Transit Oriented Development: Making it Possible in a Low Density City

by
Rushi Gadoya
B.E. Civil, 2014

Major Project Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Community Planning

in the
Department of Community Planning, Faculty of Social Sciences

© Rushi Gadoya
Vancouver Island University
May 2017
<table>
<thead>
<tr>
<th>Approval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
</tr>
<tr>
<td>Degree:</td>
</tr>
<tr>
<td>Title:</td>
</tr>
<tr>
<td>Examining Committee:</td>
</tr>
<tr>
<td>Chair</td>
</tr>
<tr>
<td>Supervisor</td>
</tr>
<tr>
<td>Committee</td>
</tr>
</tbody>
</table>

Date Defended: May 1, 2017
Date Approved: May 8, 2017
Ethics Statement

The author, whose name appears on the title page of this work, has obtained, for the research described in this work, either:

a) human research ethics approval from the Vancouver Island University Research Ethics Board; or

b) Advance approval of the animal care protocol from the Vancouver Island University Animal Care Committee; or

c) Has conducted this research as a co-investigator, collaborator, or research assistant in a research project approved in advance of the author’s involvement.

A copy of the application has been filed with the Research Ethics Board at Vancouver Island University and inquiries may be directed to that authority.

Vancouver Island University
Nanaimo, British Columbia
April, 2017
Abstract

This report identifies urban design guidelines from a Transit Oriented Development (TOD) perspective of a potential site in Nanaimo, British Columbia. Transit Oriented Development is characterized as developing a mixed-used neighbourhood in a community which is frequently serviced by public transit. In Nanaimo, bus transit service is frequent but there are certain elements of urban design that the City lacks. This report is developed to identify those urban design elements in the form of a Design Guidebook. The Design Guidebook could be used by local planners, developers, and transit professionals in helping them to make land use planning decisions that better support the integration of transit into existing communities.

Keywords: Bus Rapid Transit (BRT), design guidelines, Transit Oriented Design (TOD), transit, transportation, urban development.
Dedication

This dissertation is dedicated to my parents for all their love and support and putting me through the best education possible. I appreciate their sacrifices and I wouldn’t have been able to get to this stage without them.

I dedicate this work and give special thanks to my supervisor Dr. Pamela Shaw for being there for me throughout the entire Master’s program.

I will always appreciate all they have done helping me achieving my Master’s degree.
Acknowledgements

The path towards this project has been circuitous. Its completion is thanks in large part to the special people who challenged, supported and stuck with me along the way. I am tremendously fortunate to have Supervisor Pamela Shaw. I thank her for supporting this project and giving such thoughtful feedback, always aimed at moving me forward. I would also like to thank David Witty for helping me and guiding me throughout my research.

In addition to my supervisor, my mentor Geoff Garbutt’s contribution was pivotal in this dissertation’s development. I am also grateful to my colleagues who encouraged me to sit and write and helped me concentrate on my research when I felt low.

I would also like to thank the experts who were involved in the interviews: Tamera Rogers, Gordon Foy, Gary Noble, Matthew Boyd, Tania Wegwitz, Daniel Pierce, David Steward, Karin Kronstal, Jeoremy Holmes, Doug Kalcsics and Darren Moss, without whose valuable contribution to this accomplishment would not have been possible.

Finally, I must express my very profound gratitude to my parents: Sanjay Gadoya, Malini Gadoya and my brother: Ravi Gadoya, for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.
**Table of Contents**

