

White Picket Fences.

A Typology of Suburban Neighbourhoods.

By Meaghan Giesbrecht

A practicum submitted to the Faculty of
Graduate Studies of University of Manitoba
in partial fulfillment of the requirements
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Architecture

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Design Practicum
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Abstract.

The residential suburb is a common form of development in North America. Suburbs are home for many people, but unfortunately, the patterns most often replicated in suburban development do not encourage livability, ecology, or equity.

This practicum is a typology of residential neighbourhoods that explores how the built form, landscape, and infrastructure can promote qualities of livability, ecology, and equity. The investigation involves an in-depth analysis of four Winnipeg neighbourhoods that seeks to assess the qualities of livability, ecology, and equity in suburban development patterns.

The purpose of this research is to understand the role and application of neighbourhood types and to help planners and designers engage in the generation of new types through the design of livable, ecological, and equitable suburbs.

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FIG 1.0 Above. Greater Toronto Area



“For the last fifty years, at an ever-accelerating pace, cities, subdivisions, parks, even our houses have diminished our daily lives, often in ways about which we are unaware. Poor city design divides us from others in our communities, undermines our sense of community and place, destroys natural habitats that once gave us immeasurable joy, and fails to inspire our spirits [...]

in the process of city building, building community has been lost.”

(Hester, 2006, p.1)

*Photographs and drawings have been produced by the author unless otherwise noted in figure captions and the figure list.



FIG 1.1 Above. A typical streetscape in Bridgewater Forest to welcome you into the neighbourhood.

01

Introduction.



accent	berm	contact	detach
acoustics	bilateral	contained	detail
active	boundary	context	diagonal
additive	canopy	continuity	digital
adjacent	cantilever	contour	dimension
aisle	center	contrast	direction
allée	centered	corner	directional
aligned	centralized	corridor	distribute
anomaly	character	courtyard	divide
approach	choreography	cubic	diversity
arbor	circular	cumulative	domain
arithmetic	circulation	curved	dome
articulate	climatic	curvilinear	dominant
arranged	clustered	cylinder	dominate
ascend	colour	datum	dome
asymmetrical	colonnade	decorative	dynamic
axial	column	deep	edge
axis	columnar	deep-set	elevated
backdrop	composite	defined	elevation
background	conceptual	definition	emphasis
balance	concrete	degree	enclose
balcony	cone	density	enclosure
base plane	configuration	depressed	encompass
bay	connection	depth	end
beam	construct	descend	entrance



FIG 1.2 Above. This image is a snapshot of the author's childhood home and part of the inspiration for this practicum - Giesbrecht, 2000.

Left. A lexicon of design vocabulary. Words are compiled from three sources: *Form, Space, and Order* by Francis D.K. Ching, *A Concise Townscape* by Gordon Cullen, and *Landscape Ecology Principles in Land-use Planning* by Dramstad et al.

One of the most important decisions people make in their lives is where to live. The neighbourhoods we reside in are more than just a place to live, they are the context within which we build our lives. Housing patterns and the composition of neighbourhoods influence our lifestyles and daily routines. **“They are the places that urban residents know best and are most concerned with, for what happens in their neighbourhoods affects their quality of life and, at least for homeowners, their economic fortunes”** (Rohe, 2009, p.2). Residential development is a significant part of city building because it so intimately affects our quality of life.

In what kinds of neighbourhoods do we want to live?

Background.

According to the Merriam Webster dictionary, suburbs are residential areas located at the edge of a city or town (Merriam-Webster, 2019). In North America, almost all of city growth is or was at one point, classified as suburban development. The suburbs are home for many people, but often the word *suburb* has negative connotations due to its association with sprawl. In urban design and planning *sprawl* is a term used to describe low density, single-use development that is often automobile-dependent, fragmented, and lacking in public open space (Gillham, 2002 cited in Larice and Macdonald, 2013, p.290). The words *suburb* and *sprawl* are often used interchangeably due to the fact that “sprawl has been the typical form of most types of late-twentieth-century suburban development” (p.292).

Numerous urban critics have documented the social and ecological effects of sprawl throughout the last century including the writings of Lewis Mumford (1954), Jane Jacobs’ ‘Death and Life of Great American Cities’ (1961), Ian McHarg’s ‘Design with Nature’ (1969), Dolores Hayden’s ‘Redesigning the American Dream’ (1984), James Howard Kunstler’s ‘The Geography of Nowhere’ (1993), and Andres Duany’s ‘Smart Growth Manual’ (2010). Today, many of the effects of sprawl are well-known, widespread, and convoluted. Thus, this research does not attempt to tackle the topic of sprawl. Instead, this research will focus on three issues related to sprawl that are specific to the built form and development patterns of suburban neighbourhoods: livability, ecology, and equity.

“In part, we have a challenge of housing, which is frequently scarce, unaffordable, or inappropriately designed and located. In part we face a crisis of growing poverty and inequality, which leaves enormous numbers of people worldwide without access to decent paying work, good schools, health care, or other necessities of life, And of course in substantial part our development crisis is one of environmental damage, leading to phenomena such as global warming, resource depletion, and the loss of species that are difficult or impossible to reverse.”

(Wheeler, 2004, p.2)

Over time society has embraced sprawling development patterns that are increasingly unlivable, ecologically destructive, and inequitable. Many suburbs are isolated, mundane, and empty. They lack greenspace, pedestrian routes, and informal gathering places, thereby inhibiting the opportunity for public engagement and community participation. They are often exclusive, segregating, and inaccessible, prioritizing single-family development and catering to a small percentage of our urban population. Neighbourhoods that are completely car-dependent, exclusively residential and have limited housing options exclude specific types of people, families, and lifestyles. Lastly, many suburban neighbourhoods are destructive to the environment and ecologically very costly. Sprawling development patterns prioritize car efficiency, intensify heat island effect, destroy natural habitats, and decrease biodiversity.

Suburb and *sprawl* are not the same thing. Suburbs are a type of development, but they do not prescribe characteristics of development. The patterns of sprawl are not inherent to suburban development, meaning suburbs can exist without the physical attributes of sprawl. Charles Montgomery (2013, p.29) reminds us that “sprawl, as an urban form, was laid out, massively subsidized, and legally mandated [...] it did not occur naturally, it was designed”. Even though suburban development may continue as a type of development in North America, the patterns of sprawl do not need to. This practicum investigates how livability, ecology, and equity have been compromised by sprawling development patterns and what designers and planners can do to encourage these qualities through the physical forms and patterns of suburban neighbourhoods.

FIG 1.3 Top. An example of a suburban development that lacks pedestrian connectivity. This design detail shows that pedestrian life is not a priority in this neighbourhood - Michlig, 2006.

FIG 1.4 Bottom. This image displays a large home with an expansive yard, but it is isolated and empty, and the house has no windows - Beatty, 2010.



Methods.

This practicum will investigate the evolution of suburban development patterns throughout the last century. It involves a typological investigation of the physical, designable characteristics of suburban neighbourhoods, specifically focusing on those with a street loop pattern. The loop is a typical street pattern where the road turns back on itself to form a small semi-circle, a dominant pattern in suburban development across Canada. The objective of this research is to compile comparable information about the physical, designable characteristics of many different neighbourhoods. Identifying the range of forms and physical characteristics of the suburban neighbourhoods helps clarify how the built form can encourage – or inhibit – qualities of livability, ecology, and equity.

A series of case studies will examine four Winnipeg neighbourhoods. Each case study begins with an in-depth examination of the physical, designable characteristics of that neighbourhood, including the built form, landscape, and infrastructure. This data is presented in a series of measured drawings, including, plans, sections, elevations, and figure-grounds, to provide visual comparisons and understanding. Each neighbourhood is then evaluated, based on a set of formal indicators, concerning its potential for livability, ecology, and equity.

Typology addresses the language of design, and the goal of this investigation is to develop a design vocabulary surrounding neighbourhood forms and types that can assist designers and planners engage in the design of more livable, ecological, and equitable communities using nuanced types rather than relying on imitation. The role of the case studies is not to inform a model or prototype to replicate in future suburban development but to challenge typical housing patterns and discuss the role and application of types in neighbourhood design.

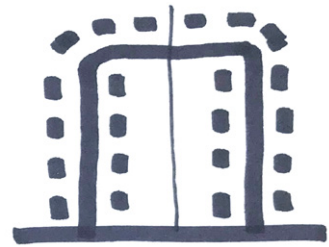


FIG 1.5 Right. A typology of street patterns where the road turns back on itself forming a small 'place' within a cluster of homes. There are different variations of this type including the cul-de-sac and p-loop as shown in the top two sketches. The rest of the sketches show various adaptations of the loop pattern that demonstrates a range in size, form, and configuration of homes.

Research Problem.

The physical, designable characteristics of neighbourhoods are significant in influencing qualities of livability, ecology, and equity. If we can design neighbourhoods that encourage these qualities, then why are the least socially and ecologically idealistic models replicated today?

Residential land use occupies such a significant portion of the urban landscape, yet we have seen little innovation in their forms and patterns over the years. Modern suburban development is often derivative, relying on the practice of imitation rather than an informed understanding of neighbourhood types and their application. The goal of this research is to engage in the language of neighbourhood design and to explore how the built form can promote livability, ecology, and equity in suburban development. Some of the leading questions that will guide this investigation are:

1. How have suburban development patterns evolved over time?

2. Do existing suburban forms and patterns encourage livability, ecology, and equity through the built form, landscape, and infrastructure?

3. What can we learn from studying suburban forms and neighbourhood types to inform future development?



FIG 1.6 Above. This aerial view of Waverley Heights shows an intricate web of winding roads and culs-de-sac - City of Winnipeg Open Data, 2016.



FIG 1.7 Above. This aerial view of Fort Richmond shows a tight arrangement of winding roads and looping streets - City of Winnipeg Open Data, 2016.



FIG 1.8 Above. This aerial view of Lindenwoods shows a combination of loop roads and culs-de-sac - City of Winnipeg Open Data, 2016.

Many neighbourhoods share these same patterns despite their social and ecological impacts. There are few neighbourhoods in Winnipeg that have used innovative design solutions or branch away from typical suburban patterns.

Justification.

Throughout North America, private developers often play the most active role in the design and development of suburbs. Developers are usually the ones to lay out subdivisions, sell lots, and build homes. While new housing developments may require the approval of city planners and zoning boards, this process does not utilize the expertise of planners, urban designers, or landscape architects in the design of the development (Wheeler, 2004)

"City planners and zoning boards exert substantial control over designs for new neighbourhoods and improvements to existing ones, in that they approve or deny project applications and grant requested zoning variances. However, while planning staff may negotiate with developers on project details, they rarely exercise the authority they might to revise subdivision layout" (Wheeler, 2004, p.184).

Zoning bylaws and planning documents help guide development, but these documents focus on regulation and policy without discussing the role of design, form, or landscape. For example, in Winnipeg, residential development is guided by a planning document called *Our Winnipeg – Complete Communities* (2015). The document outlines neighbourhood objectives like increasing housing diversity, providing access to the daily necessities of life, including a range of sustainable transportation options, and offering opportunities for local employment (Ibid), but it does not provide direction about how this is realized spatially.

It directs land use and development, but not form.

From this perspective, there is no pattern language, or design vocabulary, for designers or developers to refer to. I believe this absence identifies a gap where landscape architects and urban designers could play a more significant role in the design of future suburbs.

Delimitations.

This investigation focuses on the physical, designable characteristics of neighbourhoods rather than planning policies or land use regulations. Although zoning and development procedures play a significant role in neighbourhood development, the purpose of this research is to better understand how the built form can encourage - or inhibit - the qualities of livability, ecology, and equity.

For comparability purposes and to limit the scope of this investigation, I will focus on neighbourhoods that are characterized by a loop pattern. Limiting the research to one street pattern provides the opportunity to analyze the evolution of this pattern over time.

Ideally, this investigation would compare a large number of neighbourhoods to increase objectivity and compare more data, but to make the scope of work realistic in size and ensure the research is thorough, the number of neighbourhoods is limited to four.

Outline of Document.

This research begins with a literature review that explores the evolution of suburban development patterns throughout the twentieth century. This analysis demonstrates how the built form has been used throughout history to encourage livability, ecology, and equity in neighbourhood design. The literature review informs a set of formal indicators that will be used as criteria to assess the four case study neighbourhoods.

The case studies will investigate four Winnipeg neighbourhoods beginning with an in-depth analysis of the built form. This data will be used to assess how the built form encourages - or inhibits - qualities of livability, ecology, and equity based on the criteria compiled in the literature review.

This investigation will not determine an ideal neighbourhood pattern but instead seeks to understand typologies as a generative source for design.

Definitions.

Housing

Throughout this research, the term 'housing' is used to describe a collection of homes rather than an individual home. The intention is to investigate the spatial patterns of housing from the street block or neighbourhood scale rather than focusing on the architecture of a home.

Neighbourhood

There is no single definition that exactly defines a neighbourhood. For this research, neighbourhood is used to describe a place or region that is mostly residential and shares distinguishing characteristics and physical proximity that set it apart from other residential areas.

Community

The term 'community' refers to more than just a group of people living in the same place. It is used to describe the fellowship between a number of individuals as a result of shared common interests, goals, and geographical proximity. This understanding of community requires social and active participation from a group of people who may also live in close proximity. As Ray Oldenburg says "houses alone do not make a community" (1989, cited in Larice and Macdonald, 2007, p.140).

Livability

Livability refers to the quality of life, character, and social engagement of a neighbourhood. A livable community is designed for people, encourages public participation, and provides residents with a sense of belonging or identity.

Ecology

Ecology is the study of the relationship between living organisms and their environment. An ecological neighbourhood is one that increases the viability of living organisms to thrive in an urban environment by reducing the impacts of development.

Equity

Equity is the quality of being fair and impartial. An equitable neighbourhood should be accessible, diverse, and inclusive in order to provide people of all classes, incomes, family type, and lifestyle to have the opportunity to choose where they want to live.

Loop or Bay

The terms 'loop' and 'bay' can be used interchangeably throughout this research. Both refer to a street that loops back on itself, forming a small 'place' within a cluster of homes. This street pattern came about as a way to increase safety, reduce traffic, and create small social units. This investigation will focus on neighbourhoods with different adaptations of this street pattern.

FIG 1.9 Below.

Neighbourhood, community, and housing can all be used to describe residential development. But the word community extends beyond the physical environment to describe the social cohesion that can exist within a residential area - Giesbrecht, 2000.

Superblock

In this investigation a residential 'superblock' refers to a large tract of land that is contained by roads. These blocks are typically larger than traditional street blocks and designed to provide interior park spaces and pedestrian routes that are separated from the road system.





FIG 2.1 Wildwood Park offers a glimpse into the past with this view of the preserved woodland.

02

Literature Review.



enclosure	flush	horizon	level
encompass	focus	horizontal	light
end	form	hub	limit
entrance	formal	hue	line
entry	frame	human scale	line of sight
environment	framework	identity	linear
equilibrium	fragment	image	link
equivalent	freestanding	imagined	location
ergonomic	front	imperfection	loop
expose	function	inconsistent	low
extended	functional	independent	lowered
exterior	gateway	individuality	map
eye level	geometry	interior	manifested
fabric	geometric	interlocking	manipulations
facade	gestalt	intermediate	mass
fascia	grid	intersection	massing
feel	ground	intimate	material
fenestration	group	inward	measure
field	grouped	irregular	measurement
field of vision	grove	isolate	membrane
figure	harmony	join	model
figure-ground	hedges	large	modular
flat	height	layout	module
flexible	hierarchy	legible	mold
flow	high	length	movement

Introduction.

Since the late 19th century multiple design movements have shaped suburban development in North America. This chapter begins with a historical review of four major planning movements, the garden suburb, the neighbourhood unit, the modern city, and new urbanism, which have been influential in the evolution of suburban development. The purpose of this review is to provide background and context for understanding how suburban development patterns originated and how they have evolved.

From this historical analysis, we can draw out a variety of ways in which the built form has been used to address issues of livability, ecology, and equity in neighbourhood design. The next section is a classification of formal types and patterns based on their ability to promote qualities of livability, ecology, and equity. It provides a design vocabulary to aid in the discussion of neighbourhood design.

The last section analyzes three historic neighbourhoods that are significant in the history of suburban development: Riverside, Illinois, Radburn, New Jersey, and Seaside, Florida. The precedent study will analyze the physical characteristics of these neighbourhoods to understand how they have addressed issues of livability, ecology, and equity spatially using the design vocabulary outlined in the previous section.

Left. A lexicon of design vocabulary. Words are compiled from three sources: *Form, Space, and Order* by Francis D.K. Ching, *A Concise Townscape* by Gordon Cullen, and *Landscape Ecology Principles in Land-use Planning* by Dramstad et al.

Patterns of Development.

North America.

The Street Grid.

The physical forms and street patterns of North American cities have changed significantly over time. Many are based on a traditional square or rectangular grid pattern that makes up the center or urban core of the city (Burley, 2003; Wheeler, 2004). For a long time, these areas developed incrementally by adding new blocks to the existing street grid slowly over time (Burley, 2003).

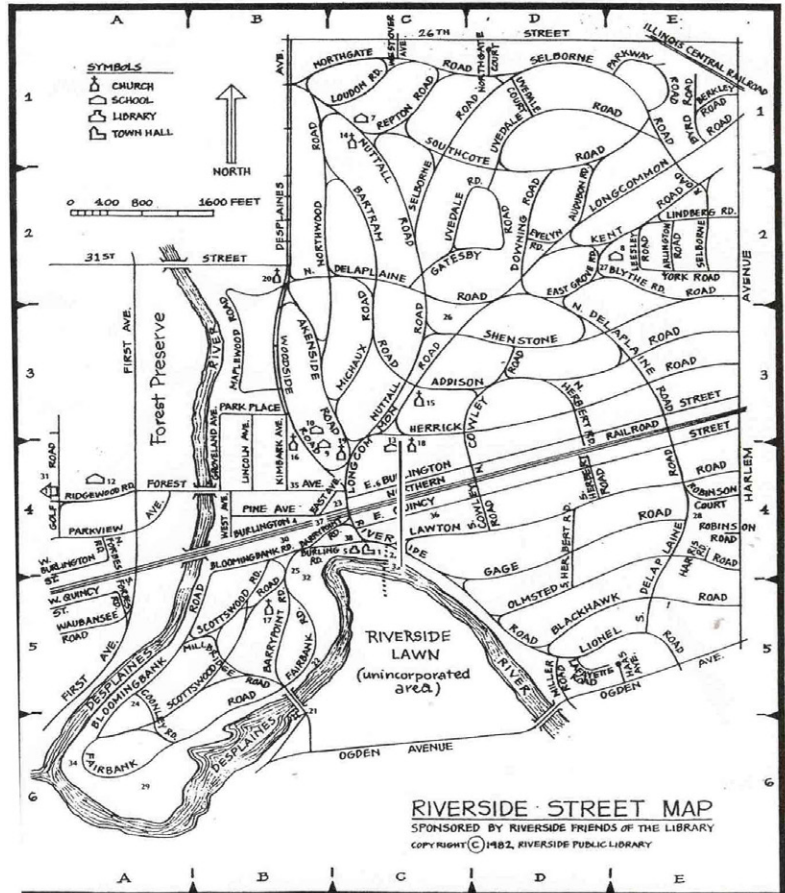
Following the industrial revolution in the late 19th century, many North American cities were experiencing similar issues of congestion and pollution (Filion and Hammond, 2003; Sharifi, 2016). Overcrowded cities made the countryside attractive for its open space and access to nature, both of which were hard to come by in the city. The first North American suburbs were designed to combine the best qualities of rural living with the benefits of city living (Hall, 2014; Larice and Macdonald, 2013). These suburban neighbourhoods were the first developments to drastically change the shape of the traditional urban grid.

The Garden Suburb.

These late nineteenth-century neighbourhoods, known as the *garden suburb*, were based on the ideals of English country living including picturesque aesthetics, naturalistic scenery, and winding roads. These suburbs contrasted the rigid forms of the traditional street grid with low-density development and curvilinear street patterns. Frederick Law Olmsted's design for Riverside, Illinois, is exemplary of the physical forms that characterize the garden suburb model (Larice and Macdonald, 2013; Wheeler, 2004).

WELCOME TO RIVERSIDE

FIG 2.2 Right. This map of Riverside, Illinois shows the intentional use of curvilinear roads to contrast the rigid forms of the urban grid pattern - Riverside Friends of the Library, 1982.



In the early twentieth century, the rise of car ownership and increased mobility continued to alter urban forms and street patterns. As public streets became roadways for cars, pedestrians were pushed onto sidewalks, and the improvement of roads and expansion of street networks provided the opportunity for suburbs to spread further and further away from the urban core (Larice and Macdonald, 2013; Wheeler, 2004). Traffic-dominated development and the increased scale of the city resulted in new concerns for safety as well as social disengagement. The Neighbourhood Unit concept was developed by Clarence Perry in 1923 to address these issues (Ibid).

The Neighbourhood Unit.

The *neighbourhood unit* was designed to be a self-contained entity. It is laid out so that large, arterial roads define the boundaries of the neighbourhood and curvilinear, winding roads make up the interior residential streets (Larice and Macdonald, 2013; Sharifi, 2016). This arrangement of streets is meant to keep heavy traffic on the outside of the neighbourhood and discourage through-traffic. The neighbourhood unit is centred on an elementary school, and other public facilities, with larger shops and retail areas pushed to the edges. The interior is connected by a network of pedestrian corridors and sidewalks that provide access to small parks, playgrounds, and public amenities without having to cross any arterial roads (Ibid). Perry attempted to address “social problems such as alienation, youth delinquency, and lack of civic participation through enhancing the physical design of the community” (Sharifi, 2016, p.5). The neighbourhood is oriented inward around a cluster of civic institutions and park spaces meant to encourage opportunities for people to meet and become involved in community life (Wheeler, 2004). These concepts have become popular as “a module for large-scale planned unit developments” (Larice and Macdonald, 2013, p.78).

The principles of the neighbourhood unit are best fulfilled in Henry Wright and Clarence Stein’s design for Radburn, New Jersey. This development characterizes many of the main features of Perry’s neighbourhood unit concept including separated roadways for pedestrians and vehicles, arterial roads as neighbourhood boundaries, interspersed parks, all oriented around an elementary school (Larice and Macdonald, 2013; Sharifi, 2016; Stein, 1949). Radburn incorporated some of the earliest forms of the cul-de-sac, or ‘dead-end’ roads, to form residential streets that are strictly local. It introduced the residential superblock, which is formed by the interstitial spaces in-between streets. In Radburn the culs-de-sac are arranged so that they form a large superblock where each home faces onto an interior, shared greenspace (Ibid). Both the cul-de-sac and superblock model have been replicated in suburban development across North America, but often without the greenspace and extensive pedestrian network that were essential to the neighbourhood unit concept (Wheeler, 2004, p.190). “In Canada, developers took a somewhat different approach, favoring loop roads over culs-de-sac, but the end result was the same: to create neighbourhood environments completely insulated from the rest of the metropolis” (p.188).

Perry's idea to separate pedestrian and vehicular traffic and insulate the neighbourhood from commercial and retail areas has also left an impression on the urban landscape in regards to land use distribution. Wheeler (p.182) argues that the development industry has over exaggerated Perry's method of separating land uses. In contemporary neighbourhoods residential areas are often completely cut off from any form of commercial, retail services and often do not include parks, local shops or civic buildings (Sharifi, 2016; Wheeler, 2004). Perry's separation of land uses is criticized for influencing "functional segregation and rigid zoning" (Sharifi, 2016, p.5) that is typical of twenty-first-century suburban development.

The Modern City.

Developing simultaneously to the neighbourhood unit and beginning in the early 20th century, "the modernist movement in architecture was represented by the *Congrès International d'Architecture Moderne* (CIAM) and the 1938 Charter of Athens, authored in large part by the most famous modernist architect, Le Corbusier" (Wheeler, 2004, p.27). The modernist planning movement is broadly described as "a rational planning paradigm, instigated by technological advances that revolutionized construction and transportation industries" (Sharifi, 2016, p.7). This movement affected architecture and planning from a citywide perspective and is not directly associated with suburban development as closely as the other movements described here, but even so, the main principles of modernist planning have impacted the forms and patterns of suburban development, especially throughout the 1960s and 1970s (Ibid).

Le Corbusier's plans were designed to provide housing for everyone and to rid the city of slums, this resulted in what is often called *urban renewal* (Larice and Macdonald, 2013; Sharifi, 2016). Urban renewal was meant to clear slums and provide people with new public housing, but in reality, these projects often ended up displacing the people they intended to help or being ostracized as they were designed without input from the people who were meant to live there (Sharifi, 2016). This method of renewal is notorious for taking place in urban centers, but it was also the reality for many suburban developments. In the 1950s, many new suburbs were developed to replace small clusters of informal housing that "became socially and aesthetically unacceptable to property developers and new suburbanites" (Burley, 2003, p.21).

Rental housing in suburban neighbourhoods often reflects the patterns of Le Corbusier's *towers-in-the-park*. The towers-in-the-park model was intended to address issues of overcrowding, slums, and lack of open space within the city by proposing a new way to organize space and resources more efficiently and to take advantage of new building technologies (Filion and Hammond, 2003; Sharifi, 2016). It was characterized by "high-rise functional buildings, abundant open space, superblocks with internal pedestrian networks, and modern, high-speed public transportation" (Sharifi, 2016, p.7). The towers-in-the-park model included a series of cruciform skyscrapers laid out in a symmetrical, rigid grid and surrounded by vast expanses of open space. This layout was meant to provide density while still offering ample greenspace in the most efficient way possible (Larice and Macdonald, 2013; Sharifi, 2016). It is common to see a complex of apartment blocks along arterial roads at the edge of a suburban development that consists of large superblocks and expanses of empty open space surrounding a series of multi-family buildings.

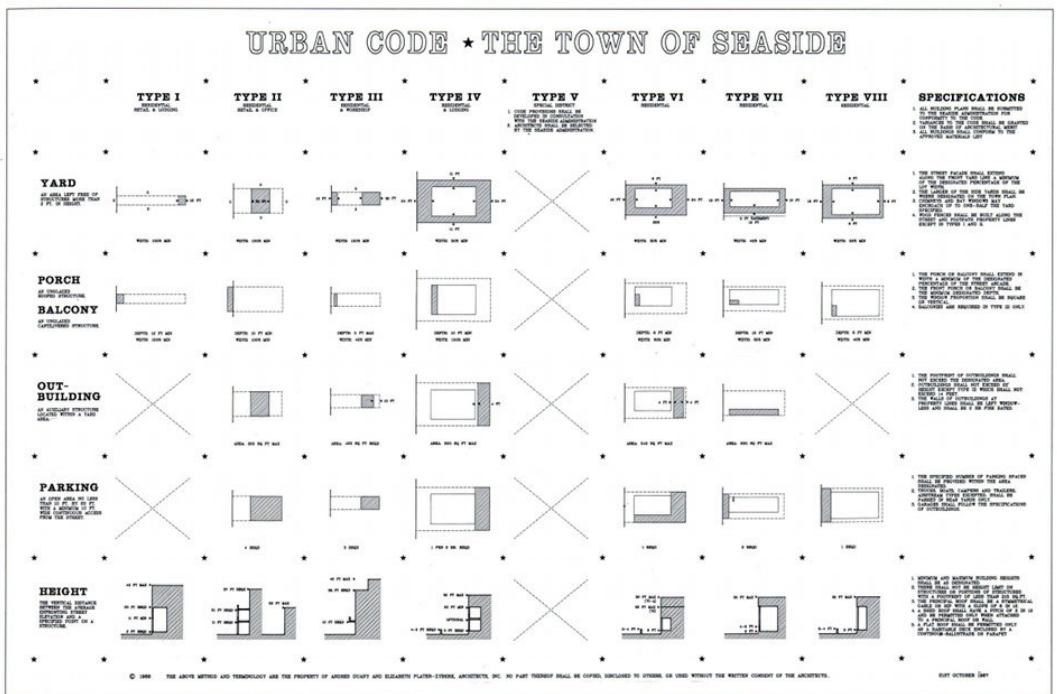
New Urbanism.

Highly suburbanized neighbourhood development continued to proliferate throughout the late twentieth century. "Though certain forms of suburban sprawl have been known throughout history, by far the largest amount has been built since the Second World War" (Wheeler, 2004, p.4). In the late twentieth century, the New Urbanism movement emerged as a reaction to the increased growth of low-density, car-dependent, fragment development patterns (Larice and Macdonald, 2013; Sharifi, 2016). The principles of New Urbanism were meant to respond to issues such as the "disinvestment in central cities, the spread of placeless sprawl, increasing separation by race and income, environmental deterioration, loss of agricultural lands and wilderness, and the erosion of society's built heritage" (The Congress of New Urbanism, 1996 cited in Larice and Macdonald, 2007, p.309).

New Urbanism and related movements, such as neo-traditional neighbourhood planning, desired to emulate and recreate the best physical qualities of traditional American neighbourhoods. These movements introduced a renewed focus on walkability, human scale, compactness, active centers, and more traditional patterns such as the street grid, rear alleys, sidewalks, front porches, and mixed-use (Larice and Macdonald, 2007; Sharifi, 2016). Additionally, new urbanism began to consider the ecological effects of sprawl more seriously than some of the previous movements. Some examples of environmental initiatives that emerged from new urbanism include infill and brownfield development, promoting environmental stewardship and the conservation of resources, managing regional growth, and encouraging density (Sharifi, 2016).

In 1993 the Congress for the New Urbanism was formed. Their Charter outlined “twenty-seven guiding principles for architecture and urban planning that focus on physical spatial structure” (Larice and Macdonald, 2013, p.308). The new urbanist movement is not expressed as an archetype, like the neighbourhood unit or the modern city was, instead it was articulated through types. A type is “a three-dimensional template that gets used over and over in endless variations” whereas an archetype is “the ideal expression of a type” (Scheer, 2010 cited in Larice and Macdonald, 2013, p.308). This method has led to the introduction of form-based codes as an alternative to traditional zoning practices (Larice and Macdonald, 2013). Pioneered by Duany and Plater-Zyberk, form-based codes are “easy-to-understand diagrams showing what street, lot, and building designs are permissible” (Wheeler, 2004, p.156). Form-based codes, design guidelines, and revised zoning codes have been used all across North America as a tool to implement new urbanist principles throughout the late twentieth and early twenty-first century. New Urbanist concepts have changed the shape of suburban development, thus many contemporary suburban developments include vast greenspaces, sidewalks, and areas for multi-family housing (Sharifi, 2016; Wheeler, 2004).

FIG 2.3 Below. The urban code separates types by form rather than function so that there is flexibility for buildings to change over time as the needs of the town evolve (Hesburgh Libraries and University of Notre Dame, n.d.) - Duany, A and Plater-Zyberk, E., 1986



Neighbourhood Qualities.

“Since type was not an identical copy or model, it involved invention or design; thus architects could employ type to not only analyse the built environment, but also generate new ones”

(Herrington, 2017, p.155).

Designers and planners have been using the built form to respond to social and ecological challenges since the first planned communities. The previous section discussed historical planning movements which have greatly influenced suburban development and throughout these different movements we can see that a desire to create more livable, ecological, and equitable communities has remained constant.

The following section describes livability, ecology, and equity as neighbourhood qualities and discusses how they are expressed through the built form in the neighbourhood context. It includes a compendium of forms and patterns that encourage qualities of livability, ecology, and equity in the suburban environment. These forms and patterns are categorised based on their potential to create a livable, ecological, and equitable neighbourhood and can be interpreted as formal indicators of livability, ecology and equity. Each formal indicator is as a *type* or *ideal form* that has a set of rules and an inner logic, yet allows for nuanced applications in a variety of different contexts. This section will define livability, ecology, and equity in the context of neighbourhood design and describe a number of formal indicators for each quality. Examples and descriptions of how these indicators are measured and observed are outlined in Section 3 Table 1.

FIG 2.4 Right. Livable neighbourhoods provide parks and playgrounds that are accessible and safe. This playground is a central component of the neighbourhood design making it a place where children can play in a safe environment where there are 'eyes on the street'.



01 Livability.

Livability refers to the quality of life, character, and social engagement of a neighbourhood. A livable community should prioritize people over cars, encourage public participation, provide residents with a sense of belonging or identity, and be an attractive place to live.

The concept of livability has become a topic of discussion in the urban design discipline "*during the last decade because of a collective realization that many of our communities do not meet this criterion very well. They often lack neighbourhood centers, downtowns, parks, local stores, recreational facilities, or even sidewalks. Increasing traffic makes the streets unsafe and unpleasant, while many neighbourhoods are so isolated and disconnected from town centers that residents must get in a car to travel anywhere. These and many other factors have decreased the livability of cities and towns that we often take this situation for granted*" (Wheeler, 2004, p.40).

