Built for Change: An Adaptive Approach to the Diversification of Halifax's Residential Neighbourhoods

by

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Contents

Abstract

Residential patterns across Canada have longstanding social and urban qualities that are no longer suited to our current socio-economic world, including smaller and more diverse households and the need to integrate activities of living and working. In Halifax, the municipal government's promotion of residential densification encourages the demolition of neighbourhoods in favour of high-rise apartment blocks that contribute little to their surroundings.

This thesis investigates the "missing middle" for residential development in the North American city. An adaptive method introduces a more subtle approach to the densification of Halifax's residential neighbourhoods by modifying existing buildings and properties. Using a typical West End block as its site, a catalogue of design explorations reveals opportunities within our current urban fabric for diverse housing options and more liveable communities that can adapt to cultural change and provide solutions to the current housing crisis.

Acknowledgements

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Chapter 1: Introduction

1.1 Geographic Limits of Study and Urban Development

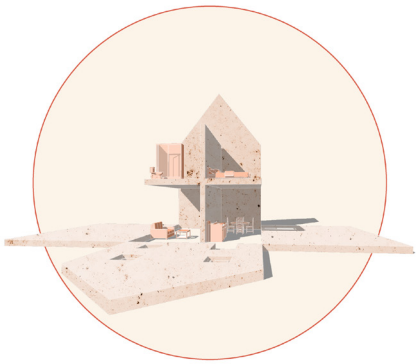
Looking at a typical North American city, we can see its history in the structure of its blocks, the layout of its streets, and the strict zoning separating life and work. The rise of industrialization in the mid-19th century led to an influx of inhabitants into city centres, putting pressure on cities: what we now know as the first wave of urbanization. North American cities were unable to accommodate this increase in population, leading to slum conditions in some central locations.

Cities responded to this problem by developing more systemic planning that relied on two related urban theories. Functionalism in the 1930's distinguished the functional elements of a city, separating areas of work from residential areas to ensure healthy living conditions and to distribute the physical benefits more fairly (Moudon 1986, 188). This was reinforced by Modernism's radical break from urban traditions. Le Corbusier's urban manifesto proposed a planned, functional city that would be suited to life in the 20th century, with room for cars and other modern conveniences (Le Corbusier 1963, 148). Since the mid-20th century, North American cities have developed a broad external zone for suburban living and a central core for urban working. Around this urban core is a semi-urban residential zone that was laid out and built in the late 19th century. This zone is the focus for this thesis.

1.2 House as Symbol

1.2.1 House as Symbol of Family

As part of modern urban planning, the single-family home was also a component in the systemic planning of urban life. The nuclear family has been the foundation of North American society since colonization. Its supporting ideologies have influenced our housing practices, urban policies, and subsequently have limited how we live.



The nuclear family and its supporting ideologies can be seen in the spatial planning of the single family home.

The importance of the nuclear family to our societal beliefs can be seen in the spatial planning of the single-family home. Its plan gives each member of the family their own room, with the main bedroom shared by the parents of the household. This spatial arrangement presumes that marriage is the basis of a modern family (Klauser 1999, 28). Wilhelm Klauser references economist Richard Sennett, who describes the core family as the only stable component of our continuously shifting urban world. The core family brought a clarity to life by “simply reducing the number of cast members. … It created an order in the daily confusing life through a reduction of relationships and stipulated a

framework for action that allowed an orientation for any form of planning. The resulting security was, however, purchased at the cost of a loss in complexity, which is in obvious contradiction to reality" (Klauser 1999, 36).

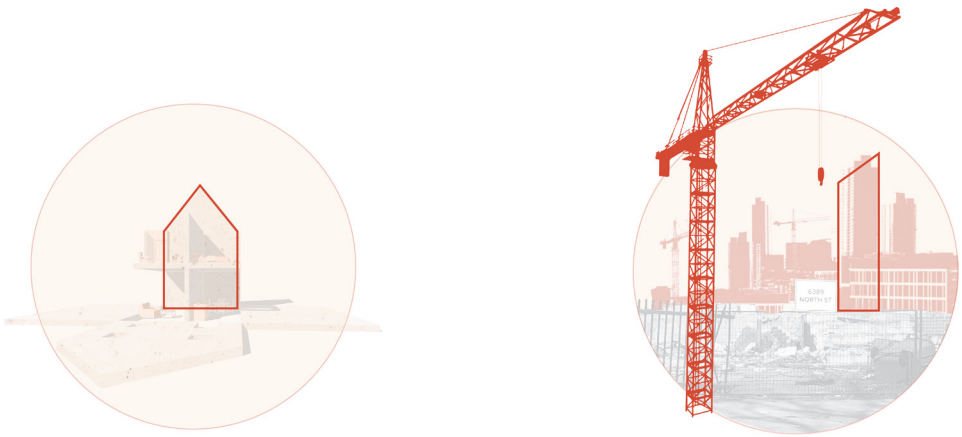
1.2.2 House as Symbol of Reproduction

The spatial planning of the modern house indicates that it is solely for living, separate from working. To appreciate the distinction between working and living (or production and reproduction), we can refer to Hannah Arendt's definition from *The Human Condition* (Arendt 1958, 79). Production, she describes, is the production of lasting objects: a table, a chair, and art as poetry and painting. Reproduction, on the other hand, is the unending business of daily life: eating, sleeping, preparing meals, cleaning, and raising children.

Pier Vittorio Aureli, architect and economist, believes that the economic effects of capitalism caused the house to be disconnected from production, and focused solely on reproduction. He references Italian philosopher Paolo Virno to point out that the goal of biopolitics is to govern life in order to make an exploitable labouring population. The

Collage of a demolition site at 6389 North Street, Halifax, with representational development in background.

functional layout of the modern house makes it a frictionless space. Each room has a specialized function in the family's daily routine or is assigned to a particular family member. This separation is reinforced by the house sitting on private property. "To inhabit a house means to accept the conditions of both being a family and entering the economic regime of private property, either as homeowner or tenant" (Aureli 2015).



Across North America we see the continuation of two patterns of residential architecture: the single family home and the high rise.

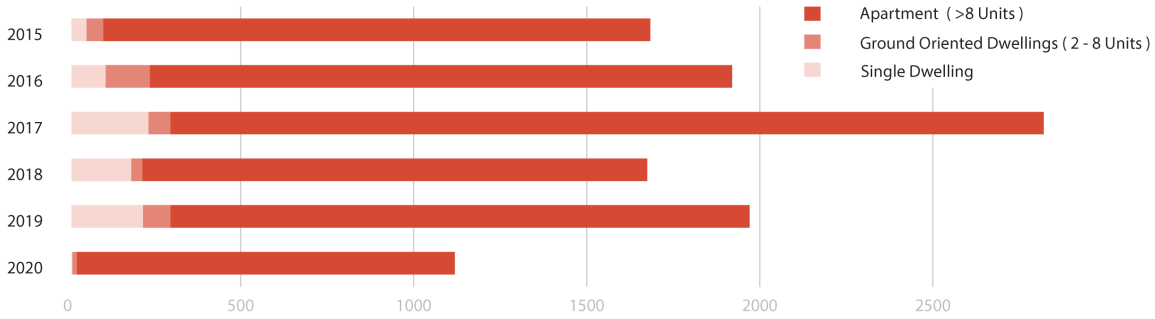
1.3 Halifax and General Architectural Situation

Today, in North American urban neighbourhoods, we have inherited a 19th-century urban grid and 20th-century zoning and housing strategies. We are now faced with two challenges: recognizing their impact on society and imagining how we can build for societal changes.

Existing Dwelling Units 2016

	single detached houses	5 + storey apartments	< 5 storey apartments	apartments in a flat	other
CANADA	53.6 %	9.9%	18%	5.6 %	12.9 %
NOVA SCOTIA	65.5 %	5.3%	14.5%	3.1%	11.5 %

New Dwelling Units by Type, 2015 - 2020



Data collected from building permit issuance data, "The Halifax Open Data Catalogue", HRM Database

The single family home continues to be the most prevalent dwelling type across Canada, and significantly so in Nova Scotia at 65%. However, construction permits over the last six years show the dominance of high rise construction in Halifax.

In Halifax, we see two approaches: the retention of low-density, single-family homes; and the demolition of low-density neighbourhoods and their replacement by residential high rises that contribute little to their surroundings. Both approaches continue the functional separation of living and working. These patterns maintain three assumptions:

- Production and reproduction should remain separate, reinforced by zoning laws and building design.
- The solution to a rising urban population can be solved through the high rise and within our current street and block structures of North American urban neighbourhoods.
- The nuclear family is the foundation of our society and should remain the social basis of the built environment.

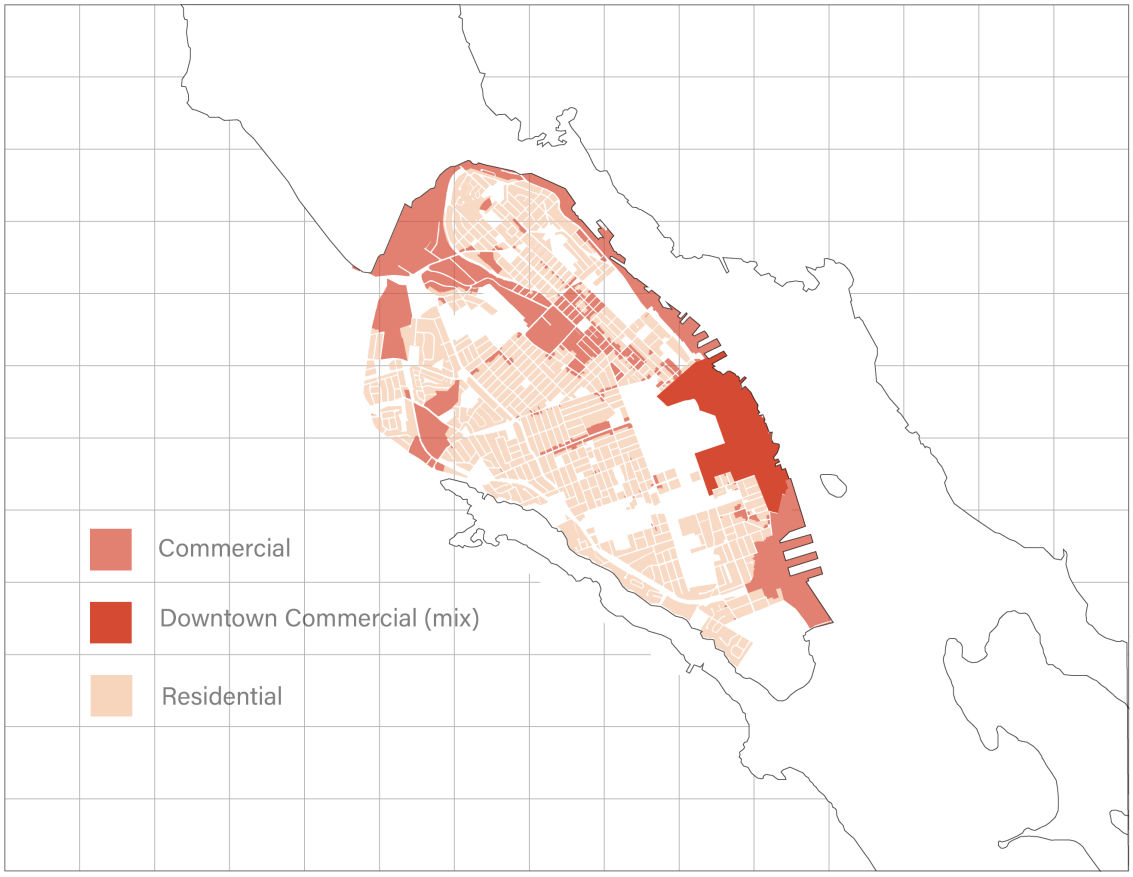
Chapter 2: The Ambition

This thesis addresses limitations in residential architecture by pursuing three main ambitions:

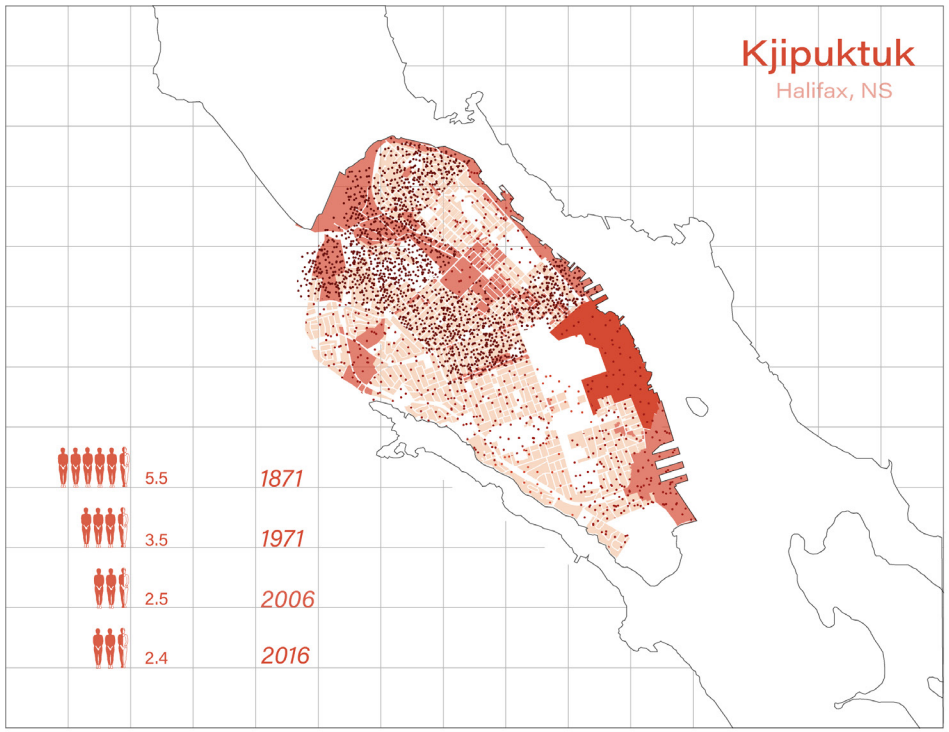
- intersecting living and working
- densification
- diversifying household structures

2.1 Intersecting Living and Working

The separation of living and working can be seen in modernist zoning strategies still remaining on the peninsula of Halifax. They were created in hopes of solving poor conditions caused by industrialization, but instead have



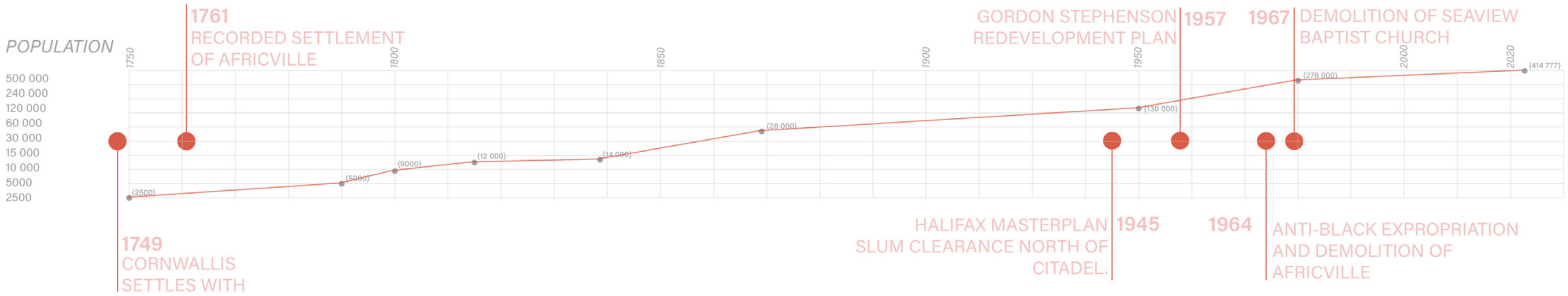
Separation of residential and commercial zoning remains from modernist planning polices. (data from Government of Canada 2016)



SEPARATION OF LIVING AND WORKING

RISING URBAN POPULATION

CHANGING HOUSEHOLD STRUCTURES



Patterns in the architectural landscape carry assumptions about our current urban lifestyles that prove to be inaccurate of today's society; that our domestic life and work spheres remain separate, that the high rise is the solution to rapid urbanization and that our household structures are based around the nuclear family. (data from Government of Canada 2016)

created a homogeneous urban environment. With our digital advancements, the boundaries of work and life can no longer be confined by zoning.

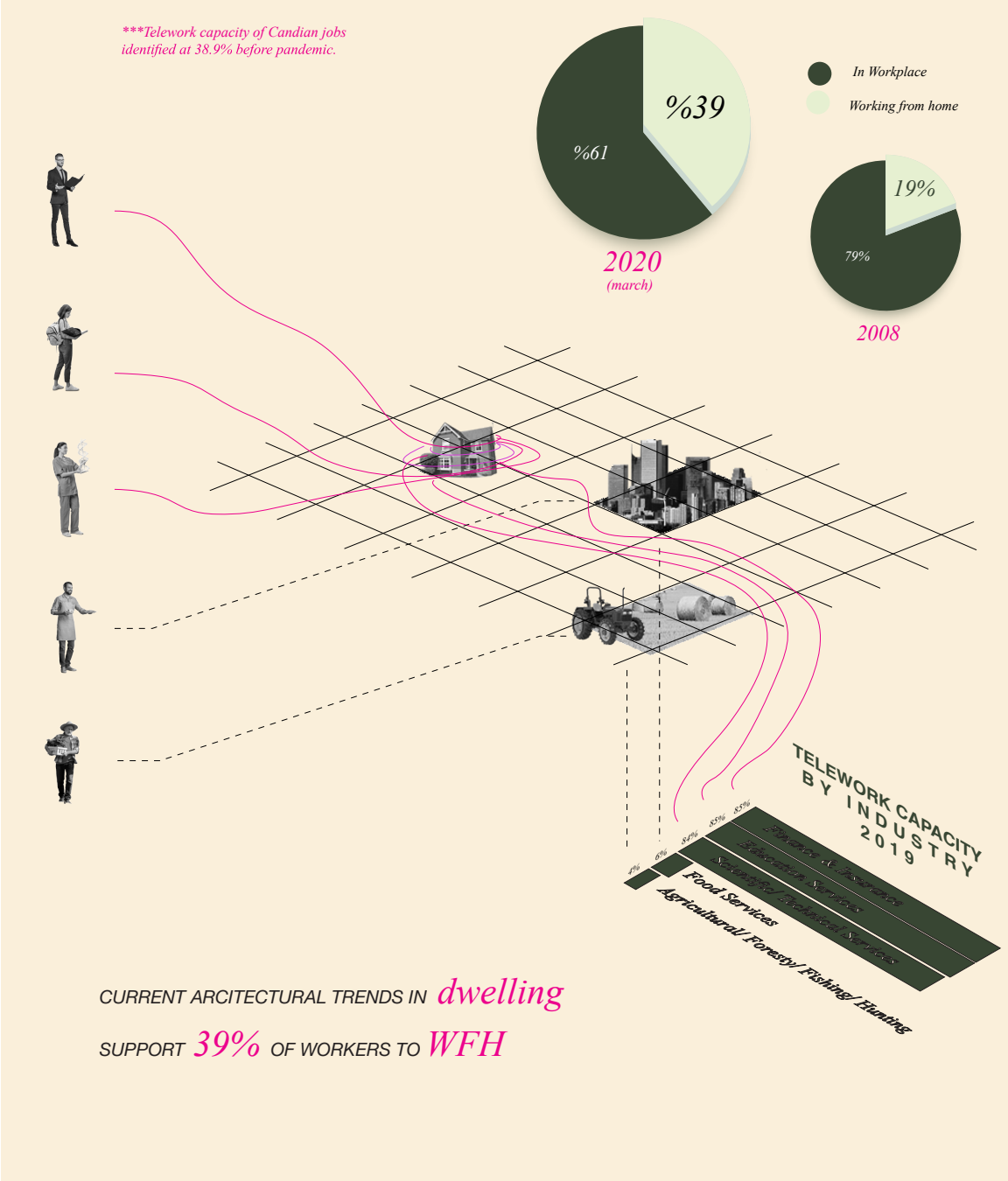
2.2.1 Live/Work

Twentieth-century zoning rightly separated loud, large-scale industrial and commercial operations from places for living. Unfortunately, it included quiet, small-scale work in the same category, causing it to be separated from residential areas. Zoning and building codes have not kept up with demographic changes in working and living during the past few decades. The morphology of the residential area and the typology of the family home, with specialized functions for a family's daily routine, do not make space for an overlap in work and life.

Pier Vittorio Aureli argues, "The housing crisis is not only one of scarcity and affordability but an ideological crisis as well. If the evolution of housing has been driven by necessity to contain the family and separate production from reproduction, then an alternative can be proposed only by challenging the boundaries of the house as containment in both physical and economic terms" (Aureli 2015, 3).

In the midst of the 2020/2021 global pandemic, it has become obvious that our architecture does not support our changing social structures. We are experiencing a fundamental shift in how we work, live, and socialize. A sudden shift – rare in our lifetime – has created an immediate, widespread blurring of distinctions among these activities.

Prior to COVID, the telework capacity for industries to work remotely was estimated at 38.9%. This was verified in March 2020, the first month of quarantine restrictions in Canada,



Telework capacity leaves architecture the opportunity to imagine spatial solutions for how more industries could function within residential neighbourhoods. (data from Government of Canada 2020b)

when we hit and plateaued at 39%. Telework capacity in finance and insurance, education services, scientific and technical services reached almost 85%; however, food service and agriculture were down at 4% and 6% respectively. This suggests that our current living environments cannot support 60% of the Canadian work force to work from home. This is an opportunity for architecture to imagine spatial solutions.

2.1.2 Public and Private Space

Since zoning policies have divided small scale businesses and work away from residential areas, our neighbourhoods have lost much of our public and semi-public spaces, as well as activities that create vibrant and enjoyable neighbourhoods. The dominance of the automobile occupies most, if not all, of public space, rendering our streets unsafe for any activity other than transit.

