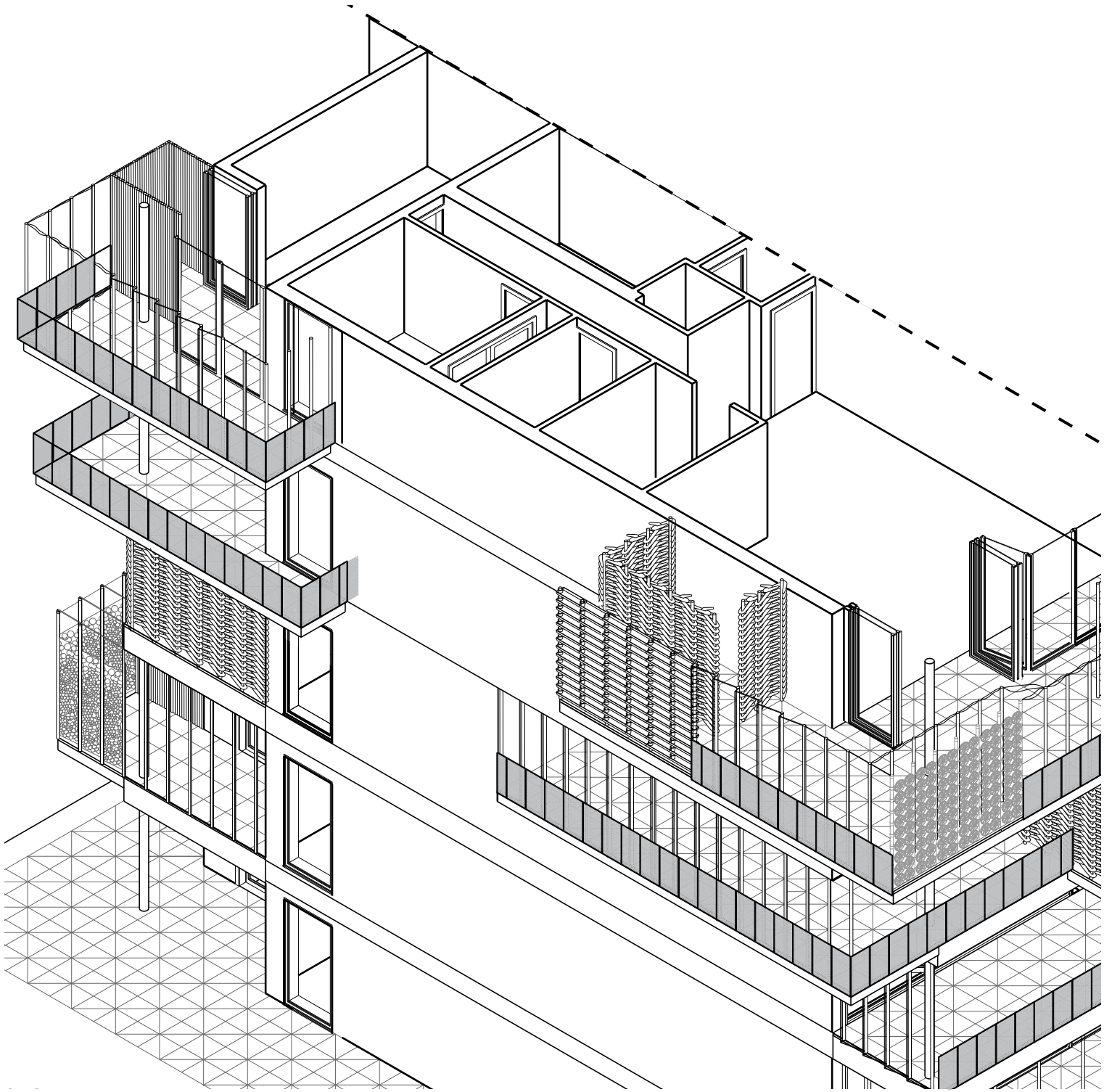


Figure 6-26 Units with Six Individuals
Winter Plan



