Connecting Suburbia:
Using Information and Communication Technologies
to Readjust the Suburban House

by

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in fulfilment of the
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Master of Architecture

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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 any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.
The North American suburban house is continually changing, a byproduct of cultural and technological development. Within the past hundred years, the house has experienced countless iterations in design as new technologies and cultural desires persisted. In 2017, the suburban house is largely constructed from principles absorbed from the ‘baby boomer’ generation, when larger houses were required to accommodate distinct generational behaviour, privacy, and security. A new generation consisting of ‘Gen Y’ and the ‘Millennials’ are currently transforming the housing market, and becoming the dominant group of property owners. These generations were raised in a global society; they are constantly connected with new technologies and social media. This has not only begun to impact the design of the house and its internal facets, but also the expectations regarding the location, transportation, and connectedness of communities. This ever-changing reality of the house, will cause preexisting suburban neighbourhoods to be less desirable compared to inner-city neighbourhoods and give rise to suburban developments marketed for these new generations.

Given these realities, this thesis explores how to create a series of tactical interventions to repurpose the suburban house for a connected generation. New technologies are used create home-based economies and services, shifting the programmatic and zoning mono-functionality into a more complex and self-sufficient system. These interventions are situated in underused spaces, designed to add needed program and activity to homogeneous cul-de-sac blocks that will allow for a more connected physical and digital community. These iterations will serve as an initial experiment, thereby showing the possibilities of how these houses can be adapted while encouraging conversation on how we can improve the habitation of existing communities constructed on archaic principles.
ACKNOWLEDGEMENTS

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Finally, I would like to thank my family for their continuous unwavering support. I would not have been able to accomplish this thesis without your support.
DEDICATION

To my parents, Les and Patty
# TABLE OF CONTENTS

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Author’s Declaration</td>
</tr>
<tr>
<td>09</td>
<td>Abstract</td>
</tr>
<tr>
<td>21</td>
<td>Acknowledgements</td>
</tr>
<tr>
<td>33</td>
<td>Dedication</td>
</tr>
<tr>
<td>49</td>
<td>Table of Contents</td>
</tr>
<tr>
<td>53</td>
<td>List of Figures</td>
</tr>
</tbody>
</table>

## Evolving Dwellings

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Evolving Dwellings</td>
</tr>
<tr>
<td>09</td>
<td>Victorian House</td>
</tr>
<tr>
<td>21</td>
<td>Ranch House</td>
</tr>
<tr>
<td>33</td>
<td>Cookie Cutter House</td>
</tr>
</tbody>
</table>

## A New Generation

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>49</td>
<td>Millenials</td>
</tr>
<tr>
<td>53</td>
<td>Connecting Technologies</td>
</tr>
<tr>
<td>57</td>
<td>Netville</td>
</tr>
<tr>
<td>61</td>
<td>Tower Renewal Project</td>
</tr>
<tr>
<td>65</td>
<td>Sidewalk Labs</td>
</tr>
</tbody>
</table>

## Service Suburbia

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>71</td>
<td>Testing Grounds</td>
</tr>
<tr>
<td>87</td>
<td>Claire’s Cafe</td>
</tr>
<tr>
<td>95</td>
<td>Tracey’s Theater</td>
</tr>
<tr>
<td>103</td>
<td>Dave’s Droneport</td>
</tr>
<tr>
<td>111</td>
<td>Guo’s Greenhouse</td>
</tr>
<tr>
<td>119</td>
<td>Winston’s Workshop</td>
</tr>
<tr>
<td>127</td>
<td>Chris’s Coworking</td>
</tr>
<tr>
<td>135</td>
<td>Connecting Suburbia</td>
</tr>
<tr>
<td>149</td>
<td>Conclusion</td>
</tr>
<tr>
<td>151</td>
<td>Bibliography</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

## Part 01

<table>
<thead>
<tr>
<th>Figure</th>
<th>Page Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1.1</td>
<td>03-04</td>
<td>Compound S. Curve Chart. By Author. Information compiled from sources referenced in the bibliography</td>
</tr>
<tr>
<td>Figure 1.2</td>
<td>05-06</td>
<td>Technology Advancement Chart. By Author. Information compiled from sources referenced in the bibliography</td>
</tr>
<tr>
<td>Figure 1.3</td>
<td>07</td>
<td>Historic house renovation and addition. London. Photograph by McGarry-Moon Architects. Retrieved from: <a href="https://www.dezeen.com/2016/08/27/mcgarry-moon-architects-extension-richmond-park-gatehouse-london/">https://www.dezeen.com/2016/08/27/mcgarry-moon-architects-extension-richmond-park-gatehouse-london/</a></td>
</tr>
<tr>
<td>Figure 1.4</td>
<td>07</td>
<td>Hennessy House contemporary kitchen addition. London. Photograph by Paul Archer Design. Retrieved from: <a href="http://paularcherdesign.co.uk/project/88/hennessy_house">http://paularcherdesign.co.uk/project/88/hennessy_house</a></td>
</tr>
<tr>
<td>Figure 1.5</td>
<td>08</td>
<td>Overlaid Oxburgh Hall Plans. By Author. Information compiled from sources referenced in the bibliography</td>
</tr>
<tr>
<td>Figure 1.6</td>
<td>09-10</td>
<td>Victorian house axonometric view. By Author.</td>
</tr>
<tr>
<td>Figure 1.7</td>
<td>11-12</td>
<td>Victorian house exploded axonometric view. By Author.</td>
</tr>
<tr>
<td>Figure 1.8</td>
<td>13-14</td>
<td>Victorian house exploded axonometric view. By Author.</td>
</tr>
<tr>
<td>Figure 1.9</td>
<td>15</td>
<td>Victorian house exploded axonometric view. By Author.</td>
</tr>
<tr>
<td>Figure 1.10</td>
<td>16</td>
<td>1900's Neighbourhood Photo series. By Author.</td>
</tr>
<tr>
<td>Figure 1.11</td>
<td>17-18</td>
<td>1900's Neighbourhood Photo series. By Author.</td>
</tr>
<tr>
<td>Figure 1.12</td>
<td>19</td>
<td>Family living in a small apartment. New York, 1890. Photograph by Jacob Riis. Retrieved from: <a href="https://www.studentloadouts.com/01-Web-Pages/01-Picture-Pages/10.07-Industrial-Revolution/1-Riis-Family-Living-in-One-Room-New-York-City-Slum-1890.htm">https://www.studentloadouts.com/01-Web-Pages/01-Picture-Pages/10.07-Industrial-Revolution/1-Riis-Family-Living-in-One-Room-New-York-City-Slum-1890.htm</a></td>
</tr>
<tr>
<td>Figure 1.13</td>
<td>19</td>
<td>Family working on garments in a tenement house. New York, 1913. Photograph by Lewis Hine. Retrieved from: <a href="http://historyinphotos.blogspot.ca/2012/06/lewis-hine-tenement-workers-ctd.html">http://historyinphotos.blogspot.ca/2012/06/lewis-hine-tenement-workers-ctd.html</a></td>
</tr>
</tbody>
</table>
Figure 1.14.  20  Homestead kitchen self-portrait. Montana, 1904.  
Photograph by Evelyn Jephson Cameron. Retrieved from: http://ellenbaumler.blogspot.ca/2012/08/ 

Figure 1.15.  21-22  Ranch house axonometric view. By Author. 

Figure 1.16.  23-24  Ranch house exploded axonometric view. By Author. 

Figure 1.17.  25-26  Ranch house exploded axonometric view. By Author. 

Figure 1.18.  27  Ranch house exploded axonometric view. By Author. 

Figure 1.19.  28-29  1960's Neighbourhood Photo series. By Author. 

Figure 1.20.  30  1960's Neighbourhood Photo series. By Author. 

Figure 1.21.  31  Seviceman watching television show with family. 1954.  

Figure 1.22.  31  Kohler bathroom advertisement, 1950.  

Figure 1.23.  32  St.Charles kitchen advertisement. 1950s.  

Figure 1.24.  33-34  Snout house axonometric view. By Author. 

Figure 1.25.  35-36  Snout house exploded axonometric view. By Author. 

Figure 1.26.  37-38  Snout house exploded axonometric view. By Author. 

Figure 1.27.  39  Snout house exploded axonometric view. By Author. 

Figure 1.28.  40-41  2000's Neighbourhood Photo series. By Author. 

Figure 1.29.  42-43  2000's Neighbourhood Photo series. By Author. 

Figure 1.30.  44-45  2000's Neighbourhood Photo series. By Author. 

Figure 1.31.  46  2000's Neighbourhood Photo series. By Author.
Figure 2.0. 47-48 Aerial photograph of Levittown, 1950s. Photograph by Hulton Archive. Retrieved from: https://www.thoughtco.com/cape-cod-house-plans-177537

Figure 2.1. 49-50 Suburban issues at Medley Ct, Vaughan. By Author.


Figure 2.3. 53-54 IoT Smart House, showing technology possibilities but no design changes. Retrieved from: http://www.iotphils.com/wp-content/uploads/2014/07/Smart-Home.png

Figure 2.4. 55 Yelp Webpage. Retrieved from: https://www.yelp.ca/calgary

Figure 2.5. 55 Facebook Webpage. Retrieved from: https://www.facebook.com/

Figure 2.6. 55 Amazon Webpage showing Amazon Echo. Retrieved from: https://www.amazon.ca/dp/B07456NHZ7/ref=fs_ods_fs_aucc_bt

Figure 2.7. 56 How a self-driving car sees. Image by Bill Gross. Retrieved from: http://www.businessinsider.com/this-is-what-a-google-self-driving-car-sees-at-a-stoplight-2013-4

Figure 2.8. 56 Google self-driving car. Image by Elijah Nouvelage. Retrieved from: https://qz.com/790834/how-exactly-will-google-make-money-on-self-driving-cars/

Figure 2.9. 57 Internet Connection Box Diagram. By Author.

Figure 2.10. 58 Early Settlement, Wired. Redrawn from the original plan by Neighboring in Netville. Information compiled from sources referenced in the bibliography.

Figure 2.11. 59 Settled, Non-Wired. Redrawn from the original plan by Neighboring in Netville. Information compiled from sources referenced in the bibliography.
Figure 2.12.  60  Settled, Wired
Redrawn from the original plan by Neighboring in Netville
Information compiled from sources referenced in the bibliography

Figure 2.13.  61  Tower Renewal Diagram. By Author.

Figure 2.14.  62  Tower Renewal Partnership Concept Diagram.