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ETHICS STATEMENT</td>
<td>3</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>4</td>
</tr>
<tr>
<td>DEDICATION</td>
<td>5</td>
</tr>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>6</td>
</tr>
<tr>
<td>LIST OF ACRONYMS</td>
<td>10</td>
</tr>
<tr>
<td>EXECUTIVE SUMMARY</td>
<td>11</td>
</tr>
<tr>
<td><strong>CHAPTER 1. INTRODUCTION</strong></td>
<td>13</td>
</tr>
<tr>
<td>1.1 Research Problem</td>
<td>14</td>
</tr>
<tr>
<td>1.2 Research Question</td>
<td>20</td>
</tr>
<tr>
<td>1.3 Research Approach</td>
<td>21</td>
</tr>
<tr>
<td>1.4 The Research Design</td>
<td>21</td>
</tr>
<tr>
<td>1.5 Site Context</td>
<td>22</td>
</tr>
<tr>
<td>Conclusion</td>
<td>33</td>
</tr>
<tr>
<td><strong>CHAPTER 2. LITERATURE REVIEW</strong></td>
<td>35</td>
</tr>
<tr>
<td>2.1 Concept of TOD</td>
<td>35</td>
</tr>
<tr>
<td>2.2 The Historical Context of TOD</td>
<td>38</td>
</tr>
<tr>
<td>2.3 Components of TOD</td>
<td>43</td>
</tr>
<tr>
<td>2.4 Benefits of TOD</td>
<td>43</td>
</tr>
<tr>
<td>2.5 TOD Guidelines and Framework</td>
<td>44</td>
</tr>
<tr>
<td>Summary</td>
<td>61</td>
</tr>
<tr>
<td><strong>CHAPTER 3. CASE STUDY</strong></td>
<td>63</td>
</tr>
<tr>
<td>3.1 Short Street, Saanich, B.C</td>
<td>63</td>
</tr>
<tr>
<td>3.1.1 Conclusion/Key takeaways for Nanaimo</td>
<td>68</td>
</tr>
<tr>
<td>3.2 Metropole, Ottawa, Ontario</td>
<td>70</td>
</tr>
<tr>
<td>3.2.1 Takeaway for Nanaimo TOD</td>
<td>74</td>
</tr>
<tr>
<td>3.3 Lessons learnt from Case Studies for Nanaimo Context:</td>
<td>75</td>
</tr>
<tr>
<td>Summary/Conclusion</td>
<td>77</td>
</tr>
<tr>
<td><strong>CHAPTER 4. METHODOLOGY</strong></td>
<td>79</td>
</tr>
<tr>
<td>4.1 Research Sub Questions</td>
<td>79</td>
</tr>
<tr>
<td><strong>CHAPTER 5. RESULTS AND FINDINGS</strong></td>
<td>84</td>
</tr>
<tr>
<td>5.1 Potential TOD sites in Nanaimo</td>
<td>84</td>
</tr>
<tr>
<td>5.3 Existing and New TODs in Nanaimo</td>
<td>87</td>
</tr>
<tr>
<td>5.4 Reasons that support better integration of development and transit in Nanaimo</td>
<td>90</td>
</tr>
<tr>
<td>5.5 Current Transit Service and Improvements</td>
<td>92</td>
</tr>
<tr>
<td>5.5 Integrating alternative forms of transportation into the City</td>
<td>95</td>
</tr>
<tr>
<td>5.6 Recommendations for TOD in Nanaimo</td>
<td>100</td>
</tr>
<tr>
<td><strong>CHAPTER 6. GUIDEBOOK FOR TOD</strong></td>
<td>104</td>
</tr>
<tr>
<td>Land-Use Planning Guidelines</td>
<td>104</td>
</tr>
<tr>
<td>Transportation Planning Guidelines</td>
<td>113</td>
</tr>
</tbody>
</table>
List of Tables

