THE TRANSIT NODE MODEL:
AN INTEGRATIVE LAND-USE AND TRANSPORTATION PLANNING ALTERNATIVE FOR SUBURBAN WINNIPEG

BY

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A Practicum submitted to
the Faculty of Graduate Studies
In Partial Fulfillment of the Requirements for the Degree of

MASTER OF CITY PLANNING

Department of City Planning
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Abstract

The research undertaken in this practicum involves examining the integration of transportation with land-use planning models that are appropriate to Winnipeg. Conventional transportation planning that gives priority to automobile commuting is increasingly being re-examined because it inherently fails to rectify social and physical urban problems such as social isolation, and inequities in employment opportunities. Moreover, the separation of land-use and transportation planning has encouraged urban sprawl, with all daily activities being segregated from each other. The intent of this practicum is to explore various innovative solutions in major cities and supportive planning models, particularly the Transit Node concept, which attempts to address some of these concerns. A Transit Node is defined as a suburban centre that fosters a job-housing balance and higher-density development; integrated with transit use.

The study is divided into two parts: the first consists of relevant literature review of precedents to derive guiding principles of the Transit Node model; the second involves the Charleswood case study. Three potential infill Transit Nodes (T-Nodes #1, #3, and #5) have been identified from the study, which could support public transportation in the community. Public transportation is defined as all commuting modes that support the mass public.

By adhering to the principles of a job-housing balance, with higher-density and mixed-use development, the proposed solutions to Charleswood include two plausible scenarios – the first potentially designating all three areas as Transit Nodes, while the second proposes only two of the three, namely T-Nodes #1 and #5. Both scenarios have their own benefits, as well as necessary conditions for implementation. Overall, the nine principles assisted in providing strong visions for a more public transportation-supportive planning and development, as identified by the objectives of the study.

Acknowledgments

I would like to take this opportunity to thank the people who have, in many ways, contributed their efforts in assisting with the research and writing of the practicum. First, I want to thank my committee, especially Prof. Basil Rotoff, who have provided me with much guidance, wisdom, and humour along the way. Your willingness to work with me is an honour that I shall cherish. Secondly, I want to thank Ms. Jacquie East for her commitment as an external advisor, as well as her efforts in the study.

Last, but certainly not least, I want to thank my family, especially my Mom, for their support during the years of my studies, and notably during the last few months of the practicum writing. I cannot express my gratitude for their patience and understanding toward my goal of achieving this degree.

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Chapter 1: Introduction

1.1 Purpose

The purpose of the research is to examine how integrative transportation and land-use planning models, specifically the Transit Node concept, can introduce a more public transportation-focused development in Winnipeg's mature suburban districts. Public transportation refers to all modes of transportation that service the mass public, including: local, urban and intercity transit systems, jitneys, shuttle services, high-occupancy vehicles (HOV), etc. A Transit Node is defined as a suburban centre that fosters a job-housing balance and higher-density development, which is integrated with a transit system linking to other suburban centres. The centre is not solely a private entity such as a regional shopping mall, but rather it is a conglomeration of concentrated land-uses (e.g., apartments, townhouses, shopping malls, business offices, etc.).

The practicum has four objectives:

1. Explore innovative planning models and precedents that support public transportation planning;
2. Develop the Transit Node model along with supportive guiding principles;
3. Perform a systematic analysis of past land-use and transportation planning, policies, and plans for the Charleswood District of Winnipeg; and
4. Perform an evaluation of plausible solutions for Charleswood, in respect of the Transit Node model, against specific transit operation criteria, as well as the social, political, and economic situation of the community.

The need to integrate transportation with land-use planning is increasingly necessary because the role of conventional transportation planning, in meeting mobility demands, has affected the social and physical structure of suburbs over the years. As discussed in Chapter 2, social isolation and unequal access to employment are two key concerns that are a direct consequence of planning for automobile commuting. Furthermore, the separation of land-use

planning from transportation planning further encourages urban sprawl and the inherent land consumption. Zoning ordinances that separate land uses have effectively augmented travel distances between all activities of urban life. It is therefore the intent of this practicum to explore different innovations in major cities, as well as supportive planning models that attempt to address these concerns, and in particular, to assess the feasibility of introducing the Transit Node model to suburban Winnipeg, as discussed above.

1.2 Scope of the Research Study

The primary aim of the practicum is to investigate how the Transit Node model can be adapted to the Charleswood District of Winnipeg. Given that the focus is on a mature suburban community, the research is confined to examining innovations that occur within the older suburbs or edge cities. The study explores the importance of using urban form design as a means to address current transportation issues, but does not include discussions on specific traffic-related projects such as parking management strategies, and/or transportation demand management principles in neighbourhood areas.

While it is important to consider that a balanced transportation system requires the provision for all commuting modes, the practicum does not explore transportation planning for walking, bicycling, and so forth. These non-motorized transportation modes are briefly discussed as they become relevant to the Transit Node model and its supportive principles. For instance, one of the functions occurring at a Transit Node is the transferring of transit riders between buses or other modes, which requires practical design provisions for non-motorized movements; however, the practicum does not address the specific design layout. The focus is on the transportation/land-use planning policies and design that enact within the overall community. Consequently, the study

endeavours to serve as a resource to local governments and community groups, as suggested in the following section.

1.3 Significance of the Research Study

The practicum may have many implications for city-planning practise. It is hoped that this research will complement past efforts, particularly in adopting a more integrative approach to land-use and transportation planning in suburban Winnipeg. The practicum explores different possibilities of adopting the Transit Node model, and consequently provides recommendations on the implementation of the model in the Charleswood District. It is hoped, as well, that the practicum will be of use to many governmental organisations such as the City of Winnipeg transportation and land-use planning administrations. In addition, the study could serve as a resource for local communities and their citizens because the Transit Node model affects development at the local level. With the understanding that local governance is crucial in the planning, implementing, and monitoring of development, individual communities can refer to the specifics of the study for guidance.

1.4 Research Methods and Analysis

The research methods adopted in the study include a literature review of planning theories, and precedents to determine how major cities are addressing current transportation-related issues. The literature review draws from multiple sources including: topic-related books, academic journals, the Internet, relevant magazines and newspaper, and published government documents. As part of the literature review, the practicum explores case studies of major urban locations that are attempting to redirect the attention towards public transportation-focused planning and development. The selection of case study locations was based on several criteria that include: the

availability of research materials, similar governmental systems as Winnipeg and Canada, suburban-focused planning and development, and cities that cover the greatest range of solutions examined. As discussed in Chapter 3, five major locations were chosen for observation: McKenzie Towne, Alberta; Toronto, Ontario and surroundings; Greater Vancouver Regional District, British Columbia; Portland, Oregon; and Copenhagen, Denmark. The information drawn from the literature research is tabulated in a matrix, patterned after the Multi-Criteria Decision Making (MCDM) technique (Massam, 1988). The thought process behind deriving the guiding principles involves placing all of the innovations learned from the precedents into the matrix. Consequently, a comparative analysis is performed on the matrix with the theoretical models learned.

From the literature research of planning and design models that engage the transportation and land-use nexus, a set of guiding principles are derived that support the Transit Node model. Thus, a study of the Charleswood District is undertaken to test the model and its principles. As previously discussed, the objective of the Charleswood case study is to determine whether the Transit Node model is a viable solution. Viability is determined through an evaluation of the model against critical transit operation parameters, as well as the "realities" of the community. Also relevant to the study is the exploration of past and present planning that occurred in Charleswood, to understand the transportation and land-use development dynamics that occurred pre- and post-Unicity. All findings are fully discussed in Chapter 6 and 7, with recommendations for proposed scenarios in the conclusion of the study (see Chapter 8).

1.5 Format of the Practicum

As discussed in the previous section, the research methods include performing a literature review of different sources to establish a guiding principle framework to support the Transit Node

model, which is then applied to the Charleswood case study. To achieve this, the practicum is divided into two parts: the first part consists of a theoretical analysis that serves as a foundation to the second part, namely the Charleswood case study (refer to Figure 1.1 and Figure 1.2 for a flowchart summary of the research process).

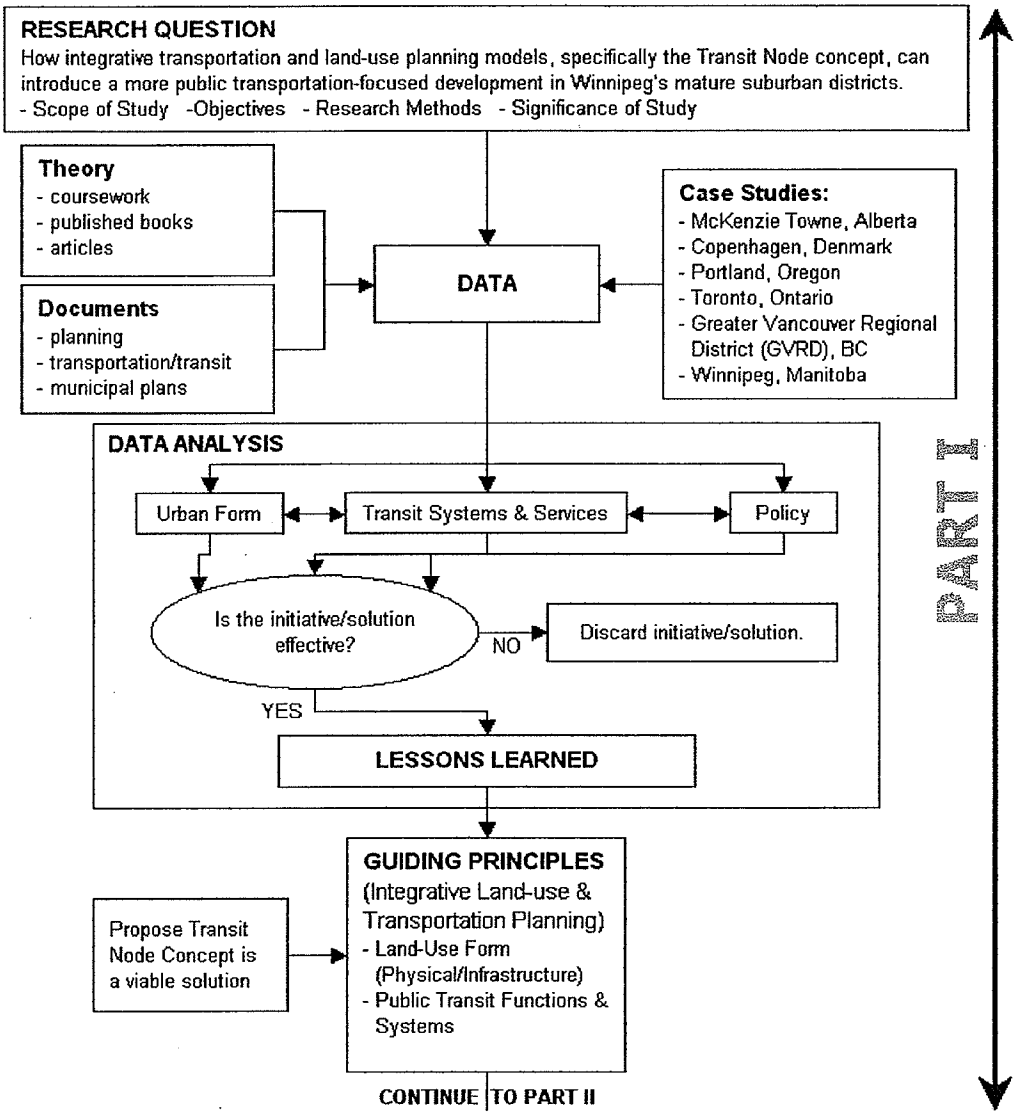

Figure 1.1: Flowchart of Theoretical Research Process (Part I)

The intent of Part I is to meet the first two objectives of the study: to explore innovative planning models and precedents that support public transportation planning; and to develop the

Transit Node model along with supportive guiding principles. Serving as a foundation for the research, Part I examines solutions that work. Effective innovations and solutions found from the existing case studies will serve as precedents in developing the guiding principles. Thus, if a solution does not seem to be effective, then it is discarded.

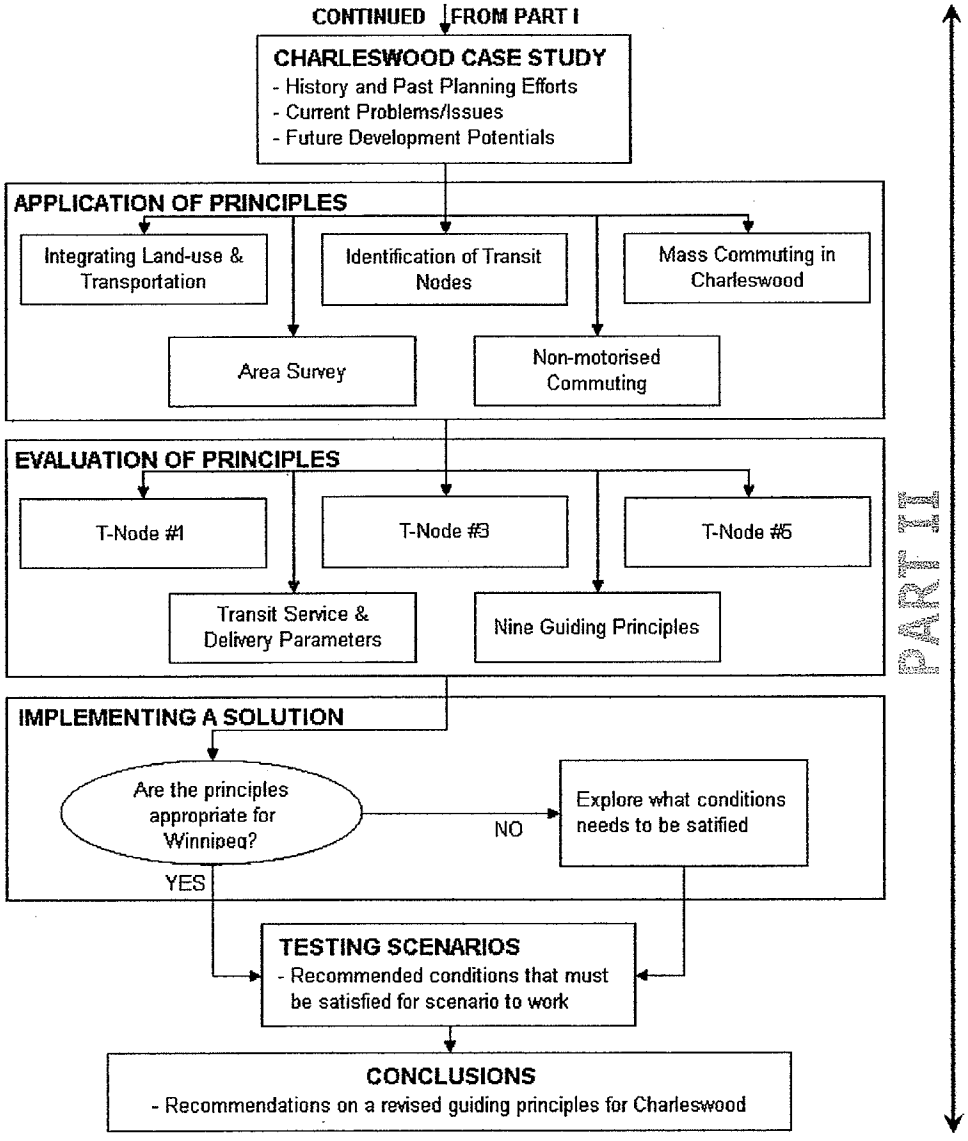

Figure 1.2: Flowchart of Practical Research Process (Part II)

The second part of the practicum is the application of the theoretical principles learned from the first part. Part II attempts to meet the remaining two objectives of the study: to perform a

systematic analysis of past land-use and transportation planning, policies, and plans for the Charleswood District; and to perform an evaluation of plausible solutions for Charleswood, in respect of the Transit Node model, against specific transit operation criteria, as well as the social, political, and economic situation of the community. The case study involves exploring possible scenarios that would meet the needs of the community.

PART I – A Theoretical Exploration

Chapter 2: Transportation versus Land-use Planning: A Literature Survey

2.1 Introduction

The focus of this chapter is on the current challenges that cities and their suburbs are confronted with, due to conventional transportation and land-use planning practises. Furthermore, this chapter explores planning strategies that address the transportation and land-use planning dichotomy.

2.1.1 The Consequence of Automobile-Transportation Priority

Since the birth of the private automobile, the trend in urban transportation planning has mainly been to achieve safety and efficiency in automobile travel. The transportation engineering guidelines in commercial and residential developments define uninterrupted traffic flow as a measure of safety, and thus favour automobile mobility over other concerns such as pedestrian and bicycling safety. During the period between the world wars, U.S. planners also favoured automobile-oriented planning with the inception of the new town movement. According to Hodge (1998), Henry Wright and Clarence Stein planned the town of Radburn in New Jersey "for a society entering the 'Motor Age'"(Hodge, 1998: 69). The Radburn plan included super neighbourhood blocks with specialised roads to meet different traffic needs. Additionally, the plan separated pedestrians from automobiles with systems of walkways and specific crosswalks along local roads. "Clarence Stein left his mark in Canada in his 1951 plan for the aluminium smelting town of Kitimat, British Columbia, which embodies the concepts that he developed in the building of Radburn. And, of course, there is hardly a metropolitan suburb planned since the end of World War II, from Fraserview in Vancouver to Churchill Park in St. John's, that does not embody the principles of

Wright and Stein to a high degree" (Hodge, 1998: 69). Thus, no ideal solution has been presented to address the concerns of automobile-dependency.

Newman and Kenworthy (1999) argue that transportation engineering practises that aim at achieving greater mobility have resulted in the continual expansion of the road infrastructure, but have never provided comprehensive solutions to the traffic congestion. As stated by Litman, "235% increased traffic congestion delays between 1982 and 1997 in major U.S. cities result primarily from more automobile-dependent transportation and land use patterns" (Litman, 2000: 20). The direct land use impact from transportation planning is the inherent land required for transport facilities such as roads, surface parking lots, and so forth. As illustrated in Figure 2.1, the road space required per unit of travel varies significantly by the mode of transportation, with the automobiles requiring the greatest amount of space per passenger travelled.

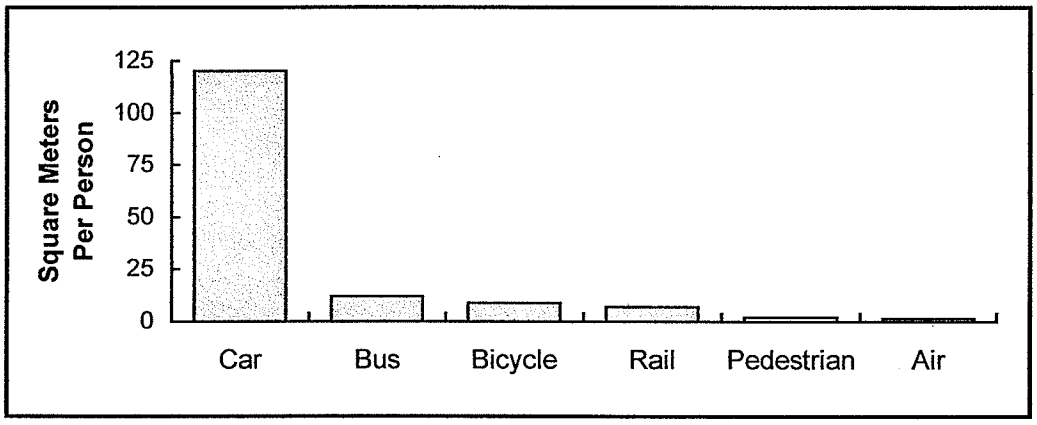

Figure 2.1: Road Space Required by Mode of Transportation
Source: Litman, Todd. Land Use Impact Costs of Transportation. Victoria Transport Policy Institute, Victoria B.C., 2000.

The supply of parking further exacerbates the traffic congestion problem since, as Cervero (1998) advocates, free parking in the suburbs has encouraged 99% of all motorists to drive rather than consider other modes of travel such as mass transit. The current trend in big box retailing requires

a substantial amount of parking space between commercial buildings, as evidenced in Winnipeg's suburbs.

Among the many concerns of traffic congestion (e.g., environmental, health, etc.), the most critical are the social impacts that result from automobile dependency, since they cannot be easily justified, both economically and/or statistically. As introduced above, the typical suburban street layout that lacks the design for pedestrian activities is a cause for concern because, according to Engwicht (1993), local streets should be viewed as an extension of the livable space of residential property. One important design element is the need to reduce vehicle speed limits on local streets because the impact of traffic can be experienced beyond the immediate location. The *zone-of-influence* is an area over which vehicular traffic extends its influence, thereby negatively affecting safety and reducing social activities within the area. There is a correlation between the dimension of the zone with the traffic speed and volume. A case study conducted by Appleyard (1981) in San Francisco examined three different residential streets with different volumes of traffic; the first street carrying 2,000 vehicles per day (Light street), the second carrying 8,000 vehs/d (Medium street), and finally the third carrying 16,000 vehs/d (Heavy street) (Appleyard, 1981). His conclusions are as follow:

> There was a marked difference in the way these three streets were seen and used, especially by the young and the elderly. [...] Light street was a closely knit community whose residents made full use of their street. [...] Heavy street, on the other hand, had little or no sidewalk activity and was used solely as a corridor between the sanctuary of individual homes and the outside world. Residents kept very much to themselves. There was no feeling of two extremes. It was still quite an active social street, although there was no strong feeling of community and most activity was confined to the sidewalks where a finely sensed boundary separated pedestrians from traffic. [...] The contrast between the two streets was striking. On the one hand alienation, on the other friendliness and involvement. (Appleyard, 1981: 22-24)

The need for greater opportunities of social interactions at the local level also resonates at the community level. The roadway infrastructure of suburban communities is characterised mainly by wide and linear road layouts that supposedly provide greater safety. However, a wider roadway encourages greater vehicle speeds, and therefore eliminates pedestrian activities altogether. In order to travel within the community, or from one suburb to another, the only convenient mode is the private automobile. This forced pattern of commuting behaviour greatly impacts the social and economic dynamics of society. The percentage of the population who is physically and/or mentally unable to drive becomes segregated from society. With "baby boomers" moving into the 65 plus age group over the next few years, this transportation concern requires the provision of greater accessibility, so that the freedom to travel is not limited by their driving ability (Transport Canada, 2000). Current trends indicate that social isolation, derived from automobile-oriented planning and management policies, seriously affects the economic and social vitality of any suburban community (Newman and Kenworthy, 1999). Social isolation results in the inability to secure equal work opportunities, as well as many other opportunities society has to offer: "For the elderly and physically disabled, isolation can mean loneliness, depression, and inattention to health-care needs" (Cervero, 1998: 49).

The discussion in this section reveals some of the challenges that suburban communities face because of conventional transportation planning that prioritises automobile usage. Additionally, as presented in the following section, the separation of transportation planning from land-use further supports automobile-dependency.

2.1.2 Conventional Land-use Planning: An Investigation

As explored in the previous section, there are serious challenges that cities, particularly the suburbs, face as a consequence of the emphasis on planning for the automobile. This is further reflected in the practise of separating the administrations of land-use planning and transportation planning. Traditionally, land-use planning was done without much consideration for its impact on the transportation system. It was assumed by land-use planners and developers that the transportation system would eventually catch up with development. From the other perspective, transportation planning had assumed the fixed segregation of land use pattern for an area, and thereby did not consider the implication of the pattern resulting from the construction of a transportation link (Huang, 1996). The traffic congestion dilemma, discussed previously, is also a factor resulting from strict zoning by-laws that segregate residential from other commercial/industrial land-use developments. As evidenced in suburban communities, these clear-cut boundaries between land-uses necessitate daily commuting to and from the workplace. Consequently, freeways and high-speed arterial infrastructure have been constructed to service these dispersed workplaces (Wheeler, 1999). Gradually, urban sprawl became an important issue, with the advent of decentralised growth to the suburbs. As argued by Peter J. Smith, "suburban growth is everywhere treated as though it can be sustained indefinitely, which is a logical impossibility" (in Bunting and Filion, 2000: 322). The assumption is that there is an unlimited supply of land, which can sustain further suburban growth and developments. Particularly, in the case of a prairie region such as Winnipeg, there exists no geographical limitation to the city, and hence the perception is that the practical limits to growth are infinite.[1] "The whole idea of limits to

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[1] Winnipeg had a development limit prior to Unicity 1972, but was disregarded by political interests.

growth has received scant attention in Canada, and certainly no city has faced up to its long-term implications" (Bunting and Filion, 2000: 322).

There are concerns over decentralisation of suburban job markets, particularly when located in segregated business parks and industrial zones. As concluded by Pierce (1993) in his research on American suburbia as a prime workplace, there are "...environmental costs to all this. Among them are horrendous traffic, commutes that take hours instead of minutes, serious air pollution, loss of greenbelts and open spaces, and obliteration of community life" (Peirce, 1993: 28). Community life is defined as the social fabric of communities, and as Hall and Ward (1998) identified, is important to the preservation of community vitality. Supportively, the American Public Transit Association (1996) argues that the single most important factor weakening our sense of community is the lack of development on a human scale in our physical environment. There is a need to redirect attention to walkable communities where neighbours can meet and interact, which is what is absent in current suburban developments.

Another characteristic of urban sprawl is the inherent leap-frog developments occurring in many suburban communities, as developments move farther apart from the urban core and existing suburban centres (Bunting and Filion, 2000). Certainly in Winnipeg, urban sprawl has occurred because of leap-frog developments that extend infrastructure prematurely to remote locations. According to Leo (1999), there are three cost elements associated with the subdivision development – road infrastructure, municipal services, and parks or green space. The concern is that, initially, the developers assume all cost of infrastructure, and therefore the approval for development by the city is rather relaxed. However, with new suburban communities, new public schools are built at the expense of those in the inner city. Furthermore, the only means to maintain the infrastructure is by increasing the municipal tax. Consequently, according to Leo (1999),

people are fleeing the City of Winnipeg, and establishing residence in outlying municipalities because of lower municipal taxes. Winnipeg must continually deal with the problems of exurbanites who are using city services, but are not contributing to the costs incurred. Additionally, exurbanites working for the City of Winnipeg are redistributing their earnings to the surrounding municipalities.

There are many challenges that major cities are facing regarding the current sprawling urban form, affecting everything from the social concerns discussed previously, to how mass transit service is struggling within the automobile-dependent landscape. The question, raised by many authors (Cervero, 1998; Hall and Ward, 1998; Huang, 1996; Newman and Kenworthy, 1999; Polzin, 1999; Simonds, 1994), is whether the decline in transit patronage is an indication that the role of mass transit, in serving between suburban communities, is no longer required in this increasingly automobile-dependent society. The mass transit system becomes inadaptable to the current street layout and sprawling suburban neighbourhoods. For instance, the mass transit system in Winnipeg is suffering from low ridership with many 40-foot buses operating at less than half the carrying capacity during off-peak hours. Similar to the argument of limits to growth on urban sprawl and the inherent land consumption, there is also a physical limitation to transit service provisions. This limitation is a physical boundary beyond which transit service will prove to be uneconomical to operate. Additionally, low-density developments associated with urban sprawl will eventually make transit operational costs greatly exceed any revenues or subsidies, unless there is implementation of policies that foster transit-focused developments (Khistry et al., 1999). Hence, the proceeding section explores planning models that integrate transportation with land-use planning. Of particular importance is the investigation of planning models that support public transportation in suburban communities.

