

# **Connecting Suburbia:**

Using Information and Communication Technologies  
to Readjust the Suburban House

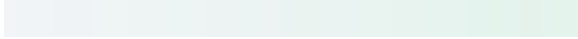
by

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A thesis  
presented to the University of Waterloo  
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thesis requirement for the degree of  
Master of Architecture

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revisions, as accepted by my examiners.*

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## ABSTRACT

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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To my friends, I am thankful for your humour, and great conversations over the years. Our interactions have greatly shaped me, and will always continue doing so.

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# DEDICATION

*To my parents, Les and Patty*

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An aerial, black and white photograph of a residential neighborhood. The houses are densely packed, with a mix of styles and sizes. A prominent road runs diagonally from the bottom left towards the center. In the background, there are open fields and a distant shoreline. A semi-transparent white box is overlaid in the upper center, containing the text 'PART 01' in a large, outlined font, and 'Evolving Dwellings' in a smaller, solid font below it.

# PART 01

## Evolving Dwellings

Fig. 1.0.

## 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.

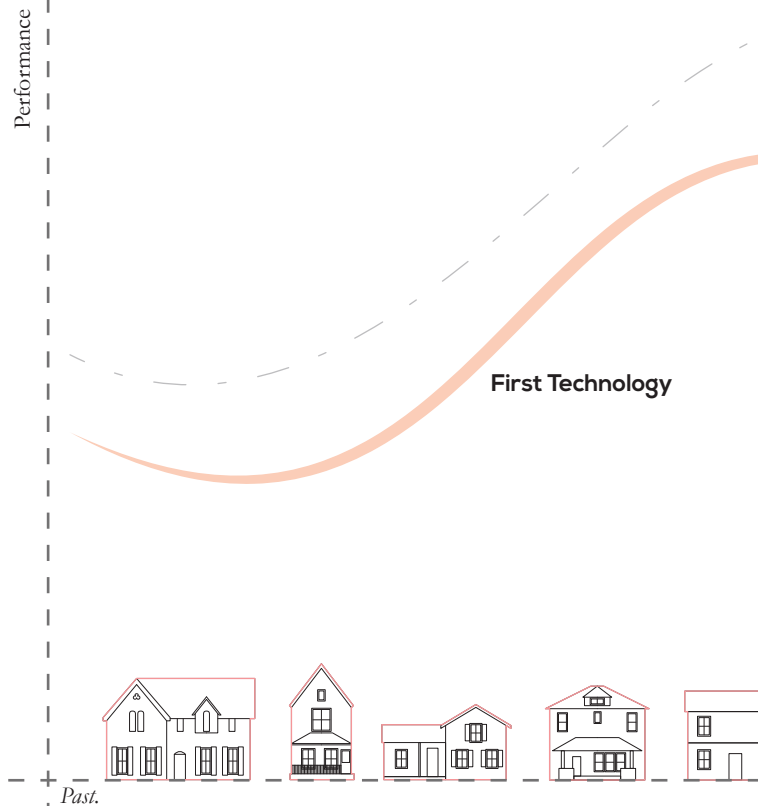
## Evolving Dwellings

*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.<sup>1</sup>*

Buckminster Fuller

<sup>1</sup> Buckminster Fuller. *Utopia of Oblivion: The Prospects for Humanity*. (Toronto: Bantam Books, 1969) 359.

Fig. 1.1. Compound S. Curve Chart



Evolving Dwellings

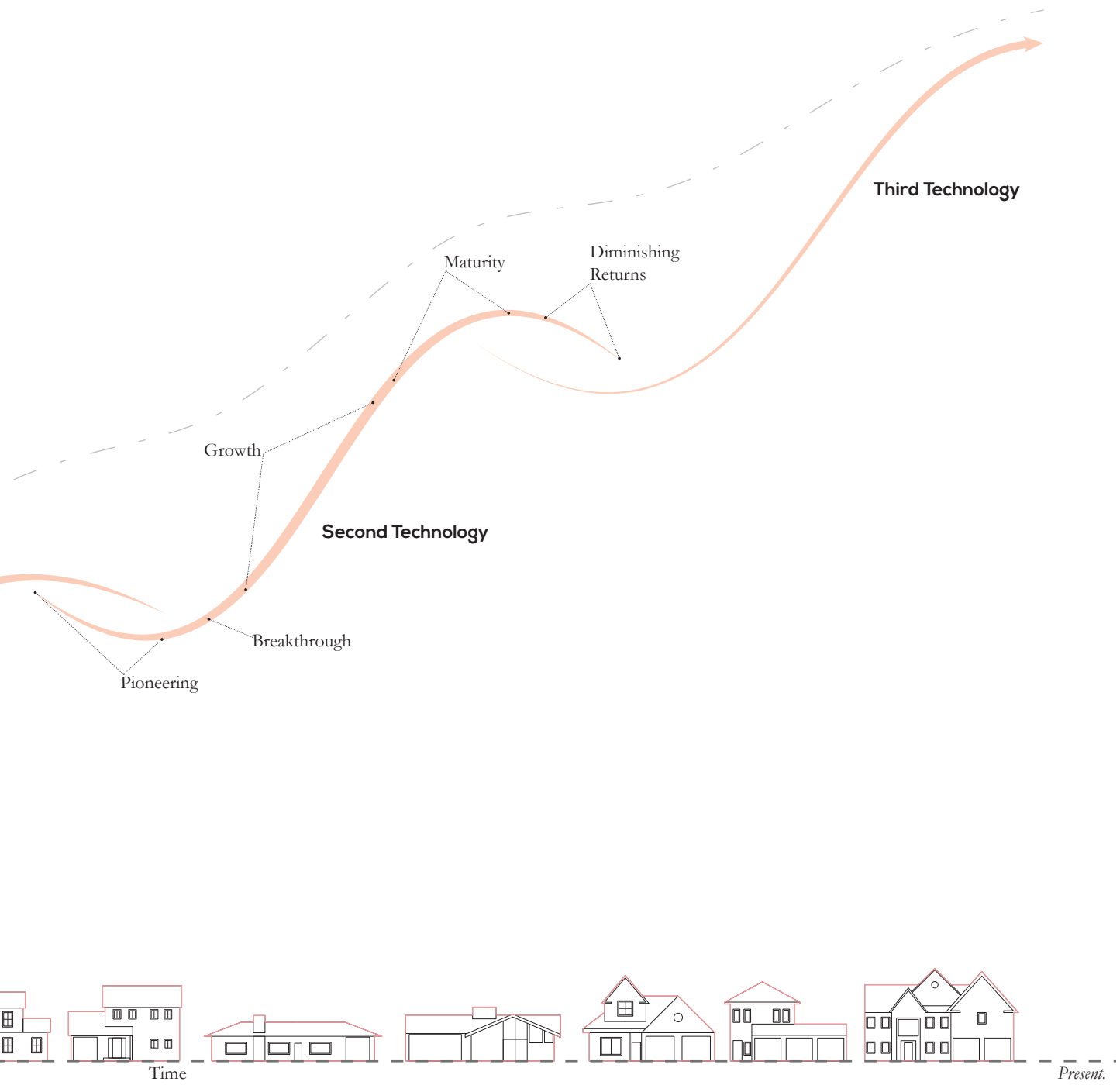
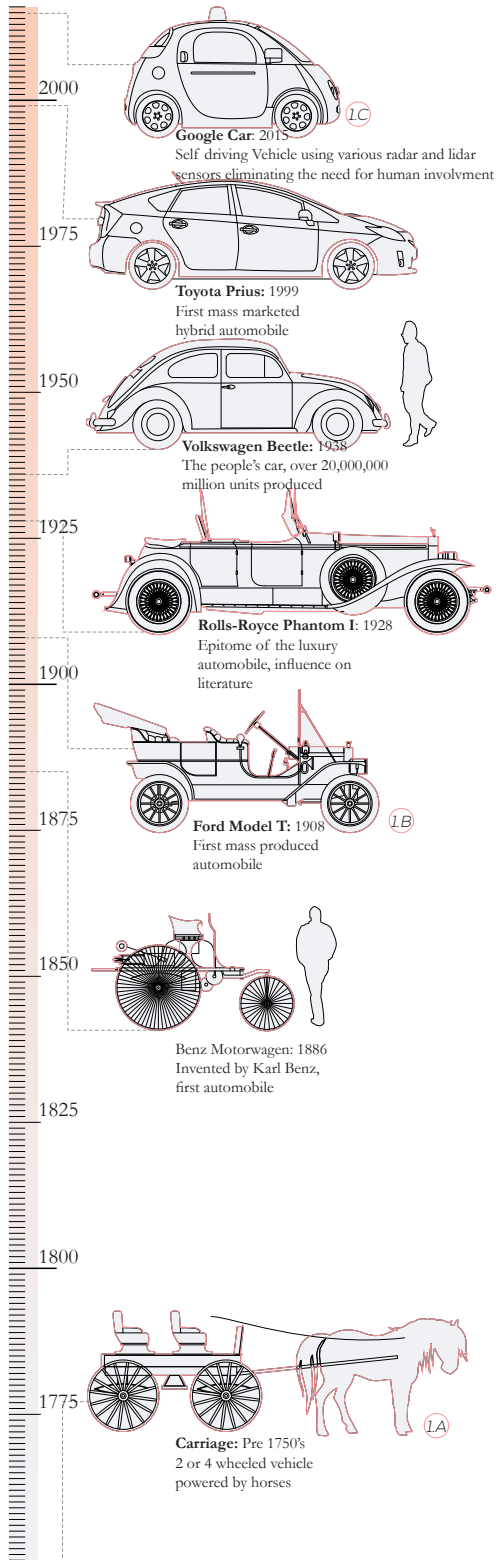
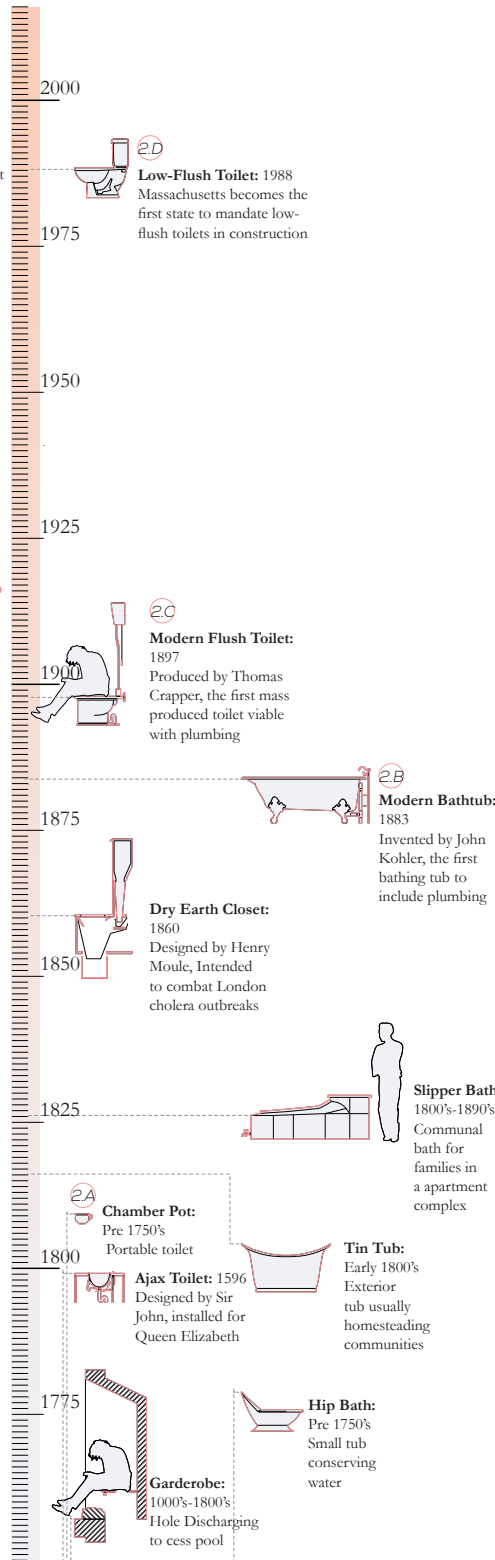


Fig. 1.1.

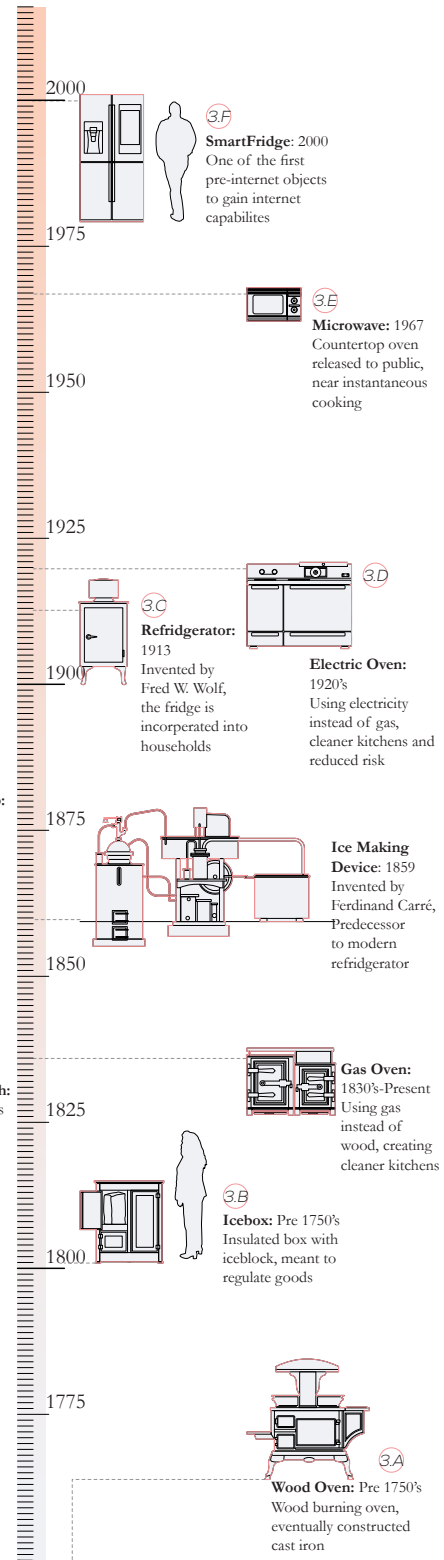
Transportation



Plumbing

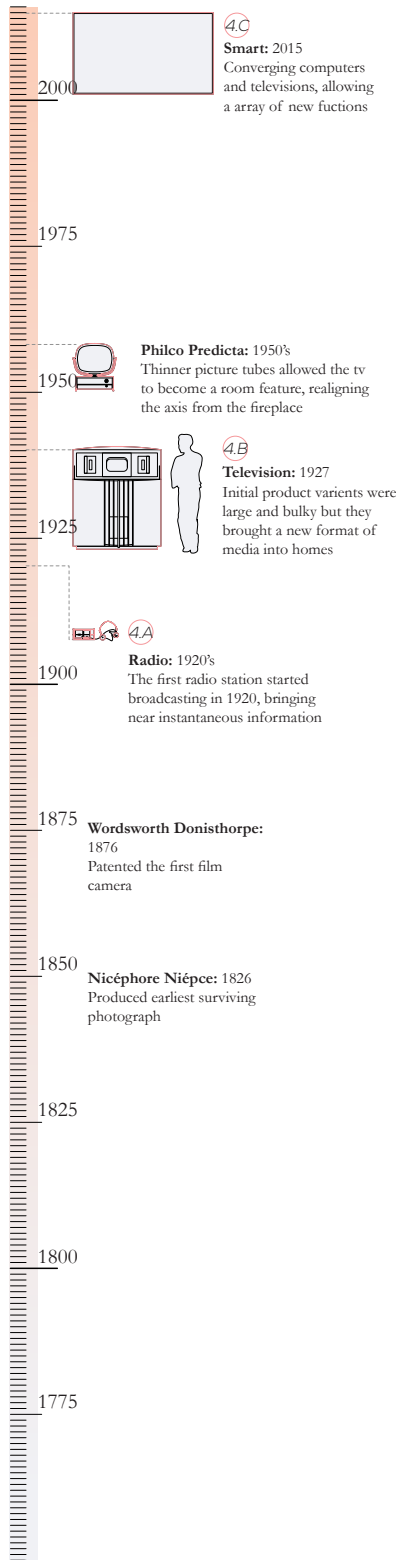


Kitchen

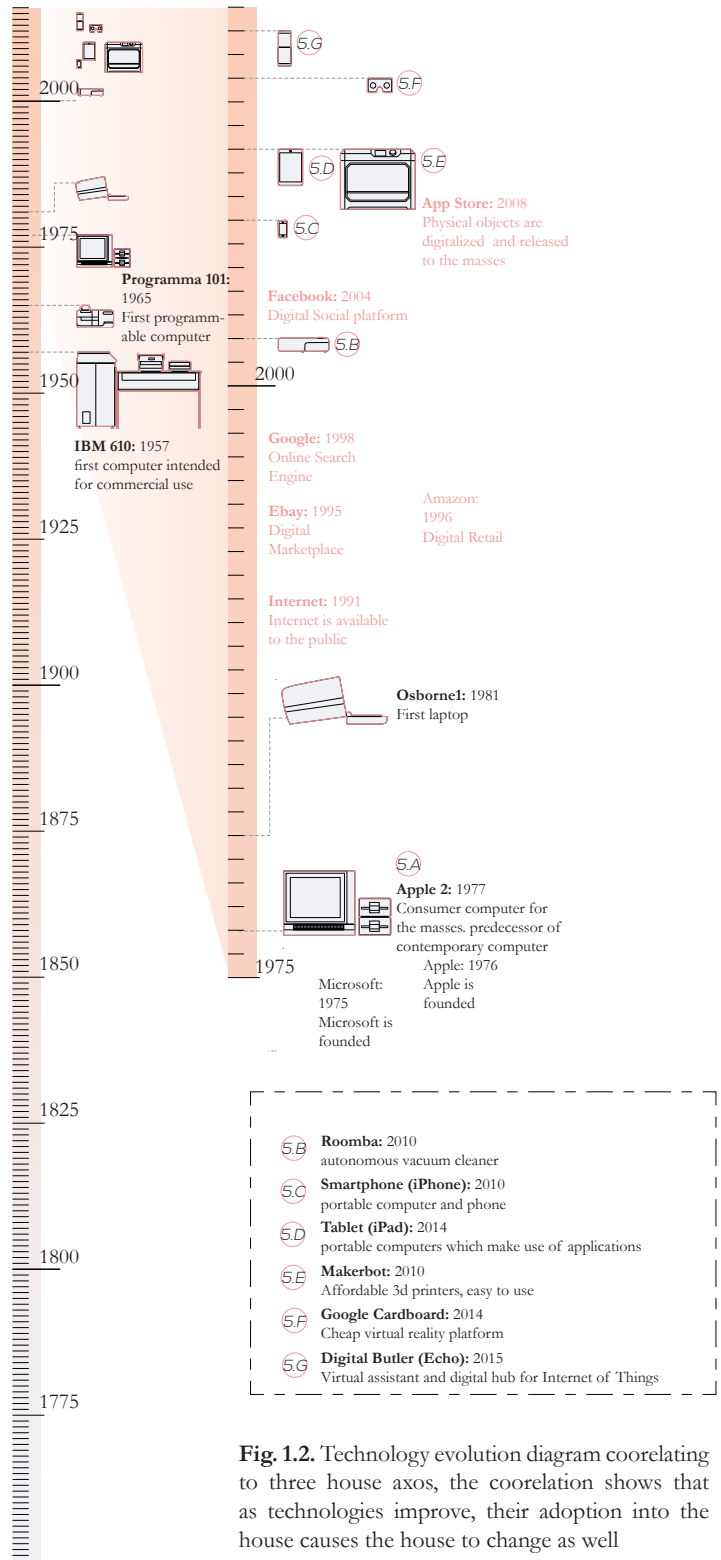


# Evolving Dwellings

## Entertainment



## Computers



**Fig. 1.2.** Technology evolution diagram correlating to three house axes, the correlation 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.”<sup>2</sup> 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.<sup>3</sup>

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.<sup>4</sup> Renovating houses has become popular in North America, where homes are now constantly updated. For

<sup>2</sup> Alan Berger, *The Suburb of the Future, Almost Here* (New York City: The New York Times, 2017), <https://www.nytimes.com/2017/09/15/sunday-review/future-suburb-millennials.html>.

<sup>3</sup> David L.A. Gordon & Isaac Shirokoff, *Suburban Nation?* (Kingston: School of Urban and Regional Planning, Queen's University, 2014), <http://www.canadianurbanism.ca/wp-content/uploads/2014/07/CanU%20WP1%20Suburban%20Nation%202006-2011%20Text%20and%20Atlas%20comp.pdf>.

<sup>4</sup> Albert Bemis and John Burchard, *The Evolving House* (Cambridge: The Technology Press, 1934), 228.

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. A concept still marketed as ‘new’ even though many publications like *kitchen Living* by Almon Foryce, and *Tomorrow's House* by Nelson and Wright introduced the kitchen-living room to the house in the mid-forties.

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.



Fig. 1.3.

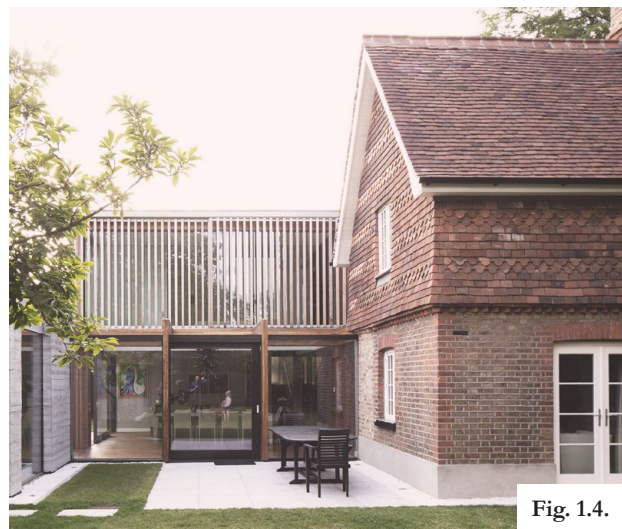
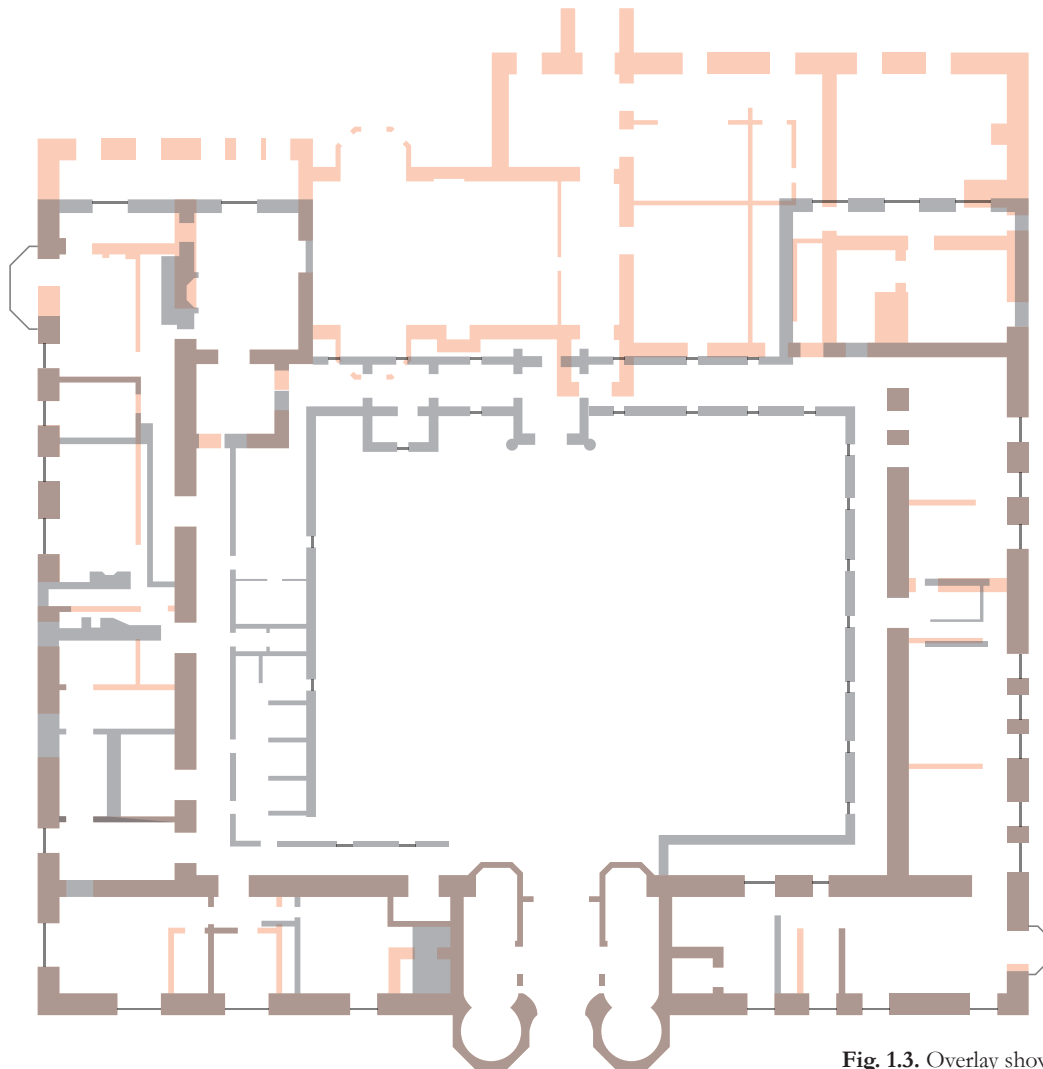
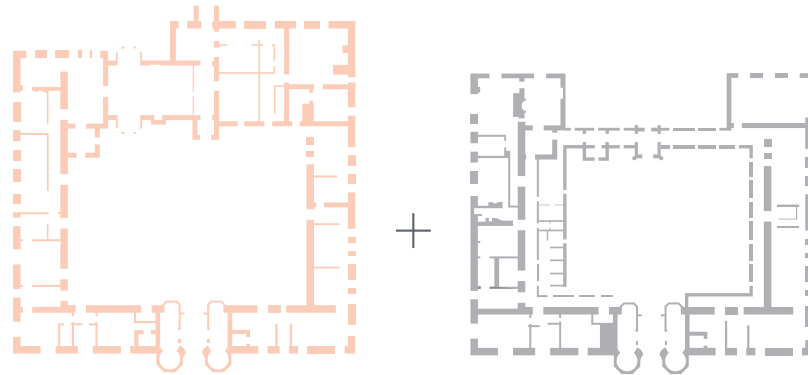


Fig. 1.4.

Evolving Dwellings

Oxburgh Hall: 1482

Oxburgh Hall: 1835



Overlaid Oxburgh Hall plans

**Fig. 1.3.** Overlay shows how the house drastically alters as the inhabitants desired use changes

# VICTORIAN HOUSE



**Example:** 1000ft<sup>2</sup> three bedroom Victorian House for ‘Northern Climates’

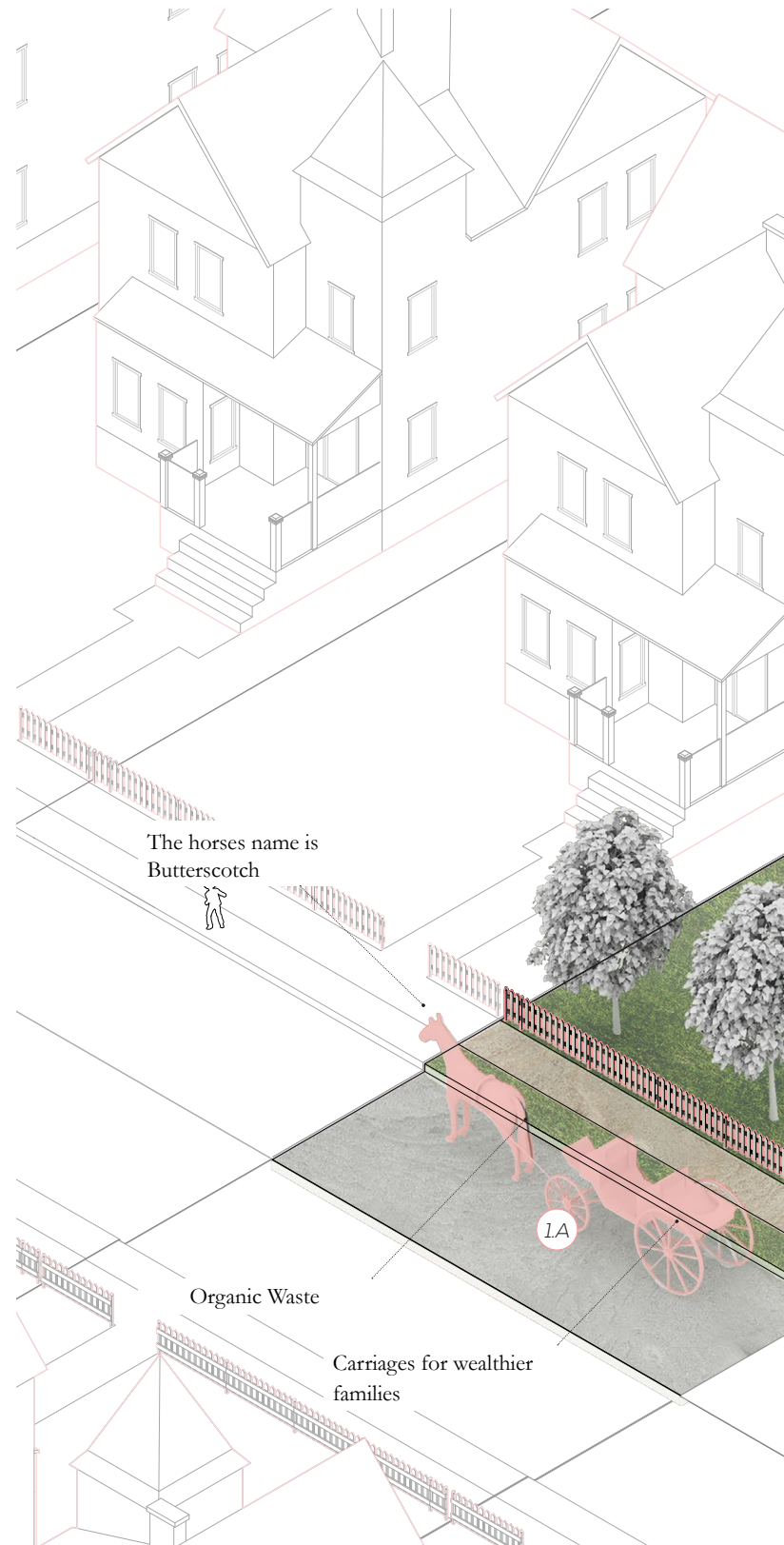
**Inhabitants:** The O’Sullivans, a family of 7

**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.<sup>5</sup> 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.”<sup>6</sup>

5 Merritt Ierley, *The Comforts of Home* (New York: Random House International, 2001), 94.

6 Merritt Ierley, *The Comforts of Home*, 62.





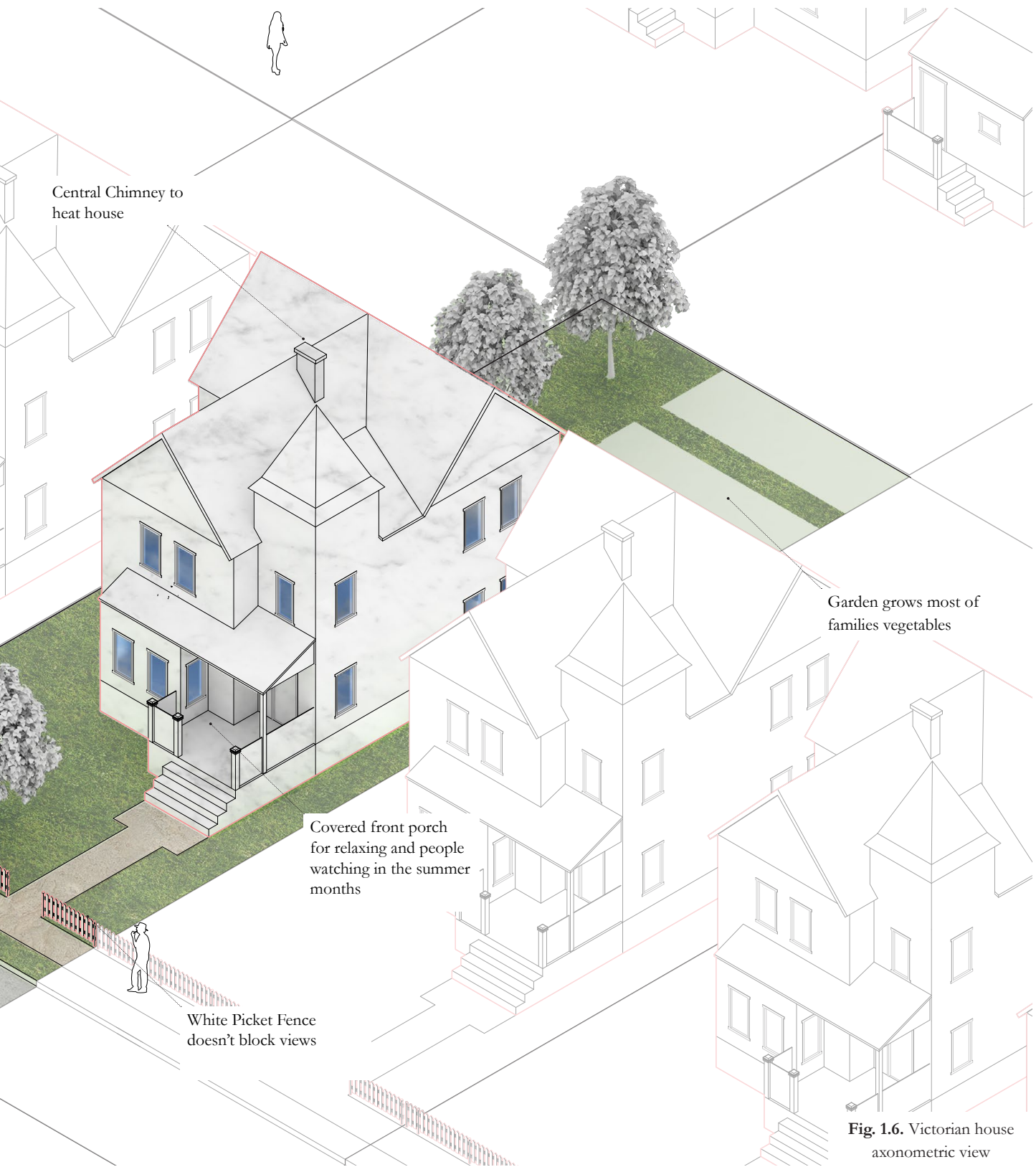


Fig. 1.6. Victorian house axonometric view

**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.”<sup>7</sup> 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.<sup>8</sup>

**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.”<sup>9</sup> 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.”<sup>10</sup> 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.



7 Clifford Edward Clark, *The American Family Home: 1800-1960* (Chapel Hill: University of North Carolina Press, 1987), 35.

8 Elizabeth Cromley, *The Food Axis: Cooking, Eating, and the Architecture of American Houses* (Charlottesville: Univ. of Virginia Press), 100.

9 Merritt Ierley, *The Comforts of Home*, 141.

10 Bill Bryson, *At Home: A Short History of Private Life*. (London: Black Swan, 2016), 358.

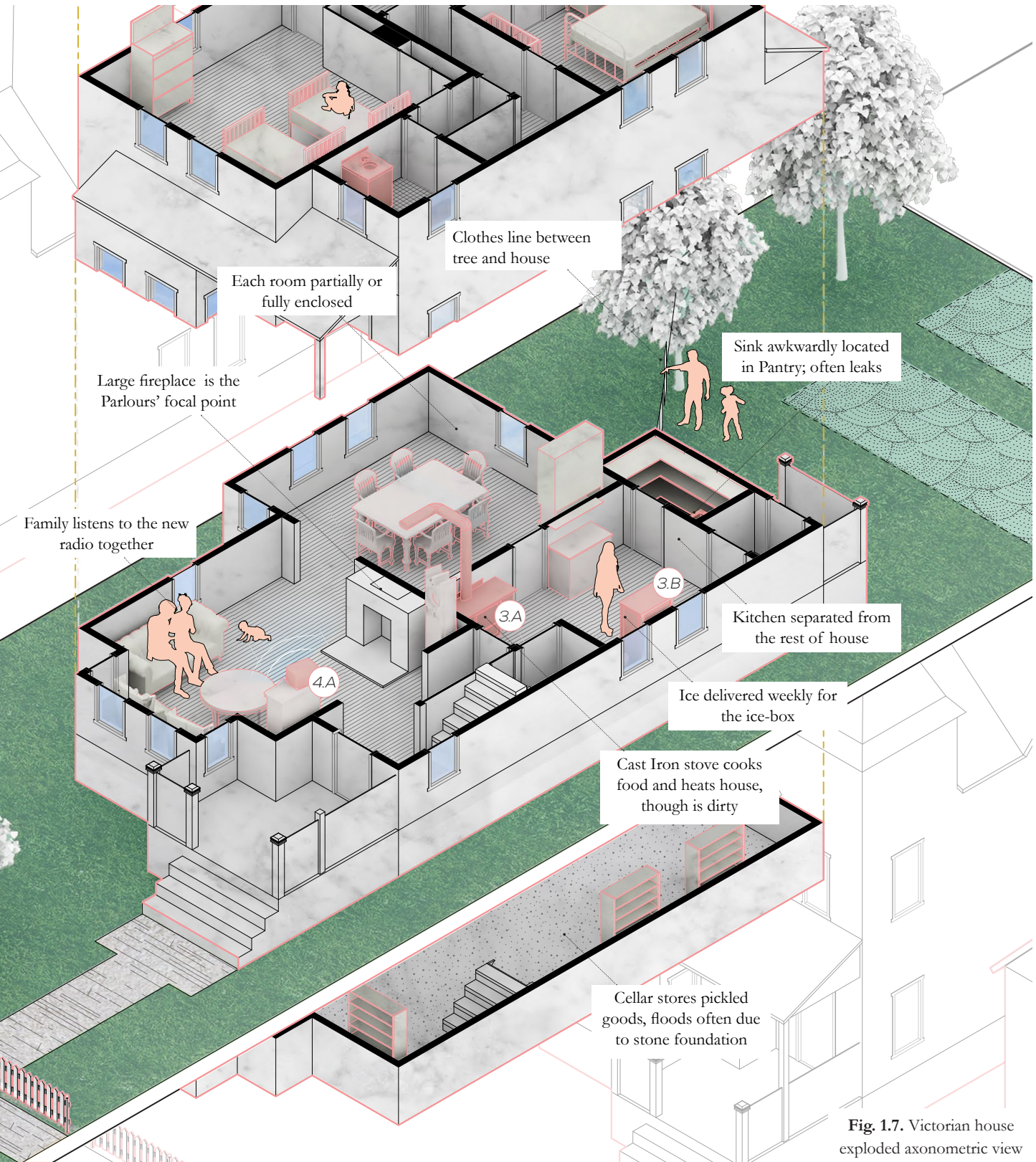


Fig. 1.7. Victorian house exploded axonometric view

**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.”<sup>11</sup> 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.<sup>12</sup> 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.”<sup>13</sup> 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.