Figure 2.15.  62  Tower Renewal Partnership After Rendering.
Retrieved From: http://towerrenewal.com/impact-areas/complete-communities/

Figure 2.16.  63  Existing Tower Makeup Phitograph.
Retrieved from: https://www.google.ca/maps/@43.6500093,-79.5689311,3a,60y,77.04h,98.02t/data=!3m6!1e1!3m4!1s-WdRPAGpswofDDD1gp1mfg2v071i33128i6656

Figure 2.17.  64  Tower Renewal Partnership Post-living Improvements Sketch.
Retrieved from: http://towerrenewal.com/initiatives/rac-zone/

Figure 2.18.  64-65  Tower Renewal Partnership Example Growth Plan.

Figure 2.19.  65  Flexibility Box Diagram. By Author.

Figure 2.20.  66  Sidewalk Labs “loft” Garage readjusting its Zoning Drawing.

Figure 2.21.  67  Sidewalk Labs ICT Connectivity Drawing.

Figure 2.22.  68  Sidewalk Labs Streetscape Drawing.

Figure 2.23.  66-67  Sidewalk Labs ICT Connectivity Drawing.
Figure 3.0. 69-70 Aerial Photograph of Markham, Ontario. Photograph by IDuke. Retrieved from: https://en.wikipedia.org/wiki/File:Markham-suburbs_aerial-edit2.jpg


Figure 3.2. 73 City Makeup Drawing of Calgary. By Author.

Figure 3.3. 74 Neighbourhood Growth Drawing of Calgary. By Author. Information compiled from: http://calgaryherald.com/news/local-news/one-map-that-shows-calgarys-doughnut-of-decline-neighbourhoods-may-be-facing-trouble-ahead

Figure 3.4. 75 Calgary Dwelling Types Map. By Author. Information compiled from sources referenced in the bibliography

Figure 3.5. 76 Calgary Transportation Use Map. By Author. Information compiled from sources referenced in the bibliography

Figure 3.6. 77 Calgary Language Spoken at Home Map. By Author. Information compiled from sources referenced in the bibliography

Figure 3.7. 78 Calgary Language Spoken at Home Map. By Author. Information compiled from sources referenced in the bibliography

Figure 3.8. 79-80 Selected Neighbourhood for Testing Plan. By Author.

Figure 3.9. 81-82 Meet the Neighbours Axonometric. By Author.

Figure 3.10. 83-84 Internet Connectivity Axonometric. By Author. Information compiled from sources referenced in the bibliography

Figure 3.11. 85-86 How Neighbours Commute Axonometric. By Author. Information compiled from sources referenced in the bibliography

Figure 3.12. 87-88 Claire’s Cafe Before Render. By Author.

Figure 3.13. 89-90 Claire’s Cafe After Render. By Author.

Figure 3.14. 91-92 Claire’s Cafe Exploded Axonometric. By Author.

Figure 3.15. 93-94 Claire’s Cafe Connected Render. By Author.
Figure 3.16.     95-96     Tracey’s Theater Before Render. By Author.
Figure 3.17.     97-98     Tracey’s Theater After Render. By Author.
Figure 3.18.     99-100    Tracey’s Theater Exploded Axonometric. By Author.
Figure 3.19.     101-102   Tracey’s Theater Connected Render. By Author.
Figure 3.20.     103-104   Dave’s Droneport Before Render. By Author.
Figure 3.21.     105-106   Dave’s Droneport After Render. By Author.
Figure 3.22.     107-108   Dave’s Droneport Exploded Axonometric. By Author.
Figure 3.23.     109-110   Dave’s Droneport Connected Render. By Author.
Figure 3.24.     111-112   Guo’s Greenhouse Before Render. By Author.
Figure 3.25.     113-114   Guo’s Greenhouse After Render. By Author.
Figure 3.26.     115-116   Guo’s Greenhouse Exploded Axonometric. By Author.
Figure 3.27.     117-118   Guo’s Greenhouse Connected Render. By Author.
Figure 3.28.     119-120   Winston’s Workshop Before Render. By Author.
Figure 3.29.     121-122   Winston’s Workshop After Render. By Author.
Figure 3.30.     123-124   Winston’s Workshop Exploded Axonometric. By Author.
Figure 3.31.     125-126   Winston’s Workshop Connected Render. By Author.
Figure 3.32.     127-128   Chris’s CoWorking Before Render. By Author.
Figure 3.33.     129-130   Chris’s CoWorking After Render. By Author.
Figure 3.34.     131-132   Chris’s CoWorking Exploded Axonometric. By Author.
Figure 3.35.     133-134   Chris’s CoWorking Connected Render. By Author.
Figure 3.36.     135-136   Large Connected Aerial Render. By Author.
Figure 3.37.     137-138   Existing and Updated Conditions Diagrams. By Author.
Figure 3.38. 139-140  Large Overlaid Connections Diagram Series. *By Author.*

Figure 3.39. 141-148  Large Overlaid Connections Diagram and Zoom in Series. *By Author.*

Introduction

This thesis is a starting point for redeveloping the North American suburbs, highlighting how a series of architectural interventions in conjunction with interconnected technologies can help resolve underlying issues like homogeneous design and a lack of community services. The first chapter investigates the historic evolution of the house by deconstructing three eras of houses with axonometric drawings and photographic documentation. Writings from various architects are compared to examine the architectural evolution of the Victorian, Ranch, and Snout houses. The second chapter situates the millennial generation and identifies how their desires for housing are different from previous baby boomers, and how information and communication technologies are beginning to play a key role in the houses development. The third chapter locates a suburban testing site for the thesis, and examines the series of six interventions designed to collaborate together to create a connected suburban community.

This thesis is a starting point instead of a final solution. The design series intends to show that by realizing the full potential of the suburban house, a movement can be set forward, eventually creating a livable community where inhabitants are not afraid of diverse program and adaptable communities.

Evolving Dwellings

As he began to have more and more time, he began to put screens on the porches. With ever more time, he began to put glass windows on the porches. Sitting on his porches, he watched other people go by. Then came the automobile, which in effect put wheels under his glassed-in front porch, so instead of waiting to see people go by he drove down the street to see the people. In a real sense, the automobile was part of the house, broken off, like hydra cells going off on a life of their own. The young people who used to court in the parlor, then on the glassed in front porch now began to do their courting in the automobile, or the porch on wheels, driving it to the drive-in theater. Because we are conditioned to think of the house as static, we fail to realize the automobile is as much part of the house as is the addition of a woodshed.1

Buckminster Fuller

Fig. 1.1.
Microsoft: 1975
Microsoft is founded

Apple: 1976
Apple is founded

IBM 610: 1957
First computer intended for commercial use

Programma 101: 1965
First programmable computer

Apple 2: 1977
Consumer computer for the masses. Predecessor of contemporary computer

Osborne1: 1981
First laptop

Roomba: 2010
Autonomous vacuum cleaner

Smartphone (iPhone): 2010
Portable computer and phone

Tablet (iPad): 2014
Portable computers which make use of applications

Makerbot: 2010
Affordable 3D printers, easy to use

Google Cardboard: 2014
Cheap virtual reality platform

Digital Butler (Echo): 2015
Virtual assistant and digital hub for Internet of Things

Google: 1998
Online Search Engine

Amazon: 1996
Digital Retail

Facebook: 2004
Digital Social Platform

Internet: 1991
Internet is available to the public

Ebay: 1995
Digital Marketplace

App Store: 2008
Physical objects are digitized and released to the masses

Fig. 1.2. Technology evolution diagram coorelating to three house axos, the coorelation shows that as technologies improve, their adoption into the house causes the house to change as well
Houses transform in response to the continual development of new technologies and shifting cultural influences. The contemporary suburban house is a paragon of domestic architectural evolution. The suburban house arose and evolved within the last hundred years due to an unprecedented surge of new technologies. One of the key evolutionary traits of the suburban house can be attributed to the introduction of the automobile. This technology helped shift the majority of houses from grid streets to single-use cul-de-sac neighbourhoods, and created a need for the attached garage typology, now included in the vast majority of suburban houses. Looking at a pre-1900’s house, its architectural traits, such as the strict division of space, lack any resemblance to a contemporary suburban house.

Networked digital information technologies are set to drastically alter the house in the near future. These technologies are already shaping our lives while gaining a greater role in use each day. Alan Berger, a professor of Advanced Urbanism at MIT proposes that future suburbs will be a new type of landscape. Houses will be smaller, use drone deliveries and autonomous cars, while abandoning the “energy wastefulness, visual monotony, and social conformity of postwar manufactured neighbourhoods.” Proposals like Bergers may eventually come to fruition in new developments, but they are not a solution for the existing housing stock where 88% of urban Canadians live in suburban or exurban metropolitan neighbourhoods.

As technology and cultural perceptions change, the house changes with it; often noticeable with renovations. Historians Albert Bemis and John Burchard first noticed houses being renovated due to technological changes with English Manors. Large estates like Oxburgh Hall underwent massive renovations in the 1800’s to include corridors, a new domestic typology allowing for greater privacy compared to the previous room to room layouts. Renovating houses has become popular in North America, where homes are now constantly updated. For example, this can often be seen today where television shows including Love it or List it, Holmes on Homes, and Property Brothers who renovate homes by predominantly dismantling pre war kitchens, favouring contemporary open concept spaces clad with marble countertops.

Three houses are investigated to see the evolutionary change in their spatial layout, construction methods, and technologies. These are, in order of construction in Canada, the Victorian House, the Ranch House, and today’s Snout House. Therefore, we can realize that the existing suburban house stock is not static and will need to restructure itself for the new technologies being brought into the house.

---


Evolving Dwellings

Oxburgh Hall: 1482

Oxburgh Hall: 1835

Fig. 1.3. Overlay shows how the house drastically alters as the inhabitants desired use changes.
**Example:** 1000ft\(^2\) three bedroom Victorian House for ‘Northern Climates’

**Inhabitants:** The O’Sullivans, a family of 7

**Construction:** Stone block foundation, timber frame construction, Mineral Wool roof

**Insulation**

The Victorian house shown here highlights the rise of comfort technologies like plumbing, electricity, and heating. Today, these technologies are never given a second thought, as living without them would be unthinkable in North America. When these technologies were brought into the house in the early 1900’s, they significantly raised the standards of living across the continent. Actions such as “Turning a tap in the kitchen sink and getting hot water; striking a match and using it to light a stove, a furnace, or a brightly burning kerosene lamp” were groundbreaking when compared to the preindustrial house. Ierley describes these technologies as technologies of convenience, a group of technologies which brought one of the “most significant advancements in the evolution of the house.”

---


White Picket Fence doesn’t block views

Central Chimney to heat house

Covered front porch for relaxing and people watching in the summer months

Garden grows most of families vegetables

Fig. 1.6. Victorian house axonometric view
**Yard:** Large front yards were an important status symbol, and a way to connect with the neighbours. Historian Clifford Edward Clark argues that the front yard and porch were a “means of extending the formal public spaces of a house beyond the front rooms. With cast-iron furniture, elaborate plantings, and long walkway, the front lawn was clearly designed as a public area that would provide a sense of spacious formality.” Back yards were much more private, and often dedicated for chores and production. A typical yard would often have a wood heap for fires, a wash basin, an outhouse, a clothesline, a water tank, and even some chickens.