2.2 Transportation and Land-use Planning Models

In the previous section, discussion revolved around the challenges to major cities as a consequence of automobile-oriented planning and engineering. There has been a recent move, however, in the planning profession that addresses these concerns through a more integrative approach to transportation and land-use developments. It is realised that "in the absence of comprehensive planning, transportation has almost by default, guided land use. Instead, land-use planning should guide transportation, and transportation should be designed to accommodate and support planned growth, inducing the needed changes in urban form" (Roseland, 1998: 127). The definition of integrative transportation and land-use planning and development is to "use land-use planning as a means toward transportation policy ends" (Boarnet and Compin, 1998: 81). That is, to adopt a transportation planning agenda that favours alternative commuting options other than automobile travel and, consequently, uses land-use planning strategies to plan, implement, and monitor land developments.

It must be emphasized that the planning models explored in this section are certainly not new. In fact, the current planning movement is striving to return to human-scaled traditional neighbourhood projects, with an emphasis on mass transit modes in suburban communities. Newman and Kenworthy (1999) put forth the notion of adopting a "Transit City" design to address the current automobile-dependency. From roughly the 1860s, the traditional "Walking City" had failed to support the rapidly increasing population and industries. This led to the outward growth of many cities, from the introduction of railway lines, into what is known as a "Transit City", shown in Figure 2.2.

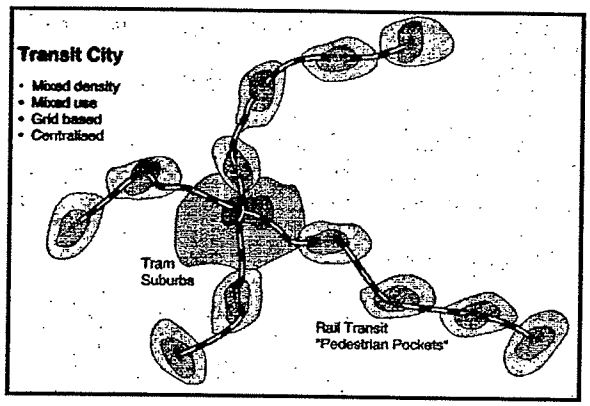

Figure 2.2: Transit City
Source: Newman & Kenworthy. Sustainability and Cities: Overcoming Automobile Dependence. Island Press, Washington D.C., 1999.

Tramways had allowed the development of linear transit corridors along the main streets. The rail transit service gave rise to centres around the suburban station. Through comprehensive land-use planning guidelines, all developments occurring at the different rail nodes were mixed-use with medium to high-density. At the local level, pedestrian-friendly planning allowed people to interact within these suburban communities. Following up on the "Transit City" idea, Cervero (1998) concludes from his worldwide study of transit cities, that retrofitting the existing landscape, using the concept of polycentrism, can better support transit-focused planning.

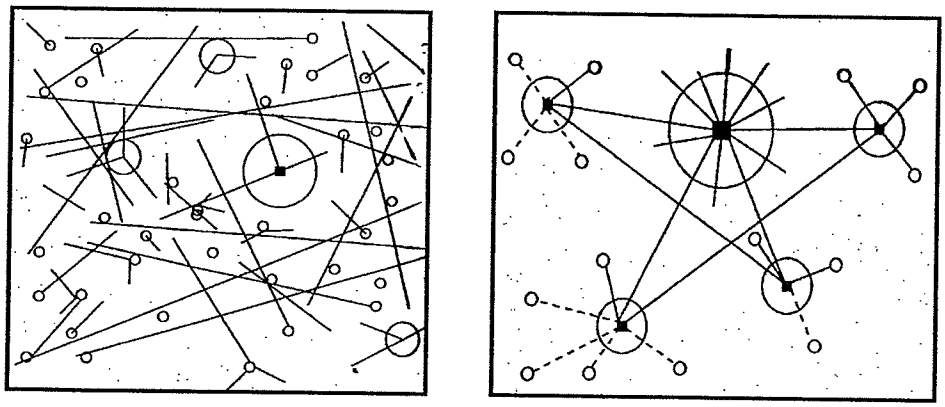

Figure 2.3: Transit and the Polycentric Urban Form
Source: Cervero, Robert. The Transit Metropolis: A Global Inquiry. Island Press, Washington D.C., 1998.

The left diagram of Figure 2.3 illustrates the typical commuting patterns of an automobile city, where trips seemingly go from anywhere to everywhere. The "polycentric urban form" model encourages growth patterns to move toward polycentrism, as shown in the figure on the right. The common layout consists of a major urban centre, acting as a hub, with satellite towns or communities that are connected by a regional transit system. Similar to the Transit City model discussed above, the centres are characterised mainly with high mixed-use density and pedestrian-friendly designs that foster greater potential for an integrated transit network. The only challenge to this type of land-use pattern is in transit service delivery, where there is a demand for proper transfer time between the main and feeder lines (Cervero, 1998). The means to achieve the polycentric urban form model is very complex, particularly in the suburban context. Many proponents of integrative land-use and transportation planning suggest the need for three complementary parameters of planning – density, diversity, and design – to achieve the necessary polycentric urban form. Thus, the following subsections explore the three parameters of planning in detail.

2.2.1 Density in Planning

In the previous discussion, the focus was on the integration of transportation planning with land-use measures to move towards more polycentric urban form. The polycentric urban form concept proposes means to interconnect suburban communities to each other as well as to the urban core. Density is defined as achieving greater concentration of developments in a certain area of land, preferably concentrating around a centre that is supported by transit services. The planning approach to counteract urban sprawl discussed in Section 2.1.2 is to regulate the density requirements of suburban developments. While land-use regulation has fostered urban sprawl and consequently greater travel distances between destinations in the past, Newman and Kenworthy

(1999) argue that these regulations are also a tool that can be used to discourage urban sprawl. However, it is imperative that investments in freeways or high-speed arterial roads be simultaneously re-evaluated. This strategy, known as urban growth management, employs zoning regulations that protect rural lands on the urban fringe. Urban growth management strategies also incorporate New Urbanism theories and practises in urban design (see discussions in Section 2.2.3). The theoretical strategies of urban growth management outline several important steps. First, Smith (in Bunting and Filion, 2000) recommends planners to identify areas with special character (e.g., greenbelts, prime agricultural land, etc.), and assess their importance, particularly the environmental impacts that a proposed development will have on the area. Once the sensitivity of an area has been identified, then relevant land-use policies need to be established to protect the area. There are many arguments raised against urban growth management strategies because it is believed that growth boundaries will cause the cost of development to rise. Particularly in the prairie region, the least expensive land to develop is in prime agricultural areas (Bunting and Filion, 2000). As a counterargument, Kevin Lynch suggests that one of the supportive measures to growth management is to extend public services on a phased basis, and not according to the demands of the developers (Banerjee and Southworth, 1990). According to Lynch, "find ways of levying the real public costs of extension directly onto the suburban developments that cause them – not only the initial construction costs, but the running costs" (Banerjee and Southworth, 1990: 744). Evidently, any suburban infrastructure development is costly and complex. Planners and designers must try to achieve maximum efficiency in the developments through increasing density of the land use (Bartuska and Young, 1994).

According to Smith (in Bunting and Filion, 2000), suburban developments should be self-supporting because suburbs must constantly remain in transition. That is, suburban communities

must be capable of adapting to social and economic changes. If a suburban neighbourhood is too narrowly defined by one type of land-use development, then with a given change in time (e.g., aging population, commercial downsizing, etc.), the neighbourhood will not be able to adapt. To address this issue, we draw upon the notion that suburbs themselves should be regarded as urban villages. The urban village model is frequently used in the literature to express the idea of self-sufficiency, and is associated with a centre or market that has the greatest density of land-use developments in the "village". An urban village adheres to the "Central Place Theory" whereby a pattern and order of relationships, an organisational mechanism, is assumed. According to Bartuska and Young, (1994), the Central Place Theory suggests that human settlements usually gravitate towards a link of cultural and/or commercial activity. In the suburban context, the Central Place Theory translates into concentrating intense developments around suburban town centres, with a mass transit system interconnecting suburban communities. However, as explored in the following discussion, complementing density is the much-needed diversity in land-use developments.

2.2.2 Diversity in Planning

In the previous discussion, one of the parameters supporting the land-use and transportation planning nexus is density. Equally important in suburban land development is the need to plan for diversity. Density planning encourages developments to occur within an urban centre, and, as a supportive measure, diversity planning explores the critical planning elements that exist within the boundary. One aspect of diversity is to provide a job-housing balance in the community. Many studies have examined the relationship between land-use types and the consequent transportation demand that arises. Levine (1998) conducted research to understand the implication of a job-housing balance as a transportation policy. The intent of Levine's (1998)

study was to demonstrate that the accessibility approach to addressing transportation management concerns, in suburban neighbourhoods, would result in better choices for land-use developments and reduce the need for automobile use. His conclusions revealed that, by establishing housing within reasonable distance from their workplace, people are motivated to relocate to the community. Furthermore, with the proper provision of transportation modes, the short travel distance between work and home encourages people to become less dependent on the automobile.

The diversity planning concept in land-use development is also relevant in transportation planning. As mentioned above, the job-housing balance approach to land-use will greatly reduce automobile-dependency. However, the challenge lies in exploring the methods that would encourage a more integrative land-use and transportation planning agenda. Cervero (1994) suggests one method called a joint development effort. The joint development effort is defined as "an arrangement between a public entity and a private individual or organisation that involves private-sector payments to the public entity...in mutual recognition of the enhanced real estate development potential...created by the siting of a public transit facility" (Cervero, 1994: 83-84). Cervero (1994) concluded from his study that land around urban transit stations induces high market values because of its accessibility and potential customers. The financial rewards near or around the stations have encouraged joint developments between the private and public sector. As for residential developments, there are opportunities for high-density development within walking distance from the transit stations. These transit stations can be considered as suburban town centres, as explored in the previous section. Additionally, joint developments between the public and private sectors may further support transit-based housing initiatives at these centres. It

is important to consider that partnerships between different interest groups are necessary to ensure a common goal and direction.

So far, the approach to integrative land-use and transportation development lies in planning for density and diversity developments. The following section will examine relevant community design standards that embrace both of these parameters.

2.2.3 Design in Planning

As a complement to the elements discussed above, this section examines the design aspect of planning that is critical for the urban village model to succeed. Prior to exploring the physical design standards and recommendations, it is worth looking at how various developments are interconnected. Wheeler (1999) introduces five criteria for development that must be met to achieve a unified urban form. The development should be contiguous, connected, compact, diverse, and fine-grained. Contiguous developments refer to adopting infill growth strategies between existing buildings to achieve continuous intensity in suburban communities. Moreover, connected development is needed to achieve good street networks that provide a visual and functional link between built-up areas.

> If development projects do not have good connections to one another, then a disjointed landscape is created in which walking, bicycling, public transit, and even driving are difficult, and in which residents are dissuaded from developing a sense of participation in and ownership of the broader urban environment. (Wheeler, 1998: 16)

The criterion of diverse development implies mixed-use development strategies to reduce daily automobile trips, as discussed previously. Complementing the diversity criterion is the need for fine-grained developments, consisting of smaller neighbourhood blocks and lot sizes to enhance the character of the community. Furthermore, fine-grained developments should

specifically meet the local needs of the community. Wheeler (1999) contends that the lack of diverse and fine-grained development in current suburban plans have negatively affected the community's vitality, because of the homogeneity in the built form. In new subdivisions, the crucial elements of a community (e.g., social interaction, diversity in resident types, activity-concentrated public spaces, etc.) are absent, in the typically sterile and monotonous suburban landscapes.

Assuming the acceptance of the principles put forth by Wheeler (1999), what are the design principles that respond to the need for more integrative transportation planning with land-use developments? There are two prominent principles in design that attempt to meet certain criteria such as concentrated density and mixed-use land developments in transit-focused centres: New Urbanism (NU) and Transit-Oriented Development (TOD). Both are discussed below.

a) New Urbanism (NU)

The principles of New Urbanism (NU) lie in a design approach to planning new or infill urban development. New Urbanism is considered an ideology by some, because the model resembles that of the early planning theorists such as Ebenezer Howard, Frederic Law Olmsted, Patrick Geddes. The intent is to use spatial relations to create a close-knit social community that encourages different elements of a community to interact. Critics of New Urbanist principles argue that New Urbanism relies too heavily on design principles as the primary planning tool, and assumes that guidelines will be interchangeable with municipal codes. Furthermore, there is criticism against New Urbanists' claim that NU is distinctly different from the current suburban design and development. As Moe and Wilkie (in Larsen, 1999) indicate, the tendency of New Urbanism to implement subdivision plans on the periphery of urban centres has signified that the model is another form of suburban sprawl. On the contrary, New Urbanism introduces careful planning of pedestrian- and transit-friendly designs in the inevitable new subdivisions.

There are ten guiding principles of New Urbanism, listed on their website, that can be applied to projects of differing scales.

The Principles of New Urbanism	
1. Walkability	6. Traditional Neighbourhood Structure
2. Connectivity	7. Increased Density
3. Mixed-Use & Diversity	8. Smart Transportation
4. Mixed Housing	9. Sustainability
5. Quality Architecture & Urban Design	10. Quality of Life

Table 2.1: Ten Principles of New Urbanism
Source: http://www.newurbanism.org/pages/416429/index.htm.

The majority of the principles advocate the need for density and mixed-use developments in a compact neighbourhood structure, similar to the points raised earlier on in this chapter. A notable recommendation by New Urbanism is *Transect* planning (under Principle #6: Traditional Neighbourhood Structure), which advocates the greatest density development at the town centres, with decreasing density towards the edge. The town centre concept is as Humphrey Carver (1962) recommended in his book entitled *Cities in the Suburbs*. Carver advised that suburban town centres should not merely be a regional shopping centre that "has come to be divorced from the other elements of community life" (Carver, 1962: 74). Thus, in following this principle, "transect is an analytical system that conceptualizes mutually reinforcing elements, creating a series of specific natural habitats and/or urban lifestyle settings" (available: http://www.newurbanism.org/pages/416429/index.htm). This planning model integrates environmental or natural planning methodologies with community design, "enabling environmentalists to access the design of the human habitat and the urbanists to support the viability of nature" (available: http://www.newurbanism.org/pages/416429/index.htm). By taking a more holistic approach to community design that reflects human-scaled planning, NU introduces a scale that reflects more of the community and its residents. NU advocates the restructuring of policy frameworks to support different criteria of neighbourhood diversity in land use and population, transportation alternatives

for daily commuting, and community design that increases the cultural and historical significance of the community.

b) Transit-Oriented Development (TOD)

Transit-Oriented Development (TOD) is a design tool more specifically conceived to integrate transportation planning with land-use developments. TOD is a "tool kit" of policies under the same umbrella as growth management. Boarnet, et al. (1998) argues that TOD practises are mainly rail transit-focused developments that interconnect suburban communities within a large city environment. There are two prominent characteristics of TOD projects. First, as advocated by Calthorpe (1993), the design principles support centralised high-density, mixed-use developments. These developments will foster community-oriented growth through the design of pedestrian-friendly urban form. Secondly, TOD encourages development to occur near or around rail transit centres, as discussed by Bernick and Cervero (1997).

The practises of TOD vary among planners. Boarnet et al. (1998) adopt zoning and land-use regulations to ensure higher developments along transit corridors. Calthorpe advocates that "average residential densities within TODs should be at least ten dwelling units per acre for neighbourhood TODs and at least 15 dwelling units per acre for more centrally located, or urban, TODs" (in Peirce, 1993: 5), that is, densities in the centres should roughly be double the surrounding neighbourhoods. Examples of successful TOD can be found in several suburban communities that have concentrated activities around transit nodes. In many of these suburban town centres, the focus is on transit-supportive designs that integrate employment with services and other social activities. The suburban centres have achieved a substantial volume of transit ridership because of design policies that encourage cluster developments for easier access.

As Huang (1996) advocates, another practise of TOD is to identify land that would create economic benefits from the integrative land-use and transportation planning. Huang (1996) proposes the "location" theory whereby planners would select transit corridors and stations based on their potential for growth and development, in addition to serving existing areas. This planning model is most appropriate in current commercial locations, which are characterised mainly by strip malls and/or big box retailers. The challenge lies in preparing existing commercial land-use layouts for future intensification and, more importantly, to support public transportation. Prior to conceptualising any design standards or policies, Belzer and Autler (2002) suggest shifting the focus from physical to functional planning. The shift is important because, currently, there is too much emphasis on evaluating projects based on physical measures. Belzer and Autler (2002) argue that people with Not-In-My-Backyard (NIMBY) attitudes will not support density developments given the spatial reasoning. However, from the functional planning perspective, density is more desirable as the provision of amenities will be concentrated and easily accessed. Through functional planning, more intense land-use developments are possible because the functions of these developments can be coordinated to share the land space (Belzer and Autler, 2002). As an example, functional planning can be used as a controlling element in the parking design of a commercial area. Table 2.2 specifies that a movie theatre requires 0.35 parking spaces per seat.

Building Type	Unit	Spaces
Office Park	per 1000 sq. ft.	3.3
Retail (medium size)	per 1000 sq. ft.	5
Single Family Dwellings	House	2
Apartments	Unit	1.5
Convention Hotel	Unit	1.2
Hospitals	Bed	2.5
Theatres	per seat	0.35

Table 2.2: Typical Zoning Requirements for Off-Street Parking
Source: Litman, Todd. Land Use Impact Costs of Transportation. 2000.

However, the peak operating hours of a theatre usually occur during the evenings, thus resulting in the parking spaces being underused during the rest of the day. Calthorpe (1993) suggests that an alternative to the physical standards in parking design is to coordinate the functions of activities so that the different peak hours of these activities can be better managed. For instance, the construction of office buildings can be encouraged to better support the activities of the theatre because the hours of operation differ during the day (Calthorpe, 1993; 2001). This difference in operating hours will accommodate the necessary parking requirements, without the need for separate parking lots. Intensification is key in Transit-Oriented Developments, particularly at major commercial locations. The redesign of big box retail and parking facilities can achieve greater accessibility, as shown in Figure 2.4.

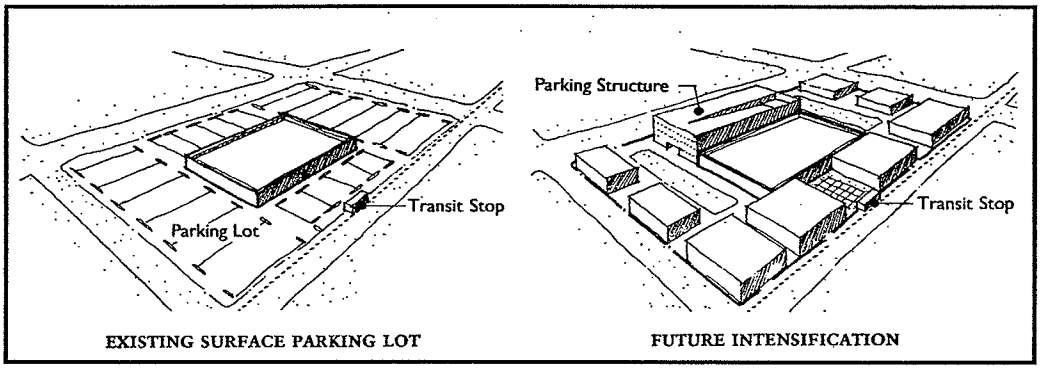

Figure 2.4: Future Intensification of Major Shopping Malls/Transit Nodes
Source: Calthorpe, Peter. The Next American Metropolis: Ecology, Community, and the American Dream. New York: Princeton Architectural Press, 1993.

So far, the discussion in this chapter has revolved around planning models that support the much-needed integration of transportation planning with land-uses developments. The following section will examine the manner in which these planning models have, if at all, influenced master plans in Winnipeg.

2.3 Current Plans for Change

Given the choice of approaches and models, which of these could best be adopted to guide future suburban planning? Many major Canadian cities are facing the same crisis and many are addressing these transportation and land-use concerns through master plans. This section uses Winnipeg as an example to study current changes in comprehensive plans that seem to parallel the models of this chapter.[2]

There have been many efforts in Winnipeg to redirect attention towards greater commitment to integrative transportation and land-use planning. The most prominent evidence is the *Plan Winnipeg 2020 Vision* (City of Winnipeg, 2000), which identified key policies that are framed around land-use development with concomitant public transportation means. Table 2.3 highlights critical "policy plates" that are pertinent to suburban planning. Several of the policies outlined in the plan are associated with the need for density planning and compact urban form, as discussed in Section 2.2.1. In particular, it is specified that higher densities and infill should be focused preferably at, or near, regional commercial centres. This direction in policy is an appropriate step to better counteract urban sprawl, land consumption, automobile-dependency, etc.

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[2] It should be noted that the purpose of this section is only to discuss visionary plans and policies, and not specific projects. The actual application of methods will be investigated in the case studies in Chapter 3.

Policy Plate	Objectives
3A Planning for Growth and Change 3A-01 Promote Orderly Development	▪ Considering the Neighbourhood designation to signify areas of local identity with mutually supportive uses generally including a residential mix together with a variety of educational, recreational, institutional, commercial, and possibly industrial uses, at a scale and density compatible with each other
3A-02 Promote Compact Urban Form	▪ Meeting transportation demand in ways which reduce reliance on the automobile, improve integration of transportation modes, and improve effectiveness of the existing transportation system ▪ Supporting new development which is adjacent to, and compatible with existing development and which is designed to minimize the spatial use of land
3B Guiding Land Use 3B-05 Promote Commercial Densification	▪ Encouraging the redevelopment, infill, and expansion of existing commercial areas as the preferred method of accommodating new commercial development ▪ Ensuring that areas of regional commercial and mixed-use concentration be designed and built as focal points for pubic transit
3C Integrating Transportation 3C-01 Provide Integrated Transportation Network	▪ Designing public rights-of-way to encourage pedestrian use through adequate lighting for safety and security, aesthetics, and comfort ▪ Minimizing walking distances to transit in the planning of new developments and making transit connections quick, easy and weather-protected ▪ Promoting alternative modes of transportation through the inclusion of transit routes and bicycle paths in transportation plans and in the design of new developments.

Table 2.3: Winnipeg's Planning Policy Plates
Source: City of Winnipeg. Plan Winnipeg 2020 Vision. 2000.

There are other proposals in Winnipeg that are note-worthy. Although they are separate from the land-use planning initiatives, they do serve as a supportive measure to the *Plan Winnipeg 2020 Vision* (City of Winnipeg, 2000). First, the document entitled *Direction to the Future: The Guide to Better Transit for Winnipeg* (City of Winnipeg, 2000) recognised several key priority measures in transit service productivity, and funding resources. One notable recommendation includes the expansion of the park-and-ride program. "The Park and Ride program should be expanded, particularly in the Portage Avenue, Pembina Highway, and Henderson Highway corridors" (City of Winnipeg, 200: 39). Park-and-ride facilities are a remedy to traffic congestion when the roadways are no longer expanded to accommodate the traffic demand. However, given Winnipeg's transportation situation, there continues to be sufficient road space available in major parts of the transportation network, and with the continual support for road infrastructure

expansion, the transit system remains less competitive with the private automobile. As argued by Calthorpe (1993; 2001), park-and-ride facilities are most effective near TODs with high-density residential and commercial activities.

One other significant transportation planning initiative is the *Winnipeg TransPlan 2010* (City of Winnipeg, 1998) study that was accomplished through public participation during a two-year period. The *TransPlan 2010* study introduces a planning concept called the TransPlanning model, which provides the public with a framework to assist in visualising their priorities in future transportation demand in Winnipeg. The consensus among the participants was that an immediate increase in the existing budget for road maintenance should be made top priority. While *TransPlan 2010* (City of Winnipeg, 1998) should be commended for the public participation process involved, the emphasis is still placed on automobile commuting. As outlined in the document, transit planning continues to play a subservient role, confining itself only to service provisions.

In the *Winnipeg TransPlan 2010* document, the definition of sustainable transportation planning did not appear until the second part of the document. There are two main concerns in the areas of sustainable development, with the first relating to environmental issues, as discussed earlier. The second is "the effect of City and regional land use and development patterns in determining the demand for transportation facilities and services" (City of Winnipeg, 1998: 102). Priority is given to roadway expansion, mainly by the widening and addition of vehicular lanes. Even at the regional scale, proposals for the upgrades of key provincial highways contradict the growth management principles, discussed previously. It is important to consider regional development in order to achieve a certain level of consistency in planning. According to Calthorpe (1993; 2001), regional transportation planning provides an opportunity to encourage transit planning and development: "The Regional Plans resemble the urban patterns generated when

trolley dominated our cities and streetcar suburbs developed at the periphery. But [the] pattern is not simply a return to the past; it is the consequence of contemporary forces" (Calthorpe, 1993: 118). Furthermore, the basic principle behind the Regional Plans is that growth occurs at suburban nodes, where there are opportunities for greater transit-focused developments.

2.4 Conclusions

The purpose of this chapter was to explore the role of conventional planning for mobility as it has affected suburban form and the livability of neighbourhoods. By favouring automobile commuting, transportation planning and engineering standards have impeded commuting by other modes (as discussed in Section 2.1.1). Individuals who are not able to drive become marginalised; thus raising the concern of social isolation and unequal opportunities for employment. As discussed in Section 2.1.2, the separation of transportation and land-use planning tended to exacerbate urban sprawl and the inherent land consumption. Moreover, zoning regulations, which segregate land-use types, increase the need to travel greater distances between employment, residence, and other loci of urban activity.

Many prominent advocates of integrative land-use and transportation planning suggest returning to traditional planning principles framed around mass transit developments. Newman and Kenworthy (1999) suggest pursuing a Transit City model, where suburban communities are interconnected by a mass transit system. Supportively, Cervero (1998) puts forth the notion of a polycentric urban form that identifies key transit stations to achieve dense, mixed-use developments. It is important that a job-housing balance be provided at these transit nodes to induce non-motorised work trips. Furthermore, developments must be contiguous, connected, compact, diverse, and fine-grained, in order to ensure a transit-friendly environment (Wheeler, 1999).

Three complementary criteria of planning have been explored in this chapter – density, diversity, and design. To re-emphasize, the three criteria are equally important, and must be met to ensure that developments support public transportation. Urban growth management is intimately tied to density planning. As discussed in Section 2.2.1, growth management strategies involve protecting natural land areas from development, and consequently endeavour to regulate against sprawl. According to Central Place Theory, higher densities develop at or near the centre of urban activity, and this is precisely where planners endeavour to encourage high density development. In addition, planners pursue diversity in planning by promoting mixed-uses near these urban centres to reduce the need for commuting great distances to places of employment, as discussed in Section 2.2.2. Design in planning is advocated by the principles of New Urbanism (NU) and Transit-Oriented Development (TOD). Both the NU and TOD principles encourage traditional neighbourhood designs to foster mass transit commuting. The most critical element in TOD is the functional design of developments. The approach is to manage mixed-use developments according to their function, instead of focusing exclusively on the physical layout of structures and the required parking spaces. Depending on the function of the facilities, the objective is to coordinate their activities so that parking spaces are used efficiently during daytime hours (see Section 2.2.3). These activities encompass all types of commercial, residential, and employment opportunities, as suggested in the job-housing balance model.

The final section of this chapter examined current master plans in Winnipeg to illustrate how the city intends to deal with the land-use and transportation-related problems. There is encouraging evidence in the *Plan Winnipeg 2020 Vision* (City of Winnipeg, 2000) document that suggests Winnipeg is embracing the planning models outlined in this chapter. The challenge,

however, is to translate these planning models into practise, and this is the focus of the case studies presented in the next chapter.

Chapter 3: Case Studies

In the previous chapter, the discussion involved the examination of current planning models that direct attention towards compact mixed-use developments. The intent of this chapter is to explore existing case studies, in search of precedents, which will form the basis for developing guiding principles. These principles will provide the framework for the Charleswood study. The chapter includes five case studies of major cities and/or their surrounding areas: McKenzie Towne, Copenhagen, Portland, Toronto and its surrounding municipalities, and the Greater Vancouver Regional District. The discussion of the selected case studies is structured as follows: first, the current problems will be introduced, followed by the city's innovations and implemented solutions.