In Jan Gehl's *Life Between Buildings,* he discusses three types of outdoor activities; necessary activities, optional activities and social activities, stating, "When outdoor areas are of poor quality, only strictly necessary activities occur. North American neighbourhoods only make space for these necessary activities, going to or from school, work or errands on our roads and sidewalks. When outdoor areas are of high-quality necessary activities take place with approximately the same frequency … In addition however a wide range of optional activities will also occur because place and situation invite people to stop, sit, eat, play, and so on" (Gehl 1987, 11). From optional activities come social activities that depend only on the presence of people in spaces. As often discussed today, in our current global pandemic, the most widespread social activity is passive contacts, simply seeing

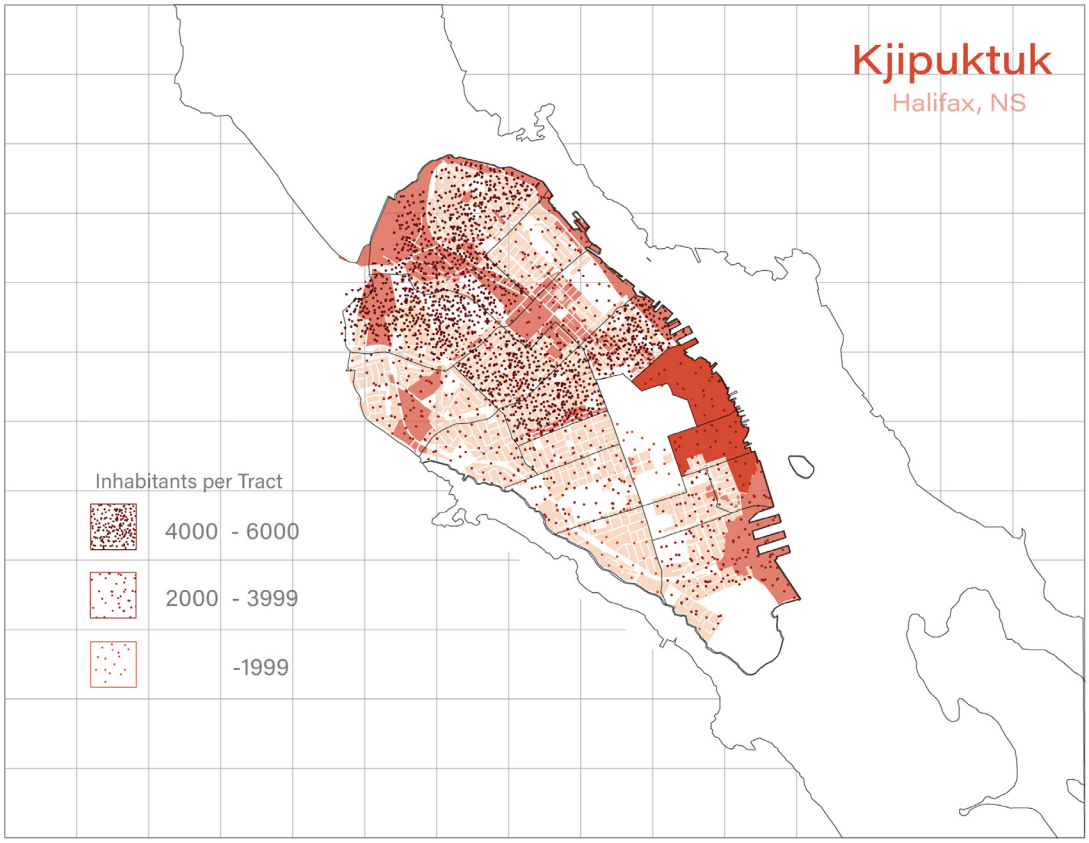
and hearing other people. If we do not have places to stop and pause or are not offered optional activities, we are also limiting our social environments.

Layering programs of work back into the dwelling sphere will increase all outdoor activities outlined by Gehl. An evaluation of where to insert public spaces into the residential sphere will be needed, as well as an architectural translation of ideas of public and private.

Riken Yamamoto actualizes these concepts spatially by using the terms “open and closed character” to describe how we can mediate between the private and public with spatial concepts. He specifies that it is the interrelationship between two spaces that makes them open or closed (Yamamoto 2009, 2). “Being closed or open is a question, not of being physically cut off or not but of the presence or absence of some sort of constraint on communication between the spaces. Yamamoto refers to this constraint as the “threshold” (Yamamoto 2009, 3). Here he describes the threshold as a spatial device situated between two spaces of different character that separates or connects the two spaces. Acknowledging this idea of threshold spaces will help with the reintegration of small-scale businesses into the block.

2.2 Densification

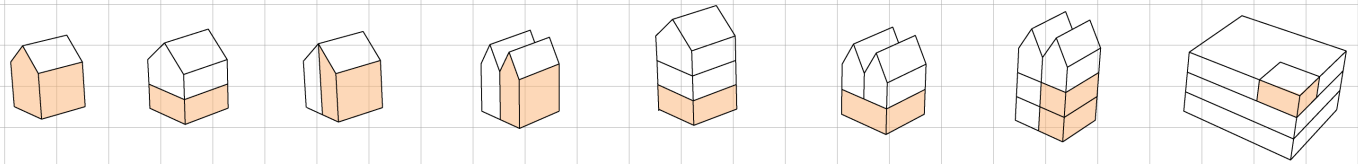
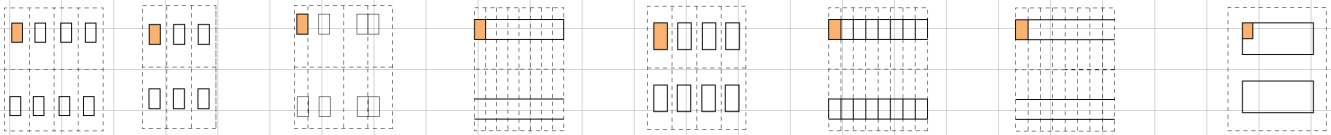
Our urban populations continue to rise, with construction rates to match, and yet our core housing needs are not met. 25% of Haligonians live in core housing need, an issue being discussed but not addressed.



The Peninsula of Halifax, showing areas of highest density.

2.2.1 Density and Floor-Area Ratio (FAR)

The two most prevalent residential forms in Halifax and across much of North America are the low-density single-family dwelling and the higher-density high-rise apartment building. The low-density single-family house in our urban centres is economically out of reach for most Canadians. By pushing others out into the suburbs or up into high-rises, it also has environmental and social consequences. With continued migration to our urban centres, we are unable to support low density in our urban environment; however, its amenities continue to be favourable. This low-density living option provides people with three main benefits: privacy, territoriality, and convenience. Privacy permits a separation between neighbours, as well as between living and sleeping areas within a house. It offers individual street

	Single detached	Duplex	Semi -detached	Row House	Triplex	Stacked Row Houses		3 Storey Walk Up
Dwelling Type								
Plot Plan								
Dwelling Units/ per acre	8	17	14	19	21	31	35	65
FAR* / %Open Space	.24/ 76%	.48/88%	.38/81%	.60/80%	.48/88%	.86/72%	1.14 / 72%	1.36 / 55%
Private Outdoor Space	on grade	50% grade 50% gr.related	50% grade	on grade	33% on grade 66% gr. related	33% on grade 66% gr. related	50% on grade 50% gr. related	33% on grade 66% gr. related
Access to Unit	yes	yes	private on grade	private on grade	33% grade 66% com. stair	33% grade 66% com. stair	50% grade 50% com. stair	com. stair

Jack Diamond's assessment of residential density based on housing form (Diamond 1976)

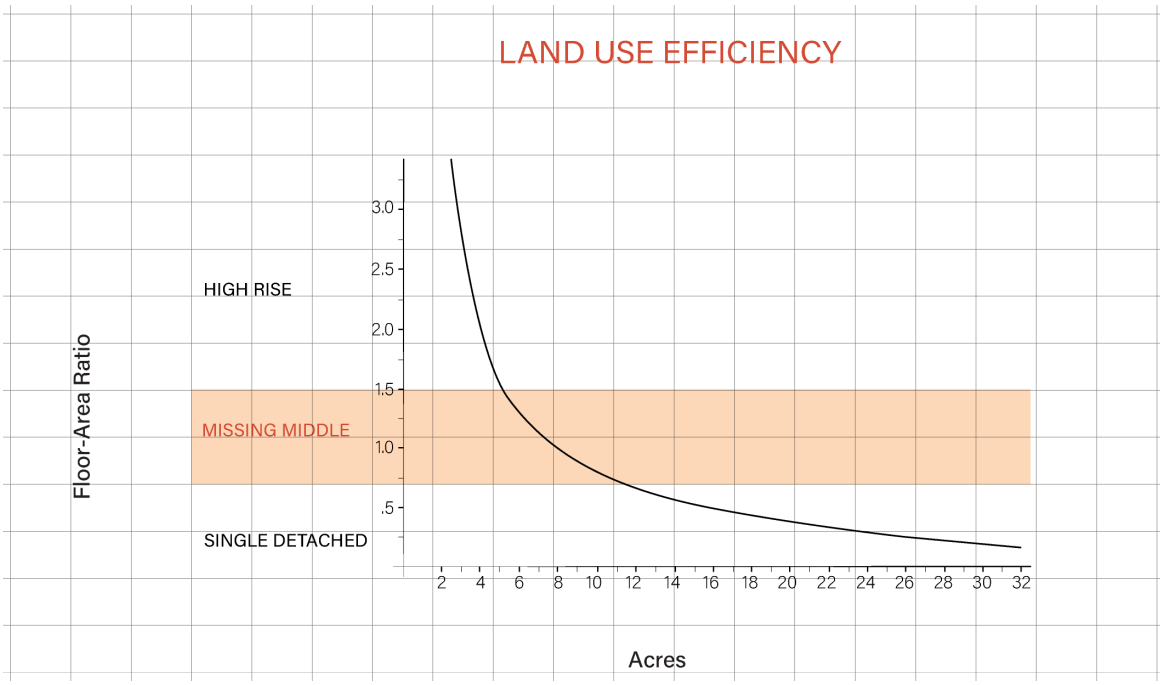
entrances, acoustic privacy, and private outdoor space. Territoriality allows for transitional space between public and private areas of the block and gives people clearly defined boundaries for responsibility and control. Convenience permits direct access to parking, proximity to the street, and an ease of both interior and exterior maintenance (Diamond 1976, 16).

The high-rise has become the prevalent alternative to the single-family dwelling. It is touted for its increased density and greater affordability. However, it does not typically increase residential population by much, nor is it as efficient in land use as one might assume. The standard high-rise design also forfeits the benefits of privacy, territoriality, and convenience found in the single-family home.

We can assess land use efficiency and densities by looking at the Floor Area Ratio of different dwelling types. This is the ratio of the total gross floor area of a building divided by the total lot area. The asymptotic curve in Jack Diamond's graph expresses the great savings in land when you increase the FAR from 0.25 (for single-family dwellings) to 0.5 for townhouses, 1.0 for stacked row housing, and 1.5 for low-rise apartments. As densities increase to 0.75, so do savings in land, but less dramatically. Once an FAR of 1.5 is achieved, there is very little advantage in terms of land use (Diamond 1976, 16). A 1.5 FAR is also the "sweet spot" for supporting public transit and other urban amenities.

2.2.2 Adaptation

An important correlation to building density is a building's ability to adapt. Stewart Brand's *How Buildings Learn* discusses how buildings are thought to be static, but in fact are dynamic in responding to those who live in and



The curve shows that land use savings are most advantageous at a middle density with a floor area ratio between .75 and 1.5. (Diamond 1976)

around them. “From the first drawings to the final demolition, buildings are shaped and reshaped by changing cultural current, changing real-estate value, and changing usage. The word ‘building’ contains the double reality. It means both ‘the action of the verb to build’ and ‘that which is built both verb and noun, both the action and the result’” (Brand 1994, 17).

Societal change, even within the last century, has led to huge changes in the design of the house. We have seen the disappearance of servants and the shrinkage of the kitchen, the introduction of cars and garages, new family rooms focused on the television, women joining the workforce and introducing new appliances to automate housework, and technological advancements made possible by the Internet. These fluctuations of life within households suggests that our architecture must be able to adapt. Single-family homes

permit a certain amount of modification, but high-rise towers do not.

Lot sizes establish a pattern or grain to a neighbourhood. This affects building size, tenure, and cultural expression. The size of a city block is an important determining factor in land tenure. The larger the pattern, the less control the individual has (Moudon 1986, 144). We can see this in a high-rise dwelling, as most physical changes occur at the scale of the lot. Land ownership is dissociated from the dwellings and the changing needs and desires of their residents. Skylights cannot be added; extensions for a growing family cannot be added; and there is no place for working outdoors.

It is challenging for social and cultural change to be reflected in a large structure. If we continue to build at the scale of the tower, our cities will be increasingly unresponsive to both individual residents and the changing face of the larger society. “The widowed parent moves in; the teenager moves out; finances require letting out a room (new door and outside stair); accumulating stuff needs more storage (or public storage frees up some home space); a home office or studio becomes essential. Meanwhile, desires accumulate for a new deck, a hot tub, a modernized kitchen, a luxurious bathroom, a walk-in closet, a hobby refuge in the garage, a kid refuge in the basement or attic, a whole new master bedroom” (Brand 1994, 31).

2.3 Diversifying Household Structures

2.4

Average Canadian household size (data from Government of Canada 2016)

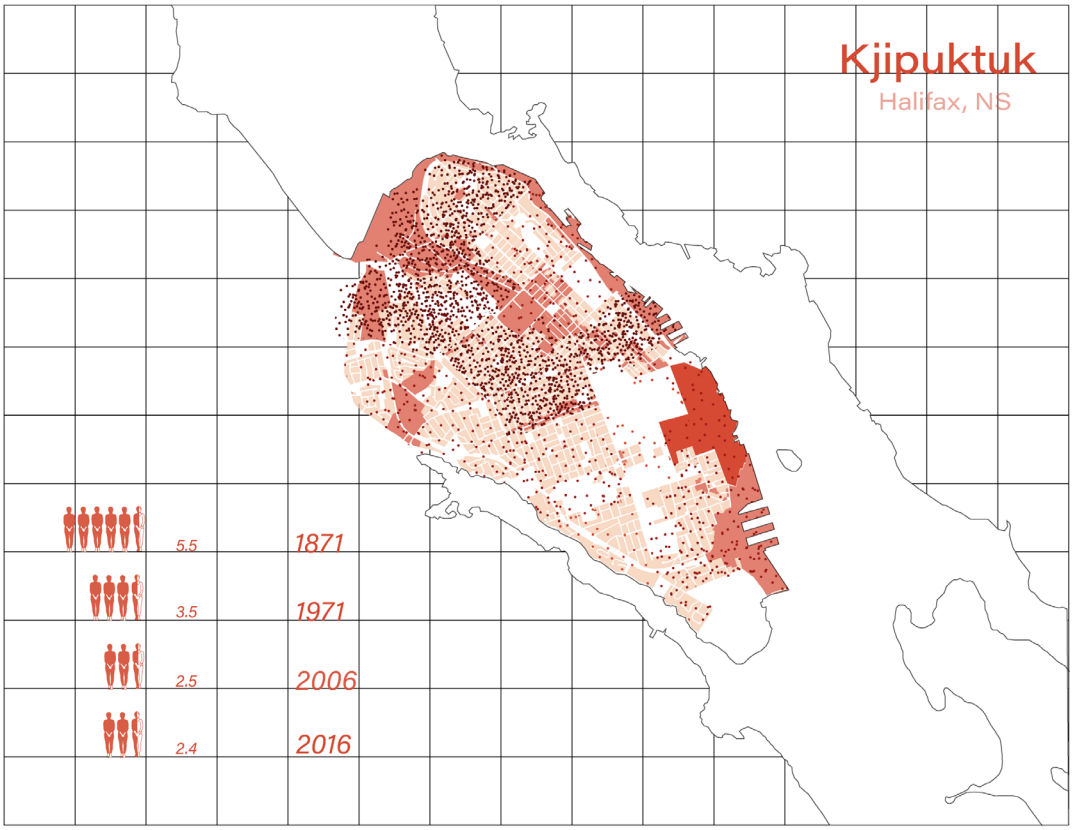
Our household sizes have been steadily shrinking since the first Canadian census of 1871. Our national average is 2.4, with even lower numbers in most urban centres. Our households have changed but our architecture has yet to catch up. The nuclear family is no longer representative of

our households and yet it remains the social basis of the built environment.

2.3.1 Demographic Shift

Japanese architect Riken Yamamoto has described the nuclear family model as “one house, one family” and believes it perpetuates the individuation of our time, causing unnecessary financial, social, and environmental burdens (Yamamoto 2015, 28). However, changing demographics show that the nuclear family is no longer representative of modern society (Government of Canada 2016). Although society has changed, few architectural changes have resulted.

Household structures are changing. Many Canadians are choosing to live on their own, while fewer are getting

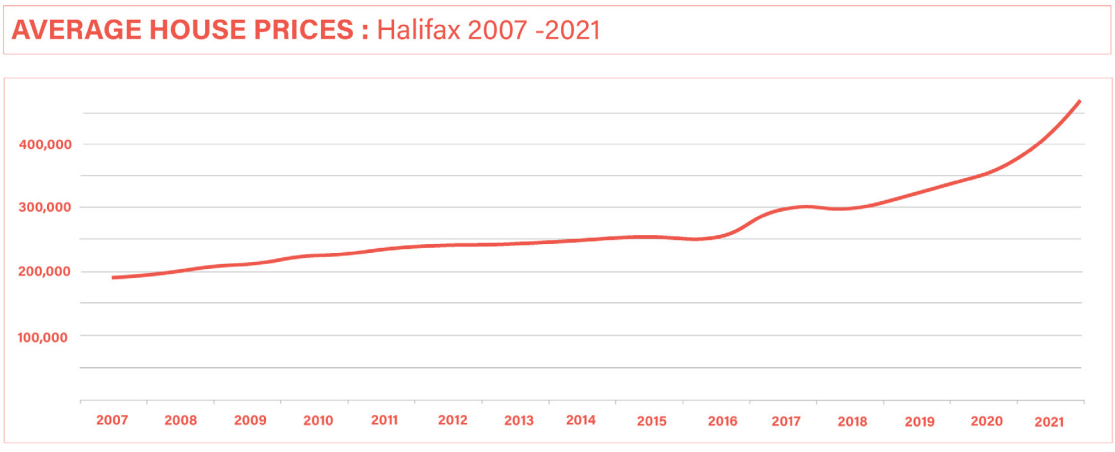


Average household size in Canada has been steadily decreasing since 1871

married and having children. The most prevalent household in Canada is a couple without children (28.2%), followed by one-person households (25.8%), and in Nova Scotia, a couple without children (29.8%), followed by one-person households (29.5%) (Government of Canada 2016).

2.3.2 Financial Pressures

The cost of urban living has increased dramatically. Along with increased student debt, taxes, and other living expenses, today's incomes are not keeping up with the costs of housing. This is keeping Millennials out of the housing market and pushing low-income residents out of urban areas. Statistics Canada shows that 1 in every 10 Canadians lives in core housing need, defined as living in an unsuitable, inadequate, or unaffordable dwelling. Three-quarters of these cases are due to unaffordability. Visible minorities and single households are twice as likely to be affected by core housing need. The 2016 Census showed that 25% of Halifax residents are in core housing need, spending over 30% of their household income on shelter costs (Government of Canada 2016).



Increase in average house prices in Halifax, NS from 2007 to 2021, showing a 35% increase from March 2020 to March 2021 (HRM 2015)

In Halifax, a Housing Needs Assessment done in October 2015 showed all household incomes divided into 10 deciles, each representing 10% of the population and showing what each can afford to rent or own (HRM 2015). It showed problems in core housing need across all income deciles and recommended work to prevent below-market housing options from declining further. Since then, the situation has only worsened. The average house price in Halifax in April 2021 was $457,027 (Canadian Press 2021). This was an increase of 35% since March 2020, continuing the upward trend of the past decade.

ONE BEDROOM UNIT COST HALIFAX, NOVA SCOTIA					
TYPE OF STRUCTURE	2016	2017	2018	2019	2020
Row and apartment structures >3 stories	$846	$881	$904	$960	$1015
Row structures >3 stories	$1028	$814	$893	$1003	$896
Apartment structures >3 stories	$845	$881	$904	$959	$1016
Apartment structures >6 stories	$851	$887	$910	$968	$1023

Halifax rental costs 2016-2020 (Government of Canada 2020)

2.4 Missing Middle

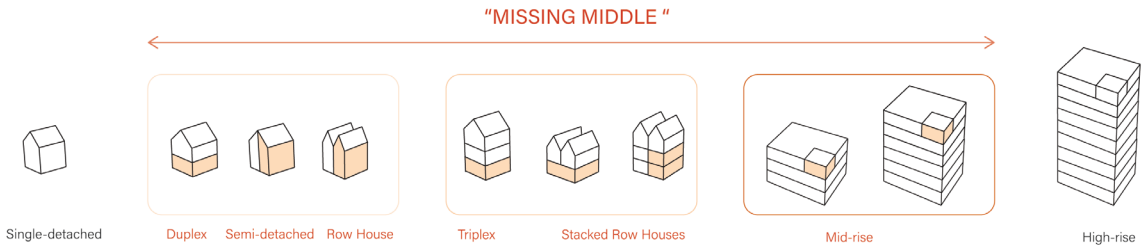
In between these two extremes in density there is a “Missing Middle” that can provide an efficient alternative to the high-rise towers that are taking over our cities, with greater benefits. The Missing Middle is a New Urbanist strategy for development based on ground-oriented architecture. It is defined by The Congress for New Urbanism:

> Missing Middle is a range of multi-unit or clustered housing types compatible in scale with single-family homes that help meet the growing demand for walkable urban living. These

> types provide diverse housing options along a spectrum of affordability, including duplexes, fourplexes, and bungalow courts, to support walkable communities, locally serving retail, and public transportation options. Missing Middle Housing provides a solution to the mismatch between the available U.S. housing stock and shifting demographics combined with the growing demand for walkability. (Congress for New Urbanism 2020)

This Middle is missing from Halifax's recent developments, as evident from the steady increase in single-family homes and apartment buildings of 5+ stories built from 2006 onward.