11 Merritt Ierley, *The Comforts of Home*, 160.  
 12 Merritt Ierley, *The Comforts of Home*, 141.  
 13 Merritt Ierley, *The Comforts of Home*, 27.



Evolving Dwellings

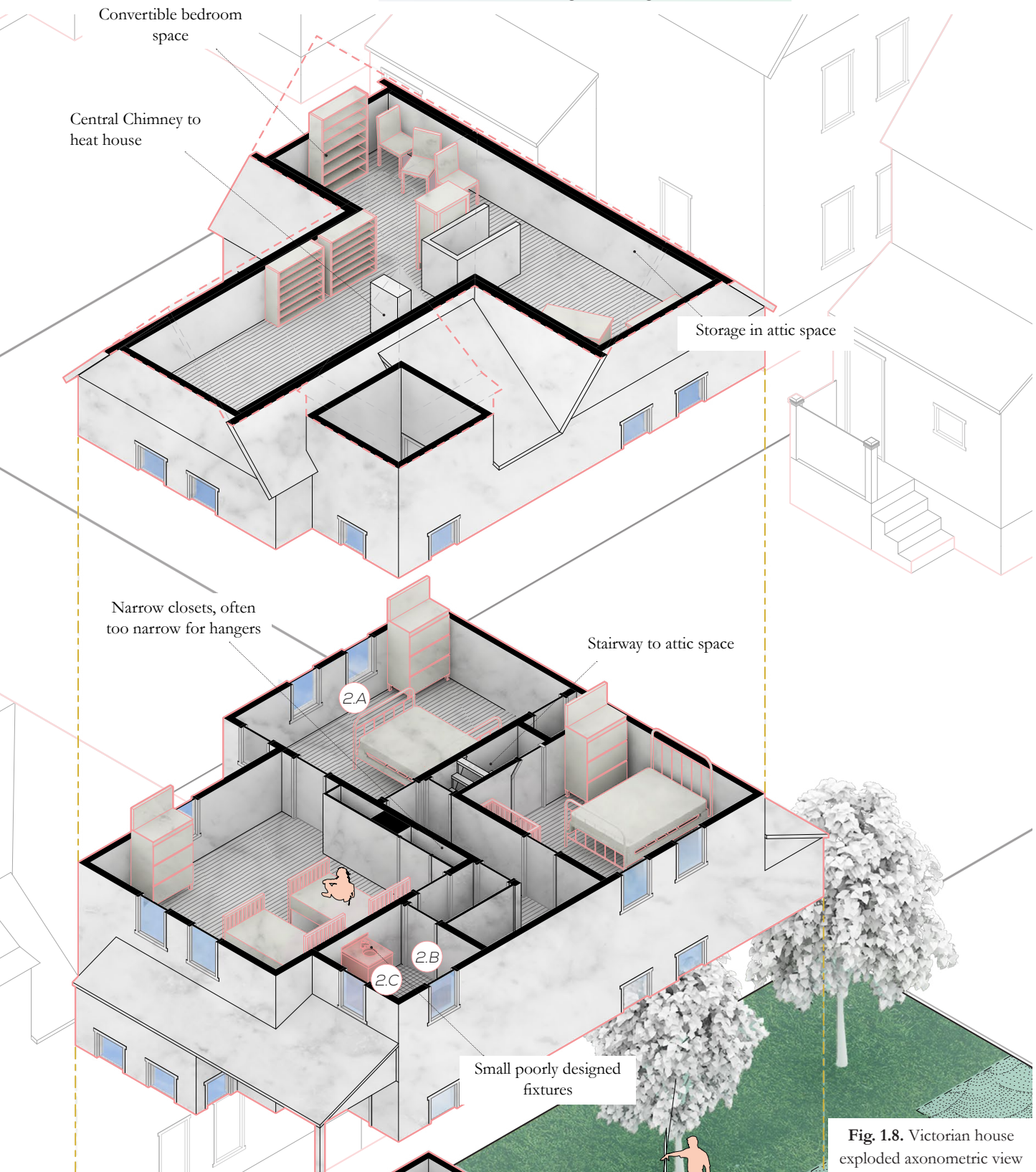


Fig. 1.8. Victorian house exploded axonometric view

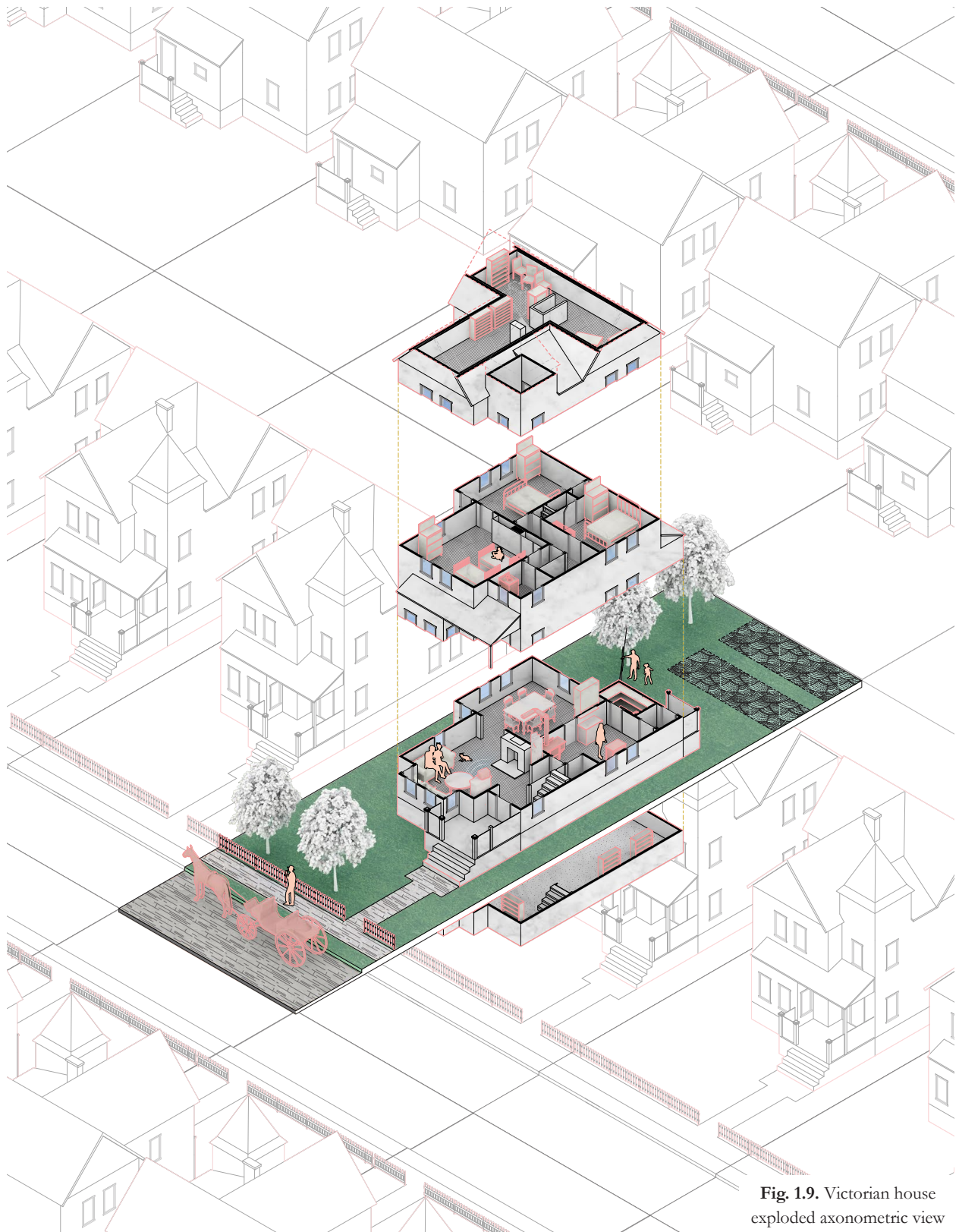


Fig. 1.9. Victorian house exploded axonometric view

Evolving Dwellings



**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<sup>2</sup> three bedroom Canadian Ranch Style Bungalow

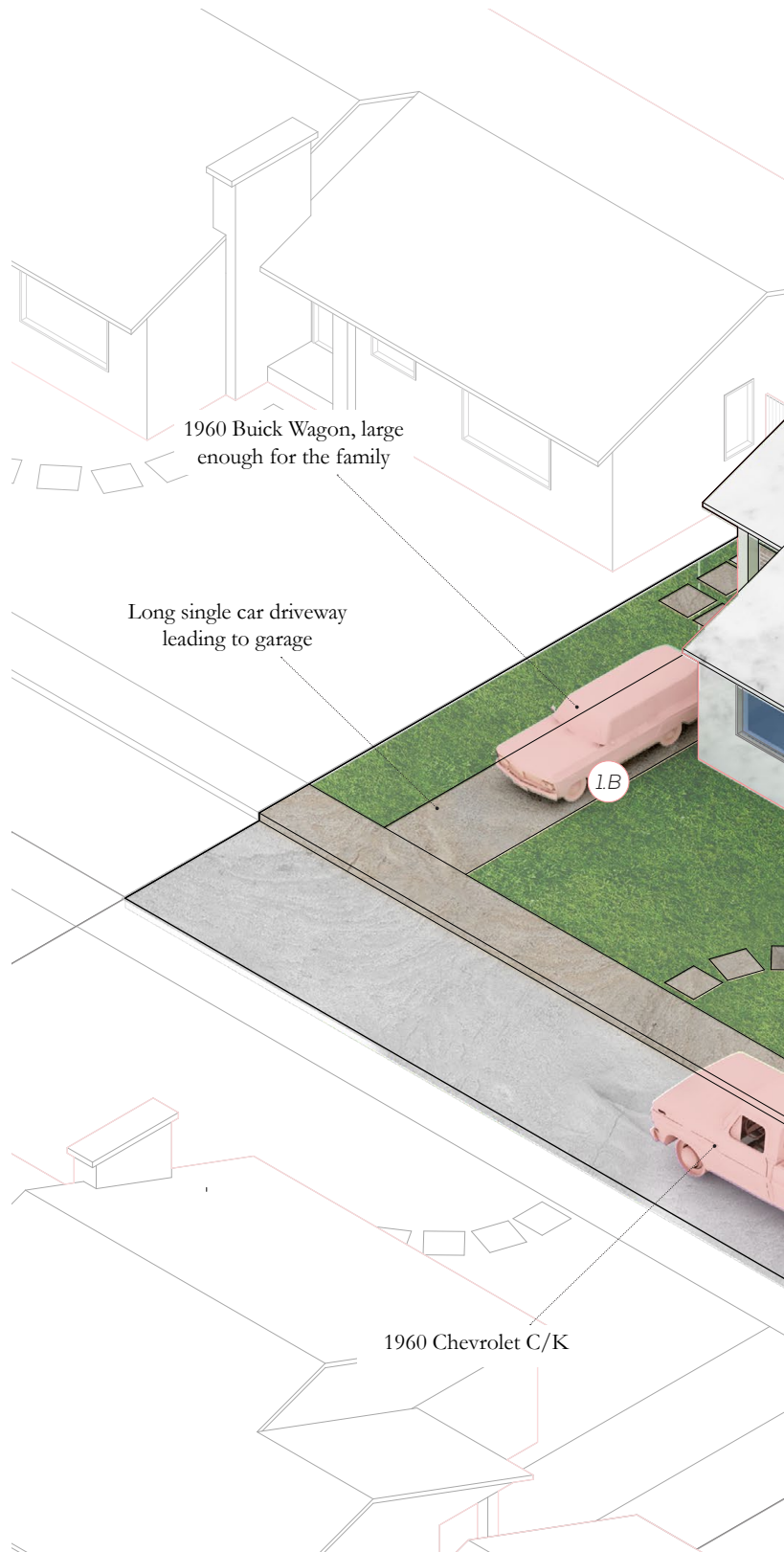
**Inhabitants:** The Johnsons, a family of 5

**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.<sup>14</sup> 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 Lerley, this allowed the kitchen to become the “most dynamic space in the house, discarding more traditional and conservative elements that lingered elsewhere.”<sup>15</sup> 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

<sup>14</sup> Robert Bruegmann, *Sprawl: A Compact History*. (Chicago: University of Chicago Press, 2006), 36.

<sup>15</sup> Merritt Lerley, *The Comforts of Home*, 248.



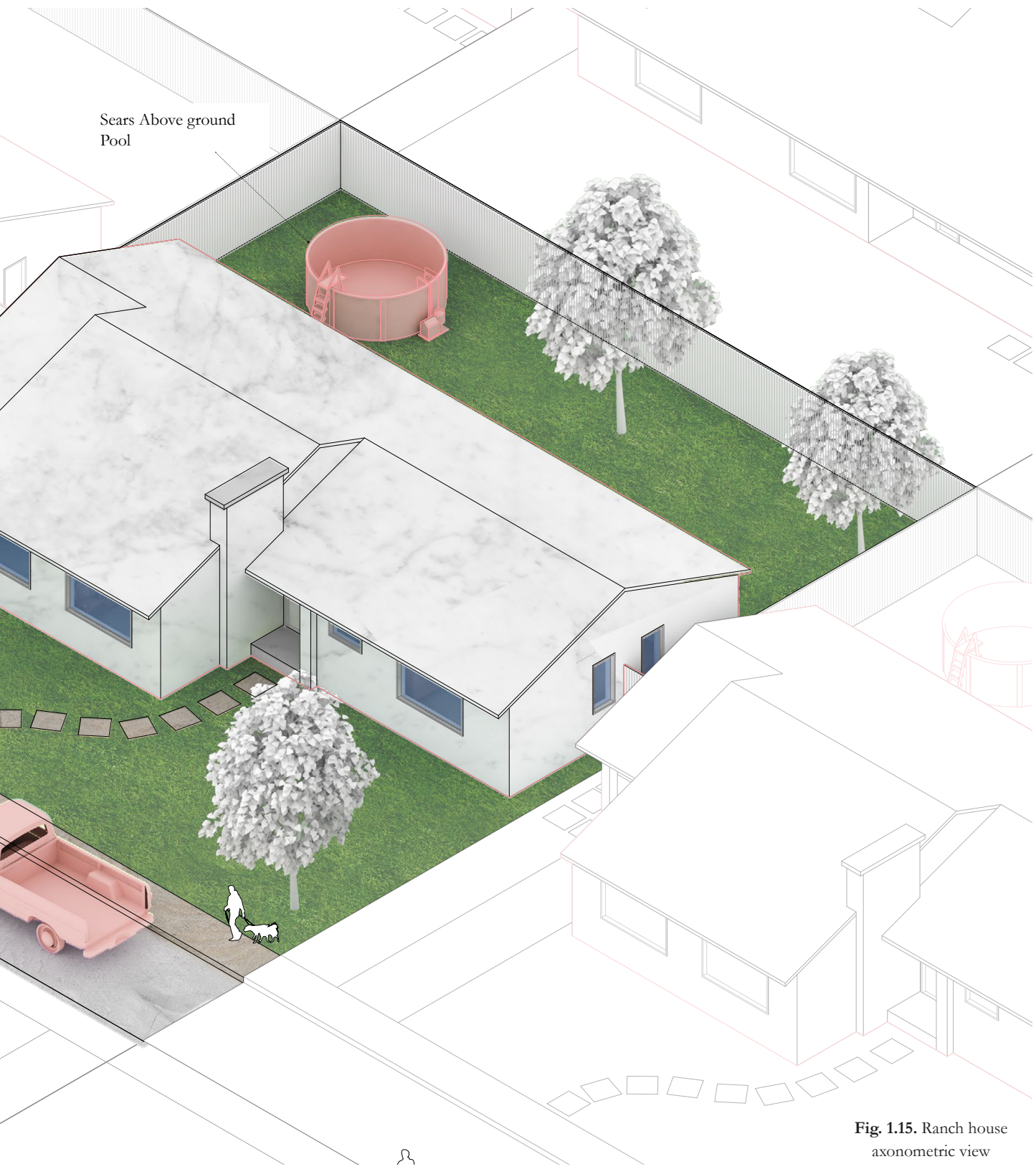


Fig. 1.15. Ranch house axonometric view

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.”<sup>16</sup>

**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.<sup>17</sup> 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.<sup>18</sup>

**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.<sup>19</sup> 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.<sup>20</sup> 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

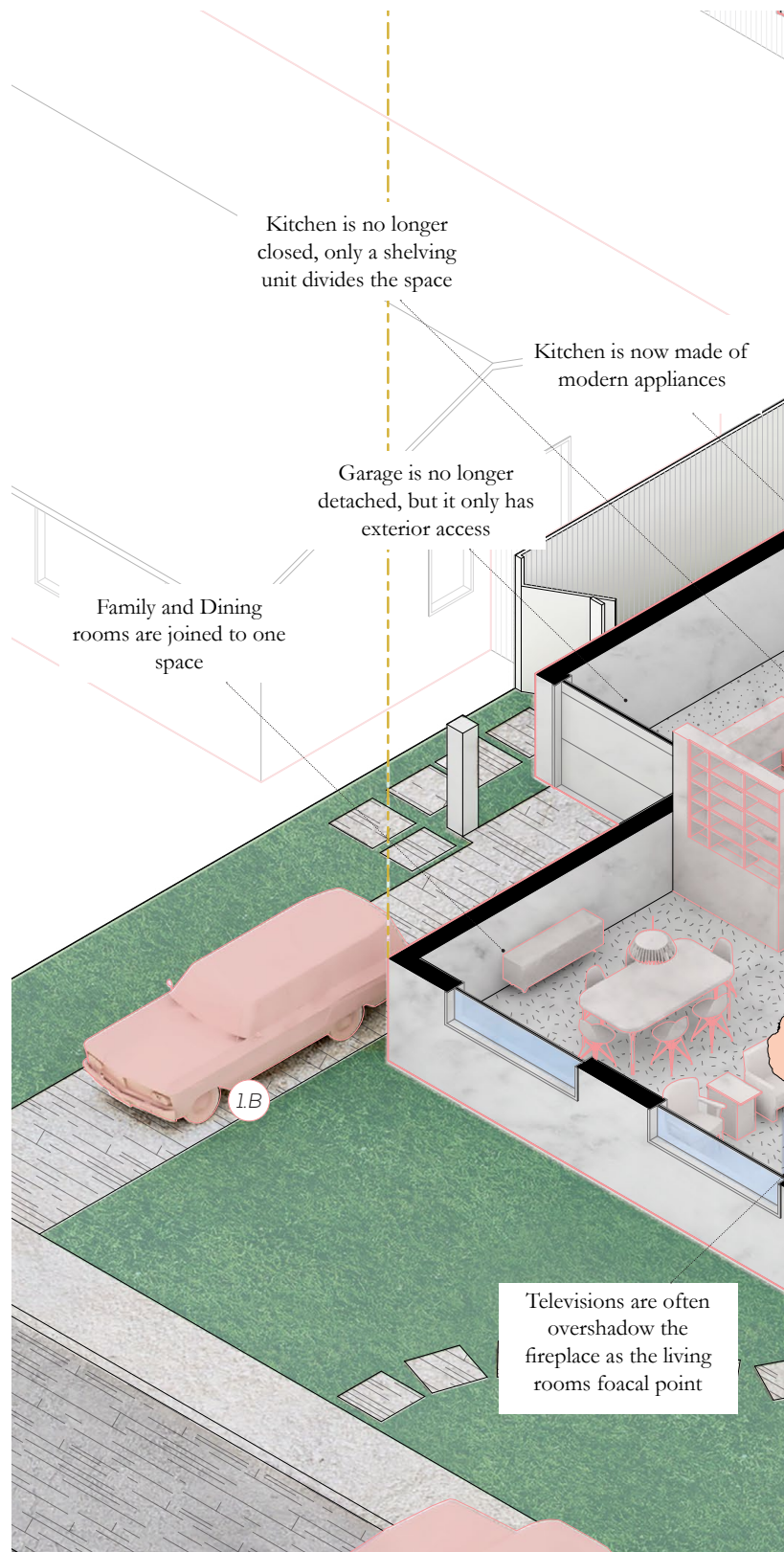
<sup>16</sup> Elizabeth Cromley, *The Food Axis*, 147.

<sup>17</sup> Robert Bruegmann, *Sprawl: A Compact History*, 36.

<sup>18</sup> Avi Friedman, and David Krawitz, *Peeking through the Keyhole: The Evolution of North American Homes* (Montréal: McGill-Queen's University Press, 2014), 153.

<sup>19</sup> Merritt Ierley, *The Comforts of Home*, 241.

<sup>20</sup> Merritt Ierley, *The Comforts of Home*, 83.



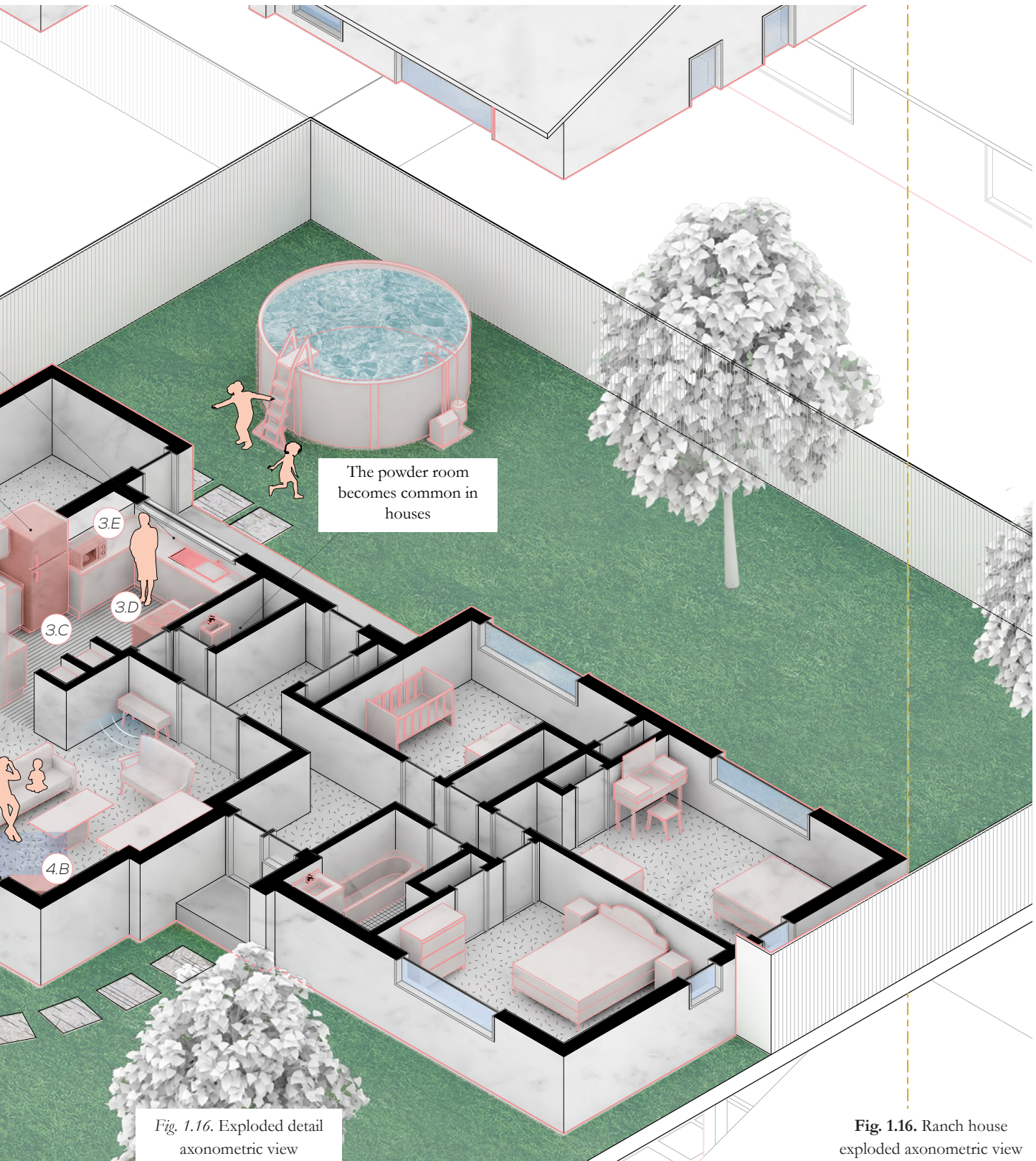


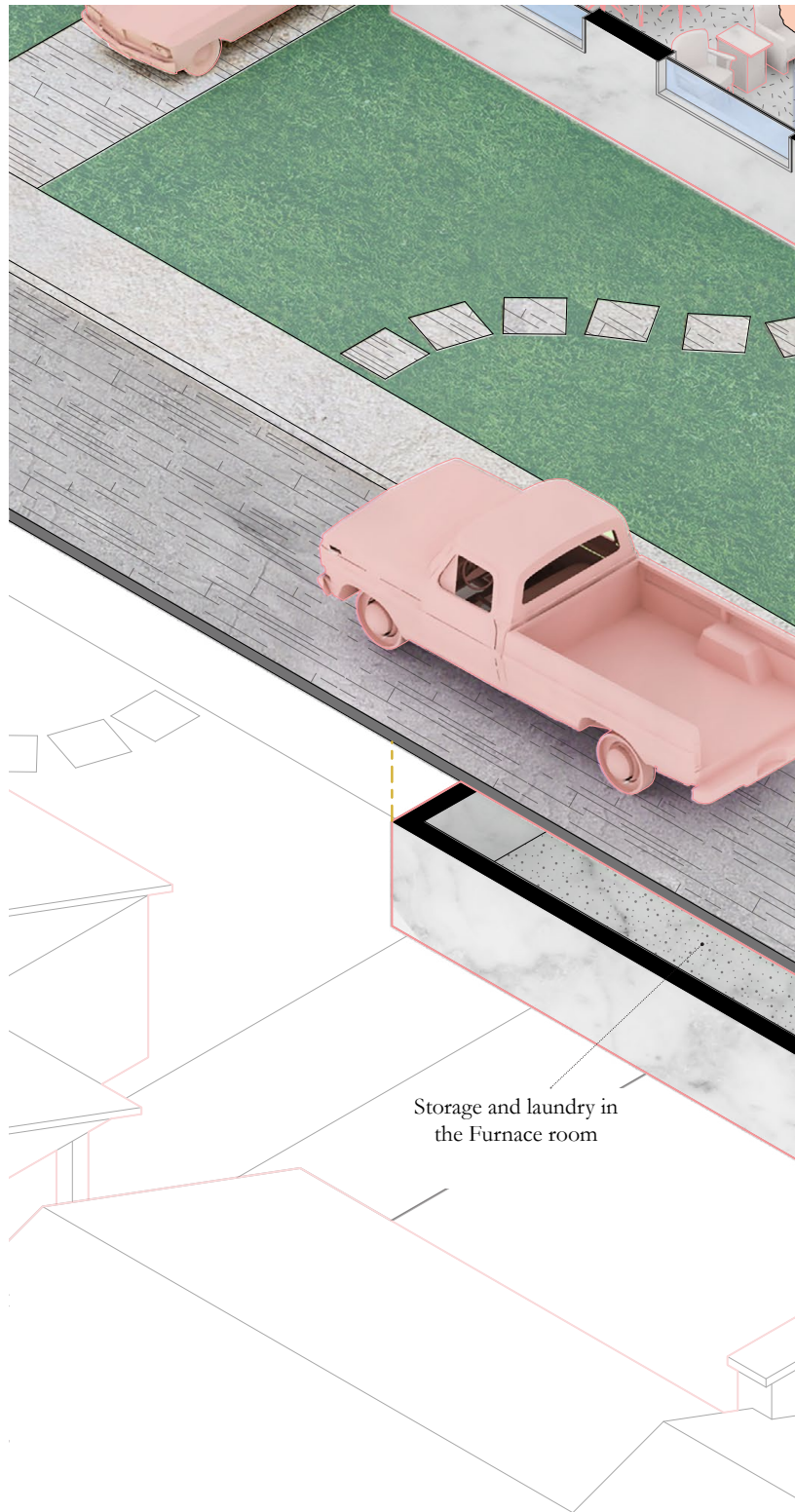
Fig. 1.16. Exploded detail axonometric view

Fig. 1.16. Ranch house exploded axonometric view

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.<sup>21</sup> 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.”<sup>22</sup> Pg. 215

**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.<sup>23</sup>

**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 garage 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.



21 Denise Boucher, *1950s American Home* (Long Island City: Shire Publications, 2013), 49.

22 Clifford Edward Clark, *The American Family Home*, 215.

23 Merritt Ierley, *The Comforts of Home*, 241.



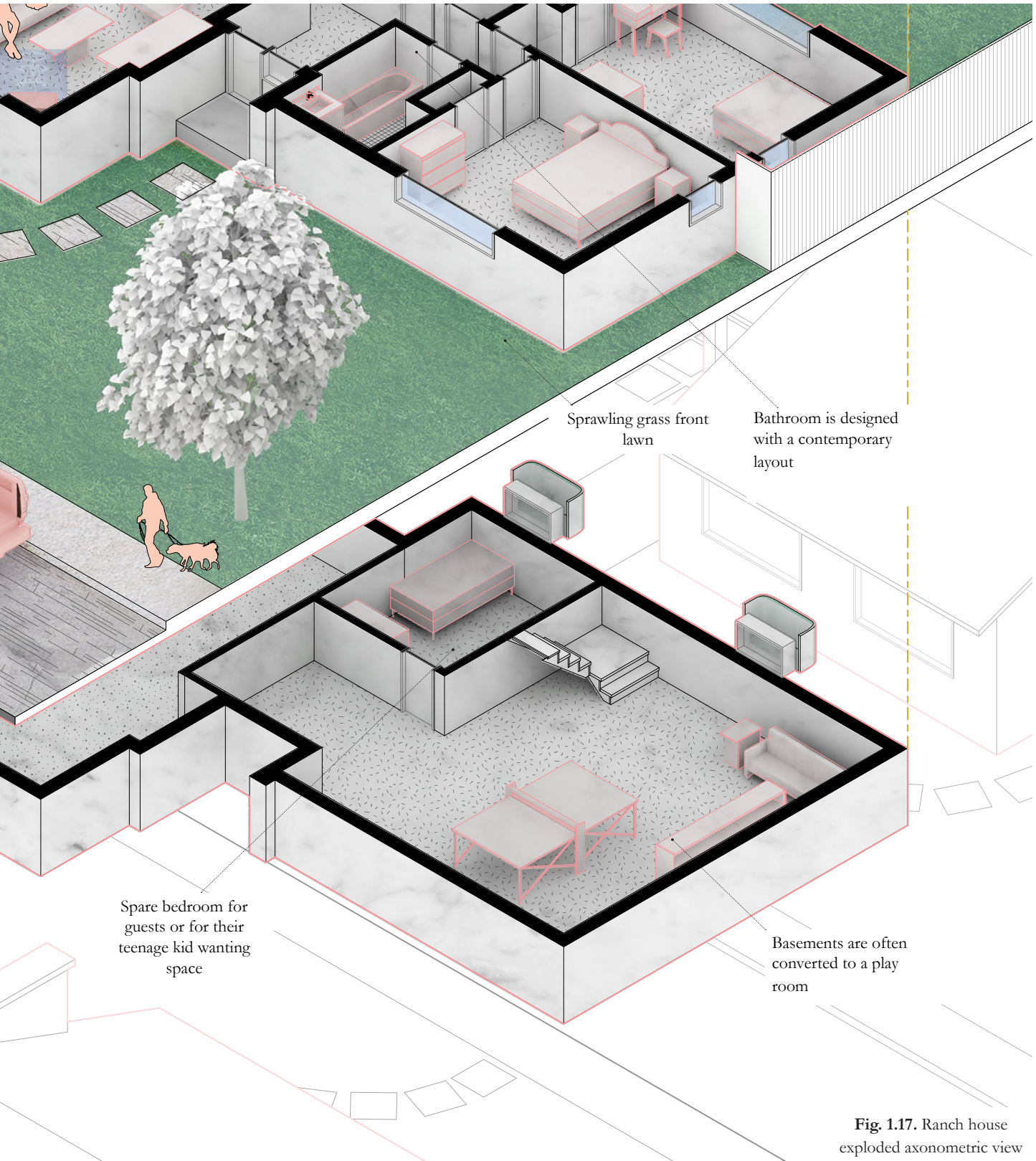


Fig. 1.17. Ranch house exploded axonometric view

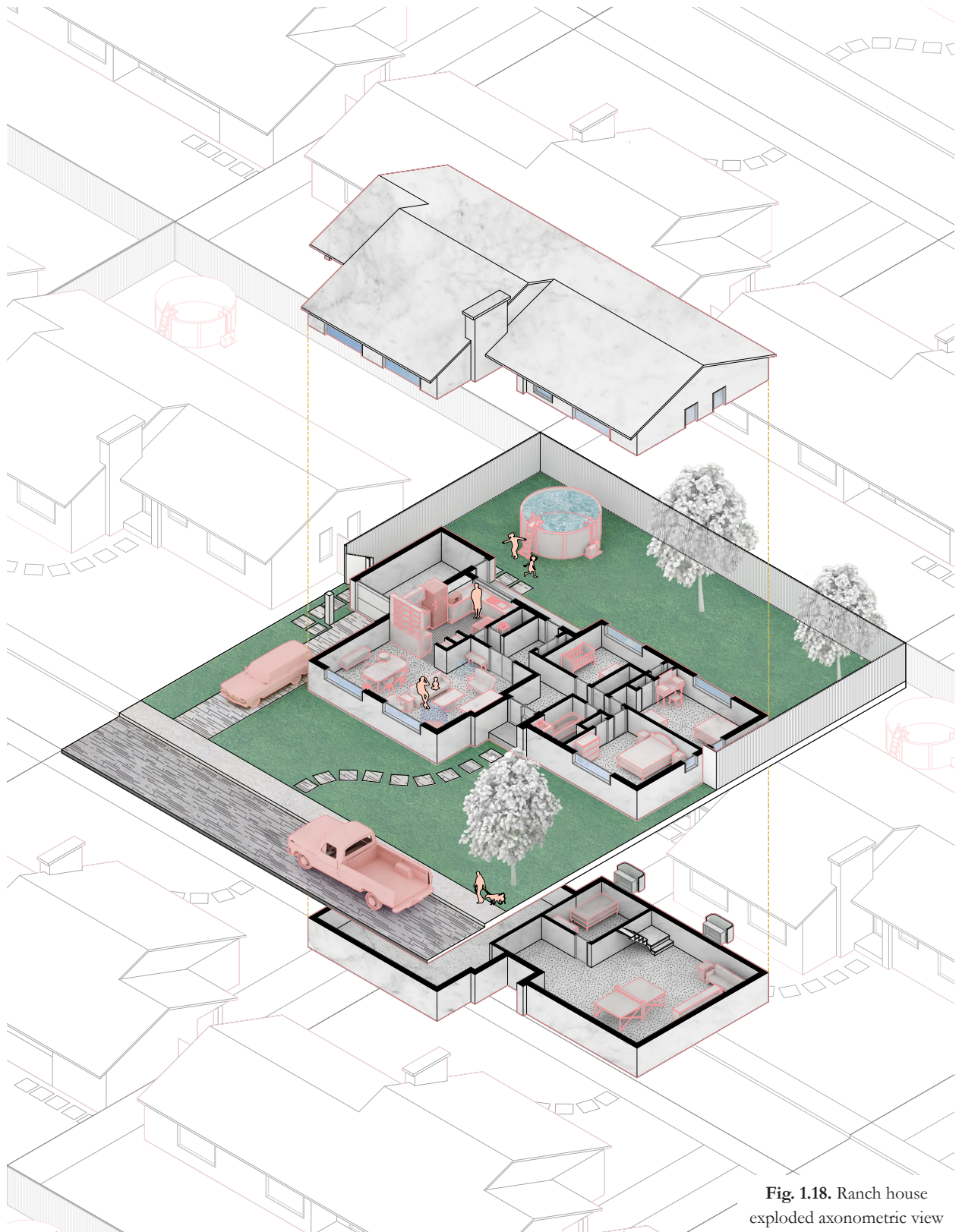


Fig. 1.18. Ranch house exploded axonometric view

Evolving Dwellings



**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

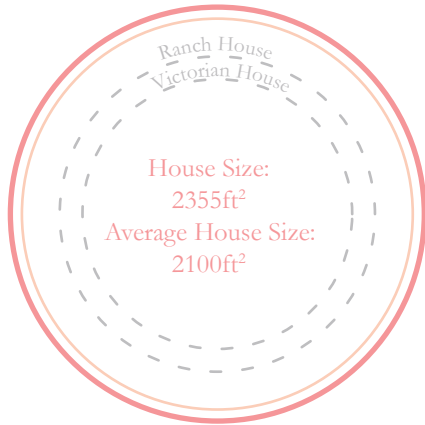


Fig. 1.22. Kohler bathroom advertisement, 1950



Fig. 1.23. St.Charles kitchen advertisement. 1950s

# SNOUT HOUSE



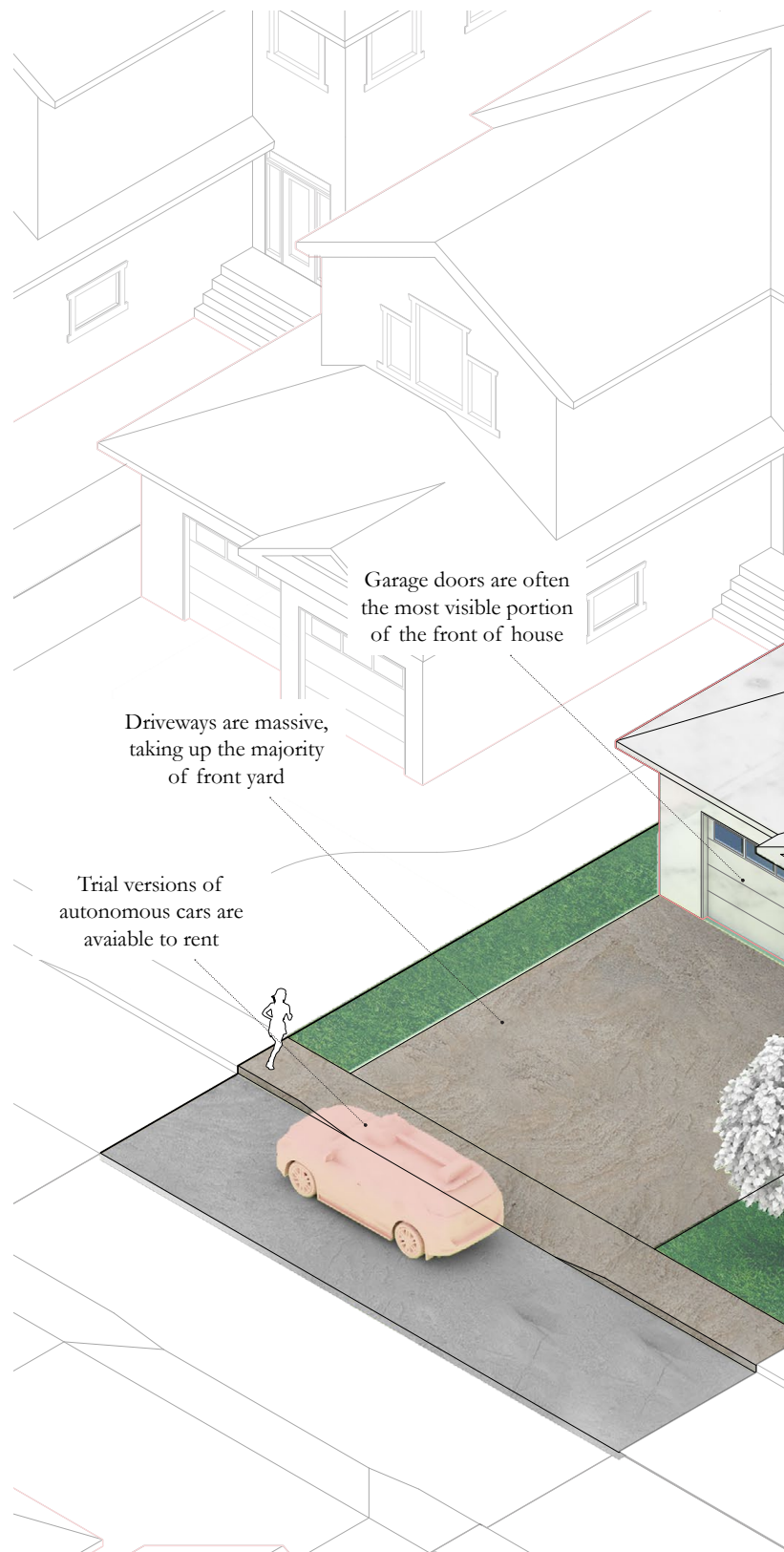
2017

**Example:** 2355ft<sup>2</sup> three bedroom Canadian Snout-nosed House

**Inhabitants:** The Chows, a family of 3

**Construction:** Concrete foundation, timber frame construction and Batt insulation

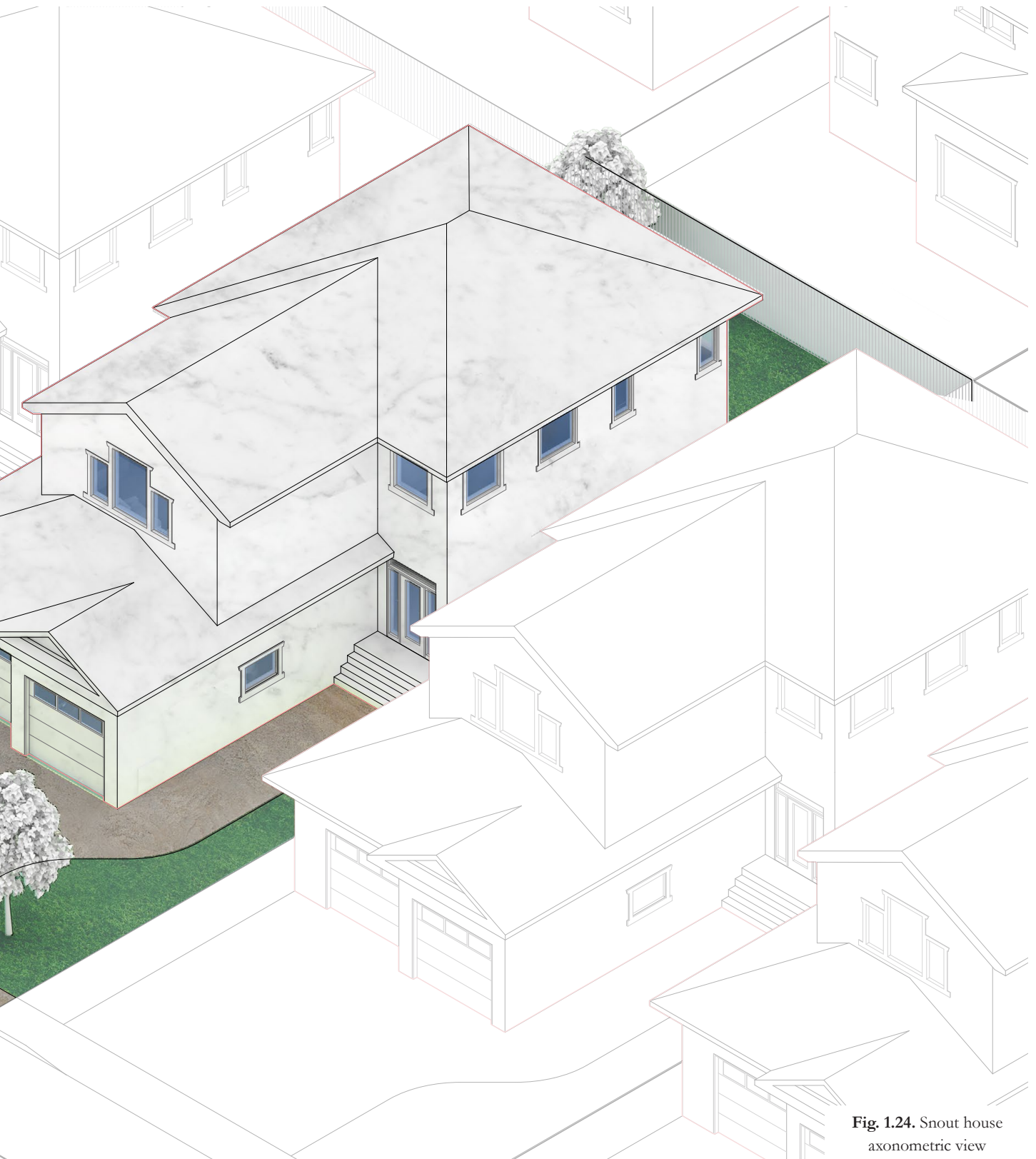
The Snout House highlights the expansion of the garage, while the house’s advancements largely followed the same principles of the previous ranch house, only expanding in size, consumer products and fixtures. The suburban house is larger than ever before, and the front facade is dominated by two to three 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.<sup>24</sup> The main floor of two story suburban houses are now rarely compartmentalized, instead favouring one large kitchen-living-dining space.