3.1 McKenzie Towne, Calgary, Alberta

3.1.1 Introduction

The sources used in this case study include: an *Outline Plan For East McKenzie by the City of Calgary; Contemporary Planning – Issues and Innovations* by *Walter Jamieson, Adela Cosijn, and Susan Friesen*; and a website developed by Demographia (http//www.demographia.com/db-mckenzietowne.htm). The McKenzie Towne case study is different from other cities identified in this chapter because it is a new suburb of Calgary, Alberta. While the focus of the practicum is Charleswood (a mature suburban district of Winnipeg), the study of McKenzie Towne assists in understanding the strengths and weaknesses of the development, which may be relevant to future growth in Charleswood.

3.1.2 Innovations and Solutions

The suburban community of McKenzie Towne is located in the southeast corner of Calgary. It comprises 13 neighbourhood units or villages that will be completed over roughly 15 to 20 years. Duany and Plater-Zyberk are the architects who conceptually drafted McKenzie Towne to fit the town centre model, as shown in Figure 3.1. Evidently, the size of each village is determined by its area, rather than its population (City of Calgary, 1993). The maximum radius from the central square is approximately 450 metres, which is the distance that most people can comfortably walk within five minutes. As Jamieson et al. (in Bunting and Filion, 2000) argue, the spatial definition is associated with the need for human-scaled development that ideally allows people to interact without dependence on automobile (as discussed in Section 2.1.2).

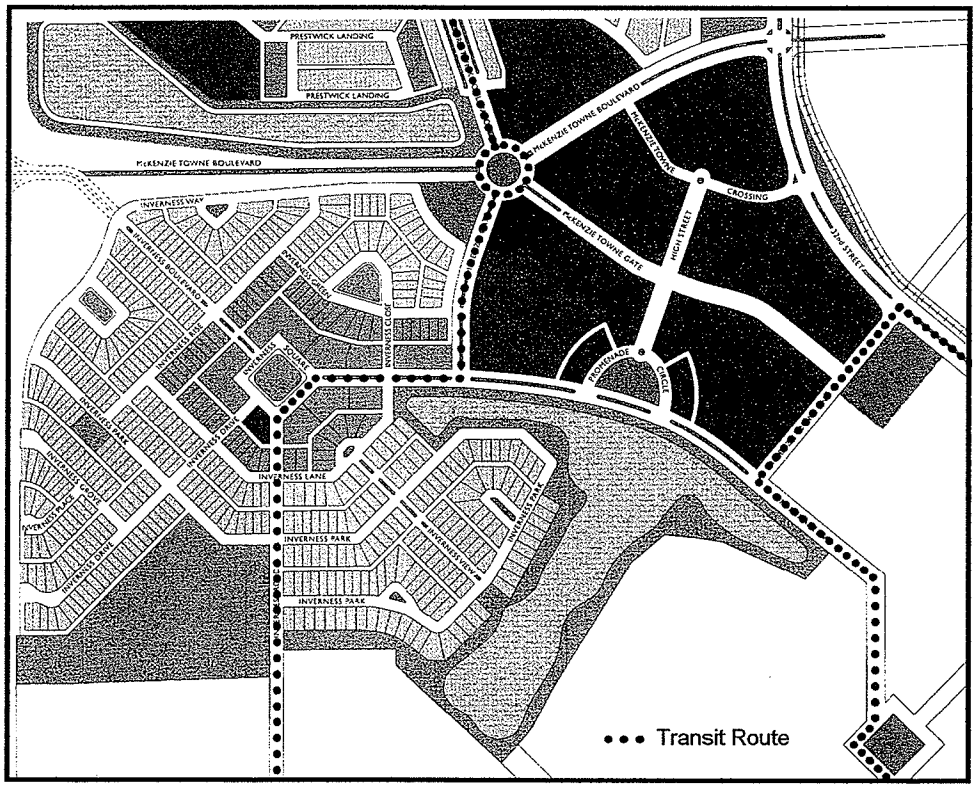

Figure 3.1: The Town Centre of Inverness in McKenzie Towne
Source: Bunting and Filion, eds. Canadian Cities In Transition: The Twenty-First Century. Oxford University Press, 2000.

Jamieson et al. commend the street layout in McKenzie Towne. The design of the streets emphasizes pedestrian comfort and safety, with shorter block lengths and narrower than city-wide standards of local roads. Additionally, the spatial design of neighbourhood boundaries complements transit patronage because of the 450-metre radius around the town centre. As recommended in the comprehensive plan, this 5-minute walking distance to the town centre concentrates transit ridership at a bus stop, which is conveniently located in the neighbourhood grocery store. The ambitious plan to give priority to public transportation is further evidenced in the following discussion:

> The comprehensive plan for McKenzie Towne provides for a light-rail transit (LRT) station at the heart of the town centre when subsequent phases are built. This concept is congruent with a "subset" of new urbanism, the so-called "transit village" which takes its inspiration from the railway- and streetcar-focused settlement patterns of the early-twentieth century. However, development of the town centre and extension of Calgary's LRT network lie some distance in the future. (Jamieson et al., 2000: 470)

The intention to connect McKenzie Towne with the rest of the city is the most logical step towards increasing transit patronage; however, it seems that the conventional phases of development may hinder the anticipated ridership. Many prominent advocates of rail-transit planning and development argue that to induce transit patronage, transit services must be available at the onset before people have established their commuting behaviour. A review of McKenzie Towne by Demographia (source: http//www.demographia.com/db-mckenzietowne.htm) reveals that only 10.4 percent of work trips are by mass transit as compared to 12.6 percent for the rest of Calgary. More discouraging is the fact McKenzie Towne's automobile ownership is approximately 1.91 per household, while the average for Alberta is 1.5.

> Even when fully built out, it is likely that nearly as many vehicle trips per capita will be produced in McKenzie Towne...It is likely that the overwhelming majority of work, shopping and other trips will take residents outside this community that is just as inopportunely located relative to Calgary's activity centres as adjacent conventional suburban developments. Beneath its traditional, retro design core beats the heart of suburbia. (source: http//www.demographia.com/db-mckenzietowne.htm)

The high percentage of automobile ownership is due to the current limitation in transit services in the community. There are only two limited bus services during the peak hours of the day, with no service during mid-day hours. From the conventional transit-planning perspective, transit services cannot be provided unless a certain level of ridership is achieved; thus, the gradual implementation of the transit system and services are expected to occur in subsequent phases of development. However, given that currently transit services are very limited, residents in the community will resort to other types of transportation – mainly the automobile. In the mean-time, the travel behaviour of residents will be set and thus will be difficult to change. "The eventual development of the town centre, complete with an LRT station, may remedy this shortcoming. But for the time being, no matter how transit-supportive, walkable, safe, pleasant, and community-oriented McKenzie Towne is intended to be, the private automobile remains most residents' chosen means of transportation to their distant places of employment, shopping, and recreation" (Jamieson et al., 2000: 471).

To many proponents of McKenzie Towne, it is considered a neo-traditional community that encompasses all of the new planning models discussed in the previous chapter (e.g., New Urbanism, Transit-Oriented Development, urban village, transit nodes, etc.). The comprehensive plan for McKenzie Towne has outlined design principles that would increase neighbourhood diversity and vitality, in terms of population and employment (City of Calgary, 1993). However, statistics show that McKenzie Towne has a homogeneous population (source:

http//www.demographia.com/db-mckenzietowne.htm). According to the same source, McKenzie Towne seems to be a success only in the architectural design sense and nothing more. The community certainly lacks two of the three parameters of planning, namely density and diversity in land-use types. There is practically no employment to attract the middle-income people living in the community. Furthermore, because of its location, McKenzie Towne is rather remote from other major hubs of employment; consequently, residents must commute great distances to work, mainly by car (source: http//www.demographia.com/db-mckenzietowne.htm).

On a final note, although successful at first glance, the design of the community appears to put greater emphasis on the physical form than on functionality. For instance, the neighbourhood square includes a grocery store so that residents can make grocery purchases on foot. However, as Demographia reveals, a large proportion of walking trips made to the local store is mostly for picking up items from the mailbox (located in the store) rather than grocery purchases (source: http//www.demographia.com/db-mckenzietowne.htm). As discussed in Section 2.2.3, it is important to coordinate different functions or activities in the square so that it plays a more critical role in the community, and not just for aesthetic purposes.

3.1.3 Summary

In summary, the planning of McKenzie Towne is mainly a physical design approach. In adopting many of the New Urbanist design concepts, there are a few notable achievements of McKenzie Towne, and they include:

1. A human-scaled community environment;
2. A village size that is derived by using a spatial parameter rather than population;
3. A transportation street network design that emphasizes pedestrian comfort and safety (with shorter block lengths and narrower than city-wide standards of local roads); and

4. Transit-focused developments that include, for example, 5-minute walking distances to the town centre where transit ridership is concentrated at a bus stop (conveniently located in the neighbourhood grocery store).

3.2 Copenhagen, Denmark

3.2.1 Introduction

The discussion of this case study is derived from the following sources: *Planning Canadian Communities – An Introduction to the Principles, Practice and Participants, by Gerald Hodge (1998); Transit Metropolis – A Global Inquiry by Robert Cervero (1998);* and *Sustainability and Cities – Overcoming Automobile Dependence, by Peter Newman and Jeffrey Kenworthy (1999).* In Copenhagen, careful planning through the integration of rail transit and urban development began with the establishment of the so-called *Finger Plan* in 1947, as shown in Figure 3.2. The main objective of the plan was to focus suburban developments along well-defined corridors so that the region's work force could commute by rail transit (Hodge, 1998). However, over the last three decades, Copenhagen's concept of the *Finger Plan* has seen serious threats due to decentralization.

According to Cervero (1998), planners of the *Finger Plan* were too optimistic in forecasting the anticipated growth along the corridor, thus making the plan contradictory to evolving conditions. Furthermore, with the rise of automobile ownership, the *1973 Regional Plan* had been revised to reflect greater encouragement of large centres that are distributed throughout the entire region, rather than along the corridor. As revealed in the following section, current initiatives, particularly transit-focused developments in the suburbs, are redirecting planning back towards the original *Finger Plan.*

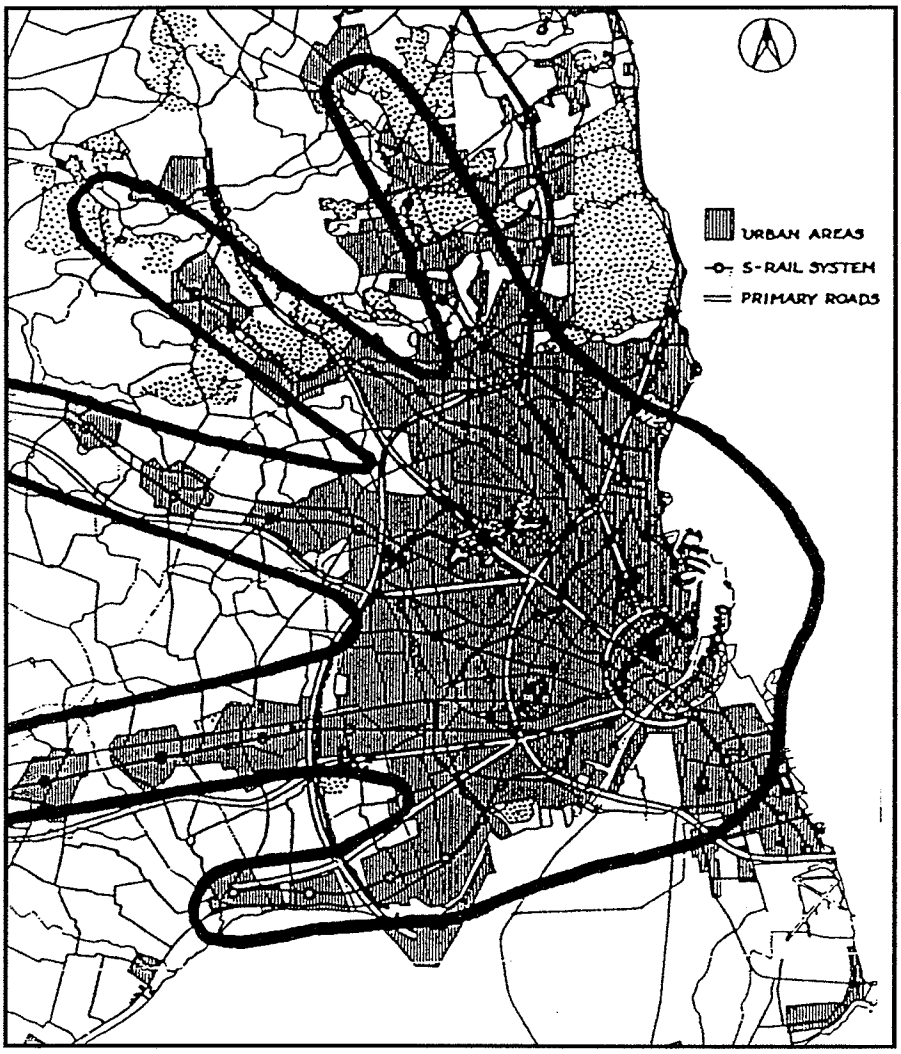

Figure 3.2: The Finger Plan of Copenhagen (1947)
Source: Cervero, Robert. The Transit Metropolis: A Global Inquiry. Island Press, Washington D.C., 1998.

3.2.2 Innovations and Solutions

In response to the decentralisation of growth and development, "regional planners have begun a process of shoring up and indeed reaffirming many of the principles of the original *Finger Plan*, especially those related to Transit-Oriented Development. The importance of public transit, in both a narrow passenger-carrying sense and a broader environmental context, has been stressed at all planning levels in recent years" (Cervero, 1998: 146). Particularly in the suburbs, one of the efforts to sustain the regional transit patronage was to encourage the development of

transit nodes. To achieve this, the concept of identifying and preserving greenbelts, from the original *Finger Plan*, was reintroduced to prevent sprawl. Consequently, suburban communities that are developed between these green wedges are intentionally planned in such a way that they are self-contained – defined by a job-housing balance in land-use planning and development. Furthermore, commuting within the new towns is readily possible because of well-integrated pedestrian and cycle networks (Cervero, 1998; Newman and Kenworthy, 1999). It is argued by many supporters of Copenhagen, that transit-focused planning in suburbia would never have been realised without strong regional governance and commitment to the original principles of the *Finger Plan*.

3.2.3 Summary

In summary, through comprehensive planning of the 1947 *Finger Plan* that focused on integrating regional rail transit planning with urban development, Copenhagen has managed to control growth in the suburbs. As discussed above, the accomplishments of Copenhagen include:

1. Focusing suburban development along well-defined corridors for easier access to employment by transit;
2. Using greenbelt preservation as a means to contain the sprawl of suburban towns and, consequently, making them more self-sufficient;
3. Supporting greater public transportation choices with well-integrated pedestrian and cycle networks; and
4. Serving as an example of strong regional governance influencing planning.

3.3 Portland, Oregon

3.3.1 Introduction

The sources used in this case study include: *Transit Metropolis – A Global Inquiry* by *Robert Cervero (1998)*; *The Regional City* by Peter *Calthorpe and William Fulton (2001)*; and a conference paper by *Stephen Wheeler (1999) on The Evolution of Urban Form in Portland and Toronto – Lessons for Growth Management and Livability*. Portland, Oregon, is pursuing planning strategies similar to those of Copenhagen, namely to control sprawling development. As shown in Table 3.1, the physical form of Portland's suburbs evolved from the streetcar technology to post-war automobile directed growth.

URBAN FABRIC	YEARS	DOMINANT PHYSICAL FORMS
The 19th Century Core	1843-1880s	200'x200' square block grid
The Streetcar Suburb / Garden Suburbs	1880s-1920s	Rectangular block grid with blocks usually 400'-500' long, plus some early garden suburb experiments. Retail in main street corridors.
Early 20th Century Expansion	1920s-1950s	Degenerate grid on flatlands; curvilinear winding streets in the hills.
Post-War Automobile Suburbs	1950s-present	Curvilinear streets within an arterial supergrid; an increasing number of cul-de-sacs; growing segregation of land uses.
New Urbanist Suburbs	1990-present	A few model communities with denser, more fine-grained, grid-like forms and many street connections. Under regional growth management policies, traditional subdivisions are incorporating higher densities, more multi-family construction, transit-oriented development, neighbourhood centres, and pedestrian-oriented design.

Table 3.1: Phases of Development in Portland
Source: Wheeler, Stephen. The Evolution of Urban Form in Portland and Toronto: Lessons for Growth Management and Livability. A Conference Paper at the 1999 Association of Collegiate Schools of Planning, 1999.

Wheeler (1999) contends that during the 1950s to the present, suburban developments have been a mix of fragmented long and curvilinear streets and cul-de-sacs. Evidently, the number of cul-de-sacs has steadily increased through the 1990s, making dead-end streets a characteristic of suburban design. Prior to the establishment of the *Region 2040 Plan*, the City of Portland had followed the typical segregated land-use and transportation planning model of many American cities. With the relatively flat topography in the western part of the city, Portland is facing similar

problems of urban sprawl and leapfrog developments as Winnipeg. Hence, Portland needed to redirect its planning policy framework to support sustainable development.

3.3.2 Innovations and Solutions

Greater Portland has achieved some degree of transit and land-use planning integration, through a metropolitan governance structure. The establishment of Portland's Metropolitan government (known as Metro) in 1978, was expanded in 1990 to become the first elected regional government in the United States (Cervero, 1998). One of the authorities invested in Metro is the ability to veto municipal zoning decisions that are not consistent with the overall regional planning goals. According to Cervero (1998), strong coalitions between local governments, business communities, environmentalists, and citizen-organised groups have resulted in the development of *Region 2040 Plan* with an outlined growth strategy, known as *Framework 2040* (future growth with transit-supportive developments in regional centres).

Calthorpe and Fulton (2001) put forth that Portland's success can be attributed to its long-term planning initiatives such as the Urban Growth Boundary, traffic and parking management, housing, municipal services, etc. The complementary *2040 Functional Plan*, developed by Metro, is a device to implement the *2040 Framework Plan*. The *Functional Plan* consists of eleven critical elements that provide different recommendations. These recommendations range from general advocacy for housing and job growth within municipalities, to specific references such as parking constraints. The plan outlines two choices in dealing with development: "a standard option, which is prescriptive, and a local option, which allows the individual jurisdiction wide latitude to find its own means to achieve the desired results" (Calthorpe and Fulton, 2001: 121). These options are particularly critical in supporting the Transit-Oriented Development (TOD), because proper zoning can be used to encourage greater flexibility in planning for higher density development. For

instance, one of a number of elements of the *Functional Plan* identifies housing and employment requirements, which advocates the establishment of target capacities. From an analysis of the character of a suburban town or community (i.e., its location, role in the region, infill capacities, etc.), the suburban town has the choice to zone for a range of development densities, and consequently establish an average minimum density for each development plan: "The fundamental shift was to move to zoning codes that set minimums as well as maximums [in density requirement]. A place could actually have too little development as well as too much" (Calthorpe and Fulton, 2001: 122). The different proportions of density can further support the TOD principles discussed in Chapter 2. Evidently, businesses in suburban town centres that have high densities are profiting from increased pedestrian traffic, generated by the regional rail transit service.

3.3.3 Summary

In summary, the expansion of the Metro Portland authority from a municipal government to a regional structure in 1990 gives indication of its importance in influencing regional and local planning. To be consistent with overall regional planning goals, Metro has the ability to veto municipal zoning decisions on particular proposals for development. Among the notable accomplishments of Metro, such as the Urban Growth Boundary and traffic/parking management, the regional comprehensive plans advocate flexible planning. That is, local government has the flexibility to set different zoning densities according to their needs. As discussed above, this type of zoning will allow greater concentration of developments to occur near or at transit stations.

3.4 Toronto, Ontario and Surroundings

3.4.1 Introduction

The Toronto case study is based on sources that include: *Central and Suburban Downtowns* by *Gunter Gad and Malcolm Matthew*; *Contemporary Planning – Issues and Innovations* by *Walter Jamieson, Adela Cosijn, and Susan Friesen (in Bunting and Filion, 2000)*; *Transit Metropolis – A Global Inquiry* by *Robert Cervero (1998)*; *Sustainability and Cities – Overcoming Automobile Dependence by Peter Newman and Jeffrey Kenworthy (1999)*; *The US and Us* by *Tamim Raad and Jeff Kenworthy (1998)*; *Car Culture Is Alive and Well* by *Janice Etter (2002)*; *Transit's Lost Decade – Rocket Riders to the Rescue* by *Mike Olivier and Gord Perks (2002)*; the conference paper by *Stephen Wheeler (1999) on The Evolution of Urban Form in Portland and Toronto – Lessons for Growth Management and Livability.*

The development of the physical form of the city is as shown in Table 3.2; it grew from the 19th century core, which was mainly surrounded by small farming communities or "Hogtown". According to Wheeler (1999), the growth pattern of Toronto has occurred in a more orderly fashion than Portland because of stricter provincial control over leapfrog development.[3] The control of suburban growth can be attributed in part to an upper-tier government known as the Regional Municipality of Metropolitan Toronto (or Metro), which was created in 1954 to reconcile the demands of Toronto and regional suburban growth. As Raad and Kenworthy (1998) suggest, Metro was one of the most innovative and successful example of urban governance in North America. "A two-tier system of governance offered the region the best of both worlds: Metro was

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[3] Leapfrog development is defined as discontinuous growth that occurs when developers want to benefit from the development of remote land.

able to plan regionally significant services and infrastructure, while the lower-tier municipalities were able to cater to local needs and preferences in the provision of libraries, parks and the like" (Raad and Kenworthy, 1998: 18). One of the significant responsibilities of Metro was the operation of the Toronto Transit Commission (TTC) that, according to Etter (2002), has been known as one of the premier public transit systems in North America.

URBAN FABRIC	YEARS	DOMINANT PHYSICAL FORMS
The 19th Century Core	1793-1880s	A coarse grid with long, rectangular blocks in somewhat irregular patterns, with many alleys. Many streets do not connect. Retail in "main street" corridors.
The Streetcar Suburb / Garden Suburbs	1880s-1930s	Coarse grid continued; modest departures from the grid such as subdivisions using "warped parallels" or "fragmented parallels".
Post-War Automobile Suburbs	1940s-present	Curving loop roads inside an arterial supergrid; inward-focused subdivisions; fewer road connections; retail in malls; industrial and commercial uses segregated.
New Urbanist Suburbs	1990s-present	Denser, more fine-grained, grid-like forms with many street connections. Pedestrian-oriented streets and village centres. Narrow, deep building lots with many alleys.

Table 3.2: Phases of Development in Toronto
Source: Wheeler, Stephen. The Evolution of Urban Form in Portland and Toronto: Lessons for Growth Management and Livability. A Conference Paper at the 1999 Association of Collegiate Schools of Planning, 1999.

Metro ceased to exist after the amalgamation of seven municipal governments with Greater Toronto in 1997; consequently, the planning for dense and mixed-use development in Toronto is increasingly being challenged. According to Etter (2002), the amalgamation has increased existing tensions because of the differences in land-use formation. Toronto and the earlier suburbs are mainly characterised by high-density developments, while the outer, more recent suburban communities catered to the automobile with low-density developments. As a consequence, the balance of power of the new city structure shifted towards a block of suburban councillors who believe that automobile usage and the concomitant increase in road construction is the proper form of urban development. Hence, the consolidation of the Road Classification System in 2000 greatly reflected the suburban values of automobile ownership: "In the opinion of many advocates of sustainable transportation, classifying roads strictly according to traffic operations and maintenance

criteria verifies the existence of a rigid hierarchy of road users. At the top is the private automobile, with transit users, pedestrians and cyclists all relegated to secondary and tertiary roles" (Etter, 2002: 13). Thus, the transit system of Toronto is being affected by the fact that, in low-density suburbs, priority is given to the automobile.

As explored in the following section, there are some innovations currently being pursued by the new City of Toronto to address the concerns discussed above. The focus is on how the former Metro government, as well as other organisational groups dealt with the situation.

3.4.2 Innovations and Solutions

As shown above, the recent amalgamation of the old City of Toronto and it neighbouring suburban communities in the former Metro has threatened the preservation of high-density development in concentrated locations, which is needed for an efficient transit system. Most of the innovations and solutions that are sought by the government seem to be inherited from the former Metro government. In his research on successful transit systems, Cervero (1998) states that Toronto is the best example of how transit-influenced urban form can be achieved, as shown in Figure 3.3. The impact on urban form was dramatic during the period 1954-1966, when approximately 50-90% of new "transit-near developments" *(sic)* were high-rise apartments and office/commercial buildings. According to Cervero (1998), Toronto's success lies with the Toronto Transit Commission (TTC) efforts to strengthen the central business district (CBD). Due to strong regional land-use planning, the central business district of Toronto is connected to the suburban towns of Etobicoke, North York, and Scarborough by the rail transit services. Thus, Metro had a major influence on the decentralization of the job market to these rail-served subcentres. In the 1970s, urban planners had recognised the emerging problems associated with suburban developments, in particular the lack of a job-housing balance for residents to reduce commuting

time in their daily work trips. Consequently, planners initiated the move to encourage suburban downtowns with densities "sufficiently high to attract and maintain a wide range of central area types of activities and to support related improvements to the transportation system" (Gad and Matthew, 2000: 262).

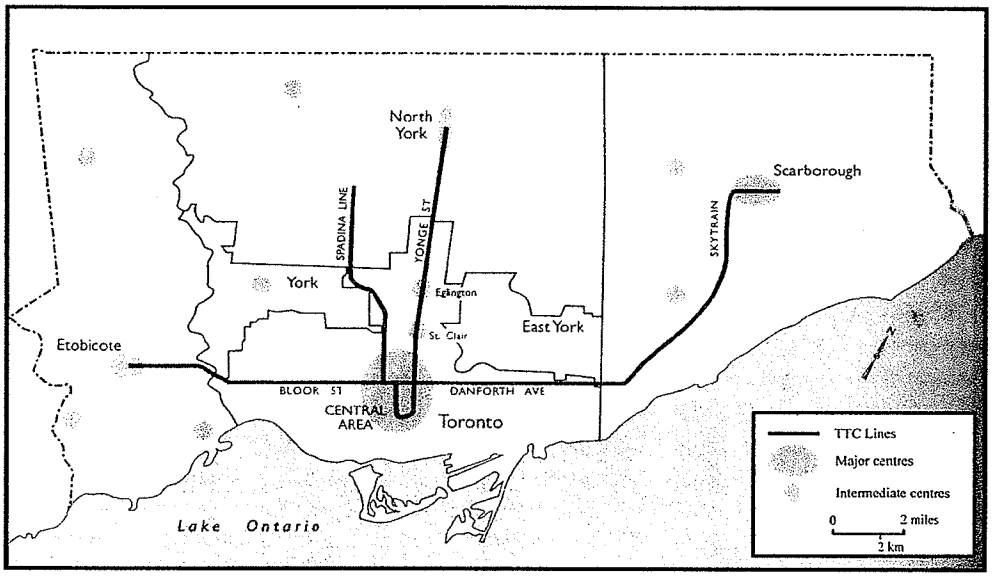


Figure 3.3: Toronto Transit Commission (TTC) Rail Services (1995)
Source: Cervero, Robert. The Transit Metropolis: A Global Inquiry. Island Press, Washington D.C., 1998.