**Bathroom:** Bathrooms were a newly invented typology for a house in the early 1900’s, bringing the outhouse into the home. Ierley states that the modern bathroom never existed in the 1800’s, and by the 1860’s, “the relative few that existed often did not yet have a sink.” The bathroom had a slow acceptance into the house, as early fixtures were prone to failure, and water closets often reminded people of the filthy outhouses tucked away in their rear yards. This was a well warranted fear, as historian Bill Bryson states that “early toilets often did not work well. Sometimes backfiring, filling the room with even more of what the horrified owner had very much hoped to get rid of.” Regardless of initial hesitance, the modern bathroom became a necessity in the house as the fixtures improves, and brought with it a much desired improvement of hygiene.

---

Clothes line between tree and house

Cast Iron stove cooks food and heats house, though is dirty

Large fireplace is the Parlours’ focal point

Family listens to the new radio together

Sink awkwardly located in Pantry; often leaks

Ice delivered weekly for the ice-box

Cast Iron stove cooks food and heats house, though is dirty

Cellar stores pickled goods, floods often due to stone foundation

Each room partially or fully enclosed

Kitchen separated from the rest of house

Fig. 1.7. Victorian house exploded axonometric view
**Kitchen:** According to Merritt, the Victorian kitchen remained an inchoate place, since the “house of the early nineteenth century, though much changed elsewhere, still largely retained its eighteenth-century kitchen.” Plumbing was brought into the house, but sinks were awkwardly located, prone to failure, rare, and often located in strange locations like inside a pantry instead of a pronounced location. Cast-iron stoves replaced the kitchen hearth, easing the burden of household work while simultaneously creating a cleaner space. Yet even with these improvements the kitchen was far from perfect. Ierley states that “women were still exposed to direct fire as they manipulated pots and pans in preparation, and they suffered frequent burns.” The hygienic improvements also had no effect on the architecture. It remained a dirty back-of-house space, entirely closed off from the house.

**Attic:** The attic was external to daily household life but offered an additional level for storage, due to the extra room found under the pitched roofs typical of northern climates. Being on the upper level, the chance of water damage was minimal compared to the cellar, making it a suitable storage place for household items and produce. Attics were often easily converted into bedrooms for families if extra space was needed.

---

Central Chimney to heat house

Small poorly designed fixtures

Narrow closets, often too narrow for hangers

Storage in attic space

Stairway to attic space

Convertible bedroom space

Small poorly designed fixtures

Fig. 1.8. Victorian house exploded axonometric view
Fig. 1.9. Victorian house exploded axonometric view
Fig. 1.10. 1900’s Neighbourhood Photo series
Fig. 1.11. 1900's Neighbourhood Photo series
Fig. 1.12. Family living in a small apartment
New York, 1890

Fig. 1.13. Family working on garments in a tenement house
New York, 1913
Fig. 1.14. Homestead kitchen self-portrait
Montana, 1904
RANCH HOUSE

Example: 1366ft$^2$ three bedroom Canadian Ranch Style Bungalow
Inhabitants: The Johnsons, a family of 5
Construction: Concrete foundation, timber frame construction and asbestos insulation

The Ranch house shown highlights a shift in domestic architecture which began after the Second World War with tract housing like Levittown in 1947. These tract houses ensured privacy and space from neighbours as they were often situated cul-de-sacs, a dead end street typology that rapidly grew in popularity. Privacy was not only desired but heavily sought following World War II According to historian Robert Bruegmann, this is because soldiers who lived in the close quarters of barracks during the war came back desiring privacy and comfort.\(^{14}\) The ranch house was also designed for the rise of consumer products, promising a new way of living. The kitchen became a more hygienic space thanks to electric ovens, refrigerators, dishwashers, and an array of new cleaning products. According to Ierley, this allowed the kitchen to become the “most dynamic space in the house, discarding more traditional and conservative elements that lingered elsewhere.”\(^{15}\) The rapid transformation of the kitchen from a closed archaic space to an open concept room that performed as the heart of the house can be attributed to the cultural


Fig. 1.15. Ranch house axonometric view
shift during the interwar period. Cromley observes that “during the years 1920 to 1945, the housework in middle-class homes shifted from being directed by the housewife but done by servants to being accomplished by the housewife, as servants became less affordable by the end of this era. As the housewife did more of the housework, she found her role less tolerable.”

**Yard:** Suburban houses grew in square footage along with lot sizes. According to historian Robert Bruegmann, this allowed for the average middle-class family to enjoy their own private yard for the first time, a revolution in domestic living. Unfortunately as the garage grew in dominance, front porches diminished along with the public connection to the house. The increased zoning regulation of suburban houses also restricted possible uses of the front and rear lawns. Professors Friedman and Krawitz observed that the suburbs built after Second World were subjected to zoning bylaws which regulated land use, facades, and even what people could keep on their property. This eliminated the possibilities of chicken coops and other non-tidy uses in most municipalities.

**Kitchen:** The kitchen began its transformation in response to new product appliances including refrigerators, electric ovens, dishwashers, and dryers which allowed for the kitchen to become a hygienic space. According to historian Ierley, systematic planning of layouts and counter heights were also adopted to make the kitchen as efficient as possible to use. For example, Neufert and the Beecher sisters tried to develop ergonomic norms and reduce unnecessary movements. These new technologies and designs allowed the kitchen to drastically shift from the least to the most advanced part of the house. This caused the kitchen to transition from an enclosed back of house space to an open hub within the home. As the walls dividing the kitchen and living room were removed, the kitchen-living room was created in the house. Architect Royal Barry Wills declared with this change “the living room has moved into the kitchen, or vice versa.” The spatial boundary of what is a kitchen and what is living space was blurred. This drastic change

The powder room becomes common in houses.
brought good and bad traits for domestic living. Boucher states that the new kitchen living rooms transformed the way people dined and socialized in the house as servants became less common, allowing for more informal dinner parties. The kitchen became a social zone in the house instead of a utilitarian workspace. In contrast, Clark argues that the new multipurpose kitchen followed with the shift of servantless houses, where the kitchen was a response to the many new roles transferred to the housewife. Mothers were expected to “be the jack-of-all-trades; child psychologists, homemaker, cook, cleaner, and consultant.”

Bathroom: More refinements occurred, and the outhouse became a space of the past in North American cities. Houses often had additional bathrooms like the powder room. According to Ierley, after the 1920s, newly constructed bathrooms were often as efficient as today’s contemporary bathrooms.

Garage: The garage was incorporated into the house as a new typology after the Second World War. With the rise of automobiles, it quickly became essential to the home. The garages integration as a core element in the suburban house was rapid. Beginning as a separate carport, then an enclosed space adjoining the house, the garage was then connected to the house by a door that permitted direct access, lessening the use of main entrances. The garage also substituted the attics’ role, offering a place for storage.

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Basements are often converted to a play room.

Sprawling grass front lawn

Bathroom is designed with a contemporary layout

Spare bedroom for guests or for their teenage kid wanting space

Basements are often converted to a play room

Fig. 1.17. Ranch house exploded axonometric view
Fig. 1.18. Ranch house exploded axonometric view
Fig. 1.19. 1960's Neighbourhood Photo series
Fig. 1.20. 1960's Neighbourhood Photo series
Fig. 1.21. Serviceman watching television show with family; 1954

Fig. 1.22. Kohler bathroom advertisement; 1950
Fig. 1.23. St. Charles kitchen advertisement. 1950s
SNOUT HOUSE

Example: 2355ft² three bedroom Canadian Snout-nosed House

Inhabitants: The Chows, a family of 3

Construction: Concrete foundation, timber frame construction and Batt insulation

The Snout House highlights the expansion of the garage, while the house's advancements largely followed the same principles of the previous ranch house, only expanding in size, consumer products and fixtures. The suburban house is larger than ever before, and the front facade is dominated by two to three car garages. These garages have become so large that many families convert part of garages into workshop spaces or simply use part as storage. House plans also became more open than their 1950 counterparts. The kitchen for example now has a non-existent boundary to the living space and is often visible from the entrance. This blurred boundary according to Ierley helps ensure the kitchen its role as the “hub of family life,” being the locus for household communications. The main floor of two story suburban houses are now rarely compartmentalized, instead favouring one large kitchen-living-dining space.

Garage doors are often the most visible portion of the front of house

Driveways are massive, taking up the majority of front yard

Trial versions of autonomous cars are available to rent

Fig. 1.24. Snout house axonometric view
Yard: Lots have begun to shrink, but house sizes have expanded creating smaller backyards. Large 2-3 car garages often have concrete driveways that cover up to 70% of the front lawn creating fields of pavement instead of grass.

Kitchen: The kitchen is almost unrecognizable compared to its counterpart in the 1900s Cromley states that today people want an open and centralized space for the whole family. Cleanliness is now an expectation, luxuries are now the dominant trend. Granite countertops, wood cabinets, stainless steel appliances, and massive islands for entertaining guests. Today’s kitchen is now a sum of many parts, a space well designed for cooking and prepping food but also a place for the entire family to congregate and use.

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Master bathrooms have become common, often larger than secondary bedrooms.

His and Hers sinks have also become common, often as large as secondary bedrooms.

Many houses now have a kitchen island, the heart of the home and main gathering area.

Kitchen-living-dining spaces are often merged into one main room in a house.
**Bathroom:** The bathroom typology has largely remained the same since the 1920s, but has become more opulent and spa-like in its design. Defining principles like cleanliness and privacy remain important factors. Master bathrooms are often larger than bedrooms and houses now often have more bathrooms than bedrooms.

**Garage:** The garage has enlarged, double and triple car garage doors are now a common occurrence. The facade is pushed towards the street taking the majority of street frontage. Due to the enlarged size, a garage can take up to 900 square feet of space, nearly the same size as the average house built in the 1950s. The Garage itself is a versatile space, the automobiles’ portal and entrance for inhabitants, and sometimes a renovated recreation center, storage space, gym, or workshop. The garage is a convertible open space that can become anything. Due to the versatility of the garage and accumulation of possessions, Krawitz and Friedman state a “great number people will confess that they park one or more of their cars in the driveway or on the street because there is no room.”

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27 Avi Friedman, and David Krawitz, *Peeking through the Keyhole*, 154.
28 Avi Friedman, and David Krawitz, *Peeking through the Keyhole*, 174.
Garages often lead into mud rooms. A secondary entry with laundry.

Basements often have wet bars with running water.

Fully finished basements are now common in houses.

Storage and hobby space in the Furnace room.