24

Merritt Ierley, *The Comforts of Home*, 249.

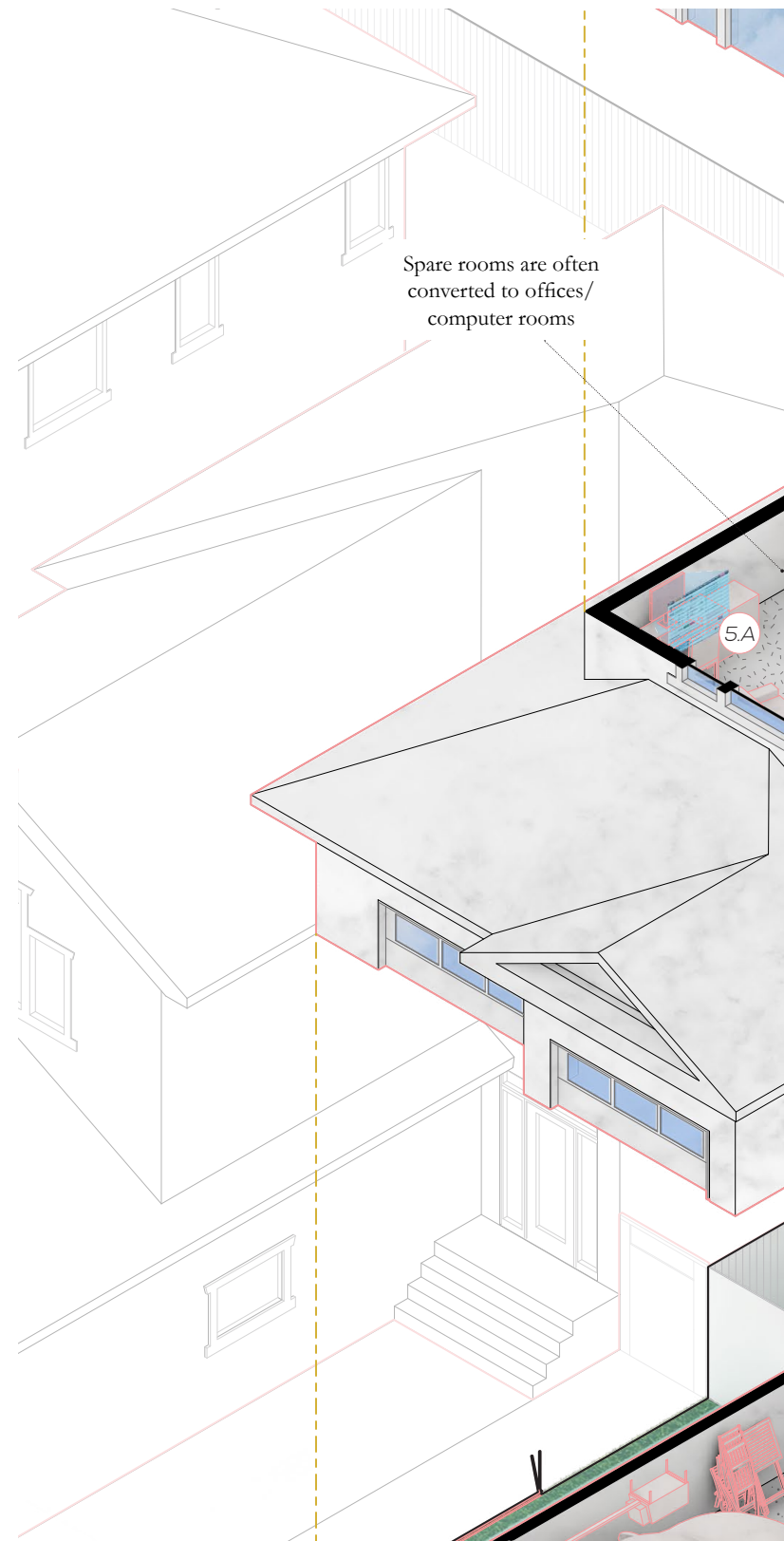




**Fig. 1.24.** Snout house  
axonometric view

**Yard:** Lots have begun to shrink, but house sizes have expanded creating smaller backyards.<sup>25</sup> 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.<sup>26</sup> 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.



25 Andrew McGill, *The Shrinking of the American Lawn* (Washington: The Atlantic, 2006), <https://www.theatlantic.com/business/archive/2016/07/lawns-census-bigger-homes-smaller-lots/489590/>

26 Elizabeth Cromley, *The Food Axis: Cooking, Eating, and the Architecture of American Houses* (Charlottesville: U of Virginia, 2010), 227.

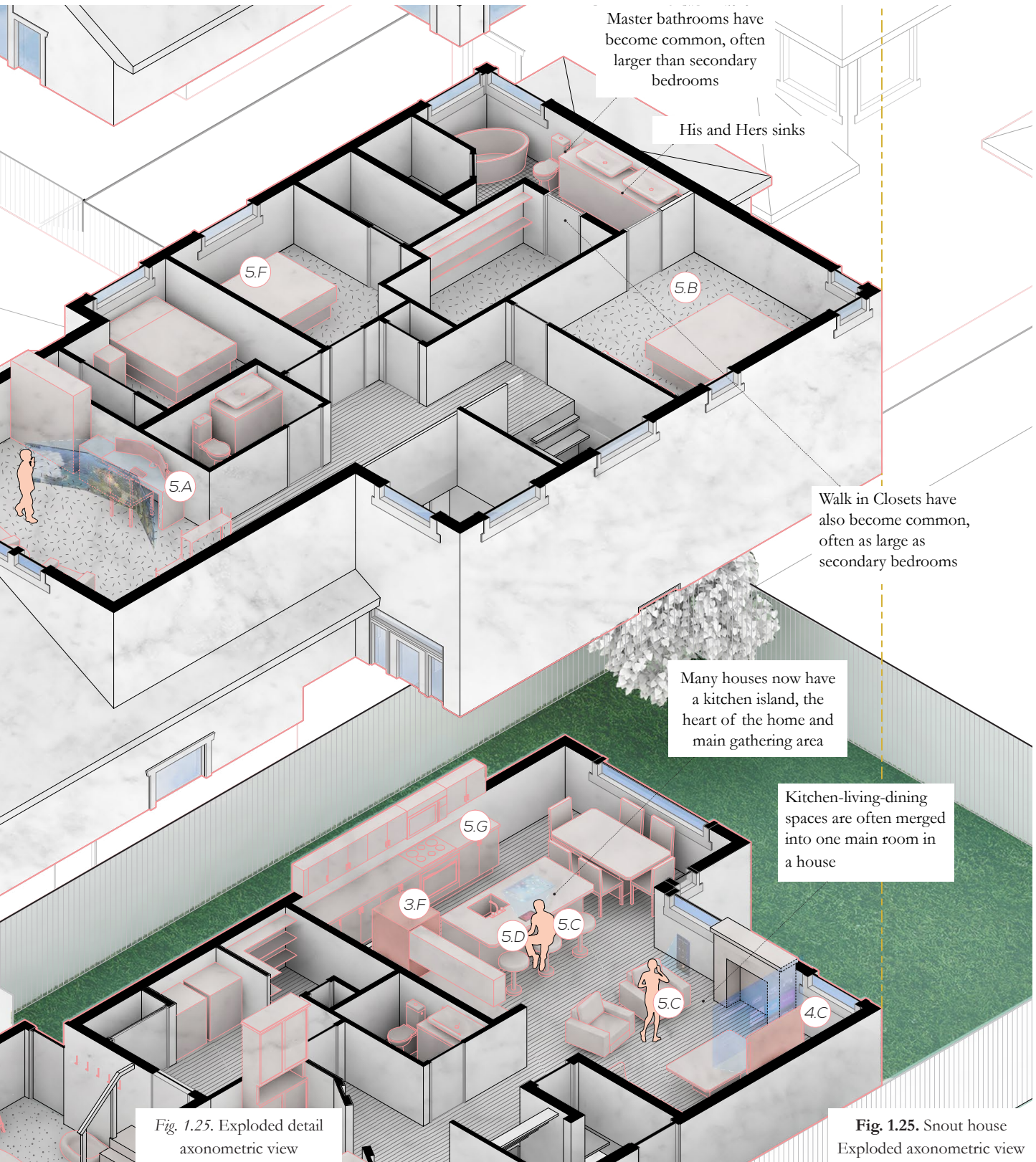
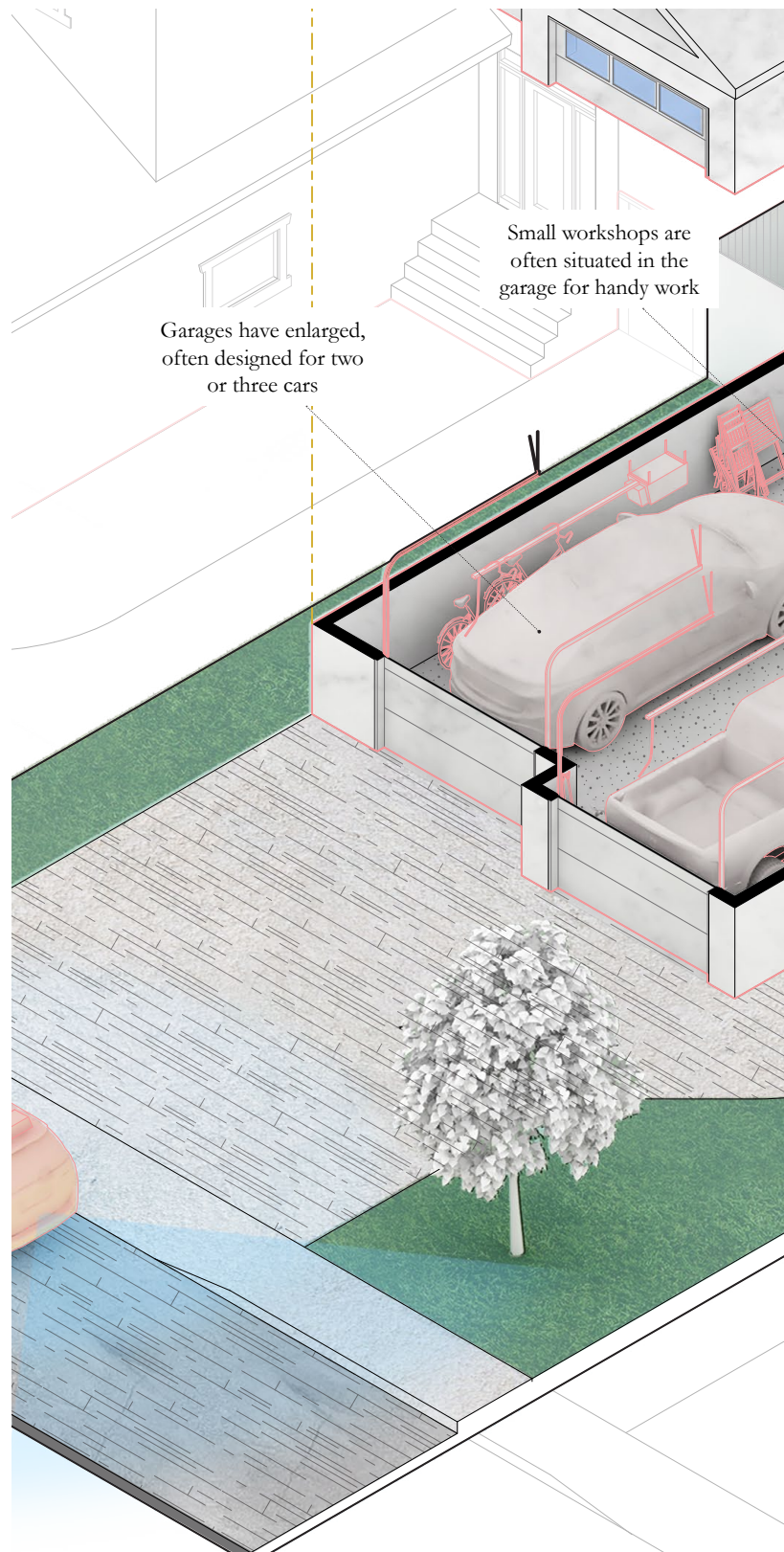


Fig. 1.25. Exploded detail axonometric view

Fig. 1.25. Snout house Exploded axonometric view

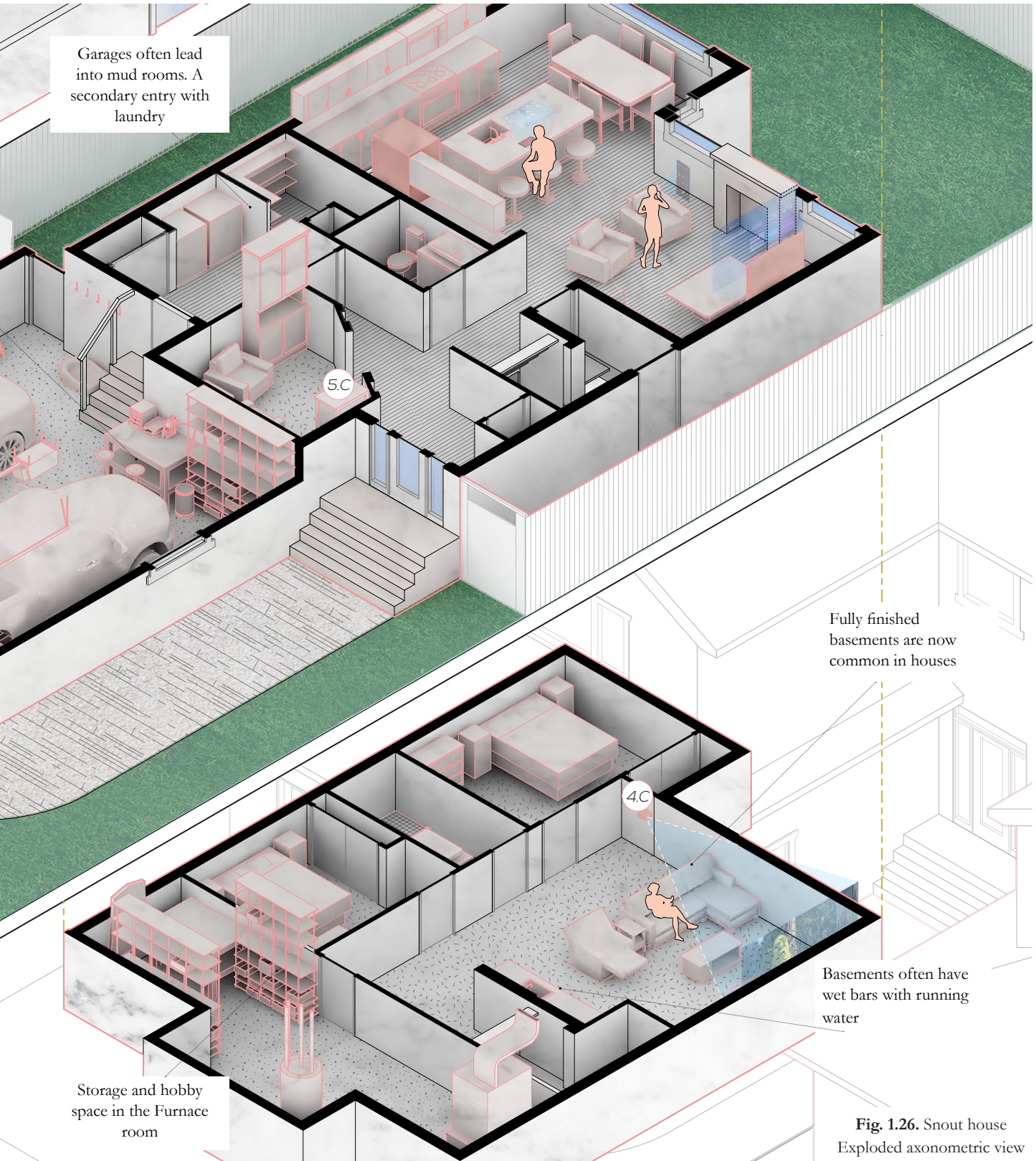
**Bathroom:** The bathroom typology has largely remained the same since the 1920's, but has become more opulent and sp- like in its design. Defining principles like cleanliness and privacy remain important factors. Master bathrooms are often larger than bedrooms and houses now often have more bathrooms 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.<sup>27</sup> 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."<sup>28</sup>



27 Avi Friedman, and David Krawitz, *Peeking through the Keyhole*, 154.

28 Avi Friedman, and David Krawitz, *Peeking through the Keyhole*, 174.



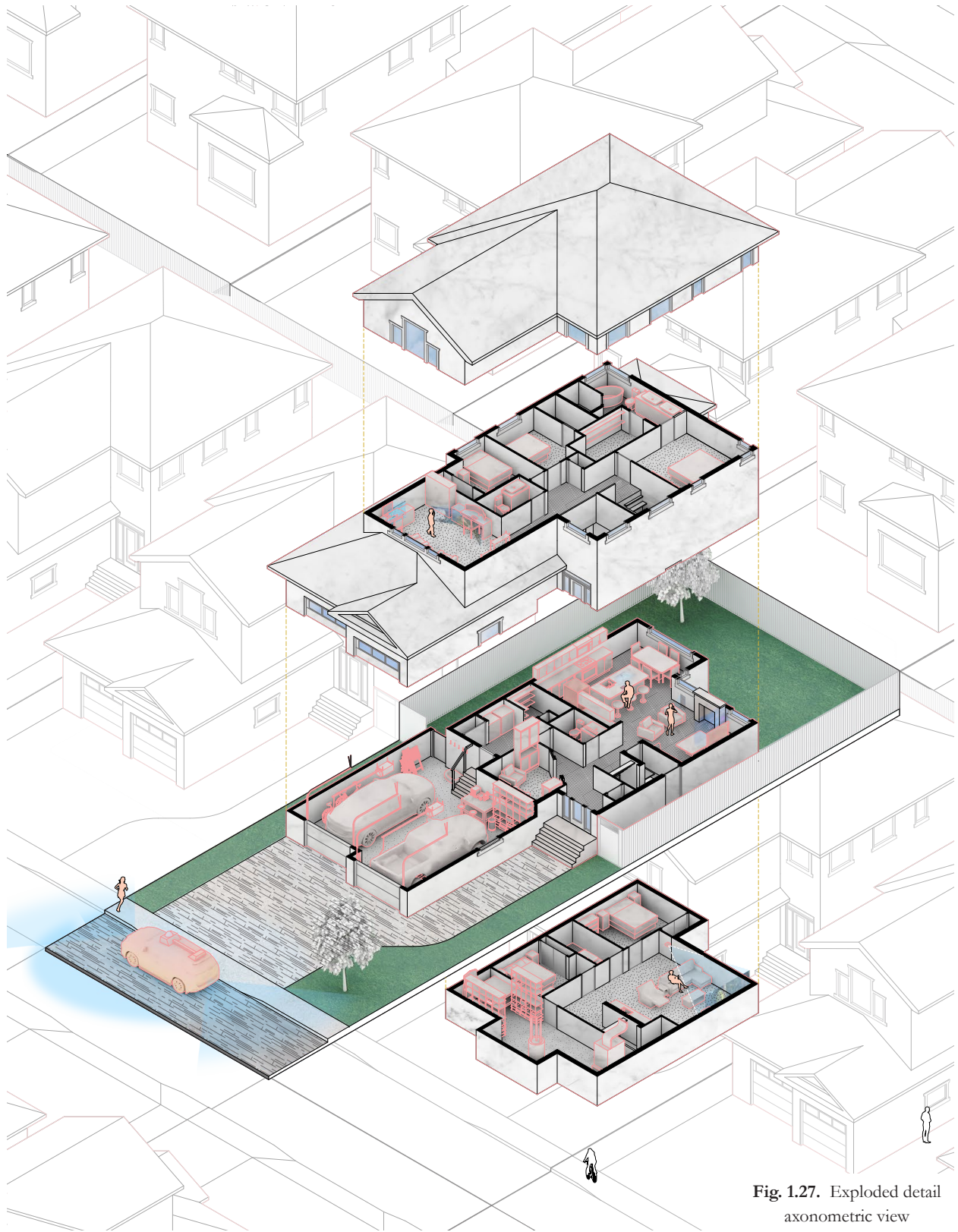


Fig. 1.27. Exploded detail axonometric view

Evolving Dwellings



**Fig. 1.28.** 2000's  
Neighbourhood Photo series





Evolving Dwellings



Fig. 1.29. 2000's  
Neighbourhood Photo series





**Fig. 1.30.** 2000's  
Neighbourhood Photo series





**Fig. 1.31.** 2000's  
Neighbourhood Photo series



An aerial photograph of a suburban residential neighborhood. The houses are arranged in a grid-like pattern with streets. The houses are mostly single-story with gabled roofs. There are some two-story houses. The colors of the houses vary, including white, beige, and red. There are green lawns and some trees. A central text overlay is present, consisting of a light blue rectangle with the text "PART 02" in a large, white, outlined font, and "Technology and Millennials" in a smaller, black, solid font below it.

# PART 02

## Technology and Millennials

*Fig. 2.0.*

## 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.<sup>29</sup>

*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*

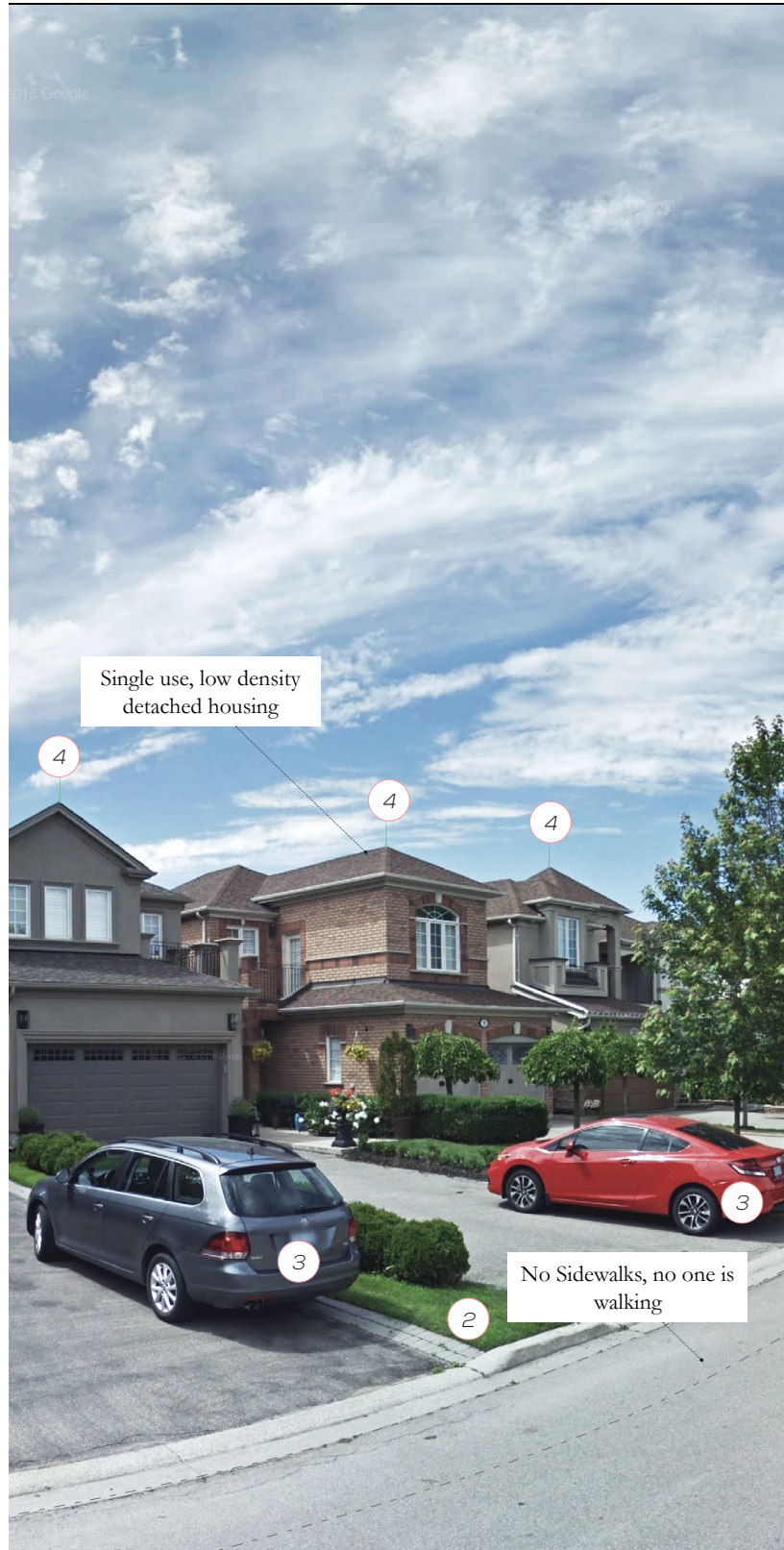
*Second, they may prefer convenience and low maintenance residential living. Gen Y has little tolerance for spending time on things like driving, caring for yards, or maintaining large homes.*

*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

<sup>29</sup> Arthur C. Nelson, *Reshaping Metropolitan America Development Trends and Opportunities to 2030* (Washington: Island Press, 2013), 43







**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.”<sup>30</sup>

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.<sup>5</sup>*

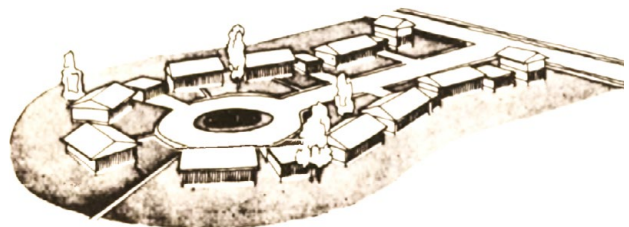
Millennials want a different way of living compared to Baby Boomers. A national survey was conducted by RCLCO Real Estate advisors in the United States polled to see what housing traits were the most desirable. The results showed that half of Millennials are confident even with kids, a detached house 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.<sup>31</sup> 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.



CONFUSION

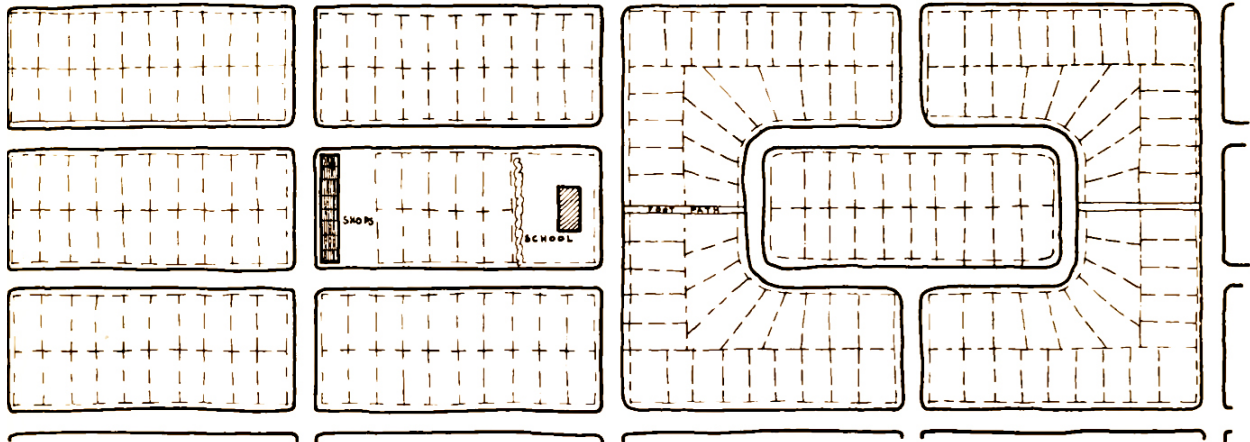


HARMONY



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

<sup>31</sup> Arthur C Nelson, *Reshaping Metropolitan America*, 42.



**STANDARD GRID SYSTEM**

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

**MODIFIED GRID PATTERN**

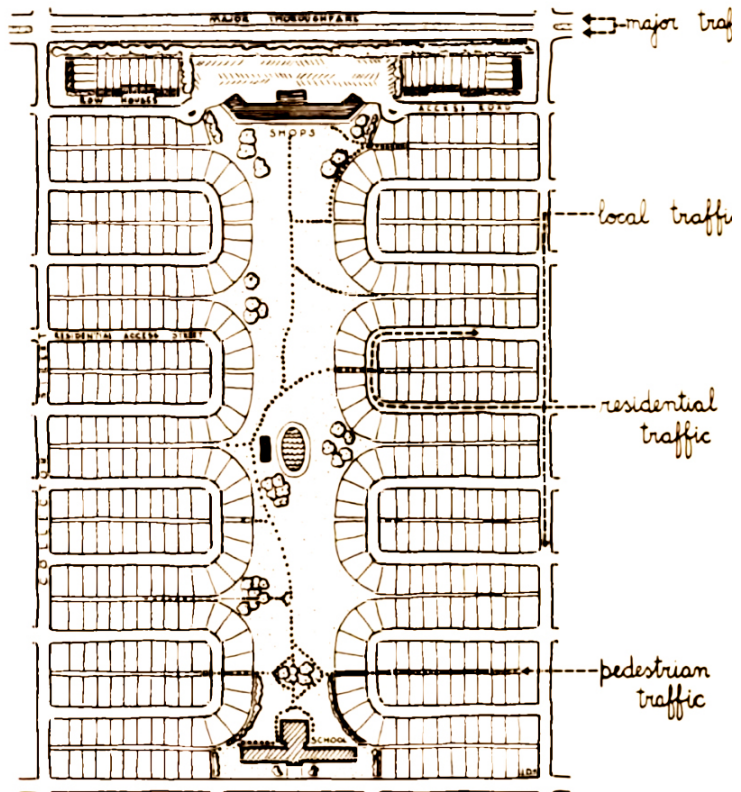
- Some separation of pedestrians and vehicles by provision of foot paths
- Channelling of traffic—less road

**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”*

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.<sup>32</sup> 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."<sup>33</sup> 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 Uber Eats 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

<sup>32</sup> *The Canadian Internet* (Ottawa: Canadian Internet Registration Authority, 2016), <https://cira.ca/factbook/domain-industry-data-and-canadian-internet-trends/internet-use-canada>.

<sup>33</sup> Adam Greenfield, *Radical Technologies* (New York: Verso Books, 2017), 11.



Fig. 2.9.



**Fig. 2.3.** 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 *Netville* 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.

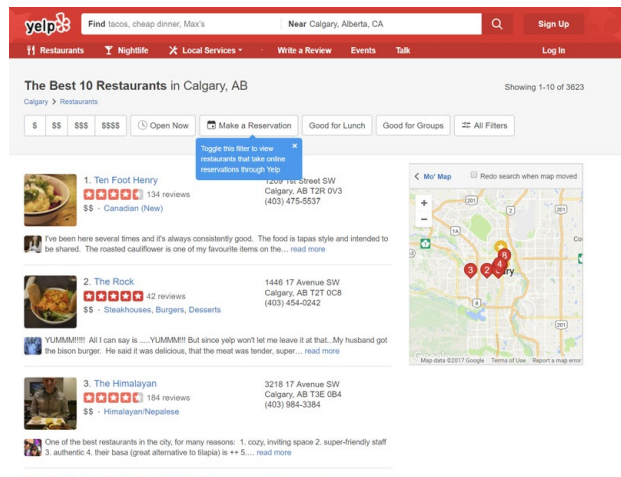


Fig. 2.4.

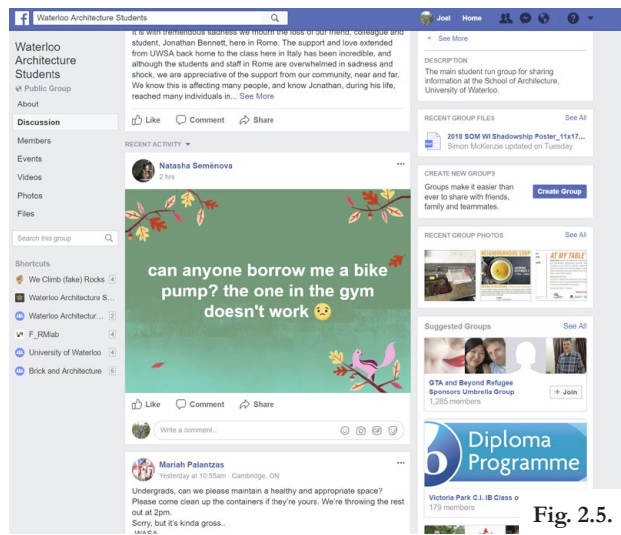


Fig. 2.5.