As Cervero (1998) argues, TTC's pro-active stance towards the development of regional rail services and land-use patterns resulted in the pronounced veto powers over land-use decisions, which were accorded to the Metro government. To ensure that development plans adhere to the regional transit system, Metro rewarded developers who foster compact development:

> In addition, Toronto has a strong "Main Street" program aimed at increasing inner-city population and revitalizing light rail/tram streets by incorporating a large quantity of new shop-top housing and other infill residential developments. Infill development and redevelopment are indeed strongly emphasized on all available vacant and underutilized land throughout Metro Toronto, but especially around subway stations. (Newman and Kenworthy, 1999: 215)

In addition to the former Metro government initiatives, Toronto is also known for its citizen-based coalitions against many major public infrastructure developments. The most notorious example is the demonstration against the construction of the Spadina Expressway in the 1970s (Newman and Kenworthy, 1999), which supposedly began the public participation movement in Canada. A more recent example is the founding of a transit-users group called the Rocket Riders that had organised a demonstration to defeat a plan to widen a six-lane expressway along a river valley that would connect the northern suburbs with the downtown core (Olivier and Perk, 2002). These examples usually give indication that there is a great mistrust of the government, and as Jamieson et al. (in Bunting and Filion, 2000) argue, it is the responsibility of the planners to take on a role as advocates to bridge the communication gap between these groups and the government. Citizen-led groups are much needed in society; however, the importance of their role should be included at the outset in major development plans.

3.4.3 Summary

In summary, there were many efforts initiated by the former Metropolitan (or Metro) two-tier government that are workable in a major city environment with its surrounding low-density suburban communities. The upper-tier of the Metro government was responsible for regional services and infrastructure, while the low-tier municipalities attended to local needs. The achievements of Metro include:

1. The influence of decentralised growth in rail-served subcentres by setting sufficiently high densities to attract concentrated development;
2. Metro had veto powers over land-use decisions, but also provided financial rewards to ensure that development plans were in accordance with regional goals; and
3. Many "Main Street" programs to assist urban core revitalisation and the transit system because one of the significant responsibilities vested in Metro is the operation of the Toronto Transit Commission (TTC).

3.5 Greater Vancouver Regional District, British Columbia

3.5.1 Introduction

So far, the discussions of the different case studies have presented current problems in suburban planning and development. The Greater Vancouver Regional District (GVRD) faces the many challenges discussed in previous case studies (e.g., sprawling development, traffic congestion, lack of affordable housing projects, etc.) and thus the discussion will not be repeated. This section will rather focus on the pro-active planning and policies that foster concentrated suburban development, mainly in a regional planning context. The sources used in this case study include: *Transit Metropolis – A Global Inquiry* by *Robert Cervero (1998)*; *the Greater Vancouver Regional District – The Livable Region* plan by the *Greater Vancouver Regional District Communications and Education Department (1996)*; *Central and Suburban Downtowns* by *Gunter Gad and Malcolm Matthew*; *Retrofitting Suburbia* by *Zinnia Clark (2000)*; *Restructuring Vancouver* by *Chris Elkey (2000)*; and *Urban Design as Public Policy – Evaluating the Design Dimension of Vancouver's Planning System* by *John Punter (2002)*.

3.5.2 Innovations and Solutions

Cervero (1998) asserts that Greater Vancouver was not subjected to the same degree of regional planning authority as Toronto. It was only in recent years, that greater coordinated effort in regional planning and development occurred with the tabling of the *Livable Region Strategic Plan* (Greater Vancouver Regional District Communications and Education Department, 1996) and the complementary *Transport 2021 Long-Range Plan* in 1995 (Cervero, 1998). The proposals of *Transport 2021* are consistent with the principles put forward in this research in that the plan explicitly supports automobile-restrained planning to expand transportation choices.

In 1976, the Greater Vancouver Regional District (GVRD) adopted the *Livable Region: 1976-1986* plan, with four main objectives aimed at minimizing the commuting distances in the region, as shown in Table 3.3. The importance of balancing employment and residence is emphasized in this table and is a key measure that guided planning and development for regional town centres (RTCs) in the suburbs. Unfortunately, the Provincial Government of the day was not supportive. The activities of GVRD were scaled down and progressive plans were put on the back burner until Expo '86 gave it a new impetus. For instance, the BC Provincial government initiated the development of False Creek in the 1980s. "[Expo '86 provided] the springboard for future development of the area...[in] the forms of BC Place Stadium and the 1986 World Exhibition" (Elkey, 2000: 2).

Livable Region: 1976-1986
1. Encouraging increased housing densities near the CBD;
2. Decentralising jobs and services to four regional town centres (RTCs) in the suburbs;
3. Improving public transportation, including a new light-rail line from the CBD to Surrey's RTC; and
4. Seeking to balance jobs and populations in each part of the GVRD.

Table 3.3: Four measures of Livable Region Policy
Source: Bunting, Trudi and Pierre Filion. Canadian Cities in Transition: The Twenty-First Century. Second Edition. Oxford University Press. 2000.

In *Central and Suburban Downtowns*, Gad and Matthew (in Bunting and Filion, 2000) states that there were four regional town centres (RTCs) identified for concentrated developments – New Westminster, Metrotown in Burnaby, Surrey, and Port Coquitlam (shown in Figure 3.4).

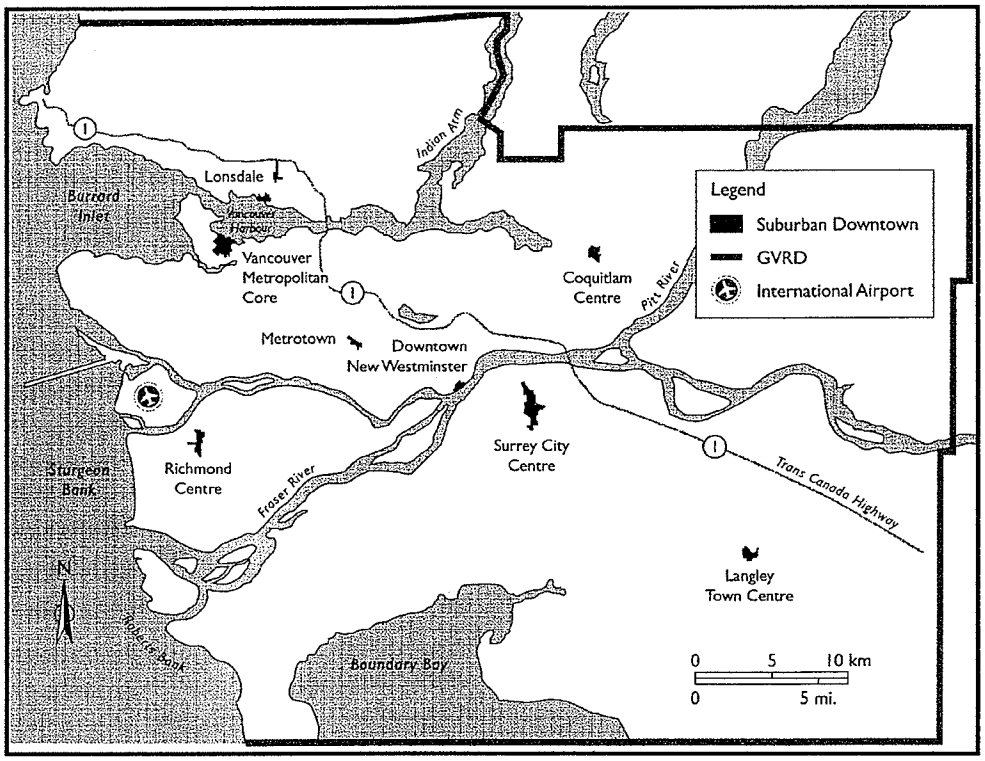


Figure 3.4: Location of Suburban Downtowns of GVRD
Source: Bunting, Trudi and Pierre Filion. Canadian Cities in Transition: The Twenty-First Century. Second Edition. Oxford University Press. 2000.

Initially, the growth in these RTCs was not as significant as Vancouver city centre. In 1986, however, the introduction of the SkyTrain transit system had stimulated some commercial and residential development in New Westminster. Evidently, three of the four links between the central business district (CBD) and the designated regional town centres (RTC) are by rapid transit. Only the connection to Richmond is still along a congested roadway system, and BC Transit has planned a transit link between Port Coquitlam and New Westminster to rectify the deficiency in the north-south movement (Bunting and Filion, 2000).

More than the purposeful vision expressed in the Greater Vancouver Regional District's (GVRD) strategic plans, there is a need for careful planning in order to channel growth into existing suburbs to contain urban sprawl. As Clark (2000) admits, the attempt to retrofit suburbia is not an easy task, but Richmond is starting to direct the attention towards higher density developments.

To increase densities in existing suburban residential areas, the municipality of Richmond had adopted a community plan with several key strategies. One critical strategy would ensure the increase in density of residential neighbourhoods. This is accomplished by allowing landowners to split their property into two small lots, thus doubling the density. When a residential neighbourhood is designated for the splitting process, planners organise a series of public meetings to inform as well as learn from the resident's reaction. According to Clark, once city council has approved the plan, it is effective for five years – "a time frame that provides a sense of stability but allows for a gradual ratcheting up of densities over time" (Clark, 2000: 20).

As evidenced in the above discussion, the Greater Vancouver Regional District (GVRD) authorities understand the critical function planners provide in bridging the communication gap between government policy makers and the public. Punter (2002) reveals that part of GVRD's success in achieving land-use development consistent with strategic policies is due to the service of planners provided during the design negotiation and review process. The assistance of two complementary design resources is provided to ensure that development plans are consistent with the strategic public policies. First, the Development Planners are responsible for administering major applications, interpreting zoning and design guidelines, and undertaking design negotiations. "All development planners are architect-trained and have private-sector experience, so they understand the design problems from the development side. Their skills, contextual knowledge, system expertise and professional judgement play a major role in achieving quality development." (Punter, 2002: 279). The organisation has continually increased the number of planners since its establishment in 1980. Second, the Urban Design Panel (UDP) operates as a peer review system for major permit applications:

> Most designers now seek the unanimous support of the Panel as an endorsement of their own professional competence. Furthermore, the Panel is able to assist in the development of a design rather than being able to comment only upon completed schemes, thus making its work more constructive and influential. It is also able to contribute to guideline and policy information. (Punter, 2002: 279)

Thus, it seems that the two complementary resources of design counselling can ensure greater commitment to the design guidelines and policies, as well as contributing to their development. The only draw back to this arrangement is the amount of time required for each development proposal to be approved, given the detailed review process involved.

3.5.3 Summary

In summary, regional planning in Greater Vancouver Regional District (GVRD) has played a significant role in addressing decentralised growth. Through comprehensive planning, suburban growth is focused at four regional town centres (RTC), with the SkyTrain service connecting them to Vancouver's downtown. As discussed above, the different methods used to achieve sustainable development in the GVRD area are most notable in the case study, and they include:

1. In Richmond, the doubling of residential neighbourhood density through a "splitting process" of private lots;
2. The service of the "Development Planners" during the design negotiation process to ensure consistency of development proposals to the regional goals; and
3. An Urban Design Panel (UDP) to assist in the development of a design.

3.6 Discussion of Case Studies

In this chapter, different innovations to address the problems of automobile-dependency and the inherent sprawling urban landforms have been explored. The means to embody the planning principles discussed in Chapter 2 are evident in the five case studies, namely McKenzie

Towne, Copenhagen, Portland, Toronto, and Greater Vancouver Regional District (GVRD). First, the planning and development of McKenzie Towne in Calgary is purely from a physical design approach. Neo-traditional design concepts are used to fashion the community as a transit-friendly environment with a town centre, which is surrounded by residential developments. There is recognition for the need to adopt human-scaled development so residents of the community can interact outside without the need for their automobiles. One aspect of this human-scaled factor is in the neighbourhood street design, where there are grade-separated sidewalks and narrower streets. However, while the architectural design standards used in McKenzie Towne are directed towards a walking neighbourhood and transit-supportive development, automobile travel still remains the dominant form of transportation. This is attributed to the fact that there is not a job-housing balance in the community, and thus many of the residents are required to commute outside for employment. Second, transit service will not be fully implemented until several years into the development phase. With only two transit routes operating during morning and afternoon rush hours, many of the residents must seek other modes of transportation.

The efforts in Copenhagen are largely attributed to the 1947 *Finger Plan* to control regional growth in the suburbs. The original *Finger Plan* advocates that suburban growth must occur in nodal centres that are serviced by the regional transit system. In addition, preserved greenbelts that separated the suburban towns, encourage the towns to be self-contained. By adopting the urban village concept, the suburban towns must provide a job-housing balance to reduce the demand for daily commutes between towns. Furthermore, daily commuting outside of the town can easily be done by the regional rail transit system. As Cervero (1998) states, transit-focused planning in the suburbs would never have been achieved without the strong regional governance of the *Finger Plan*.

The City of Portland emulates Copenhagen's example of a strong regional governance structure. The establishment of Portland's Metropolitan government (or Metro) in 1978 has ensured local developments be consistent with the overall regional planning goals. Complementing many public policies (e.g., Urban Growth Boundary, traffic calming, and parking management), the *Functional Plan* utilises flexible zoning to permit a suburban community to set different density requirements. This strategy is significant in supporting the Transit-Oriented Developments (TOD) because greater density can be set at transit nodal centres.

In Toronto, the former Metropolitan Government has influenced suburban land-use development. The two-tier governance system allowed the upper-tier to plan regional services and infrastructure, while the lower-tier ensured that local needs and preferences were protected. One of the responsibilities of the Metro Government was the operation of the Toronto Transit Commission (TTC), which had significant impact on the high-density development of rail-served centres in the suburbs. Additionally, strong infill development of the central business district provided employment opportunities for individuals by the transit system. However, the recent amalgamation of Toronto with other municipalities to form a mega city has resulted in greater emphasis on automobile dependency from the sprawling suburban communities surrounding Toronto.

The Greater Vancouver Regional District (GVRD) case study highlights the importance of regional planning, as was evidenced in Toronto. As outlined in the *Livable Region Plan* of 1976, to address the decentralisation of growth to the suburbs, the plan had identified four regional town centres (RTC) for concentrated land-use development. Initially, the growth in these centres was not as significant as in the central business district, but, with the introduction of the SkyTrain system, the centres have become great attractions for different land-use types. Similar to the other

four cities discussed in the case studies, Greater Vancouver Regional District authorities are attempting to retrofit suburban areas by increasing density. As shown above, Richmond is undertaking this initiative through their community plan. The doubling of residential neighbourhood density is done through public participation processes, being facilitated by planners. Evidently, the GVRD authorities understand the importance of planning, and in particular the role of planners in achieving the conformity and progress of strategic plans. The involvement of planners during the design review process ensures that governing policies are respected. Additionally, planners contribute to reviewing the policies for necessary changes that reflect specific location needs.

The findings from the five case studies are summarised in the following table. There are five critical issues found in the research, and they include: 1) separation of land-use and transportation planning; 2) decentralisation of suburban land form; 3) loss of natural land; 4) transportation problems; and 5) concerns of unregulated planning. The first issue concerns the problems of separated land-use and transportation planning such as traffic congestion, social isolation, cultural deterioration, etc. (see Section 2.1.2). The second issue deals with suburban sprawl due to low-density and/or leapfrog development. Consequently, the third issue is related to the encroachment of urban development against natural land. The transportation problems in the fourth issue pertain to both automobile traffic and the decline of transit system. Finally, the fifth issue is associated with unregulated planning in suburban development. Table 3.4 summarises the five critical issues and presents a synoptic view of innovations and solutions, discussed in this chapter.

ISSUES / STUDIED LOCATION	(1) Separation of Land-use and Transportation	(2) Decentralisation of Suburban Land Form	(3) Loss of Natural Land	(4) Transportation Problems	(5) Unregulated Planning
	INNOVATIONS AND SOLUTIONS				
McKenzie Towne, Alberta	Human-scaled community developments	Physical design approach	A village size - using a spatial parameter rather than population	Street network design for pedestrian comfort and safety.	
				Transit-focused developments - bus stop in store	
Copenhagen, Denmark	"Finger Plan" integrate regional planning with urban design/ development	Suburban towns - self-sufficient	Greenbelt preservation as a means to contain the sprawl of suburban towns	Focusing suburban developments along well-defined corridors (for easier access)	
	Strong regional governance in planning			Greater public transportation choices - integrated pedestrian and cycle networks	
Portland, Oregon	Metro authority in regional and local planning	Flexible planning - min and max densities	Urban Growth Boundary to contain sprawl		Vetoing power vested in Metro over zoning decisions
Toronto, Ontario	Main Street programs - assist urban core revitalisation and the transit system	Growth in rail-served subcentres - setting sufficiently high densities for development		Regional Metro's operation of the Toronto Transit Commission (TTC)	Two-tier Metro government with veto powers over land-use decisions.
Greater Vancouver Regional District (GVRD)		Through comprehensive planning, suburban growth focused at four regional town centres.		The SkyTrain service linking suburban centres to Vancouver's CBD	Urban Design Panel (UDP) to assist in the development of a design proposal
		The "splitting process" of private lots - doubling residential density			"Development Planners" during the design negotiation process

Table 3.4: Issues and solutions identified from the five locations.

An examination of the data in Table 3.4 suggests that three avenues can be effectively pursued in order to resolve the issues, derived from the case studies: influencing urban form, implementing public policies, and planning public transportation systems (see Table 3.5 for summary).

Avenue / Locations	Urban Form	Public Policies	Public Transportation Systems
McKenzie Towne, Alberta	Human-scaled community developments	Human-scaled community developments	Transit-focused development - bus stop in store
	A village size - using a spatial parameter rather than population	Spatial parameter rather than population of village size	Street network design for pedestrian comfort and safety.
	Street network design for pedestrian comfort and safety.		
Copenhagen, Denmark	Suburban towns - self-sufficient	"Finger Plan" integrate regional planning with urban design / development	Greater public transportation choices - well-integrated pedestrian and cycle networks
	Focusing suburban developments along well-defined corridors (for easier access)	Greenbelt preservation as a means to contain the sprawl of suburban towns	Focusing suburban developments along well-defined corridors (for easier access)
		Strong regional governance in planning	
		Focusing suburban developments along well-defined corridors (for easier access)	
Portland, Oregon	Urban Growth Boundary to contain sprawl	Metro authority in regional and local planning	Metro authority in regional and local planning
		Flexible planning - min and max densities	Vetoing power vested in Metro over zoning decisions
		Urban Growth Boundary to contain sprawl	
		Vetoing power vested in Metro over zoning decisions	
Toronto, Ontario	Main Street programs - assist urban core revitalisation and the transit system	Two-tier Metro government with veto powers over land-use decisions.	Regional Metro's operation of the Toronto Transit Commission (TTC)
	Growth in rail-served subcentres - setting sufficiently high densities for development	Setting sufficiently high densities for development in rail-served suburban Town Centres	Growth in rail-served subcentres
Greater Vancouver Regional District (GVRD), B.C.	Through comprehensive planning, suburban growth focused at four regional town centres.	The "splitting process" of private lots - doubling residential density	The SkyTrain service linking suburban centres to Vancouver's CBD
	Doubling residential density	Urban Design Panel (UDP) to assist in the development of a design proposal	
		"Development Planners" during the design negotiation process	

Table 3.5: Three Avenues Derived from the Issues of Table 3.4.

Chapter 4: Data Analysis

4.1 Introduction

The purpose of this chapter is to analyse the findings of the case studies in the light of current land-use and transportation models explored in Chapter 2. It has been shown in the previous two chapters that three elements that condition transportation planning became apparent. These elements can be called the cornerstone of the much-needed integrated land-use and transportation planning, and they include: urban form, public policy, and public transport systems. These categories shall be used as a framework for the analysis of the case studies. It must be noted that the concept of the 3Ds (density, diversity, and design) is inherent in this analysis as well.

4.2 The Foundation of Land-use and Transportation Planning

As discussed in Chapter 2, the conventional separation of land-use planning and transportation planning has been carried out in a hierarchical order, as illustrated in Figure 4.1. Each process advocates planning policies and design principles without consideration as to how it affects the other. However, it is interesting to note that the lack of coordination between both processes has resulted in a shared outcome of problems. That is, conventional land-use planning that advocates the segregation of land-use development has encouraged the gradual sprawling of urban form, which further necessitates long distance commuting. Urban form is defined as the spatial distribution of land uses and the transportation infrastructure such as road networks and transit systems. In terms of traditional transportation planning, automobile travel is considered the single most convenient form of commuting, and thus is given top priority. With given priorities in mobility, the result is the construction of high-speed road infrastructure that connects sprawling

land uses. As shown in Figure 4.1, the outcome of both planning elements is automobile dependency.

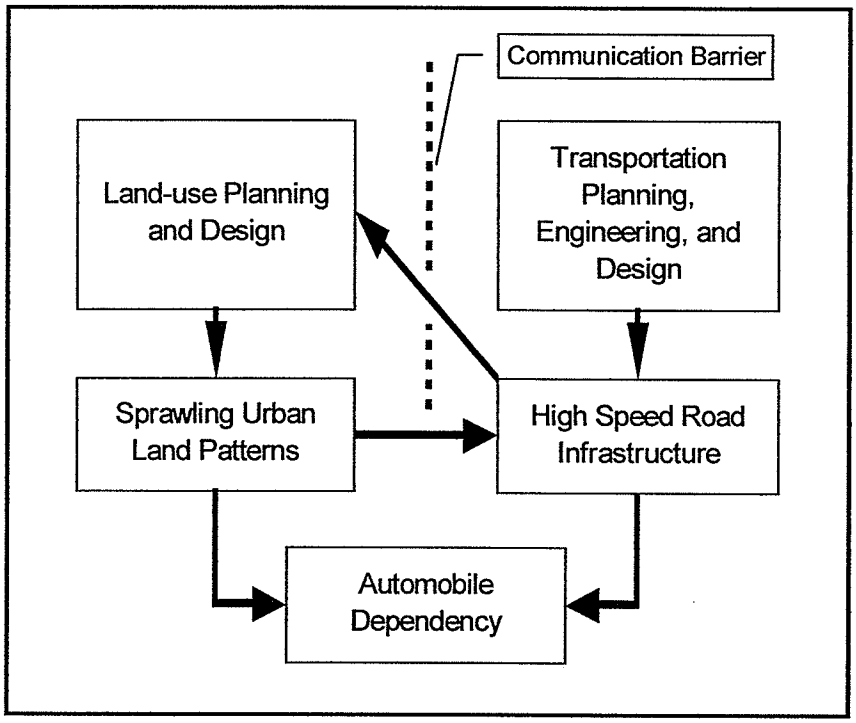


Figure 4.1: Conventional Planning Processes.

In Chapter 3, however, several of the case studies have illustrated that in order to achieve the necessary urban form that supports public transportation, transportation planning must become an integral part of land-use planning. Evidently, as introduced earlier, there is an intricate relationship between three planning elements, namely urban form, public policies, and public transportation systems, as shown in Figure 4.2. The urban form is a critical element in city planning because it conditions the way in which urban activities can be directed to function at their greatest potential. As discovered in the case studies of Copenhagen, Portland, Toronto, and Greater Vancouver Regional District (GVRD), the importance of the urban form element lies in determining the arrangement of land uses that have better addressed current social and

environmental concerns (e.g., aging population, urban sprawl, unequal employment opportunities, etc.) of Chapter 2.

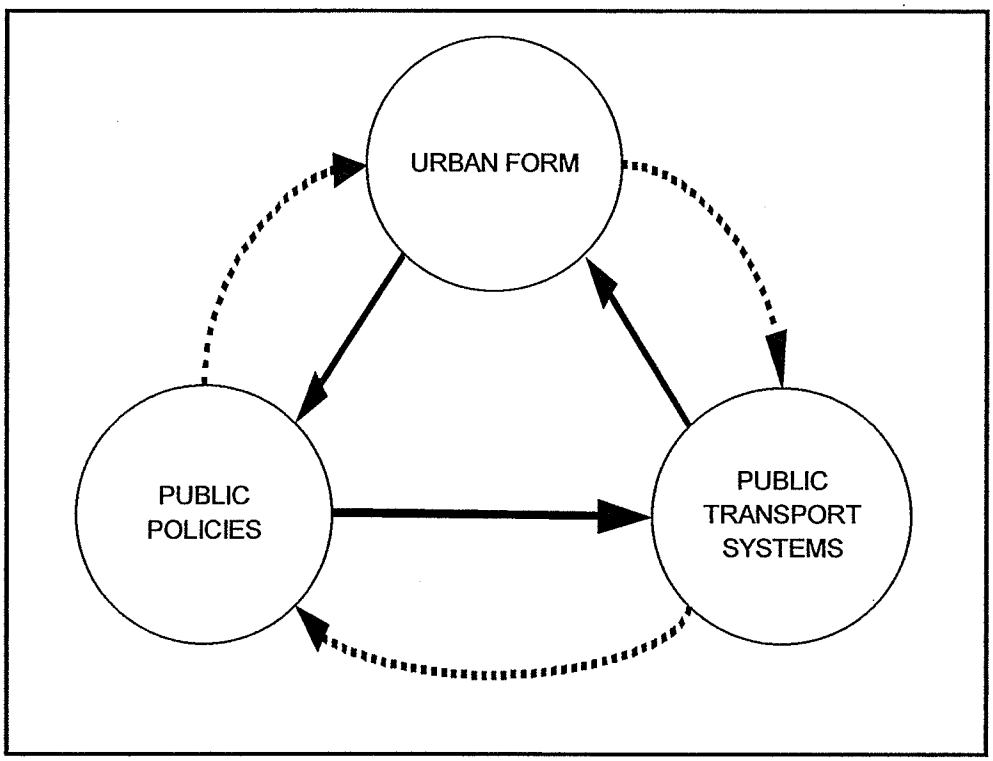


Figure 4.2: Three Interrelated Elements of Integrative Land-use and Transportation Planning.

In order to achieve the necessary urban form, however, an element of strong public policy is necessary, as shown in Chapter 3. Contrasting the conventional planning process, the three categories are not considered to be in any hierarchical order, but rather are interconnected in a cause-and-effect relationship. Consequently, there is a feedback connection between the categories to reflect any necessary changes (indicated by the dash lines in Figure 4.2). Through public policies, planners can ensure that development is consistent with the envisioned land pattern. Additionally, it is imperative that planners continually review public policies to reflect any changes in the urban form, and vice-versa. The need for constant monitoring illustrates the intricate relationship between all three elements. The third element in the diagram is public

transportation systems. In traditional planning, the separation of land-use and transportation planning puts this element at a subsidiary level, where the public transportation system is constantly trying to adapt to the built form. In most cases, the system (e.g., mass transit) is not able to adapt, and therefore becomes incapable of competing with the private automobiles. As shown in Figure 4.2, however, when alternatives to the automobile are given priority, the public transportation system becomes an integral element of planning. This element can provide feedback to the public policies, in order to retrofit the urban form to support the public transportation systems. The proceeding three sections are devoted to examining the different approaches taken in the case studies to manage urban growth, and to support the public transportation goals, according to the three categories presented above.