Fig. 1.26. Snout house
Exploded axonometric view
Fig. 1.27. Exploded detail axonometric view
Fig. 1.28. 2000’s
Neighbourhood Photo series
Fig. 1.29. 2000’s Neighbourhood Photo series
Fig. 1.30. 2000's Neighbourhood Photo series
Fig. 1.31. 2000’s
Neighbourhood Photo series
PART 02
Technology and Millennials
A New Generation

Canada’s housing stock will soon undergo an extensive transformation as the nation’s economic driver shifts from the Baby Boomers to Gen Y and Millennials. By 2030 average Baby Boomer will turn sixty-five compared to the average Gen Y at thirty-five. One generation will leave the workforce and downsize while another will reach the prime age for ownership. As baby boomers downsize, the stock of existing snout-houses will be available to the market. The main problem is that this housing type is not as desirable to Millennials as it was to the baby boomers. Gen Y and Millennials have a different set of cultural beliefs and desires compared to the Baby Boomers, meaning that the current housing stock will have to be readjusted. According to Arthur C. Nelson, an Author and Professor of planning and real estate development at the University of Arizona, four key traits set these two generations apart from the previous.

First, they may want to be connected and not isolated. This is manifest in their use of social media to stay in touch with people. Social media draws people closer together as they text instantly where they are and where they want to meet up with others. Gen Yers may prefer more densely settled areas where they can take full advantage of these social networks.

Second, they may prefer convenience and low maintenance residential living. Gen Y has little tolerance for spending time on things like driving, caring for yards, or maintaining large homes.

Third, as many Gen Y prefer to be car-independent. The New York Times reports that automobile manufacturers are perplexed that many young, prospective car buyers are not that interested in cars.

Fourth, Gen Y values the ability to relocate easily to maximize their economic and social benefits. For many, this means not being tied to a home they may be unable to sell quickly to seize new opportunities. Moreover, unlike prior generations, Gen Y does not trust that home ownership will create investment equity. These traits are different from the Baby Boomer generation and predecessors. They move away from the existing path of suburban growth. A path that has been followed since the CMHC (Canada Mortgage and Housing Corporation) published and distributed

Arthur C Nelson, Reshaping Metropolitan America Development Trends and Opportunities to 2030 (Washington Island Press, 2013), 43
Dead end Cul-de-sacs create a isolated and private street

Single use, low density detached housing

High maintenance yards producing no produce

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Fig. 2.1.
A typical cul-de-sac like Medley Ct in Vaughan has numerous design issues that are against the four traits that Millennials want
documents like *Principles of Small House Grouping* (1954) after the Second World War. These documents called for the abandonment of grids, favouring cul-de-sac suburbs as a way to avoid monotony, and ensure privacy. For example, *Principles of Small House Groupings* cited that grid streets were unsatisfactory as they had traffic moving in all directions while cul-de-sacs were optimal as it had the “most complete privacy and traffic separation for housing.”

Millennials having a different desire for living can be attributed to how they were raised when growing up. Millennials were raised with the Internet, and all the subsidiary service technologies that came with it. These interconnected technologies allowed for people to embrace a connected lifestyle. This lifestyle is so ingrained with Millennials, that connected technologies and living now almost go hand in hand. David Burstein, author of *Fast Future: How the Millennial Generation is Shaping Our World* states:

> The Millennial Generation and digital technology, like two good friends, have been there at all the important moments for each other. When we needed a last minute solution late on the night before a school paper was due, Google was there to save us. When we graduated, we uploaded our graduation pictures to Facebook; when we met a new girlfriend or boyfriend, we texted our friends to tell them. From text messaging to Twitter, from the music revolution of the iPod to the app revolution on the iPhone, from Google to Wikipedia, from Instagram to Facebook, from YouTube to Pinterest, and from Tumblr to Groupon, Millennials have truly dominated the creation, early adoption, and proliferation of the majority of the most important digital technologies of the last decade.

Millennials want a different way of living compared to Baby Boomers. A national survey was conducted by RCLCO Real Estate advisors in the United States polled to see what housing traits were the most desirable. The results showed that half of Millennials are confident even with kids, a detached house will not be needed, one-third would pay more for housing where they could walk to shops, work, and entertainment, and more than half would trade lot sizes for proximity. Growing up in a new wave of technologies has helped create a radical shift in perceptions on domestic living. The importance of seclusion and privacy has become tertiary to livable and walkable communities.

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30 *Principles of Small Group Housing* (Ottawa: Central Mortgage and Housing Corporation, 1954), 34.

The grid system of street layout is unsatisfactory because it invites traffic to move in all directions and therefore multiplies traffic hazards and reduces the privacy of residential streets.

**Standard Grid System**
- No separation of pedestrian and vehicular traffic
- All roads used for all traffic purposes
- All lot sizes standard

**Modified Grid Pattern**
- Some separation of pedestrians and vehicles by provision of foot paths
- Channelling of traffic—less road

**Open Plan**
- Pedestrians and vehicles separated
- Roads planned for specific uses

**Street Types**
- Major thoroughfares
- Collector Streets
- Access roads
- Minor residential roads

“... The grid system of street layout is unsatisfactory because it invites traffic to move in all directions and therefore multiplies traffic hazards and reduces the privacy of residential streets.”

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Fig. 2.2. Pictures from 1954 Principles of Group Housing
Interconnected Technologies

Twenty five years have passed since the Internet’s public release, and this technology has become so significant it has been declared a fundamental right by the Canadian Radio-television and Telecommunications Commission (CRTC). The internet has become indispensable in our daily lives; in 2016, 88.5% of Canada’s entire population has become connected and on average 36.7 hours are spent online monthly.\(^{32}\) The internet allows people to curate their own views, way of life, and find similar minded people, a massive divergence from the previous domestic technologies. The internet thrives on connectivity, community, diversity, and convenience. The internet is also the framework for networked information technologies; technologies that collect information from users and numerous networks to complete tasks previously thought impossible. Examples are Facebook, a large Social Networking website, Uber, an online transportation company that transforms ordinary cars into taxis, and AirBNB, an online hotel service that allows any house or room to be rented. These companies are able to network previous underused objects to make a more efficient business, often owning no physical products. Networked technologies are also on the rise in day to day use. Urbanist Adam Greenfield states that “more pertinently, networked digital information technology has become the dominant mode through which we experience the everyday. In some important sense this class of technology now mediates just about everything we do.”\(^{33}\) The quick rise can also be attributed to how these technologies are increasingly dedicated to expanded ideas of consumer choice, customization, and new experiences. If you are going to a restaurant, you can compare restaurants ratings and reviews on Yelp before deciding on the place. If you got caught up and need to eat at home or the office, you can get meals delivered from most restaurants in the city with UberEats or SkiptheDishes. Your dog can be walked with Spotwalk when you need to work late and you can see the route Fido took with a GPS tracker. If you want a nice surprise delivered monthly or weekly, you can use various subscription services like Le Tote, Rocksbox, or Wantable which curate presents delivered to your door. Do not like what they sent? Simply send it back and they will revise the gifts to be more desirable for next

\(^{32}\) The Canadian Internet (Ottawa: Canadian Internet Registration Authority, 2016), https://cira.ca/factbook/domain-industry-data-and-canadian-Internet-trends/internet-use-canada.

Smart house diagrams often show little to no changes to the house. People are often omitted from smart house diagrams. Most Smart-Home drawings and diagrams highlight the possible consumer products that can be added to the house, rather than showing how these technologies can be used as a tool for advancing the house forward.
time. This list goes on, and can include the most obscure services like Rockaloo, a subscription service for private washrooms in New York City or Wag!, a dog walking service that features live GPS updates, photo messages, and messages when the dog has defecated during the walk.

More importantly, a shift has occurred in architecture and the public realm due to these various technologies. The importance of location and proximity for businesses and zoning is lessening as more people are choosing to order products online. A notable example in Canada is the rise of digital store Amazon and bankruptcy of Sear, a company that previously had a foothold in the Canadian marketplace for 65 years. As proximity and location become less a requirement for successful services, we can look at the suburban house as an opportunity for redistributing the spectrum of services available in a city. These houses move from a single-use building, reliant on non-neighbourhood services to a connected self-sufficient neighbourhood that functions as a neighbourhood.

The reconsideration of architecture, in light of its underperformance in the current state of connectivity, is expressed in the following three studies. First is 2003 study Neutville by sociologist Barry Wellman at the University of Toronto who studied the effect of social connectivity on a suburban neighbourhood, if a community was offered free internet. Second is the Tower Renewal Partnership, a non profit organization dedicated to transforming less desirable postwar towers into sustainable, resilient, and healthy buildings. Third is Sidewalk Labs proposal for Quayside, Toronto; a proposal to create a district which challenges existing urban norms while creating a networked urban community.
Fig. 2.7.
Self-Driving cars using radar, lidar, GPS, sensors to drive autonomously

Fig. 2.8.
The cars care connected to each other, using real time data to drive more efficiently
Netville Connectivity

Barry Wellman’s study titled *Neighbouring in Netville* looked into 109 detached single family homes at an outer suburb of Toronto. The goal was to investigate how Internet use may affect neighbourhood communities.\textsuperscript{34} The study compared the results of 64 “wired” homes, connected to the internet with a community email list to 45 non-wired homes after two years. Final results were based on factors like residents recognizing people by first name basis, who they talked to, who they visited. Results showed that after the study, “wired” residents recognized three times as many people, talked with twice as many people, and visited 50\% more of their neighbours compared to their non-wired counterparts.\textsuperscript{35} Connected neighbours also communicated more often with residents further away reducing the need for proximity, recognizing residents names on average 18.7 houses away compared to 12.9 houses with non-wired counterparts.\textsuperscript{36} Wellman concluded that “preliminary analysis suggested that the Internet supports a variety of social ties, strong and weak, instrumental, emotional, social, and affiliative. Relationships are rarely maintained through computer-mediated communication alone, but are sustained through a combination of online and offline interactions.”\textsuperscript{37}

\textsuperscript{35} Keith Hampton & Barry Wellman, *Neighbouring in Netville*, 293.
\textsuperscript{36} Keith Hampton & Barry Wellman, *Neighbouring in Netville*, 298.
\textsuperscript{37} Keith Hampton & Barry Wellman, *Neighbouring in Netville*, 207.

Fig. 2.9.
Early Settlement

Initial connections (non-wired vs. Wired)
Fig. 2.11.
Settled Community

Post 2 years (non-wired vs. Wired)
Tower Renewal Partnership

Adaptability

The Tower Renewal Partnership examines the “2,000 postwar apartment towers located throughout Ontario’s Greater Golden Horseshoe Region, many of which urgently need strategies for rehabilitation and renewal.”