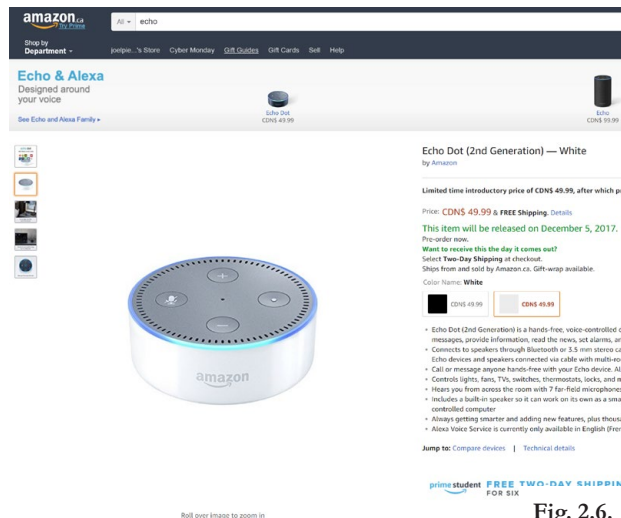
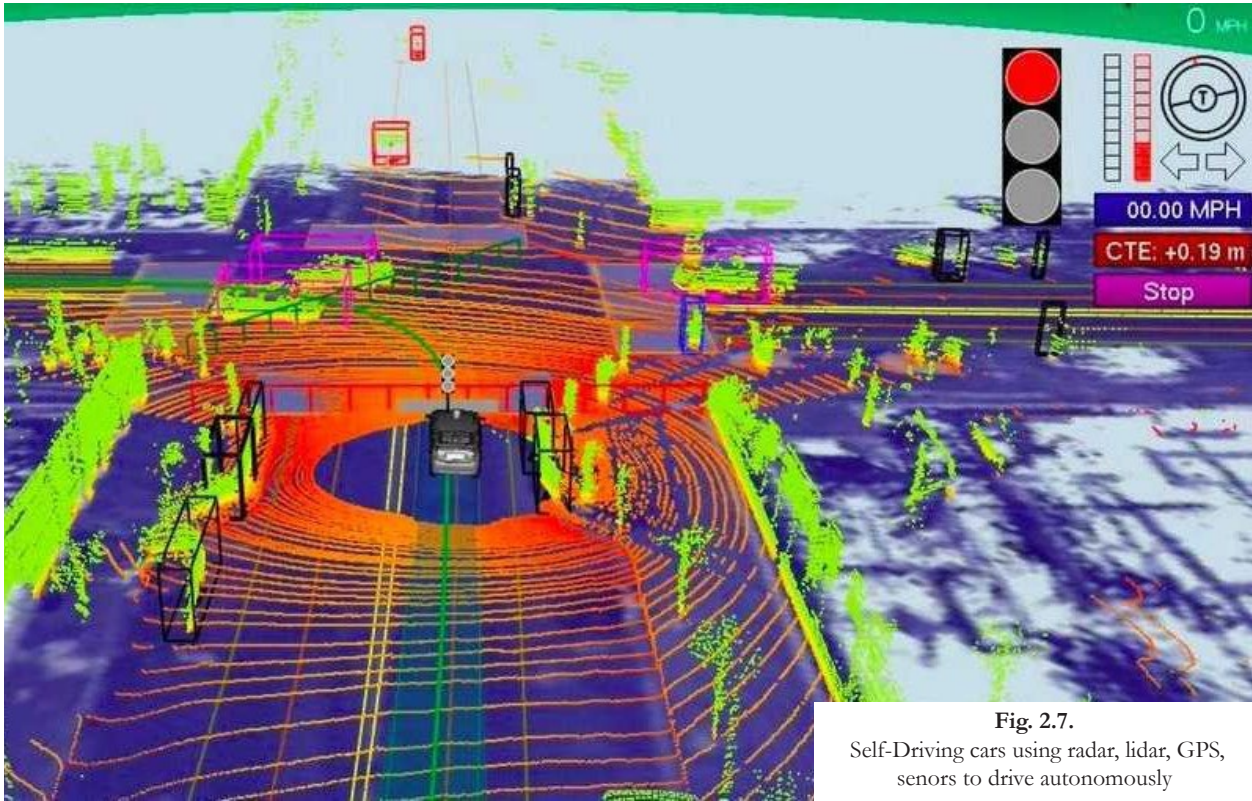


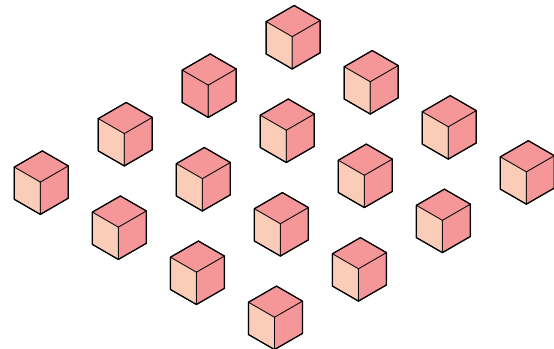
Fig. 2.6.



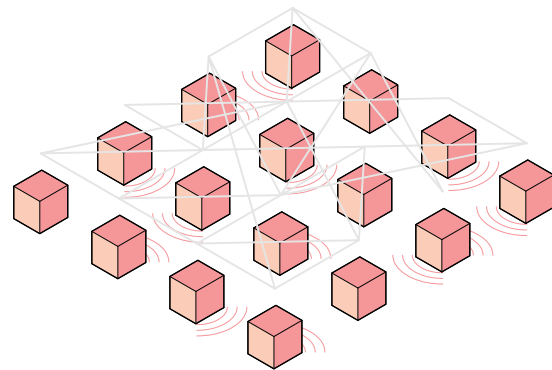
## Netville

### Connectivity

Barry Wellman's study titled *Neighbouring in Netville* looked into 109 detached single family homes at a outer suburb of Toronto. The goal was to investigate how Internet use may affect neighbourhood communities.<sup>34</sup> 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.<sup>35</sup> 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.<sup>36</sup> 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."<sup>37</sup>



Before



After

<sup>34</sup> Keith Hampton & Barry Wellman, *Neighboring in Netville: How the Internet Supports Community and Social Capital in a Wired Suburb* (Washington: American Sociological Association, 2003), 287.

<sup>35</sup> Keith Hampton & Barry Wellman, *Neighboring in Netville*, 293.

<sup>36</sup> Keith Hampton & Barry Wellman, *Neighboring in Netville*, 298.

<sup>37</sup> Keith Hampton & Barry Wellman, *Neighboring in Netville*, 207.

Fig. 2.9.



# Early Settlement

Initial connections (non-wired vs. Wired)

- Case Study
- No Connection
- Weak Connection
- Knowing Connection
- Strong Connection

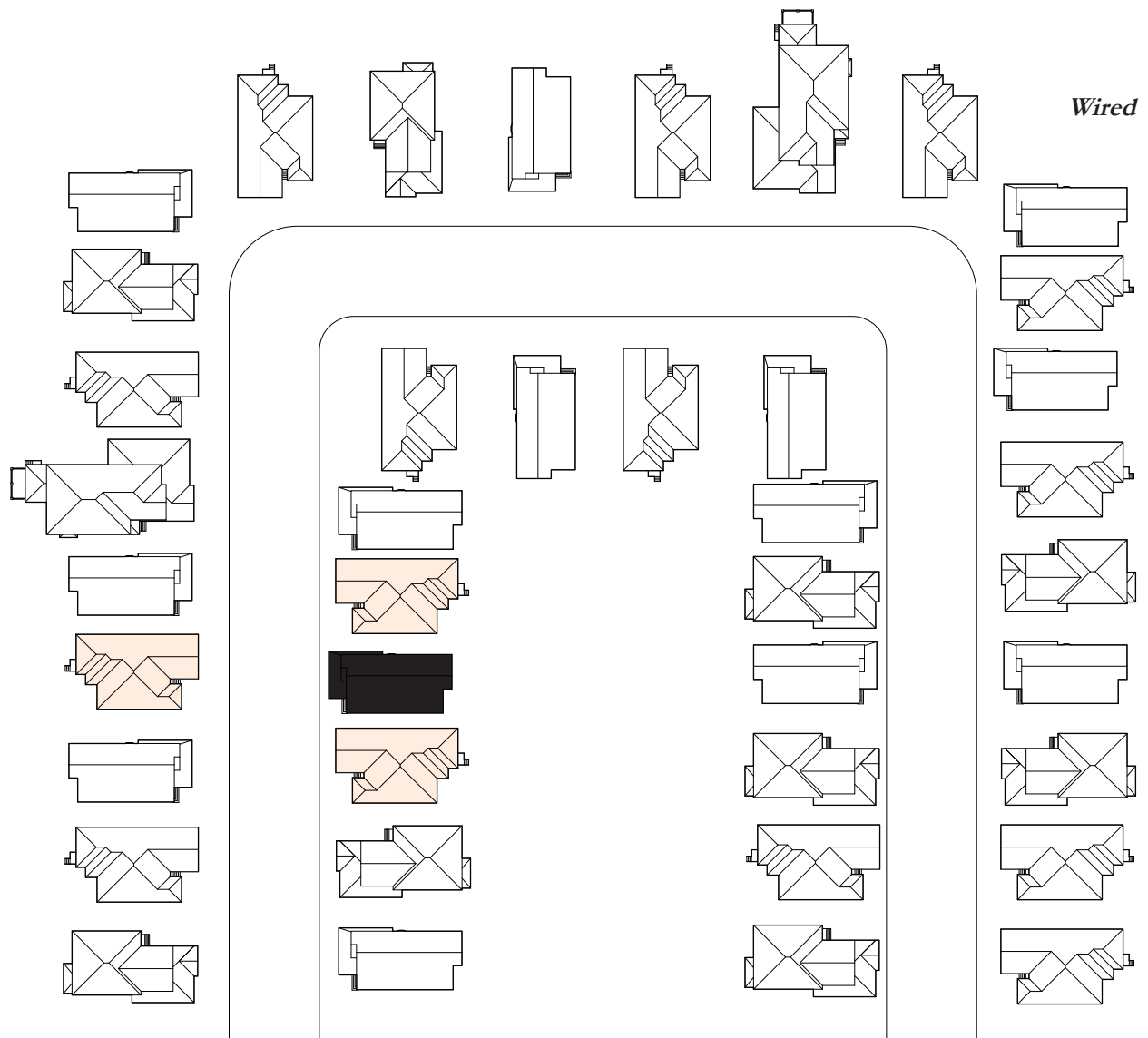
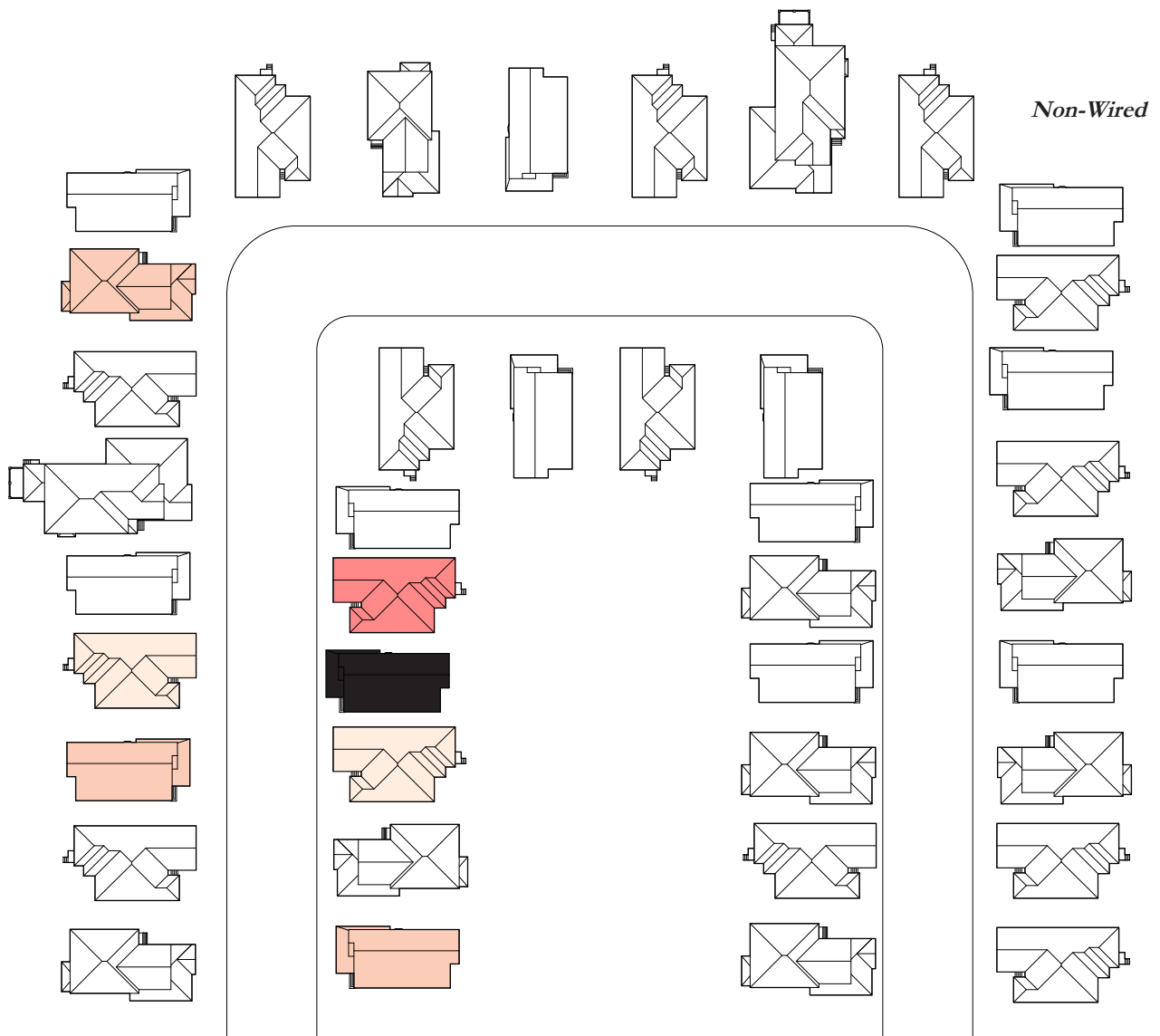


Fig. 2.10.



*Non-Wired*

Fig. 2.11.

# Settled Community

Post 2 years (non-wired vs. Wired)

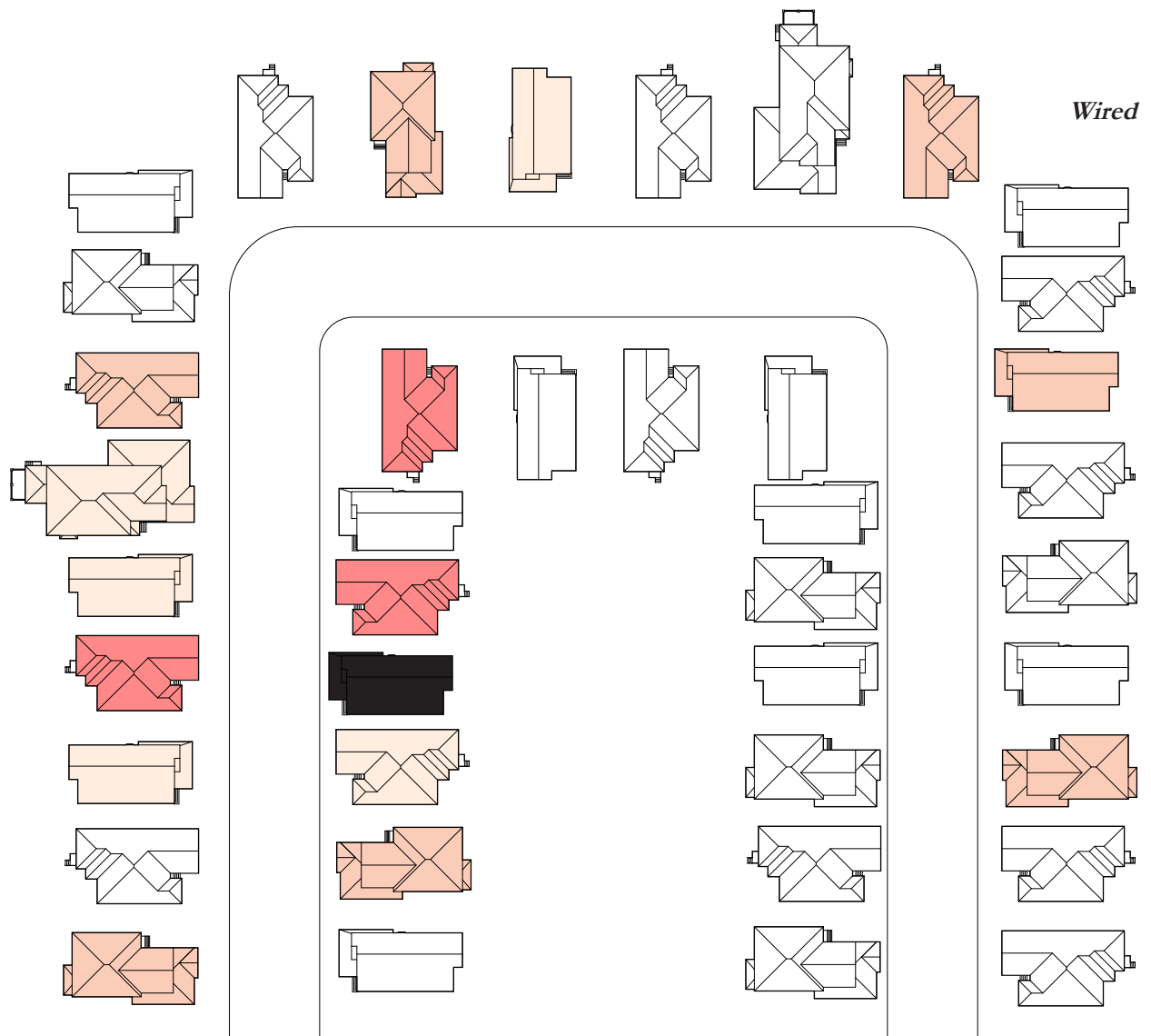
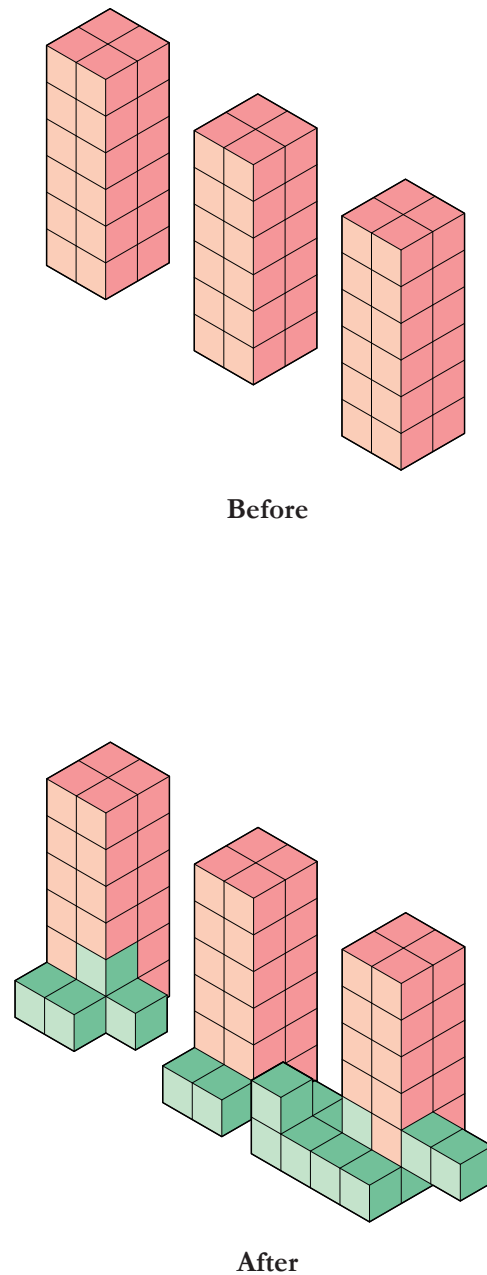


Fig. 2.12.

## 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.”<sup>38</sup> 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.



38

*Tower Renewal Partnership* (Toronto: n.p., n.d.), <http://towerrenewal.com/opportunity/>.

Fig. 2.13.

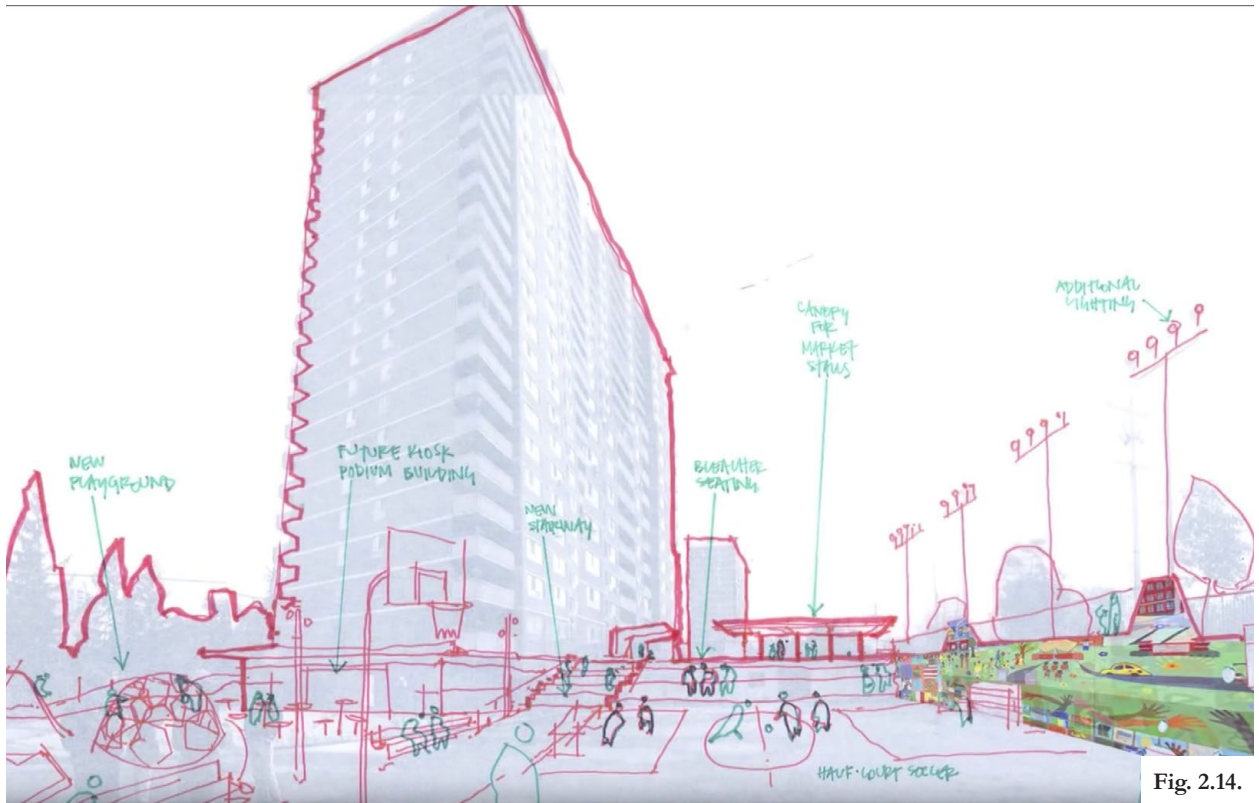


Fig. 2.14.



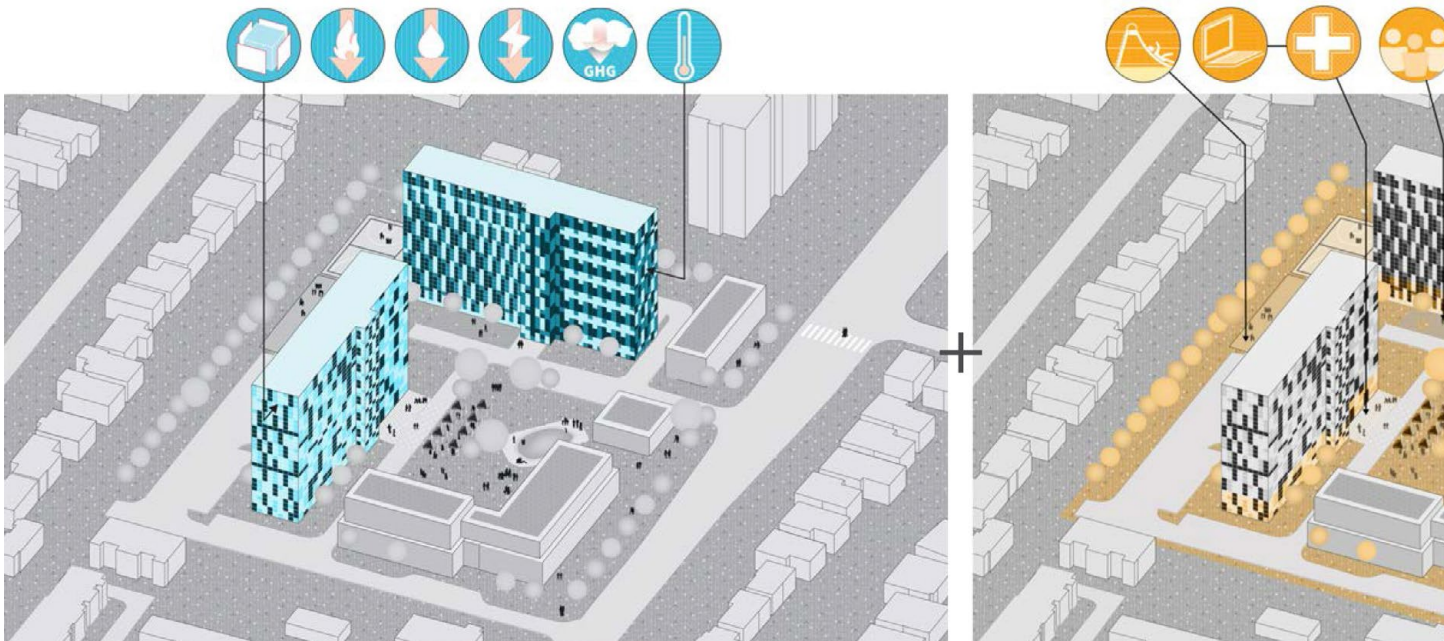
Fig. 2.15.



Fig. 2.16.

Improved Housing Stock

Community Opport



Technology and People

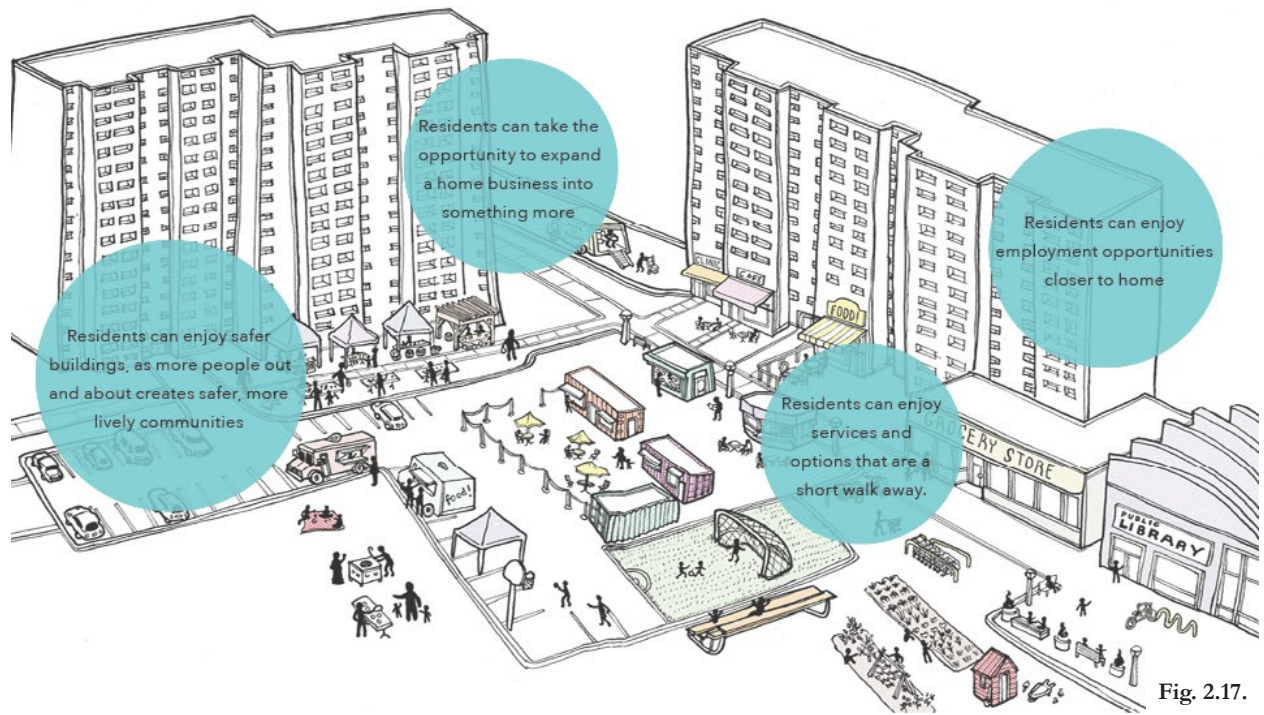


Fig. 2.17.

unities & Amenities

Urban Design, Infrastructure & Smart Growth

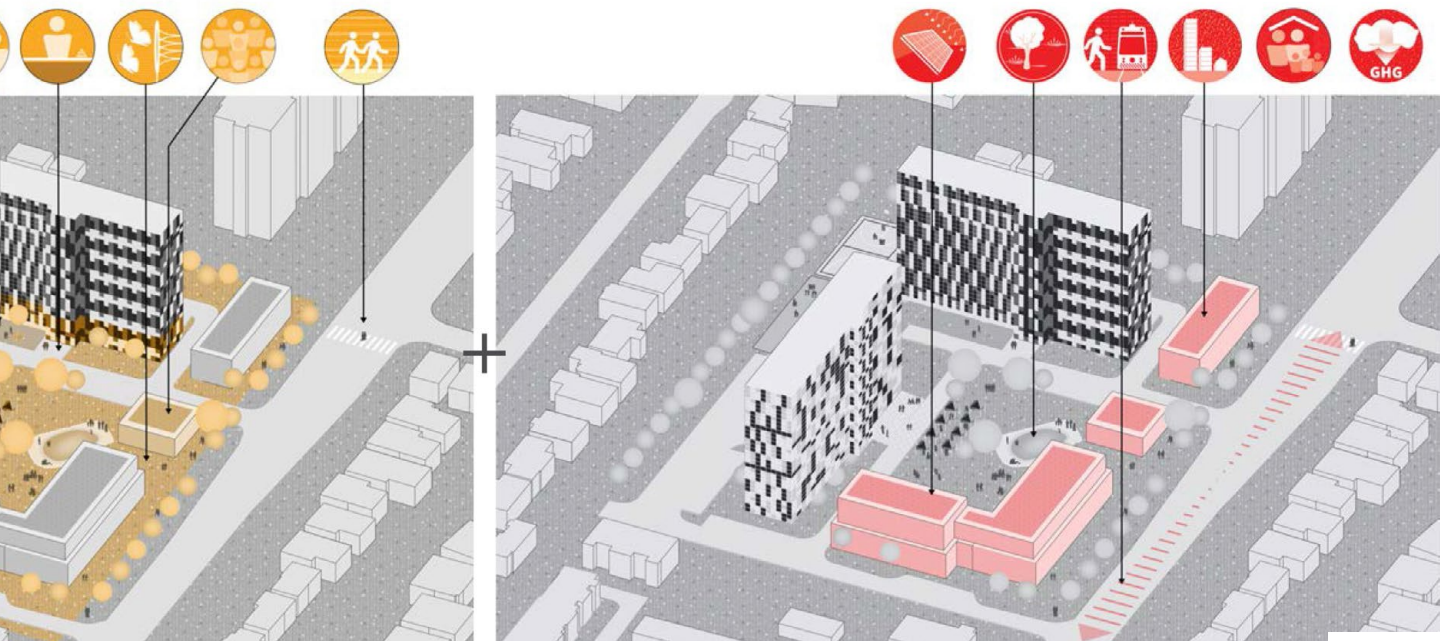
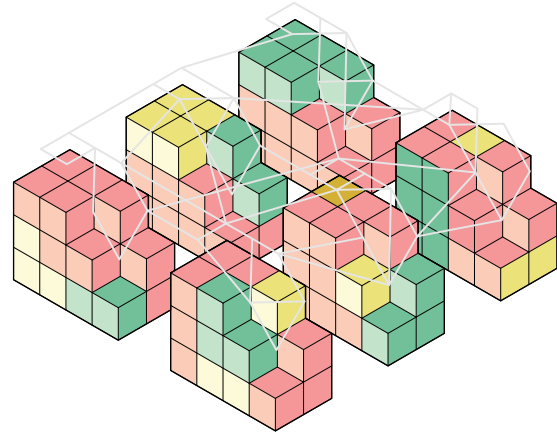


Fig. 2.18.

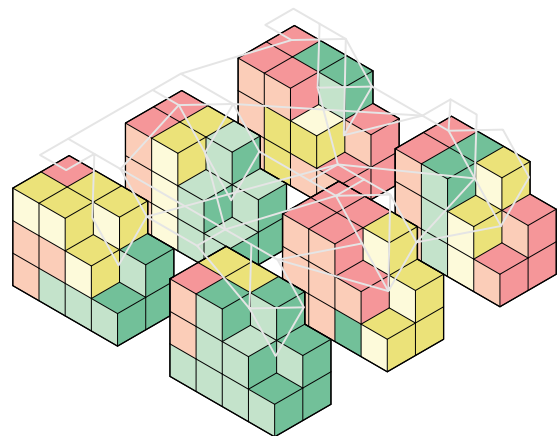
## Sidewalk Labs

### 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.”<sup>39</sup> 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.”<sup>40</sup>



Before



After

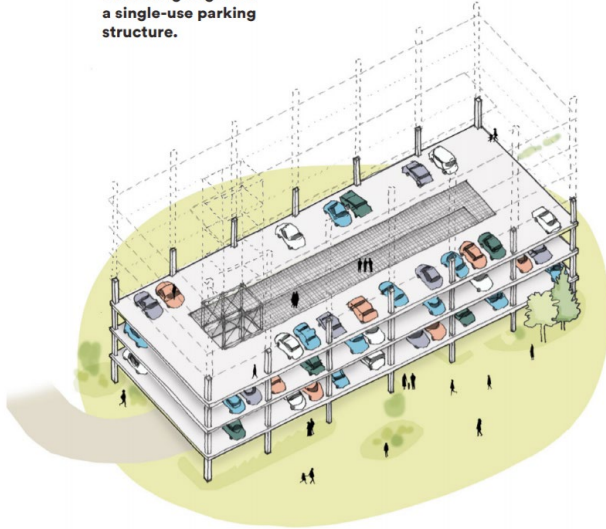
39 *Sidewalk Labs Vision Sections of RFP Submission* (New York: Google Sidewalk Labs, 2017), 10.

40 *Sidewalk Labs Vision Sections*, 18.

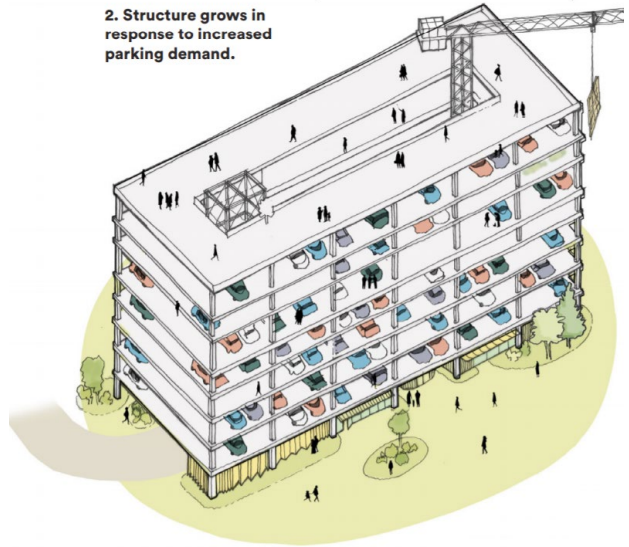
Fig. 2.19.



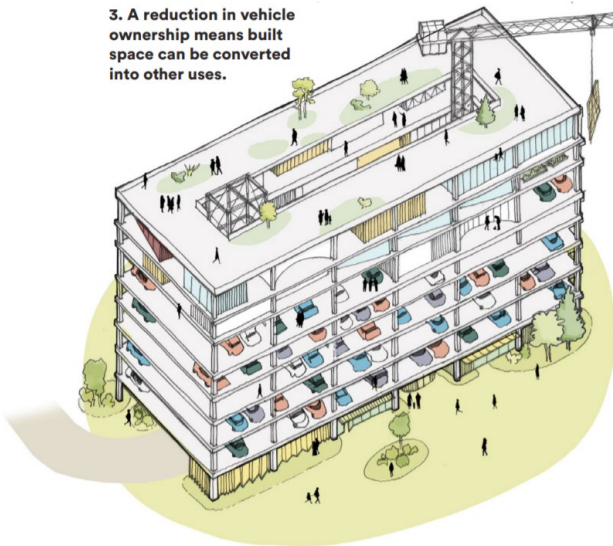
1. Building begins as a single-use parking structure.



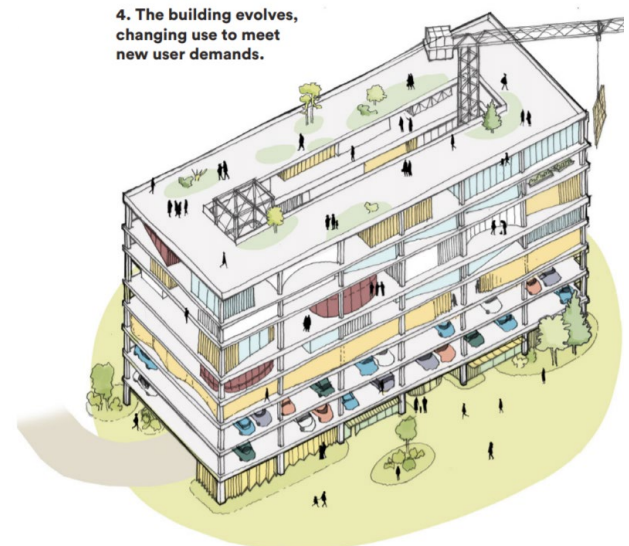
2. Structure grows in response to increased parking demand.



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.



PURPOSEFUL SOLUTIONS

Fig. 2.20.

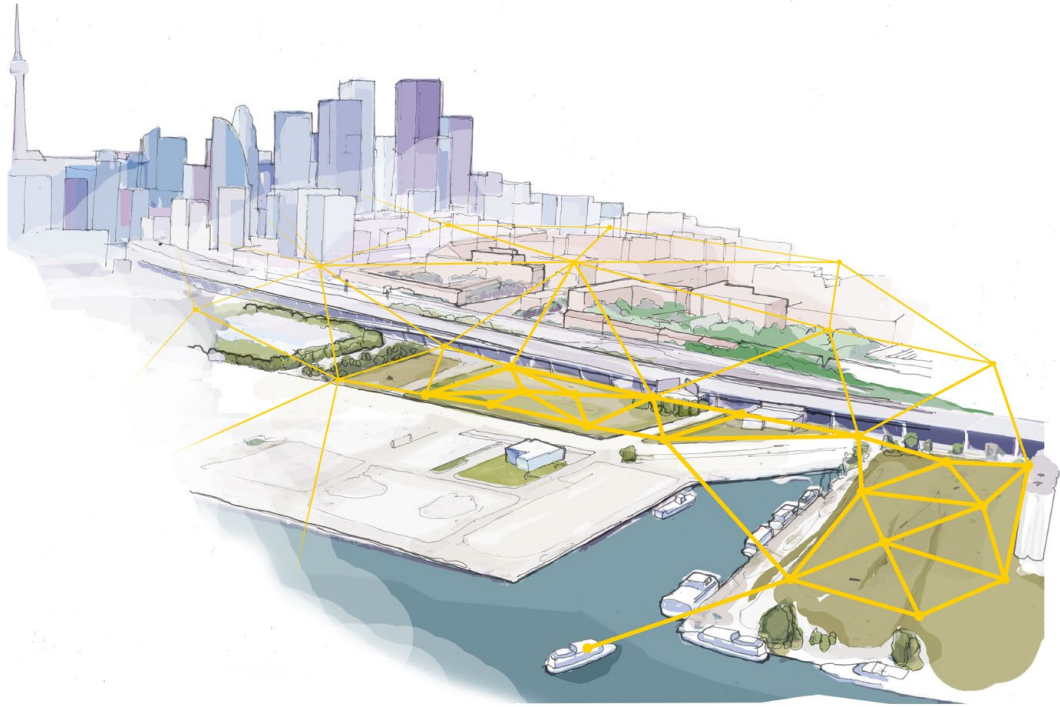


Fig. 2.21.