4.3 Urban Form

Three of the five case studies in Chapter 3 have shown a propensity towards a polycentric urban form, as well as maintaining the prominence of suburban centres. This type of urban form consists of polycentric growth patterns in and around major suburban centres (characterised mainly with high mixed-use density) that act as a hub to satellite towns or communities. The transportation link between the centre and the surrounding communities is by a transit system. Toronto, Copenhagen, and Greater Vancouver Regional District (GVRD) identified regional suburban centres as transit nodes, which are part of the transit network. In Toronto, the upper-tier Metro government directed the decentralisation of growth to rail-served subcentres through density policies. The GVRD study revealed that growth had occurred at the four Regional Town Centres (RTCs) immediately after the construction of the SkyTrain linking them with Vancouver's city centre. Copenhagen followed the same idea as the previous two locations through the 1947 *Finger Plan*, which resulted in a unique polycentric urban layout of regional towns. Furthermore,

the preservation of greenbelts between the towns reserved the region's distinctiveness as well as achieving a certain level of compact, high-density development. The polycentric urban form of the case studies parallel the planning models of Chapter 2. For instance, Newman and Kenworthy (1999) suggest the return to traditional Transit City concept that focuses on concentrated transit corridors with pockets of clustered centres (see Figure 2.2 in Chapter 2). Huang (1996) suggested that the selection of suburban centres should be based on an area's potential for growth.

As mentioned above, the preservation of greenbelts between towns acted as containment against sprawling development. Evidently, this process compels the towns to function as urban villages. As evidenced in Copenhagen, the towns have achieved a certain level of diversity in land-use activities because access to the nearby community is not easily realised with the greenbelts surrounding them. Therefore, the towns consist of intense mixed-use development, characterised by commercial buildings that have residential quarters above the main floor. This arrangement eliminates unnecessary commuting trips to work. Moreover, in many suburban town centres that integrate employment with services and activities, there is substantial transit ridership because of easier accessibility to the amenities. In planning theory, the urban village model is frequently used in the literature to mean self-sufficiency, and is usually associated with a centre or market that has the greatest density of land-use developments in the village, as defined in Chapter 2. Furthermore, urban villages are more capable of adapting to any social and/or economic changes within a given time (Bunting and Filion, 2000).

To achieve urban form that is dense and diverse, sustainable design principles are important. The McKenzie Towne case illustrates the ability to achieve a human-scaled community through the spatial planning of the subdivision, rather than by population. That is, as explained in Chapter 3, the size of each village is determined by the spatial parameter of a 450-metre radius

from the town centre. This radius supports transit patronage because most people can walk to a bus stop within this distance. In Chapter 2, New Urbanist principles integrate environmental and natural planning in community design to reflect the much needed human-scaled development.

4.4 Public Policies

To achieve the necessary urban form, both planning practises and theories have revealed that strong public policies are required. In the Portland case study, the Metro government initiated the Urban Growth Boundary to contain urban sprawl, which was part of the *Region 2040 Plan* and the subsidiary *2040 Framework Plan*. A *2040 Functional Plan* was developed to implement the *2040 Framework Plan* by also advocating flexible planning policies. By Metro's definition, policies for flexible planning had set different zoning densities according to local needs, but still maintaining regional consistency. Local governments in Oregon can set density targets in their region to concentrate development in certain areas while restricting others. If any disagreements were to arise, Metro had veto power over the zoning decision.

As an alternative approach, policy guidelines for intensity development can be retrofitted into existing sprawling conditions, as illustrated by Richmond in the Greater Vancouver Regional District (GVRD) case study. Through local policies, private residential lots can be split, resulting in a doubling of density. These types of policy cannot be effectively upheld without strong regional governance, as further evidenced in the studies of Copenhagen, Toronto, and Greater Vancouver Regional District (GVRD).

The GVRD case study revealed that strong public policies require a more direct partnership between the public and private sector because public policies affect private development. The City of Vancouver introduced two complementary review boards to assist

proponents in the consultative process in development plans. The responsibilities of the Development Planners include undertaking design negotiations, while the Urban Design Panel (UDP) functions as a peer review system during the design process. Evidently, the success of the UDP is that their assistance is more constructive and influential because they are involved right at the beginning of the process. This structure of counselling has ensured that developments are more consistent with governing policies, in addition to allowing proper changes in policies to occur when necessary.

Although not directly apparent in the case studies, several of the locations follow the job-housing balance principle in complementing governing policies of Urban Growth Boundary, traffic and parking management, clustered housing development, etc. Both Portland and Copenhagen ensured that public policies address this issue. It is apparent that the model of functional vs. physical planning in land-use development can be of benefit to their existing policies. In North America, physical planning has taken precedence in traditional land-use planning policies because the urban form is usually defined by the physical distribution of buildings and infrastructure. General planning policies that advocate physical distribution are usually further supported by physical design requirements (e.g., parking requirements, building floor sizes according to the anticipated user population, etc.) at the project-specific level. Therefore, planning theoreticians propose a job-housing balance to exist within the urban village concept. Theoretically, this model addresses the social and environmental problems associated with automobile-dependency. For instance, a short travel distance between work and home will result in greater equal work opportunities. Finally, one of the environmental benefits of this model is the management of urban sprawl.

In terms of policies that reflect neighbourhood design, Portland and McKenzie Towne studies revealed that it is feasible to apply the New Urbanist (NU) principles. As a supportive measure to the functional planning policies discussed above, NU design principles assist in the physical distribution of land uses. Evidently, design policies should reflect the true essence of NU principles to encourage human-scaled projects. For instance, transportation design standards that define automobile usage tend to regard the urban land space as vast and unlimited because motor vehicles can reach any distance. However, when guiding policies advocate walkable and traditional neighbourhood structures, the 450-metre radius between amenities becomes a defining factor, as evidenced in the McKenzie Towne case study.

4.5 Public Transportation Systems

The successful examples discussed in the previous chapter have shown that density is an important element of functional planning policies, especially in supporting the regional or urban transit system. For instance, Copenhagen's *Finger Plan* focused on regional policies that directed suburban development along the regional transit network. Moreover, transit-supportive policies and guiding principles focused high-density development at the transit node stations, and along well-defined transit corridors. In support of the policies on greenbelt preservation, the main concern was to achieve a job-housing balance and high-density development in the suburban towns to support transit commuting. Given Copenhagen's preference for rail transit technologies, the transit system serves regional commuting while more-integrated pedestrian and cycle networks occurred at the local level.

Copenhagen, Toronto, and the Greater Vancouver Regional District (GVRD) have complied with the concept of identifying transit node centres (or equivalently Town Centres) to direct growth. They all have directed transit services along well-defined corridors and between

transit nodes. It is apparent that transit-focused policies should be introduced at the outset of planning and development to ensure greater support, or else the effort to encourage transit patronage becomes very complex and difficult. The McKenzie Towne study revealed that although there is good transit-supportive neighbourhood design, the level of achieving transit patronage is somewhat uncertain because the construction of the Light-Rail Transit (LRT) link will not occur until further into the development phase. Evidently, automobile commuting remains the prominent mode of transportation in McKenzie Towne.

It was shown in Chapter 3 that strong regional governance over transportation issues has encouraged comprehensive plans to introduce regional transit links, mainly by targeting density planning. The cautionary stricture, however, is that long-term planning strategies must be upheld. As evidenced in the Copenhagen and Toronto studies, the changes in governmental power can affect the thrust of the original planning goals. In Copenhagen, the sprawl of developments had occurred because of the gradual abandonment of the original 1947 *Finger Plan*. In Toronto, the recent amalgamation of the seven municipal governments in Metro Toronto has resulted in greater emphasis on the typical suburban planning and design. Hence, there is a greater need for commitment to long-term regional plans, but allowing plans to be reviewed to meet local needs.

Diversity, discussed earlier in this chapter, pertains to encouraging intense development that consists of different land uses. To a certain extent, the definition is appropriate to the public transportation system element because diversity will encourage the use of non-motorised and transit commuting options when the travel distance is reduced. However, diversity refers as well to the formation of partnerships in the public transportation systems. For instance, partnerships fostered between different governmental agencies are important. As presented in the Toronto case study, the strength in transit-focused development was attributed to the former Metro

government, which was also involved in the operation of the Toronto Transit Commission (TTC). With Metro being a two-tier government system, the lower-tier (i.e., TTC) can learn the needs of the communities, and consequently assist the upper-tier to develop appropriate policies. The joint development arrangement discussed in Chapter 2 can further encourage transit-supportive development. Cervero (1998) argued that joint development would not only secure private-sector payments for a public entity, but it would also enhance development potentials. Although it has not been experienced in North America, according to Cervero (1998), cities in Europe and Asia have undertaken joint developments between the public and private sector to ensure greater commitment to transit-focused policies. As discussed in Chapter 2, one of the challenges that urban transit systems faced is the sprawl of developments, making transit operations incapable of meeting the door-to-door service. Hence, by allowing the private sector to become an integral part of the service delivery (e.g., jitneys, airport shuttles, etc.), there is a greater commitment to support Transit-Oriented Development (TOD) principles.

Certainly, transit system design is an important parameter in public transportation. Toronto and Greater Vancouver Regional District (GVRD) case studies revealed that while the suburban towns were relatively self-sufficient, suburban developments were also encouraged along well-defined transit corridors for easier access to employment, as discussed in Chapter 3. In both studied locations, regional planning of suburban centres were also structured around the regional transit system. The increased land developments in the four Regional Town Centres (RTCs) of the GVRD, immediately after the construction of the SkyTrain system, revealed the influence that design policies have on achieving clustered developments for easier access. Moreover, high market values of the land around urban transit stations were induced because of its accessibility and commercial potential.

In recent years, the emphasis has been placed on transit-supportive planning and design, and therefore, there exist different design principles that support transit planning. Among them are the New Urbanism principles discussed earlier, and the complementary Transit-Oriented Development (TOD). However, it is important to consider design measures that embrace both transit-focused development and other non-motorised types of transportation, as discovered by the Copenhagen case study. Copenhagen realised that a regional transit system, in addition to a well-integrated pedestrian and cycle networks were required to ensure greater commitment to the *Finger Plan*. Conversely, the McKenzie Towne case study revealed that automobile commuting remained substantially high because the rail transit connection would not occur until further into the future. In addition, there was no well-integrated cycle network planned in the subdivision. While the attempt to induce transit patronage remains questionable in McKenzie Towne, the concept of a town centre is evident with the local grocery store being located in the Main St. village square. Furthermore, the integration of a transit stop within the store is a good approach to transit-friendly design.

4.6 Guiding Principle Framework

The discussion, so far, has involved a systematic comparison of the planning practises to the models of Chapter 2. Overall, the practises initiated by the different cities paralleled the planning models that advocated high-density, mixed-use developments around transit nodes. Hence, for the purposes of this practicum, the emphasis is on the Transit Node concept as a viable solution to suburban planning. As stated in Chapter 1, a Transit Node is defined as a suburban centre that fosters a job-housing balance and higher-density development, served by a transit system linking to other suburban centres. The centres are not solely private entities such as regional shopping malls, but rather they are mutually operated by all sectors of development.

However, the question remains as to whether the Transit Node concept is feasible in Winnipeg, and specifically, in the Charleswood district. To this effect, the subsequent section attempts to define certain guiding principles.

From the analysis presented in this chapter, two guiding principle frameworks seem to emerge: (1) integrative land-use and transportation planning; and (2) transit functions and systems. As explored in the previous section, three elements of planning (i.e., urban form, public policies, and public transportation system) are interrelated in a cause-and-effect relationship. Therefore, guiding principles must embrace all three elements so that they do not remain hierarchical in nature.

4.6.1 Land-Use and Transportation Planning Principle Framework

Principle #1 Support visionary, long-range planning – defining a time length to reach regional goals, but allowing incremental reviews to occur.

First and foremost, land-use planning needs to become integrated with transportation development. Long-range visionary plans are critical to guide planning through several years of development. It is most often that long-range planning goals are abandoned with the changes in government. Therefore, perhaps it is essential that comprehensive plans define the effective period of governing policies. To address local diversity, regional plans need to be subjected to continuous review, as suggested by the model of three interrelated planning elements (see Figure 4.1). It should be noted that the term "regional" refers to the inter-suburban scale of development such as an inter-suburban transit system.

Principle #2 Identify centres or loci of activities and designate them as Transit Nodes, to achieve polycentric urban forms.

Given a suburban region, it should be encouraged that areas with growth potential be directed to multiple centres (i.e., Transit Node centres) or areas of concentrated activities to achieve a polycentric urban form. In addition, several of the case studies suggest that the identification of these centres should reflect the community's cultural, social, and historical character.

Principle #3 Encourage a job-housing balance in the community by adopting the urban village concept.

The intent of the job-housing balance policy is to ensure that the community becomes as self-sufficient as possible (advocated by the urban village concept). Functional planning (i.e., the emphasis on function, rather than physical distribution of amenities) may be applied as a supportive measure to coordinate different activities to accommodate potential growth.

Principle #4 Encourage high-density, mixed-use developments at or near the Transit Nodes.

(a) In new suburban subdivisions:

To reduce the need to commute great distances for services, intense and mixed land-use developments should be encouraged at or near the Transit Nodes. Policies should focus on the successful examples of Copenhagen, Toronto, and Greater Vancouver Regional District (GVRD). It should be noted that to induce higher densities, flexible planning serves as a tool to restrict certain areas from development, while encouraging others (i.e., at Transit Node centres).

(b) In retrofitting existing land developments:

To increase the vitality of the transit system, it is encouraged that Transit Node centres be located near areas of dense population to induce necessary ridership.

Principle #5 Establish Urban Growth Boundary policies by identifying and preserving land areas of special character.

As revealed by planning practises and models studied above, supportive policies (e.g., flexible density zoning, job-housing balance, etc.) are essential to direct development. However, it is equally important that urban growth management be implemented to restrict sprawl. The identification and preservation of special land area is a tool to support the Urban Growth Boundary policy, as evidenced in Portland.

Principle #6 Encourage development partnerships between all types of organisations.

Three types of developmental partnerships are critical to ensure greater commitment and consistency with transit-supportive principles. The first type of partnership is a joint development contract to achieve private finances (both costs and profits) on public entities. The second type is a design panel to provide consultation and approvals to development proposals. The Greater Vancouver Regional District's (GVRD) Urban Design Panel is an example of assisting developers during the proposal period. The review board provided communication and designing expertise to developers, at the beginning of the process. The third type of partnership is in transit service deliveries. One of the challenges that urban transit systems faced is the sprawl of developments, making transit operations incapable of conveniently meeting accessible service needs, let alone door-to-door service. Therefore, by allowing non-public sectors to become an integral part of the service delivery (e.g., jitneys, airport shuttles, high-occupancy vehicle arrangements, etc.), there is a greater opportunity to support transit-focused developments.

4.6.2 Transit Functions and Systems

Principle #7 Introduce a regional transit system (inter-suburban transit network).

Priority is directed at a transit network, connecting suburban communities with each other and the urban core. The intent is to connect the suburban communities through established Transit Node centres.

Principle #8 Introduce and/or adopt public transportation-friendly design from New Urbanism (N.U.) and Transit-Oriented Development (TOD) – emphasizing human-scaled design.

The application of different design principles should be adopted to achieve public transportation-friendly environment. As evidenced in McKenzie Towne, neighbourhood design elements such as N.U. and TOD are important at the local planning level to encourage human-scaled neighbourhood development. In support of Principle #7, a well-integrated pedestrian and cycling network can be implemented to provide diverse transportation options within the community.

Principle #9 Transit development needs to occur at the initial development phases of any subdivision, whenever possible.

The priority in transportation planning should shift to transit-focused development, and therefore, it is imperative to introduce transit service and design at the outset of the plan. Conventionally, the homogenous subdivision consists mainly of residential development, which makes ridership dependent on the number of residents in the community. However, as Principles #3 and #4 advocate for a concentrated and diverse community, transit ridership will not be solely dependent on residential population.

Principles	Description
1. Support visionary, long-range planning – defining a time length to reach regional goals, but allowing incremental reviews to occur.	▪ Long-range visionary plans are critical to guide planning through several years of development. ▪ Comprehensive plans need to define the effective period of governing policies. ▪ To address local diversity, regional plans should be subjected to continuous review, as suggested by the model of three interrelated planning elements
2. Identify centres or loci of activities and designate them as Transit Nodes, to achieve polycentric urban forms.	▪ Multiple centres (i.e., Transit Nodes) are directed to areas with growth potential or concentrated activities to achieve a polycentric urban form. ▪ In addition, the identification of these centres should reflect the community's cultural, social, and historical character.
3. Encourage a job-housing balance in the community by adopting the urban village concept.	▪ To ensure that the community becomes as self-sufficient as possible (advocated by the urban village concept) ▪ Functional planning (i.e., functional rather than physical distribution of amenities) may be applied as a supportive measure to coordinate different activities to accommodate potential growth.
4. Encourage high-density, mixed-use developments at or near the Transit Nodes.	*(a) In new suburban subdivisions:* ▪ To reduce the need to commute great distances for services, intense and mixed land-use developments should be encouraged at or near the Transit Nodes. ▪ It should be noted that to induce higher densities, flexible planning serves as a tool to restrict certain areas from development, while encouraging others (i.e., at Transit Nodes). *(b) In retrofitting existing land developments:* ▪ To increase the vitality of the transit system, Transit Nodes are located near areas of dense population to induce necessary ridership.
5. Establish Urban Growth Boundary policies by identifying and preserving land areas of special character.	▪ The identification and preservation of special land area is a tool to support the Urban Growth Boundary policy.
6. Encourage development partnerships between all types of organisations.	*3 types of developmental partnerships:* (1) A joint development contract to achieve private finances (both costs and profits) on public entities. (2) A design panel to provide consultation and approvals to development proposals. (3) Different partnerships in transit service deliveries.
Transit Functions and Systems	
7. Introduce a regional transit system (inter-suburban transit network).	▪ Priority is directed at a transit network, connecting suburban communities with each other and the urban core (through established Transit Nodes).
8. Introduce and/or adopt public transportation-friendly design (i.e., New Urbanism & Transit-Oriented Development) – emphasizing human-scaled design.	▪ The application of different design principles should be adopted to achieve public transportation-friendly environment. ▪ In support of Principle #7, a well-integrated pedestrian and cycling network can be implemented to provide diverse transportation options within the community.
9. Transit development needs to occur at the initial development phases of any subdivision, whenever possible.	▪ The priority in transportation planning should shift to transit-focused development at the outset of the plan. ▪ As Principles #3 and #4 advocate for a concentrated and diverse community, transit ridership will not be solely dependent on residential population.

Table 4.1: Summary of the Nine Principles Derived

In summary, the guiding principles outlined in this section are derived from the case studies of Chapter 3, and the planning models of Chapter 2. As summarised in Table 4.1, there are nine principles outlined to encourage higher-density planning and developments, centring on the Transit Node concept. In adhering to the model of three interrelated planning elements, six principles fall under the integrative land-use and transportation planning framework, while the remaining three principles target transit functions and systems. The remainder of the practicum will study and evaluate the feasibility of applying these principles in Winnipeg's Charleswood District.

PART II – FIELDWORK STUDY

Chapter 5: Charleswood District Case Study

This chapter establishes the history and character of the Charleswood district. Furthermore, this chapter presents the current problems and issues relating to transportation and land-use planning, in addition to exploring the direction of future growth patterns that potentially may occur in the district.

5.1 History and Past Planning

From the planning standpoint, Charleswood planning has evolved through time in two different phases or periods. The first could be characterised as the "Rural Period" (from the 1800s to 1950s), followed by the "Suburban Period" (from 1960s to the present).

5.1.1 Rural Period (1800s to 1950s)

The history of Charleswood dates back to the mid-1800s when the area was part of the Hudson's Bay Company holdings. With the anticipation of settlement, the Hudson's Bay Company decided, in 1857, to survey both sides of the Assiniboine River into long narrow river lots (Bidwell, 1970). Initially, Portage Ave. was the only means of transportation, where settlers would cross the Assiniboine River to get transportation access to Winnipeg (Charleswood Newsletter, 1970). In 1865, a highway trail (known today as Roblin Blvd.) was constructed by cutting through dense bush, wide enough to accommodate ox carts. According to the Charleswood Newsletter (1970), the trail was later used by buffalo hunters to reach the southern plains of Fort Garry.

In 1912, the Municipality of Charleswood was created by act of the Manitoba Legislature. The boundaries of Charleswood, at the time, included: the Assiniboine River to the north; the four mile road to the south; the Town of Tuxedo to the east; and the parish line of St. François X'Avier

to the west (Charleswood Newsletter, 1970). In terms of planning, the Municipality of Charleswood, as well as other municipalities, had difficulties in regulating land-use development because the authority was not well defined in the *Municipalities Act*, or other significant Acts at the time. To address this problem, the Government of Manitoba adopted one of the first pieces of planning legislation in Canada, namely the *Town Planning Act*. The significance of the *Town Planning Act*, adopted in 1916, was the empowerment of municipalities to regulate land-use through "planning schemes", or what is currently known as zoning by-laws (Manitoba Intergovernmental Affairs, 2001). The power vested in municipalities did not have much effect on Charleswood because only a few homes began to appear after 1920 (Lewicki, 1993).

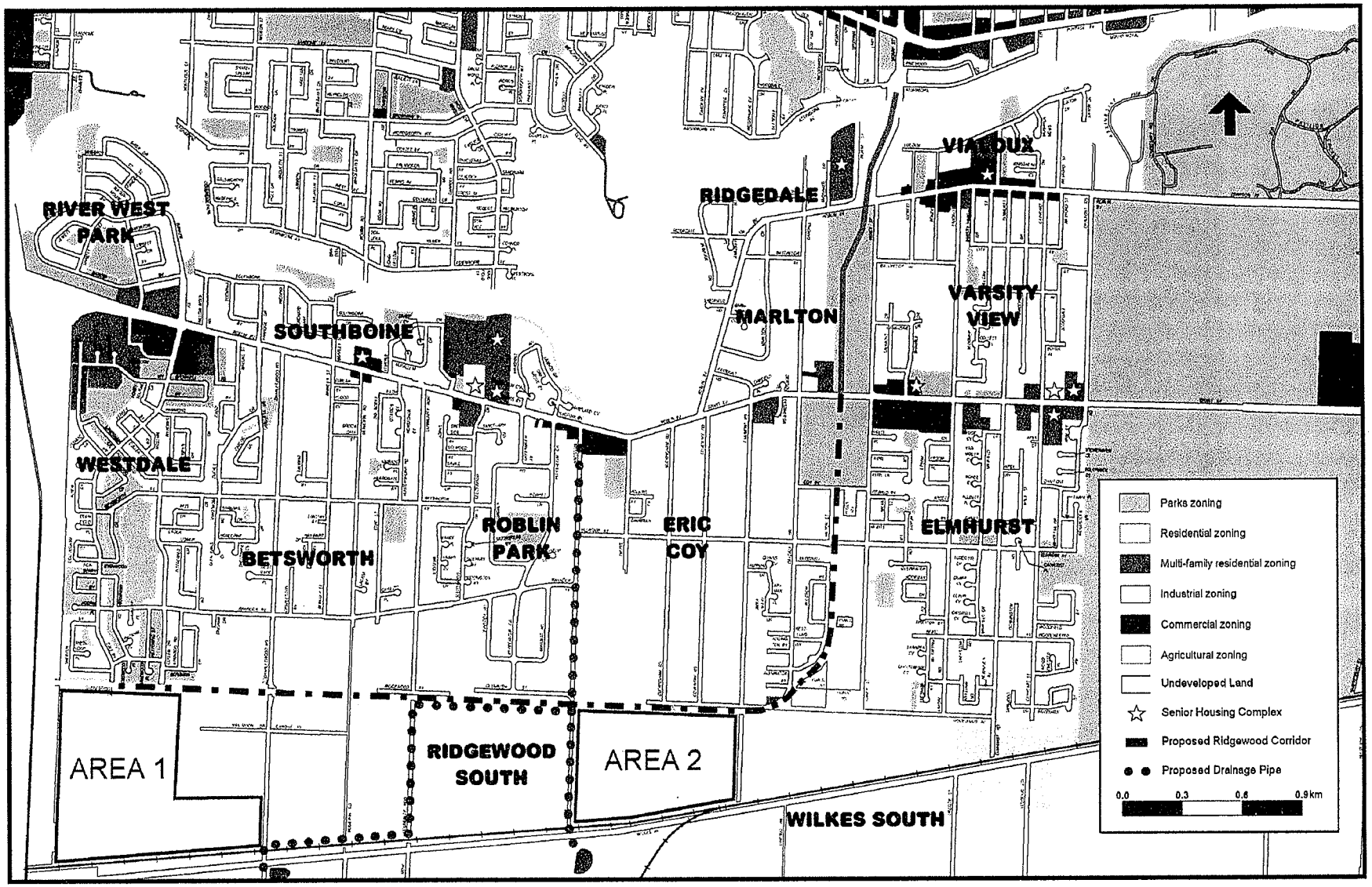
Significant growth occurred in the Municipality of Charleswood after World War II. The first major development was initiated by the Federal Government, which constructed the Roblin Park subdivision for veterans. After 1946, houses were constructed in a few development nodes, notably Varsity View and Marlton (a small development near the intersection of Dieppe Road and Roblin Blvd.). According to Bidwell (1970), war veterans comprised roughly 30 per cent of the total residents in Charleswood by 1948. At the same time, however, the Municipality of Charleswood became involved in agricultural activities including: dairy and grain farms, market garden, and over 80 mink farms. In terms of planning, Charleswood did not have the capability to undertake any local land-use planning initiatives, and thus the municipality sought planning expertise from the Metropolitan Planning Commission of Winnipeg.[4] With the approval of the provincial government, the Metropolitan Planning Commission assisted the municipality with "planning schemes" to implement local land-use regulations during the 1950s. Moreover, by the end of the 1950s, the Municipal Planning Branch came into existence to provide advisory planning to rural municipalities

[4] In 1949, the Metropolitan Planning Commission was created, with Eric Thrift as director.

immediately outside of Greater Winnipeg (Manitoba Intergovernmental Affairs, 2001). However, trunk service provisions remained as part of local government control.

5.1.2 Suburban Period (1960s to the present)

When, in the first half of the 20th Century, Charleswood first became a municipality of Manitoba, there was very slow growth. There was no industrial land-use development in the municipality because the majority of land lots were privately owned. Charleswood possessed a substantial agricultural base. The gradual growth, which started at the end of the Second World War, expanded during the 1960s. It should be emphasized that, because the general intent of the Municipal Planning Branch was to only provide advisory planning to the municipality, there was inadequate control over developments during the 1950s. Furthermore, the lack of forethought in the municipality, which allowed the untimely extension of trunk services to the Perimeter Hwy, had permitted leapfrog development to occur. According to Lewicki (1993), three neighbourhood developments occurred during the 1960s: Eric Coy, Ridgedale, and Westdale (see Map 5.1).



Map 5.1: Existing Land-use Zoning Types and Proposed Trunk Services in Charleswood (April, 2004)
Source: Land Information Services Branch, City of Winnipeg.

The realm of planning in the municipality changed again in 1961 when the Province created the Metropolitan (or Metro) Winnipeg under the *Metropolitan Winnipeg Act.* Similar to Toronto (see case study in Chapter 3), Metro Winnipeg was a two-tier system that allowed Charleswood to maintain control over local services, while the Metropolitan Corporation regulated "regional" services (Manitoba Intergovernmental Affairs, 2001). One notable planning tool that the *Metropolitan Winnipeg Act* included was the Winnipeg Additional Zone or "Add-Zone", which gave Winnipeg land-use control over an 8-10 km radius beyond the north, east, and south boundaries of Metro Winnipeg. It was shown in Chapter 2 that planning models often suggested the need for regional consistency to eliminate inequities between municipalities. Leo (1999) argued that the problem with Winnipeg's exurbanites is because of lower municipal tax structures in outlying municipalities. The "Add-Zone" gave planners the authority to protect land-use policies so that developers would not "jump the fence" to the adjacent municipalities when necessary.