Table 1: Household Vehicle Availability 16
Table 2: British Columbia Mode Share Comparison 17
Table 3: Aspects of TOD 20
Table 4: Permitted Uses and Regulations in CS1 zone 26
Table 5: Average Transit Ridership 29
Table 6: Criteria for TOD 59
Table 7: TOD potential nodes for transit service 60
### List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hospital Area with Key Traffic Generators Map</td>
<td>23</td>
</tr>
<tr>
<td>2</td>
<td>Zoning Map Nanaimo</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>Urban Containment Boundary for Nanaimo</td>
<td>27</td>
</tr>
<tr>
<td>4</td>
<td>Dufferin crescent and Dufferin crescent</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Bus no. 40-VIU Express route</td>
<td>31</td>
</tr>
<tr>
<td>6</td>
<td>Bus No. 30 NRGH route</td>
<td>32</td>
</tr>
<tr>
<td>7</td>
<td>Sacramento County TOD</td>
<td>39</td>
</tr>
<tr>
<td>8</td>
<td>Transit interrelationship</td>
<td>51</td>
</tr>
<tr>
<td>9</td>
<td>Bus route without connecting to node B</td>
<td>53</td>
</tr>
<tr>
<td>10</td>
<td>Bus route without connecting to node A-B-C</td>
<td>54</td>
</tr>
<tr>
<td>11</td>
<td>Land use transport feedback cycle</td>
<td>55</td>
</tr>
<tr>
<td>12</td>
<td>Accessibility along dense and narrow road network</td>
<td>57</td>
</tr>
<tr>
<td>13</td>
<td>Hierarchical road network</td>
<td>57</td>
</tr>
<tr>
<td>14</td>
<td>Short Street Saanich Project</td>
<td>63</td>
</tr>
<tr>
<td>15</td>
<td>Uptown Center, Galloping Goose trail and Short Street project</td>
<td>64</td>
</tr>
<tr>
<td>16</td>
<td>Short Street Saanich Plan view</td>
<td>66</td>
</tr>
<tr>
<td>17</td>
<td>Building design and frontage, Short Street Saanich</td>
<td>67</td>
</tr>
<tr>
<td>18</td>
<td>Metropole, Ottawa, Ontario site</td>
<td>70</td>
</tr>
<tr>
<td>19</td>
<td>Tunney’s Pasture Station</td>
<td>71</td>
</tr>
<tr>
<td>20</td>
<td>Westboro transit way</td>
<td>72</td>
</tr>
<tr>
<td>21</td>
<td>Student Residence Project in Nanaimo</td>
<td>87</td>
</tr>
<tr>
<td>22</td>
<td>Student Residence Project in Nanaimo on Wakesiah avenue</td>
<td>88</td>
</tr>
<tr>
<td>23</td>
<td>Transit Pyramid</td>
<td>95</td>
</tr>
<tr>
<td>24</td>
<td>Cross section of street in Victoria</td>
<td>105</td>
</tr>
<tr>
<td>25</td>
<td>Buffered Sidewalks in Vancouver</td>
<td>105</td>
</tr>
<tr>
<td>26</td>
<td>Countdown Timer on crosswalks in Vancouver</td>
<td>106</td>
</tr>
<tr>
<td>27</td>
<td>Dedicated Bike Lanes in Vancouver</td>
<td>107</td>
</tr>
<tr>
<td>28</td>
<td>Colored Walkways in Vancouver</td>
<td>109</td>
</tr>
<tr>
<td>29</td>
<td>Metropole Tower</td>
<td>109</td>
</tr>
<tr>
<td>30</td>
<td>Aerial View of Hospital Site and Bowen Road</td>
<td>111</td>
</tr>
<tr>
<td>31</td>
<td>Collingwood Village, Vancouver</td>
<td>111</td>
</tr>
<tr>
<td>32</td>
<td>Bus stop at Bowen Road</td>
<td>114</td>
</tr>
<tr>
<td>33</td>
<td>Pedestrian display in BRT</td>
<td>116</td>
</tr>
<tr>
<td>34</td>
<td>Pedestrian display in BRT</td>
<td>116</td>
</tr>
</tbody>
</table>
## List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOD</td>
<td>Transit Oriented Development</td>
</tr>
<tr>
<td>RDN</td>
<td>Regional District of Nanaimo</td>
</tr>
<tr>
<td>BC Transit</td>
<td>British Columbia Transit</td>
</tr>
<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>BRT</td>
<td>Bus Rapid Transit</td>
</tr>
<tr>
<td>CS1</td>
<td>Community Service 1</td>
</tr>
<tr>
<td>NRGH</td>
<td>Nanaimo Regional General Hospital</td>
</tr>
<tr>
<td>COSTP</td>
<td>Central Okanagan Smart Transit Plan</td>
</tr>
</tbody>
</table>
Executive Summary

This report identifies urban design guidelines from a Transit Oriented Development (TOD) perspective for a potential site in Nanaimo, British Columbia. The site (1200 Dufferin Crescent) is currently zoned as Community Service One (CS1) and contains a major employment node and focal point in the City, the Nanaimo Regional General Hospital. According to local planners in the City, this site is the most likely location for urban densification in near future.

Two successful transit-oriented community case studies were analyzed using secondary resources – Metropole Ottawa, Ontario and Short Street in Saanich, British Columbia – to understand the underlying concepts and design solutions that contribute to successful projects.

In total, 12 interviews were undertaken for this research, which included officials from BC Transit, the City of Nanaimo, the Regional District of Nanaimo, and local planning consultants. The interview subjects were carefully selected based on their involvement in and knowledge of transit services in Nanaimo.