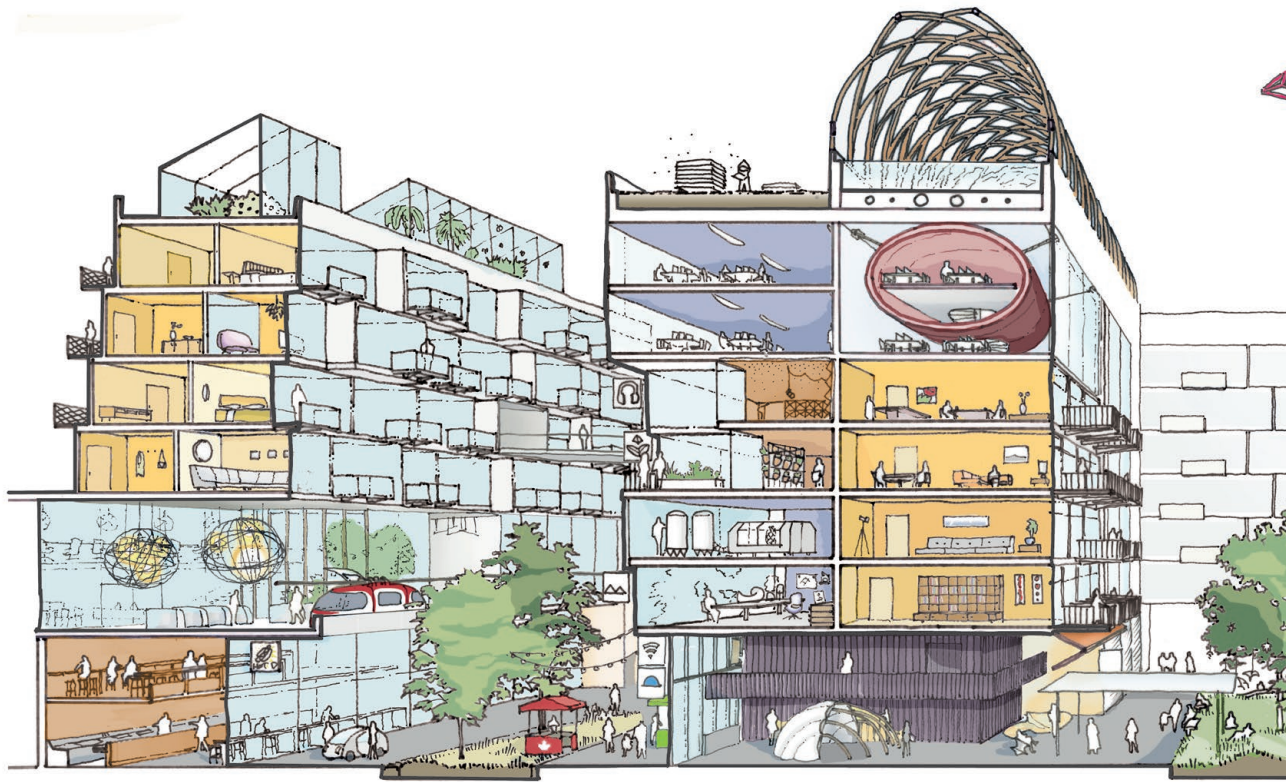




Fig. 2.22.

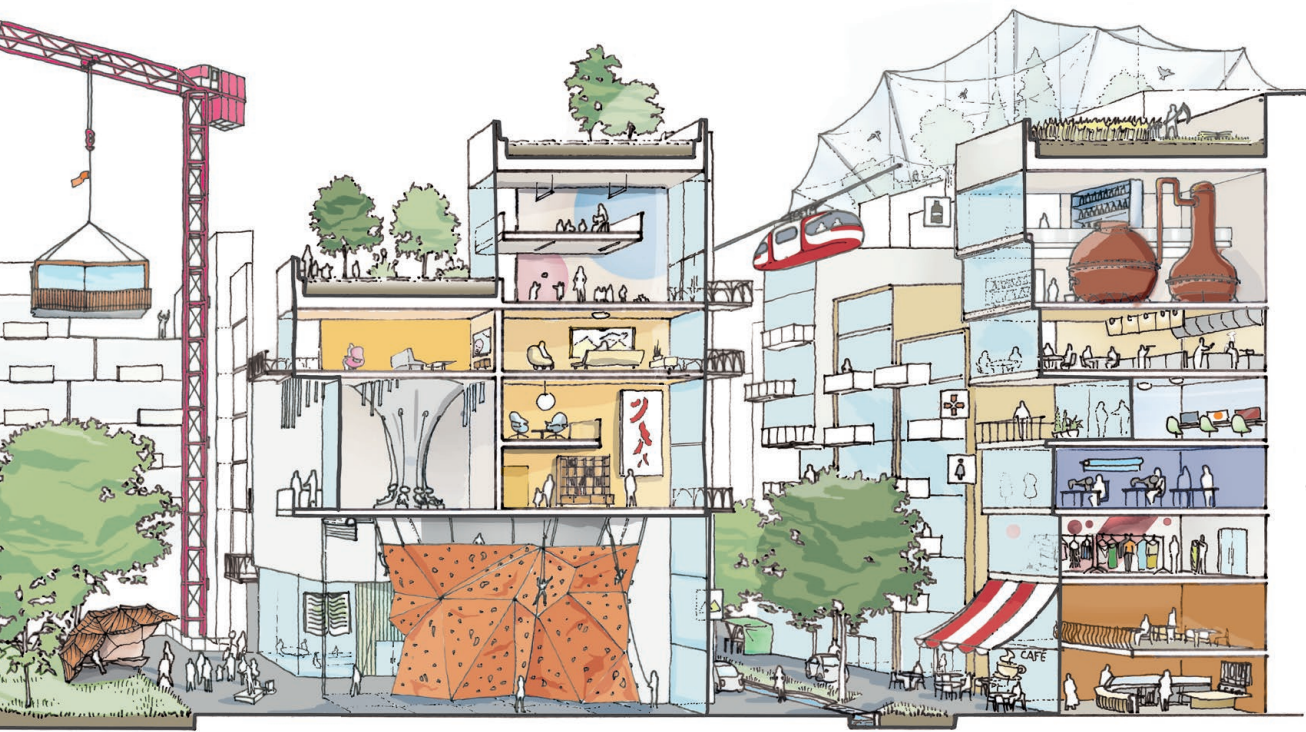


Fig. 2.23.



An aerial photograph of a suburban residential neighborhood. The houses are arranged in neat rows, separated by a central road. The houses have varying roof colors, including dark grey, brown, and red. The central road has several cars parked and driving. The overall scene is a typical suburban street view.

# PART 03

## Connecting Suburbia

Fig. 3.0.

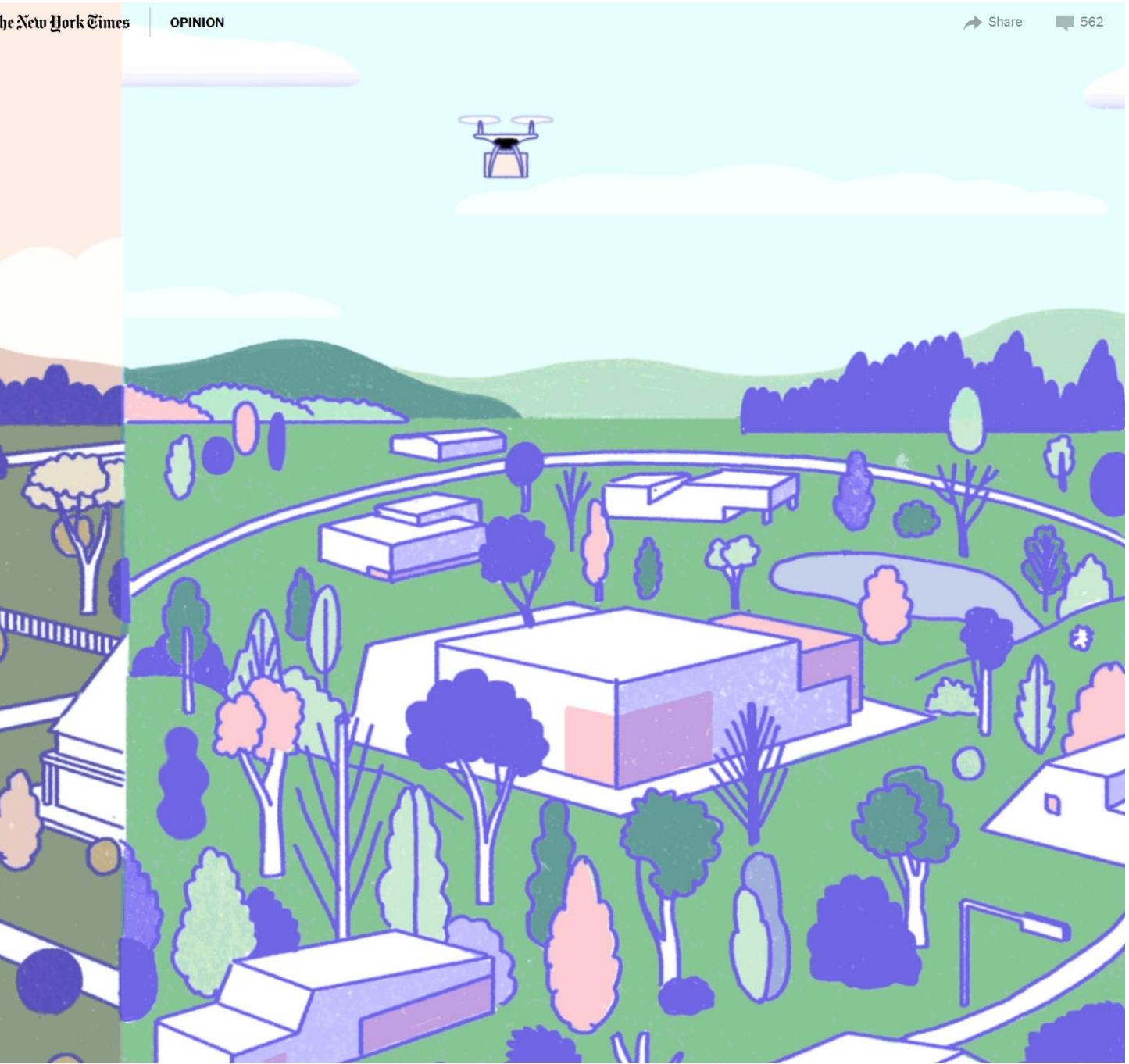
## Testing Grounds

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.<sup>41</sup>



# The Suburb of the Future, Almost

<sup>41</sup> Tom Babin, *This map shows why Calgary's older suburbs may be headed for some big problems* (Calgary: The Calgary Herald, 2016), [https://cherald.com.carto.com/viz/9d3ff076-d9a5-11e5-8b9f-0c787de82d45/embed\\_map](https://cherald.com.carto.com/viz/9d3ff076-d9a5-11e5-8b9f-0c787de82d45/embed_map)



he  
Here

Fig. 3.1.

### City Makeup

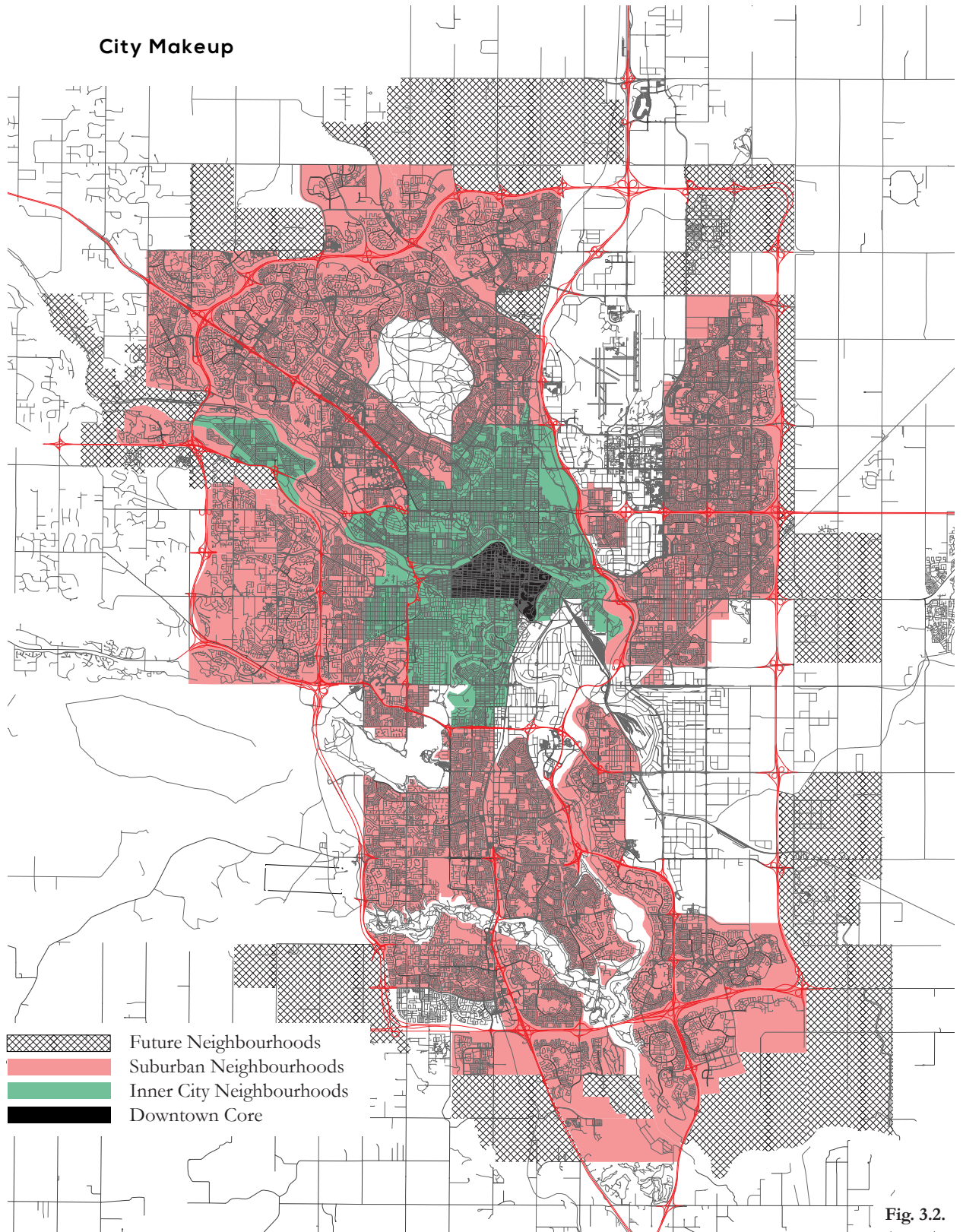


Fig. 3.2.



Neighbourhood Growth

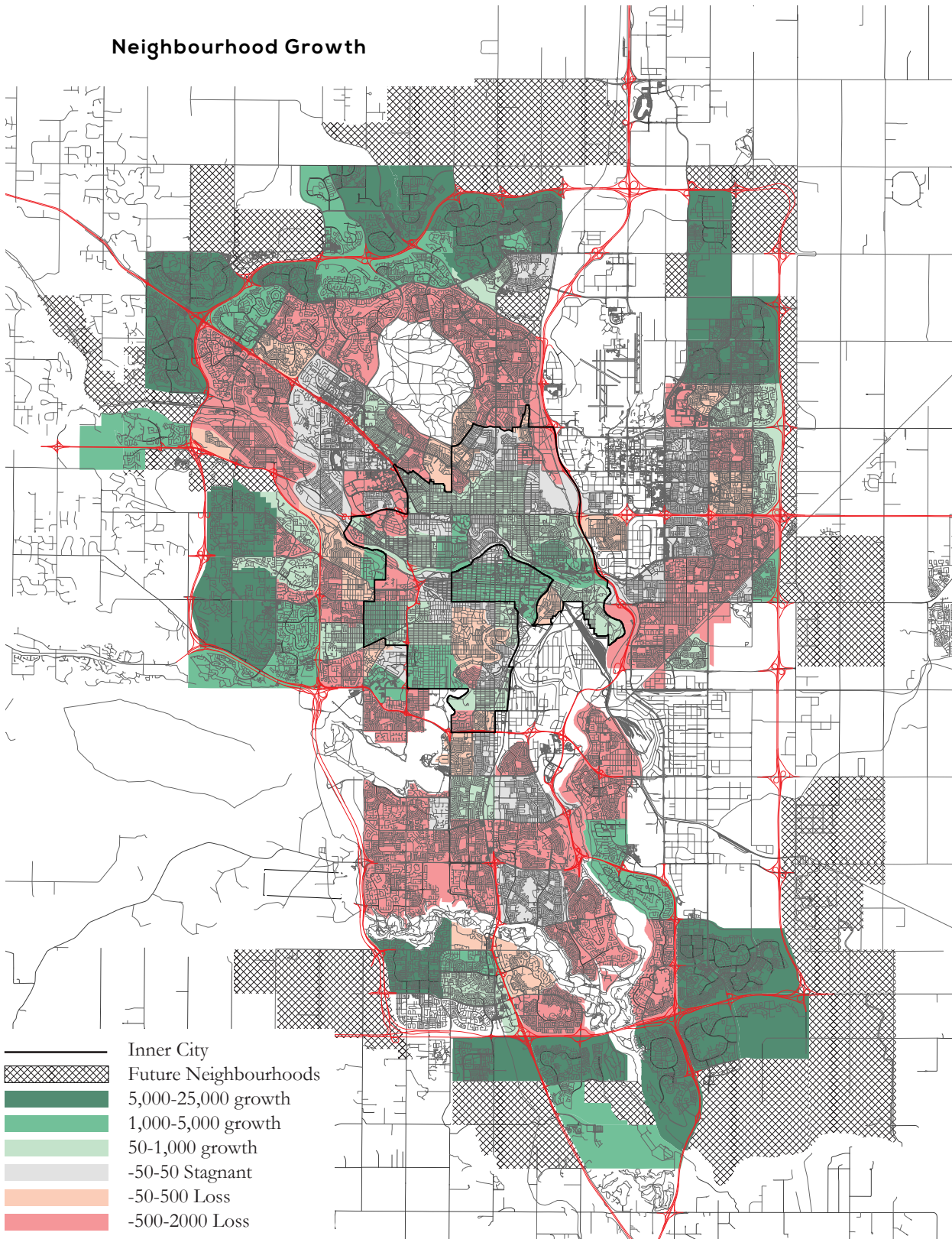


Fig. 3.3.

### Dwelling Types

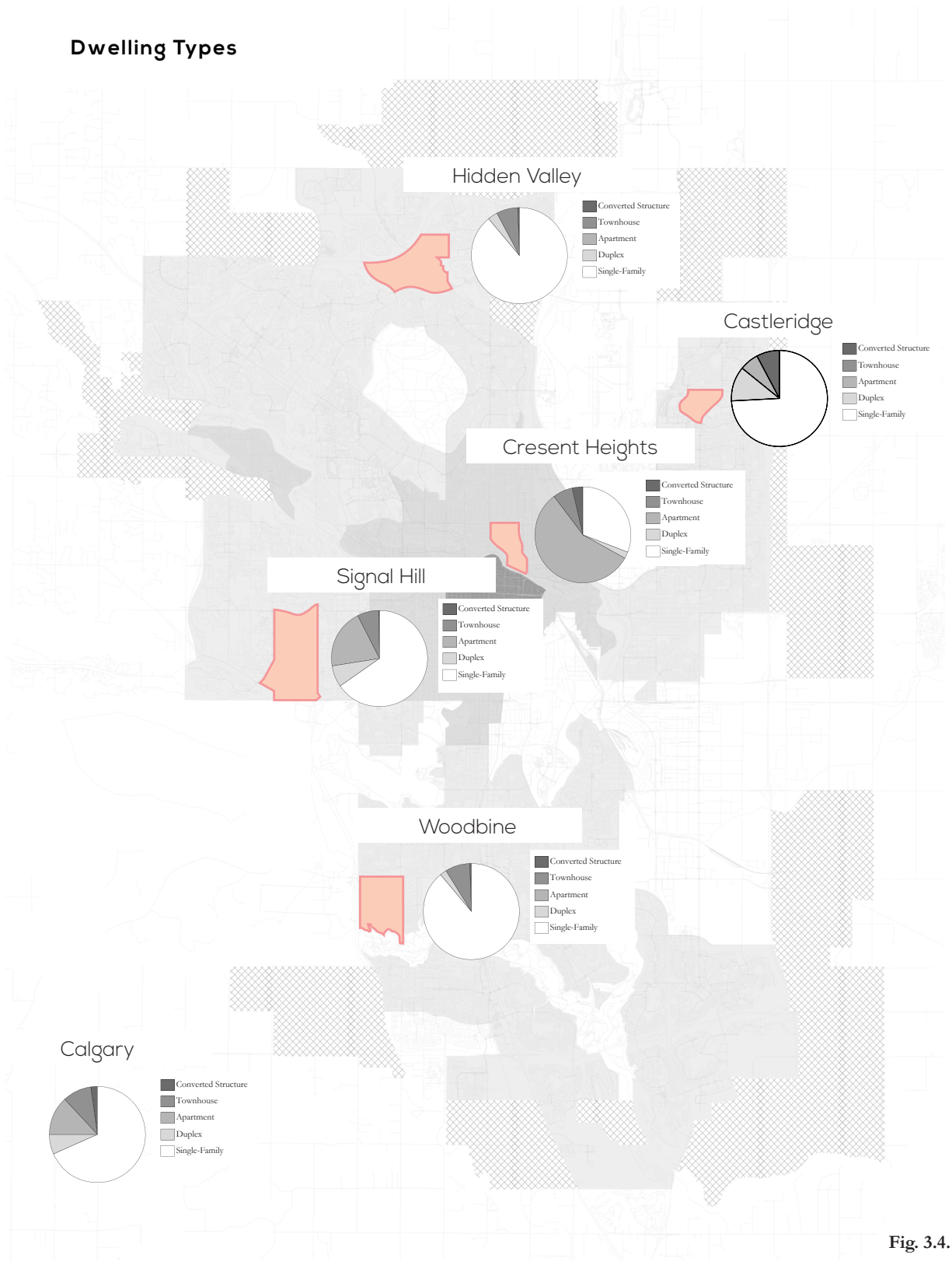


Fig. 3.4.

# Connecting Suburbia

## Transportation Use

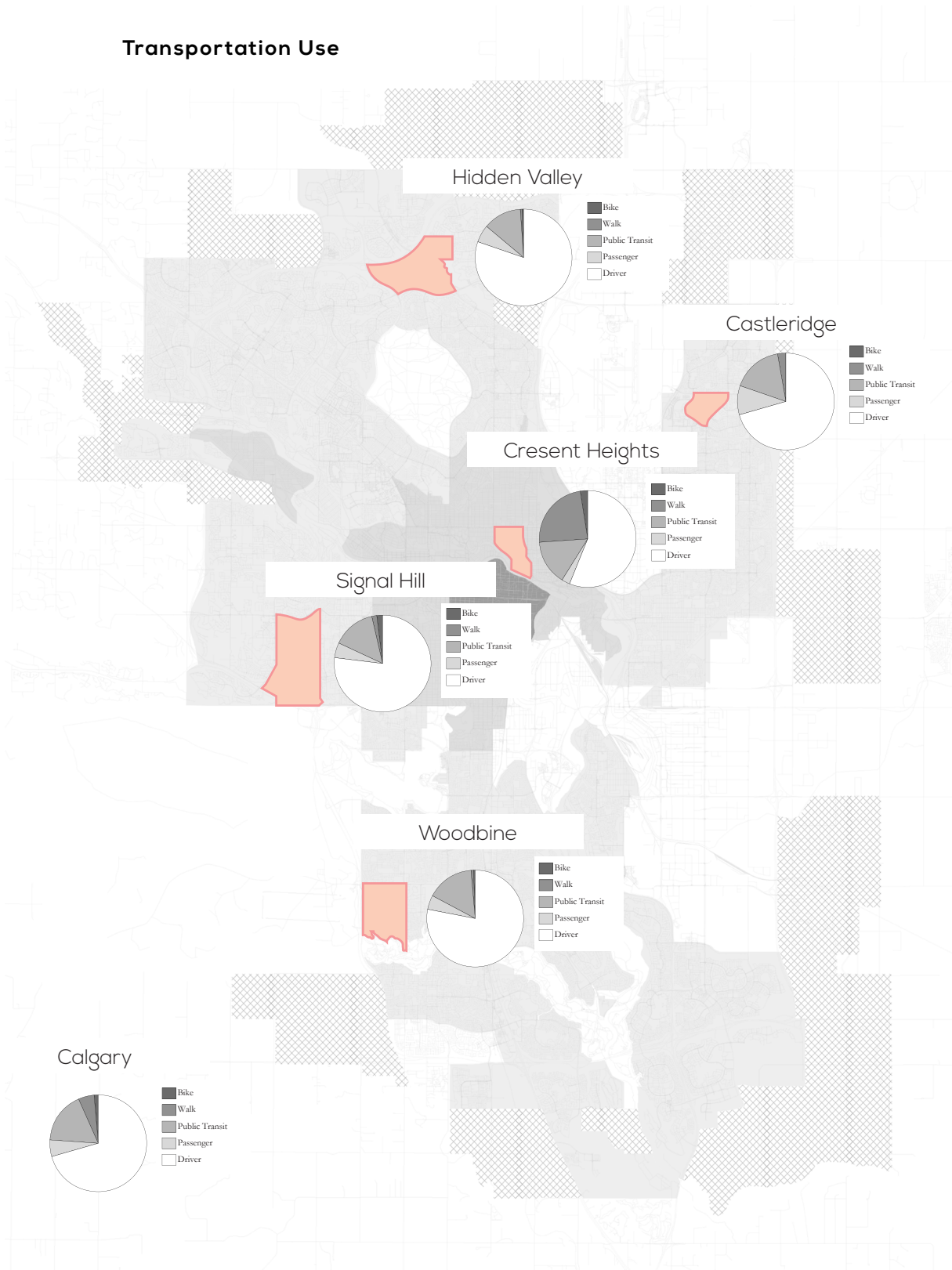


Fig. 3.5.

### Dwelling Types

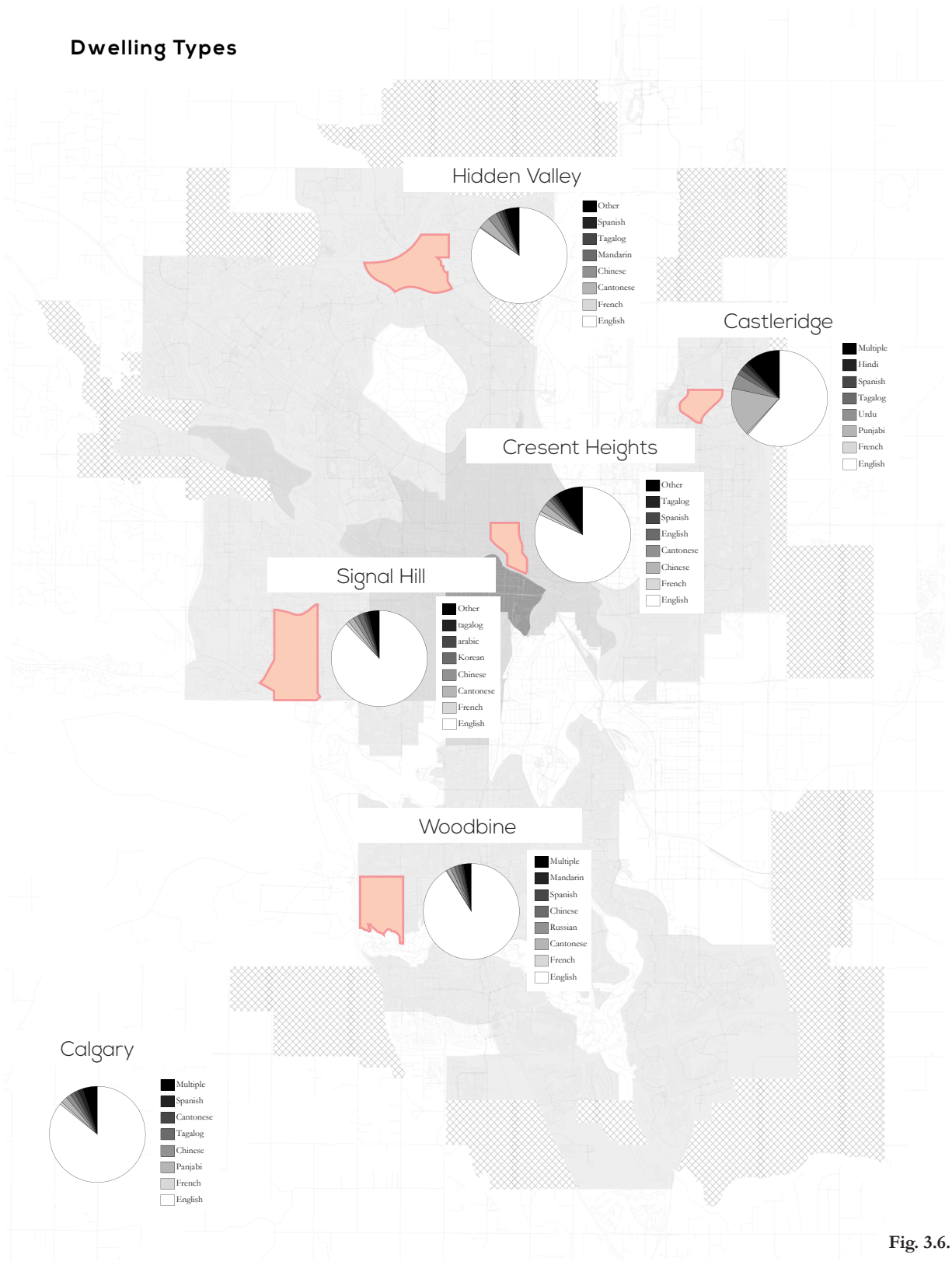


Fig. 3.6.

Transportation Use

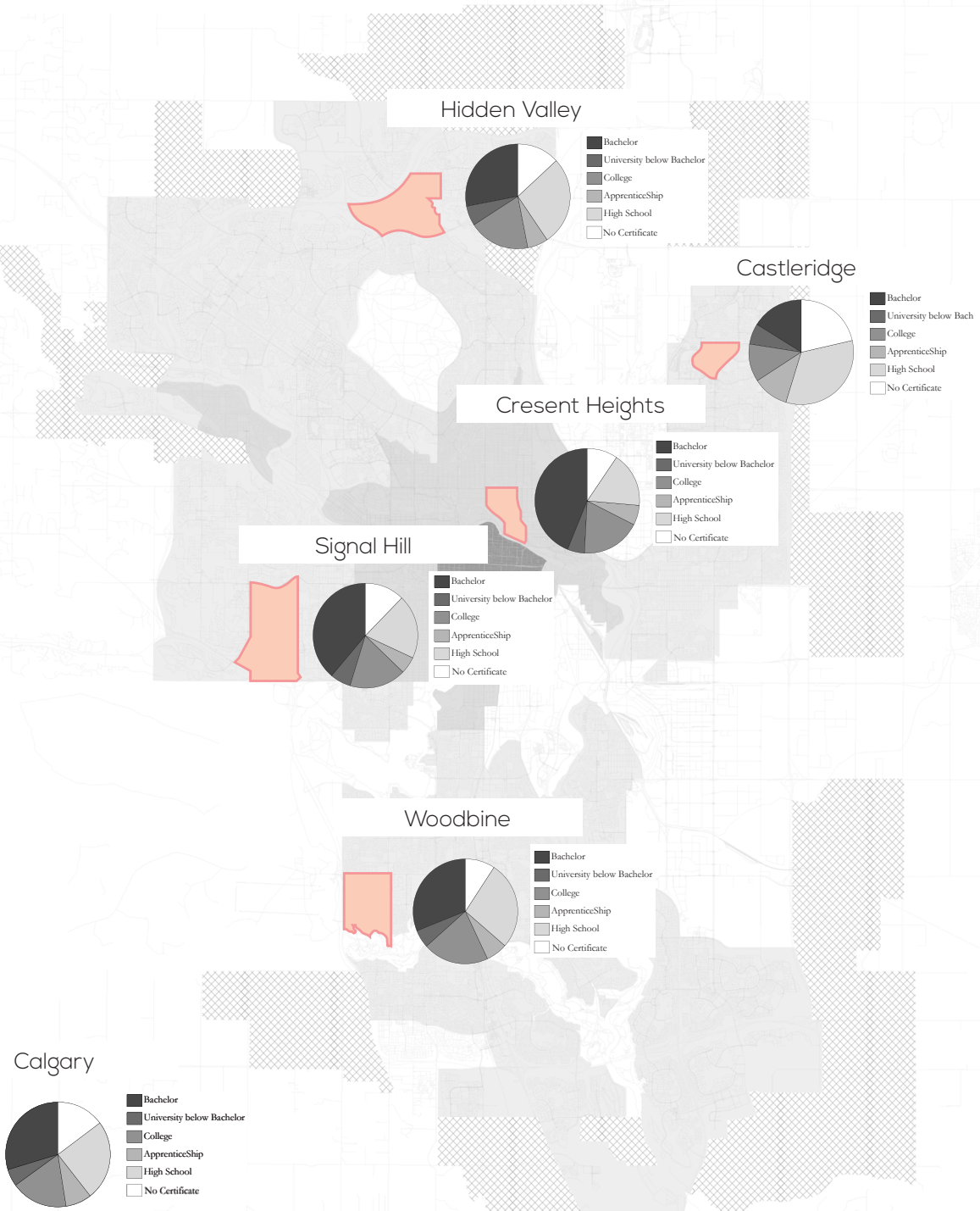
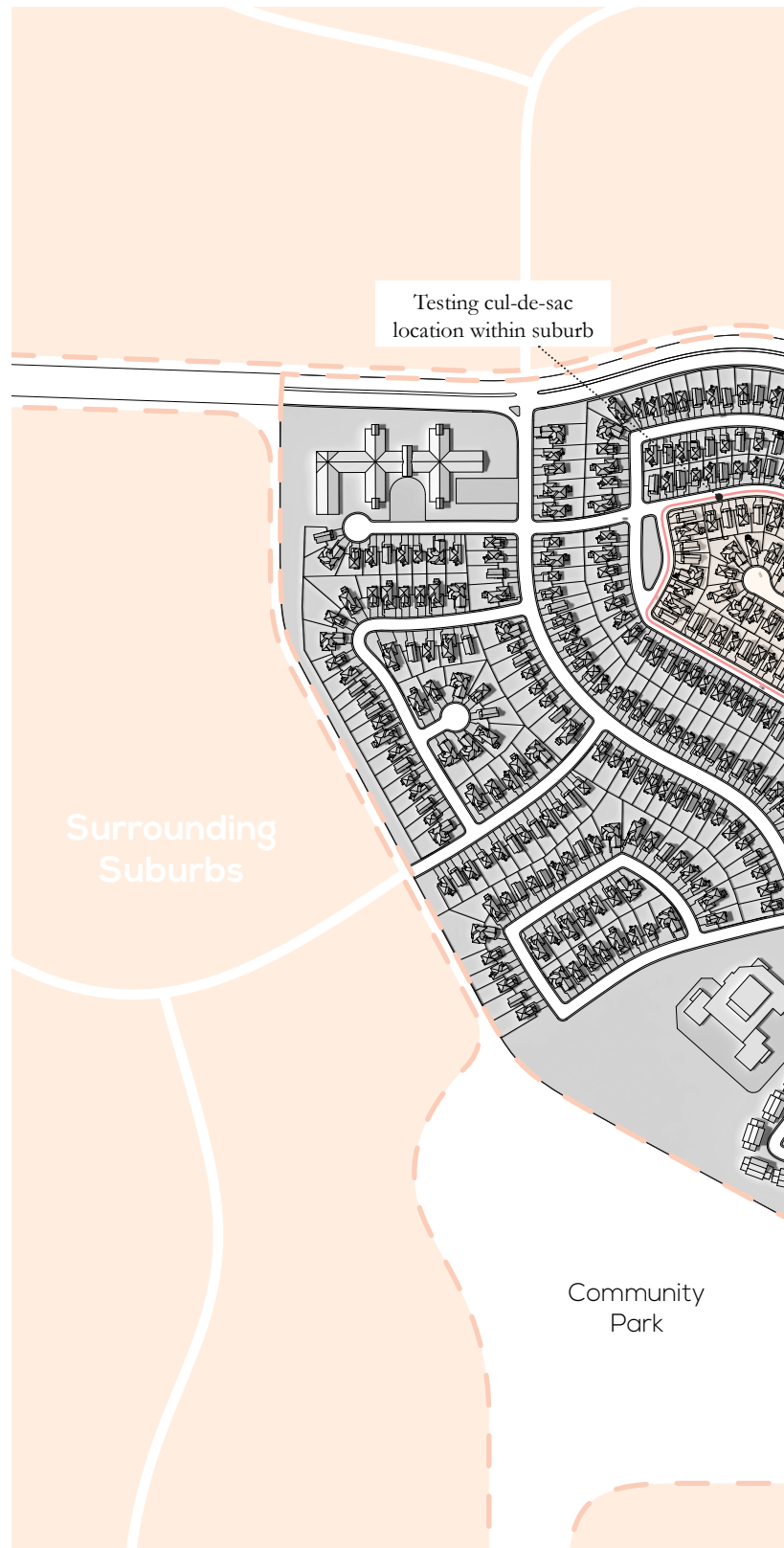


Fig. 3.7.

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.