Through the creation of a new *Planning Act* in 1964, the *Metropolitan Development Plan (MDP)* was adopted to guide long-range urban growth management, instead of the earlier "planning schemes" of the 1916 *Town Planning Act.* The planning policies advocated in the MDP were forward thinking in terms of managing future growth. Inspired by the works of Humphrey Carver (1962), one notable recommendation was to apply the Town Centre (TC) concept "for the arrangement of suburban growth so that new communities can grow up around their own local centres...[in] sprawling residential communities" (Metropolitan Corporation of Greater Winnipeg, 1966: 10). Remaining true to Carver's (1962) intent, the *Metropolitan Development Plan* defined the Town Centre as followed:

> The town centre is much more than a "shopping centre"; it is intended to provide for all the day to day recreational, educational, commercial and spiritual needs of the suburban resident at the community level. It is visualized as a vigorous place with design

> unity, full of people, allowing a completely new experience in suburban living by the combination of facilities, many of which may now exist in older communities but which have never before been provided grouped together in one location. (Metropolitan Corporation of Greater Winnipeg, 1966: 10)

The realisation was that in order to achieve the growth at the town centre, there was a need for long-term planning and the reservation of required land. To address this concern, the plan advocated greater commitment by both the local authorities and the private developers.

As mentioned above, the recommendations provided by the 1966 *Metropolitan Development Plans* were progressive in addressing future growth in Metro Winnipeg and the Charleswood municipality. At the same time, a transportation study was initiated for Metro Winnipeg, entitled *Winnipeg Area Transportation Study* (WATS). The final document recognised the need for integrative transportation and land-use planning and acknowledged "one should not attempt to plan for one without giving full consideration to the other" (Transportation Planning Branch Streets and Traffic Department, 1968: 22). There were five transportation schemes recommended to meet the future travel demands, ranging from a suburban freeway network to rapid transit lines. While the study addressed the need for integrative transportation and land-use planning, the recommendations were conventional in planning for mobility. As identified in the study, the top three schemes indicated the need for a "Suburban Beltway" or freeway to interconnect suburban communities. In Charleswood, the proposed beltway would connect Moray St. to Bishop Grandin Blvd., via the current Charleswood Parkway. The planning for public transportation, however, merely included the recommendation for an expansion of existing routes. Evidently, only the fifth scheme indicated a rapid transit system to be established as a supplement to the freeway system: "In this plan, the rapid transit and feeder bus system is complemented by a number of freeway express bus routes which would utilize four of the five proposed radial freeways

thus providing high speed limited stop service from the suburban areas to Downtown" (Transportation Planning Branch Streets and Traffic Department, 1968: 12). Charleswood was identified as being in need of the express bus services to downtown Winnipeg.

A few neighbourhoods were developed during the 1960s. One notable development is the Westdale community near the perimeter highway. The Westdale development had occurred because of inadequate development control and the over-servicing in the municipality, which gave the developer the freedom to leapfrog from existing communities in Charleswood, as discussed earlier. Evidently, the outcome of the development had incurred additional infrastructure costs to the government. Mozafari-Khalilabad (1978) suggested in his study that in addition to the development plan, a defined tax policy should be considered because urban sprawl is partly caused by the underassessment of land, allowing investors to withhold any valuable land from the market, which forces premature subdivision further out. "The fact that the value of unimproved suburban land increase from the monies which the public has invested into the provision of infrastructure must be given high considerations in studies of tax policies" (Mozafari-Khalilabad, 1978: 70).

The amalgamation of the City of Winnipeg with its surrounding municipalities occurred in 1972 to form "Unicity", and consequently the *Metropolitan Development Plan* was being effectively phased out and absorbed by the new City of Winnipeg Planning Department. However, as Winnipeg grew, the housing development in Charleswood continued, to peak in the 1970s, with a variety of styles, lot sizes, and price range. According to Sytnick (1995), by 1980, only less than five per cent of Winnipeg residents lived in Charleswood. In 1995, the newest development in Charleswood was Assiniboine Woods, which consisted 77 lots for construction.

Since the amalgamation, the City of Winnipeg officials administered planning for all suburban development. Over the years, significant changes to plans and Acts had occurred, such as *Plan Winnipeg 2020 Vision* plan discussed in Chapter 2. In 2002, the provincial government made amendments to the City of Winnipeg Charter Act, which immediately gave the city fourteen broad categories of control that included: public transportation, streets, activities in public places, etc. According to the Winnipeg Real Estate Board (2002), the second phase would endow the city with a new autonomy, and greater financial flexibility. Thus, a new planning model was adopted by City Council in 2002, as outlined in the document entitled *Toward an Integrated Planning Model* (City of Winnipeg, 2002). The intent of the Integrated Planning Model was "to strengthen our commitment to plan making and to strengthen the alignment of our actions with those plans. With an integrated planning in place changes would occur to the City's current planning functions" (City of Winnipeg, 2002: 6). While the vision of this document is similar to the *Plan Winnipeg 2020* discussed in Chapter 2, the recommendations were targeted at changing the city's administrative and departmental structure, in areas related to physical development of the city. For instance, it was recommended that the position of a transportation planner be sought for the Planning, Property and Development (PP&D), to coordinate city-based transportation policy that would integrate the land-use policies.

Another supportive measure to the recommendations of the *Toward an Integrated Planning Model* document is the former mayor's intent of establishing a design review board to ensure development proposals follow good design principles. Traditionally, the approval process of development is long and tedious, requiring developers to seek approvals from six to seven committees. According to Welch (Winnipeg Free Press, 2004), the peer review process will measure proposals against a sustainable development checklist. Currently, this new review board

is established only for downtown development. Thus, in addition to the standardisation of various departments, possible extension of this review board to include suburban neighbourhoods such as Charleswood would ensure more integrative transportation and land-use development in all regions of the city.

5.2 Current Problems and Future Development Potential

Current Physical Distribution of Land-uses

As shown in Map 5.1 (page 79), there are currently 13 neighbourhoods in the Charleswood district:

1. Betsworth
2. Elmhurst
3. Eric Coy
4. Marlton
5. Ridgedale
6. Ridgewood South
7. River West Park
8. Roblin Park
9. Southboine
10. Varsity View
11. Vialoux
12. Westdale
13. Wilkes South

The residential zoning for multi-family housing (brown shaded area in Map 5.1) is only concentrated in three neighbourhoods of Charleswood, namely the north-western area of Westdale, the southern tip of River West Park, and a collected area of Southboine that consists mainly of seniors housing. The rest of Charleswood is characterised mainly by single-family housing, which is sprawled between the leapfrog development of Westdale and the older neighbourhoods of Varsity View and Marlton. Betsworth, Elmhurst, Eric Coy, Roblin Park, and Varsity View neighbourhoods have areas that remain undeveloped, which provides an opportunity for dense infill development.

Transportation Issues – Accommodating Future Automobile Usage

The difficulty in developing the Ridgewood South neighbourhood lies in automobile traffic movement. According to a Senior Planner of the City of Winnipeg, two prominent problems have

become a major transportation issue in the area.[5] First, Dale and Cullen Blvd. are not able to handle a large amount of vehicular traffic flow, and second, the residents do not approve of a northerly flow of traffic into their community. Thus, in the mid-1980s, the attempt was made to construct a major easterly arterial road, the Ridgewood Corridor, to redirect traffic to Grant Ave. The proposed Ridgewood Corridor (see Map 5.1, page 79) would follow the nature trail along the former Harte Subdivision railway tracks. A transportation levy called the "Charleswood Regional Transportation Improvement" was introduced that would charge any developments $0.34/sq. foot (current value) for the construction of the transportation corridor. This transportation levy is unique to Charleswood, and consequently it has a profound impact on the market for new development. A municipal decision-maker is promoting the construction of this infrastructure to capitalize on a perceived desire to connect with the completed Charleswood Parkway. However, the residents of Charleswood prefer maintaining the proposed Ridgewood Corridor undeveloped. The six-kilometre trail runs from the Assiniboine Forest to the Perimeter Hwy, and serves a recreational function (e.g., running, cycling, cross-country skiing, etc). There is potential for redesignating the corridor as part of the Trans Canada Trail, as informed by the Senior Planner of the City of Winnipeg. According to Martin (Winnipeg Free Press, 1994), however, a proposed subdivision south of Westdale (Area 1 on Map 5.1) would infringe on, roughly, 700 metres of this trail at the Perimeter Hwy.

Land Drainage

According to the Senior Planner of the City of Winnipeg, land drainage is the other major issue in addition to transportation in Charleswood. It is the intention of a municipal decision-maker

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[5] Personal interview on April 30, 2004.

to allow new subdivisions to be developed in the Ridgewood South neighbourhood, particularly in the areas between Harstone and Fairmont Rd. (Area 2 on Map 5.1, page 79), and south of Westdale (Area 1 on Map 5.1). However, to accommodate new developments, trunk services must be extended on Harstone Rd. (see Map 5.1). In retrospect, the extension of trunk services would result in leapfrog developments, as experienced after the construction of Westdale neighbourhood (see Section 5.1b). It is inevitable that urban sprawl will leap into the Wilkes South neighbourhood. Furthermore, in terms of transportation, a new subdivision between Harstone and Fairmont Rd. would require the upgrade of the road system from the existing granular surface overlay, in addition to the widening of the lanes, to accommodate the anticipated 4,400 daily vehicular traffic from the single-family housing units in the area.[6]

Population Distribution

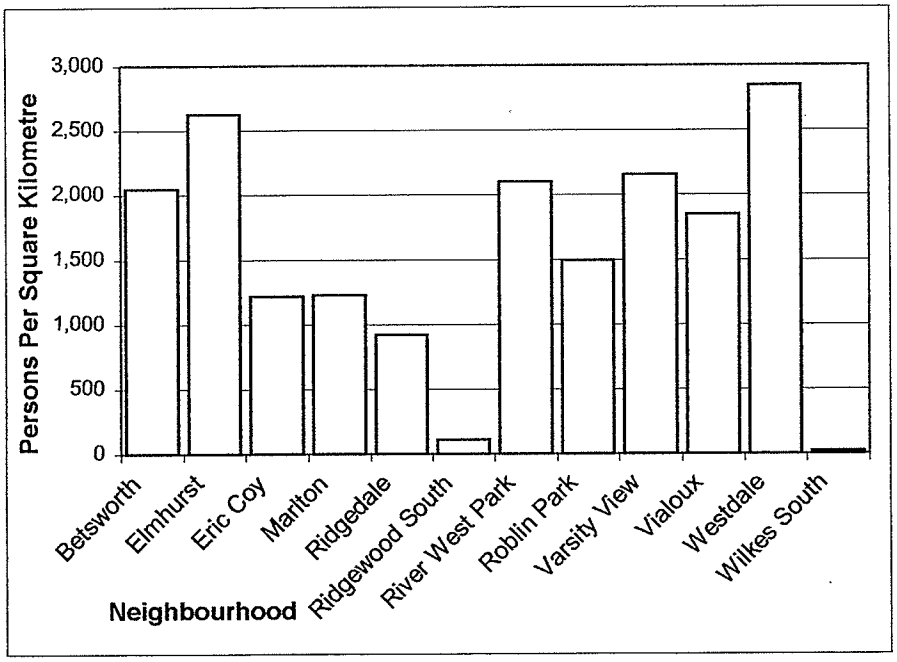

Figure 5.1: Population Density in Charleswood (2001)
Source: Planning, Property, and Development Department, Neighbourhood Profile: 2001 Census. City of Winnipeg.

[6] Telephone interview with a municipal decision-maker on April 28, 2004.

The distribution of population density is relatively consistent among neighbourhoods, as shown in Figure 5.1. Significant densities range from 2,000 to 3,000 persons per square kilometre, which belongs to the respective neighbourhoods (in ascending order) of Betsworth, River West Park, Varsity View, Elmhurst, and Westdale. However, the chart further illustrates the problem of urban sprawl because only Westdale community has the greatest population density (roughly 3,000/km^2) for its area size of approximately 1.3 km^2. The neighbourhood of Eric Coy, on the other hand, is approximately 2.0 km^2 with only a density of 1,200/km^2. As mentioned above, the undeveloped areas in the five neighbourhoods (i.e., Betsworth, Elmhurst, Eric Coy, Roblin Park, and Varsity View) can provide greater population density.

The sprawling land pattern of Charleswood has a significant impact on a particular population group, namely the seniors, with approximately 5,300 elders (ages 55-75+) living in the community.[7] There are ten seniors housing complexes distributed along Roblin Blvd. and Grant Ave. (see Map 5.1, page 79) that provide a wide range of housing options, from independent living to home care facilities, as listed in Table 5.1. The majority of seniors opt to sell their homes and relocate into one of these senior complexes because the preference is to remain within the Charleswood community.

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[7] Calculated using 1996 neighbourhood population census and the percent population change from 1996 to 2001 data to obtain an average percent of seniors ages 55-75+. The data was obtained from the city's Land-use and Planning Department.

Housing Complex	Address
A.) Independent Living	
I. Independent Living	
1) Manitoba Eastern Star Chalet	525 Cathcart St.
2) Hendon Complex	170 Hendon Ave.
3) Swedish Canadian Home	5419 Roblin Blvd.
4) Bramble Estates	3901 Grant Ave.
II. Life Lease*	
5) Vasa Lund Estates	5445 Roblin Blvd.
6) Beauchemin Park Place	5995 Roblin Blvd.
B.) Assisted Living	
I. Assisted Living	
7) Assiniboine Links	4025 Roblin Blvd.
8) The Wellington	3161 Grant Ave.
II. Personal Care Homes	
9) Charleswood Care Centre	5501 Roblin Blvd.
10) West Park Manor Care Home	3199 Grant Ave.

*Life Lease - a unique form of rental housing that includes an Entrance Fee ($25,000 - $80,000) plus monthly occupancy fees.

Table 5.1: Ten Seniors Housing Complexes in Charleswood
Source: Age and Opportunity, Inc. Winnipeg Seniors Housing Directory. Public and Non-Profit Publication Document, 2003.

As expressed by the Executive Director of the Charleswood Senior Centre, the primary concern with seniors is transportation.[8] For instance, the seniors would often carpool together to reach the senior centre, as well as to other places in the community. The cause for concern, however, is that elderly individuals are driving the carpool trips. The carpool rides are not coordinated to all seniors who require transportation, but rather only to a small of group of individuals who often meet at the centre. For the rest of seniors in the community, there exist different types of private transportation services for seniors, as outlined in Table 5.3.

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[8] Personal interview with the Executive Director of the Charleswood Senior Centre on April 23, 2004.

Transportation Service Providers	Service Fare Rates
1. Community Home Services Project	No charge*
2. Handi-Transit	Based on current bus fares
3. Veteran Affairs	Will reimburse veterans for trips to medical appts
4. Handi-Helper	Non-wheelchair user – current taxi rates Wheelchair users – starting at $11.25 +$1.20/km
5. Jewish Federation of Winnipeg	Based on percentage of current taxi rates
6. London Limos	Senior discounts, $22.00+GST for a sedan vehicle
7. Ring-A-Ride (Rupert's Land Caregiver Services)	$10.00, parking extra
8. Vital Transit	Non-wheelchair user – current taxi rates Wheelchair users – starting at $11.25 +$1.25/km
9. Louise Yurchak	$20.00 per ride, parking & other expenses extra

*One-way only to medical appointments for low income seniors

Table 5.2: Senior Transportation Services for Charleswood Residents

Source: South Winnipeg Seniors Resource Council Inc. Seniors Transportation Services. [available online at http://www.seniors.cimnet.ca], 2003.

Evidently, the charge of services listed in the table is almost equivalent to regular taxi rates, with only a few subsidised services that provide free trips for medical purpose. According to the Executive Director of the Charleswood Senior Centre, the transportation demand is also critical in terms of acquiring healthcare needs. The Winnipeg Transit department is restructuring the local feeder service to operate directly with the Grace Hospital in St. James, which is scheduled to operate in June of this year.[9] The Executive Director of the Charleswood Senior Centre indicated that there is a need for an on-site nurse at the centre to ensure greater responsibility and attention to elderly care.

5.3 Summary

The growth in Winnipeg is rather slow, particularly in Charleswood. Since the appearance of the Westdale subdivision and the encouragement of automobile commuting, there have been many sprawling developments in the community. Therefore, the greatest opportunity is in infill or retrofitting developments within built-up areas. As discussed in this chapter, the potential for new

[9] Interview with a municipal decision-maker.

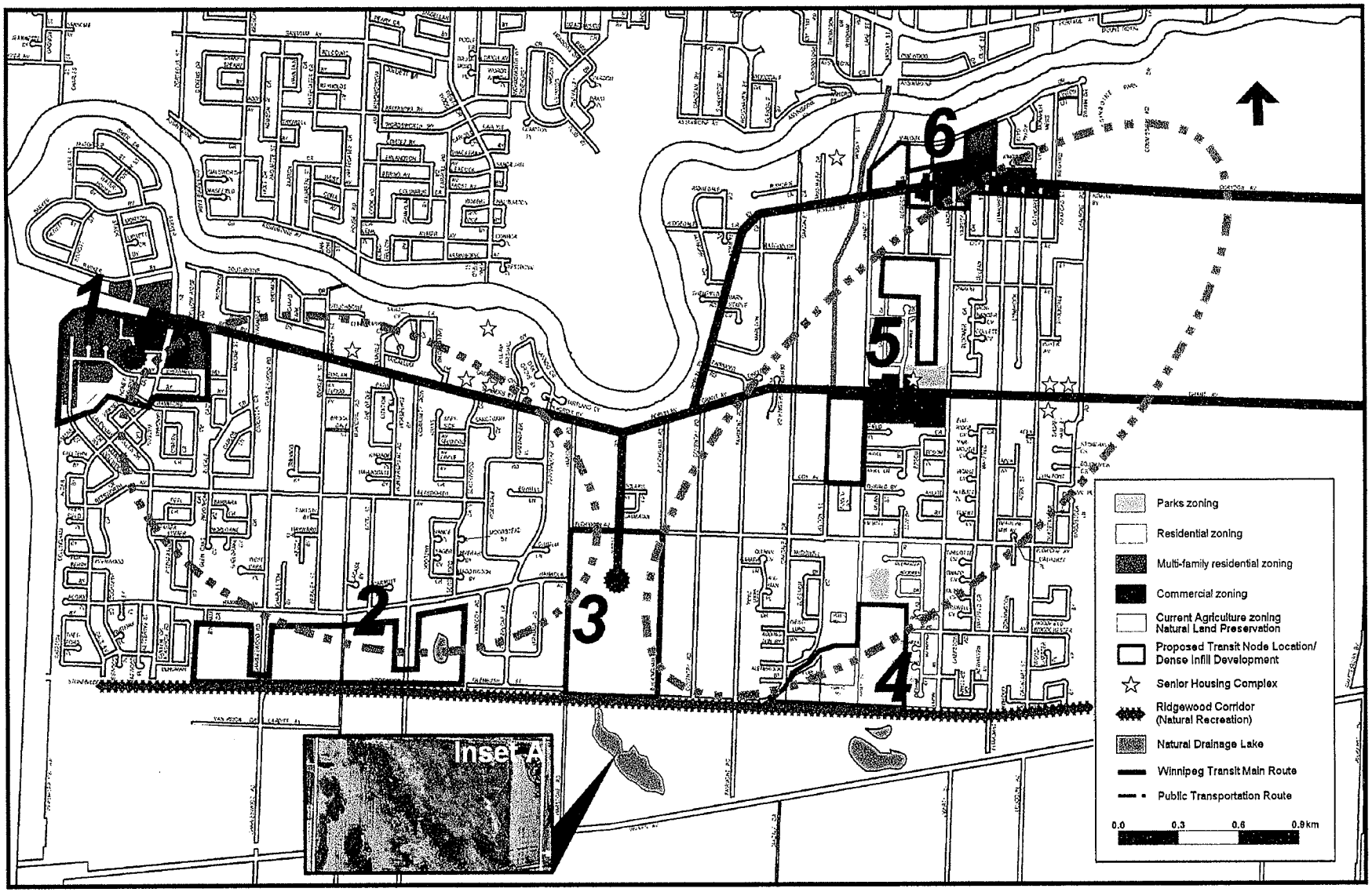
subdivisions is possible, especially given the vast unspoiled region of Ridgewood and Wilkes South neighbourhoods. The extension of trunk services south of Harstone Rd. is a formula for more leapfrog developments, which is further supported by the ambitious plan to construct the Ridgewood transportation corridor. As identified in this chapter, urban sprawl has an impact on the aging population in the community, particularly in terms of transportation demand. The sprawl between services and amenities is a challenge to seniors, who are attempting to remain in the community, and to maintain their independent lifestyle. Thus, the intent of the next chapter is to explore different planning solutions, using the guiding principles derived in Chapter 4.

Chapter 6: Seeking Solutions

6.1 Introduction

In Chapter 4, we established a framework of principles based on the findings of the case studies and certain aspects of planning theory. The foundation to the guiding principles is the Transit Node model that advocates higher density, mixed-use development. There are nine principles outlined in Table 4.1 (page 74), which incorporates the three interrelated elements of urban form, public policies, and transportation systems.

The focus of this chapter is the application of the nine principles to Charleswood, as a proposed solution to the current problems identified in Chapter 5. This chapter is divided into two sections, with the first involving area surveys of potential growth, and the second addressing the need for public transportation in the community.



Map 6.1: Proposed Integrative Land-use and Transportation Solutions in Charleswood
(For details on Inset A, refer to page 95) *Source: Land Information Services Branch, City of Winnipeg.*

6.2 Area Survey for Potential Growth and Development

As discussed in Chapter 5, urban sprawl in Charleswood can be easily seen by examining land-use distribution in the neighbourhood. To counter urban sprawl, Principle #5 can be applied by introducing the Urban Growth Boundary policy such as that in Portland, and supportively identifying any natural land for preservation. Currently, there already exist certain boundaries to the Charleswood district, namely the Assiniboine River to the north, the Assiniboine Forest and Park to the east, and the Perimeter Hwy to the west. However, as discussed in Chapter 5, undeveloped regions to the south of the district are at risk of engendering further sprawl because Ridgewood South is designated as a *neighbourhood policy area* while Wilkes South is zoned for agricultural use. Furthermore, these two areas currently support a wildlife habitat that functions as a link (wildlife corridor) between the open prairie and the Assiniboine Forest/Fort Whyte Centre.[10] The dual functions of the area call for its preservation against any new subdivision. Thus, to complete the Urban Growth Boundary, it is believed that the entire area of Ridgewood and Wilkes South remain zoned for agricultural use and/or natural habitat preservation, and as Principle #1 encourages, with a committed long-term period in effect (see Map 6.1).

In identifying the areas of Ridgewood and Wilkes South as necessary preserved eco-regions, Charleswood becomes a unique district because it is surrounded by natural parks and lands. Evidently, these natural parks and greenbelts can be officially designated as the Urban Growth Boundary to the district. Moreover, a recreational/wildlife corridor can be introduced along

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[10] According to a member of the Teacher Services at Fort Whyte Centre, approximately 648 acres of land (immediately north of the centre) has been acquired to develop a hiking trail (Green Corridor) that would connect the centre with Assiniboine Forest. The intent is to construct the corridor to support recreational function and wildlife in the area, and introduce sustainable agricultural farmscape such as the existing Earthshare Organic farm and a proposed fruit orchard. Therefore, the preservation of Ridgewood for agricultural use and wildlife corridor would enhance the hiking trail of Fort Whyte.

the Harte Trail instead of a high-speed arterial corridor (see Map 6.1, page 92). Similarly to what has been done in Copenhagen, the challenge is then for the district to become self-sufficient (i.e., acting as an urban village). As defined in Chapter 4, self-sufficiency requires a balance of critical urban functions to act coherently with each other. Principle #3 in Table 6.1 encourages the adoption of the job-housing balance model. Currently, the majority of land-use types in Charleswood are residential, with small parcels of commercial land development. Therefore, to achieve a balance of residents and employment would require the clustering of different areas where there is opportunity to introduce mixed-use development. It is suggested in Principle #2 that Transit Nodes be identified in these areas of potential growth or concentrated activities to achieve a polycentric urban form. In keeping with Principle #5 (i.e., to designate the Ridgewood and Wilkes South regions as part of the Urban Growth Boundary), only areas with infill development potentials will be examined. Thus, as shown in Map 6.1, six infill areas are identified based on their connectivity to existing built-up areas. Area #1 (see Map 6.1) is predominantly characterized with commercial and multi-family residential land-uses, and thus, there is potential for infill development of small land parcels to connect between built-up areas. Since the area is already zoned for multi-family residential use, it is recommended that higher density, mixed-use zoning be introduced in this area. For Area #2, according to the Senior Planner of the City of Winnipeg, a private developer is interested in constructing a new subdivision with the anticipated Ridgewood transportation corridor. However, the current problems in developing this area include the anticipated vehicular traffic generated from the development, as well as the need for trunk service extensions, particularly for land drainage, as discussed in Chapter 5.

Area #3 is the most critical area in this study because it is located in the heart of the Charleswood District. Similar to Area #2, the problems with vehicular traffic flow and land drainage

need to be addressed. During the spring season, natural lakes usually develop from the spring runoff. As shown in Inset A (Map 6.1, page 92), the aerial photo taken in spring 2001 reveals this natural occurrence. The dark contour of the natural lake can be improved as a naturalized land drainage system to collectively drain the area, as well as Area #3. It is confirmed by the Senior Planner that, using the natural contours, the construction of a man-made lake in the area shown in Map 6.1, can accommodate high-density development in the identified Area #3, without the need to extend trunk services along Harstone Rd. This type of naturalized land drainage system is also applicable to Area #2. This drainage system complements the proposed natural habitat corridor in Ridgewood and Wilkes South, as discussed earlier. Through land preservation policy, the region shall remain as protected marshland for wildlife habitat. The Ridgewood Corridor, on the other hand, can be designated as a natural trail for recreation, as it is currently being used.

Area #4 is a smaller area in comparison with the others. However, by inducing high-density, mixed-use development, this area could achieve greater population density than the existing low sprawling residential neighbourhood of Elmhurst. Similar to Area #3, naturalized land drainage systems can be introduced south of the area without the need to construct trunk services.

Area #5 is mainly a cluster of existing commercial uses within the undeveloped area of Varsity View. Currently, the reserved land for connecting the Charleswood Parkway with the proposed Ridgewood Corridor provides a good opportunity to introduce intense development. Moreover, this area can act as a gateway to the community for people crossing the Charleswood Bridge. As Wheeler (1999) argues, connectivity is key in transit-supportive development. Therefore, the emphasis is on achieving a linkage between the undeveloped areas of Varsity View, with the Charleswood Centre, and the reserved land south of Charleswood Parkway.

Last but certainly not least, Area #6 is important to the community because it is known as "Downtown Charleswood". Principle #2 encourages the selection of Transit Nodes that reflect the social, cultural, and historical character of the community. Area #6 is the first built-up area in Charleswood, which is mainly characterized with small commercial development. However, given the small commercial activities, there is potential to introduce infill mixed-use development to achieve a greater area size, as shown in Map 6.1 (page 92). Area #6 can be interlinked with and enhanced by Assiniboine Park.

Overall, three of the six areas have the greatest potential to be designated as Transit Nodes of Charleswood, and they include: Area #1, #3, and #5 (or T-Node #1, #3, #5 henceforth). The remaining areas (i.e., Area #2, #4, #6) can be considered as secondary to the other three in terms of intense development, but they are just as significant. Secondary nodes are usually reserved for future intense development when the primary nodes have reached their full capacity. Particularly for Area #2, the importance of designating it as a secondary node is to protect it against any further sprawl into the Ridgewood South neighbourhood.