As Wheeler (2004) has remarked, livability is influenced by the built form in a variety of different ways. This section will outline seven formal indicators of livability that are based on the previous study of neighbourhood development patterns, precedents, and literature.

Neighbourhood Centre.

Since the growth of suburbanization, the privatization of public spaces, and increased car dependency, cities have experienced the disappearance of informal gathering places. In many neighbourhoods, there is little opportunity to meet people or enjoy spaces for social activities where community life takes place (Larice and Macdonald, 2007). A neighbourhood center is a space “where people can come together on neutral ground, free of charge, to develop friendships, interact with others and enjoy being a part of a larger spatial community” (Larice and Macdonald, 2013, p.285). The concept of a neighbourhood centre originates from Clarence Perry's Neighbourhood Unit, where civic institutions, such as an elementary school, would act as a central focal point (Ibid). Randolph Hester (2006) describes a sense of ‘centredness’ that develops in a neighbourhood that is oriented around a central, multi-use space that attracts a mix of different people. A thriving center becomes a part of people’s daily rituals and routine. It is a place where social encounters bring the community to life and neighbourhood events take place. The neighbourhood center acts as both a physical and conceptual heart of a community.

Parks & Playgrounds.

In a neighbourhood, local parks and playgrounds are valuable public amenities. A report by the Government of Canada in 2005 identified the importance of providing parks and playgrounds in cities and neighbourhoods as “greenspace has been found to have social, and psychological benefits that explain the strong consumer preference [for] naturally endowed sites, and for house locations facing parks, open space, golf links, lakes, and so on. Greenspace provides visual relief and opportunity for relaxation, becomes a place for casual contacts and forms a haven for kid’s play” (p.6). Hester (2006) describes the ideal neighbourhood arrangement as having every home directly adjacent to a park or recreational space. According to the Congress for the New Urbanism (1996 cited in Larice and Macdonald, 2013) neighbourhoods should have a network of greenspaces that range in size and type, including children’s playgrounds, village greens, recreational areas, and community gardens.

Sidewalks & Trails.

Pedestrian networks provide safe and scenic routes for daily commutes, leisurely walks, and outdoor activities. In many suburbs, sidewalks are often deficient or not present. At a minimum, neighbourhoods should provide a connected network of pathways with safe intersection crossings. Wheeler (2004, p.174) describes several ways to improve the physical form of sidewalks to improve safety and make them more appealing for pedestrian use. Wide sidewalks are preferable for allowing people to walk alongside each other or pass each other. Sidewalks that are physically separated from the street by a green boulevard, protect the pedestrian physically and psychologically from traffic. Keeping a consistent grade when sidewalks intersect driveways increases continuity, and providing curb cuts ensure that they are accessible to all users. Jane Jacobs was a big advocate of sidewalks as a place where urban life takes place. Jacobs recommended keeping blocks short, providing a variety of routes and of avoiding long, monotonous streetscapes (Larice and Macdonald, 2013; Wheeler, 2004). Pedestrian networks can be enhanced with parkways that offer separated pedestrian routes along green corridors connecting people with nature and increasing safety (Stein, 1949).

Density & Scale.

“Well-fitted urban form is one in which buildings, block sizes, and other physical dimensions of the city match human needs and activities, typically through a relatively fine-grained, human-scale urban environment” (Wheeler, 2004, p.143). Jane Jacobs is well-known for advocating compact urban form and pedestrian scale. Jacobs believed that short blocks, connected street systems and a high concentration of people were necessary to encourage dynamic urban life (Larice and Macdonald, 2007). Writing in 1954, Lewis Mumford recognized the increasing issue of scale in city building, noting that “in a neighbourhood, if anywhere, it is necessary to recover the sense of intimacy and innerness that has been disrupted by the increased scale of the city and the speed of transportation” (p.269). Hester (2006) describes multiple benefits of compact form: it saves open space, reduces the amount of driving required to get around, and increases the walkability. It is important to note that density and scale are different and independent of each other, but in terms of livability, they work together. If a neighbourhood has density without scale, it does not promote livability the same as when they are both present. This indicator recognizes that compact form and scale go hand in hand to improve livability.

Sense of Place.

Mass produced suburbs often consist of generic street patterns that contribute to a condition known as placelessness. Placelessness is a term used to describe development that does not provide context of place or distinguishing features in the built form. "Focusing on place is particularly necessary right now because development throughout much of the last century has done exactly the opposite - creating an aspatial, global realm of homogeneous, interchangeable communities with little connection to local landscapes, ecosystems, history, culture, or community" (Wheeler, 2004, p.39). Neighbourhoods with a sense of place are distinct because they portray the spirit of the place, acknowledge the local history or natural landscape, and emphasize diversity. A sense of place can be expressed through the urban form, landscape and vegetation, local landmarks, and architectural details. When a neighbourhood has a strong sense of place, it encourages social cohesion and belonging (Wheeler, 2004; Larice and Macdonald, 2013), increasing the length of tenure and promoting an intergenerational mix of people.

Safety & Comfort.

Pedestrian activities are greatly influenced by safety and comfort. Traffic calming increases safety by giving pedestrians psychological preference, this includes measures such as narrowing streets, reducing the turning radius, providing raised crosswalks, or using loops and culs-de-sac to minimize traffic (Sucher, 2003 cited in Larice and Macdonald, 2013). Jane Jacobs recommends having 'eyes on the street' to increase safety. When homes have active fronts that face onto a street or park space, the residents can watch over the street and look out for each other, creating safer places for children to play and reducing crime in the neighbourhood (Jacobs, 1961 cited in Larice and Macdonald, 2013; Wheeler, 2004, p.188). Comfort is affected by design details and site vegetation. Streetscaping with benches, vegetation, and good lighting make streets more comfortable to be in. Tree canopies that provide shade and protection from strong winds and rain also enhance pedestrian comfort (Oldenburg, 1989 cited in Larice and Macdonald, 2013).

FIG 2.5 Below.

Neighbourhoods that provide infrastructure for alternative modes of transit allow people to engage more intimately in the community. People who walk or bike spend more time in their neighbourhood and have increased opportunities to meet their neighbours and participate in community life.



Public Transportation.

Transit-oriented development reduces the amount that people need to drive, decreases fossil fuel consumption, and provides transportation for people who cannot drive or who chose not to drive (Wheeler, 2004). Transport Infrastructure is closely linked with accessibility. It determines how easily people can get to work, and access services, resources, and daily necessities (Dempsey et al., 2010). "Accessibility is actually a layered concept and is not simply proximity as distance is just one contributor" (p.24). A successful transit system requires density to support frequent service and a variety of route options. Locating new development along or near transit corridors and stations makes it easier to connect new suburbs with existing transportation networks (Wheeler, 2004). Neighbourhoods with transit systems also require a series of bus stops that are connected to pedestrian networks to make them accessible. Successful transit systems promote equity and environmental responsibility in a neighbourhood.





02 Ecology.

An ecological neighbourhood is one that increases the viability of living organisms to thrive in an urban environment by reducing the impacts of development.

"Ecology is generally defined as the study of the interactions among organisms and their environment" (Dramstad, Olson and Forman, 1996, p.12). The concept of landscape ecology dates back to the 1950s, but recent issues of "land degradation, population growth, water shortage, fertile soil erosion, biodiversity loss, and spread of huge urban areas" (p.9) have brought this concept back to the forefront. Today there are a variety of 'green initiatives' that can be integrated into residential development at the neighbourhood scale that deal with water management, heat island effect, air quality, and biodiversity (Pötz and Bleuze, 2012). When greenspaces, natural landforms, and native species are identified and valued for their environmental impact, they are more likely to be preserved. "Green areas in towns and cities remain vulnerable with their limited financial yield they must maintain their position in towns and cities within a system

FIG 2.6 Above. Ecological neighbourhoods increase air quality, help balance the water table, reduce heat island effect, and increase biodiversity. Beyond their environmental value, all of these things contribute to our quality of life and make neighbourhoods more desirable to live in.

that is geared toward economic yield. Only by defining and protecting the functions of green areas can they be preserved, yet they are continually under pressure" (p.23). Six formal indicators are identified and described below. These six indicators represent different green initiatives that encourage ecology in the neighbourhood context. No scientific study has been done to compare the ecological impact of each indicator, but they do describe ways in which environmental responsibility is promoted through the built form, landscape, and urban infrastructure of a neighbourhood.

Natural Land Features.

Land preservation and conservation at the neighbourhood scale can provide both social and ecological benefits. The preservation and restoration of hills, streams, and forests improve the aesthetics of a neighbourhood, provide recreational amenities, and offer opportunities for children to explore and interact with nature. Ecologically, preserved land features improve habitat life, increase biodiversity, and protect the natural landscape that existed before development (Pötz and Bleuze, 2012; Wheeler, 2004). As environmental concerns continue to grow in the 21st century Aldo Leopold's 'Land ethic' (1949 cited in Wheeler, 2004) – the "human responsibility to care for particular lands and ecosystems" (Wheeler, 2004, p.20) – continues to be more and more relevant to suburban development. Ian McHarg's book *Design with Nature* (1969) discusses the importance of including environmental concerns and natural landforms in the design process to create urban landscapes that preserve native species, habitats, and reflect the spirit of a place.

Green Connectivity.

According to Dramstad, Olson and Foreman (1996), the shape, size, and configuration of greenspaces can be defined by three principles: patches, corridors, and the matrix. "The spatial language becomes evident when considering how patches, corridors, and the matrix combine to form the variety of land mosaics on earth" (p.15). These principles can be used in ecological planning and design within the neighbourhood context. Many neighbourhood habitats take the form of isolated patches, which decreases biodiversity and increases the risk of local extinction. Corridors provide links between patches and increase vegetation within urban neighbourhoods. They can be continuous or 'stepping stones' between patches to allow movement and permeability. A matrix is the overall network of greenspaces that incorporates both patches and corridors. Dramstad et al. (1996) outline a more comprehensive spatial analysis of these principles, while this investigation focuses on the application of patches, corridors, and the matrix in suburban neighbourhoods to promote ecological sustainability.

Landscape Variety.

There are “more people living in cities [than outside of cities] and the same tendency appears to be true of flora and fauna” (Pötz and Bleuze, 2012, p.315). Protecting valuable biotopes within the city is both difficult and important. For example, there are a range of landscape types that are “native to North America and more specifically to the habitat found in Winnipeg” (City of Winnipeg, 2018) including aspen forest, oak forest or savanna, prairie, riparian forest, and wetlands (Ibid). These habitats can take on a range of forms from grass fields to urban woodlands and vary in level of maintenance from manicured to overgrown. “The presence of these communities protect the survival of wildlife [and plant] species that rely on them and also protect the uniqueness of our North American ecosystem” (Ibi). Landscape variety benefits flora, fauna, and humans. “Biodiversity must be conserved as a matter of principle, as a matter of survival, and as a matter of economic benefit” (UNEP, IUCN and WWF, 1992 cited in Dramstad, Olson and Forman, 1996, p.9).

Neighbourhood Greening.

Neighbourhood greening is an effort to improve urban conditions by providing more greenspace, trees, permeable surfaces, and natural land conditions. Urban heat island effect is the warming of temperatures in urban areas due to a substantial amount of paved surfaces. Green infrastructure helps mitigate heat stress and improve air quality in urban areas (Pötz and Bleuze, 2012; Hester, 2006). “It cools the air, recycles carbon monoxide, and retains water” (Government of Canada, 2005, p.6). Neighbourhood greening can take the form of increased tree cover, expanding the range of green ground cover and shrubbery, providing green roofs, walls, or fences, increasing the amount and sizes of parks, preserving natural land features, and including private and community gardens (Pötz and Bleuze, 2012; Hester, 2006).

05 Water Management.

Drainage is one of the most widespread and costly systems within cities, yet development patterns continue to pave more and more surfaces and move water to faraway places (Hester, 2006). “Virtually any neighbourhood of any size has a creek, waterway, or wetland associated with it, although some of these may have been destroyed or covered up by development” (Wheeler, 2004, p.208). The goal of effective water management is to retain water on site often using techniques that “allow rainfall to recharge the local water table rather than running off rapidly often causing erosion or floods” (Ibid). In Winnipeg, clay soils do not drain water well, and in these conditions, it can be better and more cost effective to keep water drainage visible above ground. Above ground drainage systems include ditches, bioswales, decorative gutters and water channels, rainwater gardens or

ponds, retention lakes, buffering and infiltration vegetation, and permeable paving. Above ground water drainage systems can be easier to maintain than underground systems, and can simultaneously educate the public about water systems (Pötz and Bleuze, 2012).

Site Vegetation.

According to Pötz and Bleuze (2012), private gardens and lawns “have not received enough consideration in attempts to improve the urban climate and to control the water mission. Given the large proportion of privately owned green areas in the total amount of green, it would be advisable to develop instruments for this purpose” (p.259). Moreover, Hester (2006) notes that “in many regions, the only prime agricultural land that is left is in backyards” (p.57). Nevertheless, most suburban yards consist of Kentucky bluegrass or other lawn species that are not productive and require high levels of maintenance. Rather than focus on appearance, ecology can be increased by focusing on using yards to maintain biotopes and grow food (Pötz and Bleuze, 2012; Hester, 2006). Neighbourhood yards can incorporate simple features such as street trees, hedgerows, dense vegetation, native species, on-site composting, vegetable gardens, and vegetative corridors along property lines to promote ecology.

FIG 2.7 Below. The front lawn is an iconic image for North American suburbs. However, the manicured lawn is both ecologically and economically costly. By using native planting rather than grass, homeowners can eliminate the need for herbicides, pesticides, irrigation, and reduce maintenance. It also increases biodiversity and restores natural habitat.





03 Equity.

Equity is the quality of being fair and impartial. An equitable neighbourhood should be accessible, diverse, and inclusive in order to provide people of all classes, incomes, family type, and lifestyle to have the opportunity to choose where they want to live.

In planning and design, equity is almost always recognized as a significant aspect of development, but the reality is that “many powerful forces work for inequity” (Wheeler, 2004, p.60) and often equity takes the back seat behind other influential factors. Amongst other things, examples of inequity can be seen in the distribution of amenities, spatial segregation of people based on race or income, the distribution of housing types, access to public transport infrastructure, and exposure to environmental hazards (Ibid). Equity has to do with accessibility. Suburban form has a history of inaccessibility due to land use segregation, low density, and car-dominated patterns (Hester, 2006). In suburban neighbourhoods, people without cars have a hard time competing for jobs because of the separation between the workplace and the home as well as high costs and inadequate public transit.

FIG 2.8 Above. Equitable neighbourhoods are accessible, diverse, and inclusive. They require careful consideration to include a range of people, lifestyles, and family types. Diversity is especially significant in housing types. It is uncommon for suburban neighbourhoods to have a diverse range of housing from single to multi-family dwellings, limiting the types of families who can live there.



Additionally, many jobs are moving away from urban centers and into more remote locations that are hard to get to. The people who are most affected by this are the poor, minorities, immigrants, women, the young, and the elderly (Ibid). Often "cities are symbols of inequality, [...] this discrepancy may be less visible in the low-density modern city, where the display of affluence is more hidden than in the old city, but the discrepancy remains" (Jacobs and Appleyard, 1987 cited in Larice and Macdonald, 2013, p.102).

Equity is not only important as a moral responsibility but increasing social equity is also good for the economy and the resilience of a city. Hester (2006) argues that "fairness is fundamental to lasting democracy" (p.77). Equity is challenging to measure and depends on a variety of complex factors besides physical characteristics, but neighbourhood development patterns nonetheless influence equity. The following five indicators describe formal characteristics that increase the opportunity for a neighbourhood to be more equitable, accessible, and diverse.

Walkability.

"Walkability implies comfortable access to amenities such as schools, recreation, retail, and workplaces" (Government of Canada, 2005, p.5). Several different factors contribute toward walkability, including compact form, sidewalk connectivity, pedestrian-friendly intersections, and local destinations such as shops, parks, and schools (Wheeler, 2004). It is not uncommon for suburbs to contain discontinuous, indirect, and confusing pedestrian routes, all of which compromise walkability (Government of Canada, 2005). Walkable neighbourhoods can increase public health as walking reduces obesity, improves cardiovascular health, promotes community interaction, and connects people with nature (Wheeler, 2004). Walkability is especially crucial for the elderly and young who do not drive or for whom walking is their primary mode of transportation (The Congress of New Urbanism, 1996 cited in Larice and Macdonald, 2013). Un-walkable neighbourhoods limit who can live there and force people, such as the elderly, to move out as they are unable to maintain their lifestyle in an area that is ultimately car-dependent.

Local Amenities.

Local amenities are nearby public facilities and resources that add value to a community, including a variety of places such as community centres, civic institutions, and schools. A multi-functional neighbourhood is one of Jane Jacobs requirements for dynamic urban life (Jane Jacobs, date cited in Larice and Macdonald, 2013) and providing local amenities increases a neighbourhoods range of activities and uses. A neighbourhood with local amenities promotes active participation in public life and offers places for people to get involved in the community. Hester (2006) reminds us that inaccessibility to local resources and civic institutions inhibits citizens from participating in public decision making. "Creating a city that expresses fairness in its procedures and form enables more citizens to participate meaningfully and contribute to a strong ecological democracy" (p.95).

Access to Greenspace.

Access to greenspace is important for mental and physical health, as well as social well-being (Government of Canada, 2005). While some neighbourhoods are abundant in greenspace and recreational spaces, this is not always the case. Often "public resources are dispersed inversely proportionate to need" (Hester, 2006, p.82). Less affluent neighbourhoods often have limited access to amenities, such as parks and greenspace, and are often located near liabilities such as large arterial roads, industries that give off odours or pollution, and environmental hazards. Often indirect barriers and policies limit access to greenspace, including the privatization of park spaces to residents or individual lots, pass or permit requirements to access parks and recreational spaces, and design details like gates that physically separate people from greenspace (Ibid). All people should have access to quality greenspaces and recreational areas, especially within their neighbourhood.

Mixed-Use.

Mixed-use refers to the diversity of land uses in a neighbourhood. Many neighbourhoods are single-use residential, with some variation in the type of housing that can be built but lacking in commercial or industrial land uses. Commercial and industrial land uses, though they may be considered undesirable, provide people with daily necessities, jobs, and resources. Low-density, single-use residential neighbourhoods typically "deny mothers access to jobs and deny children access to diversity" (Hester, 2006, p.79). Mixed-use neighbourhoods include amenities such as local businesses, small industrial or commercial land uses, local gyms, grocery stores, restaurants, and shops that are located nearby so that people can access them easily by foot.



Housing Accessibility.

"American housing policy has so strongly favoured home ownership over rental housing (which better meets the needs of the truly poor), tends to segregate affordable housing units in a limited range of locations, and often fails to provide the necessary community services, social services, amenities, or transportation to make affordable units become part of functional neighbourhoods for residents of all income levels" (Wheeler, 2004, p.61).

Housing accessibility depends on a number of factors, but in regards to the built form, a neighbourhood should provide a range of housing types including single-family detached dwellings, duplexes, row housing, apartment buildings, and visitable or barrier-free homes. Additionally, a neighbourhood should offer a variety of different housing sizes with affordable options that are mixed in with the community rather than separated. Often rental apartments are "segregated into a large complex with fewer amenities and more liabilities than the single-family neighbourhood" (Hester, 2006, p.83). Integrated housing diminishes social stigmas toward rental and affordable housing and increases diversity (The Congress of New Urbanism, 1996 cited in Larice and Macdonald, 2013).

FIG 2.9 Below. Access to greenspace is an important part of making a neighbourhood desirable to live in. An equitable neighbourhood provides a fair distribution of greenspaces so that everyone has access.



Precedent Study.

Riverside, Illinois.

Overview.

Designer(s)

Frederick Law Olmsted
Calvert Vaux

Year

1969

Location

9 miles west of Chicago

Size

1600 acres

Population

8,875

Households

3,402

History.

Riverside, Illinois was designed by Frederick Law Olmsted at a time when many cities across North America were overcrowded and experiencing high levels of congestion and pollution. These conditions made rural living attractive for providing open space and access to nature (Larice and Macdonald, 2013; Sharifi, 2016; Filion and Hammond, 2003). Olmsted's design for Riverside was meant to combine the advantages of rural living with the benefits of city life (Hall, 2014). Located along an existing railroad line and nine miles west of Chicago, residents of Riverside could easily commute to the city for work (Olmsted and Vaux, 1868). Riverside was very successful and would become a model for suburban development all across North America (Hall, 2014; Larice and Macdonald, 2013).

FIG 2.10 Right. The commuter rail contributed toward making Riverside a success in a time period when most households did not privately own cars (Wheeler, 2004) - Cruz, M., 2008.

FIG 2.11 Far Right. The winding streets in Riverside are designed to provide scenic views through the neighbourhood - Reallyboring, 2010.



Design Concept.

After examining the site and its natural features, Olmsted discarded the traditional forms of the urban street grid arguing that “those special features whereby the town is distinguished from the country, there should be the greatest possible contrast” (Olmsted and Vaux, 1868, p.280). He determined that Riverside would feature “gracefully-curved lines, generous spaces, and the absence of sharp corners” (Ibid). Riverside is characterized by low-density residential development with curvilinear streets, wide lots, and large setbacks (Wheeler, 2004, p.187). Riverside was meant to provide its residents with open-air recreation, long views, and a ‘rural attractiveness’ to contrast urban living (Olmsted and Vaux, 1868). Today, the natural aesthetic that was central to Olmsted’s original design is maintained by the residents. Planting guides and maintenance plans are in place to ensure the quality of landscaping is protected (Anon., n.d.).



Precedent Study.

Riverside, Illinois.

Analysis of Design Features.

The following design features were used by Frederick Law Olmsted to promote qualities of livability, ecology, and equity in Riverside, Illinois.

Livability

- The existing commuter rail was the cornerstone of the neighbourhood. It allowed people to live outside of the city and use public transportation and commute to work in a period where privately owned cars were not common. This made Riverside more accessible than other suburbs at the time (Olmsted and Vaux, 1868, p.287-289);
- Some of the best land was reserved for public grounds, such as parks and playgrounds, that provided broad tree-lined parkways and picturesque aesthetics. These areas included playgrounds, croquet, ball-grounds, and drinking fountains (Ibid);
- A system of sidewalks and trails were designed to provide outlooks and views throughout the community (Ibid);
- Pathways included openings with special decorations, sheltered seats, and watering places to increase the comfort of users (Ibid);
- The streets were lined with trees to provide windbreaks and add to the aesthetics of the neighbourhood. These small details increase pedestrian comfort and contribute to a sense of place (Ibid).

Ecology

- Each lot was required to maintain one or two living trees in between the home and the street. This site vegetation requirement was implemented so that over time a large, overhead canopy would cover the street (Olmsted and Vaux, 1868, p.287-289);
- Riverside was situated on higher ground than any other point nearer Chicago providing a natural and positive water management system. Additional drainage-ways, ditches, and conduits were designed to assist manage storm water run off (Ibid);
- Drainage measures were also implemented to protect the riverbank and natural land features from erosion and flooding (Ibid);
- The neighbourhood design included a grand park system with several large commons and forty-one smaller parks many of which were connected by green corridors (Anon., n.d., p.4);
- Approximately 900 acres of the Cook Country Forest was preserved during development and provides the neighbourhood with access to natural land features (Ibid);
- Today, Riverside promotes the planting of native site vegetation and protects mature trees to maintain Olmsted's original design concept (Ibid);
- Riverside was designed to provide landscape variety by protecting existing habitats such as the river flood plain, wetland forest, upland prairie, and oak-hickory forest (Ibid).

Equity

- A main access road was designed to provide alternative modes of transportation including walking, riding, and driving. This gave the residents a variety of travel options and increased walkability (Olmsted and Vaux, 1868, p.287-289);
- Large and modest lots were included to increase housing accessibility and encourage an economically-integrated community (American Institute of Architects Illinois, n.d.);
- The train station was designed as a mixed-use centre offering commercial and retail areas within the neighbourhood (Ibid).

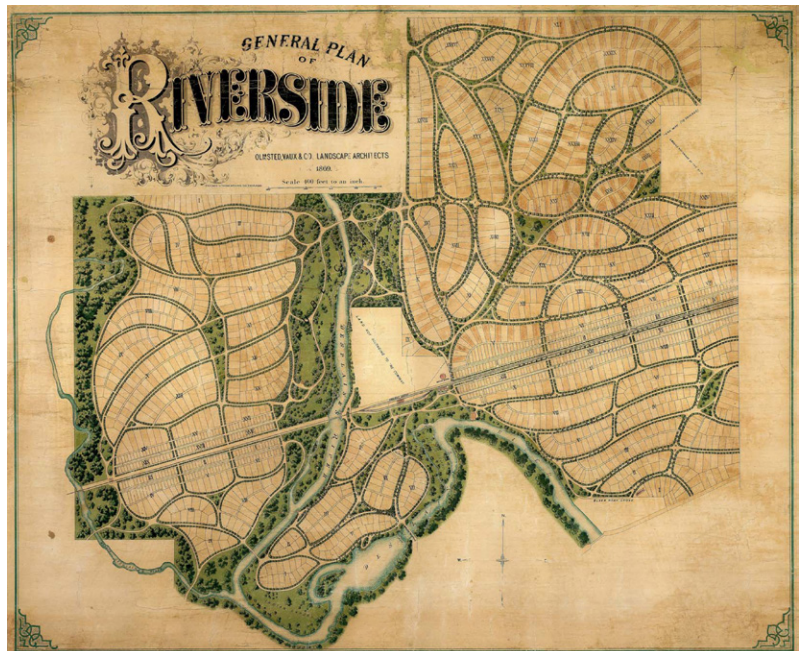


FIG 2.12 Right. The Riverside map shows the layout of the lots, arrangement of streets, river and forest areas, as well as the commuter rail that runs through the neighbourhood - Olmsted, Vaux & Co. Landscape Architects, 1869

Precedent Study.

Radburn, New Jersey

Overview.

Designer(s)

Clarence Stein
Henry Wright

Year

1920

Location

Bergen County

Size

149 acres

Population

3,100

Households

690

History.

Clarence Stein and Henry Wright designed Radburn during the 1920s. At this time, the rise of car ownership and the improvement of roads made suburbs more accessible but also presented new concerns for pedestrian safety. Increased mobility allowed people to spread out from the urban core, but resulted in a lack of social participation (Larice and Macdonald, 2013). Radburn was intended to be an American Garden City, based on the concepts developed in Ebenezer Howard's book 'Garden Cities of Tomorrow' but due to the economic downturn in 1929, the neighbourhood was never fully finished (Wheeler, 2004; Martin, 2001a; Stein and Wright, 1949). As a result only one portion of the original design was built (Hall, 2014; Martin, 2001a; Sharifi, 2016; Wheeler, 2004) and "rather than serving as a model for new regional development, Radburn laid the groundwork for a new form of suburban subdivision emphasizing culs-de-sac and an interior greenspaces" (Wheeler, 2004, p.134).



Design Concept.

Many of the principles of the neighbourhood unit were refined in the plan for Radburn including the incorporation of safe pedestrian networks, access to local greenspaces, internal park systems, and arterial roads on the periphery of the neighbourhood (Larice and Macdonald, 2013). The famous Radburn culs-de-sac were arranged to form a series of superblocks -large tracts of uninterrupted urban land- where all of the homes face onto an interior park space rather than a street (Martin, 2001a). The residential streets are narrow lanes that provide vehicular access to the back of the home, "a communal driveway" (p.158). The original plan had several superblocks arranged around a central elementary school and cluster of local amenities, based on the principles of the Neighbourhood Unit. These superblocks formed a series of parkways that provided direct access to the school on safe, separated pedestrian networks (Martin, 2001a; Sharifi, 2016).

FIG 2.13 Left. A view of the internal park space within the superblock. These separated pedestrian networks act as the 'front street' that each of the homes faces onto - Design for Health, 2012.

FIG 2.14 Below. This image is a view of the cul-de-sac or narrow lane that the homes back onto. These roads provide access to the homes but are dead-end streets that discourage through traffic - Johnson, 2016.



Precedent Study.

Radburn, New Jersey

Analysis of Design Features.

The following design features were used by Stein and Wright to promote qualities of livability, ecology, and equity in Radburn, New Jersey.

Livability

- The superblock was designed to replace typical rectangular street blocks with larger blocks that offer internal park spaces and playgrounds (Stein, 1949);
- Large arterial roads were located at the edge of the neighbourhood while narrow culs-de-sac were used to provide internal access to individual lots. This arrangement reduced the impacts of vehicular traffic and prioritized pedestrian safety (Ibid);
- Complete separation of pedestrian and vehicles was designed to increase safety and offer comfortable pedestrian networks (Ibid);
- The homes in Radburn were designed to face away from the street onto a central park space and pedestrian corridor that contributes towards a unique sense of place (Ibid);
- Large internal greenspaces were designed to provide each neighbourhood with a central community space that is both the physical and conceptual heart of the neighbourhood (Ibid).

Ecology

- The streets were laid out based on the existing topography rather than a grid in

order to use natural drainage to manage water (Stein, 1949);

- Large internal greenspaces were connected with green corridors to create continuous park networks (Ibid);
- The strategic layout of streets required less road infrastructure than other housing arrangements making it more economical to increase the percentage of greenspace (Ibid).

Equity

- As a result of the economic downturn, Radburn did not become as economically or ethnically diverse as it was intended to be, but it did prioritize housing accessibility by offering a mix of single family detached dwellings as well as apartment buildings (Sharifi, 2016);
- Local community amenities included swimming pools, playgrounds, and a school (Stein, 1949);
- Each area of Radburn was laid out strategically so that schools, playgrounds, and services were accessible within a half mile radius to increase walkability within the neighbourhood (Ibid).

FIG 2.15 Below. The arrangement of homespace creates a network of greenspaces that are connected with pedestrian networks. This layout requires less road infrastructure making it more economic to increase the amount of greenspace - Design for Health, 2012.



Precedent Study.

Seaside, Florida.

Overview.

Designer(s)

Andres Duany
Elizabeth Plater-Zyberk

Year

1982

Location

Walton County

Size

80 acres

Population

1200

Households

350

History.

Seaside, Florida was designed by Andres Duany, Elizabeth Plater-Zyberk in the early 1980s. Duany and Zyberk were hired by the developer, Robert Davis, to develop a community of 'cracker shacks', a style of vernacular architecture in southern Florida. From their research, Duany and Plater-Zyberk realized that "the traditional houses they sought to recreate could only be found in small towns" (Seaside, 2018). The traditional neighbourhood design began construction in 1981 with two houses and one pavilion on a single street. The rest of the community developed slowly over time, and after many renditions, the final plan was completed in 1985 (Ibid).

Design Concept.

The overall plan for Seaside was meant to reflect traditional neighbourhood forms such as "highly connected street patterns, pedestrian-oriented street design, mid-block alleys, and architectural features such as front porches and garages behind the house" (Wheeler, 2004, p.188). Seaside was developed with a series of codes that provided a 'regulating plan' for the entire town. While traditional zoning bylaws limit development with regulations, form-based codes are meant to be prescriptive about what you must do to implement good design rather than what you cannot do. The code defines eight different building types that are characterized by lot type, location, scale, building form, and parking requirements rather than land use. This method provides the opportunity for buildings to change use over time as the needs of the community evolve (Hesburgh Libraries, University of Notre Dame, n.d.). Duany and Plater-Zyberk designed the community plan, but all of the individual buildings and homes were designed by a variety of different architects and designers (Seaside, 2018).

FIG 2.16 Top right. Homes were designed by a number of different architects featuring the traditional vernacular architectural style in southern Florida - Alex, 2010.

FIG 2.17 Top left. The yards are green with large trees and lots of planting. Small setbacks and front porches ensure that the front of the house engages with the street - Alex, 2010.

FIG 2.18 Bottom. A neighbourhood centre orients the town and provides access to local shops and services - Cummins, 2007.



Precedent Study.

Seaside, Florida.

Analysis of Design Features.

The following design features were used by Duany and Plater-Zyberk to promote qualities of livability, ecology, and equity in Seaside.