The results achieved illustrate that Nanaimo could benefit from a transit-oriented approach to redeveloping and densifying an existing neighbourhood. At issue is the point at which density allows the achievement of adequate transit services: Nanaimo’s transit service is consistently considered to be poor to average due to low densities across the City. However, both the Regional Growth Strategy and the City’s official
community plan support increasing densities in existing neighbourhoods; this will do much to improve transit services in the City. The anticipated densification of the Hospital site makes a TOD approach possible: this site was selected for this study as it offers the most likely opportunity for achieving a successful project given the existing and proposed levels of density in the study area.

The research concludes with detailed design guidelines that could be implemented for the site or for other areas with the similar site and context conditions.
Chapter 1.
Introduction

This project examines the benefits of using a Transit Oriented Development (TOD) approach to when considering new development and increased densities at 1200 Dufferin Crescent, Nanaimo, British Columbia. The site is currently zoned Community Service One (CS1), and the primary land use in the area is the Nanaimo Regional General Hospital. Given the Hospital’s status as one of the largest employers in the City the density of existing residential and commercial/office development immediately surrounding the hospital, and the potential for urban densification in the near future, this site has been identified by local planners as having the greatest likelihood of success as a Transit Oriented Development (TOD). Briefly, TOD aims to achieve a sustainable environment by reducing private car trips and encouraging the use of public transit. It is anticipated that the success of a TOD form of development on this site could have positive implications for the development of other sites in Nanaimo and for transit in general for the municipality.

The City of Nanaimo’s Official Community Plan, titled Plan Nanaimo, incorporates a series of statements relating to transit systems in its long-term goals, including, “provide more attractive transportation alternatives to car use, such as improved transit service and safer walking/cycling routes” (OCP Nanaimo, 2008, section 6.1) and, “Improved transit exchange” (OCP Nanaimo, 2008, section 6.2). The Plan also refers to, “Longer trips are required to connect many of the City’s important destinations and are too far for many residents to walk or cycle” (OCP Nanaimo, 2008, p. 69). That is, the City supports the use of transit, but recognizes that there are many challenges in an urban
environment that have grown haphazardly through individual development proposals, leapfrog development, and a high reliance on the automobile.

Nanaimo is a city of 90,504 (Regional District of Nanaimo, population statistics, 2016) with a 8% increase from the 2011 census population and with a sprawling form of low-density residential development in a linear corridor along the east coast of Vancouver Island. The geography of the city makes the design of a transit system difficult. This factor is exacerbated by an older than average population in the city and a propensity of residents to rely on private automobile use. An additional compounding factor is that the city is not the transit authority: The Regional District of Nanaimo and the province of British Columbia share this role. The city has many challenges to address in the development of an efficient and effective transit system.

1.1 Research Problem

To date, the City’s goals around improved transit have existed on paper, but there have been many challenges impeding the practical steps needed to achieve these goals. The City has no design guidelines that specifically focus on transit improvements or Transit Design Guidelines. However, Plan Nanaimo does contain General Development Permit Area Design Guidelines, which support better transit facilities and use throughout the City (General Development Permit Area Design Guidelines, 1992). Creating a TOD plan for a selected site along with guidelines that could apply to the wider community is a critical step in moving from ideas to action on transit in Nanaimo.
Nanaimo’s *Transportation Master Plan Discussion Paper #1* (2013, p. 22) anticipates that there is ample opportunity to shift travel behaviors in the City: given that more than 86% of employment trips in Nanaimo are made by automobile, there is a great deal of room for growth in shifting to transit ridership. The report details conditions in several neighbourhoods that could support higher usage of alternative transportation: The Downtown area currently possesses the highest share of multi-modal, non-automobile trips for employment (34%) that includes walking, biking, and transit (NTMPDP #1, 2013, p. 22). Overall, however, the Nanaimo Transportation Master Plan Discussion Paper#1 predicts that the current modal share is likely to continue to support a heavy community reliance on cars. The Plan notes that this is not the desired outcome, and change is needed to reduce the City’s carbon footprint, encourage healthy living, and to support higher densities of development. The Plan concludes that “*there is a larger need to move towards a sustainable transportation system*” (NTMPDP #1, 2013, p. 61) and new methods are needed to create viable options in a car-centric city.
Table 1: Household Vehicle Availability.