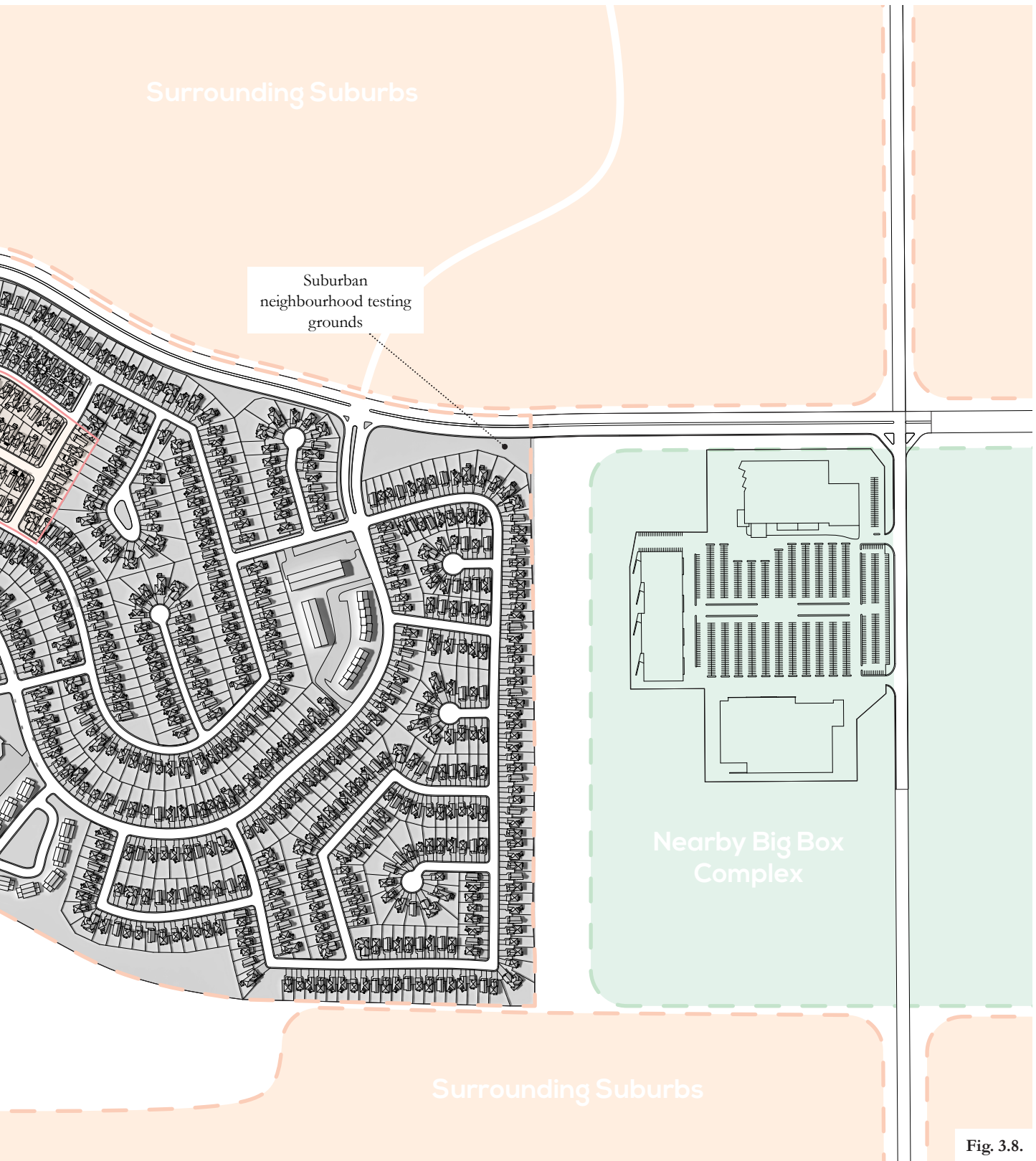
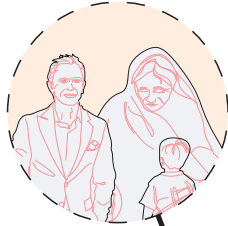
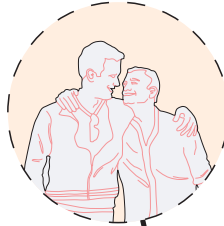


Fig. 3.8.



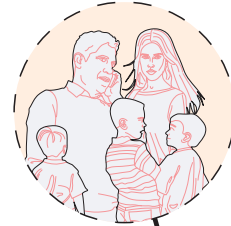
**The Ahmads**

Ali, Haneen, and Aidan immigrated from Jordan 3 years ago. Ali Works commutes to work as a full time barber while Haneen works part time from home as a IT 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 leisure purchases. Aidan started 5th grade at the near by elementary school.



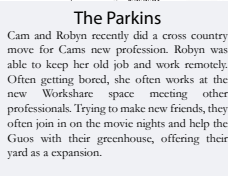
**Beitel and Tsolov**

Dave and Pavel both work in the oil patch with one week on and one off. Their schedules often conflict where they live alone. Often alone at home and with plenty of disposable money, Dave and Pavel decide to create a small startup drone delivery service for their neighbourhood.



**The Lópezes**

Fernando and Tracey have three lovely kids Tony, Charles, and Justin. Fernando works with municipal sanitation while Tracey works as a columnist in the local news station, usually working remotely 3 days a week. Loving theatre and film, they retrofitted their garage for movie nights for the neighbourhood.



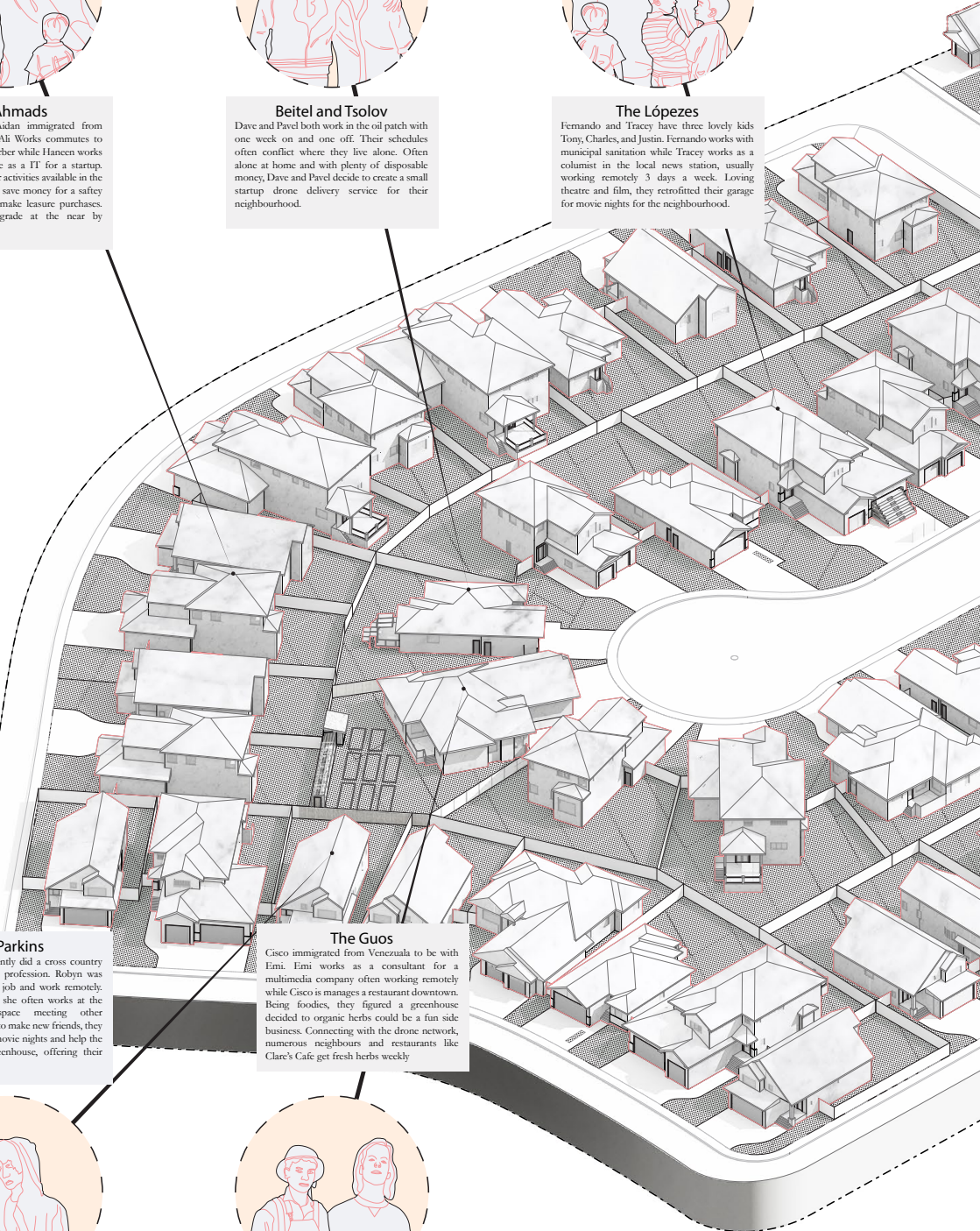
**The Parkins**

Cam and Robyn recently did a cross country move for Cam'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 Guos with their greenhouse, offering their yard as a expansion.



**The Guos**

Cisco immigrated from Venezuela to be with Emi. Emi works as a consultant for a multimedia company often working remotely while Cisco is manages a restaurant downtown. Being foodies, they figured a greenhouse decided to organic herbs could be a fun side business. Connecting with the drone network, numerous neighbours and restaurants like Clare's Café get fresh herbs weekly





## Connecting Suburbia

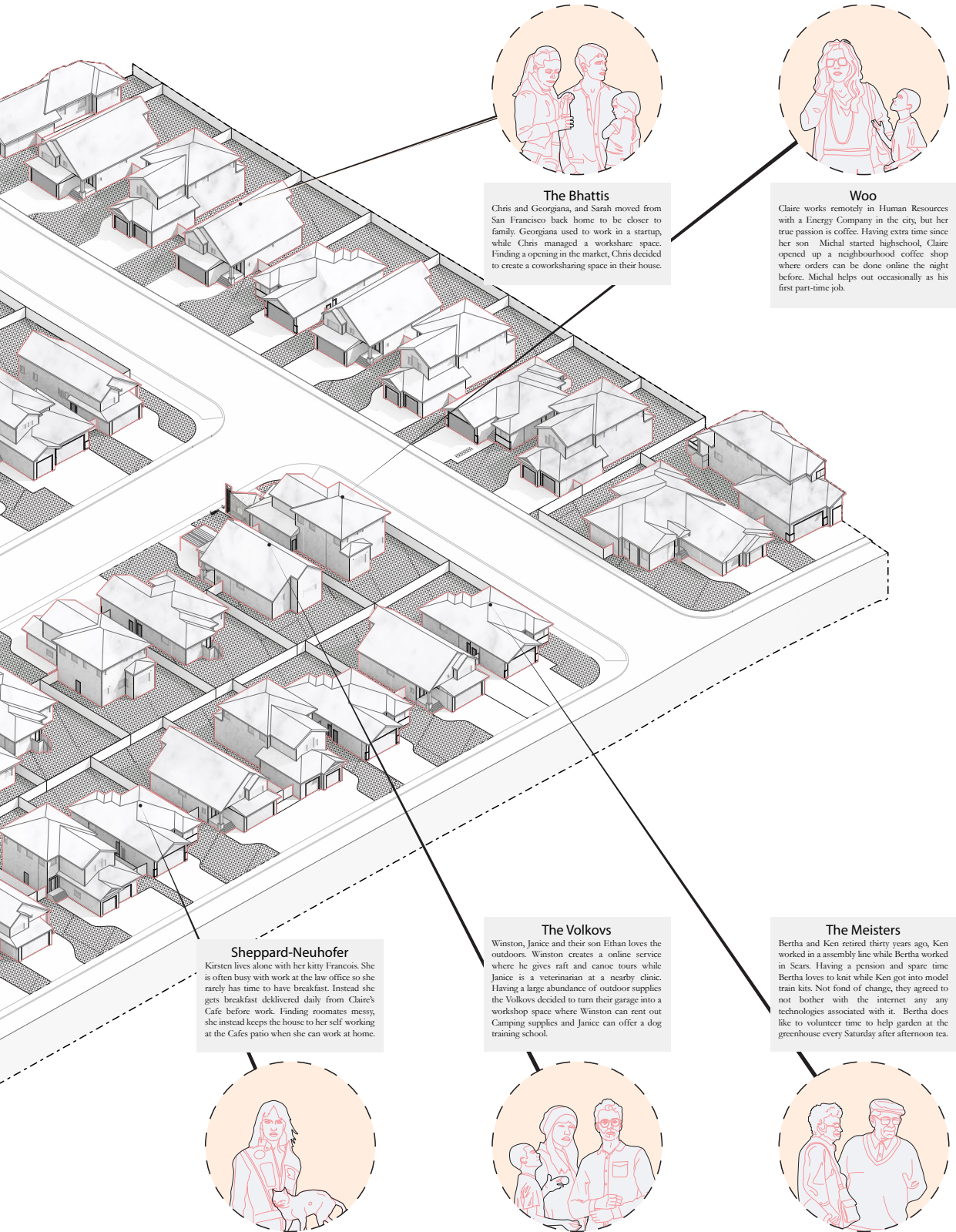
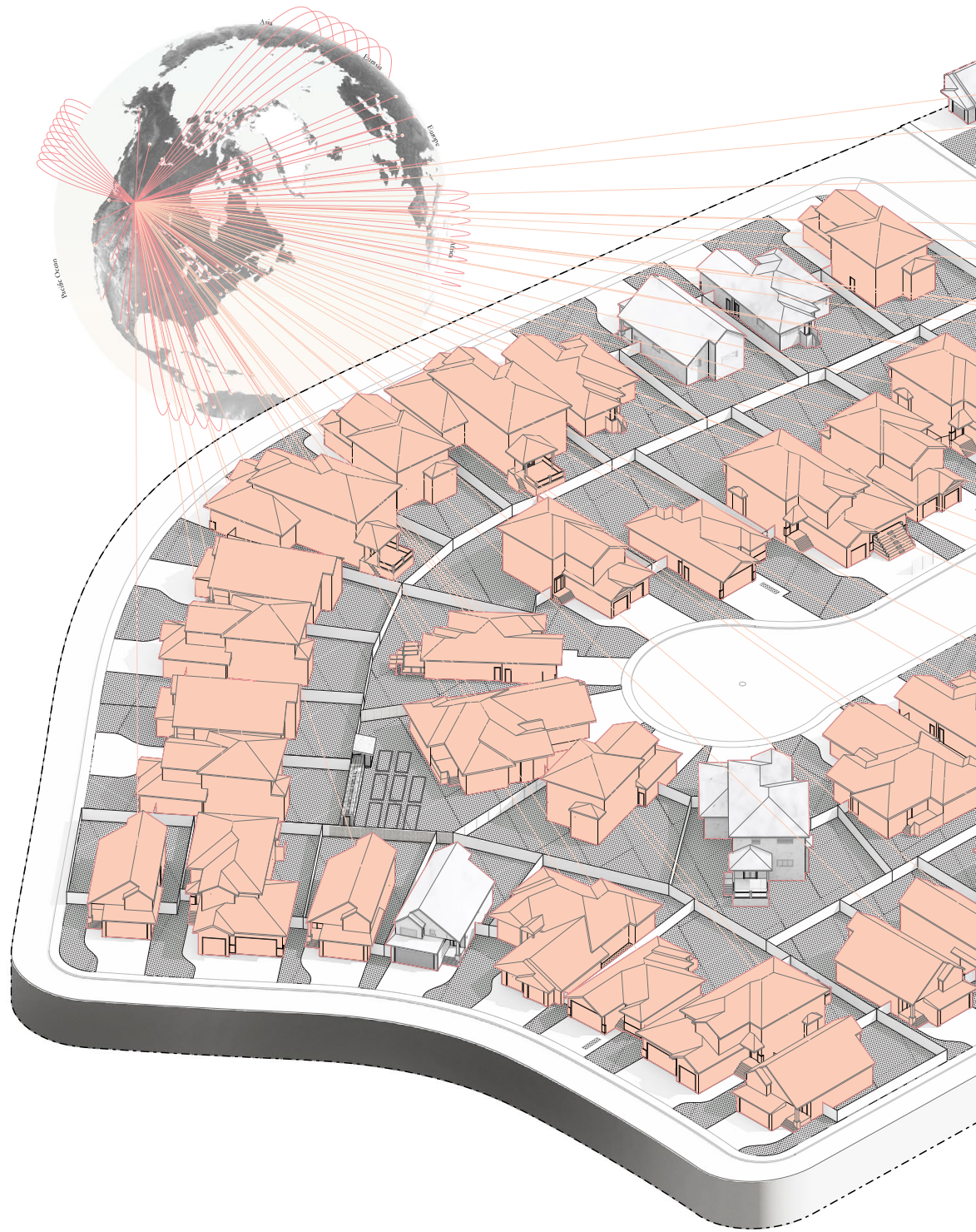


Fig. 3.9.



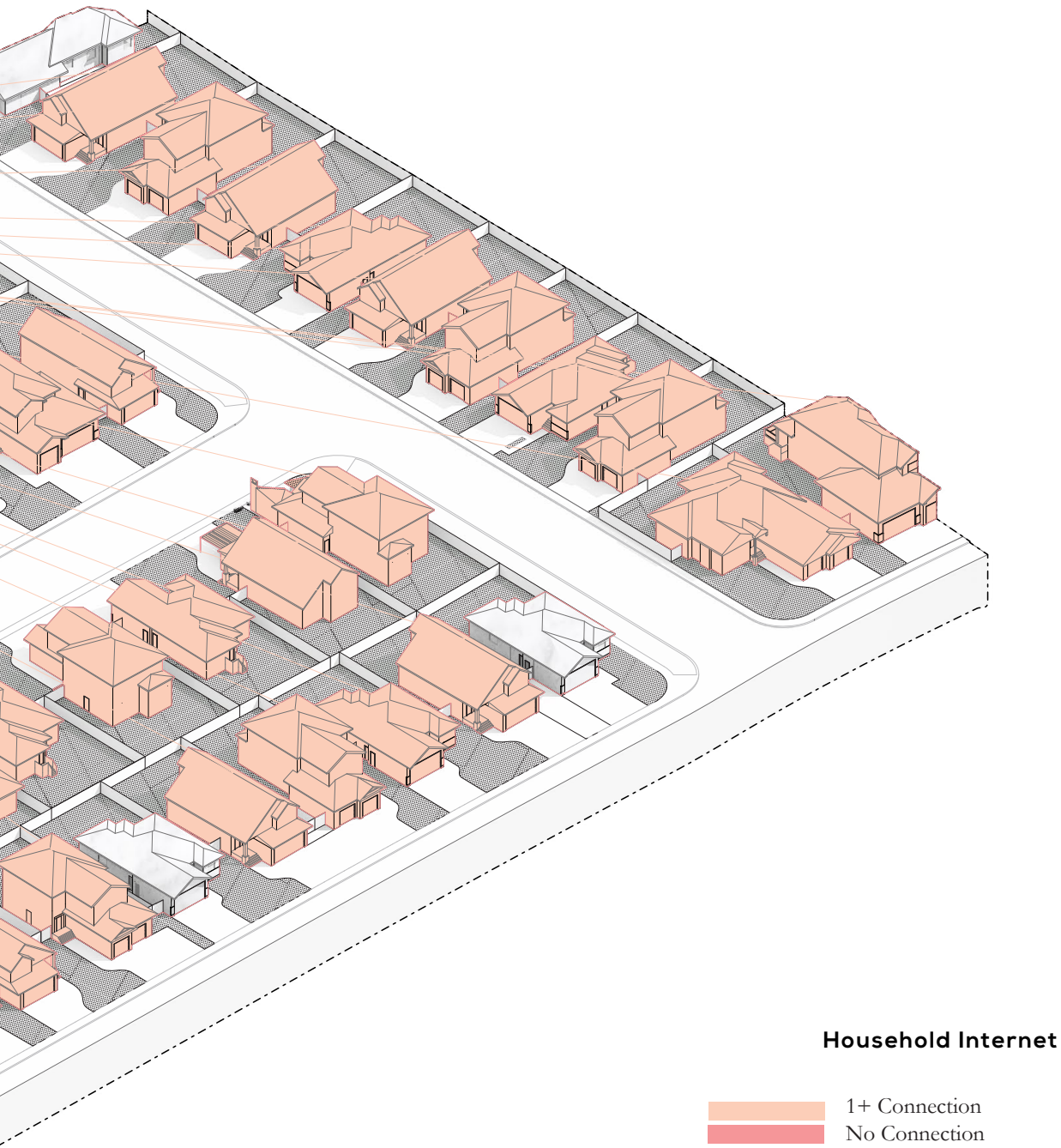
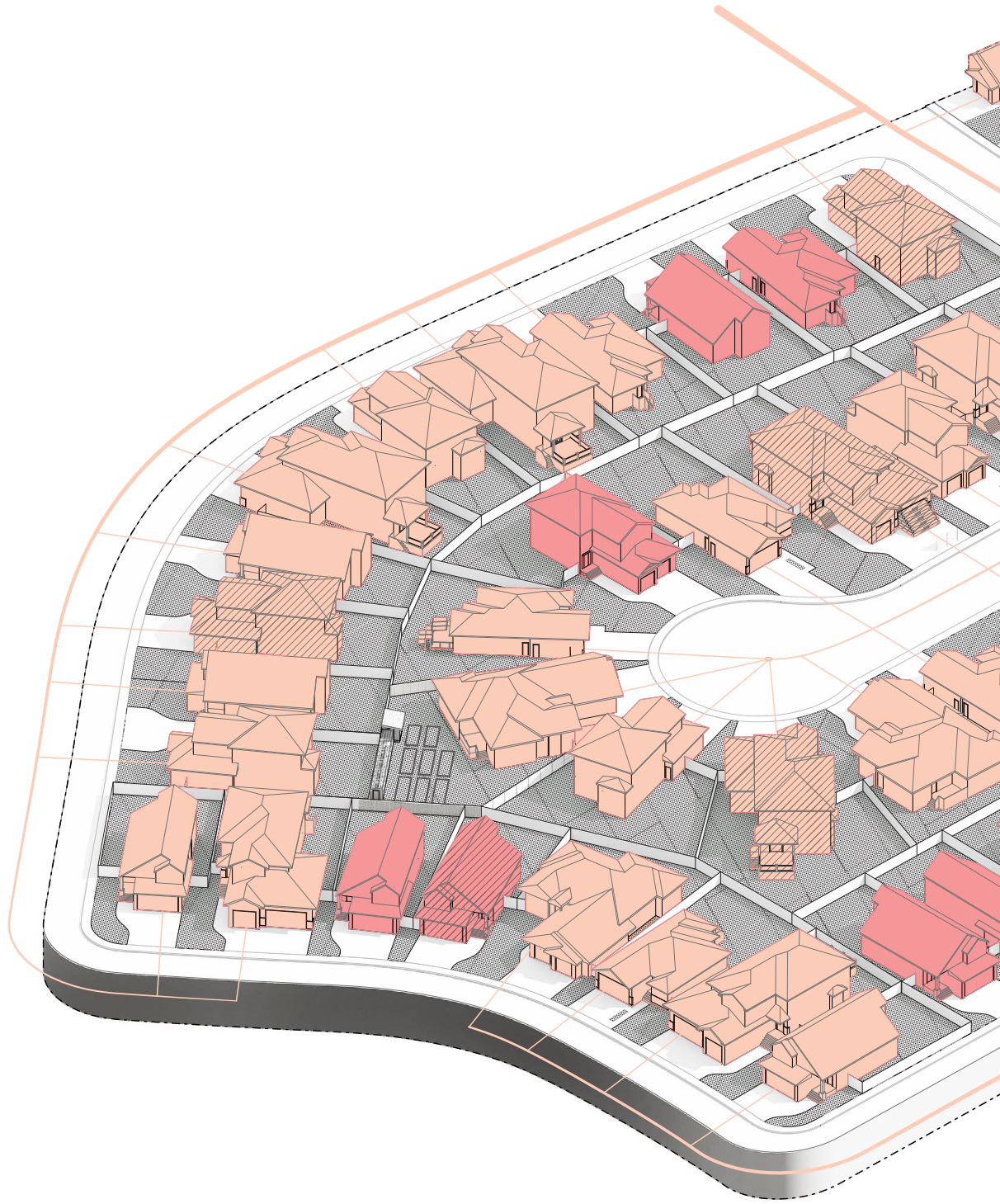


Fig. 3.10.



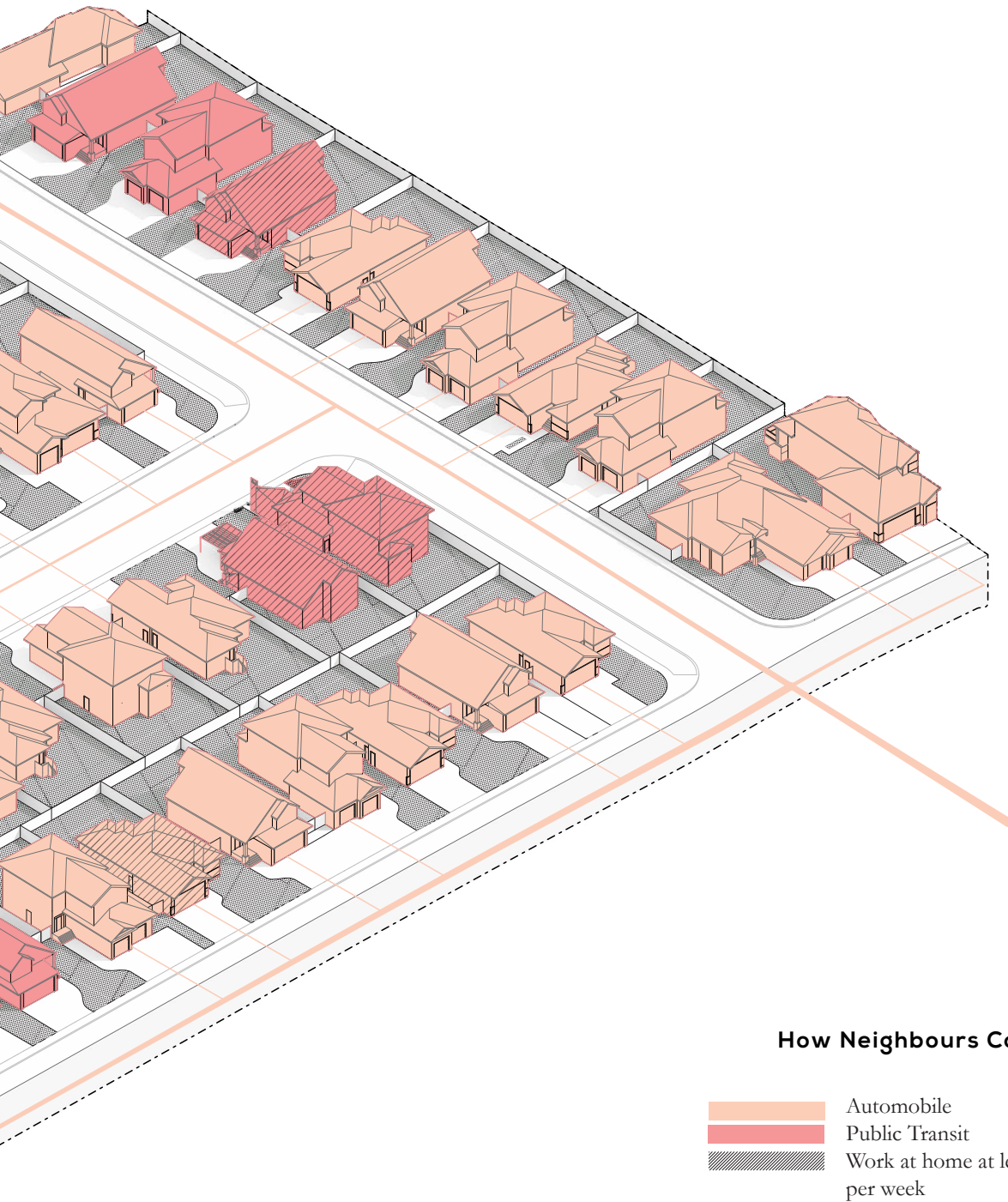


Fig. 3.11.

## Claire'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 built 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 temporary closes shop to work remotely at her IT job.





Fig. 3.12.

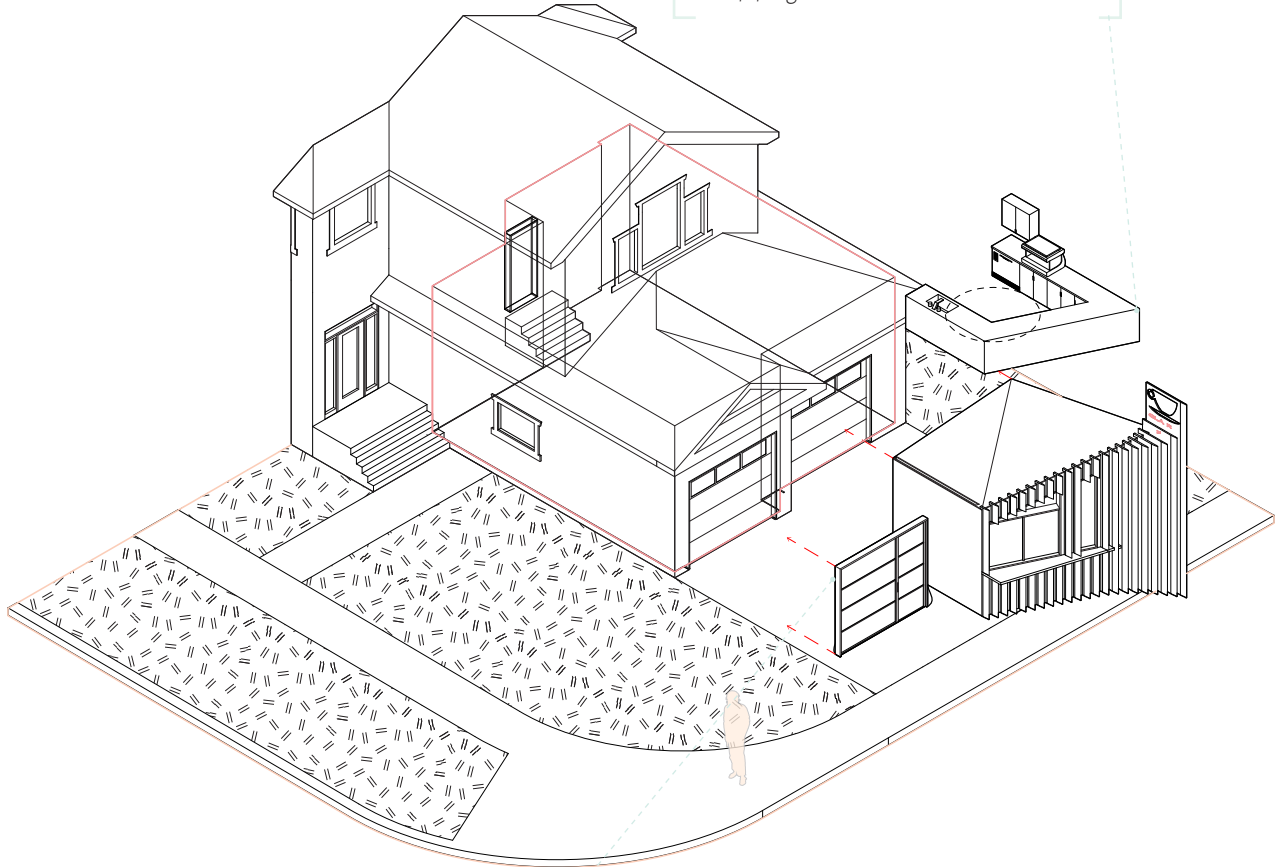






Fig. 3.13.

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

Connecting Suburbia

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

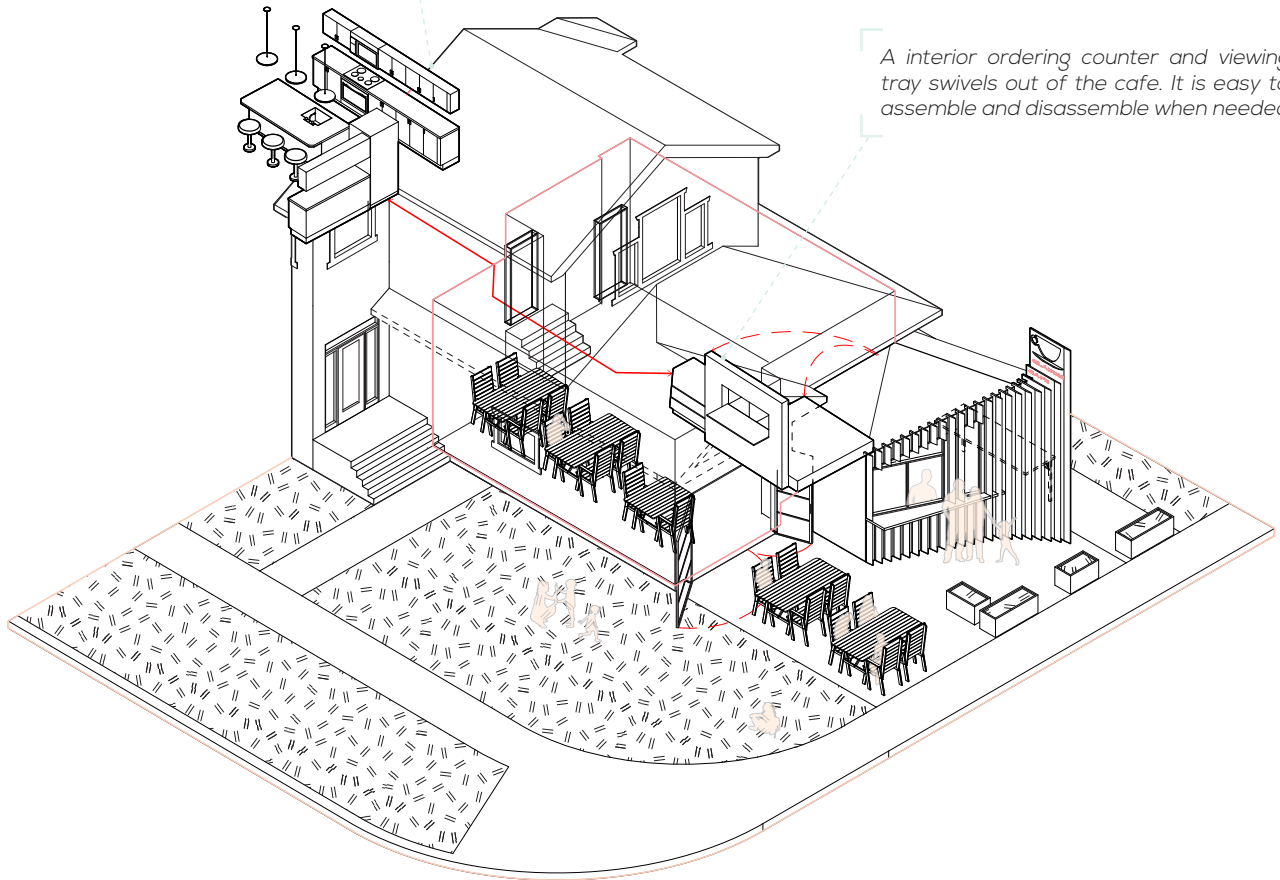
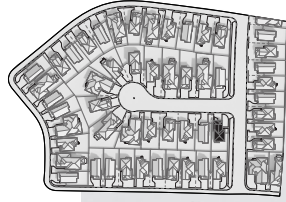


Fig. 3.14.

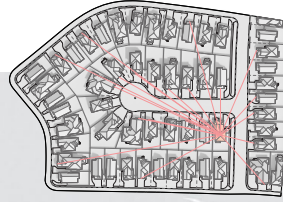
Part 03



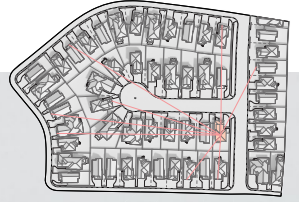
**6 a.m.** Claire wakes up for another day at her Cafe, she looks at her phone and notices that there are already a few orders.



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



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



Greg preordered a cappuccino for his afternoon stroll from work

Jane likes to work remote once a week, she loves the neighbourhood greenery

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

## Connecting Suburbia



Fig. 3.15.

## Tracey's Theater

342 Braeshire Cafe

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.





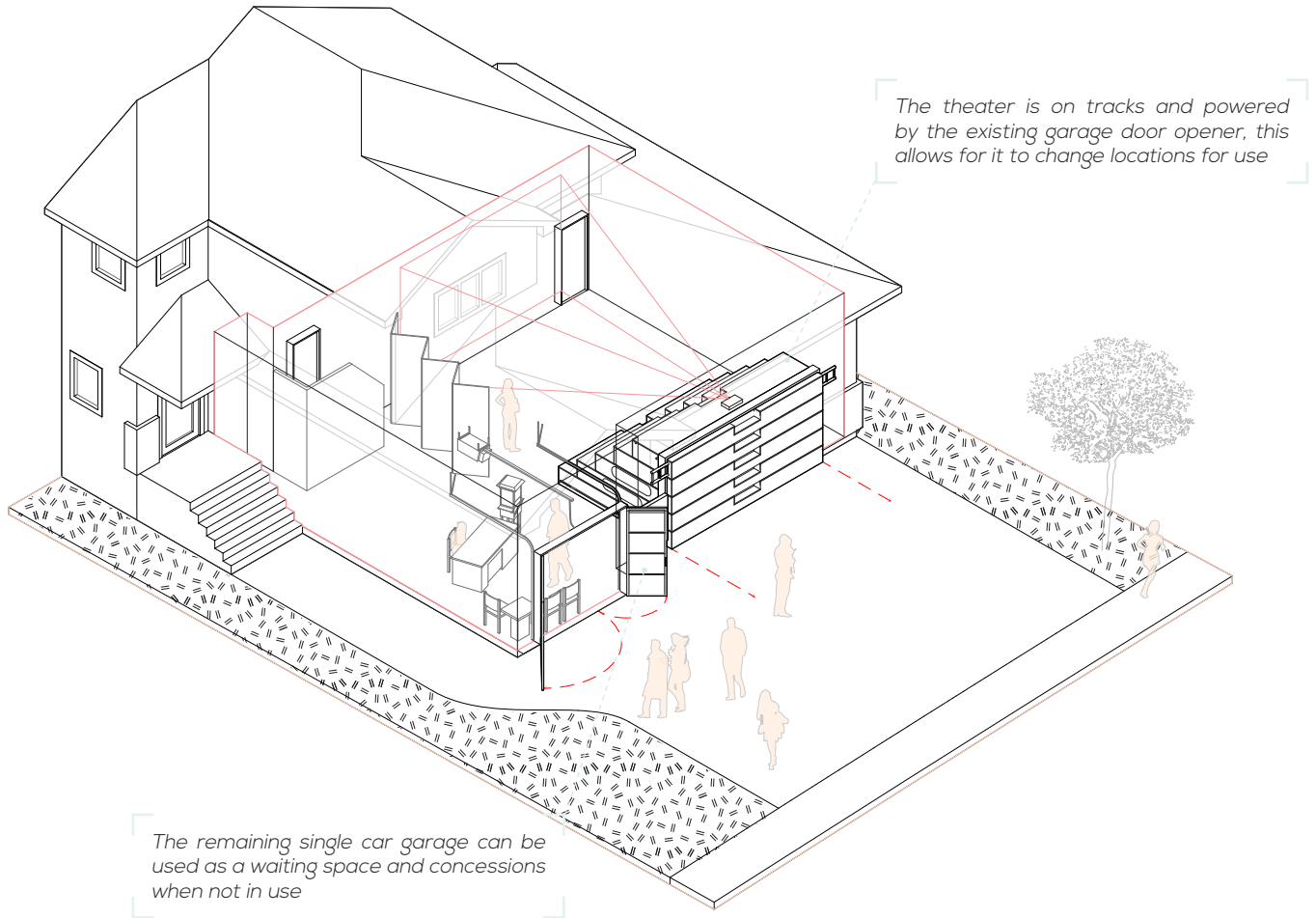
Fig. 3.16.