Most Missing Middle solutions involve the demolition of adjacent existing houses and the construction of new townhouses and small apartments, as noted by Patrick Condon in *The Tyee*: "[it] requires 'site assembly' (the acquisition of a number of small adjacent parcels, enough so you can build a larger project) as well as the necessary destruction of all existing structures and vegetation previously on site. Obviously, this would dramatically alter the look and feel of a neighbourhood, not to mention increase landfill waste" (Condon 2018). This thesis pursues the Missing Middle in a different way that avoids demolition and fits into the current look and feel of our residential neighbourhoods.



In between these two extremes of residential architecture is the "Missing Middle," an efficient alternative to high-rise towers based on ground oriented architecture. (Congress of New Urbanism 2020)

We have reached a point in history where the inevitability of global climate disaster is widely known, and the discussion about sustainable building materials and embodied energy should be a part of every architectural decision. Building with wood has one of the lowest emissions in both energy expenditures and CO_2 emissions of materials used in the construction industry. The primary energy demand from wood production is in its biomass, making up 69-83%. The balance in equivalent carbon dioxide emissions is close to neutral and can become negative if we recycle reuse or maintain wood structures instead of incinerating them (Bribian 2011, 1137).

This point in and of itself makes a strong case not only to build wood structures, but to maintain the ones we have for their value in embodied energy. Making modifications to fit new demands instead of demolition is an obvious sustainable strategy when environmental concerns are taken into account. Taken a step further, when we compare every m_3 of laminated wood absorbs 582 kg CO_2, while reinforced concrete emits 458 kg CO_2 / m^3 and steel 12.087 kg CO_2, it becomes nonsensical for our municipal, provincial and federal governments to support high rise construction over missing middle adaptations (Bribian 2011, 1138).

Chapter 3: The Proposal

3.1 Proposal Introduction

This thesis investigates the Missing Middle as an adaptive approach to a typical residential block in Halifax's West End, which was laid out in the late 19th century and early 20th century on the Halifax peninsula. Using progressive planning strategies, I will present a range of diverse housing options that are compatible in scale with the single-family home and can meet the growing demand for shifting demographics, affordability, and social change that are not being met by the current housing stock. A catalogue of options will be presented at three scales.

The Scale of the House: This includes adaptations to the sidehall house; openings, extensions and changes to landscape allow for new programs and a broader usability of existing dwellings.

The Scale of the Property: This scale allows new architectural interventions to be built onto subdivided properties separate from the existing houses. Platform frame construction, similar in merit to balloon frame, allows for future adaptations to be easily made.

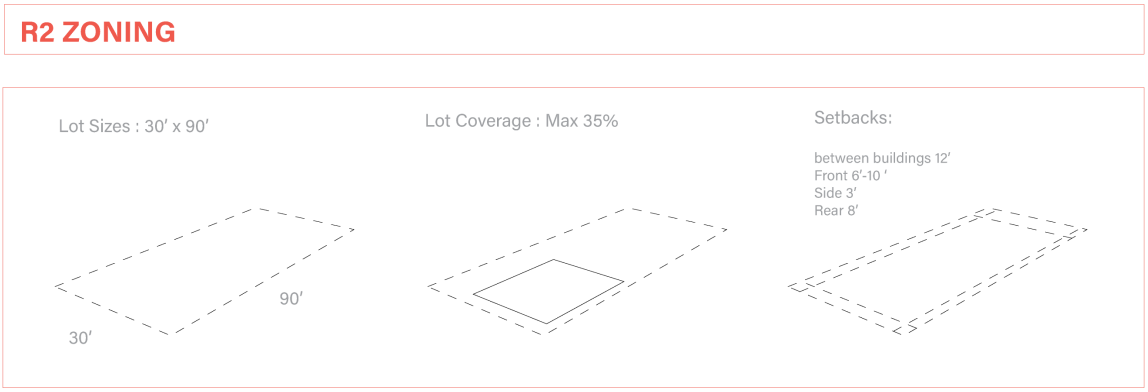
The Scale of the Block: The third scale combines a new urban strategy for mobility pathways on the block and creates threshold spaces to provide enjoyable and successful outdoor spaces.

I will then use nine criteria to access these residential patterns and compare them to the current housing stock. These criteria are based on solutions to the problems and needs described in Chapter 2.

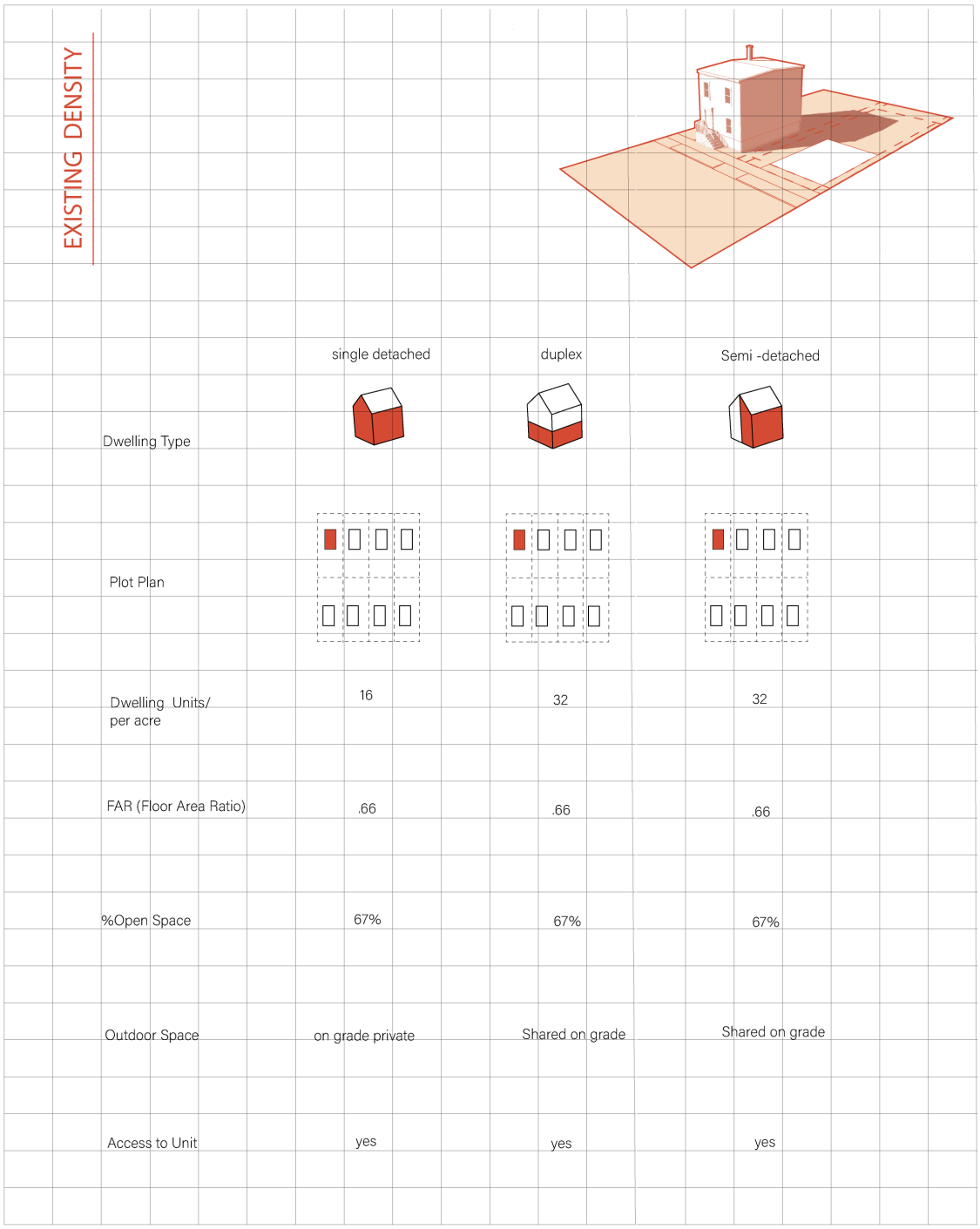
3.2 Site

R2 Zone and Typical Block

A site on the Halifax peninsula for implementing a Missing Middle required a residential area that did not yet meet the desired density and had enough open space for adaptations. R2 zones (which permit duplexes) cover 40% of the peninsula, so these changes could have a huge impact on the city's lifestyle and density. A typical block in an R2 zone has an average FAR of 0.5, which is below the recommended FAR between .75 and 1.5 by Diamond but would take only moderate levels of intervention to achieve a desirable density.



Zoning constraints of study block and R2 zoning. (HRM 2021)

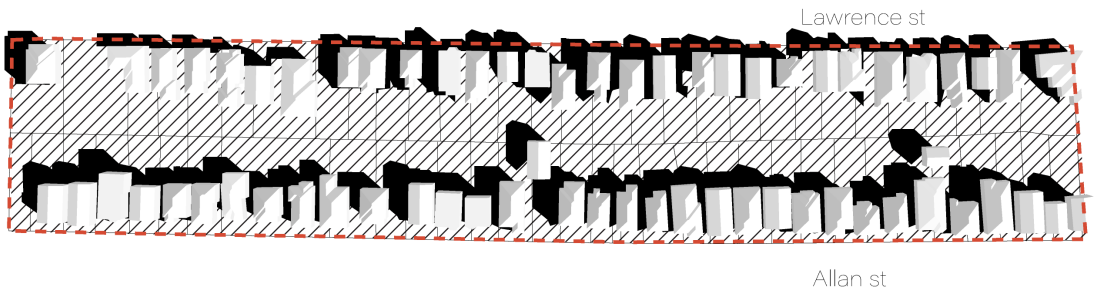


Study block density chart. The FAR (floor area ratio) of the block is .66 and leaves 67% open space for potential densification.

A study block was chosen bounded by Lawrence Street to the north, Allan Street to the south, Harvard Street to the west, and Chebucto Lane to the east. Not all housing data is available through the Canadian Census at a block-by-block scale, so much of observational data is taken from this block and represents the general fabric of the area. On this block, 66% of the lots are occupied by single family dwellings, 28% have duplexes, 4% are semi-detached, and 2% are apartment blocks less than 8 storeys.

The R2 zone in Halifax does not permit local businesses of any kind and will become part of my proposal. The C1 zone permits integrated live/work as described in the Missing Middle but is almost non-existent on the peninsula.

STUDY BLOCK



Open Space

67%

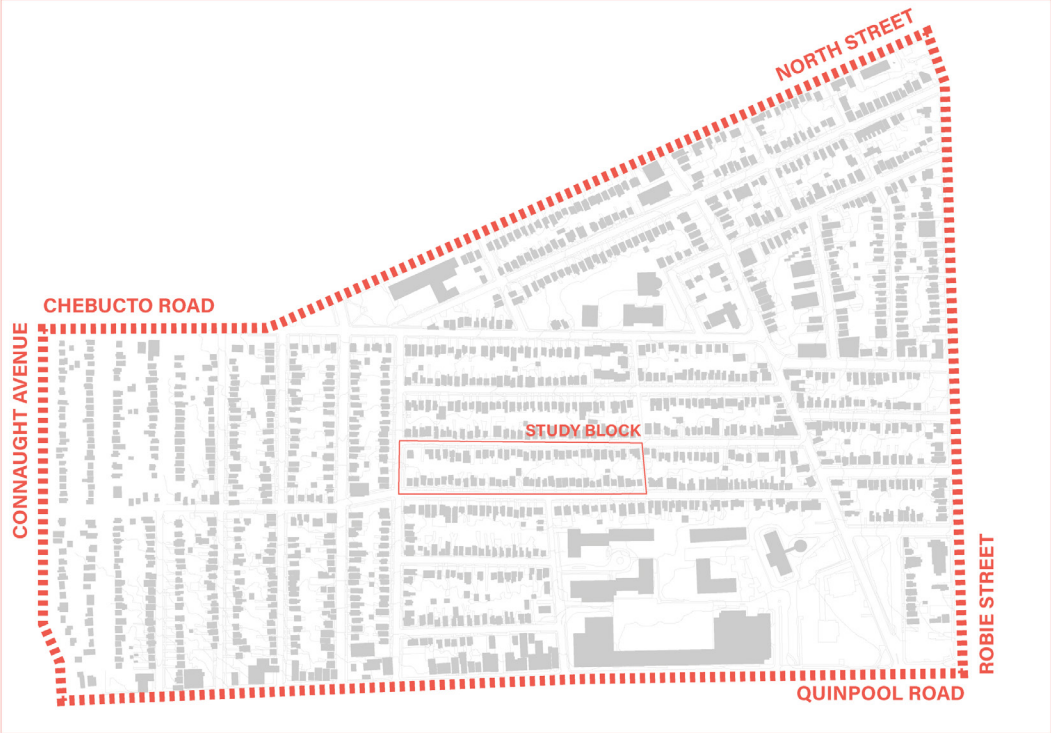
Study Block FAR

.66

A study block was chosen between Lawrence Street and Allan Street. This provides a study area to calculate average floor area ratios and population size before and after a design strategy is implemented.

Demographics

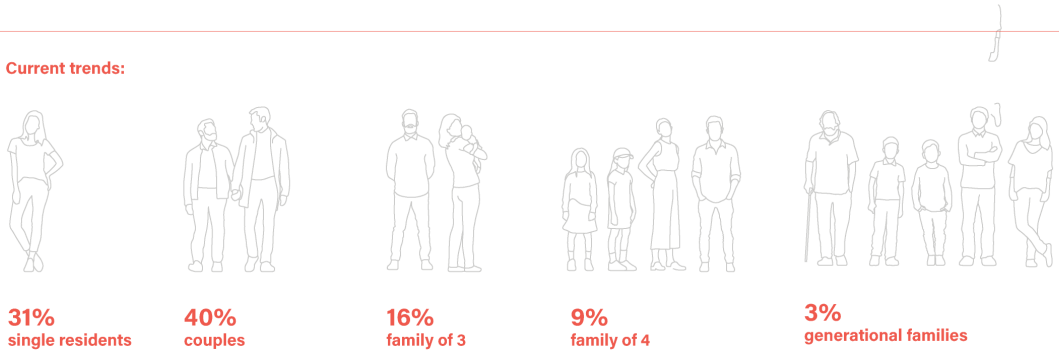
Demographic information for the site of my proposal was taken from the 2016 Canadian census. R2-zoned areas occupy multiple census tracts on the peninsula. In turn, these census tracts often contain multiple zones. The demographic data from tract 011 is what I will be referencing, as it is a tract with mostly R2 zoning and my study block is located entirely within it.



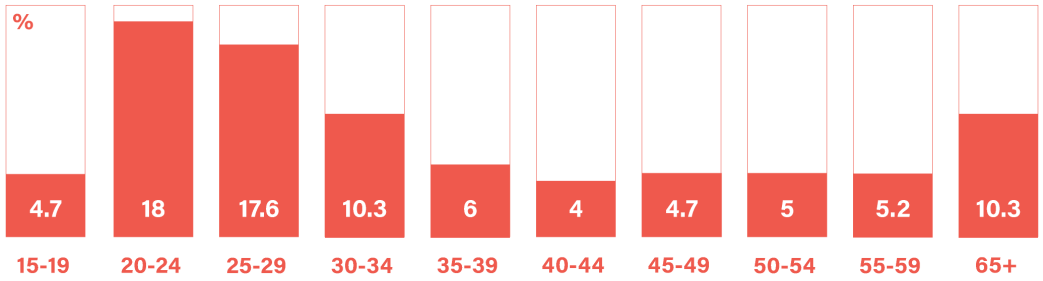
Demographic information is taken from 011 census tract
(data from Government of Canada 2016)

The average household size on this block is below the average Canadian household of 2.4 persons, which has declined steadily across the country over the past century and a half. 40% of the households on this block have two persons, while 30% have just one person (Government of Canada 2016).This suggests that a disproportionate amount of land on the peninsula is being used to house one or two

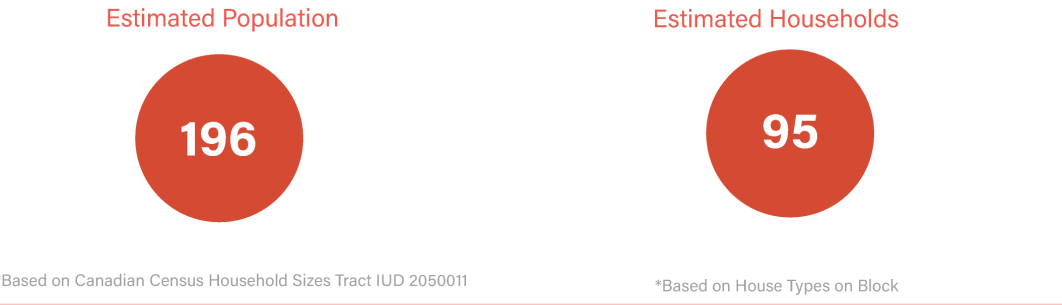
HOUSEHOLD SIZE



AGE OF RESIDENTS



POPULATION OF STUDY BLOCK:

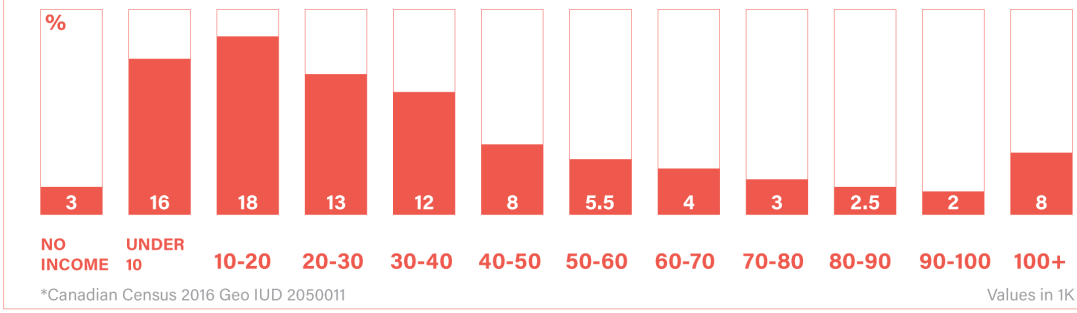


From the 2016 census data a population of 196 residents was estimated for the study block. This was calculated based on average household size per house type. (data from Government of Canada 2016)

people. This is lower than in the early 20th century, when households were much larger than they are today.

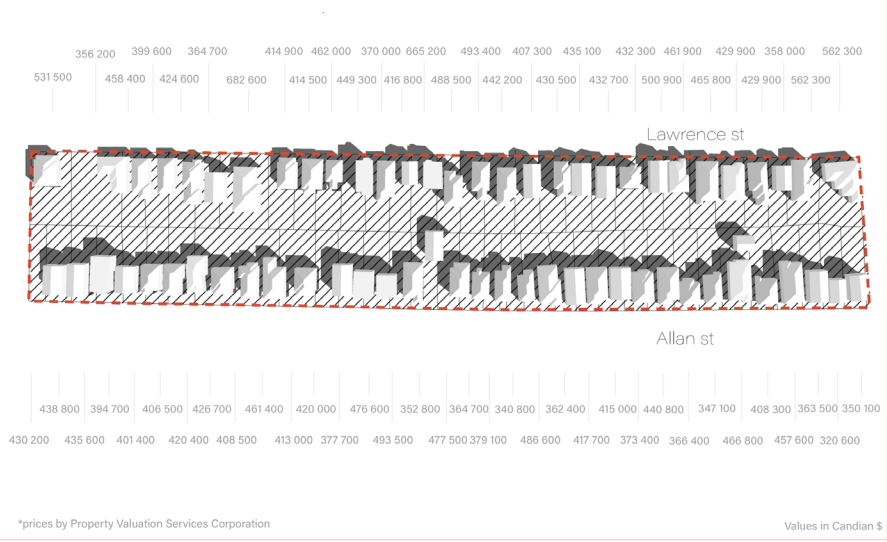
Age demographics and incomes highlight the ratio of renters to owners. During the past year, since March 2020, house prices on the Halifax peninsula have increased 35%, which is among the highest rates in the world, beating Toronto, Vancouver, and London. Although house prices in Halifax are substantially lower than in larger Canadian cities, they have greatly surpassed wage increases in the province. The household income decile and affordability chart from 2014 indicates that home ownership on this block is unaffordable to 80% of Halifax residents. Rental costs in this area - perhaps inflated due to the current global pandemic - have risen so high that they exclude 70% of households in Halifax.