The above chart depicts that only 8% of the population in Nanaimo, approximately 7,200 people, have no vehicle and rely solely on other methods of travel, albeit walking, cycling, ride sharing, or public transit. There are no data available that verifies that people who do not own cars prefer to take public transit: the chart below shows that a segment of the population does use transit, but their motivations and rationale are not known. The previously noted study does state that survey data obtained suggests that people would use transit even if they had access to an automobile if the transit service was within walking distance and operated at efficiency levels equaling or close to those achieved by an automobile (NTMP Discussion Paper #1, 2013, p. 21).
A modal share comparison of British Columbia shows that about 11% of the population in Nanaimo use public transit as their means of transportation. The study states that “…in comparison with the top ten largest cities in British Columbia, Nanaimo’s walking mode share is second highest, after Vancouver. However, Nanaimo’s cycling and transit mode shares are fairly low in comparison” as can be seen in Table 2 (NTMPDP #1, 2013, p. 23).

Most of the non-automobile trips generated in Nanaimo appear to be linking residents to commercial, institutional, and employment opportunities. The report from NTMPD #1, (2013, p. 24) states that,

“These areas of high trip activity include the Woodgrove area in North Nanaimo, and the Downtown and surrounding neighborhoods such as Brechin and Newcastle. In particular, Downtown and surrounding neighborhoods generate the majority of
non-automobile daily trips in the Nanaimo (transit, walking, and cycling), as well as residents adjacent to Woodgrove who represent a significant amount of sustainable trip making activity. For transit use, in particular, the On-Board Transit Survey found that neighborhoods of Townsite, City Centre, Harewood, and Vancouver Island University had some of the highest transit use in Nanaimo.”

The data provide some indication of how far people will be willing to travel to access employment, goods, and services, although it does not provide additional information on whether or not other modes of travel were available to the transit users or their level of satisfaction with the accessibility and level of transit service.

The Transportation Master Plan also sets out some key challenges that Nanaimo faces with features in the landscape which could be viewed as unsupportive of additional transit use, including: “Lack of sidewalks and pathways; poor quality, uneven, and inaccessible sidewalks; more priority and space for pedestrians; and unsafe crossings or lack of crossings.” (NTMPDP #1, 2013, p. 36-37)

Opportunities identified from a resident survey and series of open houses conducted as part of the development of the study include (2013, p. 37):

- “Improved sidewalk network, with complete sidewalks provided in Fairview, Harewood, the University area, and Hammond Bay.
• More walkable areas, including the safe route to school treatments, and more attractive and pedestrian friendly streetscapes, within neighborhoods and Downtown.

• More short-cuts and neighborhood connections were identified, which could make walking trips shorter, and more convenient and time-competitive with other modes.

• Well-maintained and high-quality sidewalks that are more comfortable to use.

• Better street and trail lighting for pedestrians using on and off-street routes.

• More separation between pedestrians and vehicle traffic, including wider sidewalks, more barrier landscaping, and a separated pathways/trails.”

Perceptions on the use of transit have been documented in many studies (Frank and Pivo 1994, Anders 2013, Cervero 2004, Arrington and Cervero 2008, Beimborn et al. 1991) and generally relate to one of three overall rationales. Individuals choose (or are sometimes required by the circumstances) to use transit based on social, environmental, and economic perspectives.

Transit-oriented communities allow easy access to transit services by increasing transit ridership thereby reducing automobile trips which in turn results in reducing air pollution and GHG gas emissions in the environment. Also, bus transits in Nanaimo use CNG (Compressed Natural Gas) which is more sustainable fuel compared to petrol and diesel. Socially, TODs tend to benefit its residents by delivering a social world where employment, shopping malls and other daily needs are easily accessible through transit
services and also better usage of existing infrastructure for biking and walking.

Economically, TODs help in providing a frequent transit service on which a person can rely thereby costing them less than private trips. Fewer car trips result in less parking needs and less money spent on parking’s for cars.