Fig. 3.17.



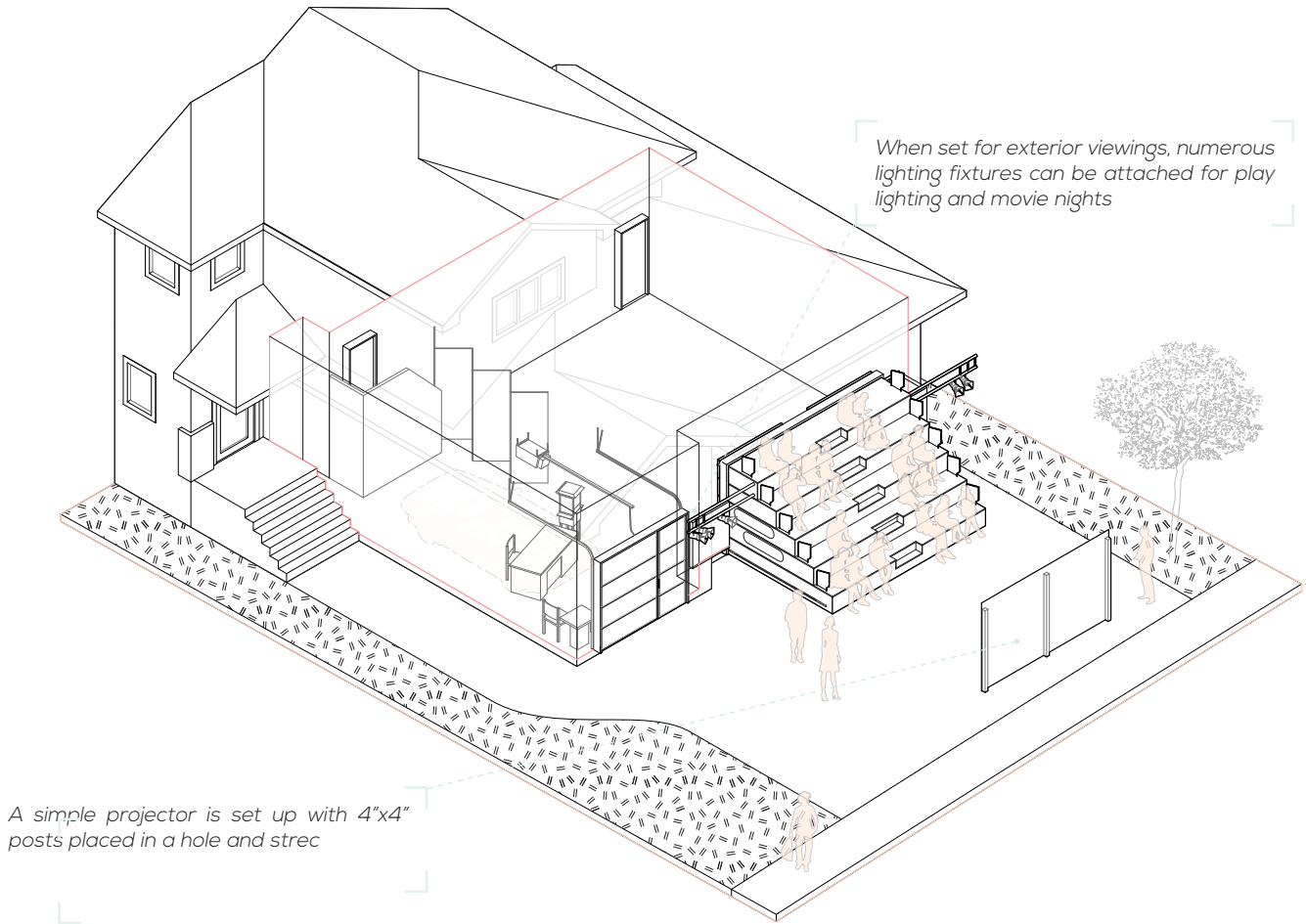


Fig. 3.18.

Part 03



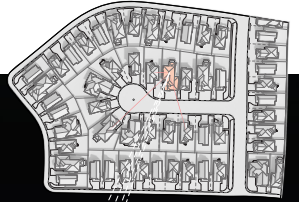
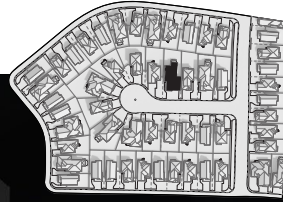
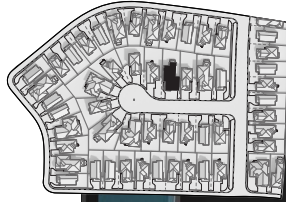
6 a.m. The theater is not in use



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



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

Andy rented out the theater for the night, he invited some of his best friends to watch it with him

## Connecting Suburbia

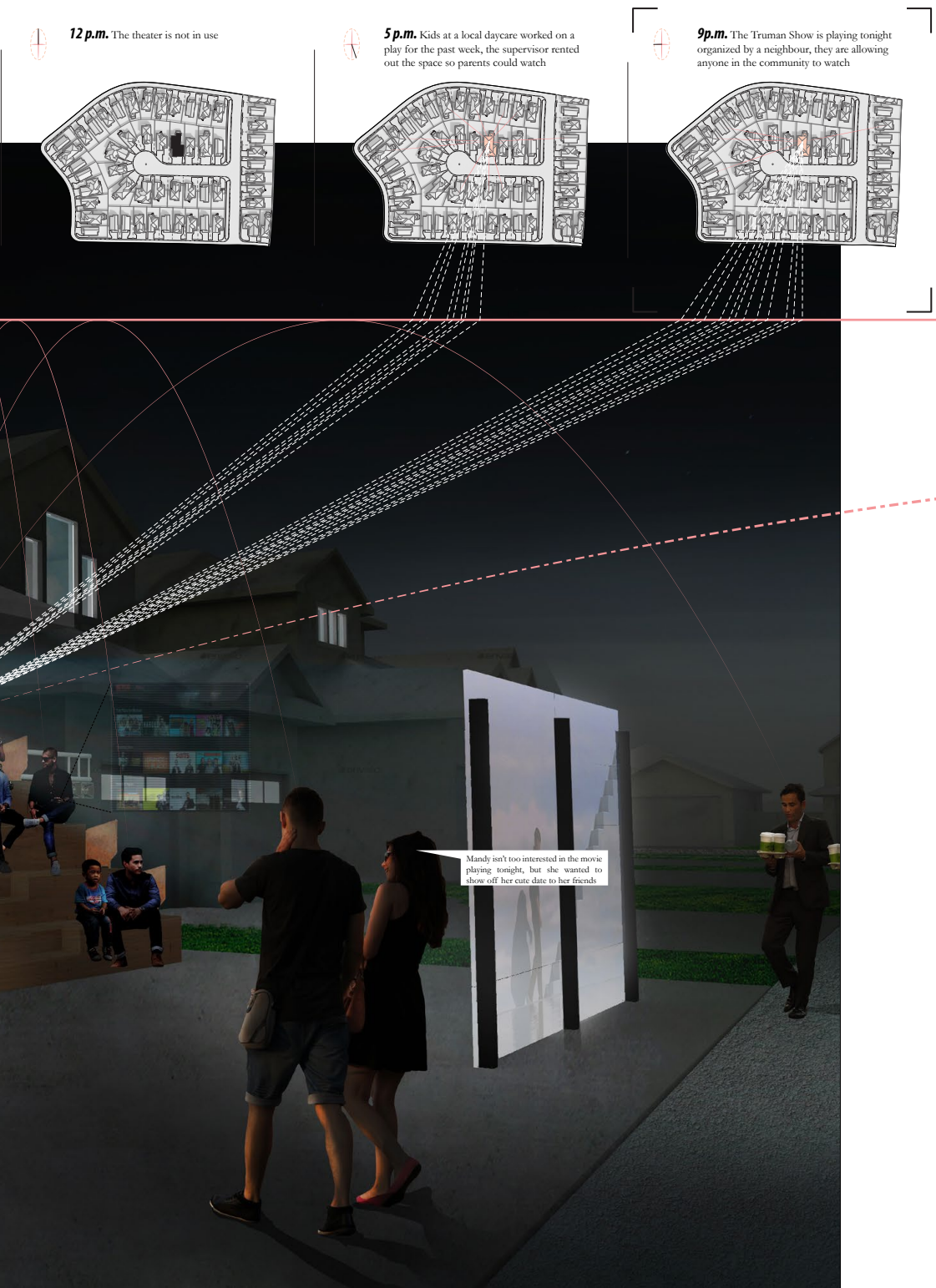


Fig. 3.19.

## 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.

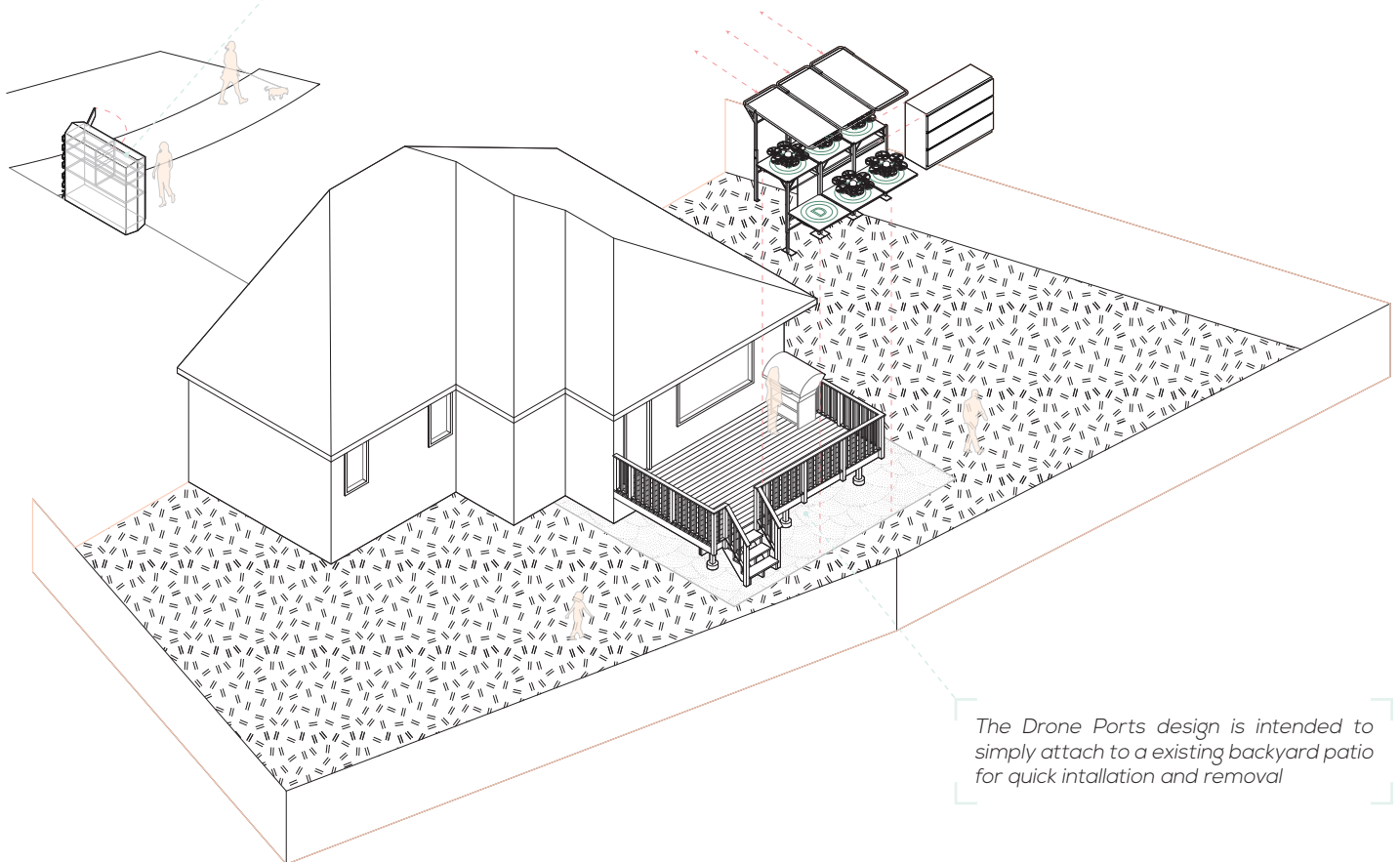






Fig. 3.21.

*A drop box allows for people to drop off packages for delivery, although a drone pickup option is still available*



*The Drone Ports design is intended to simply attach to a existing backyard patio for quick intallation and removal*

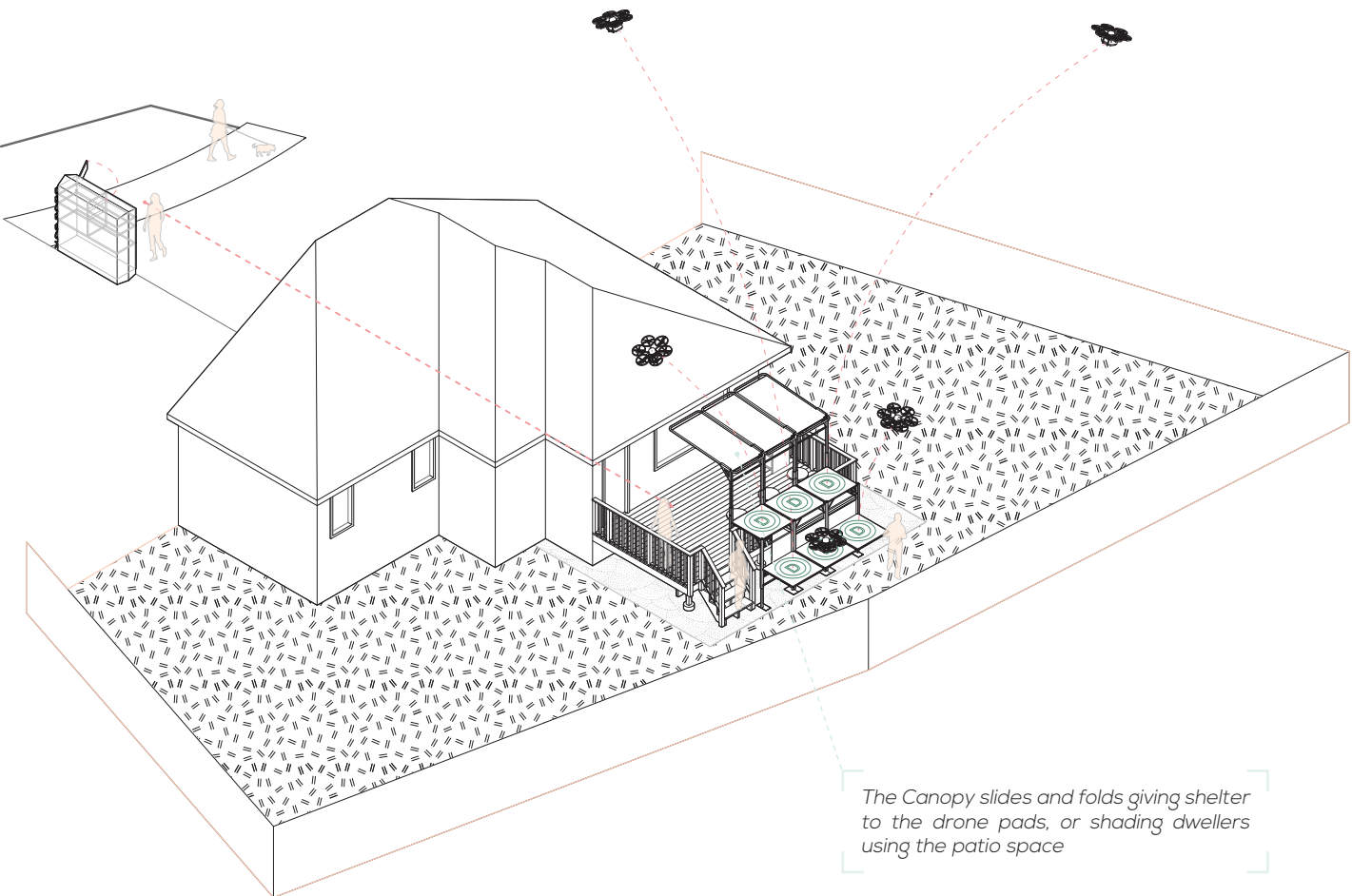
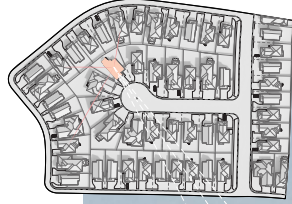


Fig. 3.22.

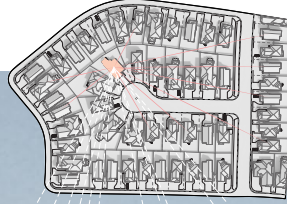
Part 03



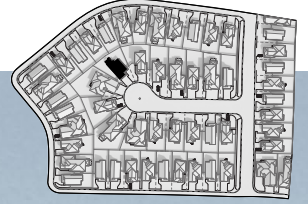
**6 a.m.** Dave sends off a few drones to pick up deliveries from Claires Cafe



**8 a.m.** The main morning rush occurs with Claires Cafe, all of the drones are doing deliveries



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



## Connecting Suburbia



Fig. 3.23.

## 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.

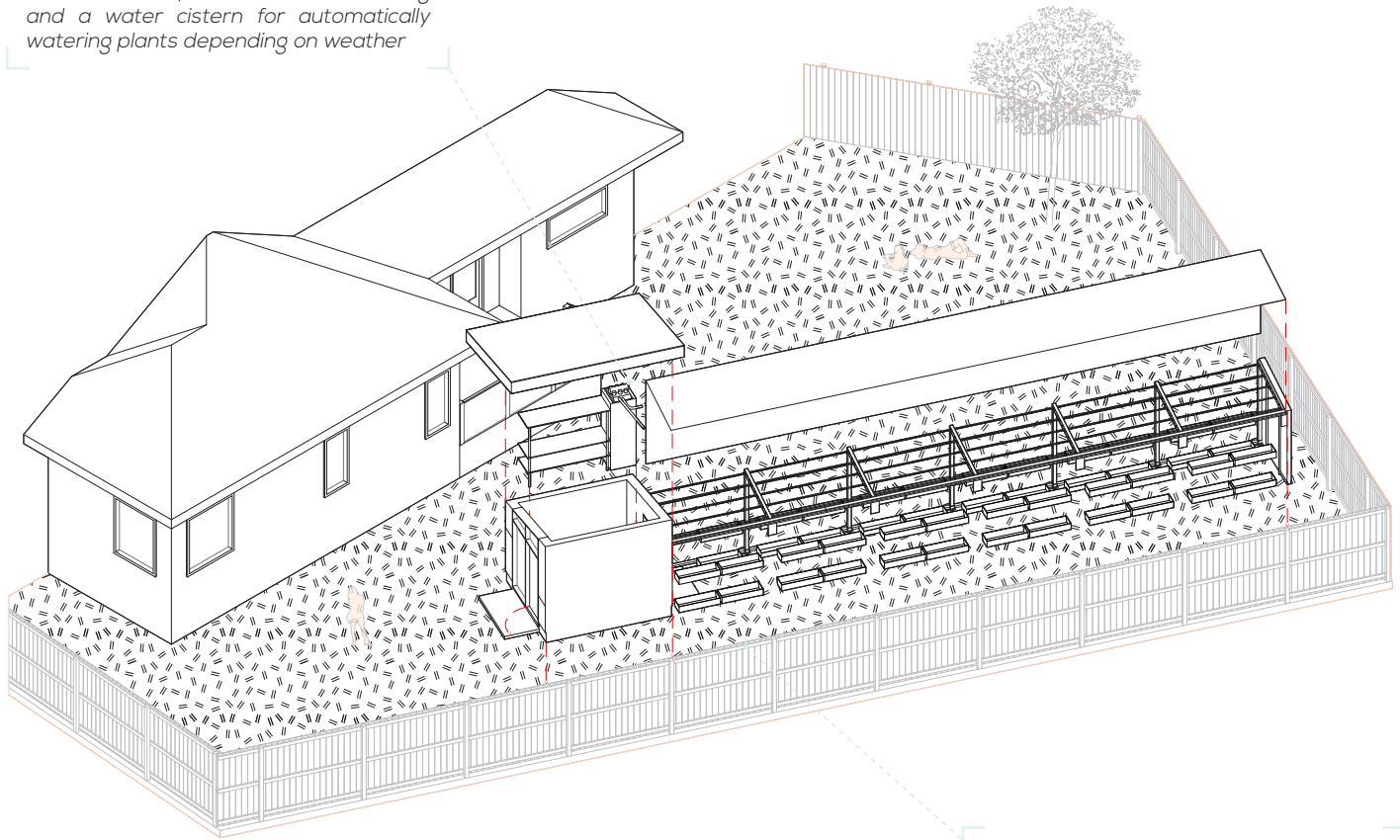






Fig. 3.25.

The shed component includes shelving and a water cistern for automatically watering plants depending on weather



The green house component is designed to fasten to the fence where a plastic poly film covers the structure

The greenhouse can work for incubation where certain plants are transferred to the exterior plots

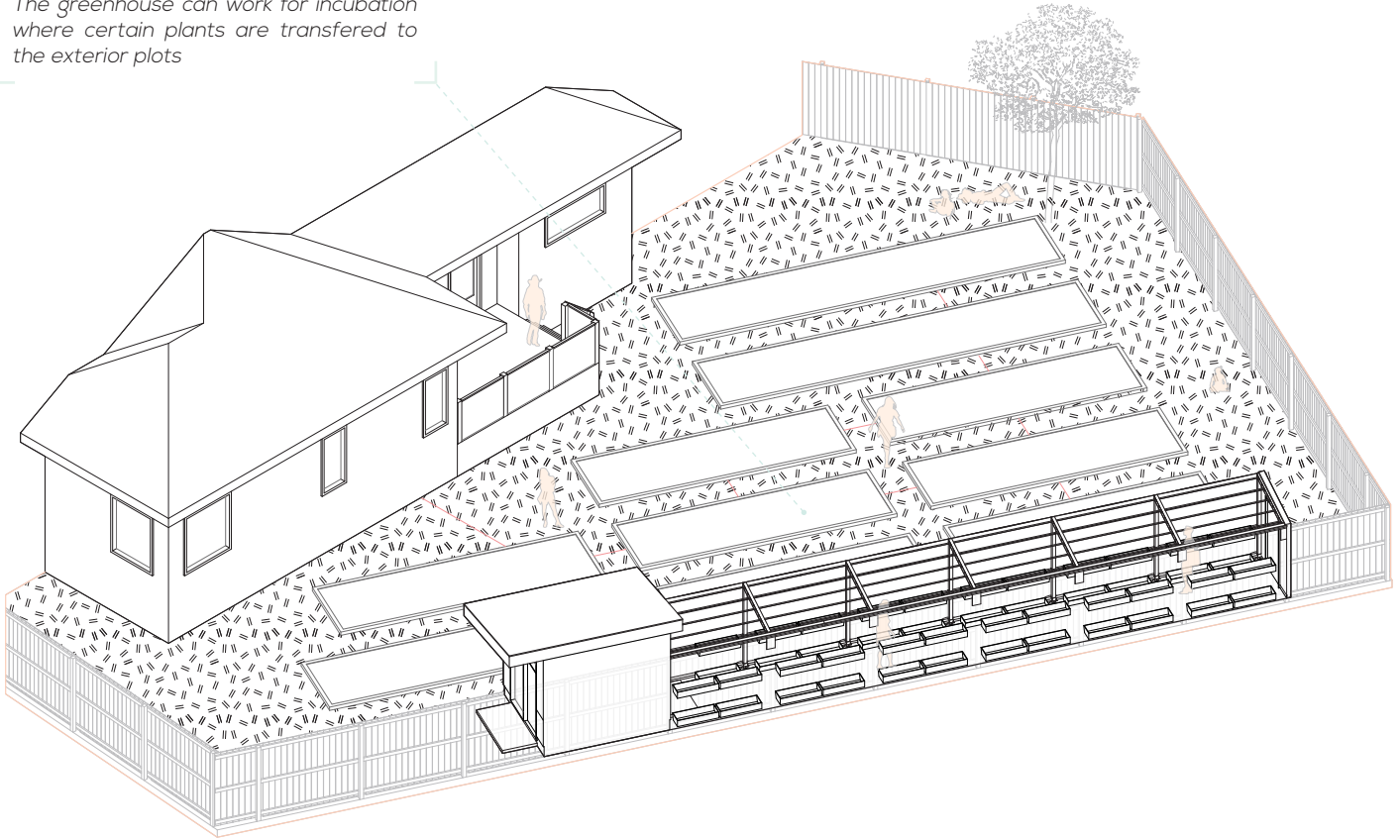
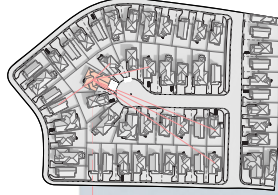


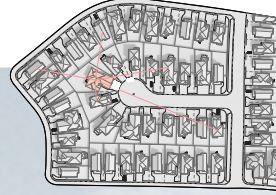
Fig. 3.26.

Part 03

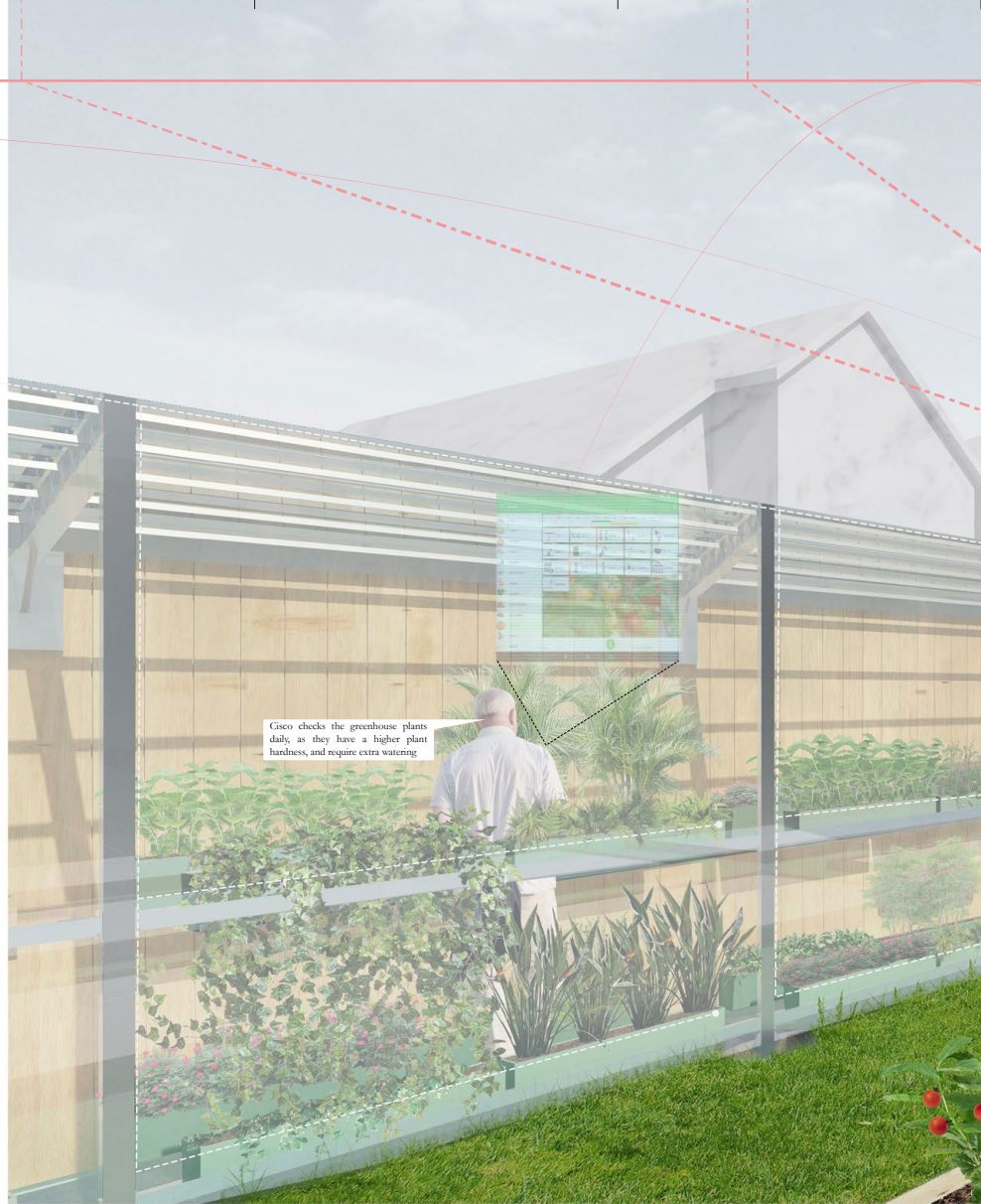
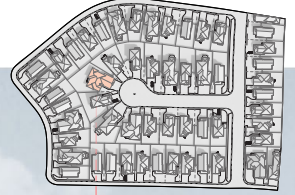
**Tues.** Claire wakes up for another day at her Cafe, she looks at her phone and notices that there are already a few orders.



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



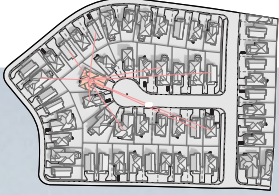
**Thur.** Retires and people working remotely go after the rush hour, the slower business allows Claire to prepare for lunch orders



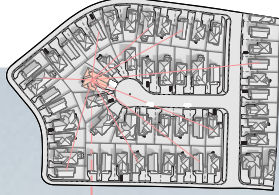
Cisco checks the greenhouse plants daily, as they have a higher plant hardness, and require extra watering

## Connecting Suburbia

**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

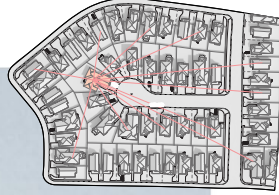


Fig. 3.27.

## 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.





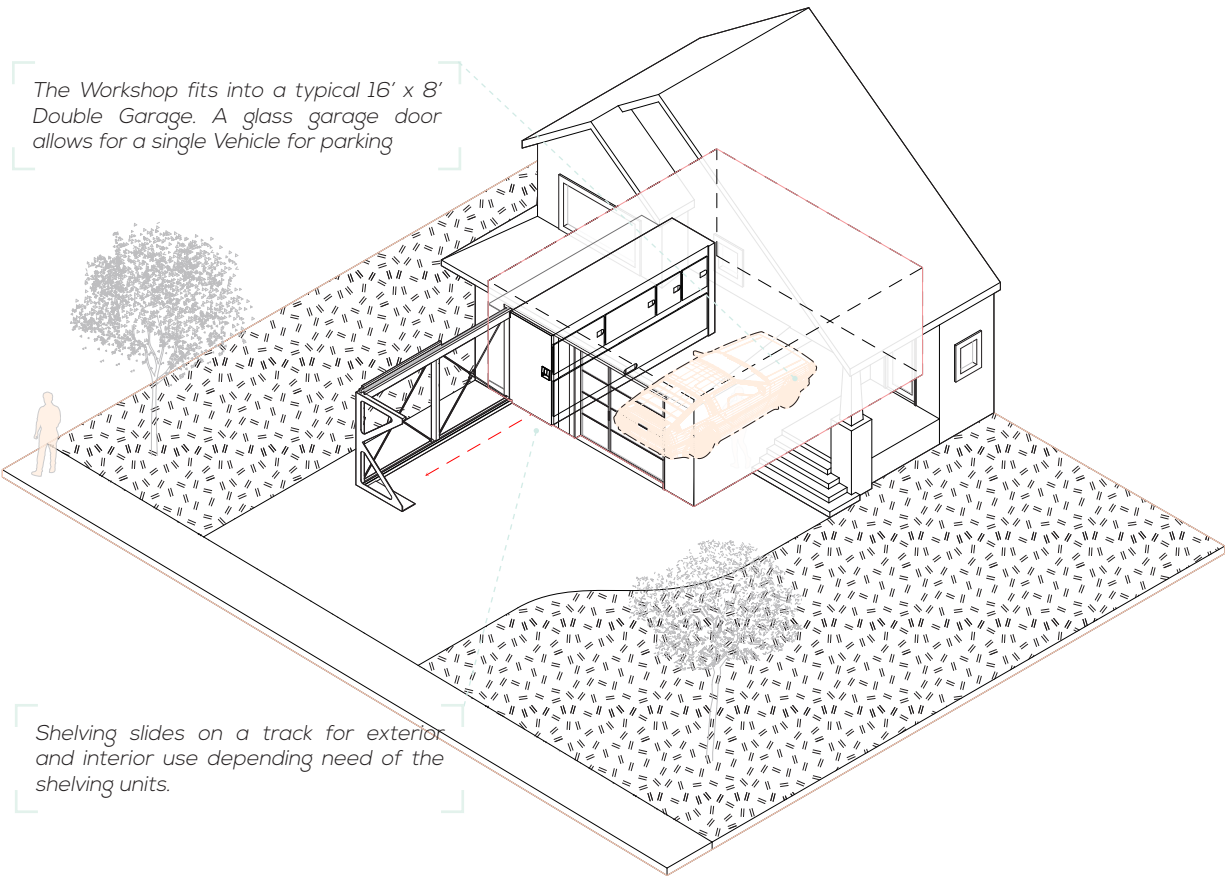
Fig. 3.28.







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 need of the shelving units.



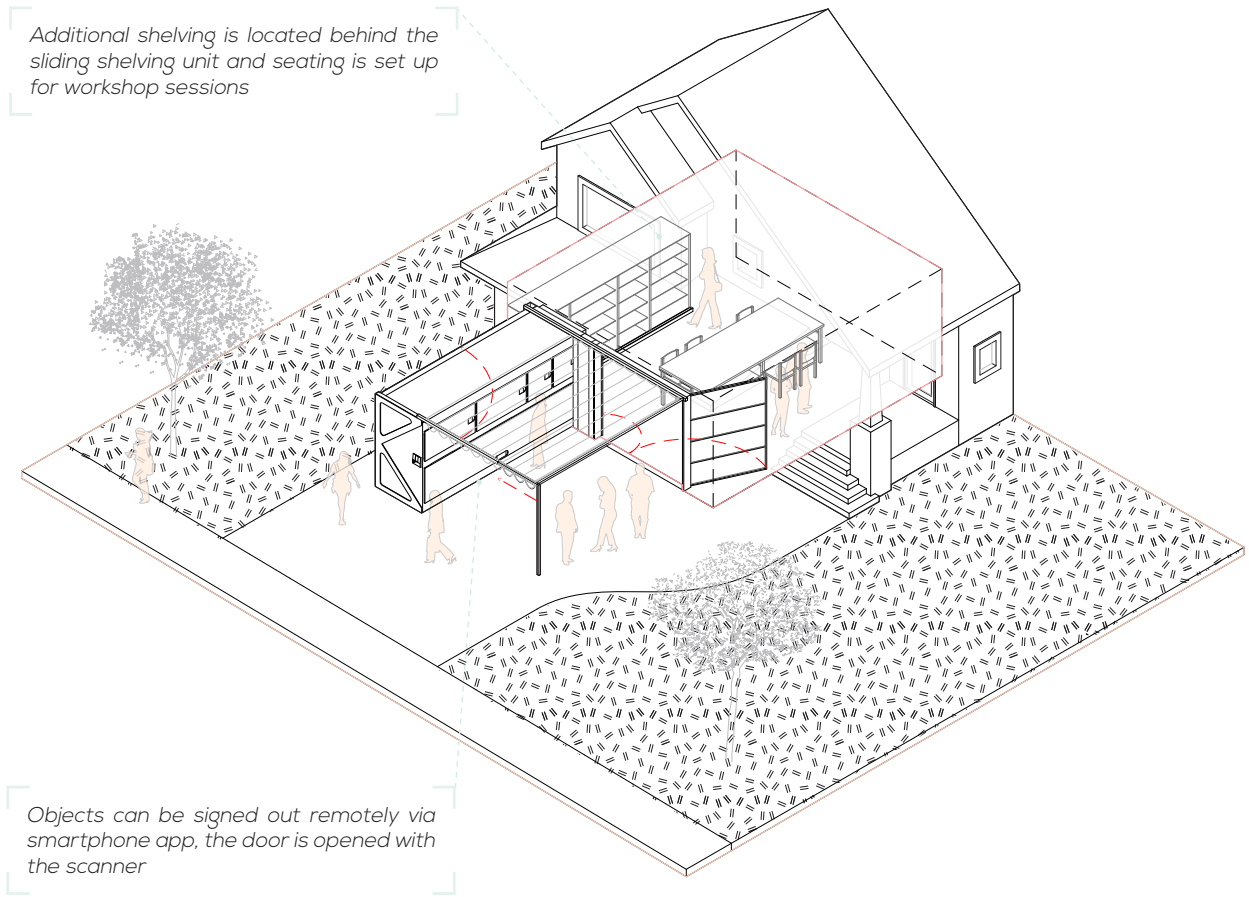
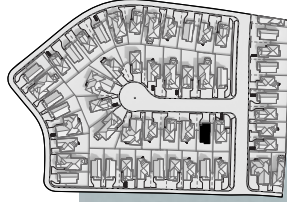


Fig. 3.30.

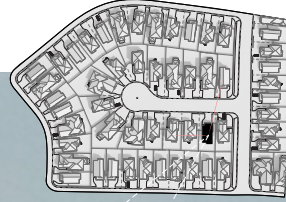
Part 03



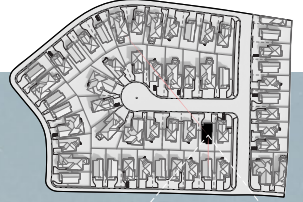
**6 a.m.** Winston leaves to meet some Customers at a nearby provincial park for a hiking tour



**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



## Connecting Suburbia



--- Business Arrangements  
--- Current Users  
--- Daily Users

Fig. 3.31.

## Chris' CoWorking

286 Brightswan Lane

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.





Fig. 3.32.