Livability

- Traffic calming measures were used to slow down traffic and prioritize pedestrian safety. These measures included narrow streets and brick paving stones (Seaside, 2018);
- An extensive pedestrian network was implemented to connect the entire town offering both sidewalks along streets and separated pathways in between homes (Ibid);
- The homes were individually designed but follow a consistent architectural style that was regulated through a set of form-based codes. This was intended to recreate the character and scale of a southern small town and contribute towards a unique sense of place (Ibid);
- In order to provide active street fronts and pedestrian scaled streetscapes the homes were strategically located at the front of the lot to meet up with the sidewalk (Ibid);
- The town was organized around a neighbourhood center that was designed to orient the neighbourhood inward and provide shared community space (Hesburgh Libraries and University of Notre Dame, n.d.).

Ecology

- The plan for Seaside incorporated native planting (xeriscaping) rather than lawn for site vegetation to eliminate the need for herbicides, pesticides, or irrigation (Seaside, 2018);
- Narrow streets were used to reduce the percentage of impervious surfaces and increase the area for green infrastructure (Ibid);
- Stormwater management was addressed at the town scale by providing a central depressed square that would act as a retention pond during rainy seasons (Duany, 2016);
- The town was intentionally set back from the gulf-front cliffs in order to protect and preserve natural land features (Ibid).

Equity

- The layout was based on the design of historic small towns where cars were not the dominant form of transportation. For this reason, the design of Seaside encourages walkability and housing-job proximity (Hesburgh Libraries and University of Notre Dame, n.d.);
- Seaside included a mix of single family detached dwellings, multi-family dwellings, and mixed-use buildings to provide a range of options and increase housing accessibility (Ibid);
- A mixed use town centre was designed to provide commercial, retail, and civic facilities within the neighbourhood (Ibid).

FIG 2.19 Below. This map of Seaside shows the orientation of the town around a neighbourhood centre. The building forms vary from large street block buildings at the centre to small individual homes at the edges. These forms are guided by an urban code that allows for the use of the building to change over time, without radically changing the urban form - Duany Plater-Zyberk and Company, 1985.

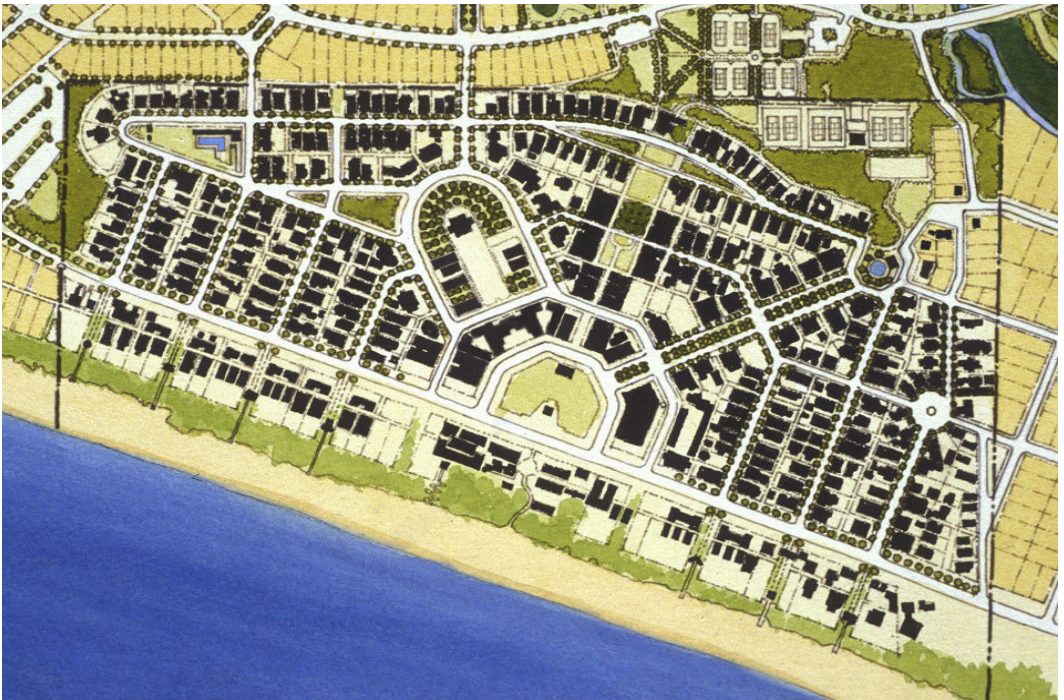




FIG 3.1 Above. Wildwood Park, Winnipeg, 1947. Construction methods for this project were carefully considered and carried out. Today, the beauty of Wildwood Park is the result of innovative construction methods that preserved most of the existing forest - Anon., 1947.

03

Methods.



model	ornamentation	physical	proportion
modular	orthographic	pillar	protection
module	outdoor	pivotal	prototype
mold	outline	placement	proximity
movement	outward	plan	public
multiple	overhang	planar	qualities
narrow	overhead plane	plane	quantity
natural	pace	platform	radial
negative	passage	point	ramped
network	parabolic	polygon	range
neutral	parallel	porch	ratio
niche	partition	portion	rational
number	passive	position	realm
oblique	path	positive	recessed
occupy	pattern	post	recognizable
off-centre	pedestrian	primary	rectangular
offset	perception	principles	rectilinear
opaque	perimeter	privacy	regular
open	pergola	private	regularity
openings	permutations	profile	regulating
opposite	perpendicular	program	reinforce
order	permeable	progression	relate
ordering	perspective	projection	relationship
organization	phase	promenade	repetition
orientation	phenomenon	properties	restricted

“By studying types and how they change over time, designers and planners can become connoisseurs of the physical environment, easily recognizing a wide variety of urban patterns and able to classify, date, and analyze the strengths and weaknesses of them.”

(Scheer, 2010 cited in Larice and Macdonald, 2007, p.311)

The previous chapter reviewed the history of suburban development patterns, compiled a set of formal indicators and design vocabulary to discuss neighbourhood qualities of livability, ecology, and equity, and analyzed historical precedents. This section will discuss classification as a research strategy and the primary method of research, typology.

First, I will discuss the nature of typology as a research method and its history in the field of design. Then, I will describe the methods of data collection and analysis for the case studies. Lastly, I will outline the limitations of typology as a research method.

Left. A lexicon of design vocabulary. Words are compiled from three sources: *Form, Space, and Order* by Francis D.K. Ching, *A Concise Townscape* by Gordon Cullen, and *Landscape Ecology Principles in Land-use Planning* by Dramstad et al.

The Nature of Typology.

As a Design Research Method.

Classification is a research strategy that involves “sorting and structuring data into a system of organization, using typical properties” (Deming and Swaffield, 2011, p.126).

In the field of design, classification is a means to analyze and categorise architectural and landscape types based on their use, physical characteristics, or both.

Typology is inductive in nature, meaning it builds theory through the generation of descriptions and explanations of relationships in the world through strategies of inquiry that are grounded in the world of experience and empirical evidence (Deming and Swaffield, 2011). This method of research depends on subjective values to select and organize data, but it is grounded by real-world phenomena. For these reasons, Deming and Swaffield classify typology as constructivist research:

“This presumes that knowledge is generated through the interaction between the investigators (and their society) and a reality (or realities) that exists but can never be known independently of the presumptions of the investigators. Landscape knowledge is thus actively constructed rather than found or discovered, and it must always be interpreted in its context. It is nonetheless anchored in some way and to some degree in a world that exists beyond the subjectivity of an individual or group of individuals”.

(Deming and Swaffield, 2011, p.9)

FIG 3.2 Below. This typology of single-family detached dwellings shows one interpretation of a suburban streetscape. Through this lens, there is a focus on the built form without consideration for the landscape. Every typology has boundaries that are placed by the investigator that suggest one way of viewing the world.



The History of Typology in Design.

Typology, or the study of types, is a method of classification that has been used by many different disciplines to provide organization, understanding, and structure (Moudon, 1994). “Types were at first defined as ideal models” (Scheer, 2010 cited in Larice and Macdonald, 2013, p.317) that were meant to be replicated over and over. The concept of type, as we understand it today, dates back to the eighteenth-century enlightenment and the work of Quatremère de Quincy. Quatremère introduced the concept of type as an abstract form that follows a set of rules, or inner logic, but can be interpreted in many different ways. “With this distinction, Quatremère allowed the possibility that man (architects) could create new abstractions and forms (types)” rather than rely on “the historical practice of imitation” (Ibid).

As a method of classification in the field of design, Scheer (2010, cited in Larice and Macdonald, 2013) highlights the work of Jean-Nicholas-Louis Durand. His book *Parallèle* (1800) was organized by a functional and formal classification system that used plans, sections, and elevations to compare and analyze architectural types. Durand’s work carried on Quatremère’s concept of types as ideal forms, defined by a set of characteristics, rather than examples to be duplicated. **“Types are abstractions that follow certain rules (that is, contain certain widely accepted characteristics) yet allow artistic interpretation of those characteristics [...]”** (Scheer, 2010 cited in Larice and Macdonald, 20, p.318).

The rise of modernism and the International Style of Architecture in the 1950s reintroduced replication and imitation in design through the use of prototypes. A prototype

is "a standardized, mass-produced expression of a type that contains little or no individuality [...]" (Larice and Macdonald, 2007, p.308). The repetitive use of standardized types, without any consideration of context or culture, has resulted in many monotonous and homogeneous landscapes. Many suburban housing developments are criticized for mass-producing these types of environments (Ibid). As a result of this growing sense of placelessness in the urban landscape, typology has since re-emerged as an approach to understanding place-making through built form types with a new focus on the city scale. By "using tried and true building types that fit existing contexts and achieve a sense of complementarity through form similarity, but which also have authentic differences because of their considered variations (i.e. nuanced models rather than standardized prototypes) can achieve a sense of place" (p.308).

In the late twentieth century, the Congress of New Urbanism used typologies in the creation of form-based codes. Form-based codes are used to regulate the formal characteristics and physical configurations of a place. "Such codes are specifically typological, in that they implicitly reference the types that are acceptable in a place, according to a set of ideals" (Scheer, 2010 cited in Larice and Macdonald, 2007, p.323). Today, typologies continue to be a tool for analyzing the urban forms and patterns that shape our cities. This method of research will be used to investigate the physical forms and spatial configurations of suburban neighbourhoods. Types are not just forms or patterns to be replicated over and over, but rather an ideal form, based on a set of characteristics, which allow for nuanced applications in a variety of different contexts.

"A single-family detached home on its own piece of land, located on a quiet, tree-lined street far from the bustle of the city, is the metonymic representation of the American Dream."

(Ritzdorf, 1994, p.117)



Justification.

Recognizing and acknowledging types is an integral part of restructuring societal values making typology a useful tool for addressing suburban housing, an urban form that is value-laden. Suburban development patterns are intertwined with ideals of home ownership and concepts of 'the American Dream'. These ideals have had a significant impact on the evolution of suburban housing patterns in North America, encouraging the development of exclusively residential, low-density, single-family home neighbourhoods. Franck and Schneekloth (1994) discuss the role of classification in both providing order to the world as well as challenging the way we see the world. **"Types help determine what we produce, modify, destroy, and preserve, and how we do so"** (p.9). To develop a design language that better responds to social and ecological housing challenges our current housing patterns need to be analyzed and evaluated.

"We may not see how much the distinctions that constitute the contemporary ordering of space enforce patterns of social domination and ecological destruction. If we wish to change these patterns, we need to modify the distinctions and separations that underlie them" (Franck and Schneekloth, 1994, p.10).

A variety of previous classifications has examined neighbourhood patterns (Forsyth and Crewe, 2009; Filion and Hammond, 2003), but this research is unique as it focuses on the role and application of suburban forms to influence qualities of livability, ecology, and equity. It challenges current housing patterns and the values they prioritize and helps designers and planners engage in a pattern language that better responds to contemporary social and ecological challenges. This investigation explores suburban development from the perspective of a landscape architect observing the built form, landscape, and infrastructure in conjunction.

FIG 3.3 Left. Many suburban developments over the last century have prioritized low-density, exclusively residential, single-family development - Strozier, 2005.

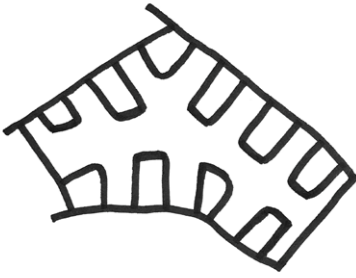
Description of Methods.

This study will investigate the physical, designable characteristics of four Winnipeg neighbourhoods. The goal is to use typology to compare the physical forms and patterns of suburban neighbourhoods and evaluate how the built form creates qualities of livability, ecology, and equity.

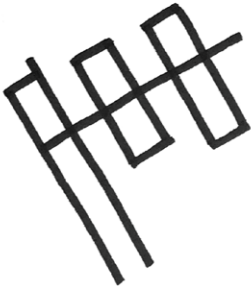
The four case studies will focus on suburban residential neighbourhoods that are characterized by a street loop pattern from the late 1940s into the early 2000s. The residential loop is a typical suburban street pattern, and each of the four neighbourhoods was chosen to highlight different variations of the loop. The first loop type is the *Reverse Loop* in which the homes are oriented away from the lane and onto an interior pedestrian path. The arrangement of the loops forms a residential superblock that provides an internal shared park space. The second loop type is the *Grid Loop*, a series of loops characterized by straight lines and right angles, tied together by a main access road. The grid loop has no back lanes or sidewalks. The third loop type is the *Double Loop*, which consists of a row of loops with both a front street and a back lane. The last loop type is the *Erratic Loop*, a hybrid of different loops, culs-de-sac, and curvilinear streets.

The four neighbourhoods to be analyzed in this study are located in the Fort Garry area of Winnipeg, Manitoba. Each neighbourhood is mostly residential and is a suburb or was considered a suburb at the time of its development. Each of the neighbourhoods varies in size and shape but has been chosen for their particular street pattern. Within each neighbourhood, a specific area of study has been identified to contain the scope of work and define boundaries for the research. The area of study is limited to only streets that are characterized by the loop pattern making the neighbourhoods more comparable in terms of size and properties. The generally recognized boundaries of each neighbourhood may not perfectly match up with the area of study, therefore, at the beginning of each case study, the study area will be identified. The four neighbourhoods are: (1) Wildwood Park, (2) Beaumont, (3) McGillivray Park (located in the neighbourhood of Maybank), and (4) Bridgwater Forest. Figure 4.8 is a map that locates each neighbourhood within the area of Fort Garry.

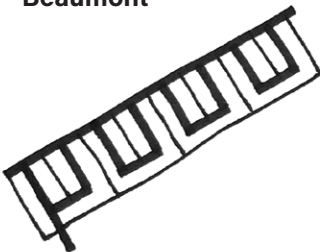
Each case study involved several site visits to observe and document neighbourhood characteristics. This data was supplemented with systematic measuring and information from 2016 orthographic images, Google Earth measuring tools, the City of Winnipeg's property maps and assessment information, as well as the City of Winnipeg's open data portal and GIS maps. The data is described and presented in the form of measured drawings, including plans, sections, elevations, details, and figure-grounds. For each



Type 1: Reverse Loop
Wildwood Park



Type 2: Grid Loop
Beaumont



Type 3: Double Loop
McGillivray Park



Type 4: Erratic Loop
McGillivray Park

neighbourhood, information was collected on the physical characteristics of streets, lots, pedestrian networks, homes, site conditions, and neighbourhood area. The properties that were documented include dimensions, areas, materiality, density, numbers, arrangement, shape, distance, type, and form. This information ranges across different scales, including the neighbourhood, the street block, and the individual lot.

The data is then assessed, based on the formal indicators outlined in chapter two, to evaluate the potential for livability, ecology, and equity in each neighbourhood. The formal indicators provide a design vocabulary from which designers and planners can evaluate the potential for livability, ecology, and equity in various suburban development patterns. The formal indicators for each quality are described in tables 1, 2, and 3. For each indicator, there is a brief description of the pattern, examples of how they might be observed, where they are observed, and the source of the data. These tables are the basis from which each neighbourhood will be evaluated. Through close observation it can be determined whether or not each indicator is present in order to assess the neighbourhoods potential for livability, ecology, and equity.

FIG 3.4 Left.
These sketches show the different interpretations of the loop pattern. Each loop type brings with it a different set of physical characteristics.

Formal Indicators of Livability.

Indicator	Description
Neighbourhood Centre	A public space that orients the neighbourhood inward drawing people together for shared experiences, activities and interests.
Parks & Playgrounds	Local parks that provide space for recreation, leisure, events and activities, as well as access to open greenspace and nature.
Sidewalks & Trails	Pedestrian and cyclist routes that provide connected networks for leisure activities, daily commutes, and exercise.
Density & Scale	Density measures the number of dwellings per hectare and human-scale is a well-fitted urban form for the use and enjoyment of pedestrians.
Sense of Place	Local characteristics, urban form, vegetation, or design details that make a neighbourhood distinct and develop a sense of identity.
Safety & Comfort	Design details that make the neighbourhood comfortable and safe for people to walk, relax, play, and interact with neighbours.
Public Transportation	Nearby transit networks that provide access to jobs, services, and daily necessities.

TABLE 1

Measures	Observed	Source(s)
Location of schools, parks, community centre, orientation of homes, access to greenspace	- Plan	- On-site Observations - Aerial Images
Schoolyards, parks, playgrounds, total area of greenspace, pedestrian links	- Plan	- On-site Observations - Aerial Images
Sidewalks, regional trails, bike paths, greenways/parkways, length and connectivity of trails	- Plan - Section	- On-site Observations - Aerial Images - Winnipeg Trails
Net density, neighbourhood size, loop size, lot sizes, housing spacing, garage location	- Plan - Section	- Aerial Images - City of Winnipeg Assessment Data
Natural land forms, streetscaping, building materials, architectural style, historic landmarks	- Elevation - Section - Details	- On-site Observations
Safe street crossings, sidewalks, lights, tree canopies, traffic calming, 'eyes on the street'	- Plan - Details	- On-site Observations - Aerial Images
Location of bus stops, variety of routes, number of routes, frequency of services	- Plan	- Winnipeg Transit - Aerial Images

Formal Indicators of Ecology.

Indicator

Description

Green Corridors

A mosaic of greenspaces that are connected and permeable to promote the movement of species throughout a neighbourhood.

Natural Land Features

Preserved or restored landscape features, maintained or natural, that are native to the local Winnipeg area.

Landscape Variety

Access to a diverse range of greenspaces that allow for a variety of activities and provide a number of different habitats for flora and fauna.

Water Management

Measures to help balance the water table and retain water on site during peak rain periods to be used during dry seasons.

Neighbourhood Greening

Mitigating urban heat island effect by minimizing the amount of paved surfaces and adding green infrastructure to the neighbourhood.

Site Vegetation

Increasing the productivity and ecological potential of yard spaces.

TABLE 2

Measures	Observed	Source(s)
Width of greenways, vegetation in corridors, edge conditions, neighbourhood permeability	<ul style="list-style-type: none"> - Plan -Section 	<ul style="list-style-type: none"> - On-site Observations - Aerial Images
Urban woodlands, riparian vegetation, topography, lakes or ponds, size of area, accessibility	<ul style="list-style-type: none"> - Plan - Details 	<ul style="list-style-type: none"> - On-site Observations - Aerial Images
Forest, manicured lawn, prairie, open greenspace, garden, wetland, edges, patches	<ul style="list-style-type: none"> - Plan - Section 	<ul style="list-style-type: none"> - On-site Observations - Aerial Images - Public Works
Bioswales, gutters, retention ponds, infiltration and buffering, permeable paving	<ul style="list-style-type: none"> - Plan - Section 	<ul style="list-style-type: none"> - On-site Observations - Secondary sources
Area of paved surfaces, ground cover conditions, building footprint, driveway size	<ul style="list-style-type: none"> - Plan - Details 	<ul style="list-style-type: none"> - On-site Observations - Aerial Images
Number of trees, native vegetation, area of gardens, naturalised planting	<ul style="list-style-type: none"> - Plan - Elevation - Section 	<ul style="list-style-type: none"> - On-site Observations

Formal Indicators of Equity.

Indicator

Description

Walkability

The accessibility of daily necessities, work, services, and resources in terms of time and distance by foot.

Local Amenities

Places or features that add value to the neighbourhood and bring people together for shared experiences or activities.

Access to Greenspace

Public access to greenspace that provides places for play, recreational activities, and exploring nature.

Mix of Land Uses

A diversity of land uses that provide access to daily necessities, reduces commute times, and encourages live and work development.

Housing Accessibility

Providing a diverse range of housing options that cater to a variety of different people, classes, incomes, family types, and lifestyles.

TABLE 3

Measures	Observed	Source(s)
Connected routes, safe crossings, proximity to jobs and services, accessibility	- Plan	- On-site Observations - Aerial Images - Google Earth
Access to schools, community centres, sports fields, local shops or retail locations, restaurants	- Plan	- Google Maps
Parkway, greenbelt, school yard, park, open greenspace, fences, proximity	- Plan - Section	- On-site Observations - Aerial Images
Mixed-use residential, small commercial or Industrial areas, mix of housing types	- Plan	- Aerial Images - Google Maps - Winnipeg Zoning
Housing type, housing size, property values, visitable/barrier-free housing, square footage	- Plan - Section	- On-site Observations - Winnipeg Assessment Data

Limitations.

This method of research comes with limitations. Although typologies are well suited for comparing physical, designable characteristics, it is important to acknowledge their limitations.

Studies of the built form are at risk of physical determinism. Physical determinism “promotes identical and generalizable physical solutions to treat problems of communities with diverse social, cultural, and economic characteristics” (Sharifi, 2016, p.9). This practicum is based on the assumption that physical forms *influence* qualities of livability, ecology, and equity rather than *determine* the livability, ecology, and equity of a neighbourhood. This distinction changes the way we understand the built form as something that enables social, economic, and cultural change “not in a deterministic way, but rather in terms of possibilities and probabilities” (Appleyard and Jacobs, 1987 cited in Larice and Macdonald, 2013, p.98). The formal indicators are not meant to be used as a checklist to solve social and environmental issues, rather they are a pattern language from which designers and developers can employ types in the design of livable, ecological, and equitable neighbourhoods.

Some qualities of livability, ecology, and equity are hard to measure and difficult to objectify. For this reason, the investigation is limited by a certain amount of subjectivity. Franck and Schneekloth (1994) describe type as a “constructed overlay on the world” (p.30). This investigation and analysis explores the built form of neighbourhoods through the lens of three values, livability, ecology, and equity. The table of indicators attempts to provide a more objective method of evaluation by grounding these criteria in existing literature, as outlined in chapter two, but they are nonetheless limited by subjectivity. The nature of typology is that it examines the real-world phenomenon, but depends on subjective values to select and organize data (Ibid).

Herrington (2017) also discusses the risks of using typologies in the design process. She notes that engaging with types can often result in the replication of types rather than the generation of new types. The objective of this typology is to provide a design vocabulary, a starting point, to aid in comprehension and from which we can approach the design process, rather than producing models for replication. The case studies provide a way to understand the role and application of types, rather than determine which neighbourhood pattern should be replicated. Typology concerns the language of design and this investigation seeks to challenge existing development patterns and suggests a new way to use neighbourhood types to promote livability, ecology, and equity through the built form.

“Type is enormously useful. It explains the world to us, it makes sense for us. And it does this, usually, without our having to think about it: we accept knowledge of the world structured and interpreted through type. Type is suggestive rather than true. This is its power, but also its problem. We assume truth, and we assume agreement when, in fact, this is not in the nature of typing nor of the struggle to form and change spatial practices.”

(Franck and Schneekloth, 1994, p.30).



FIG 4.1 Above. Beaumont
Park, Winnipeg.

04 Case Studies.



rhythm	silhouette	subtractive	translational
roof plane	single	support	triangle
room	site	surface	two-dimensional
rotated	size	surround	type
rotation	slice	suspended	typology
round	sloping	symbiotic	underside
row	small	symbol	uniformity
saturation	soft	symbolic	unify
scale	solid	symmetrical	unit
screen	sound	symmetry	unity
secondary	space	tactile	upright
section	span	tall	urban
segment	spatial	technology	use
semi-private	sphere	tension	u-shaped
semi-public	spiral	terminate	value
separate	square	territory	variation
sequence	standard	terraced	variety
series	stability	texture	vaulted
shallow	stair	thickness	vegetation
shape	straight	three-dimensional	veranda
sharp	street	threshold	vertical
shelter	structural	tone	vertically
shield	structure	topography	vertices
short	style	transformation	view
sightlines	subdivision	transitional	visual

“Case studies can [also] be used in a strategy to explore new topics, and there are many examples where a number of comparative case studies are used to build a typology or working classification of situations that can generate further, more precise research questions”.

(Swaffield and Deming, 2011, p. 81)

In this section, I will transition from studying suburban development patterns from a North American context to focus on Winnipeg, Manitoba. This chapter begins with a brief historical review of suburban development in Winnipeg to provide context for the case studies. Following this, four case studies will investigate the evolution of the suburban loop pattern in four Winnipeg neighbourhoods. Each case study involves an in-depth analysis of the physical characteristics and an assessment of its potential for livability, ecology, and equity based on the formal indicators outlined in the previous section.

Left. A lexicon of design vocabulary. Words are compiled from three sources: *Form, Space, and Order* by Francis D.K. Ching, *A Concise Townscape* by Gordon Cullen, and *Landscape Ecology Principles in Land-use Planning* by Dramstad et al.

The rise of the suburb.

Winnipeg, Manitoba.

In Winnipeg, suburban development has been a dominant pattern of city growth for over a hundred years (Burley, 2003). The ideals of suburban living and home ownership are deeply rooted in Winnipeg's history and continue to shape the city today. Since the 1970s Winnipeg has been considered a slow-growth city, but this has not always been the case. Throughout the 20th century, Winnipeg experienced intermittent periods of intense population growth (Distasio and Kaufman, 2015). From 1901 to 2001, Winnipeg's population grew from 42,000 to over 660,000, and as a result, the number of dwelling units increased from 8,000 to 260,000 (Burley, 2003). It is important to note that the rate of home ownership also increased during this time from approximately 30% of households to over 60% of households. This trend has continued in contemporary suburban development (Ibid).

Winnipeg's first planned suburbs were designed exclusively for upper-class residents. Developed in the early 20th-century, Crescentwood featured large river lots and required minimum construction costs to maintain its exclusive character (Burley, 2003). In the 20s and 30s, other neighbourhoods such as Tuxedo Park were built to replicate this exclusive character, but the depressed economy could not support the development of more high-class suburbs. For this reason, middle-class suburbs began to develop rapidly in areas we know today as East Kildonan, West Kildonan, and Fort Garry. These neighbourhoods provided small homes on cheap land, offering lower taxes than in the city. During this time, the government proceeded to promote middle-class homeownership by providing housing mortgages. "The bungalow was the symbol of homeowner pride in the interwar years" (p.19) and by 1941 home ownership was more prevalent in the suburbs than in the city (Ibid).

Suburban developments of the early 19th century were characterized by traditional street grids that made it easier for developers to survey and sell lots. As neighbourhoods expanded, developers would build

FIG 4.2 Top. Aerial image of Windsor Park in 1961. Windsor Park is a planned neighbourhood that uses a hybrid of loops and crescents as local residential roads and is "tied together with a limited number of main entry roads" (Burley, 2003, p.22) - University of Manitoba Archives & Special Collections, n.d.

FIG 4.3 Middle. Aerial image of Wildwood Park in 1950. Wildwood Park is a planned development where the houses face inward onto a shared park space. The neighbourhood consists of a series of looping streets that are arranged around an interior park - University of Manitoba Archives & Special Collections, n.d.

FIG 4.4 Bottom. Aerial image of River Heights (1949). River Heights has a traditional grid pattern with straight lines and right angles. This arrangement made it easy to add blocks incrementally over time - University of Manitoba Archives & Special Collections, n.d.

new blocks off the existing street pattern. Today it is hard to discern where the stages of spatial expansion are in these older neighbourhoods (Burley, 2003, p.22). Following World War II suburban municipalities started growing faster than the city itself. Between the 50s and 70s, the demand for housing was so high that developers began to mass-produce suburbs and develop new street patterns that improved car efficiency and separated land use (Distasio and Kaufman, 2015, p.51; Burley, 2003). In 1948 the Winnipeg Town Planning Commission released an annual report where they endorsed this transformation in suburban form:



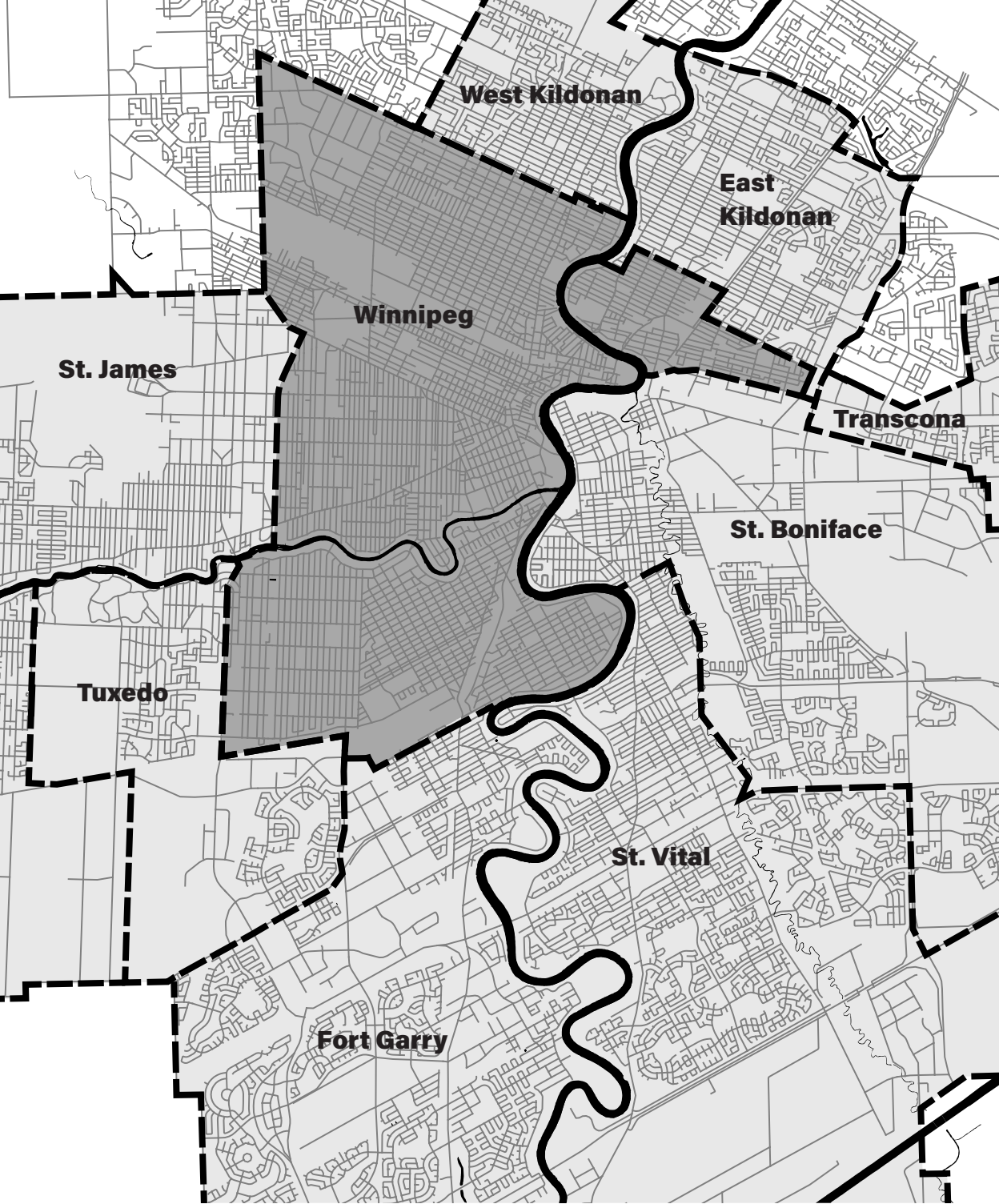
"Through the years, homes in Greater Winnipeg have been built largely on streets laid out in a grid pattern, crossing each other at right angles. Experience in other cities has proved the desirability and economy of new types of subdivision, using non-through streets and incorporating a few curves, rather than using a rigid rectangular system throughout. These provide adequate access to all the houses on the minimum amount of street, without inviting through traffic, and at the same time provide a type of development which is much improved in appearance and amenity, particularly on the flat prairie land of this area. The saving in initial development and in later maintenance costs, occasioned by the lesser length of streets and services installations, often enables the home owner to purchase a larger lot at comparable cost. While culs-de-sac may not be practicable in the Greater Winnipeg area, due to snow removal difficulties, streets laid out in continuous loops offer no street clearing problems" (p.19).