The partnership aims to modernize the aging towers with renovations and infill expansions designed to bring basic services and commercial opportunities, and create more energy efficient buildings while maintaining original affordability. The importance of the partnership is that they are working to break through the mindset that buildings are static. If there is a deficiency of program within an apartment block, the partnership works to adapt the existing building fabric to accommodate those deficiencies through an ambitious zoning. This can be challenging, as they have to work through rezoning, getting permission from residences, and readapting prebuilt architecture to address the deficit. With these changes, the partnership hopes that the existing housing stock can create healthy and complete communities, shifting from the isolated tower neighbourhoods that exist today.

Fig. 2.13.
Fig. 2.14. [Image of a high-rise building with children playing nearby.]

Fig. 2.15. [Image of a high-rise building with a street scene in front.]
Improved Housing Stock
Residents can enjoy safer buildings as more people out and about creates safer, more lively communities.

Residents can take the opportunity to expand a home business into something more.

Residents can enjoy employment opportunities closer to home.

Residents can enjoy services and options that are a short walk away.

Fig. 2.17.

Fig. 2.18.
Sidewalk Labs

Flexibility

Google Sidewalk Labs is a subsidiary organization of Alphabet whose goal is to improve urban infrastructure through technological advancements. In Fall 2017, they submitted a request for proposal to construct a technologically advanced experimental community in Quayside, Toronto. Although this proposal does not involve readapting buildings and infrastructure, it shows the possibilities of how networked information technologies can be used for architectural applications. Two key areas of interest are Sidewalk Labs proposal for a new building typology called the “loft”, and a flexible zoning scheme. According to Sidewalk Labs, “the Loft concept improves upon traditional loft buildings by planning explicitly for ongoing and frequent interior changes around a strong skeletal structure. Its structure will remain flexible over the course of its life-cycle, accommodating a radical mix of uses (like residential, retail, making, office, hospitality, and parking) that can respond quickly to market demand.” Sidewalk Labs Vision Sections, 18.

The loft is a building typology that is meant to be able to adapt and change for what is best for a neighbourhood, it allows buildings to act fluid, changing its RCI (residential, commercial, institutional) depending on what the neighbourhood needs. This is possible by using data to find out what is missing in a neighbourhood, and quickly doing adjustments for its improvement. This plan moves away from previous zoning, where a building may be fixed for years, stuck in its current zoning designation even though a change in zoning may improve the neighbourhood. Sidewalk Labs attributes the possibility of their flexible zoning scheme to the rise of the digital realm, as “online sales have upended brick-and-mortar retail; artists are experimenting across media and collaborating across disciplines; more and more public services are being driven by data.”


Sidewalk Labs Vision Sections, 18.
1. Building begins as a single-use parking structure.

2. Structure grows in response to increased parking demand.

3. A reduction in vehicle ownership means built space can be converted into other uses.

4. The building evolves, changing use to meet new user demands.

Fig. 2.20.
PART 03
Connecting Suburbia
A suburban neighbourhood in Calgary is selected for this thesis’s testing grounds to create a connected suburban neighbourhood since Calgary and its suburban-urban fabric resemble many cities in North America. The city is composed of a small urban core, a ring of inner city neighbourhoods that follow the grid alignment, and a large sprawling suburban ring that covers over 50% of the city fabric. In addition, Calgary’s growth rate distributes unevenly; population growth is occurring in the urban core, inner cities, and newly constructed suburbs while existing postwar suburbs face population decline. This is creating a ring of less desirable lower density neighbourhoods as people favour the walkable inner city neighbourhoods and compact newly constructed suburbs. This drop is significant and needs to be addressed, as many neighbourhoods have lost over 10% of their population in a 15 year span from 2000 to 2015. Deer Run decreased 16.75% going from 6389 to 5319 inhabitants, Woodbine decreased 16.12% going from 10,902 to 9145 inhabitants, and Ogden decreased 13.44% going from 10,185 to 8847 inhabitants compared to Calgary’s 41% increase during 2011 to 2016, going from 878,866 to 1,239,220 inhabitants.41

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41 Tom Babin, *This map shows why Calgary’s older suburbs may be headed for some big problems* (Calgary: The Calgary Herald, 2016), https://cheralldotcom.carto.com/viz/b3d0807e-d9e3-11e5-b89f-0e7f7d828485/embed_map
Connecting Suburbia

Fig. 3.1.
City Makeup

Fig. 3.2.

Part 03

Future Neighbourhoods
Suburban Neighbourhoods
Inner City Neighbourhoods
Downtown Core
Neighbourhood Growth

Fig. 3.3.
Dwelling Types

Hidden Valley

Castleridge

Crescent Heights

Signal Hill

Woodbine

Calgary

Fig. 3.4.
Transportation Use

Fig. 3.5.
Transportation Use

Fig. 3.7.
The neighbourhood is a typical suburb, having an elementary school, a park, a retirement center, a gated community for fifty plus people, and two apartment buildings 4 storeys high. The remainder is entirely constructed of low density tract houses, zoned for R1 for single dwelling units. The neighbourhood, like most Canadian suburbs, is diverse. People living in the neighbourhood embody a wide demographic range. To begin this suburban experiment, a zoning amendment will need to happen, similar to Sidewalk Labs’ proposal to create one new flexible category. To ease neighbourhood worries, the initial change will call for temporary structures to the house. This thesis examines six possible intervening structures located in the test neighbourhood. The designs of these interventions are meant to be expressive and varied, ranging from simple cheap creations that a homeowner could do as a DIY project, to mail-order structures that could be ordered online, to a more idiosyncratic structure designed by an architect or a grad student looking for their first project.

After examining the evolution of the house from Part One, it can be seen that due to the open concept layout of houses today, the optimal locations for interventions are the semi-public spaces of the house, as this will cause the least disruption to living habits. These locations are the front and rear yard, and the garage. The yards are often large and underused spaces already requiring unnecessary maintenance for families, and the garages are already large flexible rooms and part of the house. Due to the size of garages, portions are often underused and already renovated into workshops and recreation spaces in many houses.
Fig. 3.8.

Suburban neighbourhood testing grounds

Surrounding Suburbs

Connecting Suburbia

Nearby Big Box Complex

Surrounding Suburbs
The Ahmads
Ali, Haneen, and Aidan immigrated from Jordan 3 years ago. Ali works constantly to work as a full time barber while Haneen works part time from home as a FT for a startup. They love the outdoor activities available in the area, but still need to save money for a safety net before they can make human connections. Aidan started 5th grade at the near by elementary school.

The Parkins
Cara and Robyn married dit a area country music fan for Cara's new profession. Robyn was able to keep her old job and work remotely. Often getting bored, she often works at the new Workshare space meeting other professionals. Trying to make new friends, they often join in on the movie nights and help the park with their greenhouse, offering their yard as a expansion.

The Guos
The Guos with their greenhouse, offering their yard as a expansion.

Beitel and Tsolov
Dore and Penel both work in the oil patch with one work six and one off. Their schedules often conflict where they live alone. Often gets home and with plenty of disposable money, Dore and Penel decide to create a small startup: doing delivery services for their neighborhood.

The Lópezes
Fernando and Tracey have three lovely kids Tony, Charles, and Emi. Fernando works with municipal sanitation while Tracey works as a columnist in the local news station. Usually working remotely 1 day a week. Lying theatre and film, they transfilled their garage for movie nights for the neighborhood.
Connecting Suburbia

**The Shattis**
Chris and Georgiana, and Sarah moved from San Francisco back home to be closer to family. Georgiana used to work in a startup, while Chris managed a multifamily space. Finding a缺口 in the market, Chris decided to create a coworksharing space in their homes.

**Woo**
Chris works remotely in Human Resources with a Energy Company in the city, but her true passion is coffee. Having extra time since her son, Michal started highschool, Chris opened up a neighborhood coffee shop where orders can be done online the night before. Michal helps out occasionally as his first part-time job.

**Sheppard-Neuhofer**
Kerstin runs alone with her family. She is often busy with work at the local office so she rarely has time to have breakfast. Instead she gets her fresh baked daily from Clancy Cafe. Before work. Finding something new, she instead keeps the house to herself while she can work at home.

**The Volkovs**
Winston, Justin and their son Urban love the outdoors. Winston creates a online service where he gives raft and canoe tours while Justin is a volunteer at a nearby clinic. Having a large abundance of outdoor supplies the Volkovs decided to turn their garage into a workshop space where Winston can rent out. Camping supplies and Justin can offer a dog training school.

**The Meisters**
Bertha and Ken retired from their jobs, Ken works in a Wholesale for Janice, but his true passion is coffee. Having extra time since Ken gets into model train hobby. Not fond of change, they agreed to not bother with the internet any any technologies associated with it. Bertha does like to volunteer time to help garden at the greenhouse every Saturday after afternoon tea.
Household Internet

1+ Connection
No Connection

Fig. 3.10.
How Neighbours Commute

- Automobile
- Public Transit
- Work at home at least 1 time per week

Fig. 3.11.
Clair’s Cafe

321 Braeshire Cafe

Claire is a huge homebody, she loves coffee, tea, treats, and company. Worried about the financial cost of doing an entire cafe business, Claire decides an addition would be the best option. Claire’s Cafe is an intervention at the front of house with a storage component allowing for a cafe shop. The project is professionally designed by a local architect and designed to slot into a typical 10’x7’ garage door allowing for minimal alterations to the house for the eventual resale. The house’s second garage door is replaced with a glass folding door allowing for their one car to park inside when needed. Orders can be done in advance for commuters with Urban Spoon, and with the delivery system, orders can be delivered anywhere in the city. For select neighbours, Claire partnered with Dave for a coffee drone delivery service. Online reviews like Yelp also helped build up a reputation for Claire having among the best coffee in the city, bringing in many out of neighbourhood patrons. During non-peak times, Claire temporarily closes shop to work remotely at her IT job.
Fig. 3.12. Connecting Suburbia
The Intervention includes a full prep space for the cafe. Water is connected with piping to the house.

All pieces simply slide into the existing garage door, there is space for one vehicle to park inside.
The existing kitchen can be a great workstation for baked goods, and lunchtime sandwich prep.

A interior ordering counter and viewing tray swivels out of the cafe. It is easy to assemble and disassemble when needed.

Fig. 3.14.
6 a.m. Claire wakes up for another day at her Cafe, she looks at her phone and notices that there are already a few orders.

8 a.m. The main neighbourhood rush hour before work begins. Claire delivers the countless pre ordered Coffee deliveries.

11 a.m. Buses and people working remotely go after the rush hour, the slower business allows Claire to prepare for lunch orders.

12 p.m. As most residences are out of the cul-de-sac, the majority of orders are for afternoon coffees out of the cul-de-sac.

1 p.m. Afternoon orders across the afternoon, Claire works on her side job remotely and prepares for tomorrow.