It has been emphasized that intense development needs to occur in the areas identified, with decreasing density further from the centres. To achieve this, one approach is to adopt the planning tool used by the former Metropolitan Winnipeg Act called the Additional Zone or "Add-Zone". As discussed in Chapter 5, the Add-Zone policy granted Winnipeg land-use control over an area of 8-10 km radius beyond the northern, eastern, and southern boundaries of the city. These standards could be adapted to create a protection zone within the areas derived by the propose Transit Nodes. Within a certain radius, the area could be mainly zoned for intense mixed-use development. Principle #4(b) is applicable to Area #1 and #5 because the attempt is to retrofit existing land developments with the Transit Node model.

As shown in Chapter 3, the case studies of Copenhagen, Toronto, and Greater Vancouver Regional District all indicate the need for collaboration among different stakeholders at the Transit Nodes, which is the next logical step to the identification of the nodes. Principle #6 advocates three types of development partnerships to occur. The first type is the joint development between the public (i.e., all the different levels of government) and other sectors (i.e., private, non-profit, etc). Cervero (1994) argued that a joint development contract ensures private finances, both costs and profits, on public entities. Conventionally, public and private land developments occur in physical separation, due partly to strict zoning regulations. Thus, the challenge is to adopt different scenarios for land development. For instance, the City may want to invite investors from all sectors to develop on an unused City property. Alternatively, the City may introduce financial incentives or rewards to developers of large private properties who would consider more transit-supportive development.

The second type of partnership occurs during the development approval process. As evidenced in the Greater Vancouver Regional District (GVRD), a design panel collaborates with private developers during the entire project approval process to bridge the communication gap. Furthermore, it addresses the developers' frustration of constantly having to make incremental revisions after every review session. As explored in Chapter 5, the City of Winnipeg is adopting this type of review board (for its downtown only) that will attempt to reduce the long and tedious approval process. The third type of development, as identified in Principle #6, relates to formation of partnerships in transit service deliveries, which will be fully discussed in the next section of this chapter.

6.3 Integrative Land-use and Transportation Planning

In the previous discussion, six areas were identified, with three that could be designated as potential Transit Nodes, to achieve the polycentric urban form. The focus of this section is to explore how higher land-use densities can be introduced in the three main transit nodes (i.e., T-Nodes #1, #3, and #5) to support the public transportation requirement in Charleswood. It should be noted that the definition of mass transit is not solely limited to Winnipeg Transit, but rather extends to incorporate shuttle services. Principle #7 suggests a regional (inter-suburban) transit system to connect the transit nodes with other parts of the city, which is currently the responsibility of Winnipeg Transit.

Transit Node (T-Node) #1

As shown in Map 6.1(page 92), only T-Node #1 and #3 will be designated as centres for the origin and destination points. In addition, T-Node #5 is located along the current Winnipeg Transit route, and therefore is considered as another node for transferring to different public transportation modes. To address the aging population, as described in Chapter 5, all transit nodes will focus on seniors housing developments. Consequently, critical functional planning will be focused to achieve a mixed-use, higher-density development, which would provide a wide range of amenities and services. All centres have the capacity to do so because, for instance, T-Node #1 currently is zoned for multi-family residential uses that are mixed with commercial activities. The challenge is to encourage infill development in between built-up areas, even on the Westdale strip mall property. As discussed in Chapter 2, a parkade structure can be introduced to accommodate the current parking demand and convert existing parking spaces around the mall to other uses (see Figure 2.4, Chapter 2). Furthermore, transit stops should be incorporated into the mall facility, as evidenced in the McKenzie Towne study.

As identified in Figure 6.1, two undeveloped lots are ideal to introduce further dense multi-family development in T-Node #1. The area of Lot(1) is approximately 7,778 m^2 (1.9 acres) while Lot(2) is roughly 38,889 m^2 (9.6 acres).

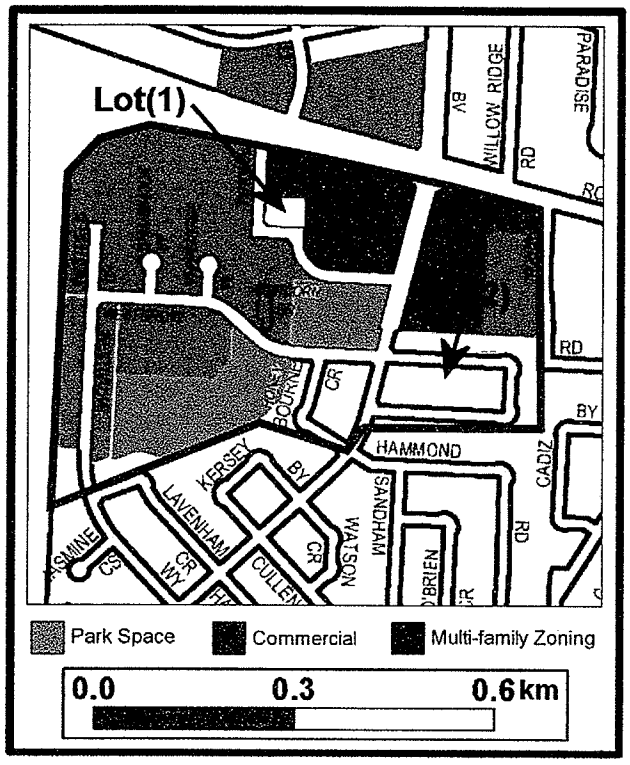

Figure 6.1: Proposed Intense Development of the Two Undeveloped Lots

For residential density development, Calthorpe advocates 35-50 dwelling units per net acre (d.u./net ac) for apartment complexes, and 18-29 d.u./net ac for townhouses (Calthorpe, 1993: 83). In adhering to these standards, Lot(1) will be assigned as an apartment with 50 d.u./ac, while Lot(2) is given a townhouse of 29 d.u./ac. density; thus, resulting in approximately 96 and 279 dwelling units in Lot(1) and Lot(2), respectively. Furthermore, by assuming that a family household consists of an average of three people, the estimated number of residents from these two lots will be roughly 1,124 persons. To obtain an estimate of the total density in T-Node #1, the bordered area (indicated in Figure 6.1) is roughly 0.276 km^2 or 16.4% of the entire Westdale community.

With this percentage combined, the total density of T-Node #1 is approximately 4,540 persons/km^2 (or 1,253 residents).

Transit Node (T-Node) #3

The opportunity to encourage intense development in T-Node #3 is more straightforward because it is undeveloped land, with only single family housing at the periphery of the area. The area should have the same intensity of developments as T-Node #1, offering different amenities and services. By adopting the concept of the Town Centre model, as advocated by Carver (1962) and the McKenzie Towne study, the commercial/employment centre will be situated in the heart of the area (shown as red shaded areas in Figure 6.2). Moreover, the Town Centre would support a main Transitway, extending from Dieppe Rd. and Rannock Ave. to connect with Roblin Blvd (as shown in Figure 6.2).

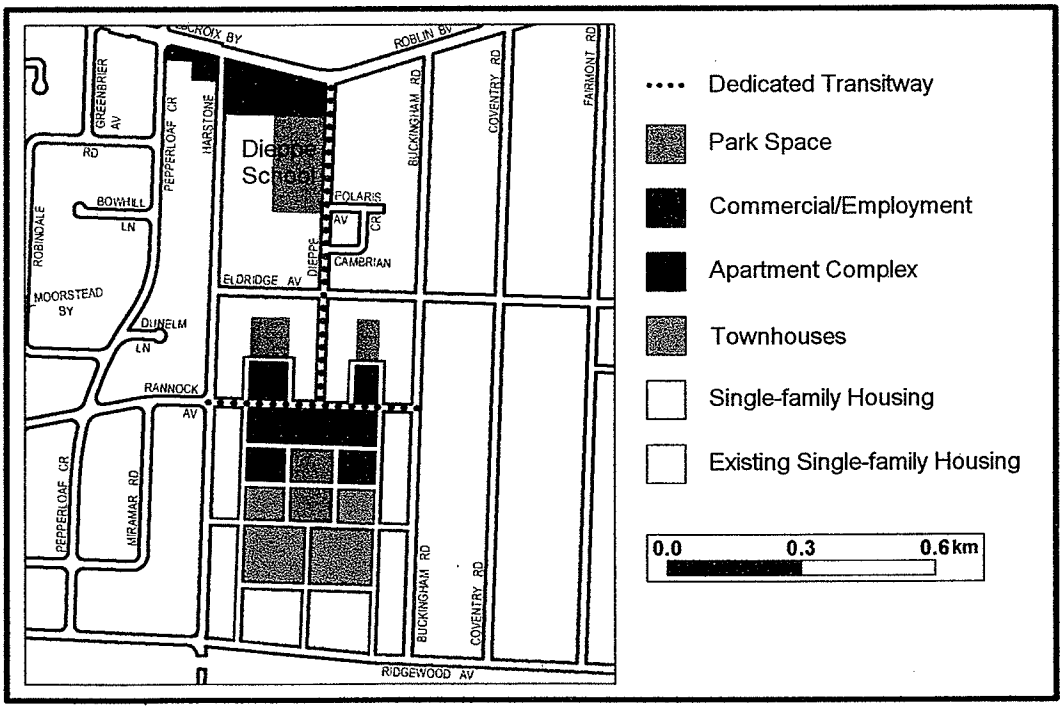

Figure 6.2: Proposed Intense Development in T-Node #3

For the centre, it is encouraged by Calthorpe (1993) and Hodge (1998) that Floor Area Ratios (F.A.R.) of at least three be assigned to achieve density.[11] Therefore, with a FAR=3, the commercial centre can cover the entire area and be three floors high or be a six-floor facility that covers only half of the area. This arrangement provides the opportunity to introduce housing over retail with a wide range of housing types such as senior complexes, live-in art studios, etc. The commercial centres (red shaded areas), total an area of approximately 39,578 m^2 (429,063 ft^2), will provide the day-to-day recreational, educational, and commercial needs of the community including offices, daycare centres, medical facilities, libraries, retails, etc. Furthermore, T-Node #3 is within close proximity to Dieppe elementary school that is located just south of Robin Blvd on Dieppe Rd (indicated by green shaded area in Figure 6.2).

Land Use Type	Area m^2	Area ft^2	Acres	Ratio (%)	Total Dwelling Units	Estimated Number of Residents*	Density (Persons Per km^2)
Apartments (50du/ac)	12,835	138,173	3.2	8.4	159	476	
Townhouses (29du/ac)	50,666	545,419	12.5	32.8	363	1,089	
Single Family (10du/ac)	36,750	395,611	9.1	23.8	91	272	
Commercial/Employment	39,857	429,063	9.8	25.8			
Public Use	14,187	152,717	3.5	9.2			
Total	154,295	1,660,984	38.0	100.0	612	1,837	11,906
Existing Residents in Area	136,731	1,471,905	33.8	-	-	166	1,216^

* Based on the assumption of (average) 3 persons per household

^ Source: 2001 Neighbourhood Profile. City of Winnipeg, Planning, Property and Development

Table 6.1: Proposed Density Development in T-Node #3

The proposed residential density shown in Table 6.2 is based on the recommended density standards of Calthorpe, as introduced earlier for T-Node #1.[12] The emphasis is on medium to high dwelling units so as to complement existing low single-family housing units in the area. In

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[11] Floor Area Ratios represent the proportion of building square footage to the land area.

[12] Calthorpe suggests maximum densities: apartment (50 du/net ac), townhouse (29 du/net ac), single-family (10 du/net ac).

particular, high-density apartments and townhouses are located closest to the town centre. The percent ratios of land-use type are as calculated in Table 6.2; with total housing comprising of 65%, commercial/employment being roughly 26%, and public space is approximately 9%. These ratios are consistent with the recommended mixed-uses for a typical "Neighbourhood TOD". Overall, the total estimated population (including existing housing units) is roughly 2,003 residents. Therefore, the density is approximately 6,549 persons per square kilometre, which is substantial when compared to current neighbourhood densities of Charleswood (ranging between 1,200 to 3,000 persons/km^2).

In terms of transportation, all public transportation-type services will be collected at the Town Centre in T-Node #3, for easier transfer between vehicles. The pavement is narrower than City standards (at maximum 7 metres wide), with paved sidewalks and shorter neighbourhood blocks – a maximum of 360-400 metres (Friedmann, 2002: 118). As discussed in Chapter 5, the main transportation concern for T-Node #3 is that the current servicing roads (i.e., Harstone Rd, Dieppe Rd., Buckingham Rd., and Eldridge Ave.) are not able to handle heavy vehicular traffic from a new subdivision in the area. Hence, T-Node #3 must embrace transit-supportive measures to accommodate the higher-density development. Principle #8, which advocates the adoption of sustainable design standards, can be introduced to achieve a public-transportation-friendly environment. Similar to the McKenzie Towne study, neo-traditional design principles such as New Urbanism (NU) and Transit-Oriented Development (TOD) are important to achieve the necessary landform. Furthermore, it is imperative to adhere to Principle #9, which advocates that transit-focused planning occur at the outset of development, whenever possible. Given the proposed density development for mixed-use, transit ridership will not be solely dependent on residential population of the area, of which there is an additional 1,837 people with the proposed housing

density. Moreover, the inter-suburban transit system will bring outside riders to the node and vice-versa.

Transit Node (T-Node) #5

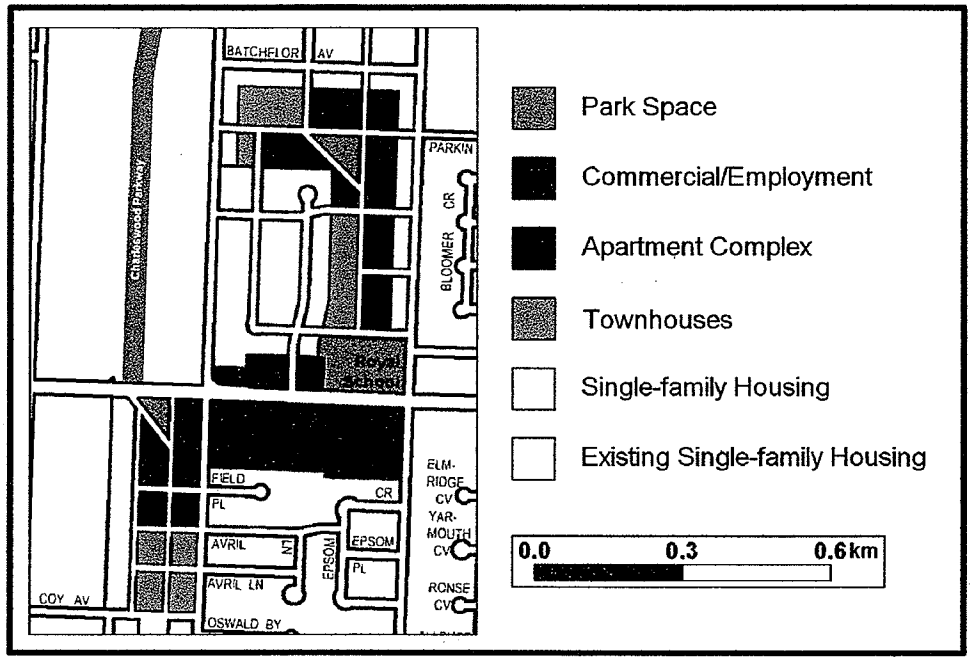


Figure 6.3: Proposed Intense Development in T-Node #5

T-Node #5 combines the features of both T-Nodes #1 and #3 because it consists of areas of different size and different opportunities for development. Similarly to T-Node #3, there currently exist many low single-family housing in periphery of the area, with the exception along Robin Blvd where there is greater density such as the Charleswood Centre, the Bramble apartment complex, and the Royal School (located at the corner of Roblin Blvd and Laxdal Rd). Further diverse development may be possible in these areas; for instance, a FAR=3 can be assigned to the Charleswood Centre to encourage density housing development in addition to retail.

Land Use Type	Area m^2	Area ft^2	Acres	Ratio (%)	Total Dwelling Units	Estimated Number of Residents*	Density (Persons Per km^2)
Apartments (50du/ac)	30,540	328,764	7.5	15.0	375	1,125	
Townhouses (29du/ac)	41,821	450,205	10.3	20.4	299	897	
Single Family (10du/ac)	22,687	244,224	5.6	11.1	56	168	
Commercial/Employment	102,657	1,105,100	25.4	50.3			
Public Use	6,482	69,778	1.6	3.2			
Total	204,188	2,198,071	50.4	100.0	730	2,190	10,725
Existing Residents in Area	102,346	1,101,747	25.3	-	-	220	2,154^

* Based on the assumption of (average) 3 persons per household

^ Source: 2001 Neighbourhood Profile. City of Winnipeg, Planning, Property and Development

Table 6.2: Proposed Density Development in T-Node #5

As shown in Table 6.2, Calthorpe's suggested density standards are used to determine a possible density development in the area. Given this configuration, T-Node #5 will achieve roughly 730 dwelling units, which results in an estimated 2,200 residents in 23.4 acres of allocated housing area. Consequently, the total population (including existing housing units) is 2,410 residents or a density of 8,071 persons per square kilometre. As shown in Figure 6.3, the northeastern corner of T-Node #5 is proposed for commercial/employment (C/E) development because the existing street block is greater than the recommended 400-metre walking distance. The recommendation is for a FAR=3 to encourage other than retail development in this commercial/employment area. Thus, the mixed-uses in this commercial/employment area will complement the Charleswood Centre. Hence, a mix-use ratio of commercial-employment is comparative to T-Node #3, comprising 25% of land-use type. Density housing comprises roughly 47%, while public use is only three per cent because the current sprawling development already has more greenspace. Again, these mixed-use ratios are consistent with the recommendations of Calthorpe (1993), and thus T-Node #5 also falls under the category of "Neighbourhood TOD".

Mass Transit Commuting within Charleswood

As previously mentioned, Winnipeg Transit will serve as a connection to the rest of Winnipeg, and such destinations as the Unicity Mall, downtown, etc. Transit riders who arrive at T-Nodes #1, #3, and #5 could transfer to the locally operated public transportation to get to other parts of the Charleswood district. As indicated in Map 6.1 (dashed light blue lines), the local public transportation will operate in a circular manner to distribute people to other transit nodes, and to the existing sprawled neighbourhoods. Moreover, the system will serve different amenities of the community such as the Assiniboine Forest and Assiniboine Park, and the existing seniors housing complexes along Roblin Blvd. and Grant Ave. The uniqueness of this local public transportation service is that it will not be solely a public entity, but rather the system will include private service delivery. As suggested by Principle #6, the third type of partnerships is transit service delivery. To encourage investment from other sectors, a public transportation system can be extended to allow jitneys, shuttle vans, and the current private transportation services such as those listed in Table 5.2 (Chapter 5) to become an integral part of the service delivery.

Non-motorized Commuting

This section is concerned with the need to provide for non-motorized commuting such as pedestrian and cycling movements. The Copenhagen study in Chapter 3 revealed that complementing the regional rail transit system are well-integrated pedestrian and cycle networks at the local level. For Charleswood, there currently exist several disconnected areas designed for pedestrian and cycling activities. As previously mentioned, the Harte Trail is currently being used by residents for recreational purposes. The preservation of the trail for pedestrians will greatly enhance the areas that are identified as transit nodes, by extending the trail from the Perimeter Hwy to the Assiniboine Forest. There are designated cycling pathways along Charleswood Bridge

and Parkway, as well as Vialoux Rd., which extend right into the Assiniboine Park. To achieve a complete cycling path in the community, there is opportunity to introduce cycling lanes along local streets by either reducing vehicular speed limits, or converting low traffic volume roads to pedestrian-only access.

6.4 Summary

To summarise, the nine principles have provided some guidance to support the much-needed integration of land-use and transportation planning, particularly in exploring the Transit Node model. Charleswood is mainly bordered by natural features, with the Assiniboine River to the north, the Assiniboine Park and Forest to the east, and a vast unspoiled region to the south. As advocated by Principle #5, it is important to identify and preserve natural lands against sprawling development. Given this condition, the potential is mainly in infill development, which is feasible in Charleswood because of the sprawl that has occurred over the years. Consequently, six areas have the greatest opportunity for development, and they are summarised in Table 6.2.

As discussed in the chapter, T-Nodes #1, #3, #5 will be considered as primary transit nodes and therefore immediate development would be focused in these areas. The other three areas (i.e., Areas #2, #4, #6) are considered as secondary nodes, which will be preserved for future development until the designated primary nodes have reached their capacity. Overall, the foundation to the solutions discussed in this chapter is the nine guiding principles, which are derived from the exploration of different cities (presented as case studies in Chapter 3), and the planning models of Chapter 2. The challenge is then to evaluate these solutions against the social, political, and economic situation of Charleswood, and this is the intent of the next chapter; i.e., to determine the feasibility of achieving the Transit Nodes, and consequently to evaluate the nine principles of the practicum.

Area	Potentials
1	▪ Designated as a Transit Node (T-Node #1), acting as a major transfer node for transit riders within and outside of Charleswood ▪ The key objective is to achieve a job-housing balance ▪ Currently, the area is zoned for commercial and multi-family residential developments ▪ The potential is in infill development of Lots (1) & (2), to achieve an additional estimated 1,124 residents, resulting in a density of 4,540 persons/km^2 for the identified area
2	▪ Considered as secondary transit node, and thus reserved for future development, but important to guard against further sprawl into Ridgewood South ▪ According to the Senior Planner of the City of Winnipeg, developers are waiting to develop this area, with the anticipated Ridgewood Corridor construction ▪ Naturalized land drainage system can be introduced, draining into a man-made drainage lake in the Ridgewood South area to accommodate intense development ▪ Automobile traffic can be addressed by focusing on transit services and Transit-Oriented Development (TOD)
3	▪ Designated as Transit Node (T-Node #3) ▪ With roughly 40 acres of developable land, this area has the greatest potential for development ▪ Proposed intense residential developments can achieve roughly 1,837 residents (or a total of 2,003 residents with existing housing in the periphery of the area – a density of approx. 6,549 persons/km^2) ▪ Similar to Area #2, introduce naturalized land drainage system draining into a natural contoured lake in the Ridgewood South area
4	▪ Considered as secondary node ▪ Again, introduce naturalized land drainage system draining into a natural contoured lake in the Ridgewood South area
5	▪ Designated as Transit Node (T-Node #5), and similar to the other two nodes, act as a major transfer node for transit riders within and outside of the district ▪ The key objective is to achieve a job-housing balance ▪ Reserved land for connecting to Charleswood Parkway can be rezoned for TOD development, acting as a gateway into Charleswood ▪ Charleswood Centre and vacant lands in Varsity View will be targeted for intense development, achieving an estimated 2,200 residents (a total of 2,410 residents with existing housing units or a density of 8,011 persons/km^2)
6	▪ "Downtown Charleswood" will be considered as secondary node ▪ Area will preserve historical buildings, with small infill development ▪ Potentials lie in its connectivity with the Assiniboine Park and Forest

Table 6.3: Summary of Potential Development in the six areas of Charleswood

Chapter 7: Evaluating the Proposed Solutions

7.1 Introduction

In Chapter 6, the nine guiding principles were applied to six potential areas in Charleswood to illustrate how integrative land-use and transportation planning can be directed to support public transportation. Three Transit Nodes showed potential for growth and development, and they are T-Nodes #1, #3, and #5. In anticipation of these areas reaching their growth capacity, three other areas (identified in Chapter 5) were considered as secondary nodes: Areas #2, #4, and #6. The intent of this chapter is to evaluate the solutions proposed for T-Nodes #1, #3, and #5 against certain relevant transit service criteria, as well as the concomitant social, political, and economic situation of the community. The aim of the nine principles proposed in Chapter 4, is to create conditions conducive to viable transit nodes. Hence, different solutions have been explored for the three Transit Nodes of Charleswood, as summarised in Table 7.1.

7.2 Transit Service and Delivery Parameters

As discussed in Chapter 1, a viable mass transit system requires a certain population density to produce ridership. Table 7.2 summarises the proposed residential density in the three Transit Nodes from Chapter 6. These estimates can be further examined to determine whether they are sufficient to support mass transit demand. To do so, these numbers are compared with empirical standards that define certain criteria to be met: accessibility distance to a bus route, minimum of passenger demand, and transit routing operations (e.g., bus headways, length of trip, etc.).

Map 7.1 identifies a potential bus route that can be operated from the three Transit Nodes of Charleswood. There are several important conditions to the routing of the bus service such as

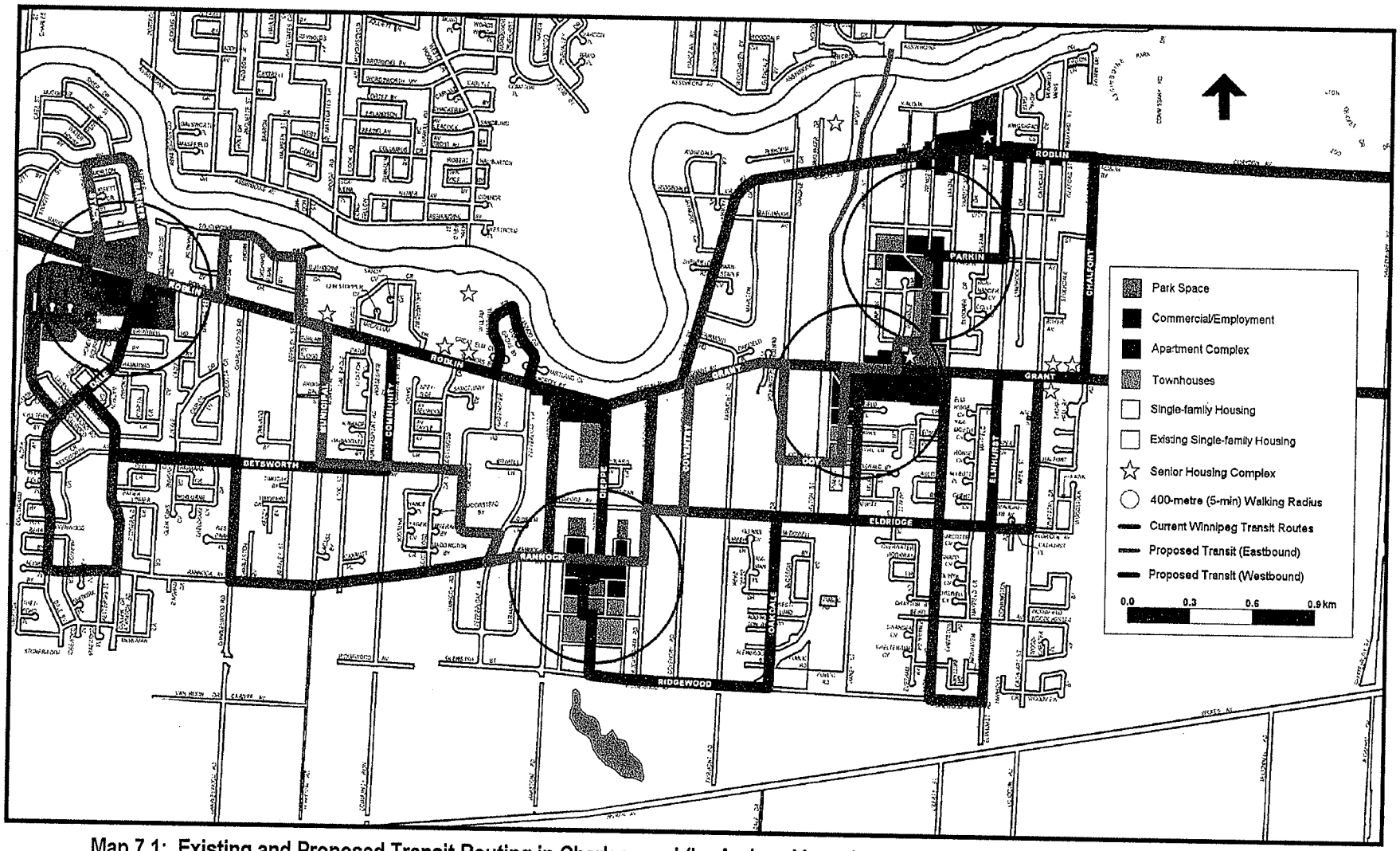
travel time, and reducing overlap with existing transit line. However, the most important condition is to connect the Transit Nodes with existing seniors housing complexes, as indicated on the map.