<table>
<thead>
<tr>
<th>Social Aspects</th>
<th>Environmental Aspects</th>
<th>Economic Aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Development of factors relating to healthy communities</td>
<td>• Affordable housing</td>
<td>• Density of housing form enables people to lie there and rely on public transit system</td>
</tr>
<tr>
<td>• Increased transit services links too more walking and cycling</td>
<td>• Reduced GHG</td>
<td>• Reduced parking</td>
</tr>
<tr>
<td>• Better use of infrastructure</td>
<td>• Reduced carbon footprint</td>
<td>• Reduced reliance on automobile</td>
</tr>
<tr>
<td>• Access to mixed use</td>
<td>• Reduced air pollution</td>
<td>• Reduced land usage which in turn helps business and allocating land for public realm and sidewalks</td>
</tr>
</tbody>
</table>

Table 3: Different Aspects of TOD³

1.2 Research Question

Many of these cited aspects and improvements relate to the principles of Transit Oriented Design. Given this, the research problem addressed in this Major Project is:

“What urban design guidelines can be developed to encourage a transit supportive landscape, and what are the features that should be emphasized to design a neighbourhood which promotes and encourages transit use, and by extension improves transit usage rates and the extent of the transit system in Nanaimo, British Columbia?”
1.3 Research approach

The research approach is qualitative data analysis with data collection from local officials (published documents and depth interviews) along with intensive case study research. The design guidelines that develop from the research reflect the “best practices” used in model locations and also reference the academic publications of scholars with recognized expertise in this area.

1.4 The research design

A number of interlinked research methods have been used to examine how TOD will impact the City of Nanaimo. My research begins with a case study approach, using TOD projects implemented/adopted in Canada and the United States that contain some relevance to the population size and site conditions found in the City of Nanaimo.

In addition, content analysis of the City of Nanaimo documents relating to past transit projects, transit use, development patterns, and trends has helped in framing and narrowing down the scope of the study. Beyond this, in-depth interviews of government officials helped explore past practices and plans for the future. Finally, the findings and issues identified in TOD literature shaped the research. These sources, considered together, allowed the researcher to triangulate the approaches, assess the relevance, and employ best practices in seeking responses to the conditions and situations in Nanaimo.
1.5 Site Context

The site which will be examined in this research is the area surrounding the Nanaimo Regional General Hospital at 1200 Dufferin Crescent. The site is currently zoned Community Service One (CS1) zoning pursuant to the City of Nanaimo Zoning Bylaw No. 4500, 2015. The size of the site is 32.18 acres (Vancouver Island Health Authority, 2010). The site is surrounded by higher density, multi-unit residential lands and commercial centers on all four sides and therefore has a high potential for development as a TOD site.

As shown in Figure 1, the Hospital Area is surrounded by single family residential neighborhoods and commercial retail. Professional office building in the area includes Vancouver Island Health Authority and the Child Development Center. The main transportation corridor in Nanaimo, the Island Highway is approximately 400 meters from the Hospital Area. Hospital Area is surrounded by a Northfield neighborhood on the north and Townsite Neighborhood on the south, which both are older, well-developed neighborhoods in Nanaimo.
Figure 1: Nanaimo Regional General Hospital Walkability and key Traffic Generators Map\(^4\).

According to the City of Nanaimo, Community Profile (2010) p. 52:

“The Nanaimo Regional General Hospital (NRGH) is a regional referral hospital located in the central health services delivery area of the Vancouver Island Health Authority (VIHA) with a fully modern 409-bed facility. Services include surgery, maternity, pediatrics, intensive care, rehabilitation, psychiatry and extended care. Outpatient services include radiology, laboratory diagnostics, diabetes education center, the Nanaimo Cancer Centre, pacemaker clinic, among others. Approximately 250 doctors from around the area serve the hospital. The catchment area for NRGH is the central and north island, which represents approximately 300,000 people.”
It is important to note that more than 1700 employees\textsuperscript{5} service the hospital. This includes medical staff, administrative personnel, and all manner of support services. The number of medical facilities and offices in the surrounding area further adds to this, along with the density of support services such as drug stores and clinics. All of these are highly staffed, often 24 hours a day. In addition, while patients may not be able to access transit due to medical conditions or travel constraints, those visiting services in the area may choose transit as an option if it is seen as comforting, viable, and a preferred mode of travel to private automobile use due to parking costs and restrictions.

The residential landscape in the area contains a high density of three to four storey residential developments, along with a significant proportion of townhouse-style developments and other higher density formats. According to a senior planner at the City\textsuperscript{6} the area contains the highest density residential lands in Nanaimo, which has rapidly grown from approximately 50 units per hectare in the 1980s to more than 150 units per hectare today. Additional growth and development are anticipated in this area in part to support the hospital, and due to the concentration of services within a fairly small, relatively flat, and walkable neighbourhood. The impacts of new development on affordability in the area is an issue that needs to be fully examined and will be addressed later in this document.