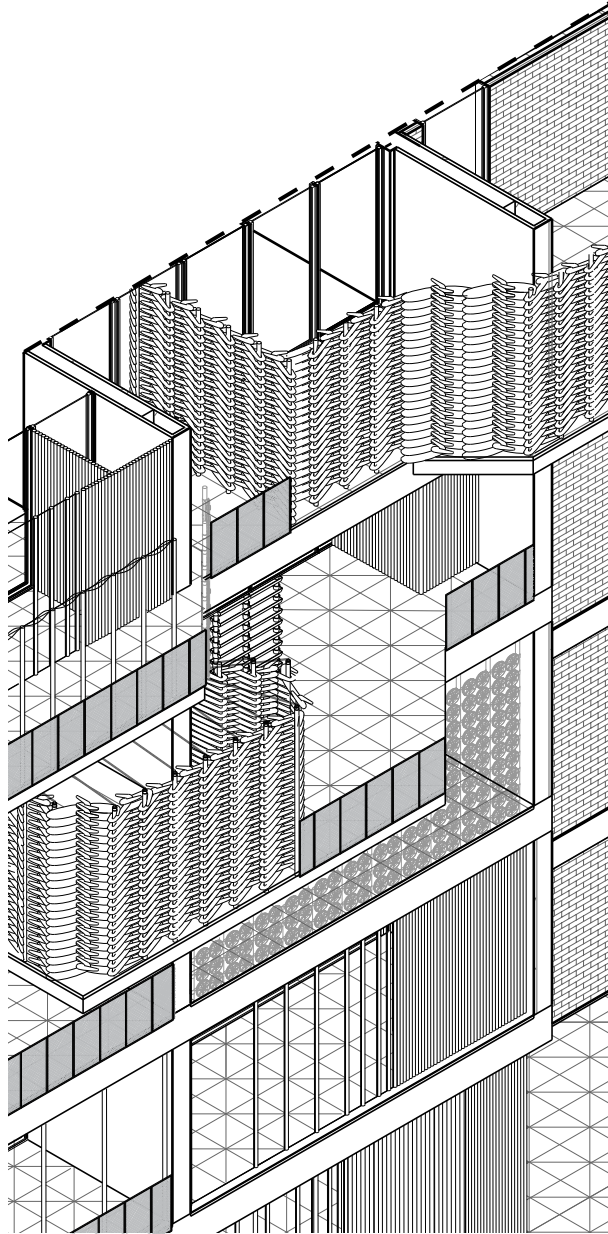
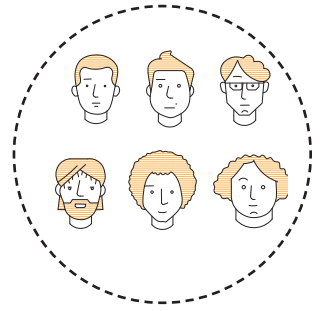