INCOME OF RESIDENTS



Comparing incomes of residents against house prices in the area, it is obvious that home ownership is not available to most residents in the area. (Government of Canada 2020)

STUDY BLOCK - HOUSE PRICES & INCOME



BLOCK NETWORTH

BLOCK NETWORK : $31 040 200

INFLATION ON PENINSULA HALIFAX : Housing pvrices increased by 35%

Potential Market Value at 35% inflation rate: $41 904 270

HOUSE TYPES

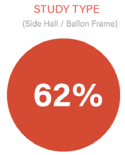
Number of plots : 64

Single Detached : 43

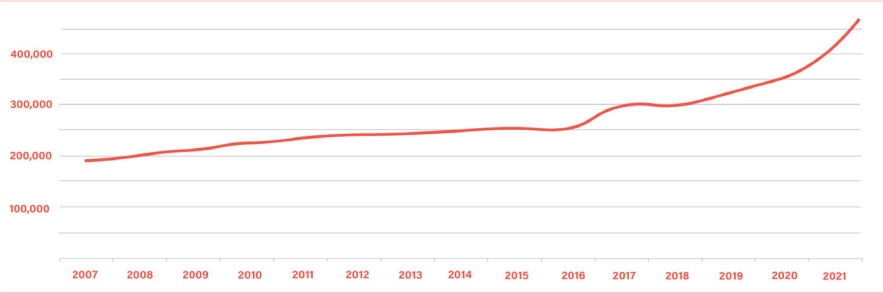
Duplex : 18

Semi Detached : 2

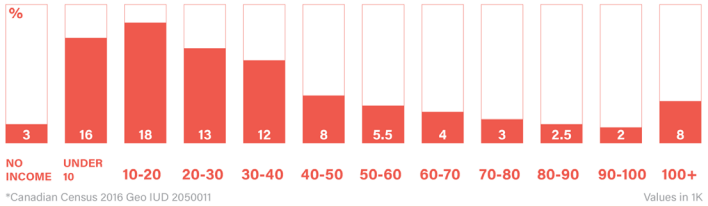
Apartment Complex:



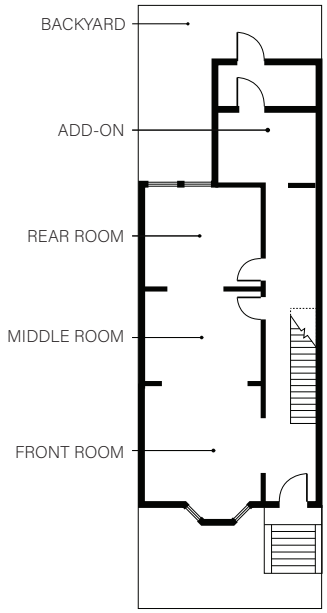
AVERAGE HOUSE PRICES : Halifax 2007 -2021



INCOME OF RESIDENTS



Calculating property values of the entire block show us estimates of close to $41 million with a 2021 market value increase. These numbers allow us to imagine with the implementation of progressive planning policies that these prices could be shared by cooperatives to allow lower income residents to live and own on the peninsula of Halifax. (Property Valuation Services n.d.)

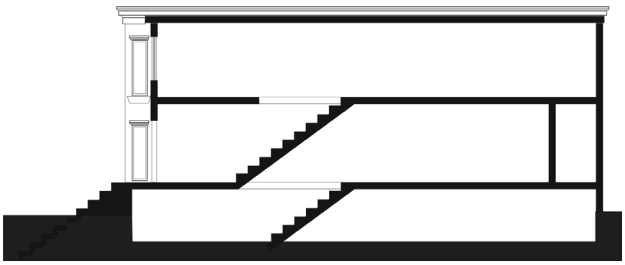


The adaptable side hall house floor plan (Moudon 1986)

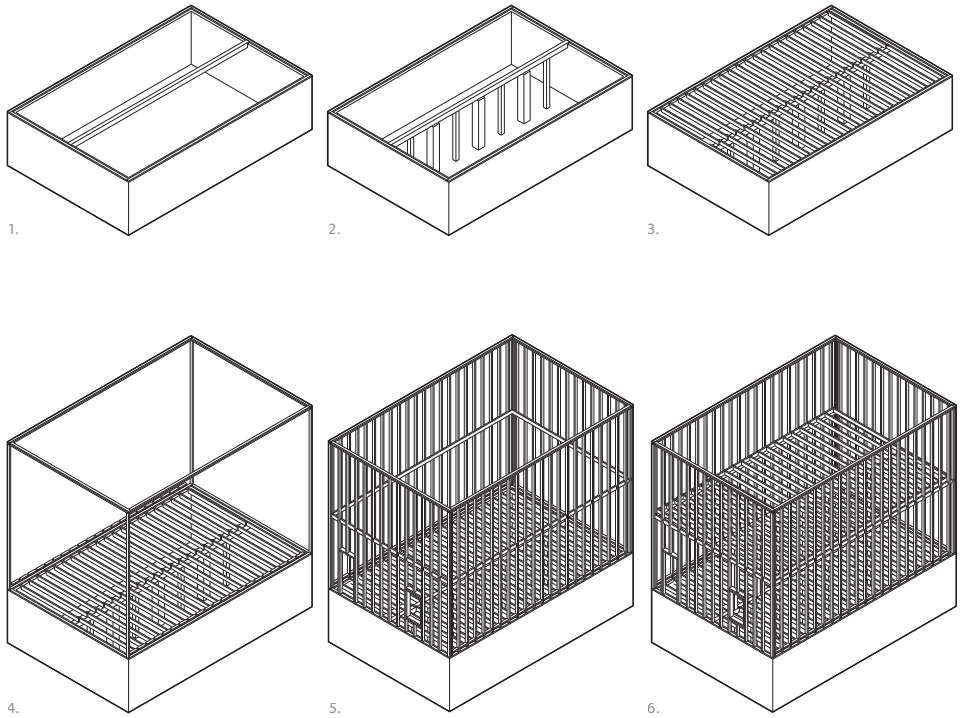
Typical House, Structure / Adaptation

Most of the buildings on this block are balloon-frame Victorian houses with a side-hall plan, built in the late 19th or early 20th century. They are laid out along the street in an A-B-A-B pattern (a 20-foot-wide house with an adjacent 10-foot-wide driveway). The houses have modest-sized rooms, averaging 13' x 13', with unspecialized functions. On each floor, three rooms are lined up on one side of the house, with a second story that follows the same pattern. This makes these houses easy to divide vertically into two flats (Moudon 1986, 52).

The houses typically have a balloon frame structure. These structures have been mentioned in written documentation as early as 1804. The name and method can be traced to multiple cultures. It has been suggested that it may be some of the earliest results of multiculturalism seen in North America today (Cavanagh 1997, 12). Balloon framing is structurally and materially efficient. No joint is more important than the next. If an individual joint fails, the whole will maintain its integrity. This allows for easy modifications and makes it a great structural system for expected adaptations. Balloon framing was used as a main construction method when 20 foot-long lumber was available. Now platform framing is the dominant construction method of wood frame buildings. It permits the same modifications as balloon framing.



Side hall house section, (Moudon 1986)

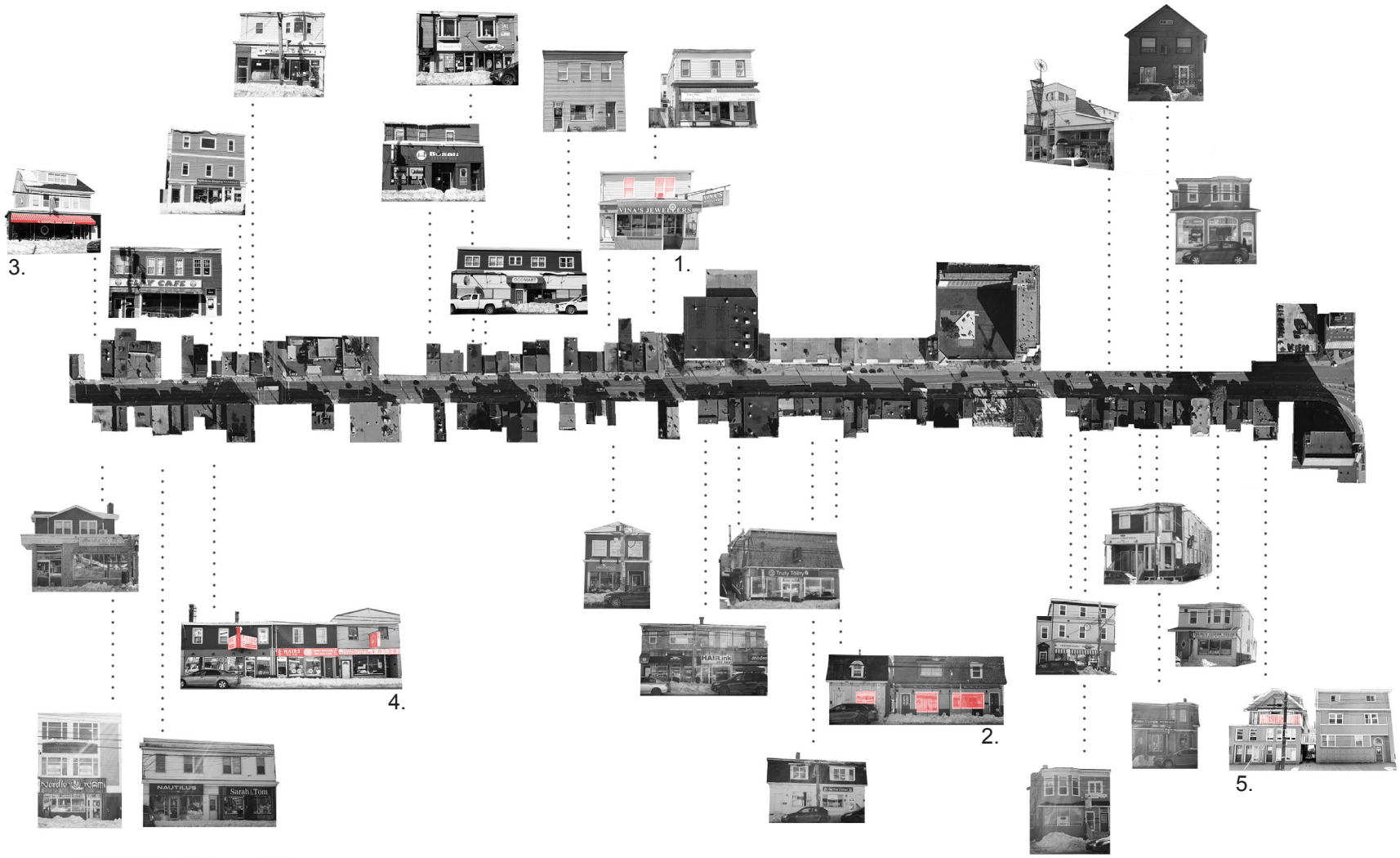


Steps of balloon frame construction.

Quinpool Road Adaptations

One block south of my study area is the commercially zoned area of Quinpool Road, where we can see numerous examples of adaptations to wood framed houses for commercial use.

The most common adaptation was the relocation of residential use to the second floor, leaving the first floor accessible to the public street. Other notable adaptations were openings, enlarged or added to the facade for display, doors inset to create overhangs for shelter, and awnings attached. Signage adorns most of the houses for easy identification and decks appear on first and second levels for views and enjoyment of public space. Although these adaptations were beneficial, Quinpool Road is a four-lane



Adaptations to houses in nearby commercially zoned areas of Quinpool Road. Notable adaptations: 1. relocation of residential use to the second floor. 2. openings made larger or new openings punched into the facade for display. 3. doors inset to create overhangs for shelter or awnings attached. 4. signage added to houses for easy identification. 5. decks appear on first and second levels for views and enjoyment of public space.

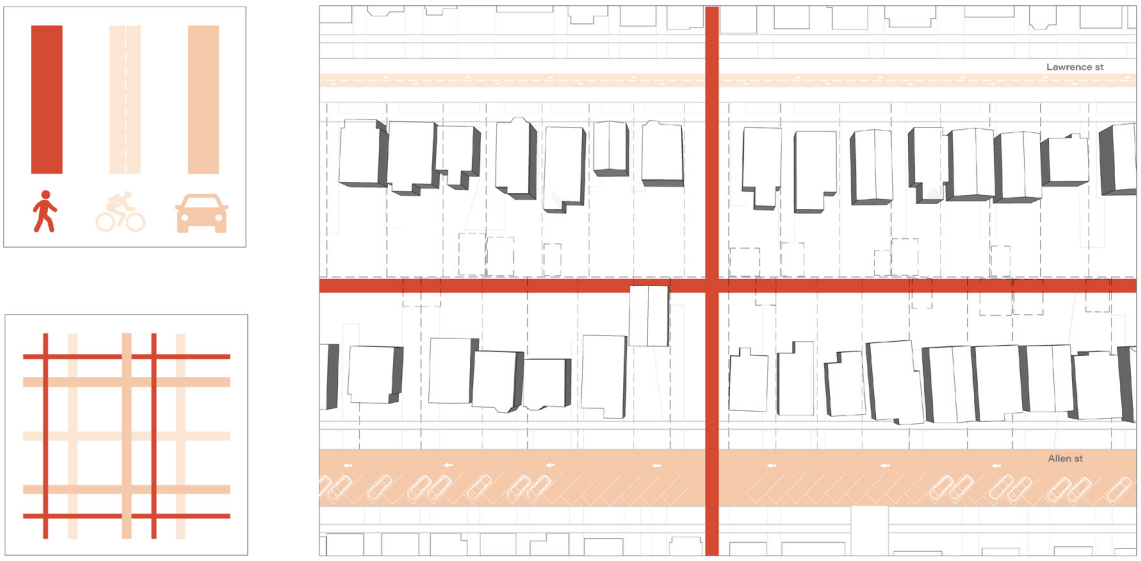
artery for traffic, rendering it unfriendly and almost unusable by pedestrians.

3.3 Urban Strategy

Urban planning and architecture are inseparable disciplines that have large impacts on each other's functioning. There are many important relationships between buildings and the city within which they reside. One important relationship is with mobility networks and the forms of transportation that affect how a building can successfully address the street. The speed of varying forms of transportation affects the accessibility of a building. Implementing a middle scale of architecture that incorporates programs of dwelling and small-scale business requires a unique urban strategy.

The catalogue begins with an urban strategy that adapts existing transportation networks in the neighbourhood and provides new opportunities to better connect to the entire peninsula of Halifax. The urban strategy references The Woven City in Susono Shizoku (BIG 2020). It separates roads into three types: vehicular streets, slow mobility, and pedestrian-only. These street types are interwoven using the existing city grid to create a 3x3 grid of all mobility types. The city is then better accessible by all mobility types and allows for a more porous city. As car share memberships in Halifax increase, as well as car services such as Uber and technological advances of the self-driving car, it is inevitable that urban centres will see decreased numbers of automobiles, certainly personally owned automobiles. This is an opportunity that will afford new spaces for architecture and people in our cities.

On my study block I have designated Allan as a one-way vehicular street with diagonal parking on one side. Spaces



Urban Plan separates mobility networks and incorporates new pedestrian laneways that bisect the block.

can be used by visitors and residents, but will mainly be allocated to carshare services. Lawrence Street becomes a slow mobility street with a bike lane on one side of the road, allowing the other side to be used by pedestrians, street activities and only to automobiles to drop off supplies and people with accessibility needs. The pedestrian-only streets are introduced into my urban strategy as new laneways through the block. The first, larger pedestrian pathway is a perpendicular laneway that cuts across the entire block. It is a ten-foot-wide laneway offset from centre on the southern properties of the block. This allows for variability in scale of design interventions and remaining property for shared and private gardens. Parallel pedestrian lanes are formed where driveways somewhat align between backing properties. This form of laneway can more easily be implemented, as it only concerns two to four properties and their residents.

3.4 Innovative Policy for Sustainable Urbanization

Architecture alone cannot solve the housing crisis in Halifax, even by meeting FAR targets and executing the most promising housing options for diverse households. Marginalized people will continue to be pushed outside city limits and unfortunately this means the large majority of Nova Scotians. Through a system of innovative policies, it is possible to allow for more equitable land tenure that lessens the reliance on current markets to establish land value and create sustainable housing options for urban Nova Scotians.

The design interventions in this catalogue are proposed with the assumption that policy relaxations and density bumps are allowed only to homeowners with properties that have been subdivided and sold to non-profits, cooperatives or land trusts. This creates opportunities for low-income Nova Scotians to own and rent where they currently cannot. Once a percentage of the land has been allocated to sustainable land endowments, the property is eligible for density bumps for their own use. These incentive strategies and policies would open up a potential for half of the land in the test block to be secured by low-income households and remove land tenure from the grips of market value fluctuation. Current homeowners are able to maintain their properties as is but are handed an opportunity to participate in solutions to the housing crisis.

Vancouver architect Sean McEwan's proposal for Urbanarium's 2018 Missing Middle competition is an example of a similar proposal. The competition set out to address Vancouver's affordability and social health issues (Urbanarium 2021). McEwan proposed that increases in

density be granted only if some portion of the new density is permanently assigned for social purpose, in the form of strata units given over to non-profit housing corporations to ensure perpetual affordability for working families. His design takes an approach that creates higher parcel density but remains compatible with existing neighbourhood character. These factors are important, as current renewal models have been causing generational conflict between house-poor millennials and typically older homeowners (Condon 2018). McEwan's proposal states that without mandatory inclusive housing units, renewal projects are likely to exacerbate unaffordability, as new, higher priced development replaces older, less expensive housing. As designers, we can only showcase creative solutions to the housing crisis that inevitably need to be supported by interdisciplinary expertise.

3.5 Criteria and Standards

All designs will be accessed using nine criteria that address the three main ambitions of this thesis. Each design does not address all three ambitions; they work in collaboration in the neighbourhood.

Intersecting Living and Working

- mixed residential/commercial
- increases community connection
- flexible spaces

Densification

- increases FAR (floor area ratio)
- adaptable over time

Diversifying Household Structures

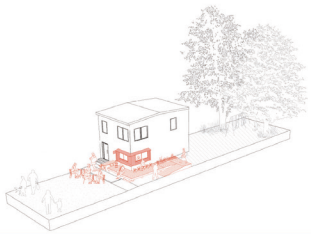
- accommodates multiple households
- accommodates a range of household types
- shared living opportunities

3.6 The Catalogue

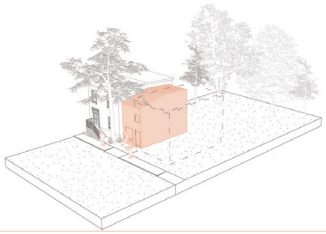
The following pages show the catalogue of middle density design explorations.

Catalogue :