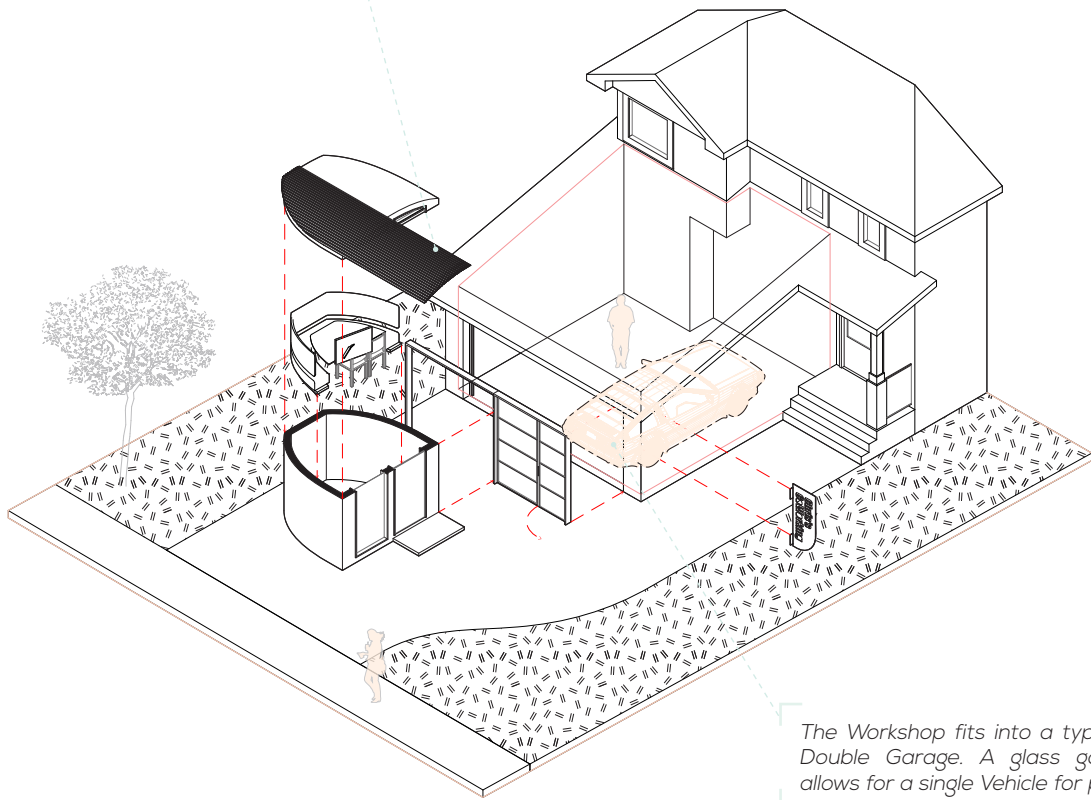






Fig. 3.33.

The pod space acts as a conference room for users allowing for presentations and skype calls



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

The interior workspace includes office tools like photocopiers, scanners, 3d printers which can be booked remotely

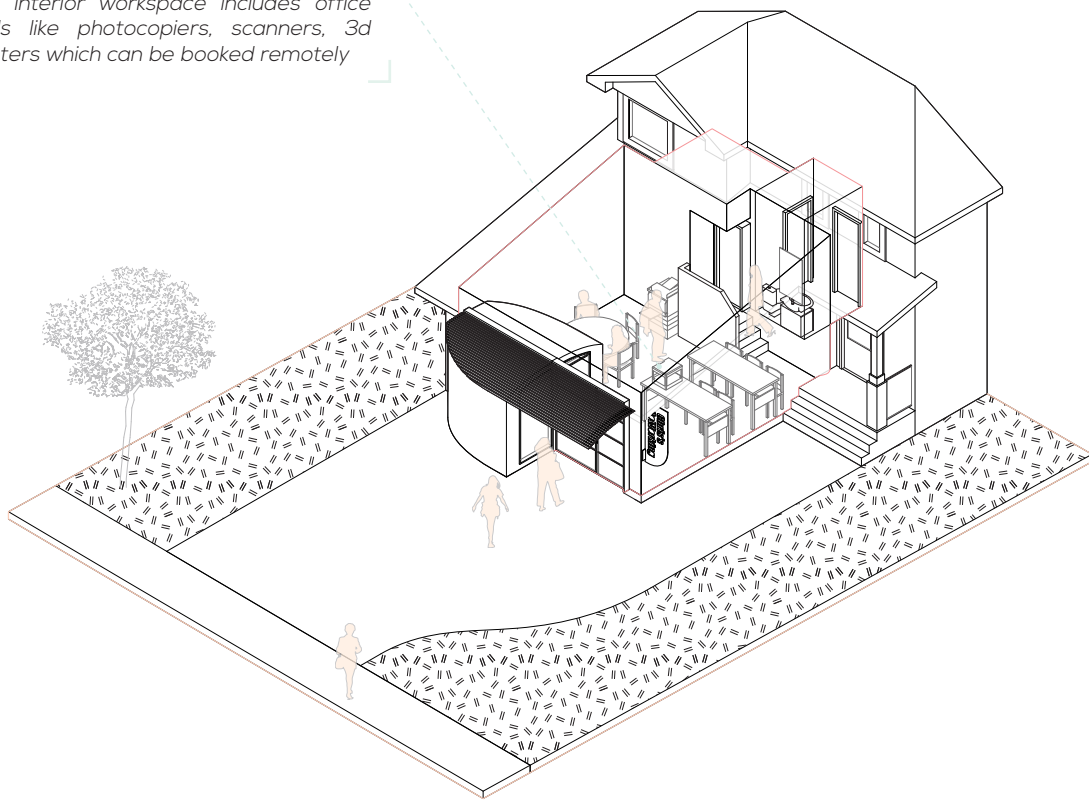
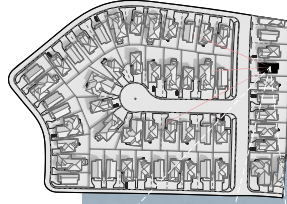


Fig. 3.34.

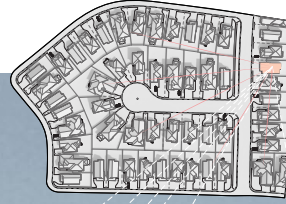
Part 03



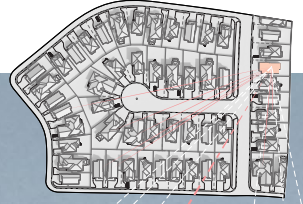
**6 a.m.** The space is already closed, but some customers remotely printed a few documents for their morning meeting



**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 the print job for the remainder of the day



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

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



## Connecting Suburbia



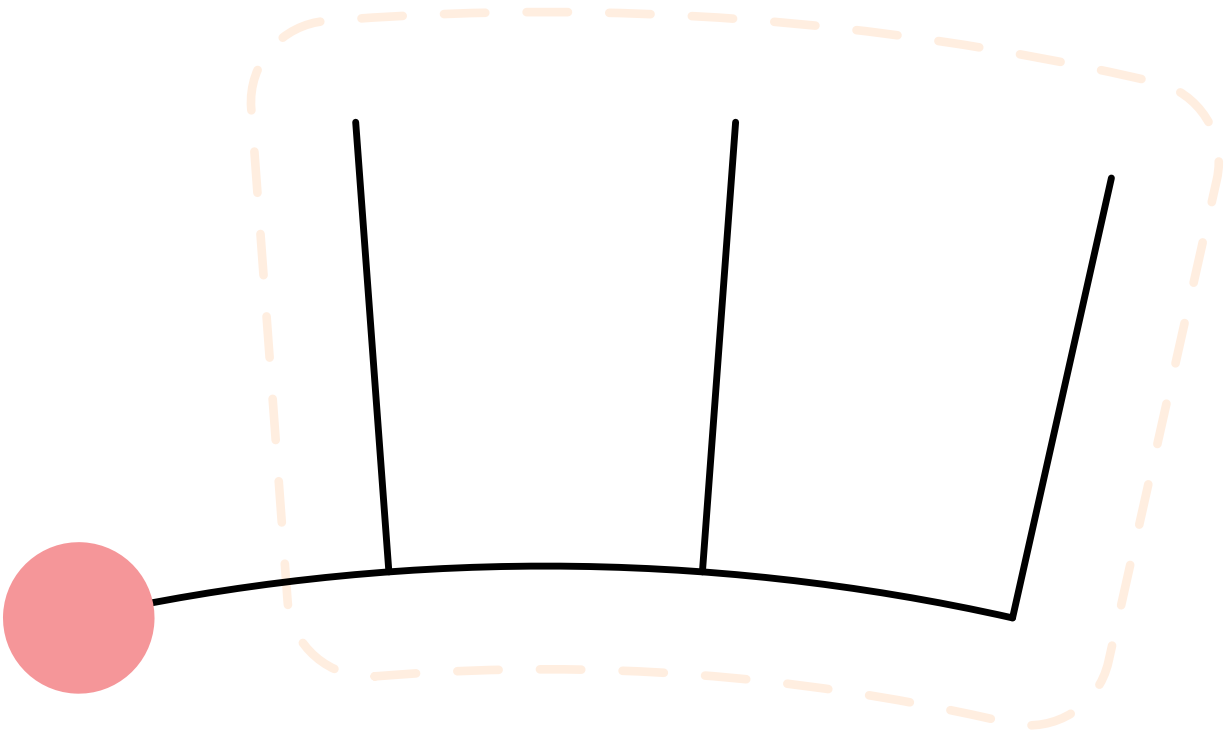
Fig. 3.35.



Connecting Suburbia



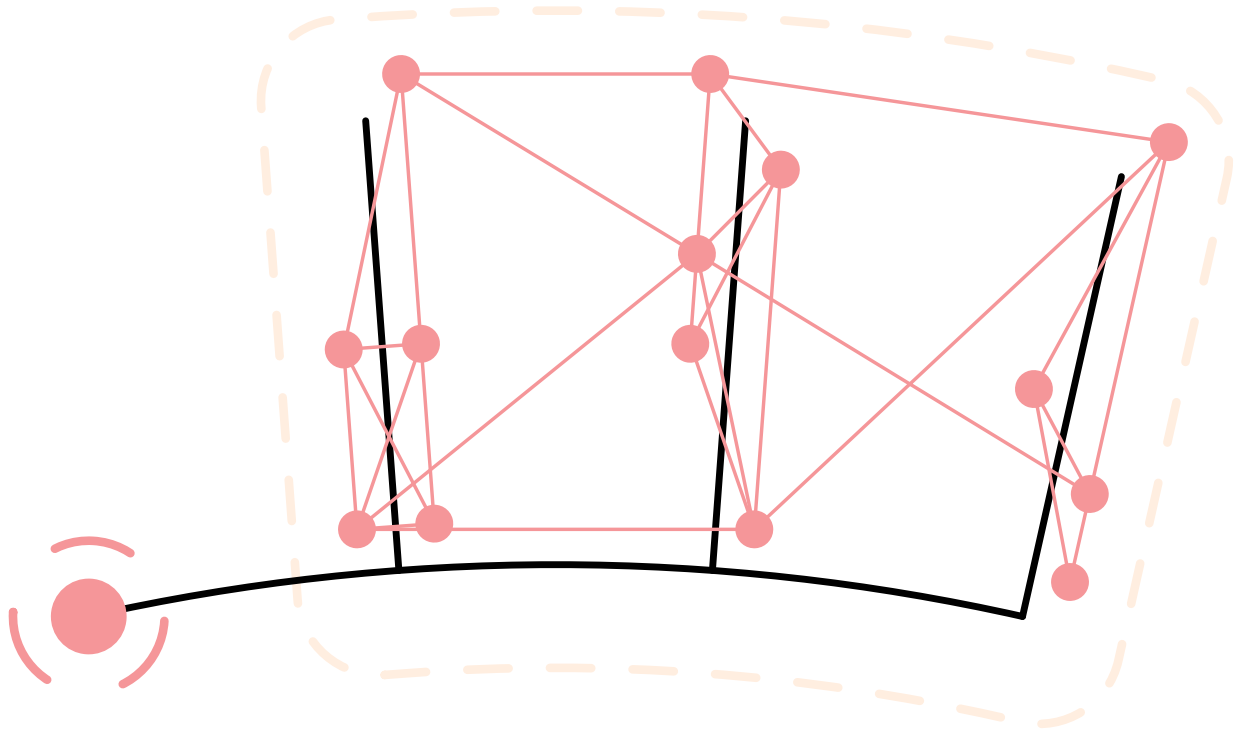
Fig. 3.36.



## 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 populace.

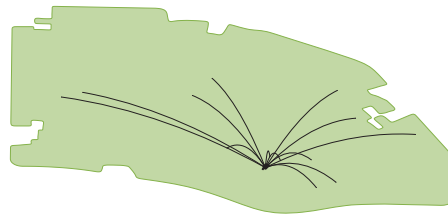
Fig. 3.37.



**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.

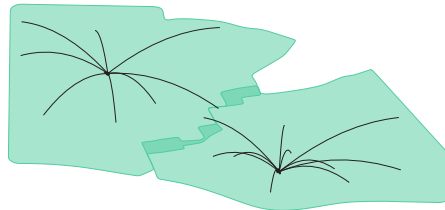
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**Theatre**

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

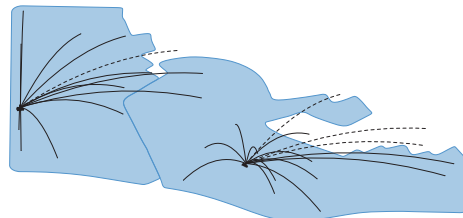
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**Drone Ports**

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

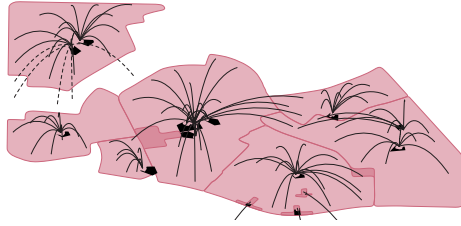
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**Workshare Spaces**

Two workshare spaces exist in the neighbourhood, not quite covering the entire neighbourhood. a market exists for another shop to open

## Connecting Suburbia



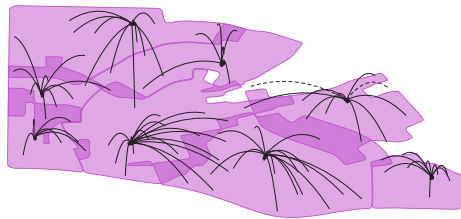
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### **Green Houses**

+

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

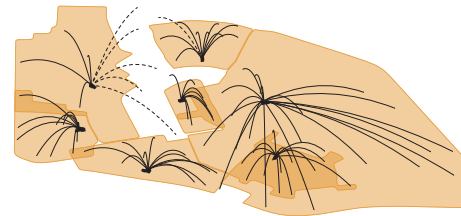
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### **Restaurants/ Groceries**

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

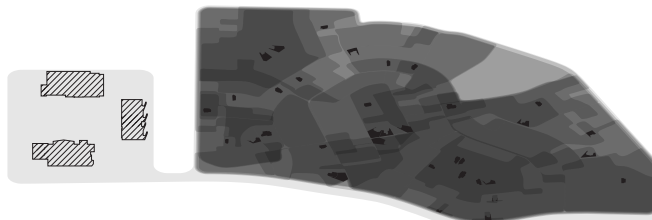
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### **Workshops / Sharing Spaces**

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

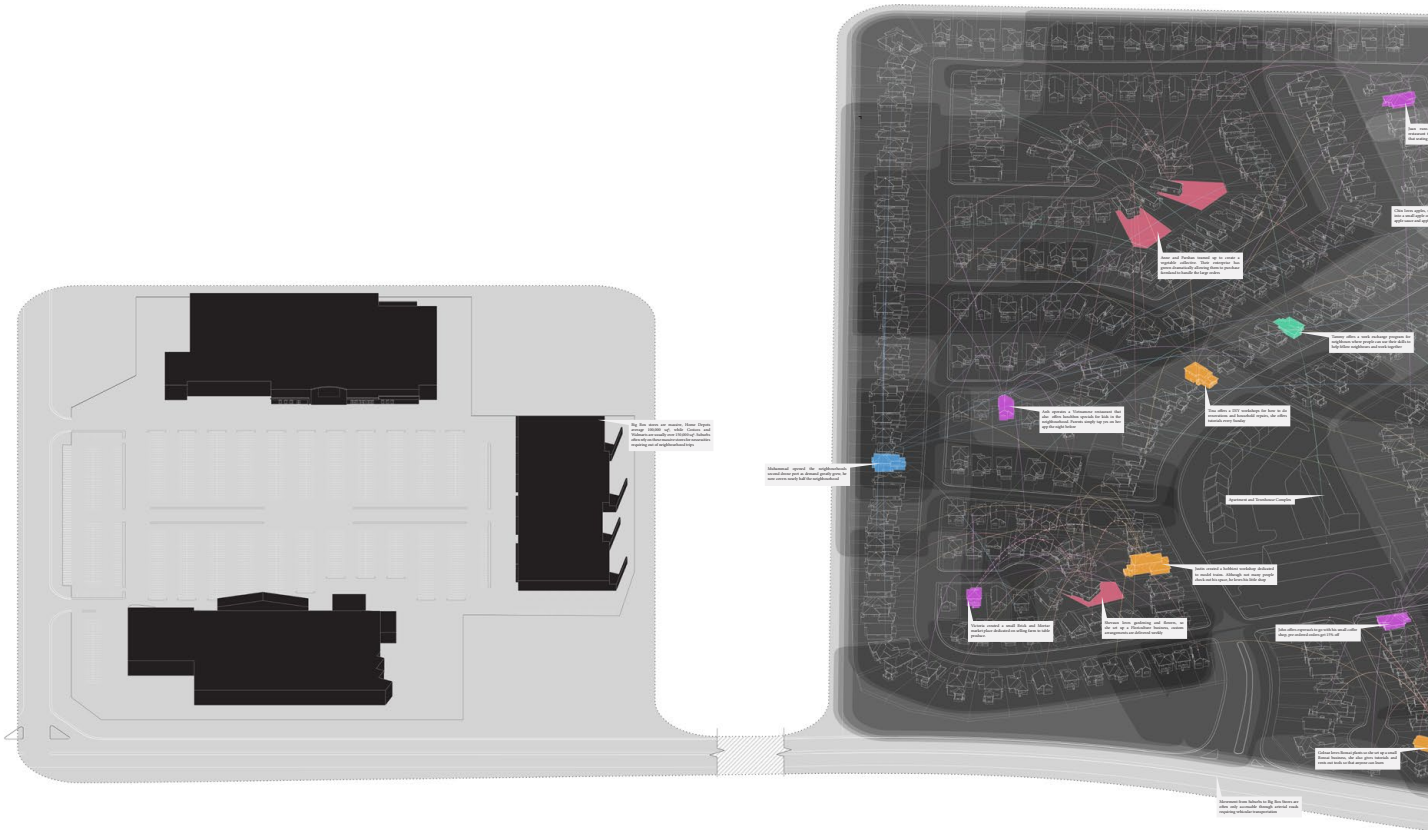
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### **A Connected Suburb**

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 so as a village

Fig. 3.38.

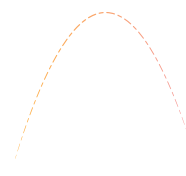


# Connecting Suburbia



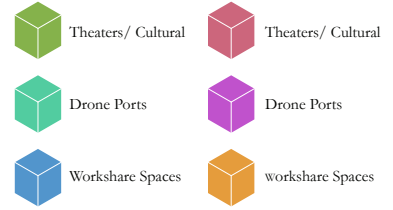
## Digital Connections

Various customers connected via orders, check outs, posts during the a one day period



## Business Connections

Businesses having various arrangements with each other within the neighbourhood



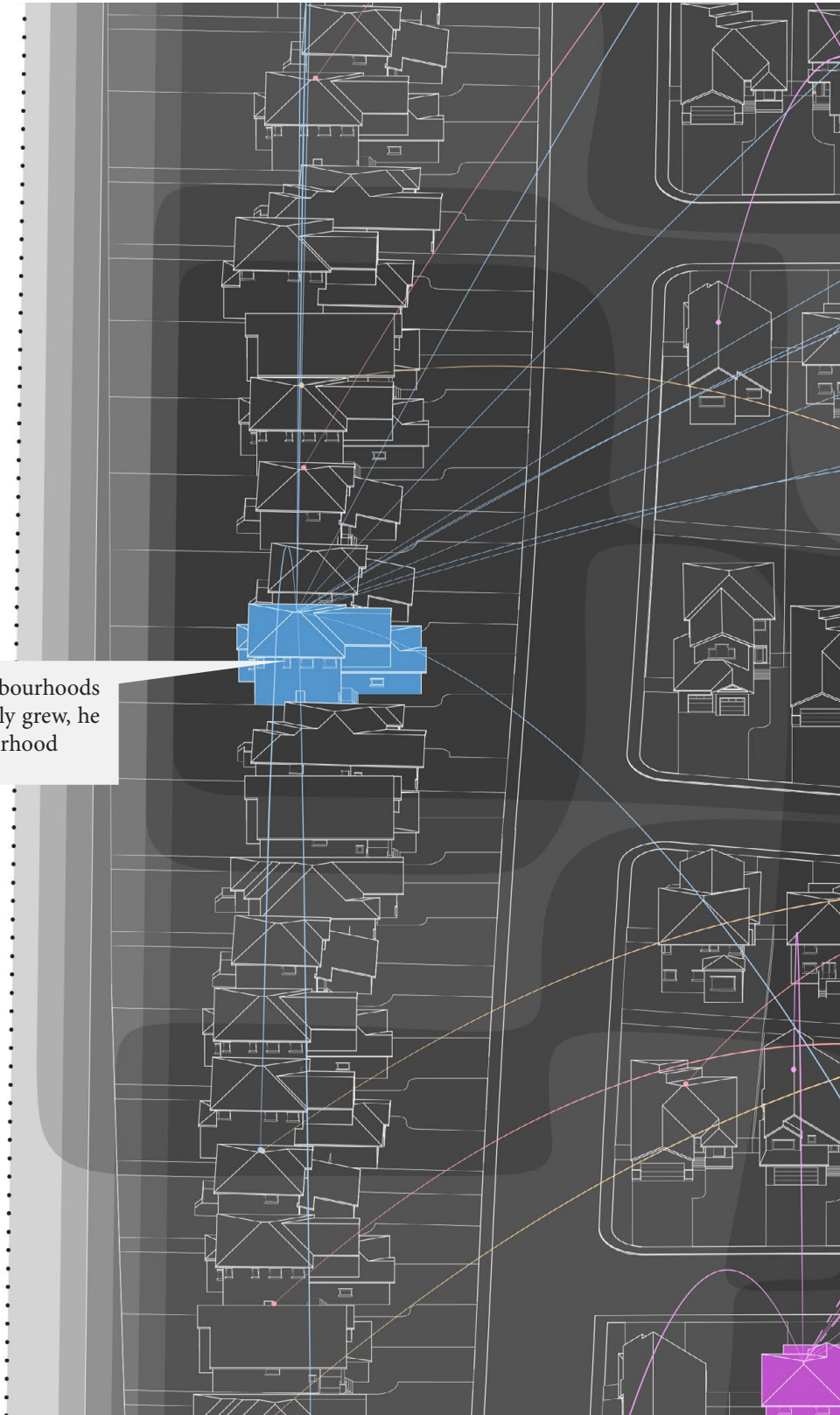
## Typologies

Types of Interventions allowed into the existing suburban neighbourhood



Fig. 3.39.

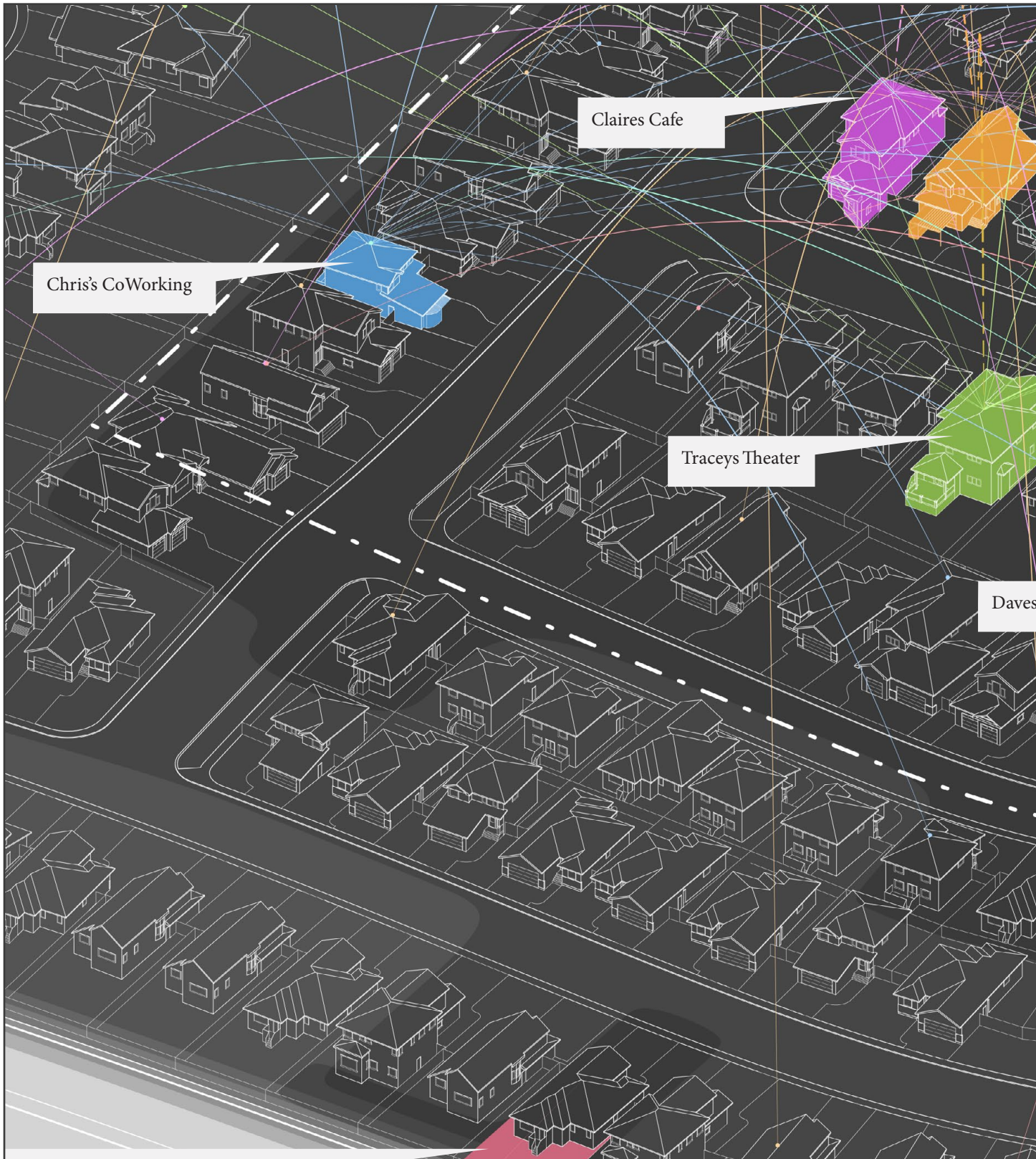
Muhammad opened the neighbourhoods second drone port as demand greatly grew, he now covers nearly half the neighbourhood



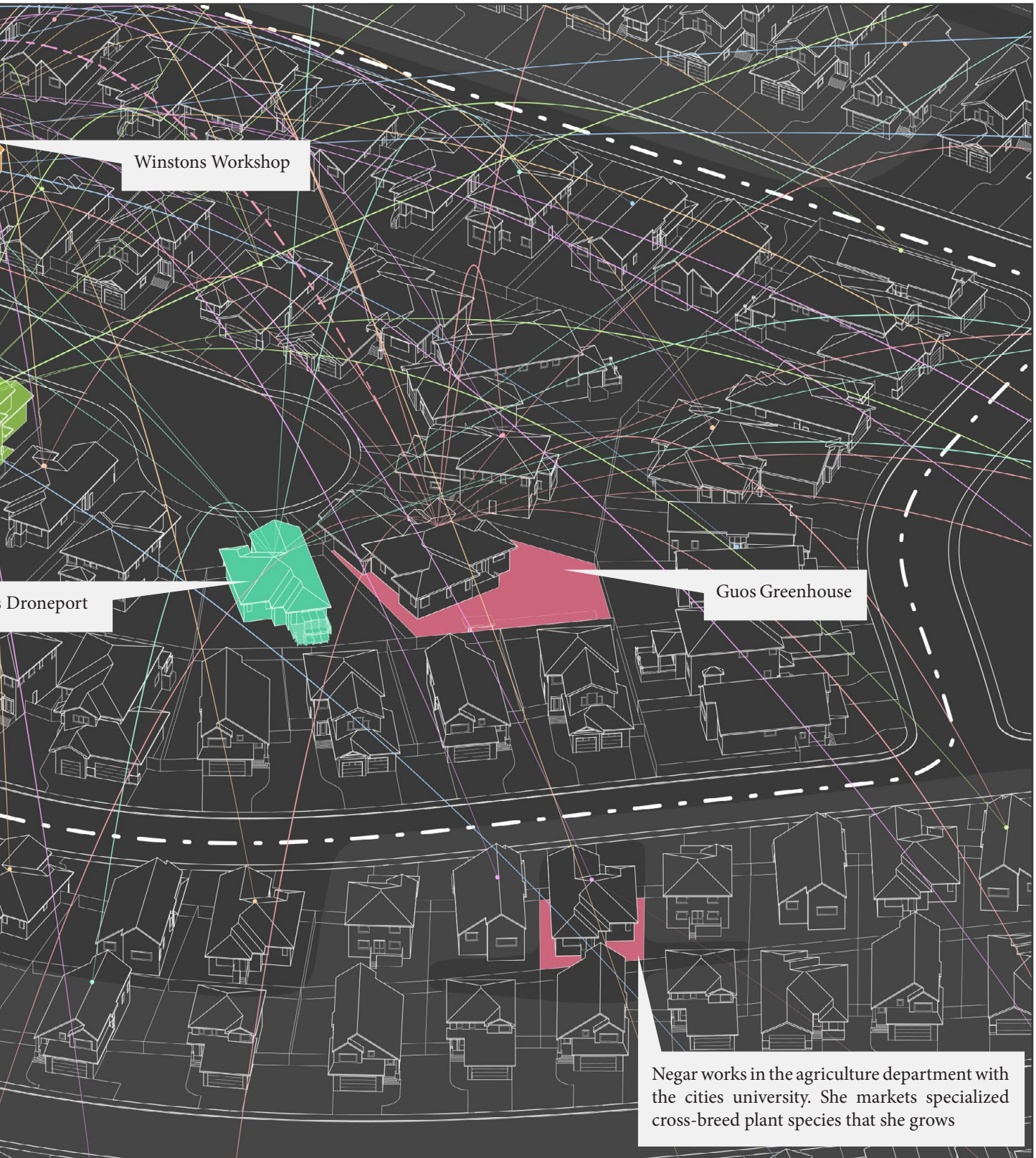


Anh operates a Vietnamese restaurant that also offers lunchbox specials for kids in the neighbourhood. Parents simply tap yes on her app the night before

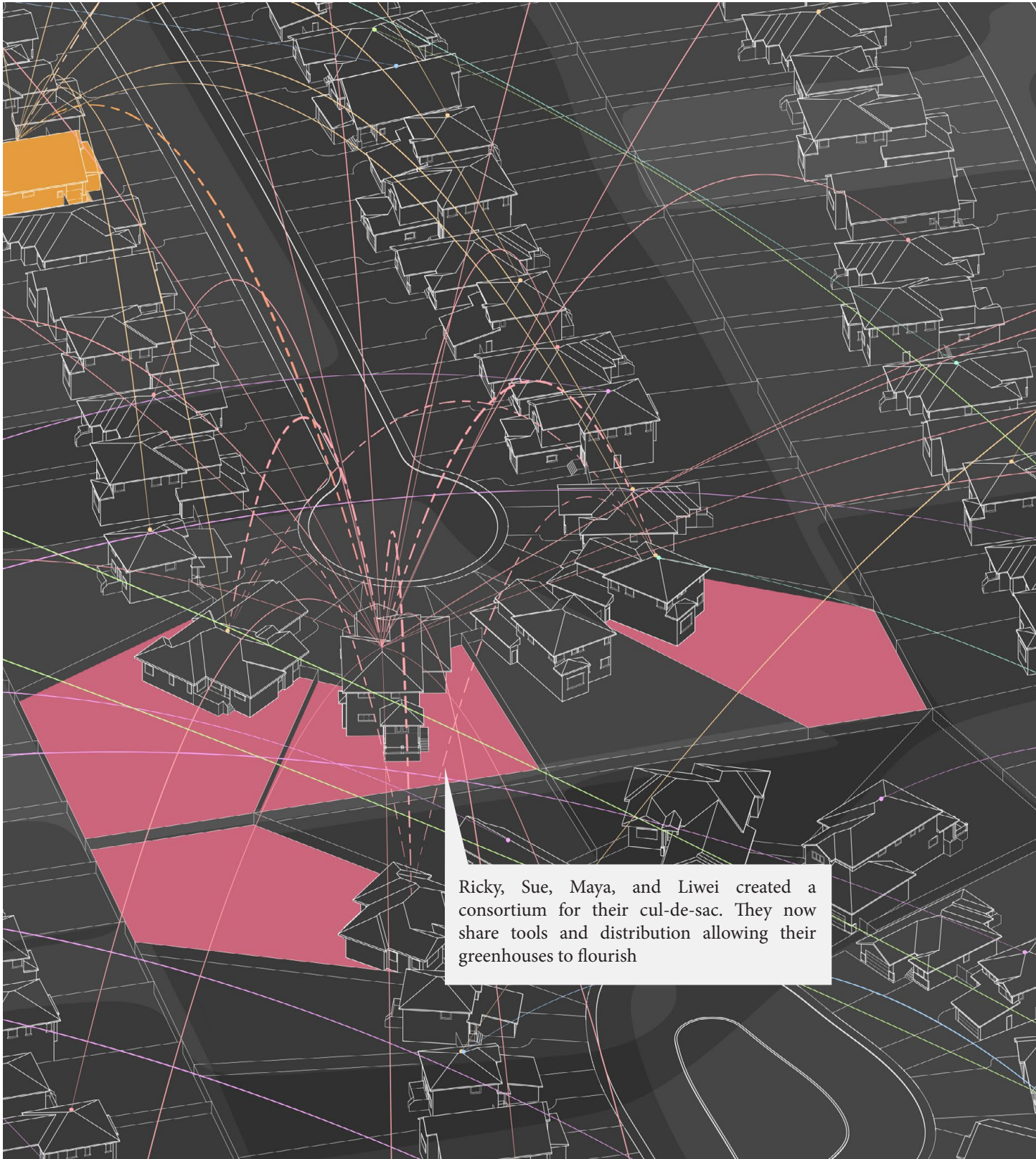
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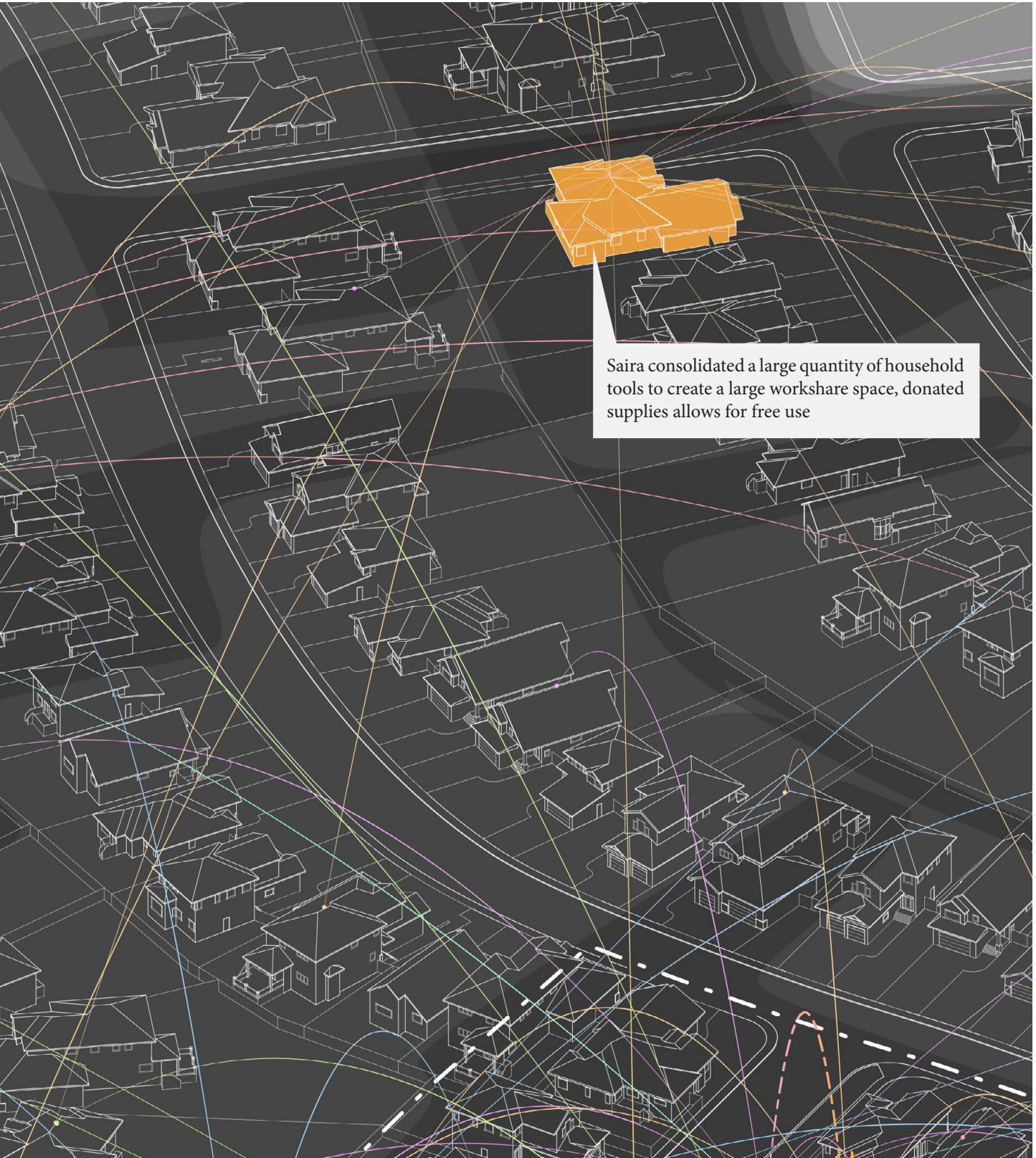






Negar works in the agriculture department with the cities university. She markets specialized cross-breed plant species that she grows





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

## Conclusion

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 weeders. 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 be 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.

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 duofunctionality. 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.<sup>42</sup>*

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 grown, 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.

**Existing International Building Code Use Groups**

A-1	Theatre and Performances
A-4	Indoor Sporting Events
A-5	Stadiums
I-2	Hospital, Nursing Homes
I-3	Jails
<b>A-2</b>	<b>Restaurants and Bars</b>
<b>A-3</b>	<b>Worship, Recreation, Amusement</b>
<b>B</b>	<b>Public and Private Businesses</b>
<b>E</b>	<b>Education</b>
<b>F-1</b>	<b>Moderate-Hazard Factory (Industrial)</b>
<b>F-2</b>	<b>Low-Hazard Factory (Industrial)</b>
<b>I-1</b>	<b>Supervised Residential Adult Personal Care Services</b>
<b>I-4</b>	<b>Day Care Facilities</b>
<b>M</b>	<b>Mercantile/Retail</b>
<b>R-1</b>	<b>Transient Living Spaces</b>
<b>R-2</b>	<b>Multiple Dwelling Units Buildings</b>
<b>R-3</b>	<b>Single Dwelling Units</b>
<b>R-4</b>	<b>Assisted-Living Facilities</b>
<b>S-1</b>	<b>Moderate-Hazard Storage</b>
<b>S-2</b>	<b>Low-Hazard Storage</b>
<b>U</b>	<b>Utilities (Misc. Structures)</b>
H-1	Materials with Detonation Potential
H-2	Materials with Deflagration Potential
H-3	Materials that are Easily Combustible
H-4	Materials that are Toxic and Corrosive
H-5	Hazardous Production Materials (HPM)

Fig. 3.40. Sidewalk Labs, Flexible Zoning Scheme

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