As shown in Figure 2 below, the site is zoned as Community Services 1 (CS1). According to City of Nanaimo Zoning Bylaw 4500 (2015), the intent of CS1 zone is to “provide for public-oriented uses designed to serve the community” (City of Nanaimo, Zoning Bylaw 4500, 2015).
Figure 2: Zoning map, Nanaimo.
The following Table summarizes permitted uses and regulations in the CS1 zone:

<table>
<thead>
<tr>
<th>Allowance in CS1 zoning</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Lot Size</td>
<td>1800 square meters</td>
</tr>
<tr>
<td>Minimum, Lot Frontage</td>
<td>20 meters</td>
</tr>
<tr>
<td>Minimum Lot Depth</td>
<td>30 meters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Siting of Buildings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Yard Setback</td>
<td>6 meters</td>
</tr>
<tr>
<td>Side Yard Setback</td>
<td>4 meters</td>
</tr>
<tr>
<td>Flanking Yard Setback</td>
<td>6 meters</td>
</tr>
<tr>
<td>Rear Yard Setback</td>
<td>7.5 meters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size of Buildings</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Lot Coverage</td>
<td>40%</td>
</tr>
<tr>
<td>Maximum Allowable Height</td>
<td>14 meters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Density</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Floor Area Ratio</td>
<td>Not more than 1.25</td>
</tr>
<tr>
<td></td>
<td>Where a single residential dwelling is listed as a permitted use, only once such dwelling unit is permitted per use</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fencing Maximum Allowance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Front Yard</td>
<td>1.2 meters</td>
</tr>
<tr>
<td>Side and Rear Yard</td>
<td>1.2 meters</td>
</tr>
<tr>
<td>Flanking Side Yard</td>
<td>1.2 meters</td>
</tr>
</tbody>
</table>

Table 4: Description of CS1 zoning. List of permitted uses in the zone is cited below at the end of the chapter in footnotes/endnotes.
Pursuant to the City’s Official Community Plan, *Plan Nanaimo* (Bylaw No. 6500, 2008) and the Regional District of Nanaimo’s Regional Growth Strategy (Bylaw No. 1615, 2011 – the City of Nanaimo is a partner in this strategy), Nanaimo Regional General Hospital is located within Nanaimo’s Urban Containment Boundary, as shown in the image below. Plan Nanaimo designates this employment center as *Urban Node*. This node is surrounded by main roads that run roughly parallel on the north and south sides of the area, specifically the new Nanaimo Parkway (Hwy 19) and old Island Highway (Hwy 19A). Bowen Road serves as a major corridor connecting the area to Downtown Nanaimo, Woodgrove Mall, and Vancouver Island University. These three areas, along with the hospital area, are identified in Plan Nanaimo as the major contributors to transit ridership in the City.

If TOD is planned (in future) in Nanaimo, then this is the area where it could be successful. Ideally, the area will develop as a TOD, incorporating affordable housing, better access to transportation, and pedestrian friendly streets in a livable and sustainable community.
Figure 3: Urban Containment Boundary, Nanaimo. The map shows that NRGH is within the UCB of Nanaimo region. The blue highlighted area on the map shows the Hospital Area.
Additional roadways adjacent to the Hospital site include Dufferin Crescent to the south, Boundary Avenue to the west, Nelson Street, to the north, and Grant Avenue to the east. The chart below details transit availability either within the hospital area or along major routes proximate to the area. The data were extracted from Transit Future Plan, Nanaimo region (Transit Future Plan, 2014). As the table below depicts, Woodgrove-Downtown, Hammond Bay, the Hospital Area, and Vancouver Island University area buses have major ridership compared to other bus services.

![Chart showing transit ridership by routes](chart.png)

Table 5: Average Transit Ridership\(^{10}\).