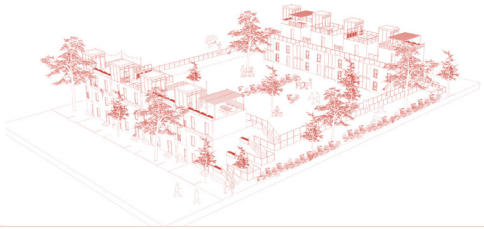
Service Opening



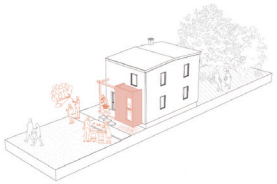
Infill



Townhouse + Courtyard



Facade Extension

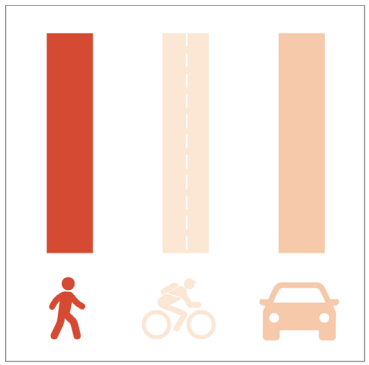


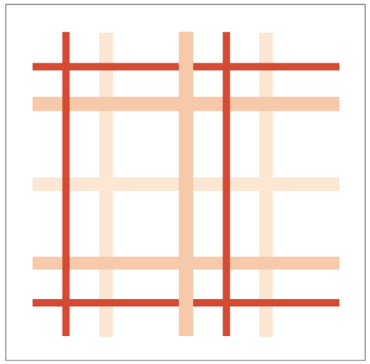
Micro House

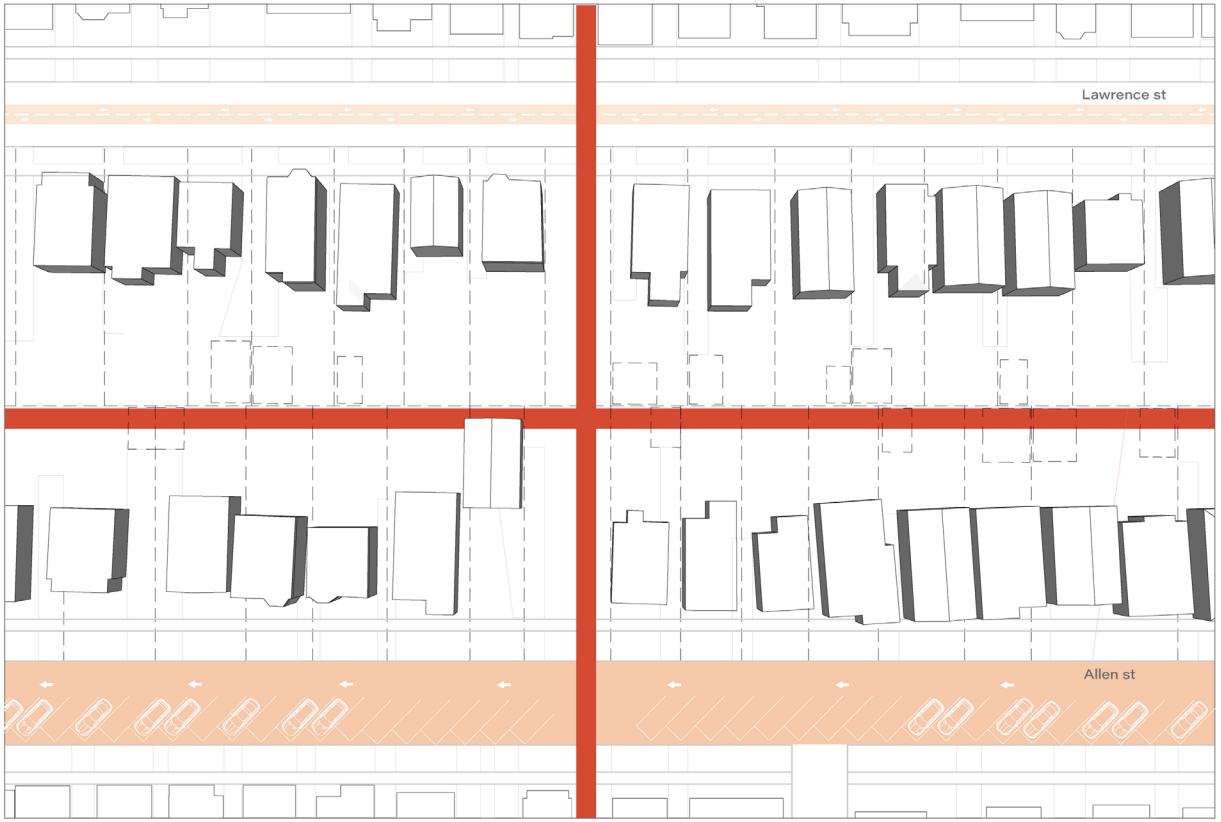
Micro Offices

Shared Live + Work

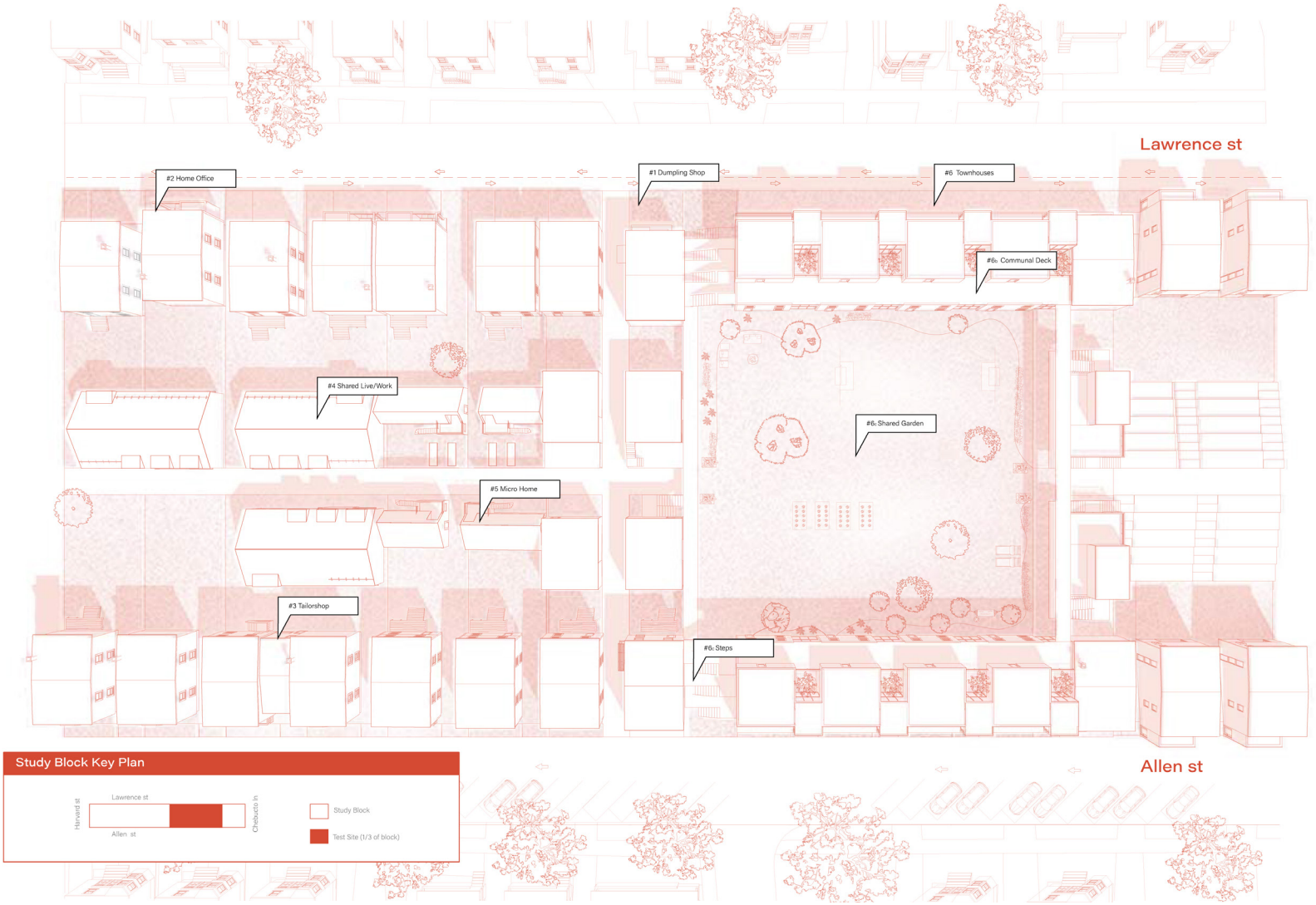
Using my study block as a test site, a catalogue of design explorations investigates the missing middle through an adaptive approach for future densification of the city of Halifax. Opportunities within the current urban fabric for diverse housing options are revealed.



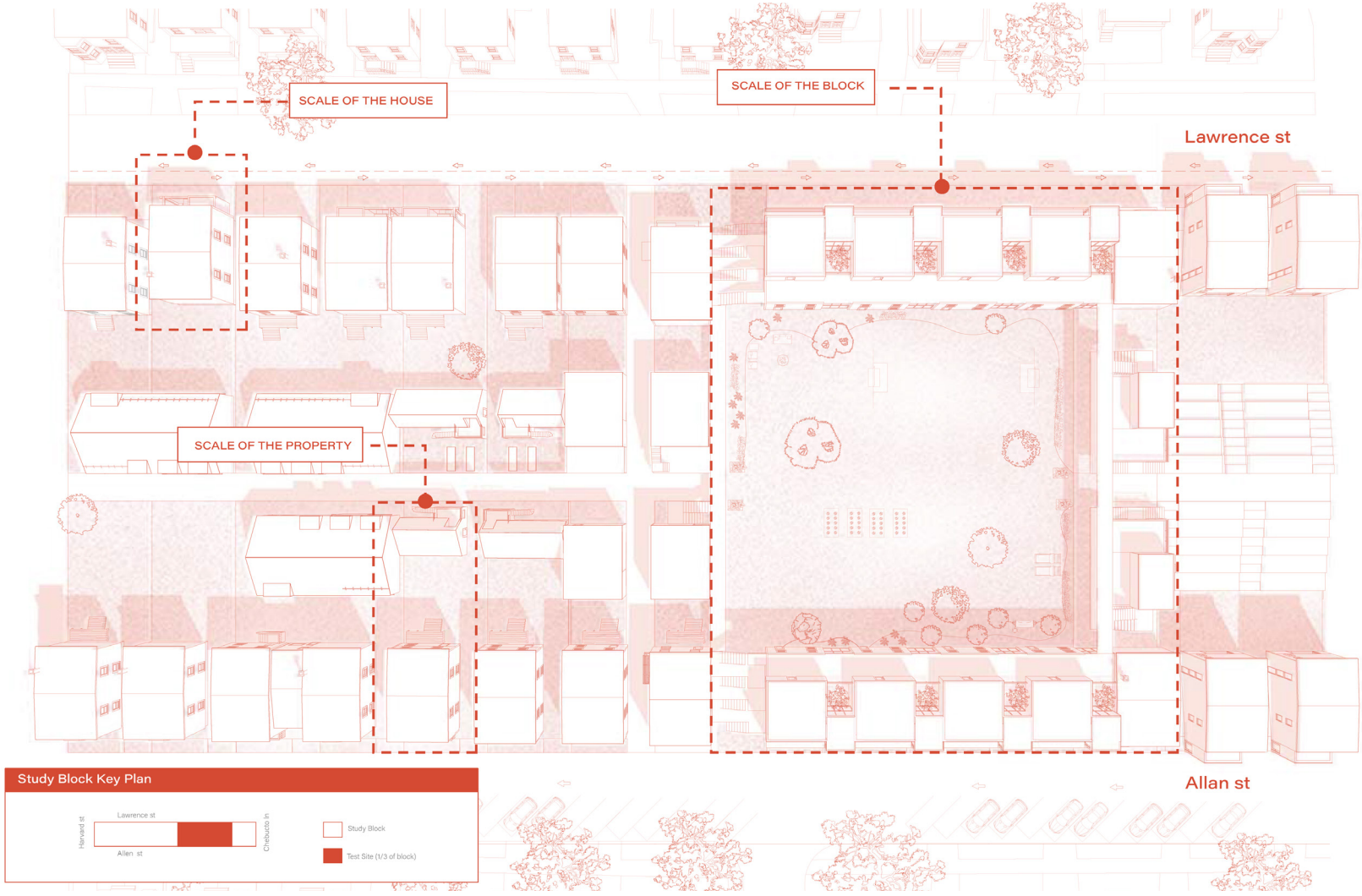




Urban strategy: The catalogue begins with an urban strategy with adaptations to current mobility networks within the city. Referencing the Woven City in Susono Shizoku (BIG 2020), the strategy acknowledges the inevitable changes in transportation. Three mobility types are separated and woven together on a 3x3 grid to allow for continuous networks throughout the city, allowing people and buildings to address the street in new ways.



A perspective plan shows 1/3 of the block where catalogue designs are implemented to show potential densities and diversity in program and household type.



The design catalogue is organized into 3 scales. 1. The scale of the house: adaptations to existing dwellings. 2. Scale of the property: additions to the lot. 3. Scale of the block: interconnected interventions.

Service Openings – The Dumpling Shop

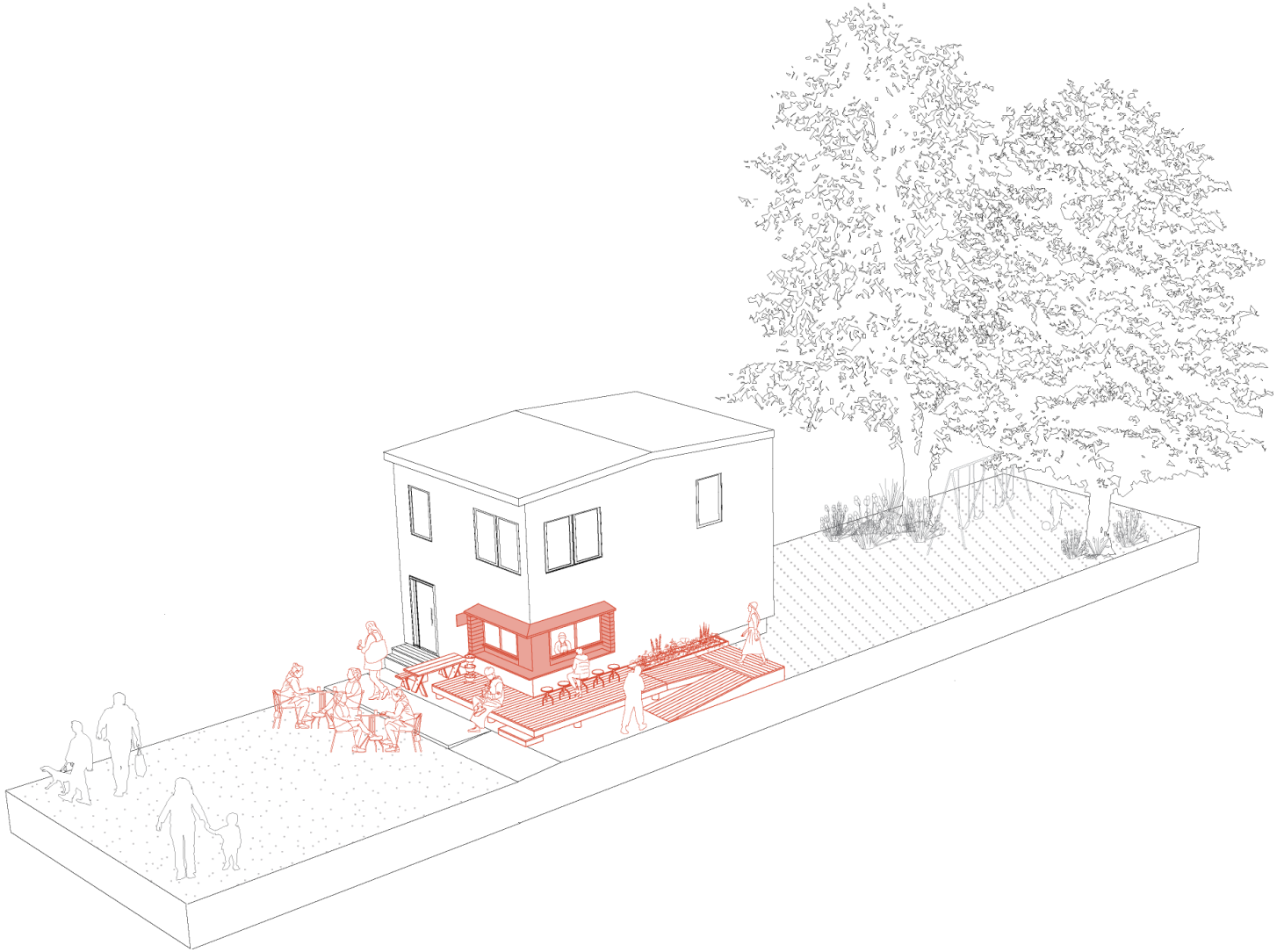
The first intervention is the service opening, represented as a dumpling shop. The subtle addition of a service opening introduces a diversity of occupancies onto the block, by the simple move of allowing the window to become an inhabitable space.

This window — only slightly larger than existing windows along the street — allows food prepared in the home to be served and sold through the window. This creates a porosity in the dwelling, blurring boundaries of public and private space within the residential block and knitting together the neighbourhood.

Service openings can support diverse households by providing entrepreneurs the opportunity to remove some financial pressures of owning/renting two properties, which could potentially allow them to afford a dwelling on the peninsula. Food service within the residential block also supports smaller household sizes and single parents whose domestic duties can be burdensome.

Façade Extension – Home Office

The increase of public space on our streets allows the facade extension to push outward where front yards once were. In this example, the added space is a home office but was designed also to be a shop. The placement on the

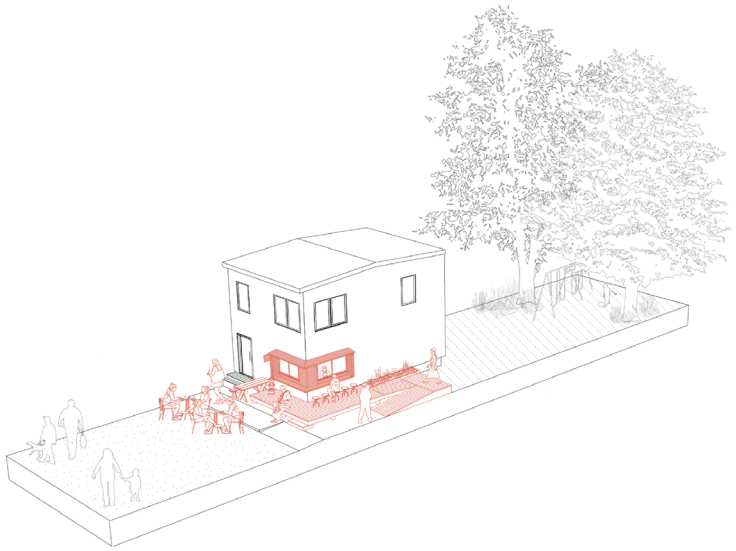


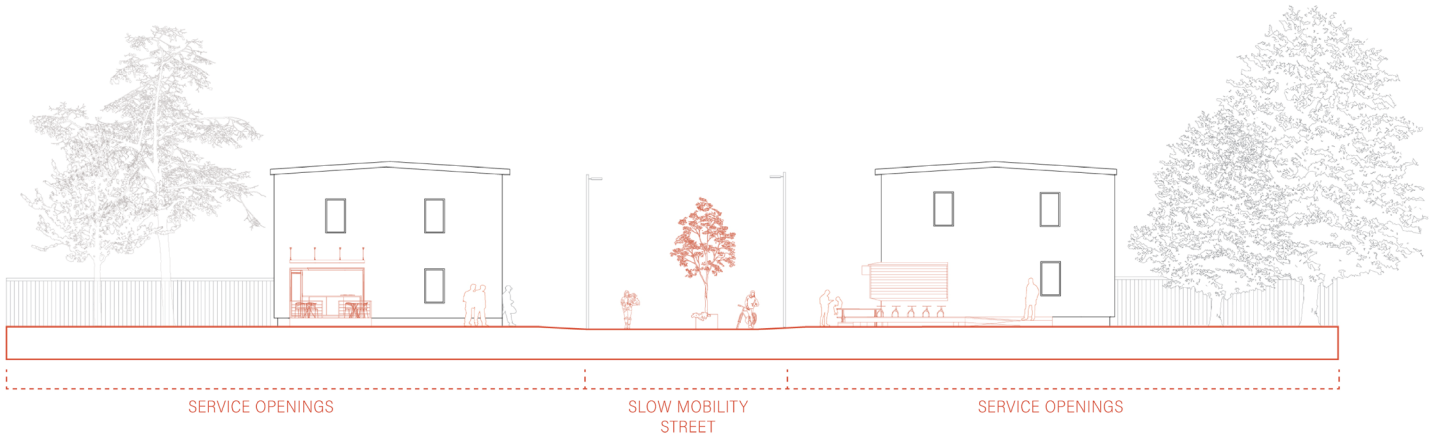
Service Opening

SCALE: HOUSE

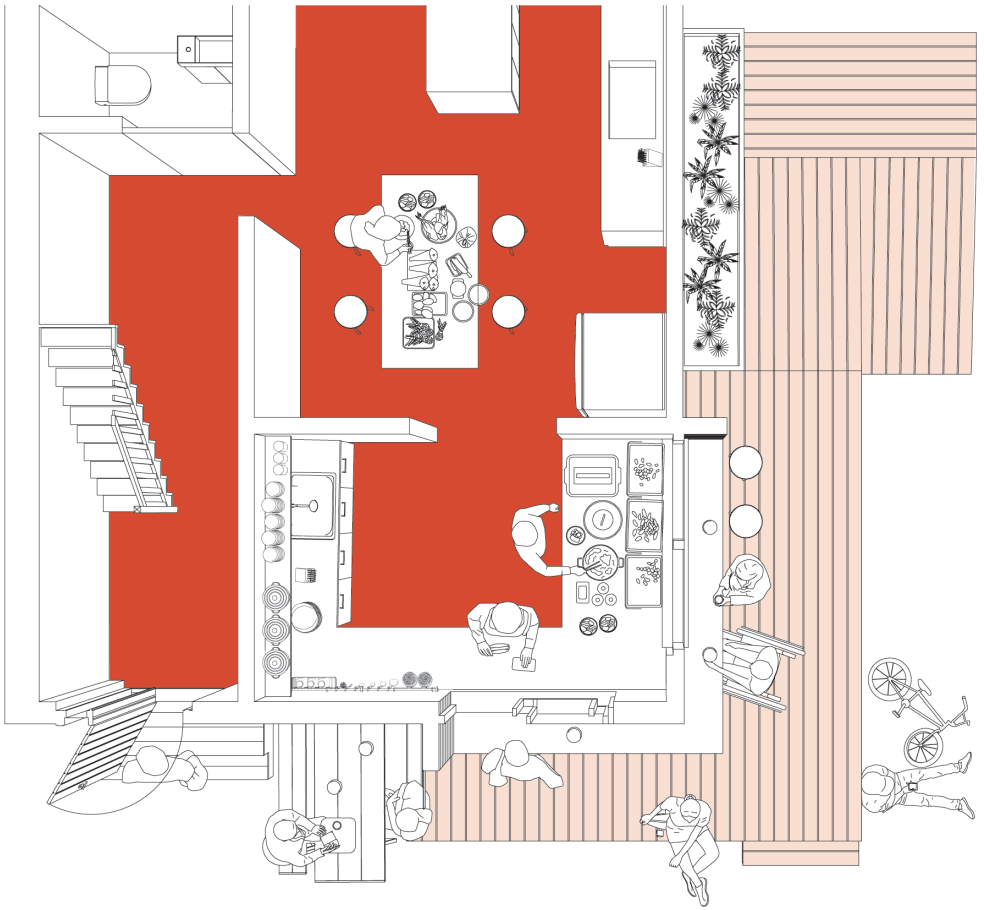
Service Opening: Dumpling Shop

		low	medium	high
INTERSECTING LIVING / WORKING	mixed residential / commercial		◒	
	community connection		●	
	flexible spaces		◒	
DENSIFICATION	FAR (floor area ratio)		.66	
	adaptive structures		●	
DIVERSIFYING HOUSEHOLD STRUCTURES	accommodate multiple households		○	
	accommodate range household types		◒	
	shared spaces		○	





Service opening: The first intervention is represented as a dumpling shop. The subtle addition of a service window permits many possible uses on the block, allowing the front of the house to become a collective space.



The service window creates porosity in the exterior of the dwelling.

front facade addresses the street, allowing for potential interaction with the public.