4 p.m. Claire closes shop and relaxes for tomorrow.

Greg preordered a cappuccino for his afternoon walk from work.

Emi and Mandy took the afternoon off from school to enjoy the one of the last warm fall days of the year.

Jane likes to work remotely at Claire's once a week, she loves hearing about the neighbourhood gossip from Claire.

Ron occasionally orders from Claire, but mostly takes a seat to play solitaire and cribbage with a few neighbours.
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Ron occasionally orders from Claire, but mostly takes a seat to play solitaire and cribbage with a few neighbours.

Connecting Suburbia

Fig. 3.15.
Tracey loves watching movies with her friends and family, and her oldest son Tony creates short films in his spare time since he wants to become a filmmaker. Their house has a massive 3 stall garage, completely overdeveloped since they only own one automobile. Wanting to spread her love of film nights, Tracey decides to get her husband’s sister to help construct a retractable theater. The theater is constructed with timber and plywood sheets and uses the existing garage motor to extend and retract the intervention. Proud of her sister-in-laws’ work, Tracey uploaded the plans online so anyone could make their own. The theater is intended to be used by the entire community; neighbours can reserve times with an app for private showings or watching movies, hosting plays, and even using the space as a grandstand to cheer on their kids street hockey game.
The theater is on tracks and powered by the existing garage door opener, this allows for it to change locations for use.

The remaining single car garage can be used as a waiting space and concessions when not in use.
When set for exterior viewings, numerous lighting fixtures can be attached for play lighting and movie nights.

A simple projector is set up with 4"x4" posts placed in a hole and strec.
6 a.m. The theater is not in use

8 a.m. The theater is not in use

11 a.m. A street hockey game is set up in front of the theater, parents rent out the space to cheer on their kids.

12 p.m. The theater is not in use

5 p.m. Kids at a local daycare worked on a play for the past week, the supervisor rented out the space so parents could watch organized by a neighbor, they are allowing anyone in the community to watch.

9 p.m. The Truman Show is playing tonight organized by a neighbor, they are allowing anyone in the community to watch.

Haneen has never seen the Truman Show before, so she invited Braden to watch it for a date night.

Mandy isn’t too interested in the movie playing tonight, but she wanted to show off her cute date to her friends.

Andy rented out the theater for the night, he invited some of his best friends to watch it with him.
12 p.m. The theater is not in use.

5 p.m. Kids at a local daycare worked on a play for the past week, the supervisor rented out the space so parents could watch.

9 p.m. The Truman Show is playing tonight organized by a neighbor, they are allowing anyone in the community to watch.

Business Arrangements
Current Users
Daily Users

Connecting Suburbia

Fig. 3.19.
Dave’s Droneport

321 Braeshire Cafe

Since Dave and Pavel both work a resource-related job, they have a one week on and one week off schedule. Unfortunately, for the past year their schedules often conflict causing significant alone time at home. Bored, Dave pitched the idea of setting up a neighbourhood droneport as a hobby. Dave started with one drone, but the enterprise quickly grew after Claire made a deal for the drones to deliver coffee and baked goods to neighbours. This requires an expansion, so Pavel designed a sturdy 6 drone port that attached to their backyard patio. The port also charges drones automatically when they are docked to increase their daily capabilities. The expansion allows for Dave’s Drones to be the core delivery system in the neighbourhood, and with the current rapid growth rate, it seems that another expansion will soon be needed.
Fig. 3.20.
The Drone Ports design is intended to simply attach to an existing backyard patio for quick installation and removal.

A drop box allows for people to drop off packages for delivery, although a drone pickup option is still available.
The Canopy slides and folds giving shelter to the drone pads, or shading dwellers using the patio space.
6 a.m. Dave sends off a few drones to pick up deliveries from Claire’s Cafe.

8 a.m. The main morning rush occurs with Claire’s Cafe, all of the drones are doing deliveries.

11 a.m. Dave heads out to run a few errands, the port is temporarily closed.

1 p.m. Dave returned homes and continued with drone deliveries.

4 p.m. The last few deliveries are sent off for the day, Dave checked the dropbox and preps for tomorrow.

Pavel doesn’t really care for the business of the Drone port, but he enjoyed designing the port.
6 a.m. Dave sends off some of the deliveries while Dave is away.

8 a.m. The main morning rush occurs with Claire's Cafe, all of the drones are doing deliveries.

11 a.m. Dave heads out to run a few errands, the port is temporarily closed.

12 p.m. Pavel sends out some of the deliveries while Dave is away.

1 p.m. Dave returns home and continues with drone deliveries.

4 p.m. The last few deliveries are sent off for the day. Dave checks the dropbox and prepares for tomorrow.

Pavel doesn't really care for the business of the Drone port, but he enjoyed designing the port.
Guo’s Greenhouse

323 Braeshire Cres

Emi and Cisco Guo moved to suburbia from New York City two years ago. When living in the city, they were huge foodies. Unfortunately the Guos find suburbia underwhelming for restaurant options so they made a decision to take matters into their own hands. Their backyard was underused, so they ordered a smart greenhouse system to grow fresh produce that can be sold to local restaurants and cafes. Since they do not consider themselves handy or like using power tools, an easy to install catalogue greenhouse makes the most sense. The greenhouse is a single load layout, and uses a typical to meter wood fence as a support structure, attaching itself to the shed and fence. The greenhouse is connected to the house’s WiFi, and uses weather forecasts to automatically give additional UV light and water. The Guos get notification with their phones when certain zones need to be weeded or when the garden needs to be covered for hail or frost warnings. The extra garden maintenance and heat effect in the greenhouse allows the Guos to grow plants that have a lower plant hardiness zone. This allows for local produce to be sold that previously could not be local, allowing the Guos a distinct advantage in the city’s produce market.
Fig. 3.24.
The green house component is designed to fasten to the fence where a plastic poli film covers the structure.

The shed component includes shelving and a water cistern for automatically watering plants depending on weather.
The greenhouse can work for incubation where certain plants are transferred to the exterior plots.
Tues. Claire wakes up for another day at her Cafe, she looks at her phone and notices that there are already a few online.

Wed. The main neighbourhood rush hour before work begins. Claire delivers the countless pre ordered Coffee deliveries.

Thurs. Retires and people working remotely go after the rush hour, the slower business allows Claire to prepare for lunch orders.

Fri. As most residences are out of the cul-de-sac, the majority of orders are for afternoon coffees out of the cul-de-sac.

Sat. Afternoon orders across the afternoon, Claire works on her side job remotely and prepares for tomorrow.

Sun. Claire closes shop and relaxes for tomorrow.
FRI. As most residences are out of the cul-de-sac, the majority of orders are for afternoon coffees out of the cul-de-sac.

SAT. Claire wakes up for another day at her cafe, she looks at her phone and notices that there are already a few orders.

SUN. Afternoon orders across the afternoon, Claire works on her side job remotely and prepares for tomorrow.

Cisco checks the greenhouse plants daily, as they have a higher plant hardness, and require extra watering.

Danielle babysits her niece Leigh once a week. Leigh loves helping out, but mostly loves playing with Buttons.

Danielle offers help with the garden in exchange to get weekly herbs for her cooking.

Connecting Suburbia

Fig. 3.27.
Winston’s Workshop

344 Braeshire Cres

Winston loves the outdoors; he hikes, fishes, and kayaks whenever he has a chance. He made a side business two years ago giving outdoor expeditions to a few hidden gems near the city. Bored with his 9 to 5 job, and since his expedition business was growing monthly, Winston decided to try turning his business into a full-time profession. Winston’s Workshop is a pre-manufactured intervention, ordered by a company that creates various additions for suburban homes. The workshop is a locker space where various outdoor equipment can be reserved online. The shop features a sliding checkout locker, a folding canopy for workshop and tutorial sessions, and plenty of shelving inside. The space also has enough room for one automobile to park inside when needed. Winston also offers a loan system, where neighbours can donate or lend outdoor products to use the workshop supplies for free.
Connecting Suburbia

Fig. 3.29.
The Workshop fits into a typical 16’ x 8’ Double Garage. A glass garage door allows for a single Vehicle for parking.

Shelving slides on a track for exterior and interior use depending on the need of the shelving units.
Objects can be signed out remotely via smartphone app, the door is opened with the scanner.

Additional shelving is located behind the sliding shelving unit and seating is set up for workshop sessions.

Fig. 3.30.
6 a.m. Winston leaves to meet some customers at a nearby provincial park for a hiking tour.

8 a.m. Previous items are returned and other outdoor supplies are checked out from the lockbox.

11 a.m. Previous items are returned and other outdoor supplies are checked out from the lockbox.

12 p.m. Winston returns to give the Metes a workshop tutorial on outdoor survival and proper canoeing stokes.

1 p.m. Afternoon orders across the afternoon, Claire works on her side job remotely and prepares for tomorrow.

4 p.m. Previous items are returned and other outdoor supplies are checked out from the lockbox.

Haruo asked Winston to set up and plan a canoe trip for his family and friends.
6 a.m. Winston leaves to meet some customers at a nearby provincial park for a hiking tour.

8 a.m. All items are returned and other outdoor supplies are checked out from the lockbox.

11 a.m. All items are returned and other outdoor supplies are checked out from the lockbox.

12 p.m. Winston returns to give the Metes a workshop tutorial on outdoor survival and proper canoeing strokes.

1 p.m. Afternoon orders across the afternoon, Claire works on her side job remotely and prepares for tomorrow.

4 p.m. Previous items are returned and other outdoor supplies are checked out from the lockbox.

Haruto asked Winston to set up and plan a canoe trip for his family and friends. Although in her late seventies, Mayu is determined to go on the trip. She always wanted to go camping.

Danielle learned how to do a J stroke today for canoeing, but she is more interested in the front lawn.

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Business Arrangements

Current Users

Daily Users

Fig. 3.31.
Chris previously worked in the tech and design field before his wife Georgiana wanted to return to her hometown to be closer with family. Not wanting to put his skills to waste, Chris decided to create a small co-working/makerspace in his garage. Chris designed the structure himself, creating a timber exterior pod with a scrap metal facade that could work as a private conference center. In the garage Chris offers many working stations, a 3d printer, office printers and supplies, and a laser cutter located in the basement. Everything can be reserved online, and Chris offers remote printing, 3d printing, and laser cutting with online bookings for people in a rush. Chris hopes this workshare space will be able to attract similar minded people who would like to work in a collective space. A space where people can help each other with projects and questions, instead of working alone at home each day. During busy days Chris allows people to work and lounge in the kitchen and living room on the main floor for extra working space.
The Workshop fits into a typical 16’ x 8’ Double Garage. A glass garage door allows for a single Vehicle for parking.