Figure 6-27 Unit with Six Individuals
Axonometric

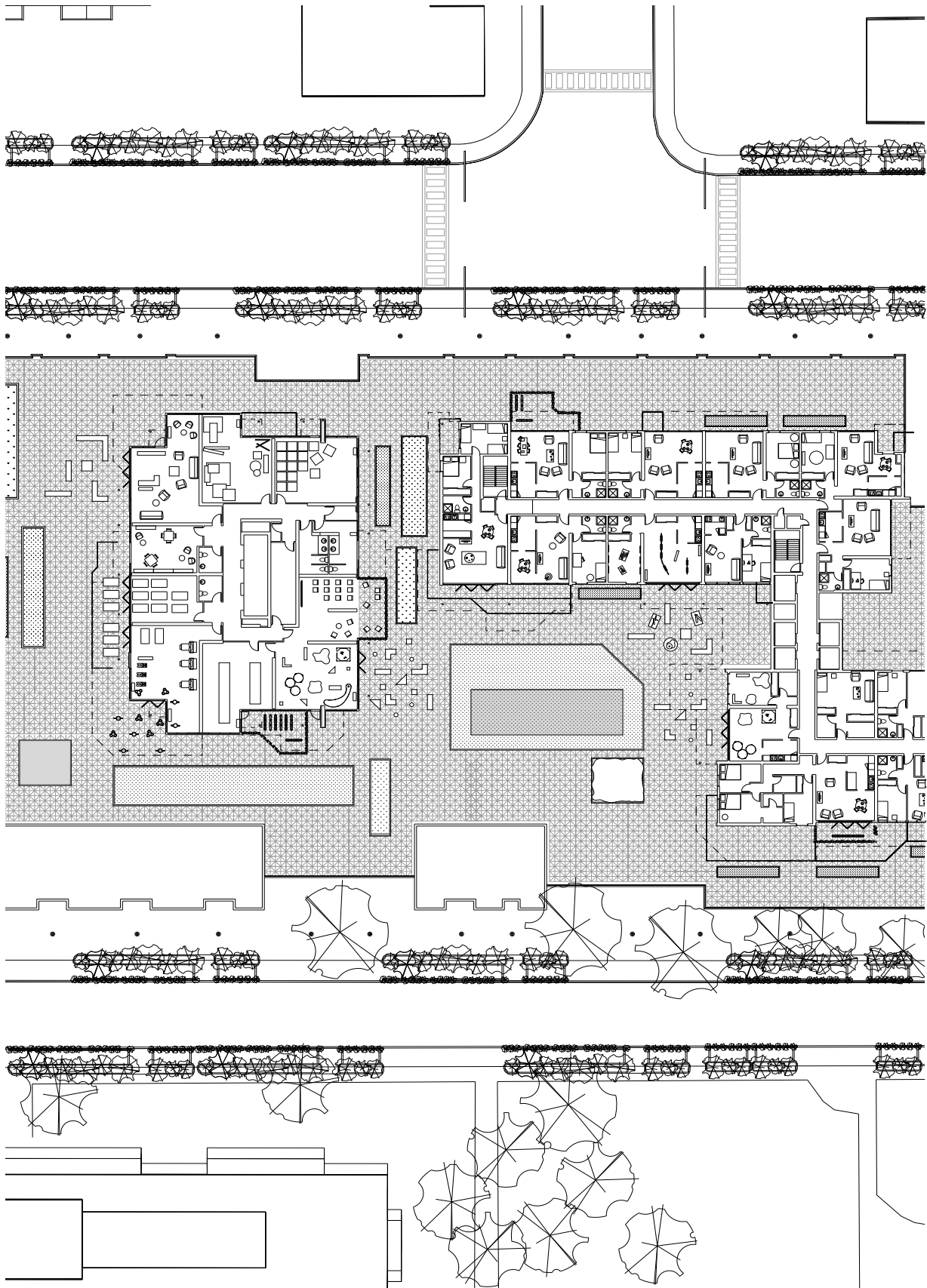


Figure 6-28 Speculative Podium Plan

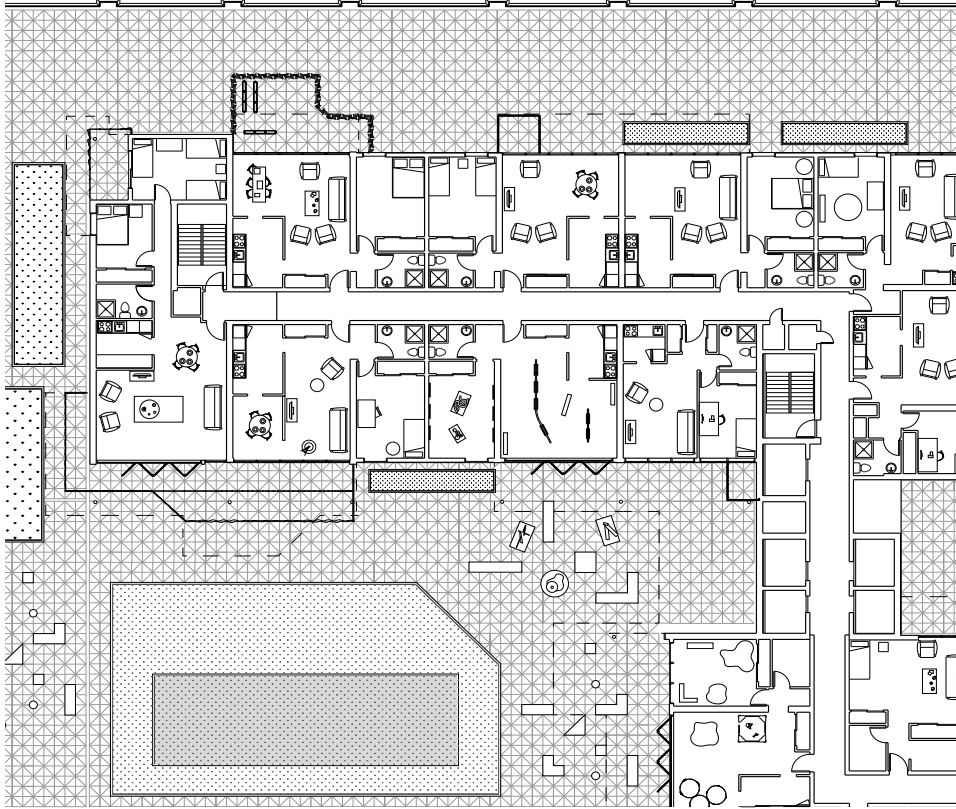


Figure 6-29 Speculative Detail of the Podium: 565 Sherbourne Street

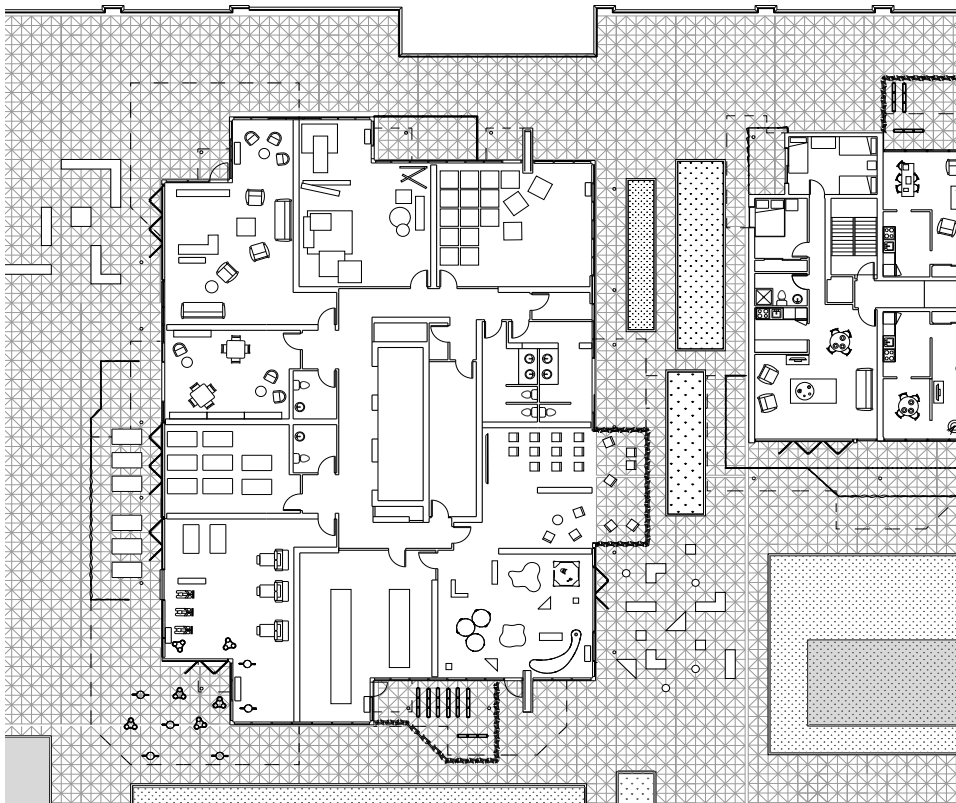


Figure 6-30 Speculative Detail of the Podium: New Development



Figure 6-31 Speculative Elevation

7.0 CONCLUSION

“In the ecological age, buildings do not simply create spaces, they craft environments. They function as part of an urban ecosystem, promote more environmentally conscious and efficient resource management, and actively contribute to the unique needs of the individual user, as well as the wider requirements of the city. By producing food and energy, and providing clean air and water, buildings evolve from being passive shells, into adaptive and responsive organisms—living and breathing structures supporting cities of tomorrow.”¹¹¹

111 Josef. 2013. London, UK: Arup Foresight & Innovation, 3.

This thesis was based on the study of the practices of renovation and reconsideration of residential tower neighbourhoods, and through its discussions and proposed design strategies, aimed to propose an alternative to the current trends. It was within the ambitions of this thesis to make an argument for the potential in the reconsideration of the role of the balcony and the exterior space of units as having opportunities for customized adaptation based on occupant use, environmental mediation and social interaction. In doing so, the design proposed an open design system that can enable existing residential towers stock to not just meet the demands of the present, but also to prepare them for the changing and uncertain demands of the future. In this manner, the design research investigated the potential of modular organization systems that will be able to aggregate over time as extensions to residential spaces and the role of social participation in the mediation of living spaces.