T-Node	Proposed Solutions
#1	▪ Act as a major transfer node for transit riders within and outside of Charleswood ▪ The key objective is to achieve a job-housing balance ▪ Currently, the area is zoned for commercial and multi-family residential developments ▪ The potential is in infill development of Lots (1) & (2), to achieve an additional estimated 1,124 residents, resulting in a density of 4,540 persons/km^2 for the identified area
#3	▪ With roughly 40 acres of developable land, this area has the greatest potential for development ▪ Proposed intense residential developments can achieve roughly 1,837 residents (or a total of 2,003 residents with existing housing in the periphery of the area – a density of approx. 6,549 persons/km^2) ▪ Similar to Area #2, introduce naturalized land drainage system draining into a natural contoured lake in the Ridgewood South area
#5	▪ Similar to the other two nodes, act as a major transfer node for transit riders within and outside of the district ▪ The key objective is to achieve a job-housing balance ▪ Reserved land for connecting Charleswood Parkway can be rezoned for TOD development, acting as a gateway into Charleswood ▪ Charleswood Centre and vacant lands in Varsity View will be targeted for intense development, achieving an estimated 2,200 residents (a total of 2,410 residents with existing housing units or a density of 8,011 persons/km^2)

Table 7.1: Proposed Solutions for the Three Transit Nodes

Transit Node	Estimated Number of Residents	Population Density (Persons/km^2)
#1	1,253	4,540
#3	2,003	6,549
#5	2,410	8,011

Table 7.2: Proposed Densities in the Transit Nodes



Map 7.1: Existing and Proposed Transit Routing in Charleswood (by Andrew Vuong)
Source: Land Information Services Branch, City of Winnipeg.

7.2.1 Accessibility to Bus Routes

It has been emphasized by many advocates of transit-supportive planning that accessibility to bus routes must be within a 400-metre (5-minute walking) radius to sustain transit demand. As shown in Map 7.1, all three Transit Nodes meet this requirement because smaller street blocks are introduced for all areas. In particular, a town centre is introduced in T-Node #3 that acts as a transfer hub. To reiterate, the proposed town centre is a commercial/employment centre that is within the 5-minute walking distance from all parts of T-Node #3. For T-Node #5, two centres have been proposed to address the need for shorter street blocks. According to Giannopoulos (1989), approximately 70-75% of the population of a densely urban area (within the 400-metre distance to transit) will commute by bus. Therefore, by assuming that roughly 75% of the estimated number of residents commutes by transit, we get an approximate ridership demand in each Transit Node, as shown in Table 7.3.[13]

Transit Node	Estimated Number of Residents	Estimated Ridership (Persons)*
#1	1,253	940
#3	2,003	1,502
#5	2,410	1,808

* Based on 75% of area population

Table 7.3: Ridership Estimates in each Transit Node

7.2.2 Minimum of Passenger Demand Criterion

In transit planning, a critical parameter is the "minimum of passenger demand", which "calls in practise for a simple and reliable way to estimate the expected passenger demand"

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[13] Understandably, the assumption of 75% estimated residents is substantially high for Charleswood; however, the percentage takes into account other (non-residence) transit users who may be accessing the node for commercial/ employment purposes.

(Giannopoulos, 1989: 106). Giannopoulos states that the justification for a new transit route is based on meeting one of two conditions:

> (1) If total daily passenger demand for a new bus route is greater than 1,800-2,000 passengers in both directions, then it is justified to provide full-time, whole day operation;
>
> (2) Consequently, if (1) fails, then the line can be considered as part-time (peak hours only), if the demand is greater than 150-200 passengers per hour.

By applying the above two conditions to the estimated ridership derived in Table 7.3, only T-Node #5 has met the "minimum passenger demand" requirement of 1,800 passengers. The ridership in both T-Node #1 and #3 are not enough to justify full-time service. Therefore, T-Node #1 and #3 will be explored if part-time transit service is feasible (i.e., Condition (2)). The new transit route proposed for the three Transit Nodes in Charleswood must complement existing service routes in the community. Currently, there are three significant transit routes in Charleswood, namely Routes 66 Grant (65 Weekday Express), 79 Charleswood (67 Weekday Express), and the local feeder bus of Route 98 (Weekday peak hours only). The concern is during peak hours, and thus the duration of both morning and afternoon peak hours (based only on the 65, 67 and 98 services) are examined.

Transit Route	Peak Hour AM/PM	Duration of Service (Hours)
65	AM	1.60
	PM	2.48
67	AM	2.58
	PM	3.57 <<Max>>
98	AM	3.13
	PM	2.95

Transit Node	Estimated Total Ridership	Estimated Hourly Ridership (based on 3.5hr)
#1	940	269 >200
#3	1,502	429 >200
#5	1,808	516 >200

Table 7.4: Proposed Densities in the Transit Nodes

From the top table of Table 7.4, the greatest duration of peak hour is 3.57 hours (or roughly 3.5 hours), which results in the hourly ridership demand at each Transit Node. As shown in the bottom of Table 7.4, all of the estimated ridership at each node is greater than 200 passengers, and therefore is justified in requiring part-time transit service. The next logical step is to verify whether the headway between buses will be compatible with existing transit service routes.

7.2.3 Transit Routing Operation

This section is critical in justifying whether the population density proposed in the three Transit Nodes can have a positive effect on transit service delivery. The intention is to determine the headways or frequencies between buses that would support existing transit services. Headways are directly related to the ridership, as suggested by Giannopoulos (1989), the greater the frequency between successive buses, the more attractive the system becomes to non-captive riders. However, if the headway is too short, the system may prove to be uneconomical because a more than necessary number of buses is in operation. On a final note, according to Giannopoulos (1989), frequency between successive buses on one route must also be responsive to transfer to and from other service routes.

The proposed transit routing of the local bus system is as outlined in Map 7.1, and in order to reduce the need to transfer, the system will operate between all three Transit Nodes. That is, the route will operate from T-Node #1 to T-Node #5 in the eastbound direction, via T-Node #3, and return in the same sequence westbound. The result of this arrangement is as shown in Table 7.5.

Direction	Total Length (km)	Total Hours Travelled*	Total Minutes Travelled
Westbound	11.81	0.413	24.79
Eastbound	9.11	0.319	19.14
Total Trip Cycle	20.92	0.732	43.93

* Based on the assumption: Avg. running speed is 50 km/h & additional 75% of travel time for passenger pick-up

Table 7.5: Proposed Local Transit Route Calculations

Consequently, the time headway (h_t) between each vehicle is determined by using the following equations, with the results shown in Table 7.6 (Morlok, 1978: 313).

$$n = \frac{\frac{q}{P \times t_r}}{Q}$$

$$h_t = \frac{60 \text{ min}}{n}$$

where n = number of vehicles
q = vehicle volume in one direction (passengers)
P = duration of time period (3.5h)
t_r = round trip or cycle time (0.732h)
Q = capacity of each vehicle (18 passengers)
h_t = headway time between vehicles (minutes)

Transit Node	Estimated Ridership (q)	Number of Vehicles (n)	Headways (h_t) (minutes)
#1	269	3	19.2
#3	429	5	12.0
#5	516	6 <<max>>	10.0

Table 7.6: Estimated Number of Required Vehicles and Headway Times

As derived in Table 7.6, six vehicles of a typical 18-passenger mini-bus are required to operate between the three Transit Nodes. One argument for a smaller bus vehicle is that current residential roads in Charleswood are not designed for heavy loads, as confirmed by a municipal decision-maker. The frequency between successive vehicles is ten minutes, which is fully compatible with existing transit routes. The range of headways between current Route 65 Grant and 67 Charleswood Express is between 13 to 20 minutes. To operate larger transit buses along the proposed route will proved to be uneconomical because the headway time will decrease, making the system less attractive. However, the current rolling stock of the Winnipeg Transit

System consists mainly of 40-foot buses operating along main transit lines, while 30-foot low-floor buses (the smallest vehicle size in the fleet) are used along the feeder lines. The preference of Winnipeg Transit for a large-bus fleet is due mainly to meeting union demands that guarantee the protection of vehicle-operating licence of operators (Prokop, 1999). Thus, as an alternative and as encouraged by Principle #6, partnerships outside of the department may be sought in the service delivery in order to obtain more accurate seating capacity of vehicles, such as the 18-passenger mini-bus proposed in the study.

7.3 Evaluation of the Proposed Transit Nodes in Charleswood

This section evaluates the three Transit Nodes against the social, political, and economic realities of the Charleswood District. Three separate subsections are devoted to each Transit Node (i.e., T-Nodes #1, #3, and#5), to evaluate the proposed land-use and transportation solutions with existing conditions in the area.

T-Node #1

By designating this area, which is essentially a portion of the current Westdale community, as a Transit Node, there will not be significant changes to the community because a somewhat high-density development has already occurred. Evidently, the residential housing type along Dale and Cullen Drive is mainly single-family duplexes. As mentioned in Chapter 5, Dale and Cullen Dr. could not handle additional vehicular traffic, which requires more attention on transit-focused development.

The majority of the high-density development exists within the intersection of Dale Dr and Roblin Blvd, which is currently zoned for multi-family residential development. What is currently missing in the area, however, is seniors housing. Although there are several located along Roblin

Blvd. and Grant Ave., these complexes, some of which are restricted to low mobility residents, are rather far apart which makes it difficult to provide transit routing to all locations (see Map 7.1).

To a certain extent, this area reflects the transit-supportive land-use principles emphasized throughout the practicum. That is, higher density development is located in a cluster at a focal point, with gradual decrease in density further away. Changes to the current zoning in the area only require the encouragement of better mixed-uses. Again, this encouragement is possible because there are already important municipal services provided in the area (e.g., transit, drainage, sewer services, etc.). For instance, there is an opportunity to introduce seniors housing with medical care facilities within the vicinity to address the concern with access to healthcare needs, as raised by the Executive Director of the Charleswood Senior Centre (see Chapter 5).

T-Node #3

This Transit Node in particular appears to be more susceptible to the social and political situation of Charleswood because the area is currently undeveloped, as well as being within close proximity to other proposed development by interested parties. As discussed in Chapter 5, the current political goal is to extend trunk services along Harstone Rd. to allow residential development in the Ridgewood South neighbourhood. In addition, there is a need to construct the Ridgewood Transportation Corridor along the Harte Trail to meet the vehicular demand in the new subdivision, despite the residents' desire to leave the trail as a natural recreational corridor. Consequently, it is important to designate the corridor as a protected natural area, which would then serve as a boundary to contain sprawling development (as encouraged by Principle #5).

Given the boundary of the Harte Trail corridor and the already existing residential development, this area proves to be the most viable location for a Transit Node. Particularly due to the fact that this area lies in the heart of the Charleswood District. The need for proper drainage is

addressed in Chapter 5, with the possibility of constructing man-made lakes that contour natural water drainage that occurs during the spring season. According to the Senior Planner of the City of Winnipeg, this type of drainage would be able to sustain higher density development in T-Node #3.

Another important consideration is the reality of residential and commercial market growth in the City of Winnipeg, which has been rather slow in comparison to other similar-sized cities such as Edmonton. Moreover, according to the Senior Planner, the transportation levy has certainly affected development in Charleswood, making any potential growth almost non-existent. Evidently, any new development in this area, of which there is approximately 38 acres of developable land, would result in a transportation levy of $0.6 Million. By examining the land allotment proposed in Chapter 6 for this area, the transportation levy, on average, is roughly $45,000 per three-acre lot. As proposed by Cervero (1994) (see Chapter 2, Section 2.2.2), the levy may be adopted as a financial incentive to encourage development, particularly ones that support mass transit. This incentive is applicable to all three Transit Nodes.

Last, but certainly not least, the public perception in Charleswood is to retain the "country-style living" in the community. There are two arguments to this claim. From one viewpoint, the demographics of Charleswood are changing, as mentioned in Chapter 5, with the relocation of many elderly residents into seniors housing complexes, and many young families moving in their stead. Many of the young families have both parents working, thus essentially requiring a convenient access to daycare services. The other viewpoint is that, in economic principles, the lack of a competitive market results in a higher cost of living. There are direct and indirect costs associated with the need to commute outside of the community to acquire daily essentials. Thus, by inducing higher-density, mixed-use developments, there is greater access to more competitive

products and services. In addition, clustered development will consume less land, thereby enabling the "country-style living" to be sustained in other parts of the community.

T-Node #5

The above discussions for both T-Nodes #1 and #3 are relevant to this Transit Node as well. As noted in Chapter 6, this node is located along an arterial road, and major transit routes. The major commercial and/or employment locations are situated at Charleswood Centre, with an additional commercial/employment strip in the northeast corner (at the newly created intersection of Princeton Blvd. and Parkin Ave.). As previously discussed, the reason for two commercial/employment centres is that the street block would then be within the required 400-metre (5-minute) walking distances. In addition, a small area of commercial/employment may be introduced to the west of Charleswood Centre, immediately south of the Charleswood Parkway. The greatest concern with this node is in its close proximity to other existing commercial areas such as "Downtown Charleswood" (Area #6), and the proposed T-Node #3. Furthermore, because the area essentially has two commercial/employment locations, there must be greater mixes of use in the node to be viable. For instance, several seniors housing complexes already exist along Grant Ave., which are within close proximity to the node, and thus senior-supportive facilities and services may be intermixed with other activities. As an alternative, the proposed area size of T-Node #5 may be reduced to a smaller area at the initial stages, which would only include the Charleswood Centre and the area south of Charleswood Parkway. Given this arrangement, however, the previously calculated transit ridership estimates may be affected.

7.4 Summary

Three T-Nodes have been proposed, based on the nine principles derived from Chapters 2 and 3. Plausible means of implementation will be presented in the concluding chapter of the practicum.

Chapter 8: Recommendations and Conclusions

8.1 Introduction

The political, social, economic, spatial and operational environments of three Transit Nodes (T-Nodes), deemed the most viable, have been examined in the previous chapter. This chapter could be construed as a "reality test". How could the Transit Node concept be implemented? Two plausible T-Node scenarios will be proposed, followed by recommendations on their implementation and a discussion on the viability of the nine guiding principles.

8.2 Recommendations on the Proposed Transit Nodes

As mentioned above, this section involves positing certain arrangements of the three Transit Nodes (i.e., T-Nodes #1, #3, and #5), and hypothetically following through their implementation, given the socio-political and economic realities of the community. The focus is to explore how different combinations of the proposed T-Nodes can result in different feasible scenarios. Two plausible scenarios exist, with different outcomes, constraints, and recommendations.

Scenario #1 – Adopting All Three Transit Nodes in Charleswood

This scenario suggests the adoption of all three proposed Transit Nodes in Charleswood, which definitely upholds the polycentric urban form model. From the evaluation concluded in the previous chapter, the density proposals in each node meet several transit parameters. For instance, T-Node #5 is justified to have full-time transit service, while T-Nodes #1 and #3 only justify peak hour operations. As noted in Chapter 7, by operating smaller buses or vans, the headway between successive buses is approximately ten minutes, which is complementary to existing transit routes.

The main concern with this scenario, however, is the close proximity of these centres to each other, which may be a barrier to achieve full development capacity in each node. Particularly, T-Node #5 has two commercial/employment centres. With the slow growth occurring in the City of Winnipeg and the transportation levy, there may not be significant demand to achieve mixed-use development in all three nodes within a reasonable time frame. If development cannot be achieved within a reasonable time frame, the essence of maintaining clustered development in and around the Transit Nodes may be challenged and abandoned, as evidenced in the Copenhagen case study.

Recommendations on Scenario #1

If this scenario is to be adopted, the following recommendations need to be considered:

1. Transit vehicles used to operate the local service must be small in order for the system to be viable. Therefore, partnerships with interest groups who can deliver services with smaller vehicle may be sought (as recommended by Principle #6). Furthermore, to encourage high-occupancy vehicle (HOV) commuting such as carpooling, other types of public transportation service should be encouraged, including multi-family residential complexes that may offer their own shuttle service to their tenants.
2. To encourage more development, and in particular higher density, mixed-use development, the current transportation levy may be used as an incentive to promote transit-supportive development. As evidenced in the Toronto, Portland, and Greater Vancouver Regional District case studies, financial incentives are necessary to foster greater commitment to visionary goals.
3. To address the close proximity of the three nodes, different phases of development can be identified that would reserve land parcels for consecutive and immediate future development. Thus, T-Node #3 may gradually be phased in while the priority is given to T-Node #1 and #5. The time frame for

consecutive future growth should be clearly defined in order to reduce any confusion, as encouraged by Principle #1.

Scenario #2 – Adopting Only T-Nodes #1 and #5 in Charleswood

This scenario designates only two Transit Nodes in Charleswood, namely T-Node #1 and #5 because both are located along the main arterial road of the community. Furthermore, this arrangement will give top priority to infill development. T-Node #3 will be redesignated as a secondary node, reserved for future development when the current ones have reached their full capacity. Given the slow growth in Winnipeg's market, this scenario is appropriate because the gradual phasing of the nodes can occur over a longer period.

The transit demand will not be as significant as Scenario #1, however, the proposed density in both Transit Nodes still justifies transit service delivery within the community. With both nodes being located along the main arterial road, and consequently along the most frequent transit routes in Charleswood, transit-focused development can be better encouraged. Moreover, the proposed local transit service can be more accommodating to existing land-use conditions in the community. For example, in Scenario #1, the local public transit route can only accommodate seven of the ten seniors housing complexes in Charleswood (see Map 7.1) in order to achieve the most viable route between all three nodes. However, with only two Transit Nodes in this case, the local route can be redirected to meet all ten locations.

The concern with this scenario is that without T-Node #3, the proposed Ridgewood Recreational Corridor does not seem to have a significant functional connection with other parts of Charleswood. As it currently exists, the recreational trail is disconnected with existing cycling paths that connect the Charleswood Bridge and Parkway to the Assiniboine Park and Forest.

Recommendations on Scenario #2

If this scenario is to be adopted, the following recommendations need to be considered:

1. There is a need to apply Principle #5 (to identify and preserve areas of special character) to the Ridgewood Recreational Corridor for two reasons: first, to securely protect the trail from being reconstructed into another typical vehicular roadway, and secondly, to create an urban growth boundary against sprawl into the Ridgewood South neighbourhood.
2. There is more flexibility to reroute the local transit line to accommodate the ten seniors housing complexes, as well as other significant areas of Charleswood such as Assiniboine Park and Forest, and Fort Whyte. There is opportunity to form partnerships with potential public transportation service providers.
3. Again, financial incentive to the transportation levy can be implemented to encourage transit-supportive (infill and intense) development.
4. Specific land-use development criteria must be addressed in both nodes. Particularly in T-Node #1, the potential for development is mainly in the Westdale strip mall property. As discussed in Chapter 2, functional planning is critical to meeting the parking demand without the need to construct additional parking spaces because parking will be shared during the hours of the day.
5. The proposed two commercial/employment centres of T-Node #5 is justified because there is no competition that potentially would exist with T-Node #3.

8.3 Conclusions and Recommendations for Further Study

As evidenced in the previous chapter, the application of the nine guiding principles to Charleswood is relatively straightforward. The principles provide a clear-cut analysis of the community, and advise on the need to reflect on specific areas that have a natural and/or cultural significance to the community. Table 8.1 summarises the integrated land-use and public transportation planning components of the nine principles, as well as how each principle is reflected in the Charleswood District. The principles closely parallel the planning plates of the *Plan Winnipeg 2020 Vision* (City of Winnipeg, 2000) visionary plan, but are quite specific to guide planning in a mature suburban neighbourhood of Winnipeg.

Charleswood has never fully experienced constructive land-use and transportation planning. During the 1950s, the Municipal Planning Branch acted only as planning advisors, leaving the municipality to extend unnecessary trunk services to the Perimeter Hwy, which resulted in major leapfrog developments. The continual recurrence of wrong decisions made by past municipal governments has resulted in fragmented, and sprawling landform. It is imperative that when future developments of this nature are being contemplated (say, Waverley West, Oak Bank, etc.), the decision makers fully consider the consequences of the mistakes.

The nine principles play a significant part in the study because, for the first time, these principles have been directly applied to the Charleswood community (see Table 8.1 for a summary of how each principle influenced the planning recommended in the practicum).

Table 8.1: Nine Integrative Land-use and Transportation Principles and their Application in Charleswood

Principles	Description	Application
I. Land-Use		
Principle #1 *Support visionary, long-range planning – defining a time length to reach regional goals, but allowing incremental reviews to occur.*	▪ Long-range visionary plans are critical to guide planning through several years of development. ▪ Comprehensive plans need to define the effective period of governing policies. ▪ To address local diversity, regional plans should be subjected to continuous review, as suggested by the model of three interrelated planning elements	▪ In the practicum, the definition of a time frame is important to proposing the Transit Nodes because mixed land-use developments require a certain period of time to reach full capacity. ▪ The definition of a time frame is essential in areas that are reserved for future development (e.g., secondary transit nodes, current undeveloped agricultural lands, etc.).
Principle #2 *Identify centres or loci of activities and areas with growth potential; designating them as Transit Nodes, to achieve a polycentric urban form.*	▪ Multiple centres (i.e., Transit Nodes) are directed to areas with growth potential or concentrated activities to achieve a polycentric urban form. ▪ In addition, the identification of these centres should reflect the community's cultural, social, and historical character.	▪ Six areas have been identified in Chapter 6 based on the recommended conditions of the principle.
Principle #3 *Encourage a job-housing balance in the community by adopting the urban village concept.*	▪ To ensure that the community becomes as self-sufficient as possible (advocated by the urban village concept) ▪ Functional planning (i.e., functional rather than physical distribution of amenities) may be applied as a supportive measure to coordinate different activities to accommodate potential growth.	▪ This principle assists in realising that when proposing the density design in T-Nodes #1, #3, and #5, commercial/employment centres must be centrally situated, with higher-density living spaces locating close to the centre.

<table>
<tr><th>Principles</th><th>Description</th><th>Application</th></tr>
<tr>
<td>Principle #4
Encourage high-density, mixed-use developments at or near the Transit Nodes.</td>
<td>
<table>
<tr><th>USE</th><th>Neighbourhood TOD</th><th>Urban TOD</th></tr>
<tr><td>Public</td><td>10%-15%</td><td>5%-15%</td></tr>
<tr><td>Core/Employment</td><td>10%-40%</td><td>30%-70%</td></tr>
<tr><td>Housing</td><td>50%-80%</td><td>20%-60%</td></tr>
</table>
Commercial Development – Floor Area Ratio (F.A.R.) = 3
Townhouses = 18-29 dwelling units per net acre (d.u./net ac)
Apartments (up to 3 stories) = 35-50 d.u./net ac

(a) In new suburban subdivisions:
▪ To reduce the need to commute great distances for services, intense and mixed land-use developments should be encouraged at or near the Transit Nodes.
▪ It should be noted that to induce higher densities, flexible planning serves as a tool to restrict certain areas from development, while encouraging others (i.e., at Transit Nodes).
(b) In retrofitting existing land developments
▪ To increase the vitality of the transit system, Transit Nodes are located near areas of dense population to induce necessary ridership.
</td>
<td>
<table>
<tr><th>Transit Node</th><th>Population Density (Persons/km^2)</th><th>Estimated Number of Residents</th><th>Estimated Number of Transit Riders</th></tr>
<tr><td>#1</td><td>4,540</td><td>1,253</td><td>940</td></tr>
<tr><td>#3</td><td>6,549</td><td>2,003</td><td>1,502</td></tr>
<tr><td>#5</td><td>8,011</td><td>2,410</td><td>1,808</td></tr>
</table>
▪ The recommended density standards were used to propose realistic density numbers, and thus derive an estimate of potential transit riders.
</td>
</tr>
</table>

Principles	Description	Application
Principle #5 *Establish Urban Growth Boundary policies by identifying and preserving land area of special character.*	▪ The identification and preservation of special land area is a tool to support the Urban Growth Boundary policy.	▪ The result of this principle is the proposed Ridgewood Recreational Corridor acting as a barrier to contain further sprawl into the south.
Principle #6 *Encourage development partnerships between all types of organisations.*	3 types of developmental partnerships: (1) A joint development contract to achieve private finances (both costs and profits) on public entities. (2) A design panel to provide consultation and approvals to development proposals. (3) Different partnerships in transit service deliveries.	▪ To achieve mixed land-use development, it is necessary to form partnerships between all sectors. ▪ It has been greatly emphasized that transit service delivery will require partnerships to form outside of Winnipeg Transit, particularly if the necessary frequency between buses cannot justify large vehicles.
II. Public Transportation		
Principle #7 *Introduce or identify a regional transit system (intra-suburban transit network).*	▪ Priority is directed at a transit network, connecting suburban communities with each other and the urban core (through established Transit Nodes).	▪ This principle advocates the need to examine existing transit service that connect the community with the rest of the city; and thus for the practicum, the mapping of the local transit route was done to complement the existing Winnipeg Transit services. ▪ The local transit service will not operate outside of the community, and must have comparable frequencies to facilitate transfers to outside transit lines.

Principles	Description	Application
Principle #8 *Introduce and/or adopt public transportation-friendly design (i.e., New Urbanism & Transit-Oriented Development) – emphasizing human-scaled design.*	▪ The application of different design principles should be adopted to achieve a public transportation-friendly environment. ▪ In support of Principle #7, a well-integrated pedestrian and cycling network can be implemented to provide diverse transportation options within the community. ▪ Street block length maximum 360-400 metres	▪ The only opportunity to apply this principle is in terms of proposing shorter street blocks in the Transit Nodes (i.e., achieving a 400-metre radius).
Principle #9 *Transit development needs to occur at the initial development phases of any subdivision, whenever possible.*	▪ The priority in transportation planning should shift to transit-focused development at the outset of the plan. ▪ As Principles #3 and #4 advocate for a concentrated and diverse community, transit ridership will not be solely dependent on residential population.	▪ This is one of the critical principles to achieve an integrative land-use and public transportation planning. While it is not directly applied in the case study, the evaluation of the proposed solutions (i.e., the Transit Nodes, proposed densities, etc.) against transit operation parameters, in Chapter 7, is a reflection of this principle. ▪ Traditionally, transit considerations only become significant when there is enough ridership. However, in this study, the density was evaluated to determine whether they are sufficient; if not, then an increase in density would be sought. Coincidentally, the proposed densities were sufficient to justify transit service needs.

In this study, the Charleswood District has been used to explore the feasibility of adopting the Transit Node model to better service a mature suburban neighbourhood of Winnipeg. Through the assistance of nine guiding principles, reflecting integrative land-use and public transportation planning, two plausible scenarios are recommended as previously discussed. Therefore, a recommendation for further study is to explore how the nine principles can be applied to other communities in the city. The results of this research can be compared to another mature suburban community, or a new subdivision such as the anticipated Waverley West neighbourhood.

The case studies explored in Chapter 3, have provided insights to sustainable planning and development, with most occurring at the regional level. Alternatively, further studies are encouraged to determine the applicability of the nine principles at the city (Winnipeg) or regional (Capital Region) level. The case studies of Copenhagen, Portland, Toronto, and the Greater Regional Vancouver District revealed that to ensure greater degrees of commitment to sustainability, regional transportation organisations play a critical role in influencing development. For instance, the former Toronto Transit Commission (TTC) was a two-tier government, with the upper tier being responsible for transportation planning, while the lower-tier provided transit services. This organisational structure may be further explored to establish how it can be adapted to the Capital Region, as well as complementing the nine guiding principles derived in this study.

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