The pod space acts as a conference room for users allowing for presentations and skype calls.
The interior workspace includes office tools like photocopiers, scanners, 3d printers which can be booked remotely.
6 a.m. The space is already closed, but some customers remotely printed a few documents for their morning meeting.

8 a.m. Chris’s CoWorking opens for the day, the first wave of early risers start their workday.

11 a.m. A large 3D printing order is placed, using up the print job for the remainder of the day.

12 p.m. A second wave of people enter the office for their workday.

1 p.m. The majority of customers leave to the nearby Claire’s Cafe for a lunchtime meal.

4 p.m. The last of the workers depart as Chris closes shop and cleans up for the next day.

Natalie is meeting Jon, a local artist in the community to collaborate on a residential building she is designing.

Kate set up a Kickstarter to create an artistic piece called ‘Smashing Water’, based on her Thesis.
6 a.m. The space is already closed, but some customers remotely printed a few documents for their morning meeting.

8 a.m. Chris’s CoWorking opens for the day, the first wave of early risers start their workday.

11 a.m. A large 3D printing order is placed, using up the print job for the remainder of the day.

12 p.m. A second wave of people enter the office for their workday.

1 p.m. The majority of customers head to the nearby Claire’s Cafe for a lunchtime meal.

3 p.m. The last of the workers depart as Chris closes shop and cleans up for the next day.

Natalie is meeting Jon, a local artist in the community to collaborate on a residential building she is designing.

Kate set up a kickstarter to create a piece called Smashing Water, based on her thesis.

Connecting Suburbia

Fig. 3.35.
Existing Conditions

Suburbs have evolved to become reliant on vehicle focused retail. This has caused neighbourhoods to dominantly use vehicles as a mode of transportation creating single use structures.
Updated Conditions

Series of temporary interventions allows for existing neighbourhoods to become more self reliant, reducing the need for Habitants to commute for basic necessities. Lacking storefronts and natural foot traffic, these interventions use the existing digital network to connect with neighbours and the out of neighbourhood populance.
**Existing Movement**
Existing modes of transportation often is up to 95% vehicular transport, requiring habitants to commute to larger big box stores for basic necessities. These complexes usually include a grocery store, theater complex, hardware store, and smaller retail.

**Theatre**
The theater space encompasses the majority of the neighbourhood, with only fringe locations choosing to commute to retail or adjacent neighbourhoods.

**Drone Ports**
Although one port can reach the furthest house in the neighbourhood, a second port was added to meet the demand of people requesting the service splitting the delivery region in two.

**Workshare Spaces**
Two workshare spaces exist in the neighbourhood, not quite covering the entire neighbourhood. A market exists for another shop to open.
Green Houses

Greenhouses have popped up everywhere in the neighbourhood, while some work solely as a private business for cafes and businesses, others make a deal for their cul-de-sac blocks or make a group collective to offer produce for larger blocks.

Restaurants/ Groceries

Numerous restaurants exist offering a wide variety of cuisine, due to the diverse nature of the restaurants, it allows for overlapping spheres of influence while also drawing in people from the city.

Workshops / Sharing Spaces

Numerous workshop and sharing spaces exist, ranging from small cul-de-sac collectives of shared tools, to specialized spaces catering to hobbies and outdoor activities. Numerous spaces attract out of neighbourhood people for rentals.

A Connected Suburb

The combination of various interventions shifts the neighbourhood's previous reliance on out of neighbourhood big box stores. Allowing for a more independent neighbourhood, acting more as a village.
Big Box stores are massive, Home Depots average 100,000 sq ft, while Costcos and Walmarts are usually over 150,000 sqft. Suburbs often rely on these massive stores for necessities requiring out of neighbourhood trips.

Evan has a small herb greenhouse renting out neighbours underused rear yards. He sells his produce to select restaurants in the city.

Movement from Suburbs to Big Box Stores are often only accessible through arterial roads requiring vehicular transportation.

John offers espresso’s to go with his small coffee shop, pre ordered orders get 15% off.

Anh operates a Vietnamese restaurant that also offers lunchbox specials for kids in the neighbourhood. Parents simply tap yes on her app the night before.

Jake transformed his garage and basement into a makerlab workshop, offering a 3D printer, CNC, and numerous power tools for rent.

Saira consolidated a large quantity of household tools to create a large workshare space, donated supplies allows for free use.

Baba Aneta offers a small Pierogi restaurant open 3 days a week, she mostly caters to the retirement home, but offers online deliveries.

Victoria created a small Brick and Mortar market place dedicated on selling farm to table produce.

Shevaun loves gardening and flowers, so she set up a Floriculture business, custom arrangements are delivered weekly.

Justin created a hobbyist workshop dedicated to model trains. Although not many people check out his space, he loves his little shop.

Golnaz loves Bonsai plants so she set up a small Bonsai business, she also gives tutorials and rents out tools so that anyone can learn.

Tammy offers a work exchange program for neighbours where people can use their skills to help fellow neighbours and work together.

Tina offers DIY workshops for how to do renovations and household repairs, she offers tutorials every Sunday.

Juan runs a Mexican Japanese infusion restaurant three days a week, it is so popular that seating is booked weeks in advance.

Chin loves apples, so he turned his backyard into a small apple orchard, he processes it into apple sauce and apple pies.

Anne and Parshan teamed up to create a vegetable collective. Their enterprise has grown dramatically allowing them to purchase farmland to handle the large orders.

Ricky, Sue, Maya, and Liwei created a consortium for their cul-de-sac. They now share tools and distribution allowing their greenhouses to flourish.

Chanel is a neat freak, but she loves helping people be neater as well, she rents out cleaning supplies and helps people get rid of junk.

Vladimir offers a small pastry shop, he loves baking cakes and often does wedding cakes, neighbours get a significant discount.

Sam has a small greenhouse operation for growing produce dedicated to jams.

Rosetta’s small cafe usually operates via online with a delivery system other than Sunday where seating is available thanks to her nieces help.

Nook’s greenhouse specializes on medicinal herbs, aimed to help people feel better from the flu.

Anqi often works with Nook on their greenhouse operations, her operations are typical produces for the neighbourhood.

Natasha partnered with a high end restaurant, she grows floral arrangements for the tables.

Negar works in the agriculture department with the city’s university. She markets specialized cross-bred plant species that she grows.

Chris’s CoWorking

Claires Cafe

Winstons Workshop

Traceys Theater

Guos Greenhouse

Daves Droneport
Big Box stores are massive, Home Depots average 100,000 sq ft, while Costcos and Walmarts are usually over 150,000 sqft. Suburbs often rely on these massive stores for necessities requiring out of neighbourhood trips.

Evan has a small herb greenhouse renting out neighbours underused rear yards. He sells his produce to select restaurants in the city.

Movement from Suburbs to Big Box Stores are often only accessible through arterial roads requiring vehicular transportation.

John offers espresso’s to go with his small coffee shop, pre ordered orders get 15% off.

Anh operates a Vietnamese restaurant that also offers lunchbox specials for kids in the neighbourhood. Parents simply tap yes on her app the night before.

Jake transformed his garage and basement into a makerlab workshop, offering a 3D printer, CNC, and numerous powertools for rent.

Saira consolidated a large quantity of household tools to create a large workshare space, donated supplies allows for free use.

Baba Aneta offers a small Pierogi restaurant open 3 days a week, she mostly caters to the retirement home, but offers online deliveries.

Local Elementary School

Retirement home

Senior 55+ private residences

Muhammad opened the neighbourhood’s second drone port as demand greatly grew, he now covers nearly half the neighbourhood.

Victoria created a small Brick and Mortar marketplace dedicated on selling farm to table produce.

Shevaun loves gardening and flowers, so she set up a Floriculture business, custom arrangements are delivered weekly.

Justin created a hobbyist workshop dedicated to model trains. Although not many people check out his space, he loves his little shop.

Golnaz loves Bonsai plants so she set up a small Bonsai business, she also gives tutorials and rents out tools so that anyone can learn.

Tammy offers a work exchange program for neighbours where people can use their skills to help fellow neighbours and work together.

Tina offers DIY workshops for how to do renovations and household repairs, she offers tutorials every Sunday.

Juan runs a Mexican Japanese infusion restaurant three days a week, it is so popular that seating is booked weeks in advance.

Chin loves apples, so he turned his backyard into a small apple orchard, he processes it into apple sauce and apple pies.

Anne and Parshan teamed up to create a vegetable collective. Their enterprise has grown dramatically allowing them to purchase farmland to handle the large orders.

Ricky, Sue, Maya, and Liwei created a consortium for their cul-de-sac. They now share tools and distribution allowing their greenhouses to flourish.

Chanel is a neat freak, but she loves helping people be neater as well, she rents out cleaning supplies and helps people get rid of junk.

Vladimir offers a small pastry shop, he loves baking cakes and often does wedding cakes, neighbours get a significant discount.

Sam has a small greenhouse operation for growing produce dedicated to jams.

Rosetta’s small cafe usually operates via online with a delivery system other than Sunday where seating is available thanks to her niece’s help.

Nook’s greenhouse specializes in medicinal herbs, aimed to help people feel better from the flu.

Anqi often works with Nook on their greenhouse operations, her operations are typical produces for the neighbourhood.

Natasha partnered with a high end restaurant, she grows floral arrangements for the tables.

Negar works in the agriculture department with the city’s university. She markets specialized cross-breed plant species that she grows.