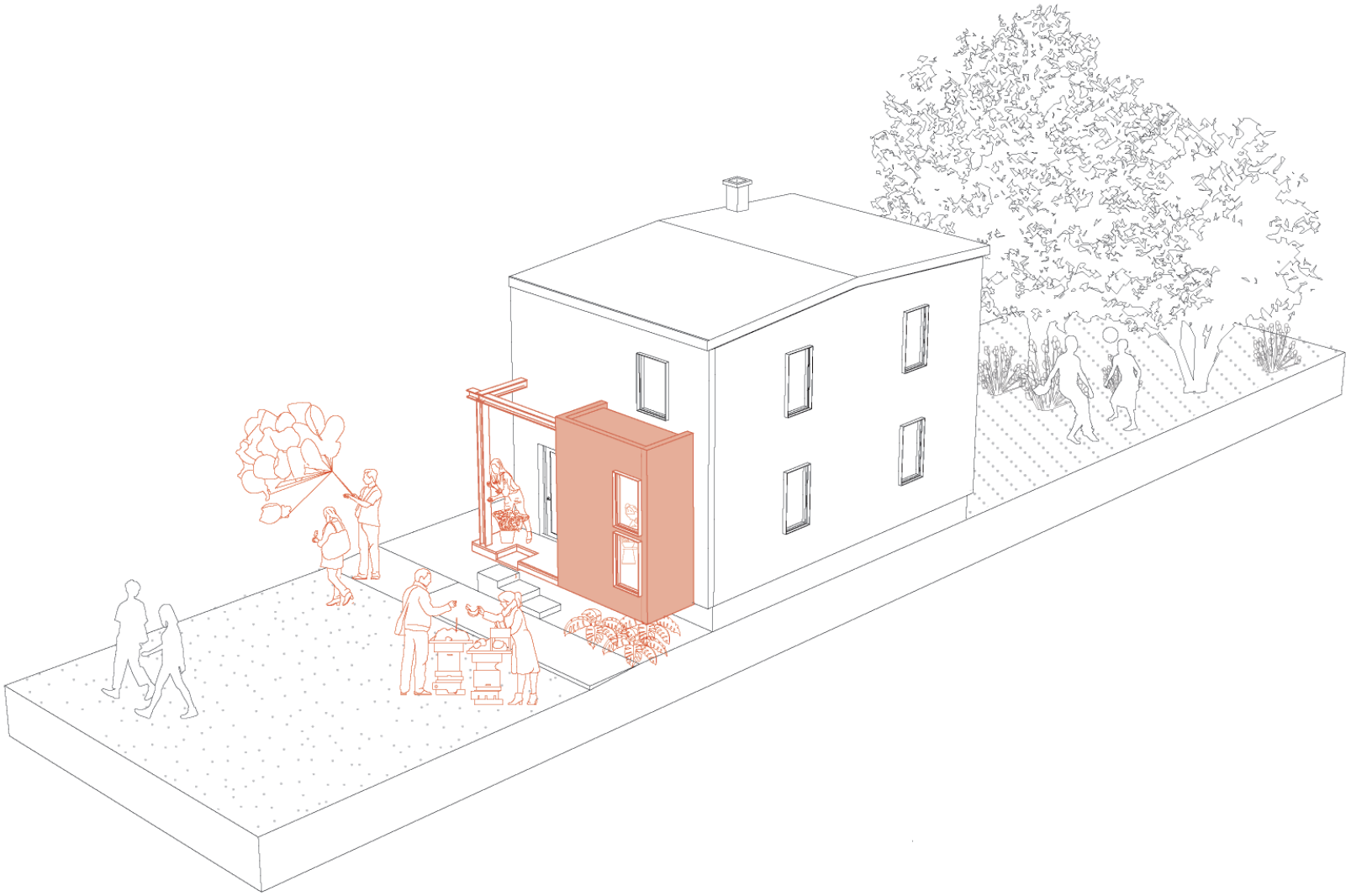
As virtual work continues to grow with a heavy nudge from our current global pandemic, this façade extension addresses the need for integrated workspaces in our homes and, with separation from simply a sliding door, it maintains physical separation and privacy from other activities in the home. This extension can be imagined in much larger versions and also can extend the floor area on the second floor of the home.

Similar to the service window, this design intervention focuses mainly on increasing public life on the block. This extension is very adaptable in function and use over its lifetime and highlights the strength and adaptability of the pre-existing balloon frame structures. It serves as a small example of how wood frame construction can be modified instead of being demolished.

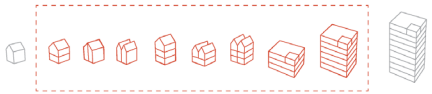
The Infill – Tailor Shop

The first intervention at the scale of the property is the Infill. This can be seen as a house adaptation but is built as a separate unit between two houses. It stands where a driveway once was, taking its place as an adaptable space and adding a new dwelling unit to the property.

Depicted as a tailor shop, this infill serves as a workspace for the homeowner, and, with an entrance to the existing dwelling on the ground floor, it can grow and change with household needs over time. It can be used for an extra bedroom as the household grows, or transitioning to an in-law suite, and is designed so it could eventually be sold off to the growing demographic of singles.



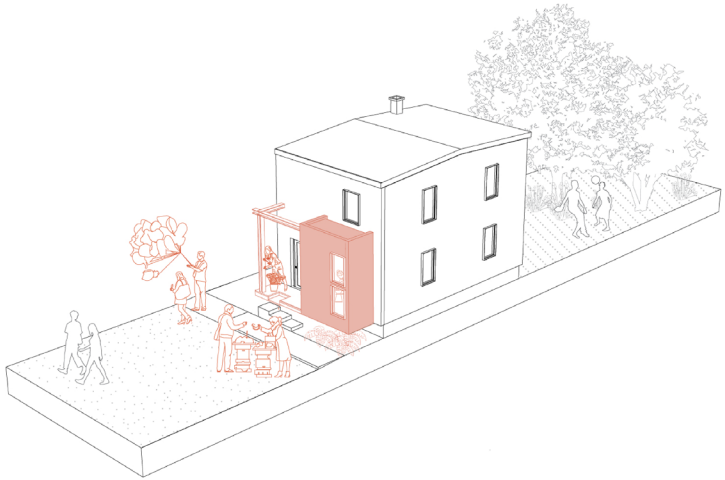
Facade Extension

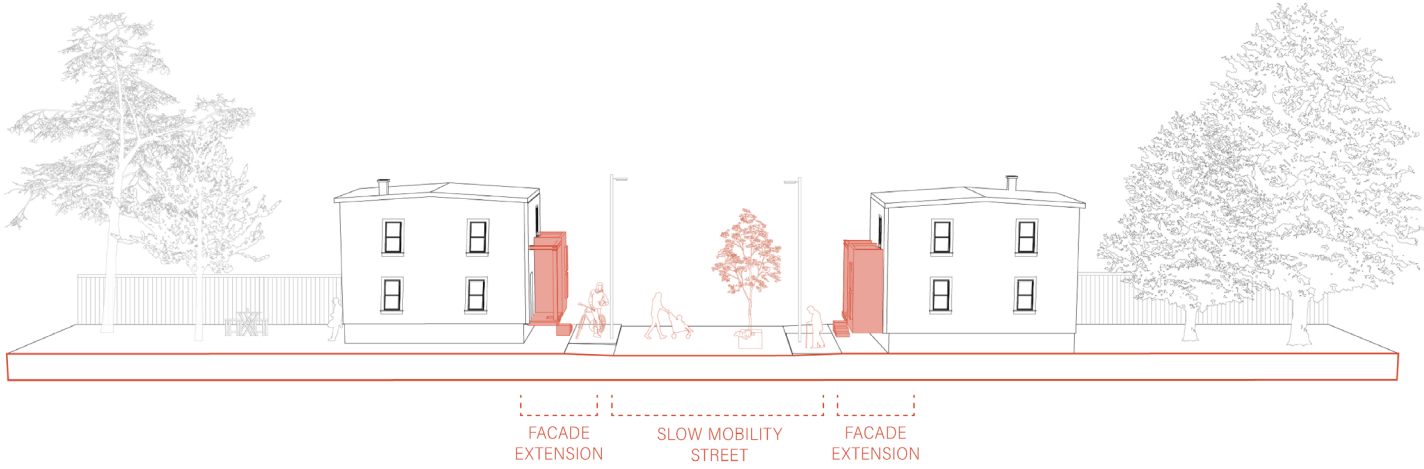


SCALE: HOUSE

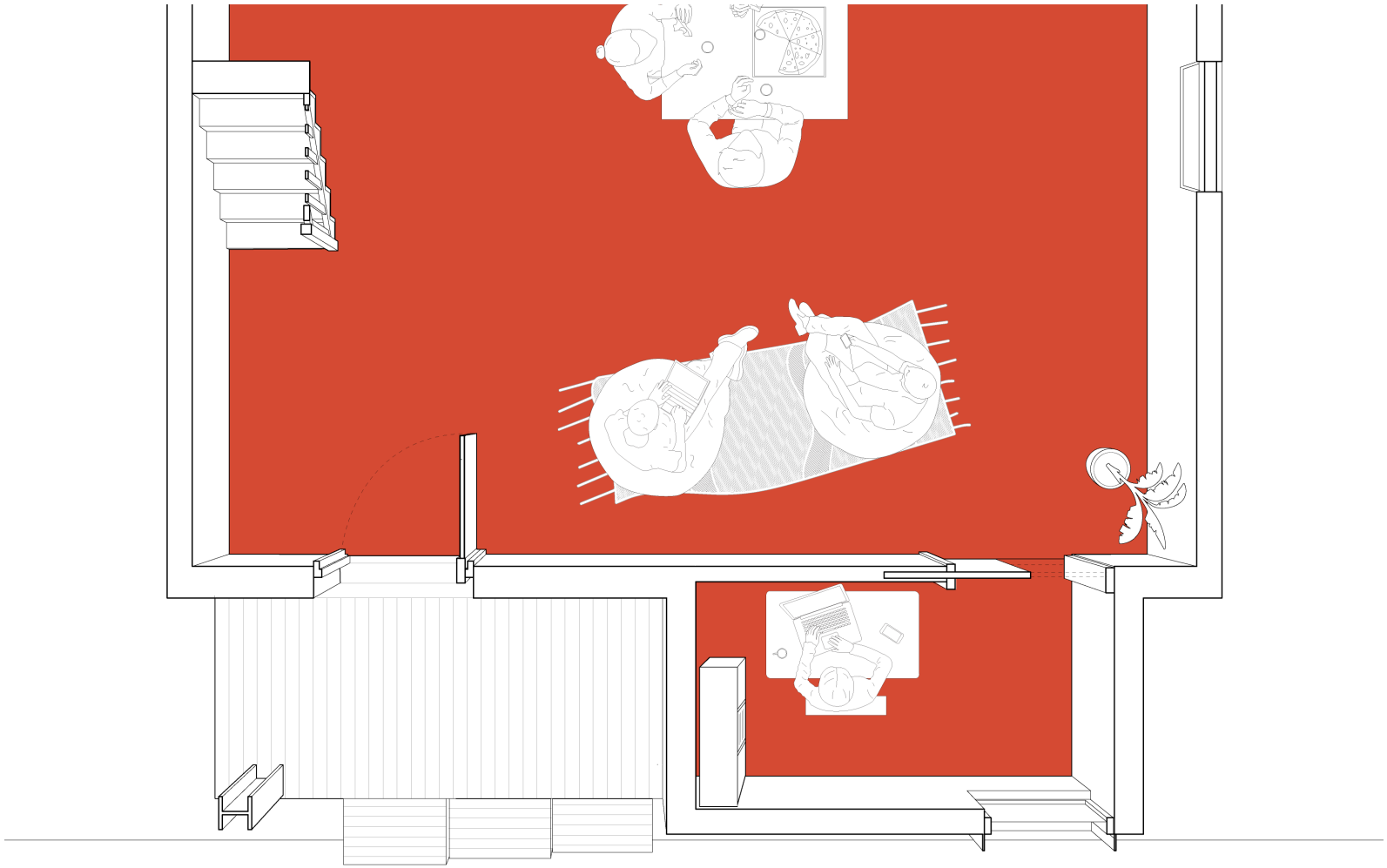
Facade Extension: Home Office

		low	medium	high
INTERSECTING LIVING /WORKING	mixed residential / commercial		●	
	community connection		●	
	flexible spaces		●	
DENSIFICATION	FAR (floor area ratio)		.81	
	adaptive structures		●	
DIVERSIFYING HOUSEHOLD STRUCTURES	accomodate multiple households		○	
	accomodate range household types		○	
	shared spaces		○	

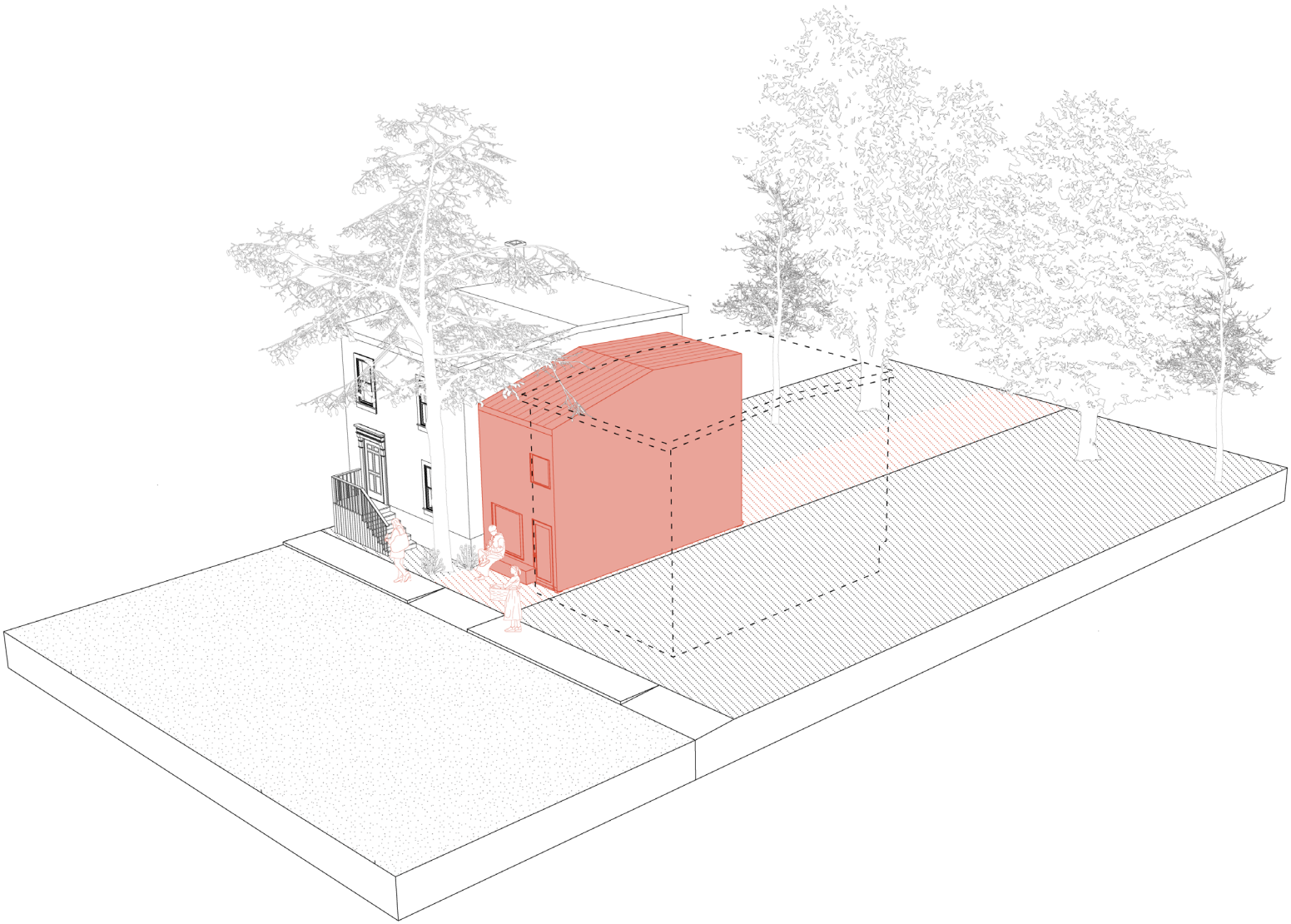




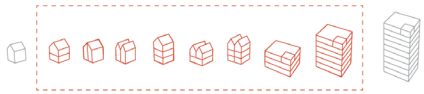
Facade extensions enable homeowners to extend their dwellings where front yards once were. They could be used for an office or a shop.



Perspective plan showing a facade extension.



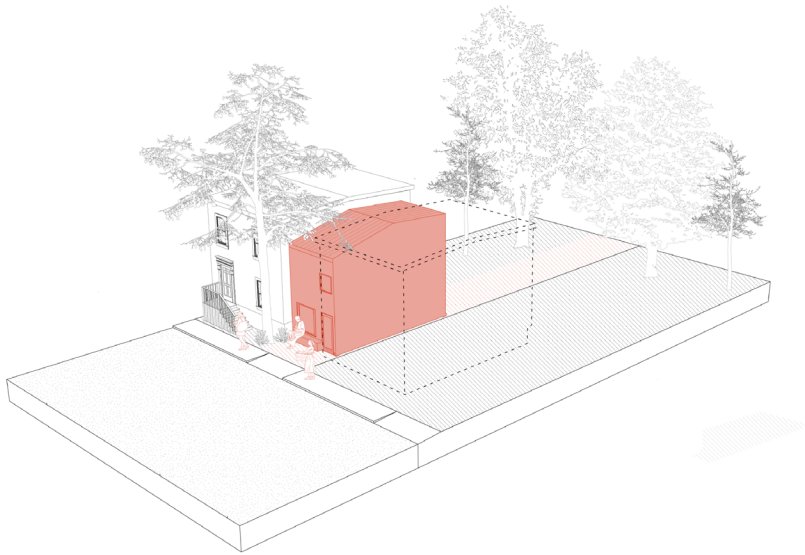
Driveway Infill



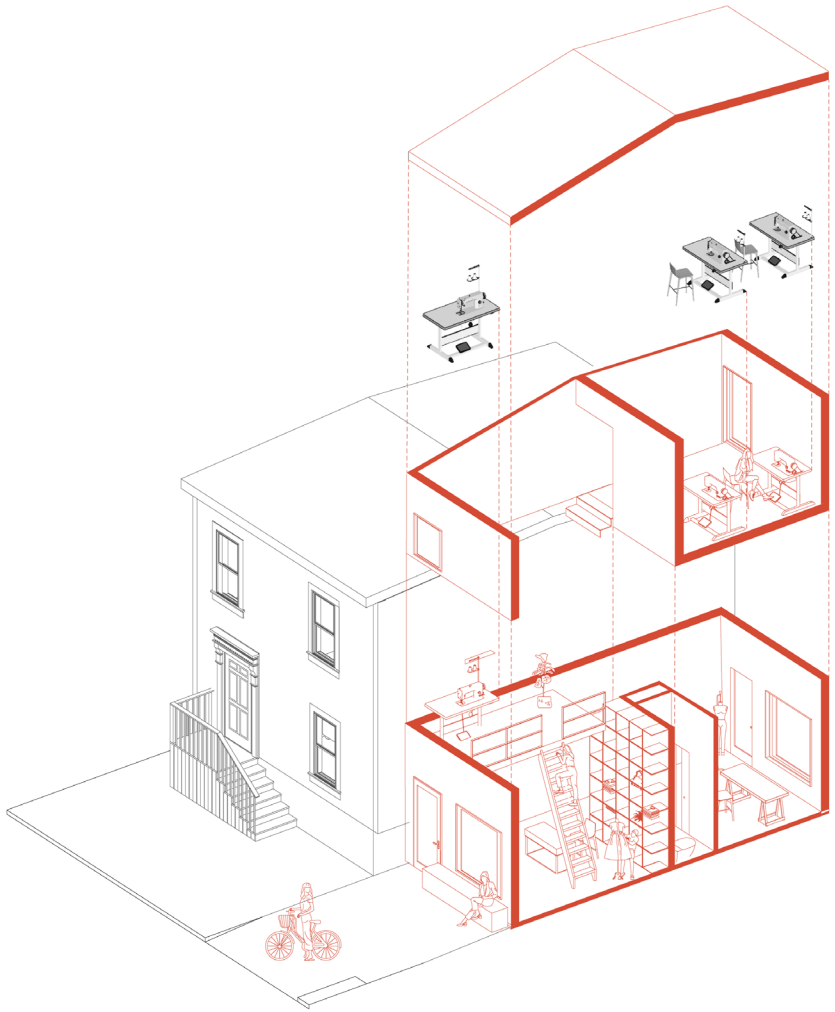
SCALE: PROPERTY

Driveway Infill: Tailor Shop

		low	medium	high
INTERSECTING LIVING / WORKING	mixed residential / commercial			●
	community connection			●
	flexible spaces			●
DENSIFICATION	FAR (floor area ratio)		.79	
	adaptive structures			●
DIVERSIFYING HOUSEHOLD STRUCTURES	accomodate multiple households			●
	accomodate range household types			●
	shared spaces	○		



An infill building replaces a driveway between two houses. It is built as a separate structure that can be owned and occupied by a new household or can extend the adjoining house.



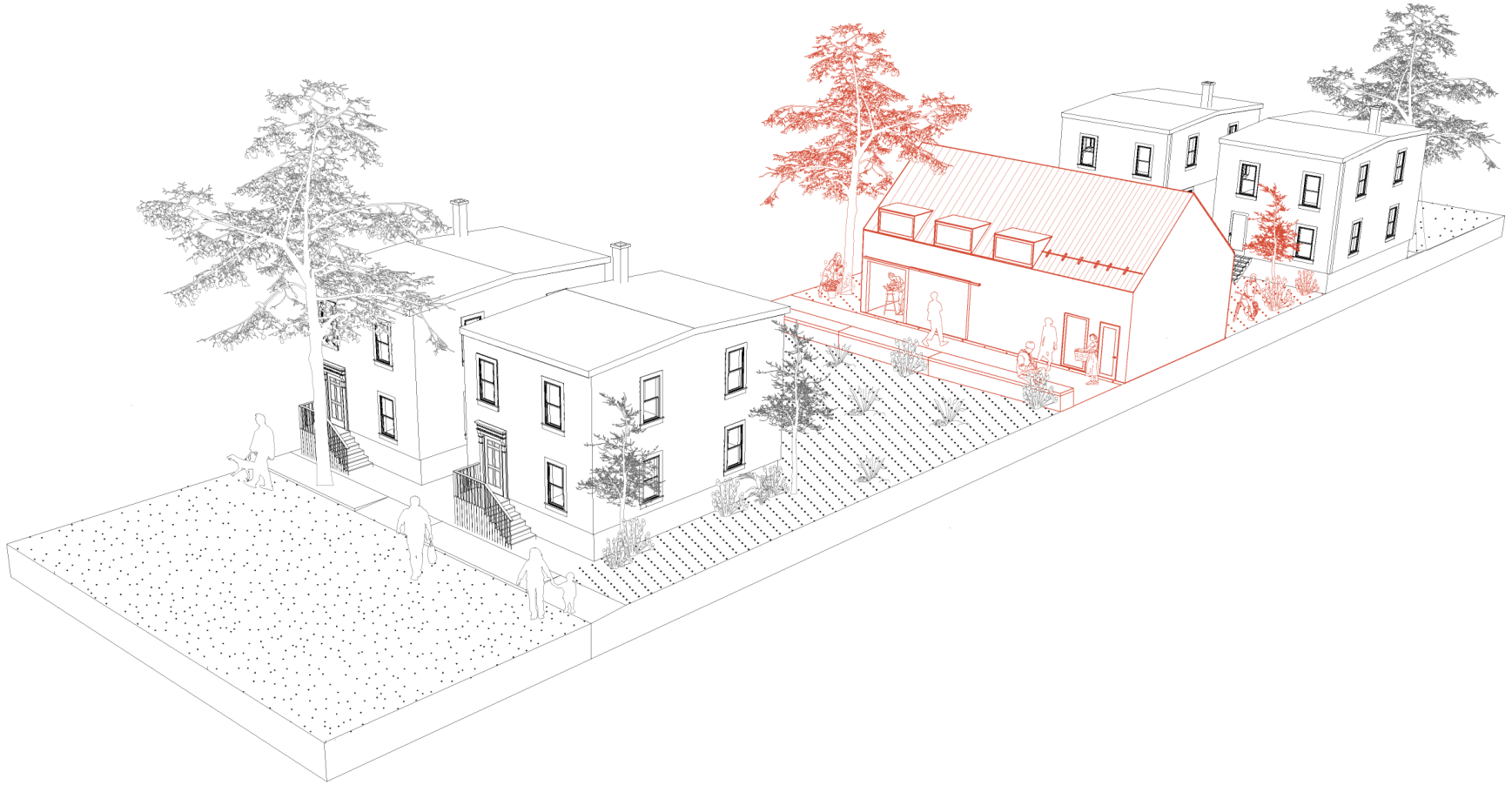
The infill: Depicted as a tailor shop, this space serves as a workshop for the homeowner. It can grow and change with household needs, transitioning to an in-law suite and eventually can be sold to the growing demographic of singles.