The thesis focused on the significance of the balcony as a type, and through studies of its use in a residential context summarized that residential balconies are understated and overly rigid in their structure, while at the same time play an important role in the formation of the urban realm and the relationship of the units to the city. The design systems proposed enable the formation of balconies with extensions that are not directly dependent on the existing architecture, therefore making it applicable to a large spectrum of settings. The design proposal specifically investigated the attachment of a rigidly adaptive structural systems as a way for occupants to alter the composition of their spaces as well as a modular, layered and responsive screening system that allows the modulation of the balcony space. The proposed system formulates a spatial condition that makes constant change possible—a network that is designed to be dynamic, intelligent and reactive in response to the programmatic needs of its users and its surrounding environment. In this sense, this study and design synthesis aimed to create a secondary system for the renewal of tower neighbourhoods that is in correspondence with the social needs and structure, energy demands and the environmental control of the facade systems—with the hope of shaping a new type of urban experience that is social, sustainable and one that can be evolutionary over time. The current scope of the design investigation restricts the proposal as an alternative design language for designers in addressing tower renewal, but with inherent potential to manifest as a social self-built system with more development.

IMMEDIATE DEVELOPMENTS AND REQUIREMENTS

THE DEVELOPMENT OF INTELLIGENT CITIES OF THE FUTURE

The 'Smart Floor' mentioned in the design scheme—as an ubiquitous computing tool integrated as part of the balcony infrastructure—is based on the development of intelligent floor technologies at the College of Computing and GVI Center at Georgia Institute of Technology and the Smartfloor technology developed at the Center for Sports Engineering Research, Sheffield Hallam University. The current developed smart flooring systems noted mainly focus on occupant recognition and development of behaviour patterns in their intended uses. The development of these tile technologies for the purpose of integration within the balcony system, and being able to track user behaviour as well as the spatial qualities of the balcony and the enclosure organization can have great potentials for the development of the design system proposed. Being able to collect environmental and spatial data from the balcony, as well as having data input from the occupants in one singular interface can be a beginning for the provision of the idea of a social balcony and the communication between the occupant and the condition of their immediate exterior space, their neighbouring balconies and the exterior network of the building at large.

With the success of the computing system and the communicative interfaces, the design assembly proposed can be envisioned to have a large impact in the urban form, social interactions, energy production and economical processes within dense urban environments of the future. A sophisticated communication system that allows for the transfer of data between the users, the balcony and the building at large are fundamental to the success of the system and the ability to respond to the needs of the building in real-time, as well as the ability to be updated and adjusted and to adapt new technologies in the long term.

OCCUPANT PARTICIPATION

The developments in the field of communications mentioned, can facilitate the accumulation of occupant data over time resulting in the possibility of organizational patterns on the exterior of the buildings in urban environments. The collection of units and formation of clusters due to common programmatic requirements or the extension of parts of the building for the creation of microclimates are examples of how the communication between neighbours and the network at large can help in the organization and activation of the exterior spaces of the building. The active participation of occupants and the resulting growth of the system in different ways can therefore greatly affect the functioning of the system. The inclusion of a vertical circulation system to the structure of the balconies in order to enable vertical collective spaces between balconies is an example of the response to the growth of the system. The growth and the extent to which the system can grow and be effective can be said to be proportional to the initiative, need and actions of the occupants of the towers, making occupant participation and initiative a large part of the development of the user-led system.

KEEPING COMPONENTS UPDATED AND ACCOUNTING FOR NEW TECHNOLOGIES OVER TIME

The soft adaptive enclosure proposed as a design strategy within this investigation includes a series of adapted technologies and systems in the form of attachable modules to standardized mullion structures in order to form screens as examples for the spatial and environmental mediation of exterior spaces of units. It is also suggested within the context of this thesis that the screens should be regarded as light and replaceable components that could be adjusted and updated with new technologies and as per the need of occupants. Therefore, a continuous input of designers in adjusting new technologies required by the occupants for the system is important for the long term success and continuous relevance of the system.

MAKING THE COMPONENTS FOR ADAPTABILITY ACCESSIBLE AND ECONOMICAL TO USE

The structural components for the expansion of the balcony and the adjustable screening systems for the enclosure have been designed at small scales for the ease of construction, assembly and fabrication. The accessibility of the system and its economical fabrication are important for the functioning of the system and its adoption by the occupants. The assumption for the future of residential towers is the reality of bottom-up mixed-use integration within the residential context. Therefore the possibility of on-site production, repair, recycling and maintenance of the system components can be investigated further and developed in order to ensure the long term sustainability of the system proposed.

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