Chris’s CoWorking

Claire’s Cafe

Winston’s Workshop

Tracey’s Theater

Guo’s Greenhouse

Dave’s Droneport

Fig. 3.39.
Muhammad opened the neighbourhoods second drone port as demand greatly grew, he now covers nearly half the neighbourhood.
Anh operates a Vietnamese restaurant that also offers lunchbox specials for kids in the neighbourhood. Parents simply tap yes on her app the night before.
often rely on these massive stores for necessities. Suburbs average 100,000 sq ft, while Costcos and Muhammed opened the neighbourhood's second drone port as demand greatly grew, he produces. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Olympus created a small brick and mortar market place that seats up to 50 people. Parents simply tap yes on her app the night before. Anh operates a Vietnamese restaurant that also offers lunchbox specials for kids in the neighbourhood. She set up a floriculture business, custom arrangements are delivered weekly. Anne and Parshan teamed up to create a greenhouse business, they now cover nearly half the neighbourhood. Farmers sell produce. Tina offers DIY workshops for how to do renovations and household repairs, she offers tutorials every Sunday. Justin created a hobbiest workshop dedicated to help fellow neighbours and work together. Tammy offers a work exchange program for neighbours where people can use their skills to help fellow neighbours and work together. She discusses a cross-breed plant species that she grows for the city's university. She markets specialized genetic cross breeds. Negar works in the agriculture department with the city's university. She markets specialized genetic cross breeds. She grew floral arrangements for the tables of the city's university. Natasha partnered with a high-end restaurant, she grows floral arrangements for the tables of the city's university. She markets specialized genetic cross breeds. The city's University has a 55+ retirement home, but offers online deliveries 3 days a week, she mostly caters to the senior 55+ private residences. Baba Aneta offers a small Pierogi restaurant that seats up to 50 people. Seating is available thanks to her nieces help. Rosetta's small cafe usually operates via online pre-orders. John offers espresso's to go with his small coffee shop, pre-ordered orders get 15% off. John offers espresso's to go with his small coffee shop, pre-ordered orders get 15% off. Evan has a small herb greenhouse renting out tools to create a large workshare space, donated supplies allow for free use. Saira consolidated a large quantity of household tools to create a large workshare space, donated supplies allows for free use. Chris's CoWorking renovated and turn underused rear yards. He sells his produce to select restaurants in the city. Evan has a small herb greenhouse renting out tools to create a large workshare space, donated supplies allow for free use. Saira consolidated a large quantity of household tools to create a large workshare space, donated supplies allows for free use. Jake transformed his garage and basement into a makerlab workshop, offering a 3D printer, cnc, and numerous powertools for rent. Chris's CoWorking rents out tools so that anyone can learn. Bonsai business, she also gives tutorials and workshops. Evan has a small herb greenhouse renting out tools to create a large workshare space, donated supplies allow for free use. Saira consolidated a large quantity of household tools to create a large workshare space, donated supplies allows for free use. Claires Cafe check out his space, he loves his little shop. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Chris's CoWorking check out his space, he loves his little shop. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Chris's CoWorking check out his space, he loves his little shop. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Victoria created a small Brick and Mortar marketplace dedicated on selling farm-to-table produce. Chris's CoWorking check out his space, he loves his little shop.
requiring out-of-neighbourhood trips often rely on these massive stores for necessities. Walmarts are usually over 150,000 sq ft, while Suburbs average 100,000 sq ft, while Costcos and Big Box stores are massive, Home Depots average 100,000 sq ft. Muhammad opened the neighbourhood’s second drone port as demand greatly grew, he operates a Vietnamese restaurant that produces farm-to-table produce. Parents simply tap yes on her app the night before. Shevaun loves gardening and flowers, so she set up a Floriculture business, custom arrangements are delivered weekly. Anne and Parshan teamed up to create a vegetable collective. Their enterprise has grown dramatically allowing them to purchase farmland to handle the large orders. Evan has a small herb greenhouse renting out supplies allows for free use. Chris’s CoWorking checks out his space, he loves his little shop, he offers a makerlab workshop, offering a 3D printer, CNC, and numerous power tools for rent. Jake transformed his garage and basement into greenhouses to flourish. Ricky, Sue, Maya, and Liwei created a consortium for their cul-de-sac. They now share tools and distribution allowing their greenhouse operations, her operations are focused on medicinal herbs, aimed to help people feel better from the flu. John offers espresso’s to go with his small coffee shop, pre-ordered orders get 15% off. Vladimir offers a small pastry shop, he loves baking cakes and often does wedding cakes. Saira consolidated a large quantity of household supplies and helps people get rid of junk as she’s neat, but she loves helping people be neater as well, she rents out cleaning supplies allows for free use. Nook’s greenhouse specializes on medicinal produce to select restaurants in the city. Evan has a small herb greenhouse renting out supplies allows for free use. Rosetta’s small cafe usually operates via online with a delivery system other than Sunday where weekend seating is booked weeks in advance. Juan runs a Mexican-Japanese infusion restaurant three days a week, it is so popular that seating is booked weeks in advance. Chris’s CoWorking checks out his space, he loves his little shop, he offers a makerlab workshop, offering a 3D printer, CNC, and numerous power tools for rent. Jake transformed his garage and basement into greenhouses to flourish. Ricky, Sue, Maya, and Liwei created a consortium for their cul-de-sac. They now share tools and distribution allowing their greenhouse operations, her operations are focused on medicinal herbs, aimed to help people feel better from the flu. John offers espresso’s to go with his small coffee shop, pre-ordered orders get 15% off. Vladimir offers a small pastry shop, he loves baking cakes and often does wedding cakes. Saira consolidated a large quantity of household supplies and helps people get rid of junk as she’s neat, but she loves helping people be neater as well, she rents out cleaning supplies allows for free use.
Ricky, Sue, Maya, and Liwei created a consortium for their cul-de-sac. They now share tools and distribution allowing their greenhouses to flourish.
Big Box stores are massive, Home Depots average 100,000 sq ft, while Costcos and Walmarts are usually over 150,000 sq ft. Suburbs often rely on these massive stores for necessities requiring out of neighbourhood trips.

Evan has a small herb greenhouse renting out neighbours underused rear yards. He sells his produce to select restaurants in the city.

Movement from Suburbs to Big Box Stores are often only accessible through arterial roads requiring vehicular transportation.

John offers espresso’s to go with his small coffee shop, pre-ordered orders get 15% off.

Anh operates a Vietnamese restaurant that also offers lunchbox specials for kids in the neighbourhood. Parents simply tap yes on her app the night before.

Jake transformed his garage and basement into a makerlab workshop, offering a 3D printer, CNC, and numerous power tools for rent.

Saira consolidated a large quantity of household tools to create a large workshare space, donated supplies allows for free use.

Baba Aneta offers a small Pierogi restaurant open 3 days a week, she mostly caters to the retirement home, but offers online deliveries.

Victoria created a small brick and mortar marketplace dedicated on selling farm to table produce.

Shevaun loves gardening and flowers, so she set up a Floriculture business, custom arrangements are delivered weekly.

Justin created a hobbyist workshop dedicated to model trains. Although not many people check out his space, he loves his little shop.

Golnaz loves bonsai plants so she set up a small bonsai business, she also gives tutorials and rents out tools so that anyone can learn.

Tammy offers a work exchange program for neighbours where people can use their skills to help fellow neighbours and work together.

Tina offers a DIY workshops for how to do renovations and household repairs, she offers tutorials every Sunday.

Juan runs a Mexican Japanese infusion restaurant three days a week, it is so popular that seating is booked weeks in advance.

Chin loves apples, so he turned his backyard into a small apple orchard, he processes it into apple sauce and apple pies.

Anne and Parshan teamed up to create a vegetable collective. Their enterprise has grown dramatically allowing them to purchase farmland to handle the large orders.

Ricky, Sue, Maya, and Liwei created a consortium for their cul-de-sac. They now share tools and distribution allowing their greenhouses to flourish.

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Vladimir offers a small pastry shop, he loves baking cakes and often does wedding cakes, neighbours get a significant discount.

Chris’s CoWorking

Claires Cafe

Winstons Workshop

Traceys Theater

Guos Greenhouse

Daves Droneport

Connecting Suburbia

Saira consolidated a large quantity of household tools to create a large workshare space, donated supplies allows for free use.
Individually, each intervention creates a significant change to a suburban house design and how inhabitants can use its space, but its capabilities are limited within an entire neighbourhood. These interventions perform best as a network of nodes working together across an entire neighbourhood. A sizable amount of interventions will densify services in neighbourhoods, and it would allow for the increased chance of hybrid interventions, where two or more suburban interventions work together to create improved services. Examples are numerous greenhouses operating together in a collective unit, sharing tools and workforce to reduce overhead while having a larger farmable plot increasing quantity and competitiveness. A cafe could operate with a theater to deliver snacks and refreshments for movie nights, possibly creating a movie ticket/snack deal to increase patrons. Greenhouses can operate with cafes to create farm to table meals, or collaborate with workshops to create DIY gardening tools or develop autonomous weeder. The options and possibilities are endless, and when these services become established they can network with services outside the neighbourhood block. Many connected interventions work together to reduce the reliance of car dependant services located outside of suburban neighbourhoods. The result is a connected and a social community that functions with economic networks at a local scale.

A networked community would also alter the fabric of the non-detached houses surrounding the neighbourhood. Families running small businesses would not be required to commute to big box stores for supplies with delivery services, further reducing the need for big box stores compared to the rising fulfilment shipment facilities. Partnerships with local schools can also occur, where various spaces can rented for classroom trips like fabrication labs. Neighbourhood schools can also gain a greater role as being a central node for communities, having the largest flexible spaces with classrooms and fitness facilities, they can act as a meeting/gathering space for local communities and events when needed.

**Conclusion**

The series of designed interventions are intended to be the starting point for readapting suburbia, eventually helping to create denser and more liveable neighbourhoods. The suburban housing stock exists in almost every urban city in North America and the technology for creating a connected community is available. The role of design in this thesis is using design in conjunction with new technologies to diverge away from existing homogenous usage and living standards existing in most suburban houses and neighbourhoods. Various additions from a breadth of architects and designers can help spur points of interest in neighbourhoods, allowing for wayfinding and spaces for the public to congregate. Properly designed additions can also dramatically change the living habits for dwellers since their house gains a duo-functionality. Existing municipal zoning is by far the main hindrance preventing change to these neighbourhoods, and its adjustment would be a massive innovation for suburban communities. Sidewalk Labs understands this problem with their Quayside Park proposal. Their measure to combat this zoning hindrance is to simplify zoning where 80% of building uses can fit into one new Flexible category. According to Sidewalk Labs:

> In order to foster dynamic neighbourhoods that can efficiently and safely deliver a shifting range of uses over time, a city must have an equally flexible building code that enables innovation without compromising safety. Historically, static zoning and building ordinances are the mechanism by which cities regulate the built environment—construction, building use, neighbourhood composition, quality of life standards, building safety. These codes were the best tools cities had to segregate potentially harmful uses from residents. However, static regulations often result in low-quality, single-use neighbourhoods that reward obsolete approaches and penalize innovation. 42

42 Sidewalk Labs Vision Sections, 120.
Unlike Sidewalk Labs’ proposal, this thesis examines the possibility of adjusting the existing urban fabric instead of creating a new zone for a new neighbourhood. This means that for change to occur, the existing R1 detached house zone will have to be amended either lot by lot with individual proposals or a larger overall amendment with municipal planning. If a zoning amendment happens, and residences approve the change, the first steps can occur in creating a connected suburb. Other than zoning issues, these interventions are a simple step to begin change in a suburban neighbourhood. Regardless of its success, trials will help bring forward discussion regarding the suburban home and its neighbourhood, and hopefully help influence new ideas on how we can improve our houses and communities.

The suburb has gone through numerous phases of evolution, from the Victorian street car neighbourhoods, to the ranch tract neighbourhoods, eventually becoming today’s contemporary snout house neighbourhoods. This thesis posits a radical new phase in suburban growth, sitting between the digital village and existing suburban development. The result is a new series of suburbs, each with its own economy and morphology, and with the rise of new technologies we are poised to see yet another evolution.
Bibliography


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