In the mid 1900's developers were "more likely to be engaged in house construction and sales, as well as land assembly and the sale of building lots" and "attempted to create privacy in their subdivision, by limiting access points for traffic and by laying out curving crescents and residential bays" (Burley, 2003, p.22). In the United States "cul-de-sacs proliferated steadily throughout the twentieth century, their numbers reaching a peak in the 1980s and 1990s development. In Canada developers took a somewhat different approach, favouring loop roads over cul-de-sacs, but the end result was the same: to create neighbourhood environments completely insulated from the rest of the metropolis" (Wheeler, 2004, p.188). Improved roads and increased automobile accessibility have continued to shape the urban form. Today "front garages testify to the importance of the automobile in suburban development. This use of space and also a concern for family privacy have shifted the focus of the house to backyard, to decks, pools, and gardens" (Burley, 2003, p.51).

From 1951 to 1971 the population of Fort Garry grew from 8,193 to 27,448, a 251 percent increase in twenty years. This expansion included the development of areas we know today as Maybank and Beaumont (Distasio and Kaufman, 2015, p.52). As rural municipalities continued to expand with suburban development, growth in the inner city was on a decline, and in 1972 the municipal government amalgamated twelve of the surrounding rural municipalities, including Fort Garry, into the City of Winnipeg. This amalgamation was meant to unify and increase cooperation between the city and the suburbs (Distasio and Kaufman, 2015; Burley, 2003). Since then Fort Garry has continued to expand outward and contains some of the city's most recent and extensive subdivisions, and includes all four of the case study neighbourhoods: Wildwood Park, Beaumont, McGillivray Park, and Bridgwater Forest. Today, the area of Fort Garry consists of over 30 neighbourhoods and displays a wide range of suburban development patterns as they have evolved over the past half-century.



FIG 4.5 Right. This road pattern map shows the twelve distinct municipalities that became part of Unicity in the 1972 amalgamation. This map also shows the evolution of street patterns in Winnipeg. The traditional grid pattern characterizes many of the areas near the urban core. As the city expands outward, the streets begin to loop and curve. The developments on the outskirts of the city have the most variable street patterns with winding roads, loops, and culs-de-sac.



3 kilometres

01 Case Study.

Wildwood Park.

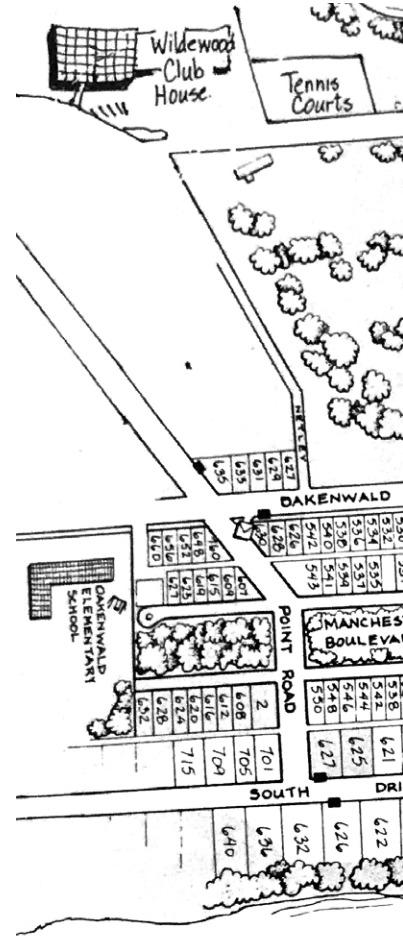
“Wildwood Park is the first planned housing development in Western Canada. It won an award of merit from the Canadian Housing Design Council and the concept is studied in Architecture faculties throughout the world”.

(Wildwood Into Tomorrow, 2013, p.98)

History.

Wildwood Park is a planned community designed by Hubert J. Bird in 1945. Despite previous proposals for development, the site of Wildwood remained undeveloped until after the Second World War when Bird, owner of Bird Construction, purchased the fifty-hectare site from the municipality of Fort Garry. Inspired by the layout of Radburn, which he had noticed during a plane ride over New Jersey, Bird drafted a plan for Wildwood based on Radburn’s main design principles: the separation of pedestrian and automobile circulation, reversed orientation of homes, and arrangement of a superblock with a central park space (Wildwood Into Tomorrow Committee, 2013).

Bird submitted his plan to the National Housing Administration in Ottawa where they recommended the change from Radburn style culs-de-sac to looping bays to increase accessibility for service vehicles. This decision made Wildwood a unique variation of Radburn. Wildwood Park was built in 1947 and introduced innovative construction techniques for pre-fabricating homes using assembly line production. This method made it possible to preserve many of the trees throughout the park and uphold its original character (Wildwood Into Tomorrow Committee, 2013).



WILDWOOD

☑ - MAIL BOX

198



FIG 4.6 Left. This drawing shows the extent of Wildwood Park neighbourhood. All of the numbered lots were included in the original design for Wildwood Park in 1947 including several river lots and grid street lots - Anon., 1988.

ⓘ Not to scale

Location.

Wildwood Park is located south of downtown Winnipeg nestled in a bend in the Red River. The peripheral streets follow the shape of the river and form an irregular rectangle with a series of inwardly oriented loops. The full extent of Wildwood Park is about fifty hectares and includes river lots along South and North Drive and the properties along Manchester Boulevard. Figure 4.6 shows Bird's original neighbourhood plans and shows the full extent of Wildwood Park. For this investigation, the area of study is limited to include only the ten looping streets. Figure 4.7 outlines the boundaries of the study area, a total of approximately thirty hectares. Data collected regarding streets, lots, pathways, and yards pertains to the area of study to limit the scope of work and make the information more comparable across the four case studies. The whole neighbourhood of Wildwood Park will be acknowledged for context and is used to examine the surrounding area.

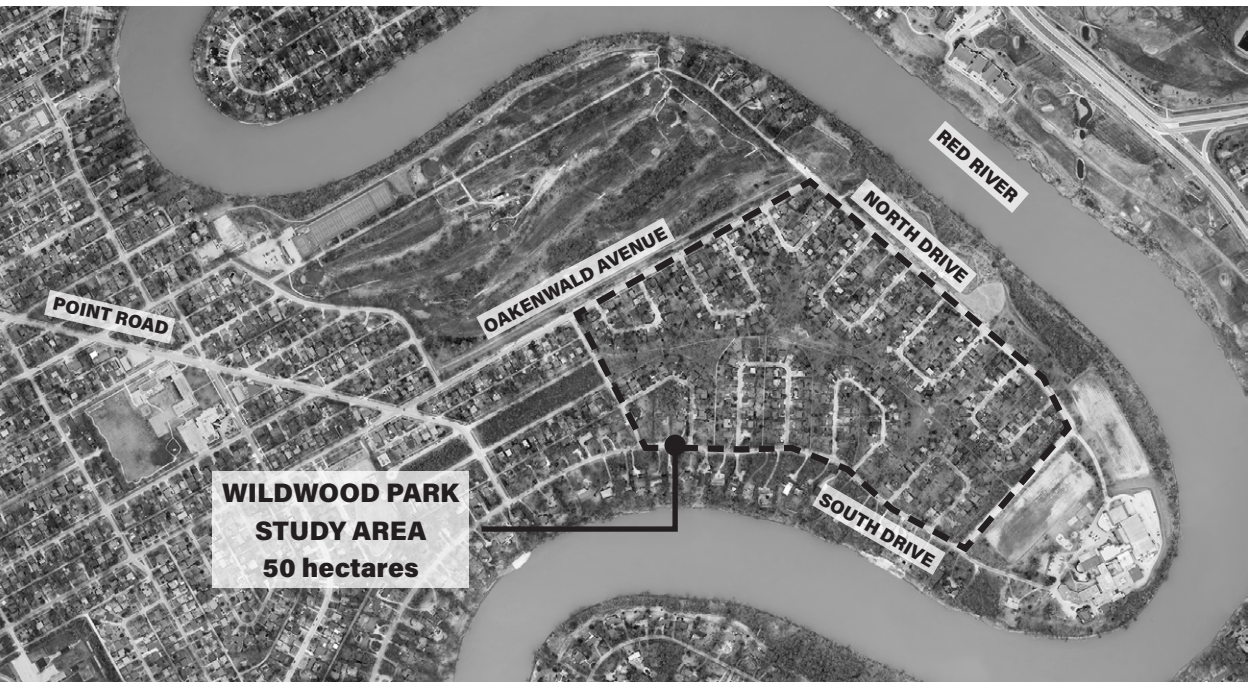


FIG 4.7 Above. This aerial image of Wildwood Park shows the arrangement of the loops with the built form and surrounding landscape. The study area is outlined in blue. It consists of ten looping streets that are the focus of the investigation. The surrounding neighbourhood will be referenced for context.



500 metres

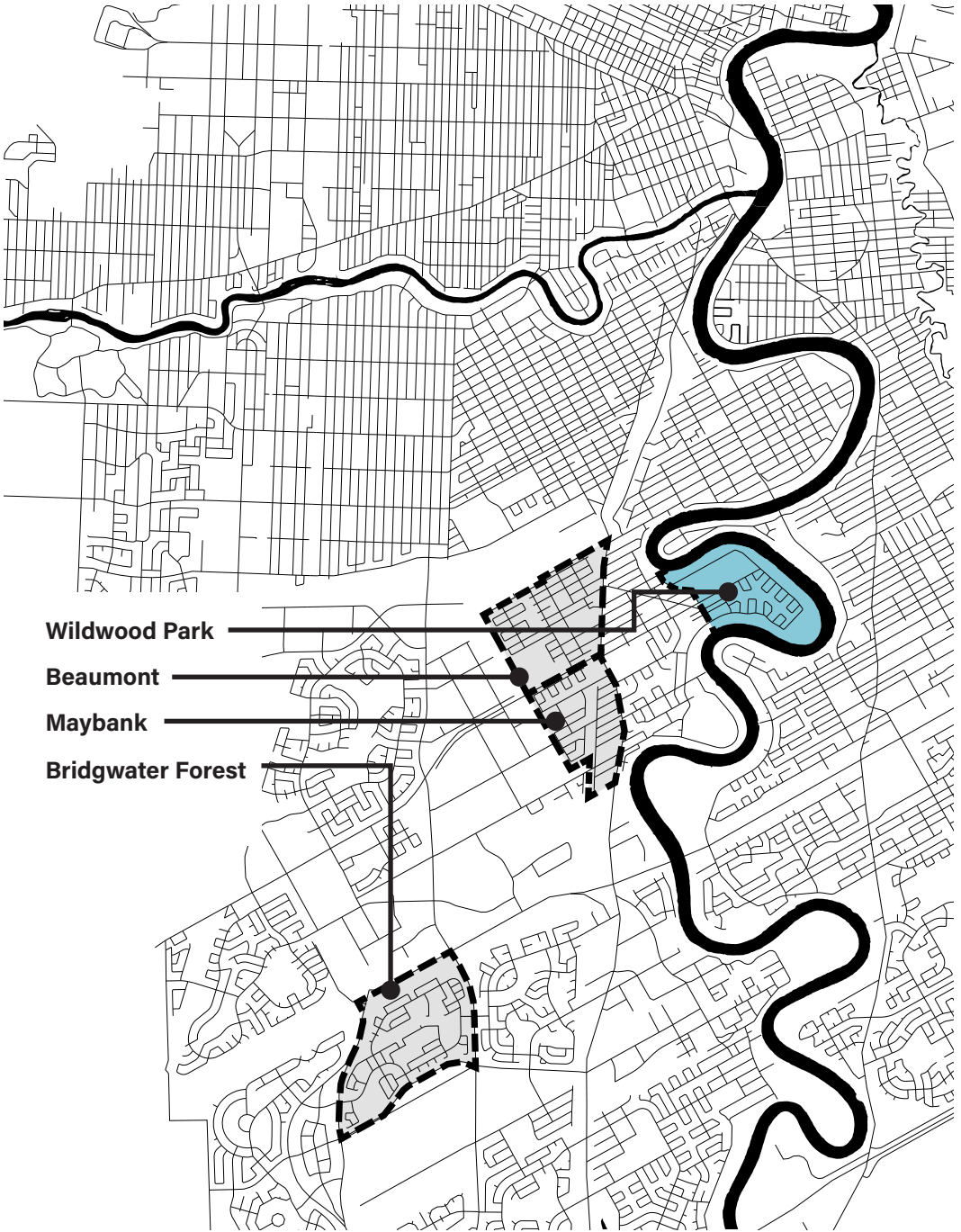


FIG 4.8 Above. The context map shows the location of the four neighbourhoods in Winnipeg and proximity to each other.



Design.

Wildwood Park is known for its unique street layout inspired by Clarence Stein and Henry Wright's design for Radburn, New Jersey. Wildwood Park uses a *Reverse Loop* pattern that is similar to Radburn except that it uses looping streets rather than culs-de-sac. A reverse loop means that the loops are back lanes rather than front streets and the homes face away from the street rather than onto the street. In Wildwood Park the arrangement of loops forms a large *superblock* with a central interior park space (Wildwood Into Tomorrow Committee, 2013; Martin, 2001a; Martin, 2001b). There are a few other neighbourhoods in Winnipeg that utilize the reverse loop pattern, but it is not very common even though these neighbourhoods hold high market value.

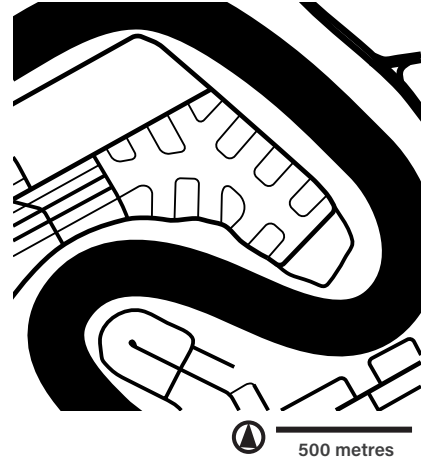


FIG 4.9 Above. The figure ground shows the relationship between street and open space. This arrangement of reverse loops forms a superblock with no streets that run through the neighbourhood.

FIG 4.10 Below. Each lot has direct access to shared greenspace. This arrangement creates permeability throughout the neighbourhood that is uncommon in most suburban neighbourhoods.



Physical Characteristics.

STREETS

Wildwood Park consists of ten loop bays, two straight street blocks and river lots along the perimeter of the neighbourhood. The study area focuses on the ten loop roads. Each of the loops emerges from one of the three collector roads, South Drive, North Drive, and Oakenwald Avenue that form an asymmetrical circle around the site. These roads mark the perimeter of the site and restrict access in and out of the neighbourhood. This layout of loops forms a large superblock where the internal space is void of streets and through traffic. Each lane is five metres wide with a one-and-a-half metre wide shoulder on each side. These back lanes are the only streets to provide access to the homes so they must be wide enough to accommodate an emergency vehicle – that is the purpose of the shoulder. On most days, the shoulder acts like a sidewalk or becomes extra space for guest parking. The size and shape of the bays vary throughout the neighbourhood, accommodating approximately twenty to thirty-six lots per bay.

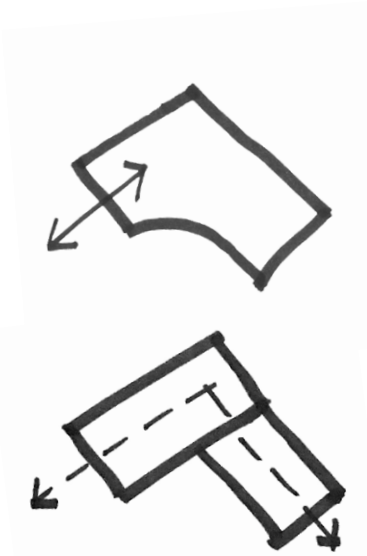


FIG 4.11 Top. The top sketch shows the limited vehicular access points into the neighbourhood. Cars enter on the west side and circle around the neighbourhood but do not cross through it.

FIG 4.12 Middle. The middle sketch shows how the interior park space acts as an axis of symmetry through the centre of the superblock.

FIG 4.13 Right. The local streets in Wildwood are five-metre-wide back lanes with one-and-a-half metre shoulders on each side. This arrangement makes the road accessible for services vehicles and provides additional parking space. The homes are designed so that the kitchen and service entrance face onto the back yard and lane, while living spaces face on to the interior park space.



LOTS

The typical lot in Wildwood Park is eighteen metres wide and thirty-six-and-a-half metres long. These lot dimensions are very consistent throughout the neighbourhood except at corner lots where they often increase in size. Each lot provides rear access from the back lane, while the front of the lot overlooks shared park space. The front yard of each home owner's private property is collectively shared to create a larger public park space. The interval between homes varies depending on the size and location of the house, but the distances range from approximately six to nine metres. This spacing maintains an openness throughout the neighbourhood and emphasizes the park-like feel.

The original design for Wildwood Park did not include garages, but over the years this has changed, and many residents now have parking structures along the back lane. Today, seventy-three percent of the homes have detached garages, and eight percent have attached garages. The remaining nineteen percent have only driveways, parking pads, and sometimes small structures that cover their cars.

There are 286 single family homes within the area of study in Wildwood Park, producing a net density of twelve dwellings per hectare. In Wildwood, this measurement of density can be misleading as the front yard is technically private property but used as shared open space. Taking this into consideration, and classifying the front yards as open space increases the net dwelling density to nineteen-point-seven dwellings per hectare.

*Net Density measures the number of dwellings per hectare of the total land area devoted to residential land use (private properties).

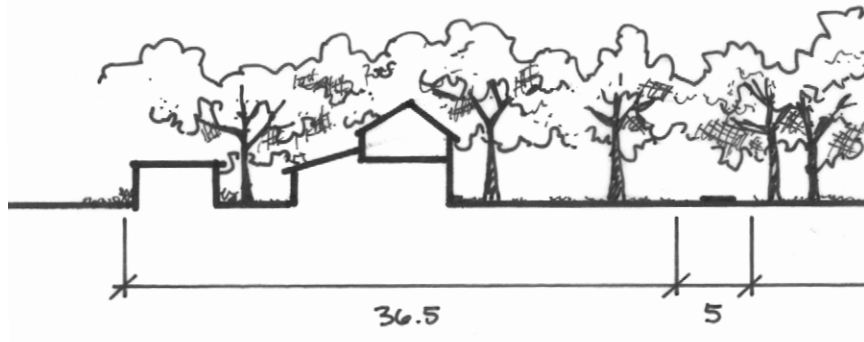
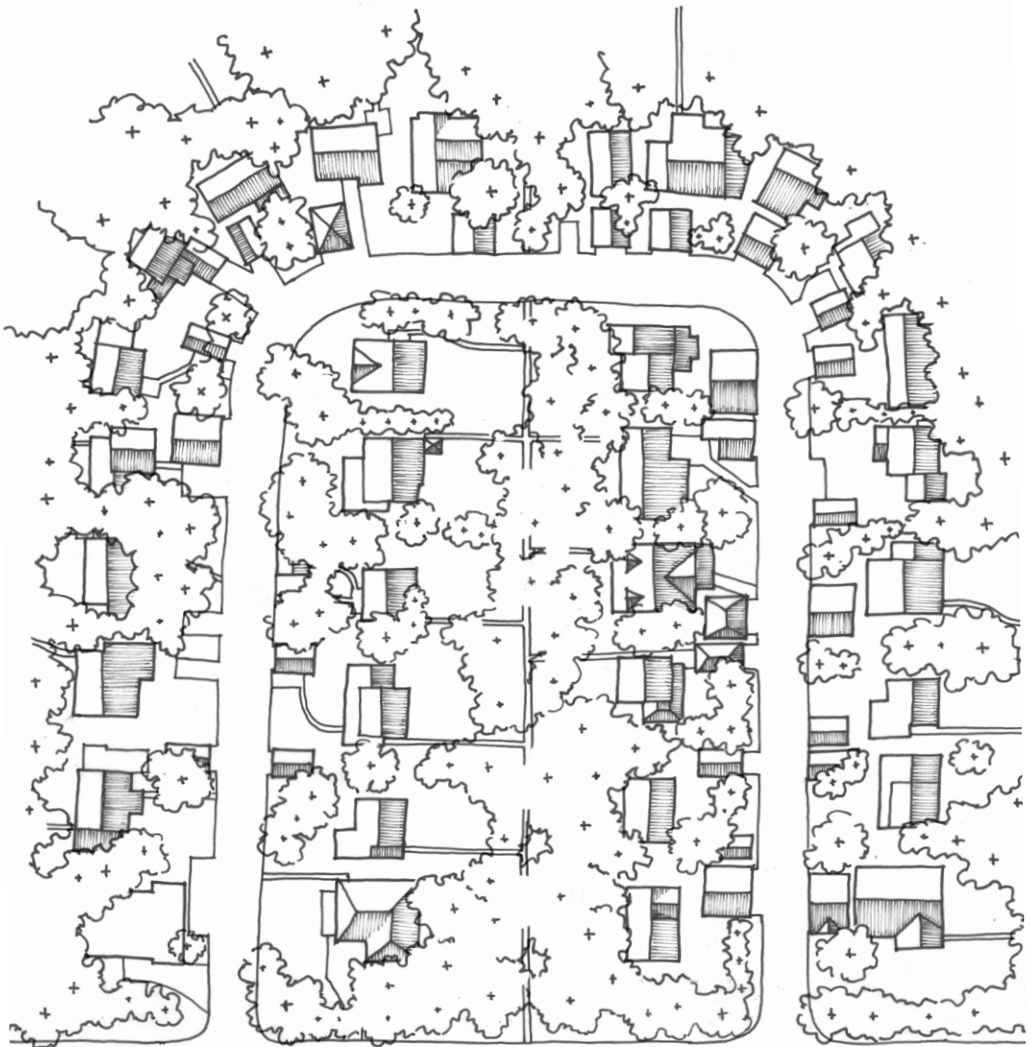
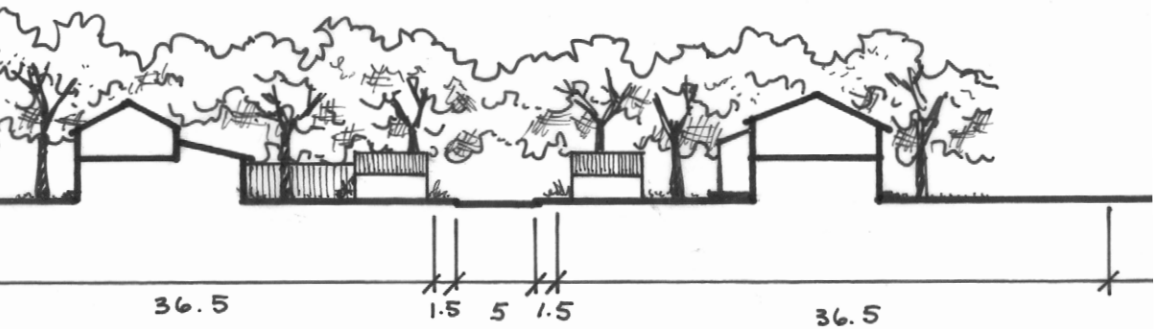


FIG 4.14 Right. The block plan shows the relationship between the lot and the street. The permeability of the neighbourhood makes it hard to discern where property lines start and end. Large tree canopies cover vast areas of the neighbourhood.

FIG 4.15 Below. The section shows the relationships between the buildings and the street. The lane is narrow, while the pedestrian corridor is wide and spacious. Tall trees provide an overhead canopy that is continuous over the streets.



25 metres



PATHWAYS

The pedestrian network within Wildwood Park is extensive. It does not follow along the street but instead runs down the center of the superblock connecting with each loop. The sidewalks vary in width from one to one-and-a-half metres. This internal pedestrian network completely separates traffic from pedestrians, except where the paths cross a back lane.

The central parkway is approximately thirty metres wide between the façade of each home, but this distance fluctuates reaching up to ninety metres in width between the bays. The mature trees form an overhead canopy and frame long views through the neighbourhood. Along the central pathway, there are three focal points where multiple pathways intersect. These main intersections provide children's play structures, benches, and signage acting as small destinations or meeting places along the route and offer safe places for play within the superblock.

The perimeter roads of Wildwood Park are part of a regional trail called the South Winnipeg Parkway. The South Winnipeg Parkway runs along the west side of the Red River and includes over twelve kilometres of trail. As it passes through Wildwood Park, it follows along North and South Drive.

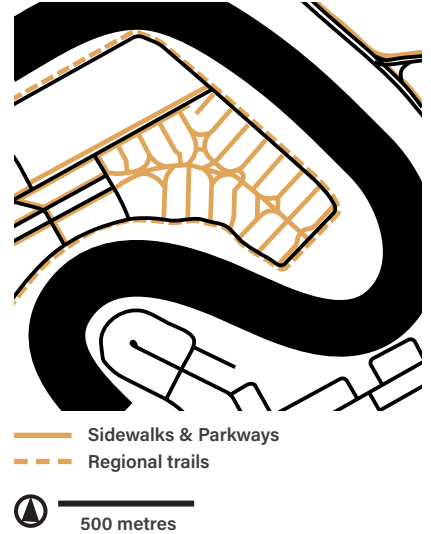


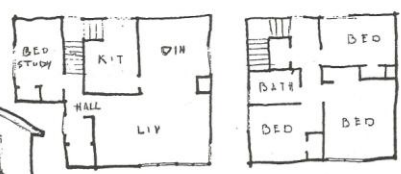
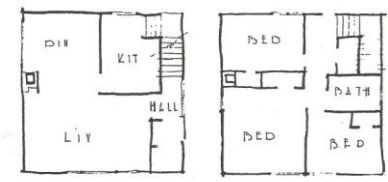
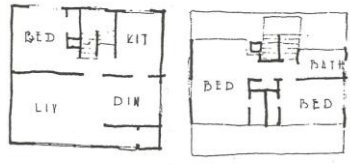
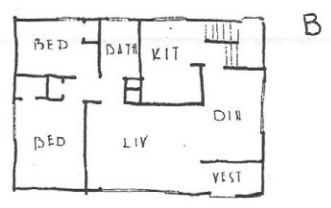
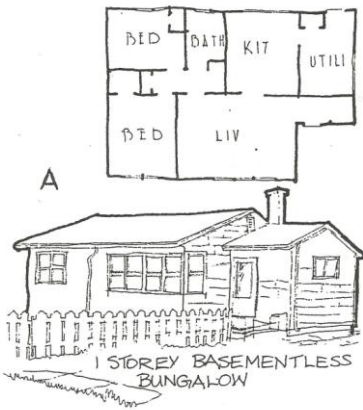
FIG 4.16 Top. This pedestrian map shows the locations of sidewalks, parkways, and regional trails in and around the Wildwood Park neighbourhood.



FIG 4.17 Top. The interior parkspace with an expansive parkway through the centre of the neighbourhood. The overhead tree canopies frame long views through the park.



FIG 4.18 Bottom. At the junction of pathways are three focal points that provide children's play structures, signage, benches, and garbage receptacles.



HOUSES

There is only one apartment block located at the west end of Manchester Road, and a few more apartment blocks in adjacent neighbourhoods, but the region consists of mostly single-family detached dwellings.

FIG 4.19 Left. Sketches of the original Wildwood Homes by Carl Nelson. These sketches show the original five housing footprints including a one-storey bungalow with no basement, a one-storey bungalow with a basement, a one-and-a-half storey home with a basement, a two-storey home with six rooms, and a two-storey home with seven rooms - Nelson, 1989.

FIG 4.20 Below. This elevation shows the variation in the original home sizes along with some renovations that have been added onto the original building footprint. Many of the homes have patios or decks that face onto the parkspace and there is generous spacing between the homes that is often filled with plantings. The elevation also shows the tree canopy that sits well above the roof of the home.

The original plan for Wildwood Park provided homebuyers with five different housing options to choose from: a one storey bungalow without a basement, a one storey bungalow with basement, a one-and-a-half storey, a two storey, and a two storey with den. Over time the original house plans have changed and grown to adapt to the needs and lifestyles of their homeowners. A neighbourhood study done in 2010 reported that only seventy-five of the original 307 homes still maintained their original building footprint (Wildwood Into Tomorrow, 2013). Many of the homes have increased in size, but the neighbourhood still supports a diversity of housing sizes. Throughout Wildwood Park homes range from approximately 800 square feet to over 3,000 square feet with an average square footage of 1,525. True to the original design, the homes in Wildwood Park today continue to vary in form. Approximately forty-three percent of the houses are two storey homes, twenty-six percent are single storey homes, and thirty-one percent are split level or one-and-a-half storey homes. There is a fairly diverse and even range of home sizes and form.





YARDS

The homes are set back approximately fifteen metres from the sidewalk and the front yards all mesh together like a sea of grass. Mature trees are scattered through the development with no sense of order. Many of the trees were preserved during construction resulting in a random dispersal of trees that emphasizes a sense of wildness throughout the neighbourhood. Wildwood Park contains a range of tree species that were preserved including Boxelder maple (*Acer negundo*), Green Ash (*Fraxinus pennsylvanica*), Bur Oak (*Quercus macrocarpa*), American Elm (*Ulmus americana*), and some introduced species such as the White Spruce (*Picea glauca*).



FIG 4.21 Above. This home is an example of a yard that is extensively landscaped, but not as manicured as yards you might see in other suburban neighbourhoods. This natural looking vegetation is common throughout Wildwood Park.

FIG 4.22 Far left. There are a variety of trees throughout the neighbourhood. Some were preserved during development and some have been introduced after development.

FIG 4.23 Left. The back yards are often individualized to meet homeowners needs, including garages, patios, play equipment, and planting.

Many properties include a variety of site vegetation, including planting beds, large shrubs, and native plantings. Some properties use fences to enclose their back yards. The style of fences ranges from a typical chain link or wooden fence to fence-like structures, such as hedges and border planting. Transparent-style fences or low fences are often used to delineate space rather than tall, opaque fences that completely obstruct views into the yard. The back yards provide residents with private open space and have been individualized to meet the needs of the homeowner, including site features like decks, gardens, basketball hoops, sheds, and small play structures.

LAND USE

Wildwood Park does not include a large variety of land uses. Within a 500-metre radius of the study area are three different land uses: residential single-family (R1), parks and recreation (PR), and a minimal amount of residential multi-family (RMF). Initially, in 1947, when the neighbourhood was first built, a shopping mall was located at the intersection of Point Road and Oakenwald Avenue. This retail outlet provided the area with a variety of jobs, services, and resources such as food, hardware and clothing, a pharmacy, dry cleaners, beauty parlour, post office, and bowling alley. Unfortunately, when the shopping mall burnt down in 1981, it was never rebuilt and was replaced with more residential structures.