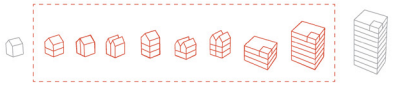
This particular design intervention achieves all three ambitions. It is one of the most adaptable designs, providing the flexibility to be a space for work or dwelling. It can be used as an extension to the existing house or can create a separate unit. This design could also incorporate cooperative living measures by sharing facilities — kitchen, laundry facilities, shower — with the existing house. In combination with other forward-thinking reuses of driveway space, this could offer a new dwelling type in the neighbourhood.

Shared Work + Live – Craftsperson Studio

The shared live + work unit is a nod to rooming houses of Halifax's past that have almost disappeared from the housing landscape. The rooming house throughout urban history in North America has always been a good solution to single-person households. Today, the proportion of single-person households is the largest it has ever been in North America, and yet we have almost completely abolished this housing type in Halifax.

This shared live + work unit accommodates 3 single households who would benefit from a workspace as the focus of their home. The plan of the unit has a flexible open workspace with sliding doors into private spaces on the main floor. A covered space opens onto the lane for a connection to nature in warmer months and allows access to the laneway for deliveries. A shared second floor kitchen is open to the shared workspace below. Three private bedrooms and separated shower and toilets are also on the second floor. I think the success of this new rooming house type would depend on keeping numbers of residents small and having programmed spaces within the dwelling

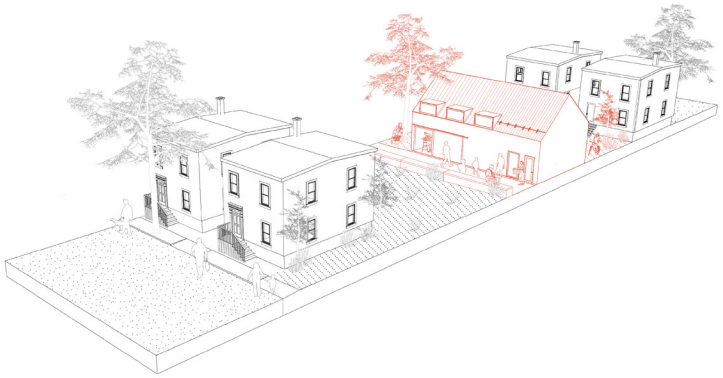


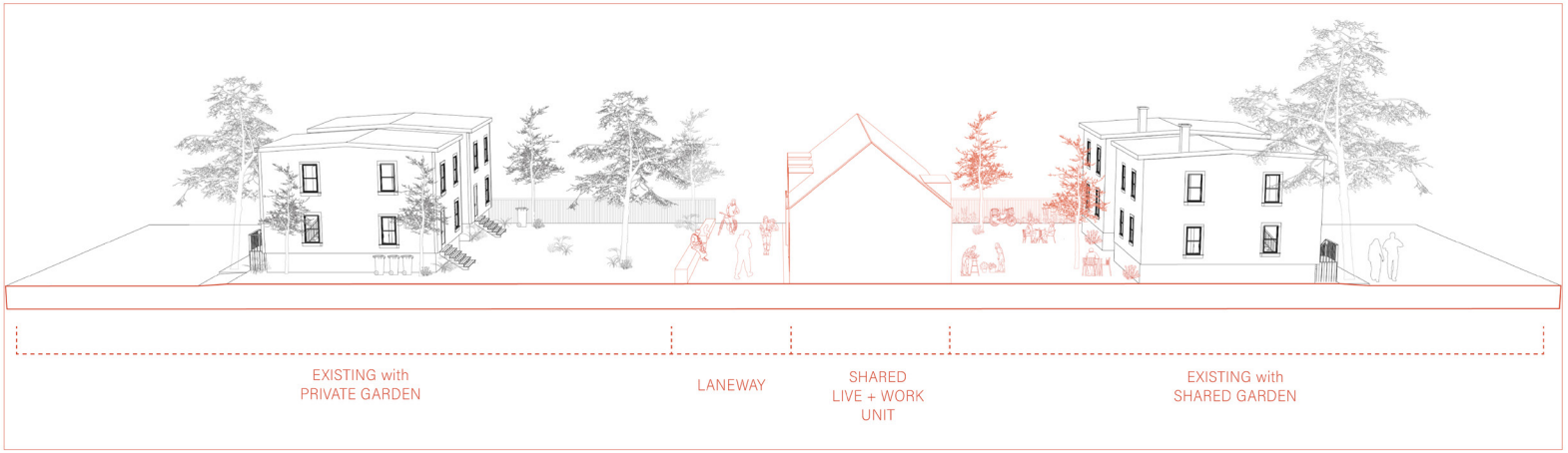


SCALE: PROPERTY

Shared Live + Work

		low	medium	high
INTERSECTING LIVING / WORKING	mixed residential / commercial			●
	community connection			●
	flexible spaces			●
DENSIFICATION	FAR (floor area ratio)		1.12	
	adaptive structures			●
DIVERSIFYING HOUSEHOLD STRUCTURES	accomodate multiple households			●
	accomodate range household types			●
	shared spaces			●





Shared live + work unit: The property on the right is subdivided to accommodate a new building for 3 single-person household that would benefit from a workspace as the main focus of their shared home. It is accessed from the laneway.

that would attract like-minded people to live agreeably with each other.

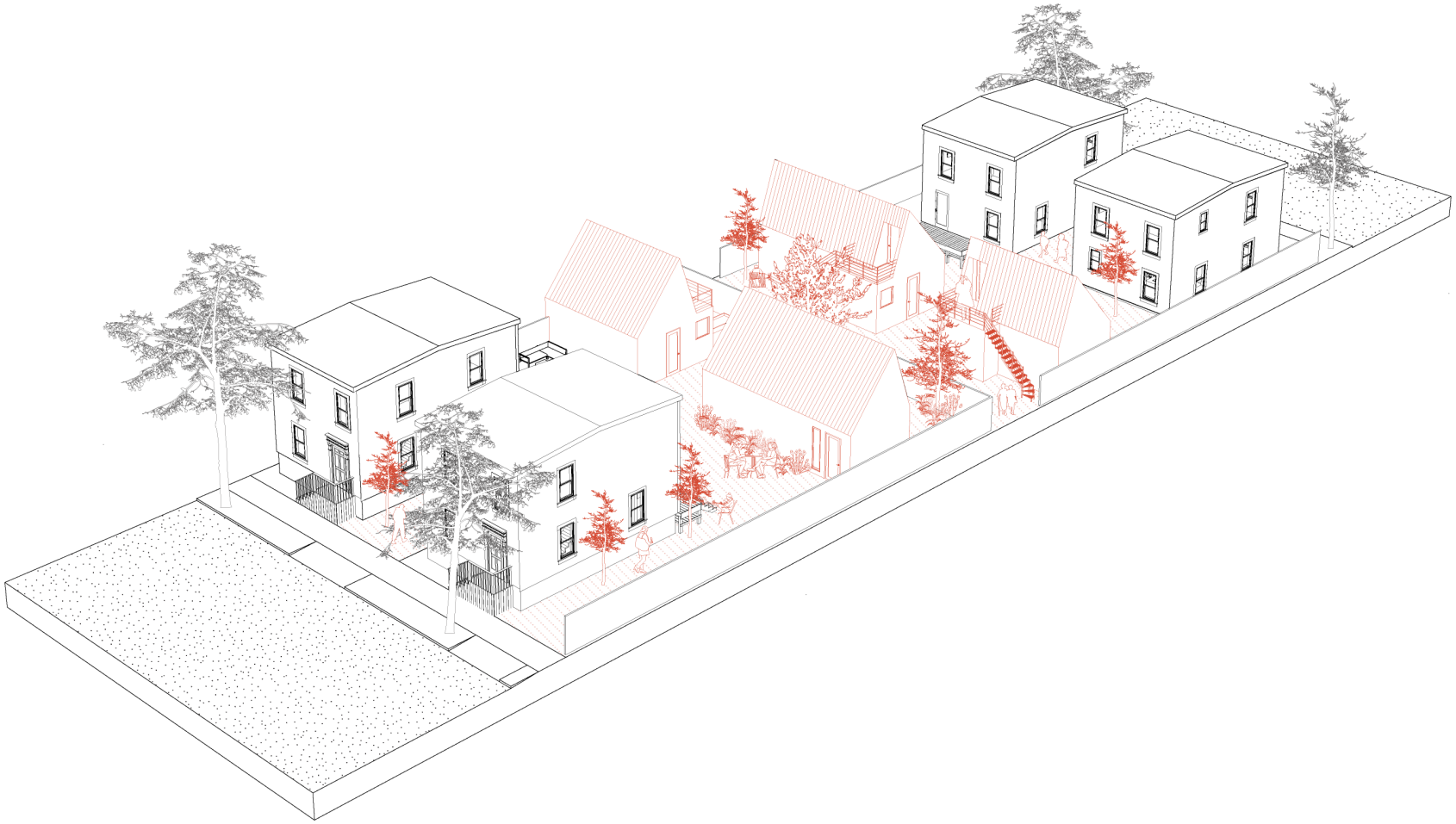
This design intervention succeeds in meeting all three housing ambitions defined by this thesis. It is able to densify properties by adding multiple households onto a property, while also incorporating work spaces to the block. The scale and floor plan of this building enable it to be used as a rooming house, a workspace, or a single family dwelling.

The Micro-House

With new coach house guidelines being implemented in Halifax, we can easily imagine properties being divided for micro homes. This design intervention speaks directly to the growing population of single person households in Canada, which makes up 31% of the census tract in which the study block is located. While the shared work + live is a valid strategy for densifying and merging households, the micro house acknowledges the desire for many single households to own a private residence. When we look at the two lowest income brackets in Halifax — the lowest 20% of the population — we see a large majority of these residents are persons living with a disability, immigrants, aboriginal Canadians and single parents. These individuals have a right to adequate housing and home ownership like any Canadian or permanent resident.

If we opened up home ownership to more than the top 30% of earners, architects and designers would see new opportunities for dwelling design that would advance residential architecture.

The micro house is able to fit on the properties to the north, leaving space for both the existing dwelling and the micro

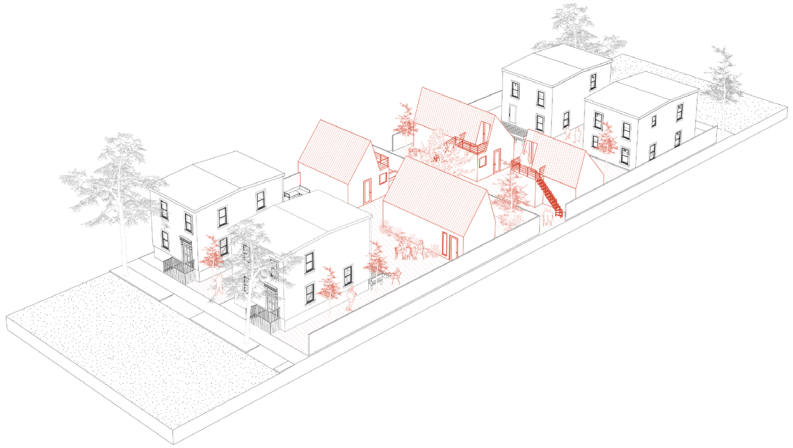


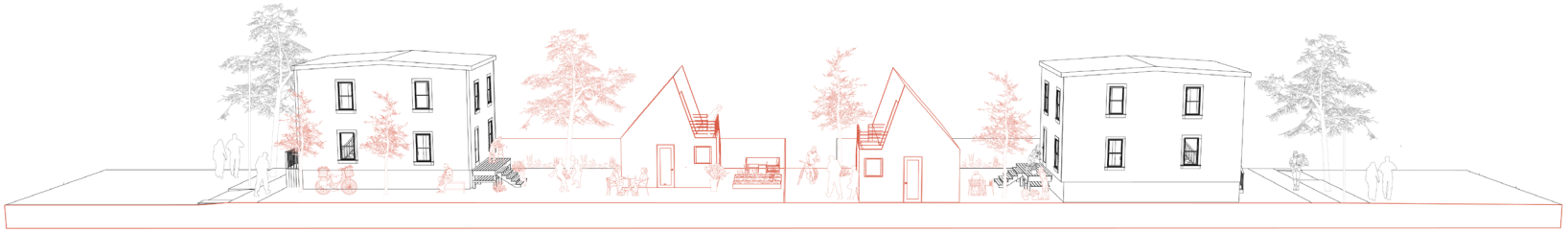
Micro House

SCALE: PROPERTY

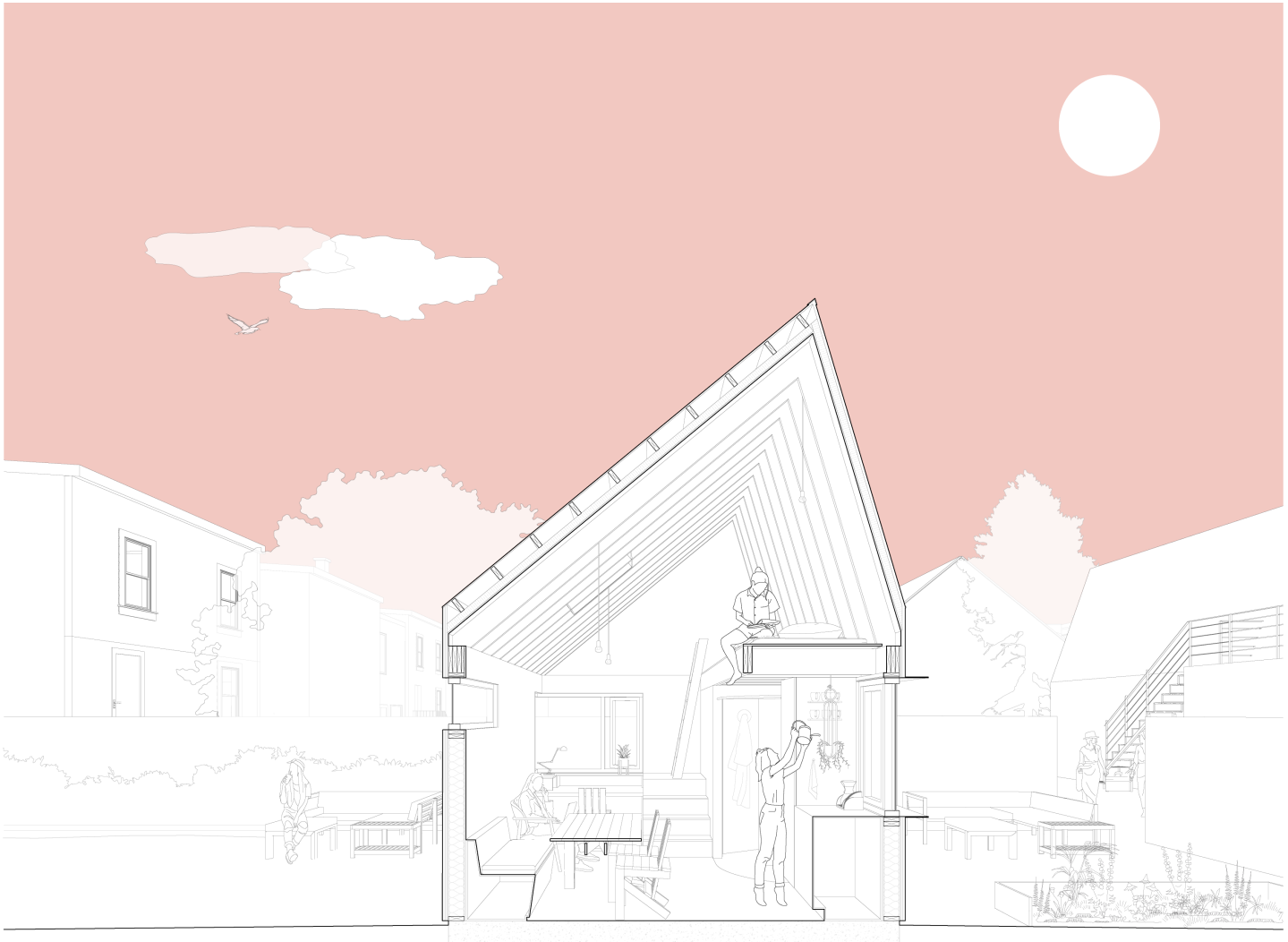
Micro House

		low	medium	high
INTERSECTING LIVING / WORKING	mixed residential / commercial	○		
	community connection		◒	
	flexible spaces			●
DENSIFICATION	FAR (floor area ratio)		.75	
	adaptive structures			●
DIVERSIFYING HOUSEHOLD STRUCTURES	accomodate multiple households	○		
	accomodate range household types		◒	
	shared spaces	○		





Two back-to-back 30’ x 90’ properties are subdivided. Each backyard is partially occupied by a micro house with a small 300 sq ft footprint. The off-centre placement of the laneway allows the micro homes on the north side their own private garden.



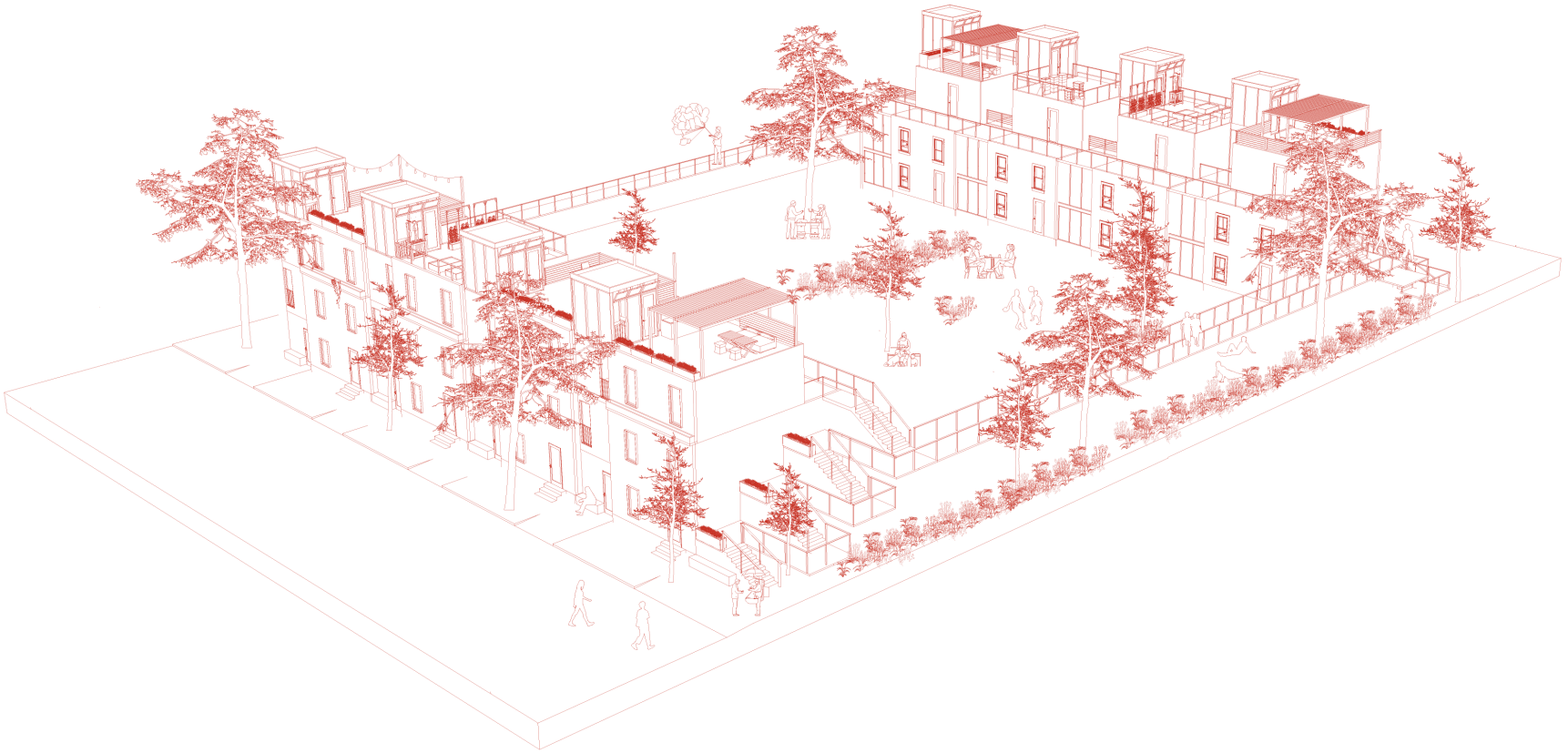
Section perspective of a micro house

house to have their own private garden. The properties on the south side of the block have a shared garden or leave the yard to the existing home and add a small deck to the micro house. The pitched roof gives a more expansive feeling of space for its small 300 sq ft. area. Finishes are simple plywood, an affordable option with a contemporary aesthetic.