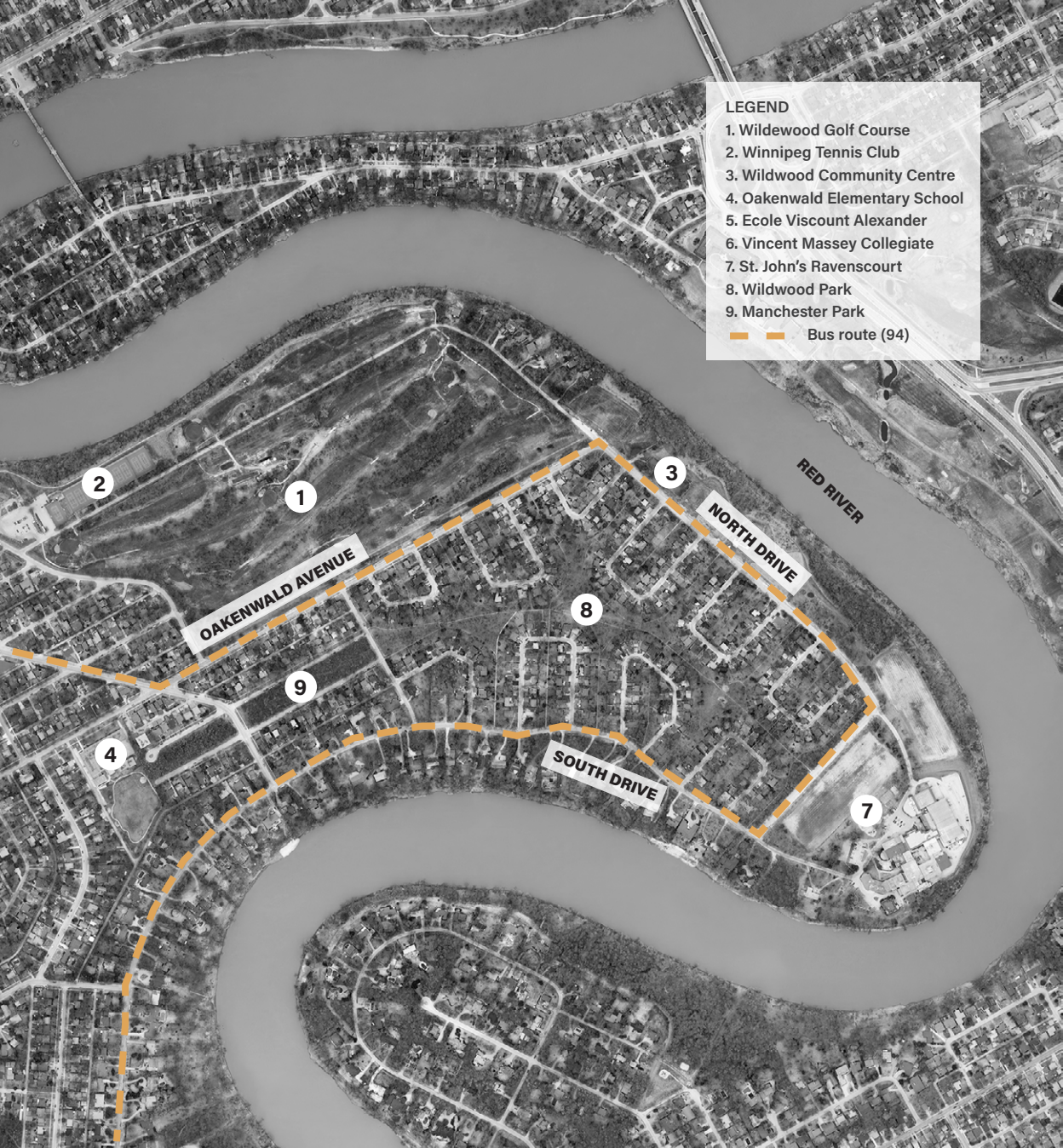
Beyond Wildwood Park, is a high saturation of exclusively residential neighbourhoods. The closest commercial area is almost a mile away along Pembina Highway. Pembina Highway is an arterial road that provides Wildwood Park and other communities in the region with amenities such as grocery stores, banks, drug stores, restaurants, and shops.

AMENITIES

The neighbourhood of Wildwood has several public amenities including the Wildwood Community Centre. Wildwood Golf Course, some outdoor sports fields, and nearby schools. The Wildwood Golf Course is located just north of Oakenwald Avenue. Beyond golfing activities, the golf course provides the neighbourhood with additional greenspace and seasonal walking paths. The Winnipeg Tennis Club is situated northwest of the golf course offering outdoor tennis courts. The Wildwood Community Centre is located east of North Drive, along the river providing several sports fields including hockey rinks, baseball diamonds, and a soccer field. Two blocks to the west of Wildwood Park, at the end of Manchester Road, is Oakenwald Elementary School and Daycare. The schoolyard includes children's play structures and open greenspace. Within a mile of the study area are three more schools, one middle school, one high school, and a private school: Ecole Viscount Alexander, Vincent Massey Collegiate, and St John's Ravenscourt. These schools also provide open greenspace as well as sports fields.

One bus route runs through Wildwood Park connecting it with Pembina Highway and the Fort Garry Industrial Park. A bus stop is located at the end of each bay, but bus routes and frequency of services are limited. Pembina Highway is a transit hub for over ten different bus routes, most bus trips from Wildwood Park would require at least one bus transfer at Pembina Highway.





LEGEND

- 1. Wildewood Golf Course
- 2. Winnipeg Tennis Club
- 3. Wildwood Community Centre
- 4. Oakenwald Elementary School
- 5. Ecole Viscount Alexander
- 6. Vincent Massey Collegiate
- 7. St. John's Ravenscourt
- 8. Wildwood Park
- 9. Manchester Park

— Bus route (94)

FIG 4.24 Above. This context map shows the location of nearby amenities in relation to the neighbourhood. There are no commercial or retail areas in the immediate area, but there are some slightly further west along Pembina Highway. The yellow dashed line shows the bus route that runs through the neighbourhood.





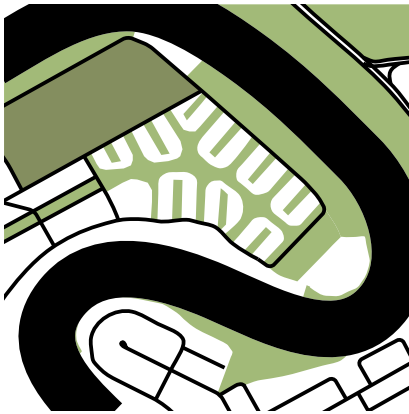
FIG 4.25 Top Right. This view through Wildwood Park shows the density of the forest that was preserved during development.



FIG 4.26 Top left. This is the riparian forest along the Red River characterized by large trees and thick underbrush.

FIG 4.27 Bottom right. Manchester Park is also characterized by dense underbrush, but has a more open canopy than the riparian forest due to the mix of poplar and aspen species.





Public shared greenspace

Semi-private greenspace
(golf course)

500 metres

FIG 4.28 Top. This greenspace map shows the extent of public, shared greenspace in Wildwood Park and the surrounding area. This does not include private properties, but does include semi-private greenspaces, such as the golf course. If you include the front yards forty percent of the neighbourhood is shared greenspace.

GREENSPACE

Surrounding the neighbourhood of Wildwood is an extensive network of greenspaces that feature a diverse mosaic of landscape types and ecological habitats. A thick edge of riparian forest follows the side of the river acting as a natural buffer between the river and the neighbourhood. The riparian forest differs from Wildwood Park with a higher concentration of trees and thick underbrush. The riparian forest changes condition throughout the year as water levels in the river rise and fall, sometimes flooding the forest paths.

Next to the Wildwood Community Centre, along North Drive, is an introduced meadow of native grasses that transitions the riparian forest into maintained park space. East of Wildwood Park is another preserved woodland that takes up two street blocks between residential streets. Manchester Park is a green corridor that is not regularly maintained. This network of greenspaces creates a series of habitat patches that are interconnected and provide both edge and interior conditions for increasing biodiversity and wildlife habitats. Wildwood Park itself is a green corridor that connects surrounding greenspaces. It contains many preserved trees as well as introduced trees and a variety of natural planting. In large open areas, dry ponds help retain storm water run-off during heavy rainfalls.

Within the study area, eleven percent of the neighbourhood is road infrastructure, eighty percent is technically private property, and nine percent is public greenspace. The unique part of Wildwood Park is the way that the front yards act as shared open space rather than private property. This drastically changes the amount of open space without increasing the size of the neighbourhood. Considering front yards as park space increases the amount of public greenspace to forty percent and reduces the amount of private property to only forty-nine percent of the total land area.

Neighbourhood Assessment.

Legend.

The large box means the indicator is present and emphasized in the design.

The small box means the indicator is present to some extent.

No colour means the indicator is not present or present but not effective.

ECOLOGY

Walkability.

Pedestrian routes are well connected and provide access to commercial and retail areas, but their distance from the neighbourhood makes it difficult to access daily amenities or commute to a job by foot.

Local Amenities.

There are a number of schools within walking distance. Several parks and playgrounds are located within and around Wildwood Park. Local recreational amenities include a golf course, community centre, tennis centre, and sports fields.

Natural Land Features.

The natural land features include riparian forest, the preserved woodland in Manchester Park, and the preserved trees in Wildwood Park. The total area of preserved forest is very high for a residential development.

Landscape Variety.

There are a variety of habitat types including prairie, aspen forest, oak forest, and riparian forest. This includes some maintained landscapes and some natural areas, as well as open greenspace.

Neighbourhood Centre.

A central park space is both the physical and conceptual heart of the neighbourhood. It is multi-functional and accessible with walking paths. Almost every home has direct access to this shared public greenspace.

Parks & Playgrounds.

Park space is extensive with very high percentage of the neighbourhood being greenspace. A number of children's playgrounds, sports fields, and open greenspace are easily accessible by foot.

Sidewalks & Trails.

There is a well-connected pedestrian network throughout Wildwood Park. It provides access to parks and playgrounds and a regional trail that runs along the river around the neighbourhood.

Density & Scale.

Dwelling density is low due to large lot sizes and exclusively single-family homes. The neighbourhood is well suited to the human scale with small loops and active frontages to encourage community life.

Access to Greenspace.

Each lot has direct access to open greenspace and the neighbourhood is surrounded by parks and forest. The front yards are shared open space increasing public access to greenspace.

Mixed Use.

The neighbourhood and surrounding area is almost all residential except for some park and recreational spaces. The nearest commercial or retail area is on Pembina Highway and industrial areas are even further away.

Housing Accessibility.

There is diversity in housing size (square footage) and structure (bungalows to two-storey homes). There is little diversity in housing type as most of the neighbourhood consists of single detached dwellings and property values are fairly high.

EQUITY

Green Corridors.

Many of the greenspaces around Wildwood are connected with green corridors that have similar vegetation. The tree canopy extends over the whole area, which speaks to the connectivity of greenspaces.

Site Vegetation.

There is a high density of trees. Most lots have additional planting including shrubs, small trees, and planting beds. There is a lot of naturalised vegetation and less lawn space than most neighbourhoods have.

Neighbourhood Greening.

The percentage of paving is reduced with narrow lanes and no front streets. A large amount of the neighbourhood is greenspace. There are a lot of trees and forested areas that help mitigate heat island effect.

Water Management.

The vegetative ground cover allows for more water infiltration than paved surfaces and a dry pond in the park retains water during wet seasons, but there could be more neighbourhood-wide strategies to retain water on individual properties.

Sense of Place.

The unique layout, preserved landscape, character of homes, architectural variation, intergenerational and long-term home ownership, and limited extent of the neighbourhood all contribute to a sense of place.

Safety & Comfort.

Limited access ways, narrow streets, and no through-streets reduces traffic and the arrangement of homes puts 'eyes on the street' to increase safety. The tree canopy provides shade and protection from the elements.

Public Transportation.

Wildwood Park features many bus stops, but only provides one bus route and the frequency of services are low. Most transit trips require a bus transfer at Pembina Highway, but it the neighbourhood is not far from other transit routes.

LIVABILITY

Conclusion.

The pie graph is a visual tool for comparing the evaluation of each case study neighbourhood. Each segment of the pie graph represents one formal indicator correlating with the assessment on the previous page. A coloured pie graph implies that many indicators are present and emphasized in the design while the white gaps show where indicators are lacking.

Almost all of the formal indicators are present in Wildwood with many of them are emphasized in the design. Wildwood Park promotes livability and ecology in almost every category which you can see by the amount of orange and green that fill up the pie chart. There is less of an emphasis on the quality of equity, where we see a higher percentage of white. Compared to the other neighbourhoods you can see that the pie graph for Wildwood Park has fewer gaps and less white than any of the other neighbourhoods. This suggests that a higher proportion of formal indicators present in Wildwood Park.


The average property values, square footage, and price per square footage are used to compare market values against neighbourhood qualities. While the price per square foot does not accurately determine market values, it does show trends. Wildwood Park has the second highest average price per square foot and property values among the four study areas while maintaining the most diverse range of housing sizes. Wildwood Park shows us that using patterns and forms that encourage livability, ecology, and equity can provide a return on investment, increase property values, and make neighbourhoods more desirable to live in.


Legend.

 **Livability**

 **Ecology**

 **Equity**

 A little bit of colour means the indicator is present to some extent.

 A lot of colour means the indicator is present and emphasized in the design.

A white gap means the indicator is not present or that it is ineffective.

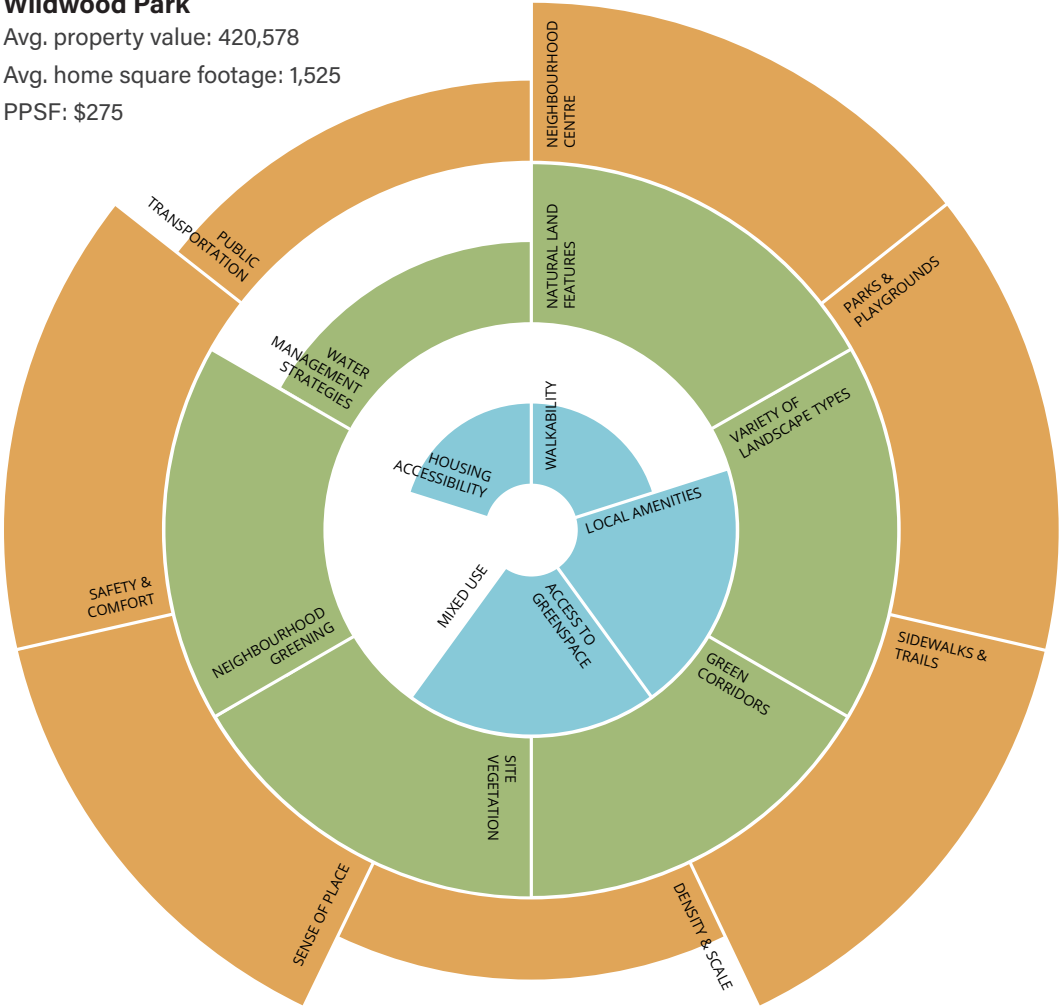
*PPSF: Price per square foot is calculated by dividing the average square footage by the average property value. It tells us the average price per square foot for a home in this neighbourhood.

Wildwood Park

Avg. property value: 420,578

Avg. home square footage: 1,525

PPSF: \$275



Beaumont

PPSF: \$290



McGillivray Park

PPSF: \$218



Bridgwater Forest

PPSF: \$265



02 Case Study.

Beaumont.

History.


The neighbourhood of Beaumont was not developed all at once, rather, it grew over time. The first homes were built in the late 1920s at the junction of Parker Avenue and Pembina Highway in what was, at the time, the rural municipality of Fort Garry. These first streets were laid out in a traditional rectangular grid from east to west. At this time the land north of Parker Avenue was cleared for a hydro right-of-way followed by another one on the west side of the site at a later date. These corridors would eventually define the boundaries of Beaumont neighbourhood. From 1920 until the early sixties the grid pattern continued to extend west and south filling in the area between Parker Avenue and McGillivray Boulevard. In the early 1960s, seven bays were constructed along with four culs-de-sac on the west side of Beaumont Street. Each of the five bays within the area of study is named after a planet - Saturn, Jupiter, Mercury, Neptune, and Mars - but there is no historical record why or how they got these names. Today, the hydro corridors are undergoing development to become a new rapid transit corridor. The land north of the old hydro corridor, known as the Parker Lands, has remained undeveloped (Gem Equities Inc., 2017).





FIG 4.29 Above. Beaumont, Winnipeg, 1929.

This aerial photograph from 1929 shows the beginning stages of Beaumont neighbourhood. A grid pattern is beginning to form off of what is now Pembina Highway with newly constructed homes. The hydro corridor to the north has been cleared which will eventually define the northern boundary of the neighbourhood - National Air Photo Library, 1929.

 Not to scale

Location.

The entire neighbourhood Beaumont is approximately eighty-six hectares. It lies at the junction of Pembina Highway and McGillivray Boulevard stretching north to Parker Avenue and west to a hydro corridor. For comparability purposes, the study area in Beaumont is limited to the five bays situated on the west side of the neighbourhood. The study area is shown in figure 4.29 and is approximately twenty-six hectares. Data collected regarding streets, lots, pathways, and yards pertains to the area of study to limit the scope of work and make the information more comparable across the four case studies. The whole neighbourhood of Beaumont will be acknowledged for context and is used to examine the surrounding area.



FIG 4.30 Above. This aerial image of Beaumont shows the arrangement of the loops with the built form and surrounding landscape. The study area is outlined in blue. It consists of five looping streets that are the focus of the investigation. The surrounding neighbourhood will be referenced for context.

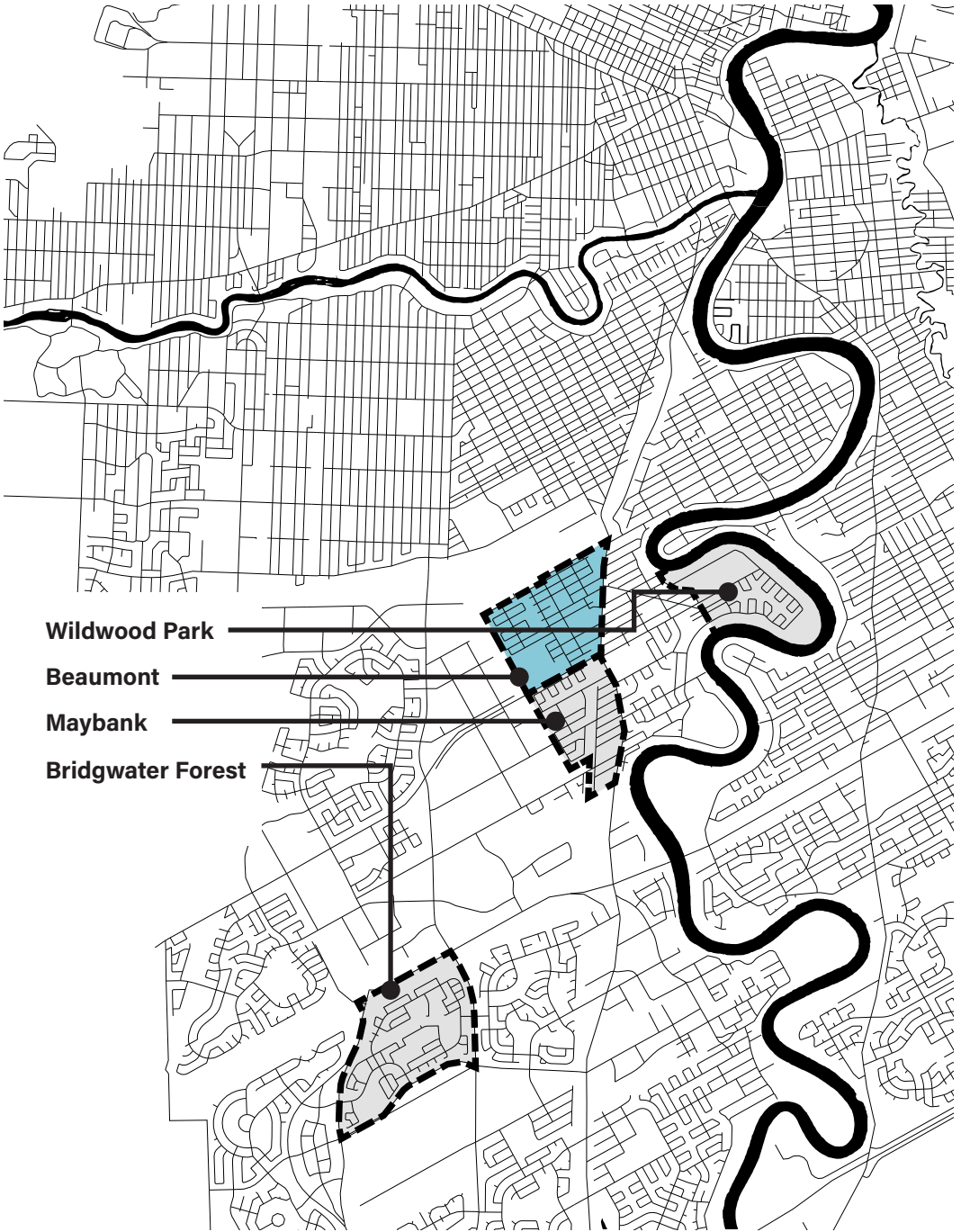


FIG 4.31 Above. The context map shows the location of the four neighbourhoods in Winnipeg and proximity to each other.

Design.

The neighbourhood of Beaumont shows the transformation of suburban street patterns from the 19th century to the late 19th century. The east side of the area was built first using a traditional grid pattern, typical of an early century suburb, while the west side of the neighbourhood uses a *grid loop* pattern that is more typical of a 1950s suburb. Beaumont Avenue runs north to south through the middle of the neighbourhood separating these two distinct patterns. Similar to the traditional grid pattern, the grid loop is distinguished by its straight streets and right angles, but the roads bend back on themselves forming loops rather than intersections. The five bays in Beaumont are large loops with no sidewalks or back lanes that feature a variety of 1950's style bungalows.

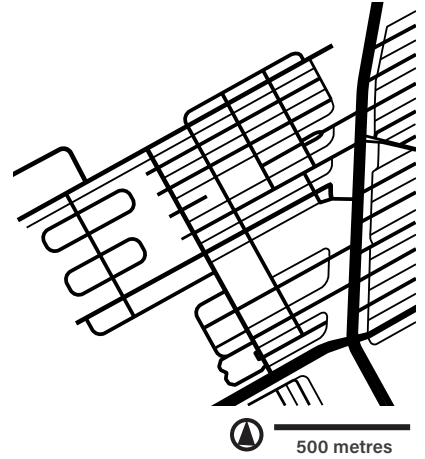


FIG 4.32 Above. The figure ground shows the relationship between streets and open space. This arrangement of loops follows the existing grid to the east, except the streets loop back to the east, except the streets loop back on themselves instead of forming intersections.

FIG 4.33 Below. The neighbourhood has only front streets with no sidewalks. This streetscape prioritizes the efficiency of the car with wide streets, lots of parking, and long driveways.



Physical Characteristics.

STREETS

On the east side of Beaumont, the streets follow a rectangular grid pattern while looping streets and culs-de-sac characterize the west side of Beaumont. The five bays within the area of study all emerge from the main collector route, Planet Street. This collector road is eight metres wide and runs through the centre of the neighbourhood, like an axis of symmetry, with bays on either side. The only gateways into the area lie at either end of Planet Street. The northern entry point connects the neighbourhood to Waverley Street, which is located on the west side of the adjacent industrial park. The southern access point links the bays with the rest of the Beaumont neighbourhood.

Each of the loop roads is approximately seven-and-a-half metres wide and contains thirty to fifty houses. The bays are about eighty-five metres wide, and their lengths vary, the shortest being 150 metres long and the longest 200 metres.

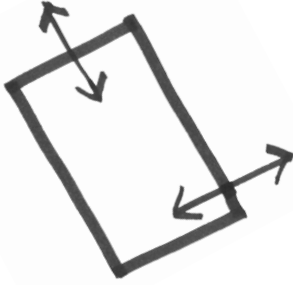


FIG 4.34 Top. The top sketch shows the two points of access into the neighbourhood. This limited access reduces the amount of cars that drive through the neighbourhood.

FIG 4.35 Right. This view down the street visually captures the length of the loops. The loops in Beaumont are large compared to other neighbourhoods and the long stretches of straight road are less effective at slowing down traffic than a short loop.



7.5m wide street with no sidewalks

LOTS

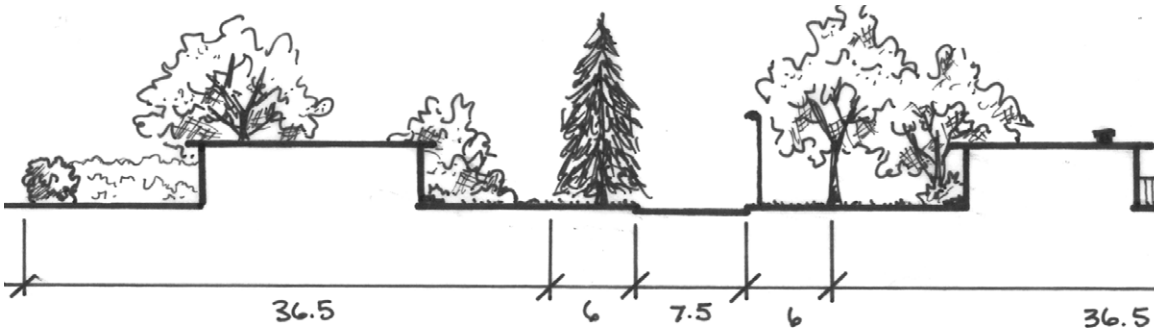
Within the study area, the average lot is about eighteen metres wide, but the lots vary from fifteen to twenty metres wide. The typical lot length is thirty-two to thirty-six metres. These lot dimensions differ from one bay to another and based on their location within the bay. The distance between the sides of the homes varies from three to ten metres depending on the location of the house on the lot. There are no back lanes in the area, so all of the lots are accessible from the front street. Each lot includes a paved driveway located on one side of the lot. It extends from the front property line to the side of the home or back of the lot. In some cases, two nearby homes will have both driveways next to each other at the edge of their property lines appearing as one large driveway. Single driveway widths generally do not exceed the width of a single car garage door.

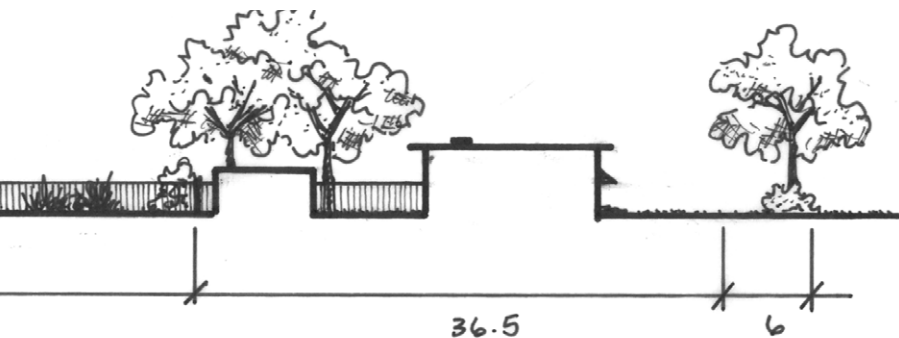
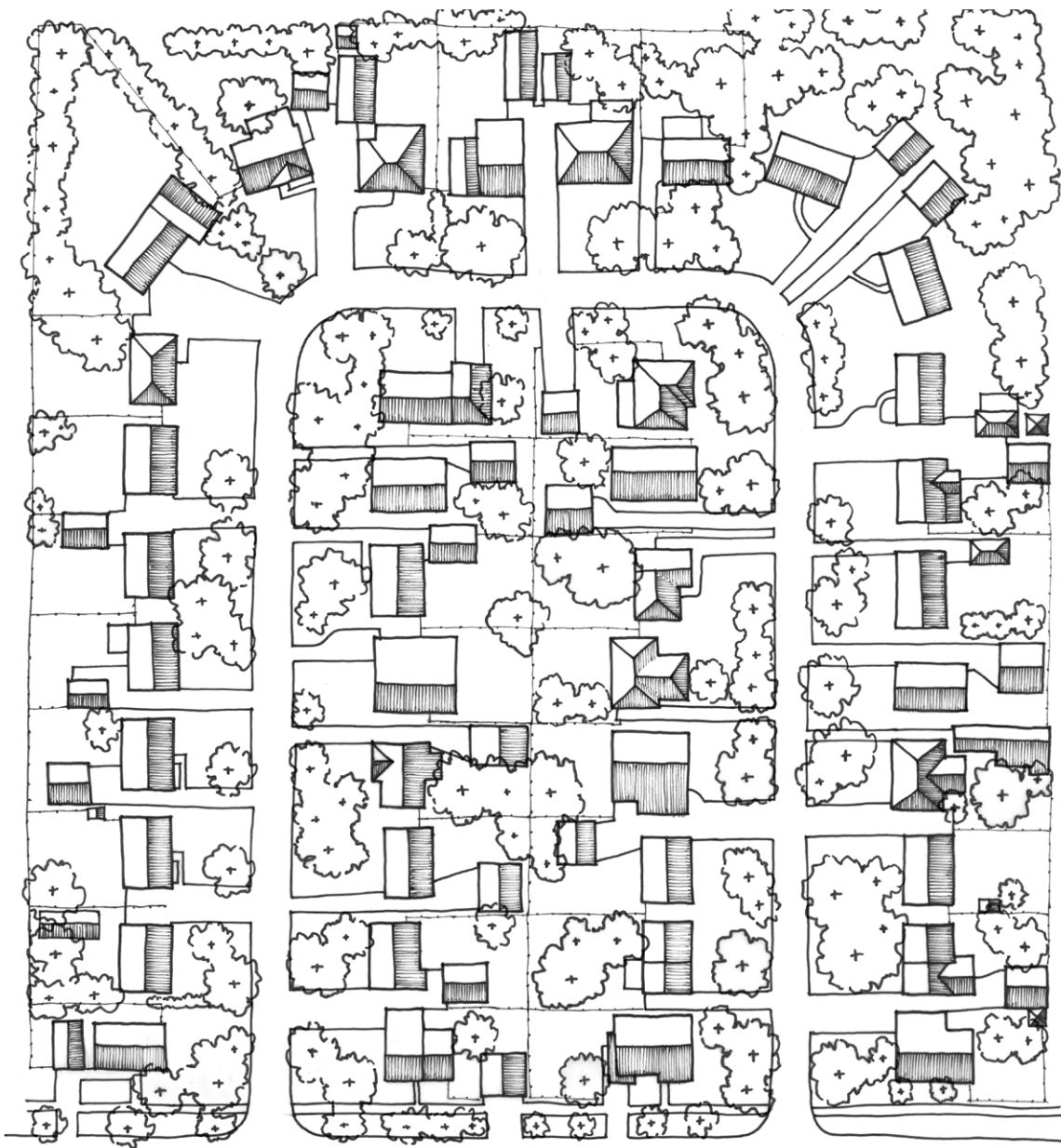
Only eight percent of the homes in the five bays have a garage that is attached to the house. Most of the lots, over sixty percent, have a detached garage that is located beside the home or at the back of the lot. It is common for the driveway to extend from the front of the yard right to the end where the garage is located. The remaining twenty-eight percent of the homes have either a carport beside the house or no parking structure at all. Street parking is also available on each bay.

FIG 4.36 Right. The block plan shows the relationship between the lot and the street. The arrangement of trees and fences clearly define the edges of each property. Tree canopies are interspersed but still prominent in the neighbourhood.

FIG 4.37 Below. The section shows the relationship between the buildings and the street. Many of the homes are bungalows which are horizontal and low-lying. Fences delineate back yards and eliminate any permeability between the bays.

*Net Density measures the number of dwellings per hectare of the total land area devoted to residential land use (private properties).





PATHWAYS

The only streets in the study area that have sidewalks are the ones that are the main access routes, Somerville Avenue and Planet Street. These streets have a one-and-a-half metre wide sidewalk on either side that is separated from the road by a green boulevard. The rest of the bays do not have sidewalks or any designated pedestrian pathways.

A new multi-use asphalt trail runs along the north and west boundaries of the neighbourhood. This pathway connects the northern end of Planet Street with the west side of Somerville Avenue, but there are no ways to access the trail from each bay. This trail will eventually be part of the rapid transit corridor that is currently under development just outside the neighbourhood.

A few small pathways and painted crosswalks connect Beaumont Park with surrounding bays and culs-de-sac to improve permeability and provide safe pedestrian access.



FIG 4.38 Top left. This pedestrian map shows the locations of sidewalks and bike routes in Beaumont neighbourhood. Sidewalks are well connected throughout the neighbourhood, but there are no pedestrian routes on the loops.