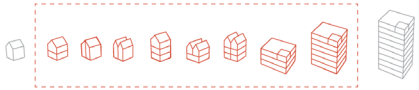
The Townhouses

The largest adaptation in the catalogue of design explorations takes shape as four sidehall houses are converted to townhouses with the addition of a third story. The flexibility of the existing sidehall configuration allows the new third floor to be an additional unit, turning the duplex into a triplex, or it allows one unit to have a workspace for small commercial business. The converted townhouses use the driveway space — much like the infill — to extend the floor area on the main floor, incorporating a ramp to make the main floor an accessible unit for living or working and having an enclosed courtyard bringing light into all three floors.

Two back-to-back townhouses turn the otherwise private yards into a communal green space. Stairways from the two neighbouring streets lead to a publicly accessible third-floor walkway in the middle of the block. This wide walkway also provides small decks for the residents in the new third-storey additions. Rooftops give the residents additional private spaces to grow plants, keep bees and have small, intimate gatherings. While communal gardens are a good use of space when densifying residential areas, maintaining smaller outdoor spaces for more intimate use is important.



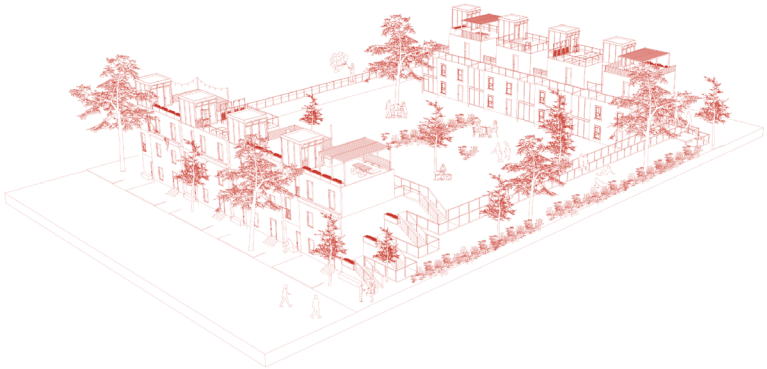
Town Houses + Courtyard

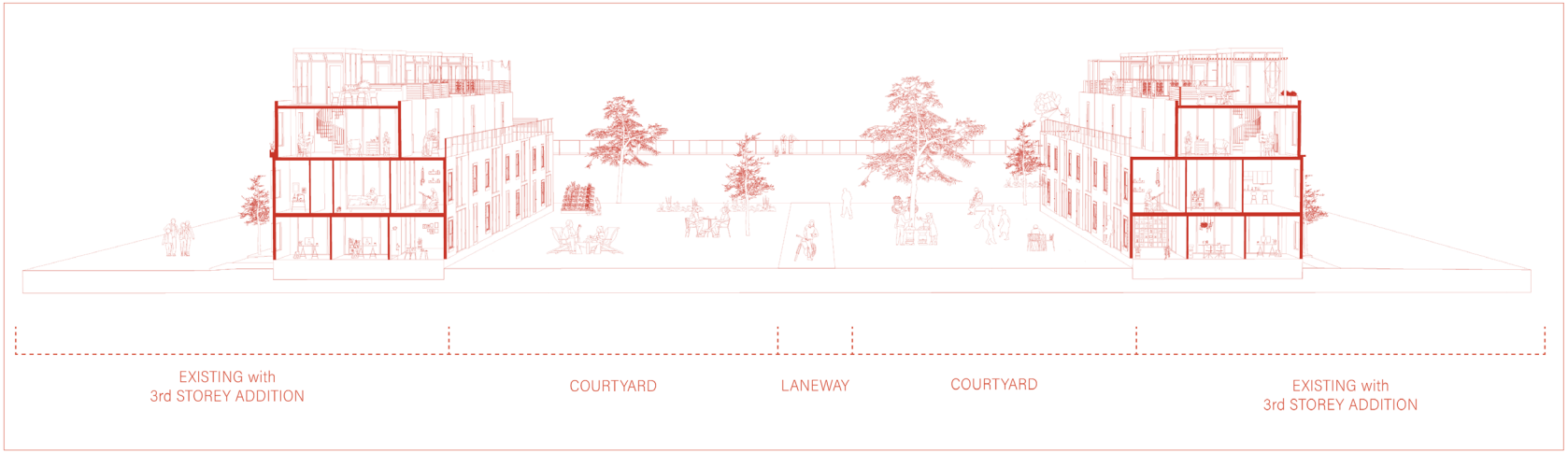


SCALE: BLOCK

Townhouse + Courtyard

		low	medium	high
INTERSECTING LIVING /WORKING	mixed residential / commercial		●	
	community connection		●	
	flexible spaces		●	
DENSIFICATION	FAR (floor area ratio)		1.09	
	adaptive structures		●	
DIVERSIFYING HOUSEHOLD STRUCTURES	accomodate multiple households		●	
	accomodate range household types		●	
	shared spaces		◒	





The Townhouses + Courtyard: On each street, four sidehall houses are converted to townhouses. The third story allows for an additional unit for work. Two sets of townhouses create a communal green space in between.

The Steps

The gateway to the communal deck is The Steps. This street type is common in Europe but seldom seen in North America. Here, neighbours can run into each other, sit and chat or pause and enjoy the view. Space underneath the steps can be used as storage for the communal yard: lawn mowers, BBQ's and seating.

Micro Offices

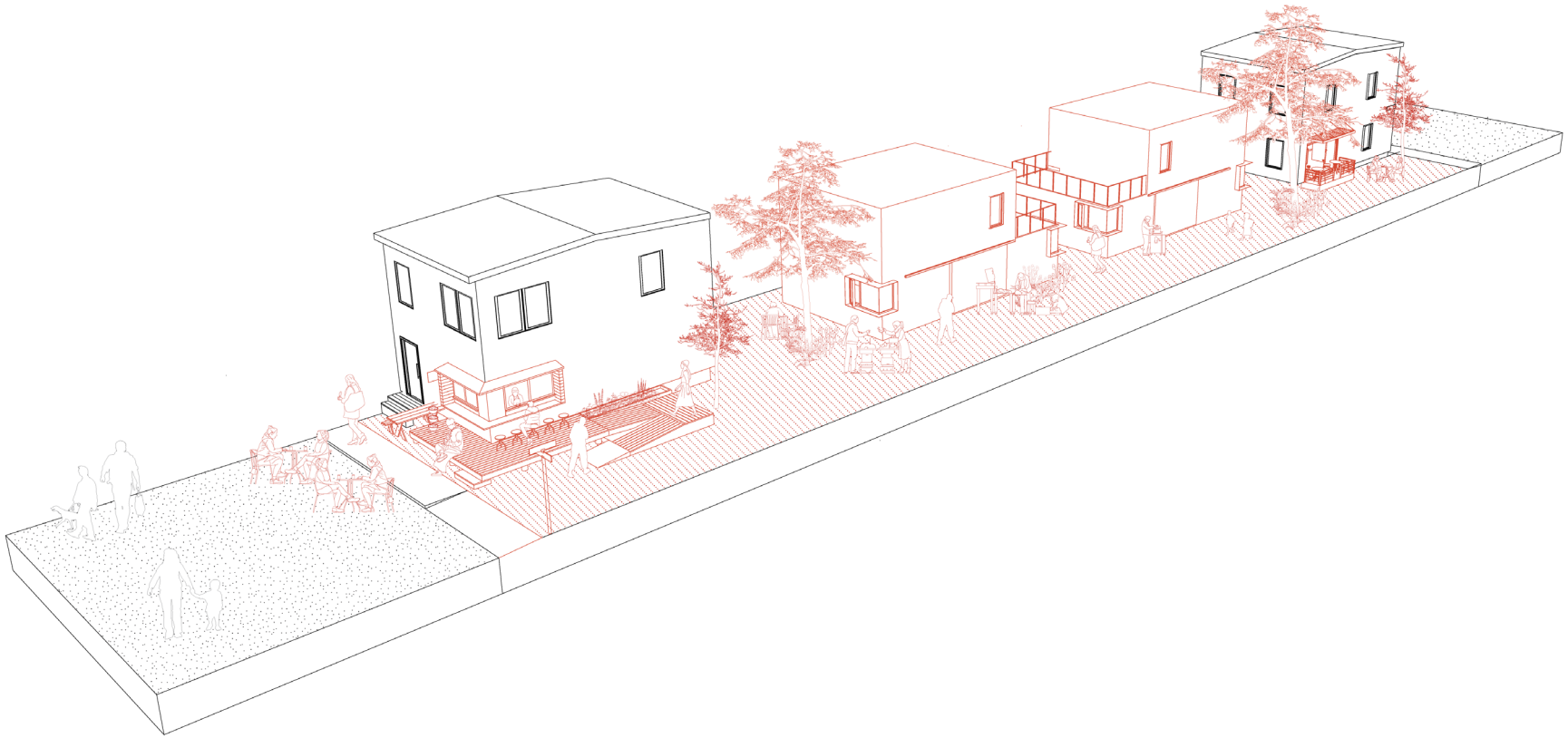
Flanking the shared courtyard are the micro-offices. This design intervention works best when placed on a new perpendicular laneway. The incorporation of service windows alongside the micro-offices creates a hub of activity on the block.

These shared offices are connected to everyone's home on the block by the shared deck or a laneway. This allows for the separation of work and life that works best for some, while still providing convenience to home and domestic duties of life.

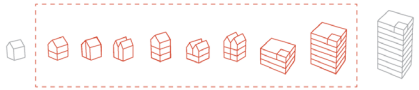
3.7 Density Calculations

As well as calculating the density of each individual design intervention by FAR, I have also added to Jack Diamond's Housing Form and Density chart. This chart is a quick way to show how each design can be implemented on a property, the number of dwelling units on the property, and its capacity of households. It shows the remaining open space and whether gardens are shared or private. One alteration I made to Diamond's chart is to measure area based on one Halifax lot, instead of by acre. This allowed me to calculate the population increase for the designs implemented into the test block. I calculated the increase

The Steps: The gateway to the communal deck is The Steps, a pedestrian street type seldom seen in North America. Here, neighbours can run into each other, sit, chat, or pause and enjoy the view.



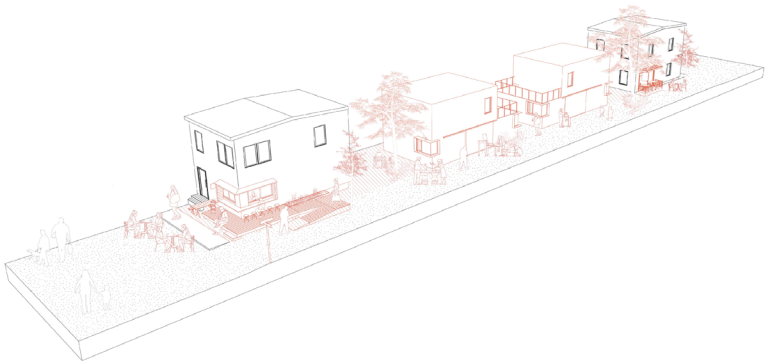
Micro Offices

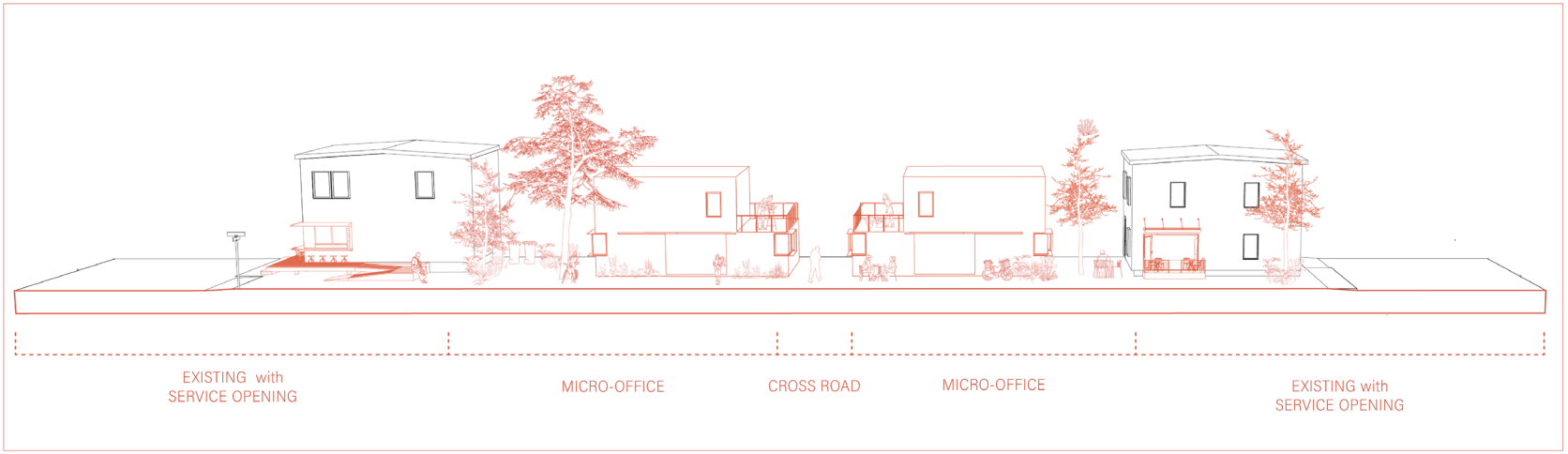


SCALE: PROPERTY

Micro-Offices / Work Lane

		low	medium	high
INTERSECTING LIVING /WORKING	mixed residential / commercial		◒	
	community connection		●	
	flexible spaces		●	
DENSIFICATION	FAR (floor area ratio)		1.03	
	adaptive structures		●	
DIVERSIFYING HOUSEHOLD STRUCTURES	accomodate multiple households		◒	
	accomodate range household types		◒	
	shared spaces		●	





Micro Office: Flanking the shared courtyard are the micro-offices. This design intervention works best placed on a new perpendicular pedestrian work lane. The incorporation of service windows alongside the micro-offices creates a hub of activity.

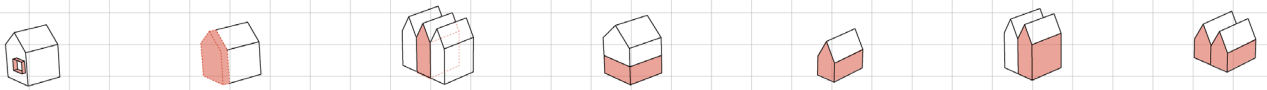
Micro Office: This shared office scheme allows for the separation of work and life that works best for some, while still providing convenience to home and the domestic duties of life.

in population by starting with how many households were added to the 1/3 test block. Then, since most designs were created for a particular household size, I could then calculate how many people were added to the 1/3 block. I then multiplied this by three to show the total block outcome. Using my moderate plan for densification, I estimate that 66 new households and 78 new residents could be easily added to the block. This would be possible by adding 36 new dwelling units (including third story additions) and 42 integrated workspaces into the block.

Policies that allow for organic densification would have different results on each block. For this reason, I placed only a few of each design on 1/3 of the test block. Even with this modest increase in dwelling units we see notable gain in density on the block.

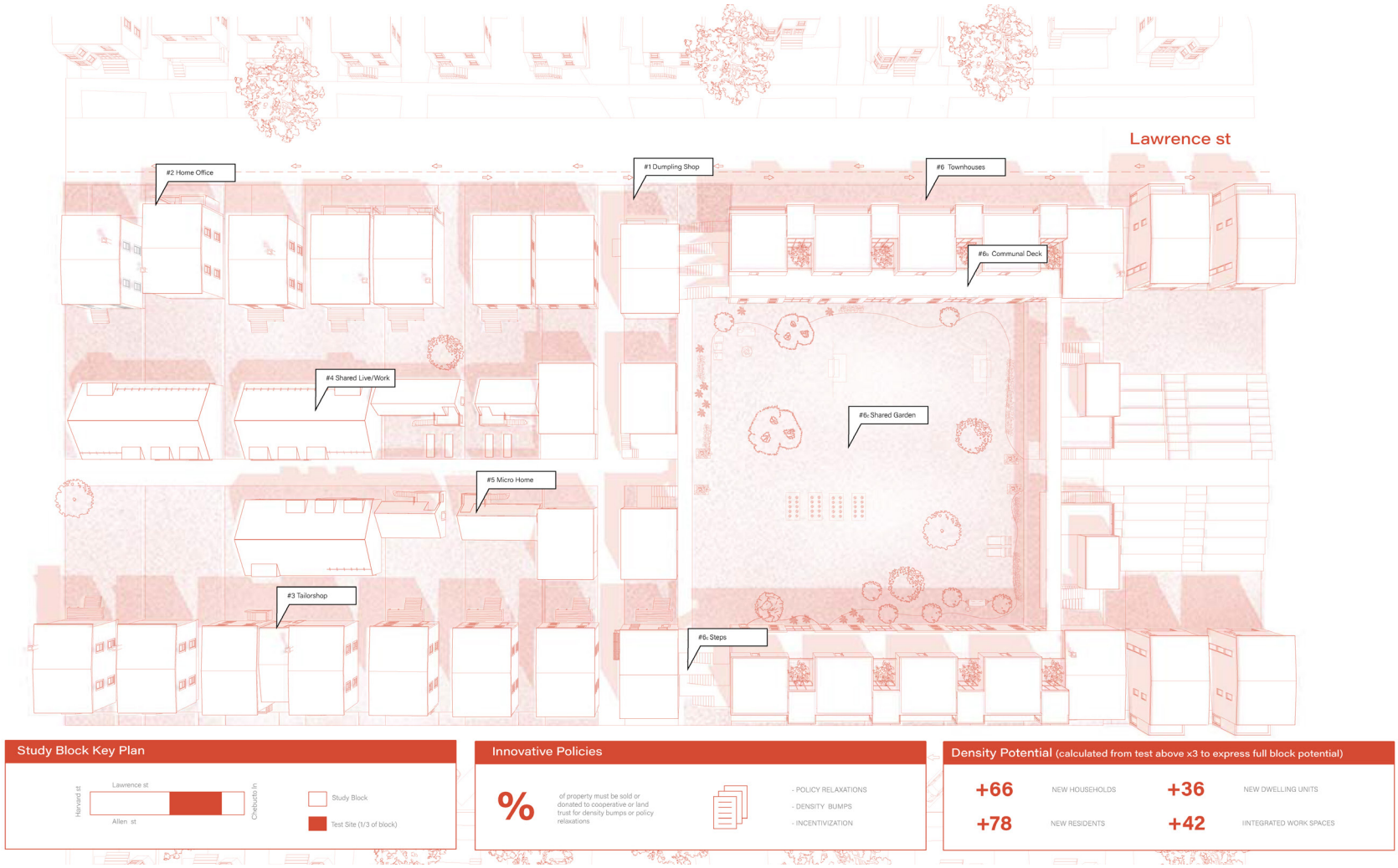
We can calculate the existing population based on the existing 64 dwellings. By referencing the type of dwelling we can then estimate there are currently 95 households on the block. Then using census data of average household sizes in the 011 census tract we can estimate an existing 196 residents on the block. Implementing my middle density designs to the block we see an increase to 100 dwelling units, housing 161 households with a population of 274 residents. When we divide the increase in people (78) by the pre-existing residents (196), we see a population increase of 40% to the city block.

Analysis of Designs



Dwelling Type	Service Opening	Facade Extension	Driveway Infill	Shared Live + Work	Micro Home	Townhouses	Micro Offices
Plot Plan							
Dwelling Units/ Property	1	1	2	1.5	2	3	0
# Households	1	1	2	2.5	2	3	0
FAR (Floor Area Ratio)	.66	.81	.79	1.12	.75	1.09	1.03
%Open Space	67%	65%	60%	42%	56%	62%	41%
Outdoor Space	on grade private	on grade private	grade shared	on grade shared	north side on grade private south side balcony private	all units on grade shared top unit private roof	on grade shared second story private balcony
Access to Unit	private on grade	private on grade	private on grade	private on grade	private on grade	private on grade top unit shared deck	private on grade

Catalogue information: This chart analyzes the new catalogue of designs using the categories in Jack Diamond's "Residential Density and Housing Form" chart. This chart is a quick way to read how designs sit on the property, the number of dwelling units and the capacity of households for each design.



Densification of the block: The implementation of the design catalogue onto the block demonstrates a population growth of 40%. 36 new dwelling units have been added, supporting 66 new households of 76 new residents and adding 42 new integrated work units to the block. This thesis is evidence that the densification of Halifax and other North American cities does not need to depend on the high rise.

Chapter 4: Conclusion

The population growth of 40% demonstrated in this thesis is hugely promising. It shows that densification can happen without increasing building heights above three stories or increasing land coverage over 60%. This thesis provides evidence that the densification of Halifax and similar North American cities does not need to depend on the perpetuation of the high rise with its shortcomings. A multi-disciplinary approach by city planners, architects and policy makers is needed in order to find solutions like this to the housing crisis.

The missing middle, as an adaptive approach to densifying our existing neighbourhoods, is a scale that can address complex issues of urban housing. In this thesis we see how the implementation of simple architectural additions into the existing fabric addresses a rising urban population, it acknowledges a need for integration of places of work into the neighbourhoods within which we dwell, and provides housing for a diversity of households. The mindset of adaptation also has environmental benefits in maintaining the embodied energy in our existing buildings.

When we take a multidisciplinary approach to solving problems in society and acknowledge the connections between disciplines, we can create solutions that would not be found in isolation. The missing middle is a scale that works for people and can address cultural change. It allows diverse life to flourish in the neighbourhoods we already know and love, leaving them as they are: Built for Change.

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