FIG 4.39 Top right. The main commuter roads have sidewalks, but only a few homes front onto these streets to create an active streetscape.

FIG 4.40 Bottom right. Beaumont park includes several pathways that link to the adjacent loops and culs-de-sac.





FIG 4.41 Top. This is a mid-century modern home with a low-pitch front gable roof and overhanging eaves.



FIG 4.42 Bottom. This is a minimal traditional style home with a cross gable roof and a detached garage at the back of the lot.

FIG 4.43 Right. The elevation shows a variation of bungalows. Many of the homes have large picture windows on the front facade that face onto the street and small planting beds along the base of the home.



HOUSES

There are 270 single detached dwellings within the study area, producing a net density of Twelve-point-six dwellings per hectare. Almost all of the homes in the area, over eighty percent, are bungalows, with less than five percent being two storey homes. The remaining houses are split levels or one-and-a-half storey homes. There is quite a diversity of home sizes ranging from 860 square feet to over 2,500 square feet.

Two distinct architectural styles are common throughout the study area. The first is a minimal traditional style home that is characteristic of the 1950s. These side or cross gable bungalows are rectangular in shape featuring one or two planes on the front façade. The front entrance may be slightly off center with asymmetrical windows on each side. The other style is mid-century modern. These front gable bungalows often feature low pitched roofs with overhanging eaves. It is characteristic for them to have asymmetrical features on the front façade as well as exposed rafters. Often, the roof will extend past the edge of the home to create an attached, covered carport. The front façade has one or two planes and a series of windows that wrap around the front door. The rest of the homes throughout the area vary in design, including some two or one-and-a-half storey homes.

Despite the variations in form, most of the homes use a combination of the following exterior materials: stucco, wood siding, stone, or brick. The homes vary in colour but are often white or have muted palettes of beige, brown, or grey. Some homes have colourful accents such as red, green, or blue.





YARDS

The homes are setback fifteen metres from the curb, leaving approximately thirty-seven metres of distance between homes. The front lawn extends from the house right up to the street. A front driveway is located on the side of the yard extending from the road to the back edge of the house or the back of the lot. Most driveways are about four metres wide and take up less than twenty-five percent of the lot frontage. A paved approach extends from the driveway to the front steps. This walkway is often set back from the building, providing space for a small planting bed against the base of the building.

Some properties have additional planting beds or site vegetation such as large shrubs, small trees, flowering plants, or ornamental grasses. This planting includes border shrubs or feature planting beds at the front or edges of the property. The trees are not spaced regularly along the street, but the quantity and maturity of the trees produce an overhead canopy above the road. Every property has at least one tree on the front yard, but most have several deciduous and coniferous trees throughout the lot. There is a large variety of tree species throughout Beaumont including Paper Birch (*Betula papyrifera*), Black Ash (*Fraxinus nigra*), Green Ash (*Fraxinus pennsylvanica* var. *subintegerrima*), various crabapple species (*Malus* spp.), Blue Spruce (*Picea pungens*), Chokecherry (*Prunus virginiana* var. *Shubert*), various Linden species (*Tilia* spp.), and American Elm (*Ulmus Americana*).

Almost all of the back yards are separated by fencing on three sides. The fences vary in material but are usually wood or chain link. The back yards are personalized by homeowners to fit their own needs and often include features such as decks, patios, sheds, planting beds, and small play structures.

FIG 4.44 Top. This home is an example of a typical yard in Beaumont. It includes a large coniferous tree on the front yard and some additional planting against the base of the home.

FIG 4.45 Bottom. There are a lot of large mature trees throughout the neighbourhood and lots of manicured lawn.

LAND USE

Most of Beaumont neighbourhood is designated for single-family residential (R1), with a few exceptions. A small complex of multi-family residential (RMF) is located on the southwest corner of the site near McGillivray Boulevard. There are three areas designated as parks and recreation (PR) scattered throughout the neighbourhood, and a small industrial area (M1-3&MMU) is located on the east side of Beaumont, near Pembina Highway.

Surrounding the neighbourhood are some more extensive areas of commercial and industrial space. To the east of the community is a strip of commercial (C1-4) along Pembina Highway that provides access to local shops and services such as grocery stores, banks, gas stations, and restaurants. To the west is a large industrial park that offers a range of different job opportunities.

AMENITIES

Only one bus route runs through the neighbourhood of Beaumont connecting it with the industrial park to the west and Pembina Highway to the east. Bus stops are located just outside of the study area within a 500-metre radius. Pembina Highway is a transit hub that offers services from over ten bus routes that and is approximately one kilometre away from the study area.

The neighbourhood of Beaumont has a variety of local amenities. There are three park areas within the community. The first is General Byng elementary school, which includes a children's play structure, sports fields, and open space. It takes up two street blocks. The next patch of greenspace contains the Fort Garry Community Centre, a children's play structure, two hockey rinks, and a baseball diamond. The last patch of greenspace is located within the area of study, and it is called Beaumont Park. It is surrounded on almost all sides by adjacent properties, with only one side that opens up to a street. The park is a large open greenspace, with a small 'children's play structure, some park benches, a grass mound, and mature trees.





FIG 4.46 Above. This context map shows the location of nearby amenities in relation to the neighbourhood. There are a number of commercial and retail areas surrounding the area, as well as a school and community centre in the neighbourhood. The yellow dashed line shows nearby bus routes and the dotted line shows the future rapid transit development.



3 kilometres



FIG 4.47 Top. This image shows the size and openness of Beaumont Park. It is a significant feature in the neighbourhood that many loops and culs-de-sac connect with.

FIG 4.48 Bottom left. The park is open and spacious but surrounded by a windbreak of trees.



FIG 4.49 Bottom right. This is one of the pedestrian links between the loops and the park to increase connectivity and access for pedestrians.

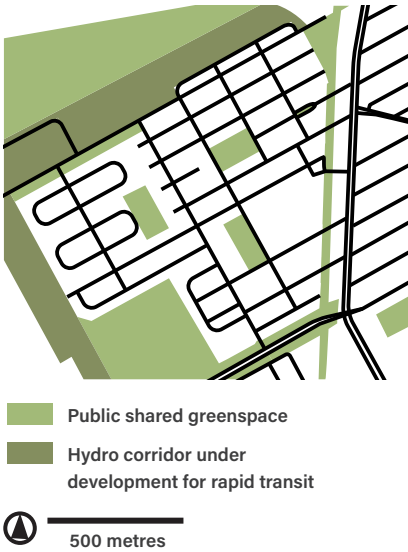


FIG 4.50 Top. This greenspace map shows the extent of public, shared greenspace. The development of the rapid transit corridor has greatly impacted the extent and connectivity of greenspace in the Beaumont neighbourhood.

GREENSPACE

Most of the trees border the edge of the park and include species such as Boxelder Maple (*Acer negundo*), Blue Spruce (*Picea pungens*), Golden Willow (*Salix alba* 'vitellina'), and Siberian Elm (*Ulmus pumila*). A few small pedestrian links connect the park with the surrounding loops and culs-de-sac. Within the study area, thirteen percent of the neighbourhood is road infrastructure, eighty-one percent is private property, and only six percent is public greenspace.

Surrounding the neighbourhood are several greenspaces that buffer the community from nearby arterial roads, industrial areas, and railway tracks. A large cemetery, located at the southwest corner of the development, provides a vast area of greenspace with small patches of woodland. The Parker Lands to the north of the site has remained undeveloped for many years and feature vast expanses of open greenspace, a large patch of preserved woodland, and a popular dog-walking park.

Today, the two hydro corridors that used to run along the north and west edge of the site are being developed into a rapid transit corridor. These hydro corridors used to connect Parker Lands with the cemetery, creating a green corridor. This linear greenway also acted as a buffer for the industrial park to the west of the site. Unfortunately, rapid transit development has resulted in a loss of open greenspace and green connectivity within the Beaumont neighbourhood.

Neighbourhood Assessment.

Legend.

The large box means the indicator is present and emphasized in the design.

The small box means the indicator is present to some extent.

No colour means the indicator is not present or present but not effective.

Walkability.

The neighbourhood is walkable, with the Fort Garry Industrial Park to the west, Pembina Highway to the east, and Taylor Avenue to the north. These places provide jobs and services within walking distance.

Local Amenities.

There are several local amenities including a couple of parks, General Byng Elementary school, Fort Garry Community Centre, and a dog park. Other amenities may be close by, but located in other neighbourhoods.

ECOLOGY

Natural Land Features.

There are a few patches of preserved woodland in Parker Lands and the cemetery, but a large portion of the existing forest was cleared during development.

Landscape Variety.

There is a small variety of landscape types, including aspen forest and open greenspace. There are some natural woodlands in Parker Lands and maintained park spaces in the cemetery and park.

Neighbourhood Centre.

Beaumont Park acts as the heart of the study area, but there are limited access and a lack of sidewalks leading to the park. In the whole neighbourhood of Beaumont, there is no clearly defined centre.

Parks & Playgrounds.

There are several parks and playground within the neighbourhood, but a lot of the surrounding greenspace has been eliminated with the new rapid transit corridor development.

Sidewalks & Trails.

Sidewalks are limited to only main streets so most of the loops do not have one. A multi-use trail runs on the outside of the neighbourhood, but there is little permeability to access this route.

Density & Scale.

Density is low, but defined boundaries make it an appropriate scale for pedestrians. Loop sizes are large, making it less effective to encourage social cohesion. Side and back garages activate the streetscapes.

Access to Greenspace.

Several lots back onto greenspace around Beaumont Park, but all of the other lots do not. The new rapid transit corridor that runs along the old hydro corridor has limited the neighbourhoods access to greenspace.

Mixed Use.

The limited extent of the neighbourhood allows it to be surrounded by a mix of land uses. To the west is a large industrial park, and to the north and east are commercial areas. This proximity allows people to live and work nearby.

Housing Accessibility.

There is a range of housing sizes, but little diversity in housing type. There is a small complex of multi-family housing, but it is completely separated and does not mix in with the neighbourhood.

EQUITY

Green Corridors.

The hydro corridors acted as green corridors, but the recent rapid transit development has reduced greenspace connectivity around Beaumont. Within the neighbourhood, each greenspace is an isolated patch.

Site Vegetation.

All of the lots have at least one mature tree, and many of them have additional deciduous and coniferous trees throughout the front and back yard. Some yards have small planting beds but are mostly lawn.

Neighbourhood Greening.

Many trees provide shade and mitigate heat island effect. There is less road infrastructure with no back lanes, but long driveways add to the amount of paved surfaces

Water Management.

There are no apparent water management strategies, such as bioswales, retention ponds, buffering, or infiltration planting to retain water on site.

Sense of Place.

The street names and loop pattern differentiate the area of study from the rest of the Beaumont. However, there are no features that refer to the local landscape or history of the neighbourhood.

Safety & Comfort.

Limited road access reduces traffic, but large bays and straight streets let cars drive fast. In many bays, there are no sidewalks. Tree canopies provide shade and shelter. Side garages allow for 'eyes on the street'

Public Transportation.

Currently, one bus route runs through the neighbourhood with limited frequency of services, but proximity to Pembina Highway and the new rapid transit corridor makes this area a transit hub.

LIVABILITY

Conclusion.

The pie graph is a visual tool for comparing the evaluation of each case study neighbourhood. Each segment of the pie graph represents one formal indicator correlating with the assessment on the previous page. A coloured pie graph implies that many indicators are present and emphasized in the design while the white gaps show where indicators are lacking.


Beaumont has a fairly even distribution of formal indicators, but there are very few indicators that are emphasized in the overall design. This is in part due to the new rapid transit development that has affected many of the indicators that relate to greenspace but is also a product of the design decision made in the development of the neighbourhood.


The average property values, square footage, and price per square footage are used to compare market values against neighbourhood qualities. While the price per square foot does not accurately determine market values, it does show trends. The neighbourhood of Beaumont does not have the highest property values but it does have the highest average price per square foot.

*PPSF: Price per square foot is calculated by dividing the average square footage by the average property value. It tells us the average price per square foot for a home in this neighbourhood.

Legend.

-  **Livability**
-  **Ecology**
-  **Equity**

 A little bit of colour means the indicator is present to some extent.

 A lot of colour means the indicator is present and emphasized in the design.

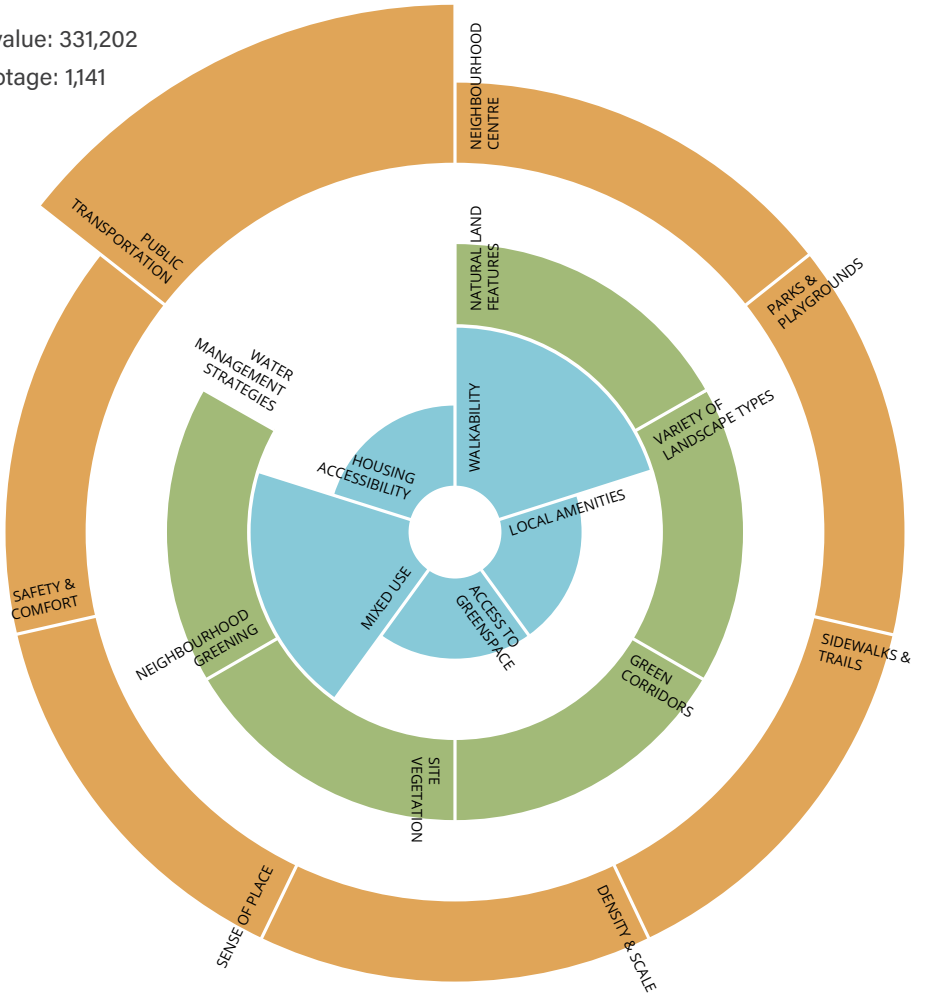
A white gap means the indicator is not present or that it is ineffective.

Beaumont

Avg. property value: 331,202

Avg. square footage: 1,141

PPSF: \$290



Wildwood Park

PPSF: \$275



McGillivray Park

PPSF: \$218



Bridgwater Forest

PPSF: \$265



03 Case Study.

McGillivray Park.

Location.

The entire neighbourhood of Maybank is approximately seventy-one hectares. It is situated between McGillivray Boulevard, Pembina Highway, and Chevrier Boulevard. For comparability purposes, the study area is limited to McGillivray Park, which consists of four double loop bays. The study area is shown in figure 4.50 and is approximately eleven hectares. Data collected regarding streets, lots, pathways, and yards will pertain to the study area to limit the scope of work and make the information more comparable across the four case studies. The whole neighbourhood of Beaumont will be acknowledged for context and is used to examine the surrounding area.



FIG 4.51 Above. This aerial image of McGillivray Park shows the arrangement of the loops with the built form and surrounding landscape. The study area is outlined in blue. It consists of four looping streets that are the focus of the investigation. The surrounding neighbourhood will be referenced for context.

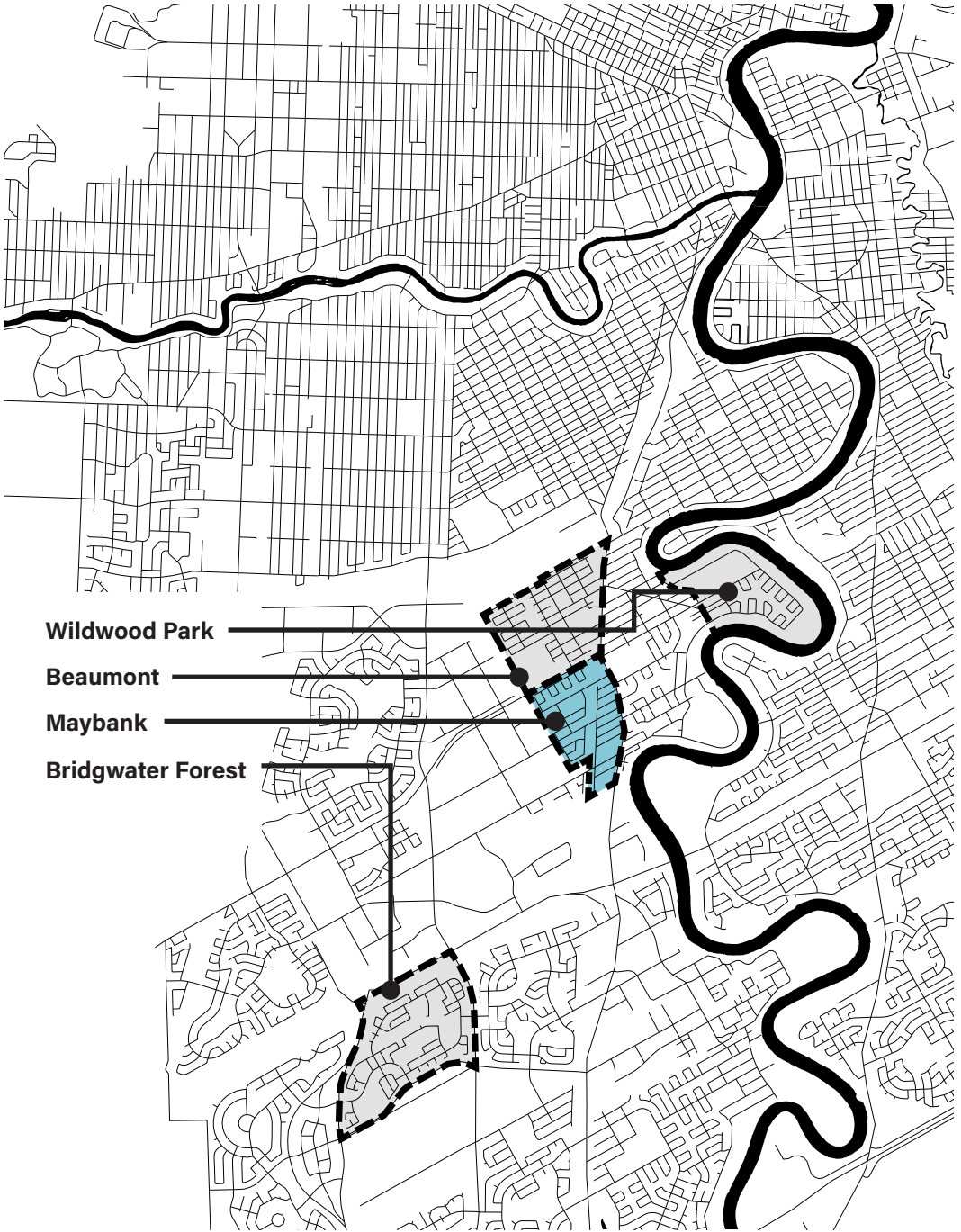


FIG 4.52 Above. The context map shows the location of the four neighbourhoods in Winnipeg and in proximity to each other.

History.

This multi-family housing complex was developed in 1954, designed by Graham Lount. The plan for McGillivray Park resembles some of the characteristics of Le Corbusier's 'Towers in the Park.' Although the homes in McGillivray Park are not high-rise towers, a series of identical, rectangular multi-family units are evenly spaced on plots of land surrounded by open space. The design is based on modernist principles that were typical of many 1950s social housing projects – although today, the homes in this community are owned and rented privately.

Design.

McGillivray Park is a small multi-family housing development at the edge of the Maybank neighbourhood. Maybank is located in what was originally, the rural municipality of Fort Garry, at the junction of Pembina Highway and McGillivray Boulevard. A railway track intersects the neighbourhood splitting it in half and separating two different development patterns. To the east of the tracks, the streets are straight and rigid following a traditional grid pattern. To the west of the tracks, the streets form loops and crescent streets. McGillivray Park, located on the west side of the tracks, consists of four large loops that are oriented away from the neighbourhood toward McGillivray Boulevard. These loops are classified as a 'double loop' because there is both a front street loop and a back lane. These lots have private vehicular access at the rear as well as public access from the front.

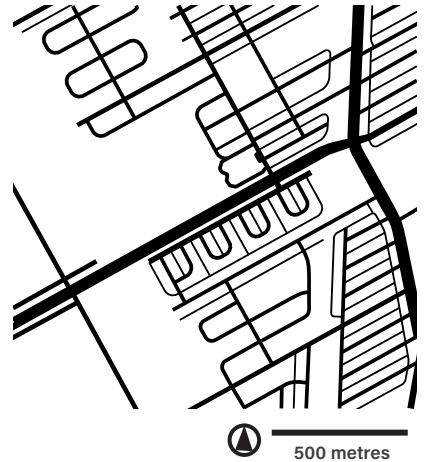
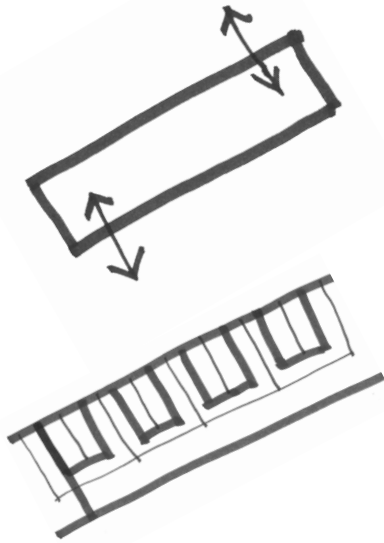


FIG 4.53 Above. The figure ground shows the relationship between streets and open space. This arrangement of loops is linear and symmetrical. The loops are small, but appear to have a second loop around them, which is the back lane.

FIG 4.54 Below. McGillivray Park consists of all multi-family housing and resembles some of the characteristics of Le Corbusier's towers-in-the-park.





Physical Characteristics.

STREETS

The streets in McGillivray Park are straight and perpendicular bending only at the corners of the loops. The study area consists of four symmetrical loops that emerge off of the main collector road, McGillivray Place. The collector road runs the length of the neighbourhood providing access points on either end. The main entry point on the northeast end of the site connects McGillivray Park with McGillivray Boulevard. A second access point at the southwest corner of the site provides access to the rest of the residential neighbourhood. This road is the only vehicular connection between McGillivray Park and the rest of the Maybank neighbourhood. Each of the loops is approximately 110 metres long and eighty-five metres wide. All four loops are almost identical in size and shape. The front access street is seven-and-a-half metres wide, and the back lanes are five metres wide.



FIG 4.55 Top. The top sketch shows the access points into the neighbourhood, while the bottom sketch provides more information about the street structure with the front and back roads.

FIG 4.56 Top right. The back lanes provide rear access providing areas for private parking and garbage pickup.



FIG 4.57 Bottom right. The front street provides additional street parking, but no sidewalks so these streets are used by both vehicles and pedestrians.

LOTS

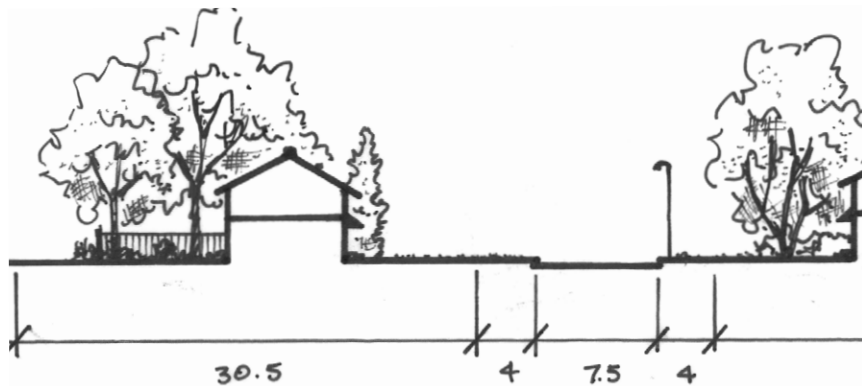
The lots in McGillivray Park are all thirty-and-a-half metres in length and approximately thirty-two metres in width. Each lot is accessed from a back lane and there is parking space allocated for four cars. The arrangement of parking varies from building to building as some residents have added additional parking spaces, garages or carports behind their building. Only nine percent of the homes have detached garages, but others have added canopies or tent-like structures over their parking pad to cover their parked cars. On-street parking is also available on the front street.

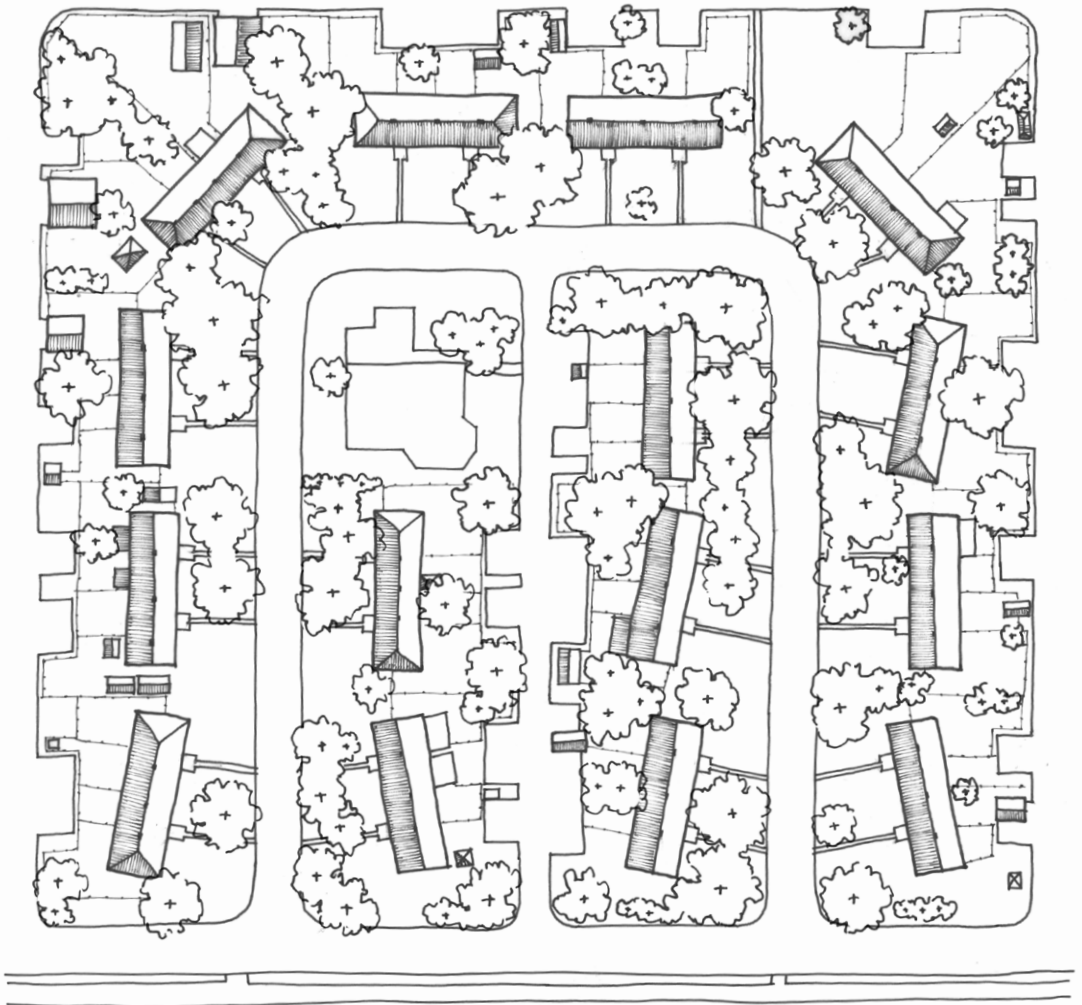
Each of the multifamily buildings is angled slightly on the lot. This variation adds some visual interest to an otherwise repetitive streetscape. The spacing of the buildings varies based on the angle of the building ranging from four to nine metres.

*Net Density measures the number of dwellings per hectare of the total land area devoted to residential land use (private properties).

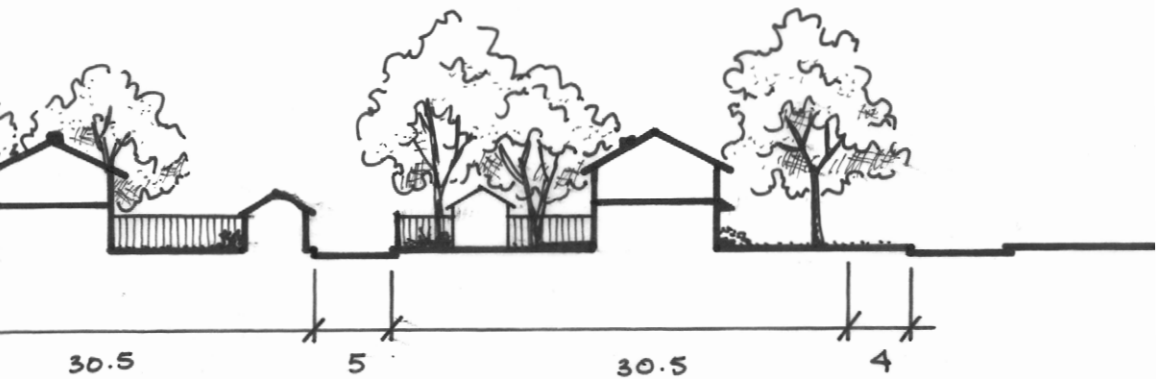
FIG 4.58 Right. The block plan shows the relationship between the lot and the street. The arrangement of the loop centers it on a small park space, that many of the buildings have direct views of. There are a number of mature trees on each lot providing a interspersed overhead canopy.

FIG 4.59 Below. The section shows the relationship between the buildings and the street. The two-story buildings are identical in form varying slightly in their orientation on the lot.





25 metres



PATHWAYS

There are very few pedestrian connections throughout McGillivray Park. None of the loops have sidewalks along the streets, and there is very little permeability throughout the neighbourhood. Three of the four bays have one-metre-wide paved walkways that run parallel to the lots and provide access to the rest of Maybank neighbourhood. These pathways offer direct access to a local elementary school and include painted crosswalk lines across the roads. They are the only designated pedestrian routes within the study area.

A multi-use path, called the McGillivray Trail, is located just north of the neighbourhood. This asphalt path is a three-and-a-half metre wide regional trail that runs parallel to the main collector road. In total, the McGillivray Trail is five-and-a-half kilometres long, running from Pembina Highway to Fort Whyte Alive. This pathway is separated from McGillivray Boulevard by an eighteen-metre-wide green buffer with large shrubs and tall grasses that block the view to the highway.



FIG 4.60 Top. This pedestrian map shows the locations of sidewalks and regional trails in McGillivray Park and the surrounding neighbourhood.

FIG 4.61 Top right. This is a view of the McGillivray Trail, a regional commuter trail that runs parallel to McGillivray Boulevard, separated by a vegetated buffer. This trail provides essential links to surrounding amenities.

FIG 4.62 Bottom right. This is a small pedestrian passage that links the bay to the rest of Maybank neighbourhood. This is the route that children would take to access the elementary school. Where it crosses the back lane, a pedestrian crosswalk is provided.



HOUSES

Each loop in McGillivray Park has fifteen semi-detached homes, with a total of sixty buildings. The rest of the neighbourhood of Maybank contains mostly detached single dwellings and several duplexes. McGillivray Park is both physically and conceptually separated from the rest of Maybank due to limited access points, the orientation of the loops, and the stark contrast in housing types.

The semi-detached buildings are approximately twenty-five metres wide and nine metres deep. They each contain four side-by-side units producing a total of 240 units and a net density of thirty dwellings per hectare. The multi-family units are all identical, rectangular buildings with a footprint of approximately 200 square metres. Each building is two storeys and includes four individual units that are either 1,032 square feet or 888 square feet.

The designs of the buildings are identical, except for variation in materiality and colour. The front façade is one single plane with two front doors on each side, providing each unit with a private entrance. A small entrance canopy projects over the top of the doors and each facade has the same symmetrical pattern of windows. Most of the homes use a combination of stucco and wood siding, but the arrangement of materials and trim is not applied consistently from building to building. This variation produces a sense of individuality for each building. The colours vary significantly ranging from muted palettes, such as white, beige, or brown, to brighter ones including blue, green, and yellow. There are two different roof styles throughout the development: one is a hip roof and the other a gable roof.





FIG 4.63 Top. This building shows a beige facade that features three different materials. The front yard has a number of trees and planting beds.

FIG 4.64 Bottom. Alternatively, this home features a red accent material with a different arrangement of materials. This lot has trees but not a lot of planting.

FIG 4.65 Left. The elevation shows a typical multi-family building with two separate building with two separate stair cases that each have two entrances. Each building has four separate units.



YARDS

The buildings are set back from the curb approximately ten to fifteen metres, depending on the angle of the building. The front yards are mostly lawn, with two narrow walkways that lead to the front steps. Each of the multi-family dwellings has a small planting bed that borders the base of the building and sometimes additional shrubs or conifers on the front lawn. A variety of large, mature trees is interspersed throughout the neighbourhood and includes species such as Boxelder Maple (*Acer negundo*), Green Ash (*Fraxinus pennsylvanica*), White Spruce (*Picea glauca*), American Elm (*Ulmus americana*), and Siberian Elm (*Ulmus pumila*). They provide a full, but intermittent canopy over the street.



FIG 4.66 Above. The back yards are often individualized to meet the homeowners needs. This includes small decks, play structures, sports equipment, sheds, and gardens.

FIG 4.67 Far left. The front lawns are mostly grass but often have many large trees to provide shade and shelter.

FIG 4.68 Left. Almost all of the side and back yards are delineated by fences. These vary in structure and style throughout the neighbourhood.

Many of the rear yards have fences to delineate four separate back yard spaces. The type and arrangement of fencing vary from building to building. Most yards use a simple wooden or chain link fence, some buildings have applied a consistent style of fencing for each unit, whereas others are done more haphazardly to suit individual tastes. The back yards have been personalized by each unit owner and include additional features such as decks, sunrooms, small play structures, recreational equipment, gardens, patio furniture, or small storage sheds.

Within each loop, one thirty-two-metre wide lot has is preserved as a public park. These corner parks vary in design from loop to loop, but each one includes a small children's play structure, trees, a picnic table, a park bench, and a garbage receptacle. The parks are located in the centre of the loop so that most of the homes have views of the park.

LAND USE

All of McGillivray Place is designated as residential multi-family (RMF). South of the study area, within the neighbourhood of Maybank, is a small area of land designated as residential two-family (R2), but otherwise, the rest of the region is all single-family residential (R1). Within a 500 metre radius of McGillivray Park, is a variety of land uses including parks and recreation (PR), commercial (C1-4), manufacturing mixed use (M1-3&MMU), and agricultural (A). This proximity to several different land uses provides the neighbourhood with jobs, services, resources, and retail facilities all within walking distance.

AMENITIES

There are a number of public amenities within the neighbourhood of Maybank. A local elementary school, Ralph Maybank, and community center are located just south of the study area. These two places offer children's play structures, open greenspace and sports fields.

Located directly west of Maybank neighbourhood is a large industrial park that provides a variety of different job opportunities. The Manitoba Institute of Trades and Technology, a post-secondary school, has two locations nearby and Vincent Massey high school is located just east of Pembina Highway. Along Pembina Highway is a commercial and retail strip that includes many amenities such as grocery stores, banks, drug stores, gas stations, and restaurants. Pembina Highway is also a transit corridor providing access to over ten different bus routes. There are no bus stops located directly within the area of study, but there are bus stops located within 500 metres of the site.





FIG 4.69 Above. This context map shows the location of nearby amenities in relation to the neighbourhood. There are a number of commercial and retail areas surrounding the area, as well as schools and a community centre nearby. The yellow dashed line shows nearby bus routes and the dotted line shows the future rapid transit development.



GREENSPACE

There is not much greenspace within McGillivray Park. The four playgrounds in each bay include play equipment and site furniture, but not a lot of vegetation, open space, or natural land features. Throughout the rest of Maybank are a couple of small patches of greenspace that provide access to nature, including Ralph Maybank schoolyard, Belair Park, and Marshall Crescent Park. To the west of the neighbourhood used to be a hydro corridor that provided the community with expanses of open greenspace and an area for community gardens. The hydro corridor was the largest area of greenspace directly accessible to McGillivray Park, but unfortunately, it is being developed and will soon be a rapid transit corridor.

Within the study area, only five percent of the land is public green space, and seventy-five percent is private lots leaving twenty percent of the land dedicated to road infrastructure.





- Public shared greenspace
 - Hydro corridor under development for rapid transit
- 500 metres



FIG 4.70 Top. This greenspace map shows the extent of public, shared greenspace. The development of the rapid transit corridor has greatly impacted the extent and connectivity of greenspace surrounded McGillivray Park in a neighbourhood that already lacks access to open greenspace.

FIG 4.71 Left. Each loop has a whole lot dedicated to park space. Each one includes a small children's play structure, some benches, and picnic tables.

Neighbourhood Assessment.

Legend.

The large box means the indicator is present and emphasized in the design.

The small box means the indicator is present to some extent.

No colour means the indicator is not present or present but not effective.

Walkability.

The sidewalk network is not extensive, but it does provide essential links to commercial areas and public amenities. It is possible to access schools, jobs, services, and daily necessities by foot.

Local Amenities.

There are a number of local amenities, including several schools, a community centre, parks, shops, restaurants, and grocery stores all within walking distance of the study area.

ECOLOGY

Natural Land Features.

There are no natural land features, such as riverbanks, urban woodlands, or prairie grasses in the neighbourhood.

Landscape Variety.

Almost all of the greenspaces are lawn, with some areas of bush along the McGillivray Trail and some groves of trees along the hydro corridor.

Neighbourhood Centre.

Maybank has a central elementary school, but the four bays in the study area are oriented away from the school and have limited access. While each bay has a small park, there is no overall neighbourhood centre.

Parks & Playgrounds.

There are numerous playgrounds and several parks throughout the neighbourhood, but the parks located within the area of study are very limited in size and quality of greenspace.

Sidewalks & Trails.

There are no sidewalks throughout the neighbourhood. However, there are important connections that link the community with the local school and a regional commuter trail that is well-used.

Density & Scale.

Multi-family housing makes the study area high-density. The neighbourhood has a limited extent and is scaled appropriately for the pedestrian.

Access to Greenspace.

Each bay has a small playground area, but since the development of the existing hydro corridor, there are no open greenspaces, urban woodlands, or community garden spaces in or around the study area.

Mixed Use.

There is a mix of land uses in and around the neighbourhood. The Fort Garry Industrial Park to the west and Pembina Highway to the east provide jobs and services within walking distance of the study area.

Housing Accessibility.

McGillivray Park provides affordable housing options, but it does not provide a range of housing types or sizes within the complex. Single-family housing options are available in the neighbourhood, but separated from the multi-family housing.

EQUITY

Green Corridors.

The hydro corridor used to provide some green connectivity, but since the rapid transit development, there are no longer any green corridors; all of the greenspaces in the neighbourhood are isolated patches.

Site Vegetation.

There are many mature deciduous and coniferous trees throughout the neighbourhood. Each lot includes a planting bed along the base of the building. Some lots have additional planting beds or large shrubs.

Neighbourhood Greening.

There is a lot of lawn space without the use of driveways, but at the same time, the double loop increases the amount of paving. Large, mature trees help mitigate heat island effect.

Water Management.

There are no apparent water management strategies, such as bioswales, retention ponds, buffering, or infiltration planting to retain water on site.

Sense of Place.

The unique layout and cohesive style throughout the neighbourhood contributes to a sense of place, but there are no features that reference the local history or landscape of the place.

Safety & Comfort.

The arrangement of the buildings and small loops encourages social cohesion and 'eyes on the street'. Large tree canopies provide shade and shelter. Limited access reduces traffic through the study area, but lacks sidewalks for pedestrian safety.

Public Transportation.

The neighbourhood has access to several transit routes in close proximity. Additionally, the new rapid transit development will make this neighbourhood a transit hub.

LIVABILITY

Conclusion.


The pie graph is a visual tool for comparing the evaluation of each case study neighbourhood. Each segment of the pie graph represents one formal indicator correlating with the assessment on the previous page. A coloured pie graph implies that many indicators are present and emphasized in the design while the white gaps show where indicators are lacking.


Similar to Beaumont, McGillivray Park has many indicators that are present to some extent, but not emphasized in the overall design. McGillivray Park lacks many of the formal indicators for ecology, which can be seen by the large gaps and small segments of green. This correlates with previous research that suggests multi-family housing projects often have fewer amenities and more liabilities than single-family neighbourhoods (Hester, 2006; Wheeler, 2004).

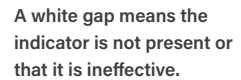
The average property values, square footage, and price per square footage are used to compare market values against neighbourhood qualities. While the price per square foot does not accurately determine market values, it does show trends. McGillivray Park has the lowest price per square foot and the lowest property values. Despite having similar size units as the homes in Beaumont, the property values in McGillivray Park are much lower. This is partly due to the fact that multi-family housing complexes are often considered less desirable to live in, but the pie graph also suggests that a lack of quality parks and access to greenspace could be a contributing factor.

Legend.

-  **Livability**
-  **Ecology**
-  **Equity**

 A little bit of colour means the indicator is present to some extent.

 A lot of colour means the indicator is present and emphasized in the design.

 A white gap means the indicator is not present or that it is ineffective.

*PPSF: Price per square foot is calculated by dividing the average square footage by the average property value. It tells us the average price per square foot for a home in this neighbourhood.

McGillivray Park

Avg. property value: 209,299

Avg. square footage: 960

PPSF: \$218



Wildwood Park

PPSF: \$275



Beaumont

PPSF: \$290



Bridgewater Forest

PPSF: \$265



04 Case Study.

Bridgwater Forest.

The intended goals are to create a more densely developed neighbourhood, with minimal environmental impact, that will meet the future housing market demands of Winnipeg.

(Clark, 2009, p.1)

History.

Bridgwater Forest is part of Waverley West, a 3,000-acre tract of land that was set aside for the development of seven new suburbs in 2005. Waverley West was intended to house almost 40,000 people providing in 10,000 new housing units within twenty years (Clark and Witty, 2009).

The neighbourhood of Bridgwater Forest is one of four Bridgwater neighbourhoods. The construction of Bridgwater Forest began in 2009 followed by Bridgwater Lakes, Bridgwater Center, and Bridgwater Trails. South Pointe is the fifth neighbourhood within Waverley West, and two more areas are yet to be constructed. Bridgwater Center was designed to act as a central hub that would provide local services and resources to all of the seven subdivisions (Bridgwater Neighbourhoods, 2019). Unlike many other suburbs in Winnipeg Bridgwater was developed by a Crown Corporation, Manitoba Housing, and a developer, rather than solely by a developer (Manitoba Government, 2017).



▲ Not to scale

FIG 4.72 Above. This is a map of the four Bridgewater neighbourhoods. Each one varies in form and structure, but all provide extensive pedestrian networks, retention lakes, and large open greenspaces - Architecture 49, n.d.

Location.

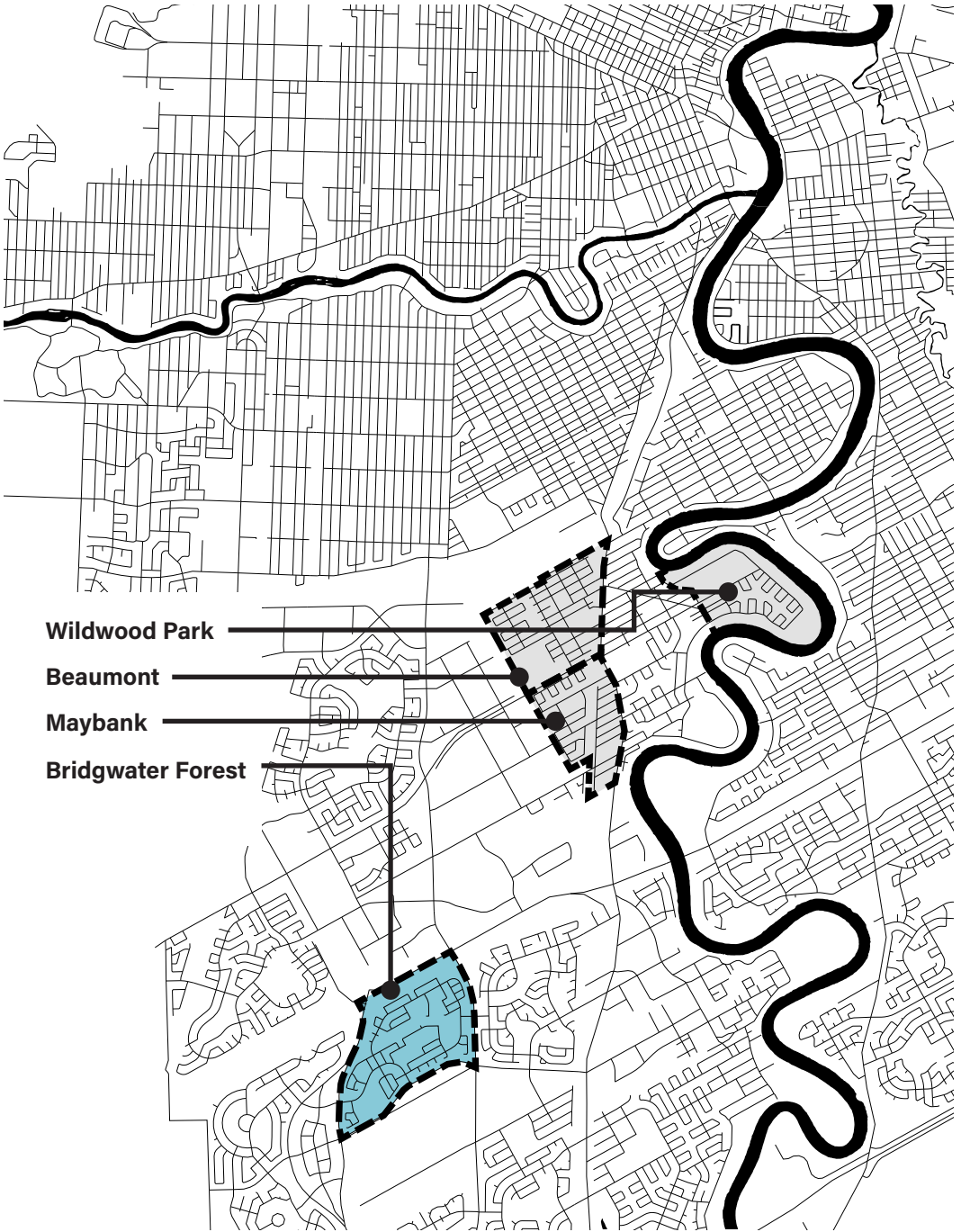
The entire neighbourhood of Bridgwater Forest is a total of 133 hectares. It lies in the middle of three arterial roads: Waverley Street, Kenaston Boulevard, and Bishop Grandin Boulevard. In order to keep the size of research manageable the data collected will be limited to a designated area of study, which is shown in figure 4.73. The study area is sixteen-point-three hectares and was chosen to include a sample of the different loops that are common throughout the neighbourhood. Data collected regarding streets, lots, pathways, and yards pertains to the area of study to limit the scope of work and make the information more comparable across the four case studies. The whole neighbourhood of Beaumont will be acknowledged for context and is used to examine the surrounding area.



FIG 4.73 Above. This aerial image of Bridgwater Forest shows the arrangement of the loops and culs-de-sac with the built form and surrounding landscape. The study area is outlined in blue. It consists of. The surrounding neighbourhood will be referenced for context.



500 metres



Wildwood Park

Beaumont

Maybank

Bridgwater Forest



3 kilometres

FIG 4.74 Above. The context map shows the location of the four neighbourhoods in Winnipeg and proximity to each other.

Design.

Bridgwater Forest is a 133-hectare subdivision in southwest Winnipeg. The neighbourhood uses an 'erratic loop' pattern that is characterized by a haphazard combination of loops and culs-de-sac in a variety of different shapes and sizes. The streets are winding and irregular, which can make it complicated to navigate.

The Bridgwater neighbourhoods were intended to provide innovative and sustainable design features such as local trails, expansive greenspaces, community spaces and playgrounds, unique architecture, and access to local amenities, shops, and services (Bridgwater Neighbourhoods, 2019; Clark and Witty, 2009). The extent to which these features have been realized vary, but these qualities resemble many aspects of New Urbanism that promote walkability, active frontages, and neighbourhood centres. Seaside, Florida is the first town to be designed based on the principles of New Urbanism in 1978 (Seaside, 2018). The designers of Seaside "pioneered the development of form-based codes as an alternative to traditional zoning practices" (Larice and Macdonald, 2007, p.308). This method was used in the development of Bridgwater. Architectural guidelines were applied to regulate the quality and design of the homes in each neighbourhood. They were meant to "ensure a community of stylish homes with a traditional feel" and provide a consistent set of styles including Colonial Revival, Georgian Revival, Cape Cod, Victorian, Arts and Crafts, and Country (Smith Carter, 2008).

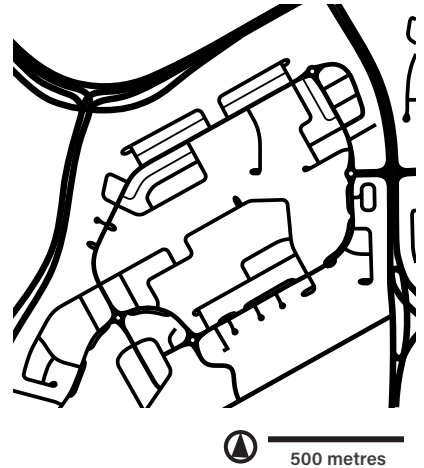


FIG 4.75 Above. The figure ground shows the relationship between street and open space. This combination of loops, culs-de-sac, and crescent streets creates an erratic pattern with irregular shapes.

FIG 4.76 Below. This view shows a typical streetscape in Bridgwater Forest with front access lots and sidewalks on either side.



Physical Characteristics.

STREETS

Three main collector roads, Bridgeland Drive North, Bridgeland Drive South, and North Town Road form a sort of loop network through the development from which all the local residential loops and culs-de-sac branch off. The collector roads are approximately ten metres wide and act as the primary access routes. There are three gateways into the community that provides vehicular access from Kenaston Boulevard to the west, Waverley Street to the east and Cadboro Road to the south. The neighbourhood is contained on each side by arterial roads, offering only limited access to discourage through traffic.

Bridgwater Forest incorporates a variety of different street patterns that are meant to keep traffic off of local residential streets. The residential streets consist of loops, culs-de-sac, and frontage roads. Most of the homes are located on these streets, although some homes are located on the collector routes. The loops and cul-de-sac roads are seven metres wide, and these streets vary significantly in their shape and size. Some of the loops and culs-de-sac contain as few as six homes whereas some contain upwards of seventy.

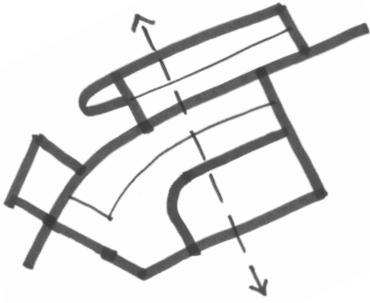


FIG 4.77 Top. The top sketch shows the arrangement of streets and back lanes in the study area. The dashed line shows where a pedestrian route runs through the neighbourhood providing access to the central park spaces.

FIG 4.78 Right. The rear access lots include five metre wide back lanes that provides access for rear garages and garbage pickup.



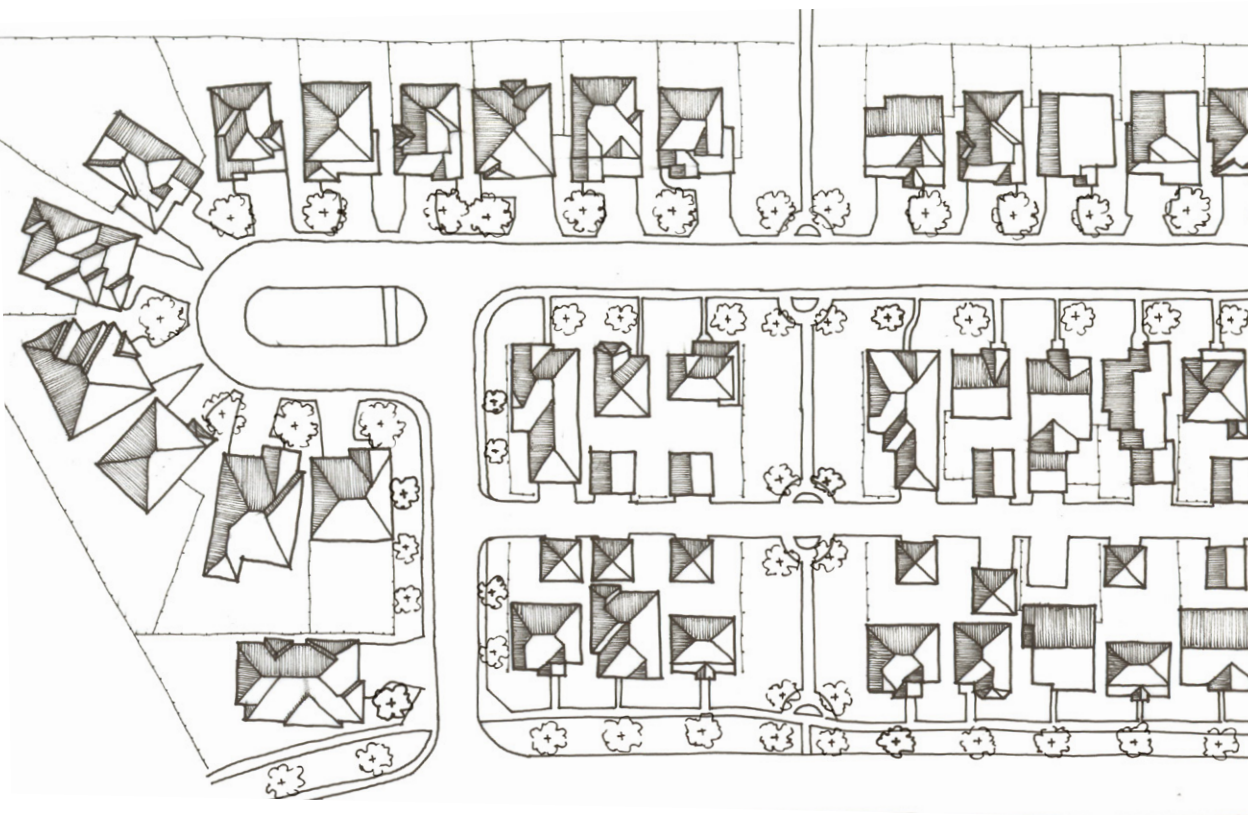
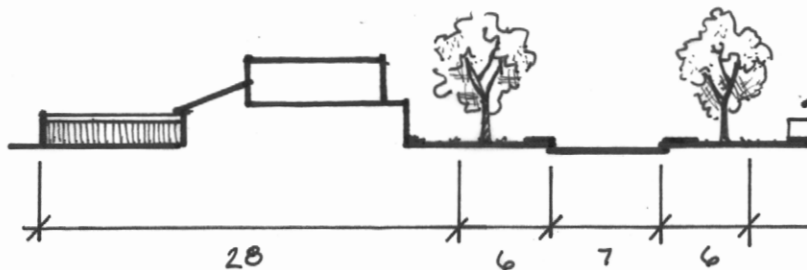
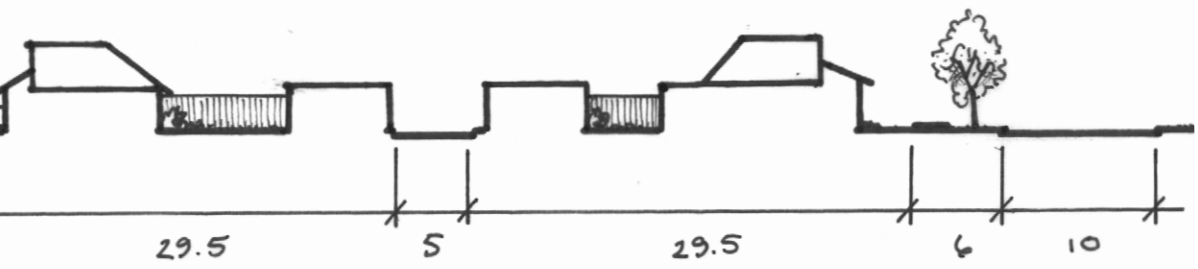
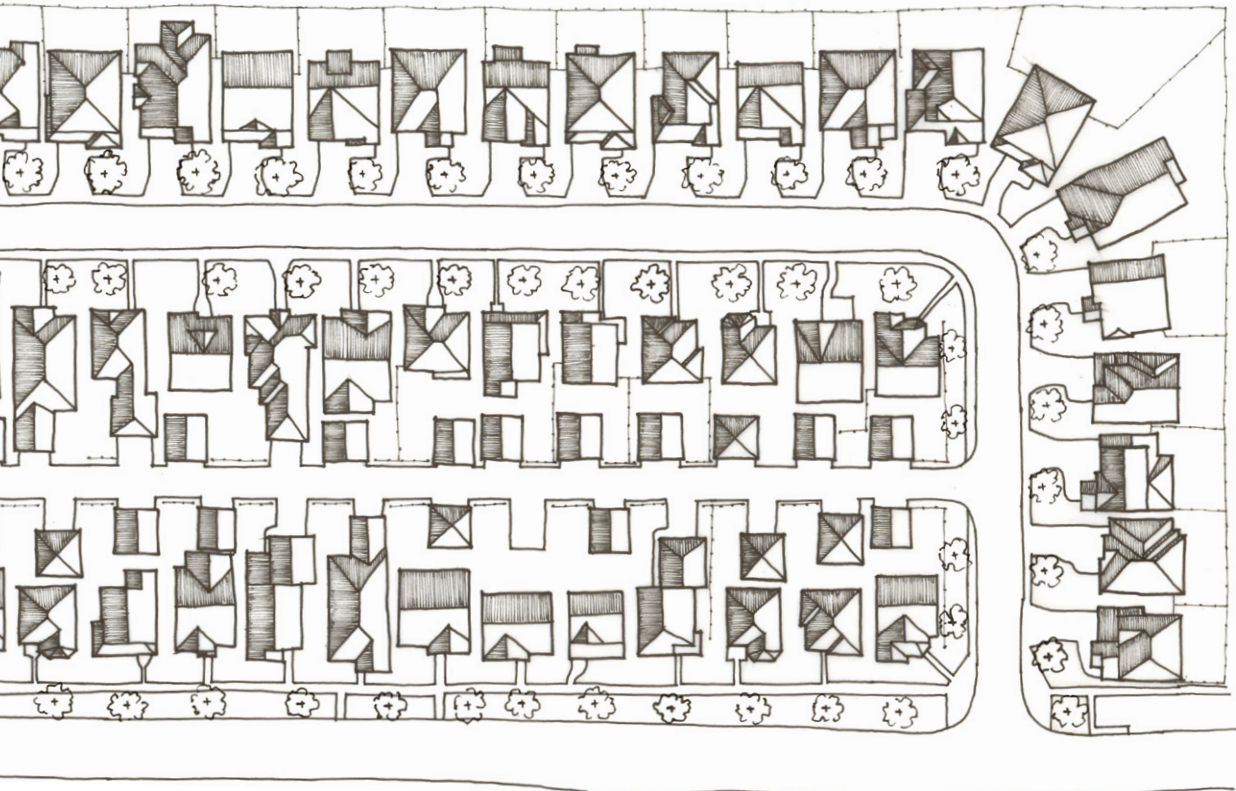


FIG 4.79 Top. The block plan shows the relationship between the lot and the street. The narrow lots and large homes create a tight arrangement on a large loop. The dense configuration of homes is broken up by a twenty-metre wide pedestrian route that runs perpendicular to the neighbourhood.

FIG 4.80 Right. The section shows the relationship between the buildings and the street. Many of the homes take up a large percentage of the lot and the lack of tree canopy makes the homes appear especially large. The rear garages and fences are present in every back yard.





LOTS

Bridgwater Forest contains both front access lots and rear access lots. Front access lots are the most common as they are found on loops, culs-de-sac, and frontage roads. Rear access lots occur on streets where homes face onto the main collector road or back onto a rear access lot. Within the study area, front access lots are typically fourteen to eighteen metres wide and twenty-eight to thirty-eight metres long. Rear access lots are relatively consistent in size, at twelve-point-eight metres in width and twenty-nine-point-five metres in length. The spacing of homes allows for approximately one to three metres between the sides of each house depending on the size and location of the home on the lot. This tight arrangement is due to the combination of narrow lots and large housing footprints but attempts to maximize dwelling density in a neighbourhood of single-family homes.

Front access lots have a driveway that provides vehicular access to the front of the lot. The homes on these lots have an attached garage on the front façade of the house. Rear access lots have a five-metre-wide back lane that provides vehicular access to a rear garage, either attached or detached. Almost every lot includes at least a single-car garage on the lot, and in many cases a two-car garage. Within the study area, approximately seventy-two percent of the homes have an attached garage, twenty-five percent have, and only three percent of the homes do not have a garage at all.



*Net Density measures the number of dwellings per hectare of the total land area devoted to residential land use (private properties).

FIG 4.81 Left. This pedestrian map shows the extensive network of sidewalks and regional trails in and around Bridgwater Forest. Sidewalks follow along the roads, but there is also a network of separated parkways that connect greenspaces.

PATHWAYS

Bridgwater Forest has an extensive network of sidewalks. Each right-of-way has a one-and-a-half metre wide sidewalk on either side of the road. On residential streets, the sidewalks are directly adjacent to the road, with only a curb to separate modes of transportation. Main collector roads provide a grass boulevard between the sidewalk and the street to physically separate pedestrian and vehicular routes. All of the sidewalks are paved and made accessible with curb cuts.

In addition to sidewalks, Bridgwater Forest features an inter-neighbourhood trail network, known as the Bridgwater Forest Trail. These twenty-metre-wide parkways extend for over five kilometres and are used for both walking and biking. Unlike sidewalks, these pathways run perpendicular to the street and traffic calming measures have been added to slow down traffic at these pedestrian crossings. The parkways are almost as wide as lot and include one-and-a-half metre sidewalks with some planting at road intersections. This network connects residential streets with the central park spaces and a nearby regional trail along Bishop Grandin Boulevard.



FIG 4.82 Left. This is a view down a large loop in Bridgwater Forest. The street is so long that you cannot see where it turns around. Long, straight streets encourage fast driving on residential roads.

FIG 4.83 Above. Twenty-metre wide parkways connect multiple different loops, but large speed bumps were required to slow down traffic on collector roads.

FIG 4.84 Bottom left. This view shows the car-oriented design of Bridgewater Forest. Large paved surfaces with driveways on every lot and two car garages on the front facades of the homes.

FIG 4.85 Top left. The front entrance is detailed with overhanging canopies and columns, but the garage dominates the front facade of the home.

FIG 4.86 Bottom right. The elevation shows the tight spacing of the homes in Bridgewater Forest. It also shows a lack of planting and trees on a typical streetscape.



HOUSES

Most of Bridgwater Forest contains single-family homes, except for three separate areas that contain apartment buildings and townhouses. The multi-family housing is all located at the edge of the neighbourhood around the primary access routes and is not mixed with the single-family housing. Within the study area are 198 homes, all of which are detached single family dwellings providing a net density of eighteen dwellings per hectare.

There is a strong sense of continuity among the homes in Bridgwater Forest due to the architectural controls that guided development. Each house has a formal entryway that faces the street with an overhanging roof and columns on either side. On front access homes the front entryway is often pushed to the side of the facade to allow for a one or two-car garage. The garage door occupies roughly fifty percent or more of the front façade. On rear access lots the front entryway is the focal point of the home and often features a front porch or planting bed. Most of the houses are two-storeys with multiple front planes and detailed roof masses featuring stepped rooflines, dormers, and gable features. Over sixty percent of the homes within the study area are two-storey homes, with building footprints that range from 130 to 240 square metres (including the footprint of the garage). A variety of exterior materials are used on the front facades, including acrylic stucco, stone, Hardy board, and sometimes wood. Each home contains one primary material, and an additional one or two accent materials.





FIG 4.87 Top. This home is an example of a home in Bridgwater Forest that is landscaped extensively. These types of yards are not common in the neighbourhood.

FIG 4.88 Middle. This home is a typical example of a yard in Bridgwater Forest. It contains one small tree and the rest is manicured lawn.

FIG 4.89 Bottom. Some homes in Bridgwater Forest have eliminated the grass for ground cover that requires less maintenance such as granite stone mulch.

YARDS

On residential roads, the span from the front of a home to another home across a street is approximately thirty metres. The right of way, including sidewalks, is almost ten metres in width and front setbacks are about ten metres on either side of the street. Rear access lots include a one-and-a-half or two-metre wide walkway on the front yard that connects the sidewalk to the front entrance of the home. On front access lots almost fifty percent of the front yard width is occupied by a driveway, and a short pathway connects the driveway to the front entrance. The rest of the front yard is mostly lawn with the occasional planting bed or stone mulch. The massing of vegetation varies from home to home, in most yards, there is little to no planting, but a few homes feature planting beds or large shrubs that border the edge of the lot. Each property contains one street tree that was planted during construction and does not yet produce a large canopy. These trees vary in species including Amur Cherry (*Prunus maakii*), Basswood (*Tilia americana*), other types of Linden species (*Tilia spp.*), American Elm (*Ulmus americana*), and Japanese Elm (*Ulmus davidiana var japonica*).

A one-point-six metre high wooden fence encompasses the entire neighbourhood. This fence borders the edge of the lots and features decorative stone columns at all entrances and corners. Within the neighbourhood, a five-foot-high wrought iron fence runs along the public edges of corner lots, laneway lots, and lots adjacent to park space. The developer implemented these fences to maintain consistency throughout the neighbourhood. Additionally, each back yard is contained on all three sides by a wooden fence that is supplied by the homeowner if it is not an exterior lot. Victorian style lamp posts line the street, and twenty community mailboxes are interspersed throughout the neighbourhood.

FIG 4.90 Right.

Developer installed fencing provides continuity throughout the neighbourhood but also reduces permeability throughout the neighbourhood.



LAND USE

Within a 500 metre radius of the study area are four different land uses, single-family residential (R1), parks and recreation (PR), residential multi-family (RMF), and agricultural (A). Most of the neighbourhood is designated for single-family residential use with three distinct areas for multi-family housing. The park and recreation areas are interspersed throughout Bridgwater Forest, while the agricultural land is outside of the neighbourhood acting as a “green” buffer for the arterial roads that surround it. Beyond the 500 metre radius is some land designated for manufacturing mixed use (M1-3&MMU) and commercial use (C1-4), both of which are located in Bridgwater Centre.

AMENITIES

The closest place to access services, resources, or retail areas is Bridgwater Centre, which is approximately one mile from the study area, and even further for the homes on the east side of Bridgwater Forest. Bridgwater Centre provides amenities such as a gas station, grocery store, and bank. There are no schools in Bridgwater Forest or any of the Bridgwater neighbourhoods and only one bus route runs provides services to Bridgwater Forest. The bus route runs along the main collector roads with bus stops spaced approximately 300 to 500 metres apart. Additional bus routes run along Waverly Street and in adjacent neighbourhoods but are about one mile away from the study area.



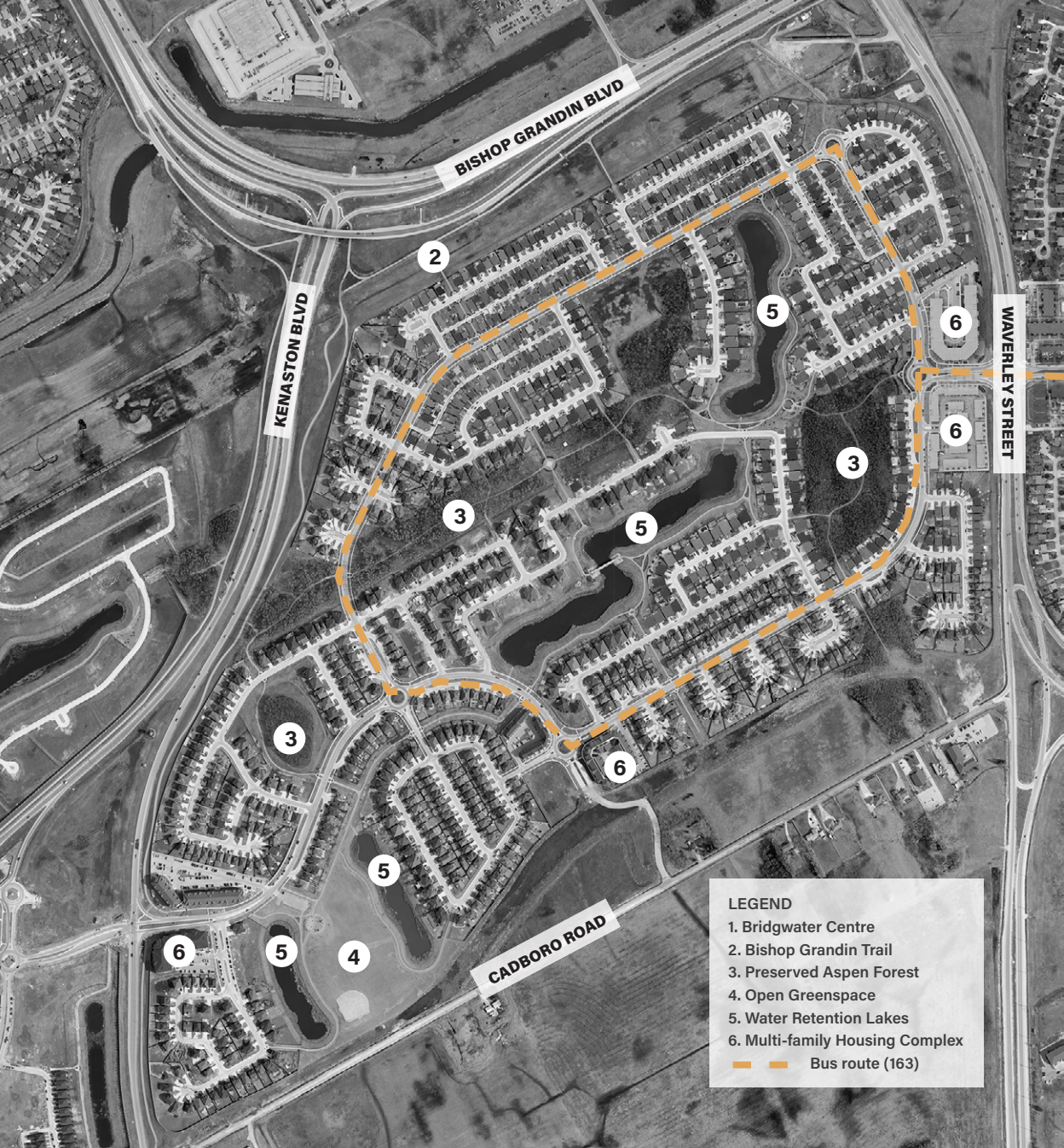


FIG 4.91 Above. This context map shows the location of nearby amenities in relation to the neighbourhood. There are no amenities that are not greenspace within the neighbourhood - the closest commercial area is in Bridgwater Centre. The yellow dashed line shows the bus route of the one route that services Bridgwater Forest.



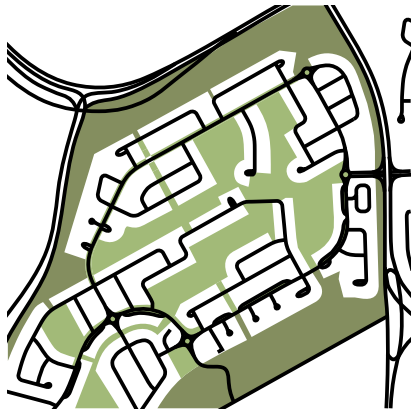
3 kilometres

FIG 4.92 Top left. This is a view of the trail that runs through the aspen forest. These trails connect multiple different greenspaces throughout the neighbourhood.

FIG 4.93 Bottom left. There are a variety of different greenspace areas. This one includes a plaza with a picnic shelter and children's play structure.

FIG 4.94 Bottom right. A network of pathways circle around the retention lakes, except for some areas where properties have private access to the lake front.





Public shared greenspace
 Undeveloped green buffer
 500 metres

FIG 4.95 Top. This greenspace map shows the extent of public, shared greenspace in Bridgewater Forest. The green areas surrounding the neighbourhood are undeveloped greenspaces that buffer the neighbourhood from large arterial roads.

GREENSPACE

Bridgewater Forest features forty hectares of greenspace that dispersed throughout the neighbourhood. Five large lakes are naturalised with native vegetation and serve as retention ponds for stormwater run-off. Most of the lakefront area is public, but there are some areas where private properties back onto the lake limiting access for the rest of the community members. There are twenty-five acres of preserved aspen forest that is contained within three distinct patches. These patches of forest are surrounded by residential creating abrupt edge conditions where the forest meets private property. Asphalt pathways run through the aspen forest to provide pedestrian links and public access. Lastly, vast expanses of open greenspace offer children’s playgrounds, a baseball diamond, and a plaza area with a picnic shelter.

Within the study area, approximately eighteen percent of the land is public greenspace, fifteen percent is road infrastructure, and only sixty-seven percent of the land is private property.



Neighbourhood Assessment.

Legend.

The large box means the indicator is present and emphasized in the design.

The small box means the indicator is present to some extent.

No colour means the indicator is not present or present but not effective.

ECOLOGY

Walkability.

The pedestrian network is extensive and well connected but does not provide access to daily necessities, jobs, or services. The neighbourhood is very car dependent.

Local Amenities.

There are no schools, jobs, services, or resources within Bridgwater Forest. The closest place to access these amenities is in Bridgwater Centre or other neighbouring communities.

Natural Land Features.

There are twenty-five acres of preserved aspen forest throughout Bridgwater Forest, and the retention lakes help naturally drain water on site.

Landscape Variety.

There are a variety of different habitat types including aspen forest, wetland, prairie, and some oak forest. There is also a mixture of maintained and natural areas.

Neighbourhood Centre.

The neighbourhood is arranged around a central greenspace, but the scale of the community and single-use of the space makes it less effective for bringing people in and encouraging social cohesion.

Parks & Playgrounds.

Almost one-third of the development is reserved for greenspace. These park spaces provide informal gathering spaces, sports fields, a children's playground, and access to natural land features.

Sidewalks & Trails.

There is an expansive pedestrian network that includes sidewalks as well as separated parkways. These routes connect to local parks and a regional trail. They are used for walking and biking.

Density & Scale.

Density is relatively high for a single-family neighbourhood, but the wide streets, large extent, and open spaces are not human-scaled and prioritize car efficiency. Residents are dependent on having a car.

Access to Greenspace.

There are large areas of greenspace in Bridgwater. While some lots back onto greenspace, for others access is limited by distance. Not all green areas are public, some have been privatized for individual lots.

Mixed Use.

The neighbourhood is all residential with the nearest commercial and industrial areas located in Bridgwater Center. The neighbourhood is so large that these areas are a significant distance away.

Housing Accessibility.

There is both multi-family and single family housing options, but they are not evenly dispersed. The single-family homes do not offer a wide range of styles or sizes, but there are a limited number of visitable homes.

EQUITY

Green Corridors.

There are some green corridors within the neighbourhood, but they do not extend beyond the community. Many of the preserved woodlands are isolated patches.

Site Vegetation.

There is not a lot of site vegetation throughout the neighbourhood. Most of the lots consist of lawn and a single street tree. Some lots have additional planting or landscaping but it is not common.

Neighbourhood Greening.

There are large areas of greenspace, but a large percentage of the streetscape is paved, especially on front access lots where the driveways take up most of the yard. Often the boulevards on culs-de-sac are also completely paved.

Water Management.

On a large scale stormwater is managed with five retention lakes that hold excess water in peak rain periods, but more could be done on individual lots to retain water on site including bioswales, retention ponds, buffering, or infiltration planting.

Sense of Place.

The architectural guidelines encourage diversity while maintaining continuity, but overall, the neighbourhood does not have many distinguishing features that offer a strong sense of place.

Safety & Comfort.

Sidewalks provide safe pedestrian routes, but there is a lack of 'eyes on the street' due to attached garages and tall fences. There are no street trees to provide shade or shelter. Large loops with straight streets are not effective at calming traffic.

Public Transportation.

There is one bus route that runs through the neighbourhood, but it is not very practical for daily commutes due to the low frequency of services and limited area of service.

LIVABILITY

Conclusion.


The pie graph is a visual tool for comparing the evaluation of each case study neighbourhood. Each segment of the pie graph represents one formal indicator correlating with the assessment on the previous page. A coloured pie graph implies that many indicators are present and emphasized in the design while the white gaps show where indicators are lacking.


Bridgwater Forest has a great emphasis on some indicators but also includes large gaps in others. Compared to Beaumont and McGillivray Park there is a significant increase in orange and green suggesting that more indicators for livability and equity are emphasized in the neighbourhood design. But there are also quite a few indicators that are not present at all which can be observed in the large gaps.

The average property values, square footage, and price per square footage are used to compare market values against neighbourhood qualities. While the price per square foot does not accurately determine market values, it does show trends. Bridgwater Forest has the highest property values out of all the neighbourhoods, but its average price per square foot is the second lowest. This speaks the number of large homes in Bridgwater Forest, which increases property values overall, but on average costs less per square foot than Beaumont or Wildwood Park. This suggests that there is less of a return on investment for such large homes and large-scaled neighbourhoods.

Legend.

-  **Livability**
-  **Ecology**
-  **Equity**

 A little bit of colour means the indicator is present to some extent.

 A lot of colour means the indicator is present and emphasized in the design.

A white gap means the indicator is not present or that it is ineffective.

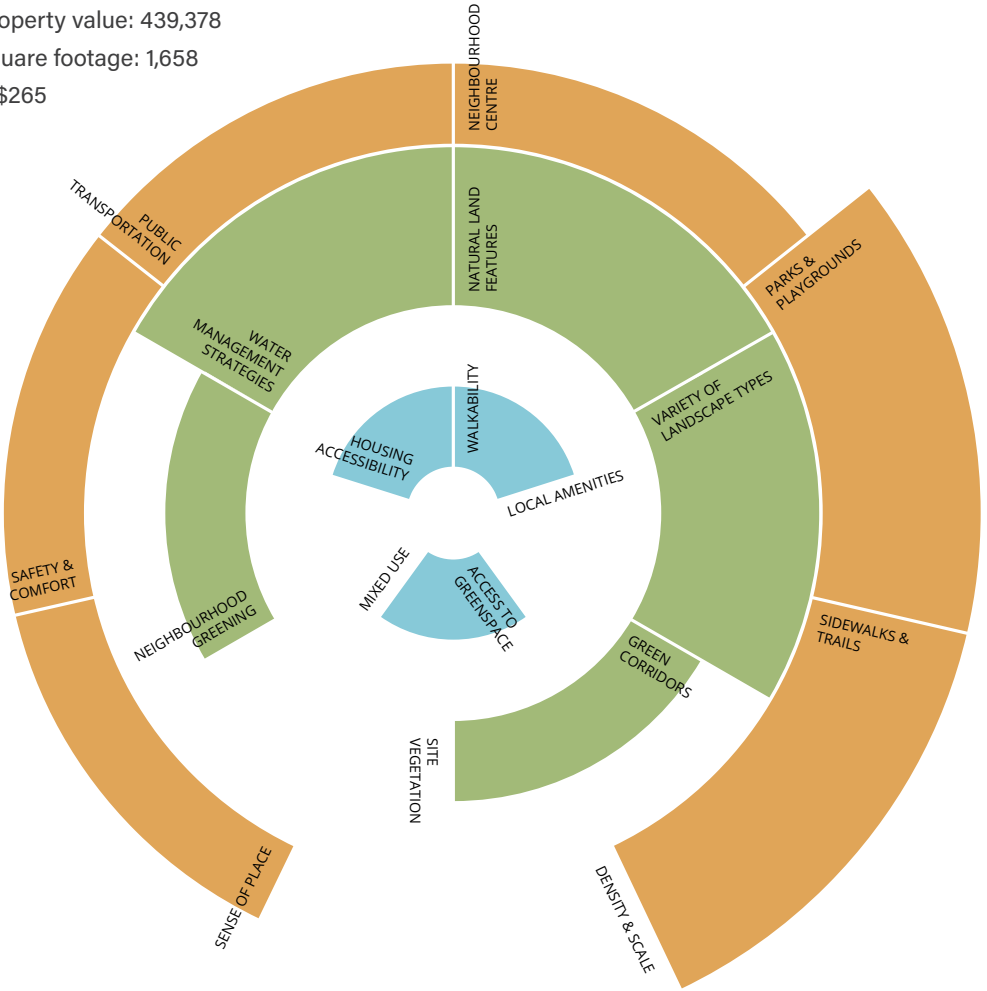
*PPSF: Price per square foot is calculated by dividing the average square footage by the average property value. It tells us the average price per square foot for a home in this neighbourhood.

Bridgwater Forest

Avg. property value: 439,378

Avg. square footage: 1,658

PPSF: \$265



Wildwood Park

PPSF: \$275



Beaumont

PPSF: \$290



McGillivray Park

PPSF: \$218





FIG 5.1 Above. Aspen
Forest Trail in Bridgwater
Forest - Giesbrecht, 2018.

05

Conclusions.



visually	calligraphy	exploiting	intimacy
void	canopy	exposure	intricacy
volume	capture	external	isolation
wall plane	categorical	fences	join
weight	centre	fluctuation	juxtaposition
wide	change	fluidity	landscape
width	climate	focal point	lettering
window	closed	functional	levels
zone	content	garden	line
absence	continuity	gate	linking
adaptability	contrast	geometry	metaphor
advantage	cross	gesture	movement
aerial	datum	giantism	multiple use
animism	decoration	grandiose	mystery
anticipation	define	hazard	narrows
archway	deflection	hedge	netting
articulation	density	here and there	nostalgia
awning	dispersal	illumination	noticeable
barrier	display	illusion	occupy
being itself	distortion	immediacy	opening
black & white	division	incident	ornament
bluntness	enclaves	indoor	outdoor
bollards	enclosure	inescapable	passage
bridge	entanglement	infinity	path
bypass	evocative	inside	pinpointing

This practicum has analyzed the physical characteristics of suburban development to understand how the built form affects qualities of livability, ecology, and equity. An analysis of suburban development patterns and neighbourhood types has shown that there is a body of knowledge surrounding neighbourhood planning, specifically in how the built form can be used to encourage livability, ecology, and equity. Through a series of case studies, this investigation revealed that contemporary suburbs are often not designed in a way that promotes these qualities. While existing knowledge and research surrounding the design of suburban neighbourhoods is recognized, this knowledge is not always applied in the design of contemporary suburbs. This practicum attempts to connect neighbourhood planning and design theory with practice through the study of types.

“[Typology] helps establish workable patterns of urban forms and spaces quickly at the outset of a project, setting out a framework that can be enriched by the subtleties of site circumstances”

(Herrington, 2017, p.157)

Left. A lexicon of design vocabulary. Words are compiled from three sources: *Form, Space, and Order* by Francis D.K. Ching, *A Concise Townscape* by Gordon Cullen, and *Landscape Ecology Principles in Land-use Planning* by Dramstad et al.

Conclusions.

Do existing suburban forms and patterns encourage livability, ecology, and equity through the built form, landscape, and infrastructure?

This research aimed to identify whether existing suburban neighbourhoods address issues of livability, ecology, and equity through the built form. An in-depth investigation of the physical characteristics of four Winnipeg neighbourhoods, Wildwood Park, Beaumont, McGillivray Park, and Bridgwater Forest, has shown that there are mixed results in addressing these issues. While some neighbourhood patterns do encourage livability, ecology, and equity, others do not and despite the fact that each of the neighbourhoods examined shares similar characteristics, there are uneven results.

Based on this investigation, Wildwood Park is the most livable. While Beaumont, McGillivray Park, and Bridgwater Forest each address a number of the formal indicators for livability, none of them includes as many as Wildwood Park does. In Wildwood Park the formal indicators for livability are almost all emphasized as a main aspect of the overall design, whereas in other neighbourhoods, some of the formal indicators may be present but often only play a small part in the overall design. For example, in Beaumont, there are some sidewalks, but significant gaps in the pedestrian network show that pedestrian circulation was not a priority in the overall design. By contrast, the pedestrian network in Wildwood Park is a central aspect of the design as it is located at the core of the neighbourhood and connects with other sidewalks and pedestrian routes.

Similar to livability, the ecological qualities are most encouraged in Wildwood Park. Bridgwater Forest and Beaumont include some of the formal indicators of ecology while McGillivray Park addresses only a few of them. As a newer neighbourhood (developed in 2009 rather than 1947) Bridgwater Forest was designed to be 'sustainable.' This investigation reveals that there are some areas where Bridgwater Forest does this well, but there are other areas where it does not. The design of Wildwood Park promotes ecological qualities in more areas than does Bridgwater Forest. This is especially apparent when analyzing the neighbourhood at a smaller scale. For example, the design of the streetscapes and individual lots could include more green infrastructure and native planting in Bridgwater Forest. Wildwood Park, on the other hand, is full of greenery and native planting, as this was a central element of the overall design.

In terms of the quality of equity, we see a different pattern. While Beaumont and McGillivray Park address many of the formal indicators for equity, Bridgwater Forest and Wildwood Park do not. This investigation reveals a trend that our current neighbourhood forms and patterns do not prioritize equity in conjunction with ecology or livability. Multi-family housing developments, as seen in McGillivray Park, are often separated from single-family housing and lacking in large open greenspaces, as seen in Wildwood Park. Additionally, McGillivray Park, a neighbourhood designed for multi-family housing, does not include many amenities such as large green spaces or green corridors.

From these observations, we can draw a few conclusions. This investigation has shown that the neighbourhood patterns which are most often replicated in contemporary suburban development are not necessarily the most sustainable, ecological, or equitable. Many new developments are similar in design to Beaumont or Bridgwater Forest even though other neighbourhood patterns better address qualities of livability, ecology, and equity. Next, we can conclude that there is no perfect neighbourhood pattern and each neighbourhood has areas where they could better address aspects of livability, ecology, or equity. Overall, our suburban development patterns could better address these three qualities.

Conclusions.

What can we learn from studying suburban forms and neighbourhood types to inform future development?

By analyzing the physical characteristics of suburban housing, this practicum has shown that patterns, forms, and types do affect neighbourhood qualities of livability, ecology, and equity. While there is no perfect neighbourhood form, this investigation provides comparable information that designers and urban decision-makers can refer to in the design of future neighbourhoods. The following observations and pie graphs discuss the overarching strengths and weaknesses of different neighbourhood types. These descriptions use typical language to discuss neighbourhood patterns, in order to better understand how the built form can promote - or inhibit - qualities of livability, ecology, and equity.

Wildwood's biggest asset is a well established, central park space. Almost every home backs onto this shared open greenspace providing openness and connectedness that is not often experienced in other neighbourhoods. This shared public space contributes to a strong sense of community. Another strength is the beauty of the landscape. The large trees and expansive canopies that were preserved throughout development, as well as the naturalised vegetation that might be considered 'undesirable' in another context, all contribute to a sense of place and offer ecological benefits. Where Wildwood lacks is the proximity of commercial and retail areas, and housing accessibility. While there is a range of housing sizes within the neighbourhood, it is almost exclusively single-family detached dwellings. Wildwood Park has a high market value and as homes continue to be renovated housing affordability will continue to decrease.

Wildwood Park



Beaumont



Legend.

■ Livability

■ Ecology

■ Equity

These indicators are emphasized in the design.

These indicators are present to some extent.

White gaps means the indicators are not present or not effective.

Beaumont's strength is in its limited extent and scale. It is a small and walkable neighbourhood contained by surrounding commercial and industrial areas. These attributes make Beaumont more livable and equitable offering a neighbourhood that is not dependent on cars and where one can access jobs and services without requiring a vehicle. Where Beaumont lacks is in pedestrian and greenspace connectivity, both of which have been affected by recent development. All of the greenspaces in Beaumont are isolated patches while pedestrian routes are limited and not well connected.

McGillivray Park has emphasized the strength of the loop pattern to calm traffic and create small community units. The small loops, density of housing, and park spaces encourage social cohesion and increase safety by providing 'eyes on the street'. Additionally, the neighbourhood has good access to public transportation and nearby amenities due to its limited extent and high density. Its shortcomings include its orientation toward a large arterial road and physical segregation from the rest of the neighbourhood. McGillivray Park is isolated and there is a clear separation between multi-family and single-family housing. This neighbourhood also lacks in its quantity and quality of greenspaces and natural land features. There are few opportunities for residents to explore and interact with nature and little consideration of ecological issues.

Bridgwater Forest's biggest assets are its large open spaces, water retention lakes, and the preserved aspen forests. Beyond their ecological impact, each of these formal indicators is a public amenity and they are used as selling features for the neighbourhood. These spaces are supplemented by a well-connected trail system. Where Bridgwater Forest is not as effective is its scale and size. The neighbourhood is so large and spread out that it is not well suited to the pedestrian scale. The neighbourhood is designed at a much larger scale than the other three neighbourhoods. This is apparent in the size of the homes, streets, open spaces, and overall extent of the neighbourhood compromising walkability, increasing travel distances and prioritizing car usage.

Through these discussions, we can better understand how types affect qualities of livability, ecology, and equity. This investigation reveals the importance of typology in generating a design language that can inform development. This comparison of patterns and forms contributes toward a better understanding of how to design more livable, ecological, and equitable neighbourhoods.

McGillivray Park



Bridgwater Forest



Legend.

■ Livability

■ Ecology

■ Equity

These indicators are emphasized in the design.

These indicators are present to some extent.

White gaps means the indicators are not present or not effective.

Recommendations.

Overall, this practicum seeks to build a design language surrounding neighbourhood planning and the use of types in creating more livable, equitable, and ecological suburbs. Replicating types and patterns produces varying results, and it is imperative to understand the role and application of these types to enhance the overall design of the neighbourhood.

Through this investigation, we gain a better understanding of how types can be used and the rules that guide them.

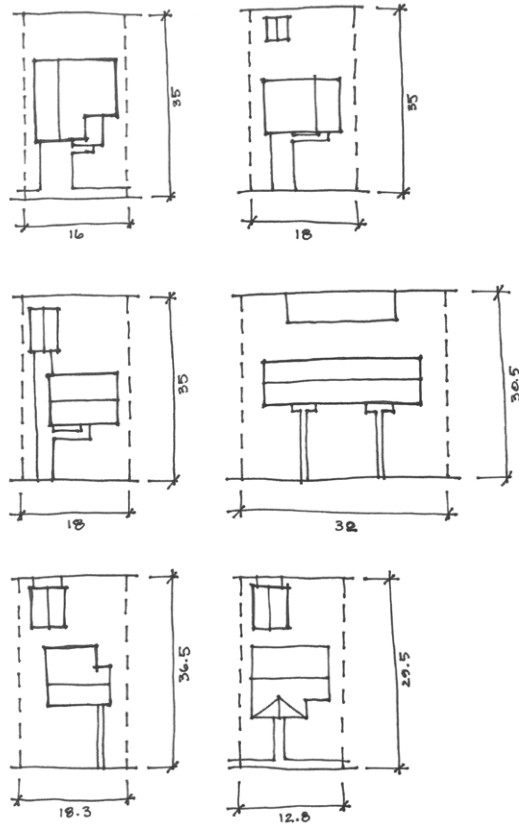
- The way we design streets changes the way they are used. Developers started using the loop pattern as a way to calm traffic, keep traffic off residential streets, and create small social units, but these qualities are not inherent to the loop pattern. When street loops are too large, have long stretches of road, and wide streets they compromise the traffic-calming benefits as well as the intimacy and sociability of the loop pattern. An effective loop should be short, with narrow roads and small turning radii to slow down traffic and create a small social unit.

- The neighbourhood centre is most effective when it is accessible by foot and visible from the home. In a large development, it is more effective to have a series of centres or public spaces, rather than one single one, so that different groupings of homes have direct access to their own park space. This arrangement allows the neighbourhood centre to become a part of daily life and a place that the community calls their own, rather than an occasional destination. Ideally, lots should back onto these park space to provide access without crossing major roads and offer a place for children to play that is close-by and watched over by the community.

- Sidewalks and trails serve different purposes and should be designed that way. Sidewalks bring people to and from destinations while trails are used for leisure and recreation. The sidewalk network is most effective when it offers a variety of routes, safe pedestrian crossings, and a small buffer from the street. These routes should provide access to services, commercial areas, and public transportation. Trails, on the other hand, do not need to follow the street. These routes should be wider to accommodate cyclists and other modes of transportation while providing access to parks,

FIG 5.2 Right.

Understanding the rules and inner logic of various types allow designers to generate new types that are "enriched by the subtleties of site circumstances" (Herrington, 2017, p.157).



playgrounds, and regional trails. These networks should follow along green corridors that connect greenspaces and provide links through the neighbourhood.

- Density increases a neighbourhood's ability to support amenities such as efficient public transportation systems and small businesses. To increase equity and density simultaneously residential streets should include small multi-family housing units, such as row housing, at the end of each street or mixed-in with single-family homes rather than concentrating single-family homes on thin lots. This allows the neighbourhood to offer wider lots and open space while providing density.

- A mix of different housing types encourages a diversity of people and lifestyles within the neighbourhood. This does not need to be achieved with high rise apartment blocks on a street with single-family homes, but it does mean including other types of housing besides single-family homes. Row housing and semi-detached homes are a simple way to add diversity and increase the accessibility of suburban development. Row houses and semi-detached homes should not be separated or isolated from single-family homes. When multi-family housing is mixed-in with single-family homes it provides a more compact urban form and helps create more diverse and equitable communities.

- Although sidewalks are important in providing safe pedestrian routes and encouraging social activity, the presence of sidewalks alone does not make a neighbourhood walkable. A walkable neighbourhood should provide routes that are attractive for pedestrians to travel on. This means there are safe pedestrian crossings, shelter and shade, trees and vegetation, and adequate separation from heavy traffic. Walkability is also dependent on having nearby amenities, shops, jobs, services, and resources that residents can access by foot. For a neighbourhood to be walkable, a resident should be able to access their daily necessities without depending on a car.

- Suburban developments should be designed in conjunction with existing natural land features. This means that low areas become wetlands and high areas are used for development. Rather than preserve a single patch of woodland, the existing landscape should be integrated into the neighbourhood. Preserved natural land features often end up being the most valuable parts of a neighbourhood and are often the easiest way to minimize drainage issues. While a neighbourhood can be built in a year, a forest cannot, and for this reason existing land features are so valuable and their protection should be prioritized throughout development.

- Suburban neighbourhoods comprise a large percentage of the urban landscape and a significant portion of that land is dedicated to lawn. There is so much potential for these lawns to be productive landscapes that provide ecological habitats or grow food. Landscaping yards to include on-site water retention and native plant species should be a part of the overall neighbourhood design to create more productive landscapes and increase the ecological impact of the suburban yard.

Limitations and Future Research.

“Shadows cast a form out of the light that is not an exact replica of the object that it portrays.”

(Herrington, 2017, p.157)

Typology, the study of types, concerns the language of design. It does not seek to find a single, perfect type, but rather engages in a conversation that critiques, challenges, and transforms types. This is one of its limitations. The study of types is used to aid comprehension and does not provide an ideal pattern to be replicated in future development. Types are meant to be used as a starting point in the design process rather than an end result.

The study of types is also limited by the quantity of neighbourhoods included in the study. Throughout this investigation it became clear that four neighbourhoods is a relatively small sample size and that this study could be strengthened with the inclusion of many more neighbourhoods. The criteria are meant to be used across a variety of different scales and neighbourhood types providing the opportunity for further work in studying many more neighbourhoods. The more neighbourhoods that can be analyzed the more we can understand how different forms and types are used and how they influence qualities of livability, ecology, and equity.

While this practicum is limited by the number and types of neighbourhoods that were chosen, it creates a framework from which we are able to continue to assess neighbourhood patterns in future work and it proposes a design vocabulary for neighbourhood planning and design. Through the analysis of suburban forms and types we can better understand how the built form can promote qualities of livability, ecology, and equity in suburban neighbourhoods.

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