Bowen Road (i.e. Bus number 40) provides the most connected and frequent transit in the neighbourhood. Residents in the neighbourhood could walk or bike along Dufferin Crescent, which is relatively flat and wheelchair accessible, to move between the hospital site and this major connector.
While Dufferin Crescent is the main road, the road that tees off is also named as Dufferin Crescent. That is, the road before Dufferin Crescent tees off Dufferin Crescent. Although it has a sidewalk for pedestrians, there are no buffer systems (trees, plantation) between streets and sidewalks (which is later proposed as one of the design guidelines).

Later, continuing on this road when Dufferin Crescent meets Dufferin Crescent (as shown in the Figure-4), the streets widen into a separated pedestrian walkway with a buffer between streets and walkway. This buffer continues until Bowen Road, where bus number 40 runs through.

Figure 4: Dufferin Crescent and Dufferin Crescent. Although it seems confusing, but both the roads are named the same as Dufferin Crescent.
Figure 5: Bus no. 40-VIU Express route\textsuperscript{12}. Transit service is available through the core of this area: Bus #40, which is also the most frequent bus service in Nanaimo passes through Bowen Road (see Table 5). The distance measured from the hospital to the closest bus stop on Bowen Road is approximately 900 meters.
Figure 6: Bus No. 30 NRGH route. Additional service is provided by Bus #30 NRGH. Bus #30 does not provide frequent bus service, but it can be used as a means of commute to travel to bus stop onto Bowen Road.
Conclusion

From all the background data on the site (Hospital) and documents such as Plan Nanaimo, Community Profile, General Development Area Design Guidelines, Nanaimo Transportation Master Plan, it can be concluded that the site selected could be developed as potential transit-oriented community in coming future. The hospital area has the potential to develop into a more mixed-used community. It has a residential and commercial element of urban design to it, but lacks in transit service. Efforts need to be made to improve transit services in a way that justifies the future development/growth in the neighborhood.

Analyzing the bus routes and services offered in Nanaimo finds that bus number 40-VIU EXPRESS that connects Woodgrove in the north and Downtown in the south can be idealized as a bus rapid transit service and hence the development in hospital neighborhood could be forecasted to justify the frequency of this bus service. There is a great deal of potential for transit service to this area. Later chapters (specifically, the Results and Findings) will examine this more closely.
Footnotes/Endnotes:

3 Source: By author
4 Source: Google Maps
5 as per NRGH Human Resources Department, telephone conversation January 2017
6 telephone conversation March 2017
7 Source: City of Nanaimo, Zoning Map of Nanaimo.
8 Source: City of Nanaimo, Zoning Bylaw No. 4500, 2015
9 Source: City of Nanaimo, Urban Containment Boundary for City of Nanaimo.
10 Source: Transit Future Plan, 2014, Nanaimo Region (p. 43)
11 Source: Google Maps
12 Source: Regional District of Nanaimo.
13 Source: Regional District of Nanaimo.

List of Permitted Uses in CS1 Zoning - Source: City of Nanaimo Zoning Bylaw No. 4500, 2015

<table>
<thead>
<tr>
<th>Zone</th>
<th>Uses</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1</td>
<td>Academic School</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Bus Terminal</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Assembly Hall</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Cemetery</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Club or Lodge</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Cultural Facilities</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Daycare</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Electric Vehicle Charge Station</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Fire Hall</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Health Clinic</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Hospital</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Library</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Museums</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Personal Care Facility</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Recreation Facilities</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Religious Institutions</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Seniors Congregate Housing</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Single Residential Dwelling</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>Social Service Resource Center</td>
<td></td>
</tr>
<tr>
<td>CS1</td>
<td>University, College and Technical School</td>
<td></td>
</tr>
</tbody>
</table>

The following uses shall be permitted as an accessory use within the specified community service zones:

<table>
<thead>
<tr>
<th>Zone</th>
<th>Uses</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1</td>
<td>Crematorium</td>
<td>A crematorium shall be permitted in conjunction with a cemetery, provided the crematorium shall not be located within 30 meters of any lot line or 60 meters of any lot line in a rural or residential zone</td>
</tr>
<tr>
<td>CS1</td>
<td>Dwelling Unit</td>
<td>One accessory dwelling unit shall be permitted.</td>
</tr>
<tr>
<td>CS1</td>
<td>Helicopter Landing Pad</td>
<td>A helicopter landing pad shall be permitted as an accessory to a hospital use.</td>
</tr>
<tr>
<td>CS1</td>
<td>Office</td>
<td>-</td>
</tr>
<tr>
<td>CS1</td>
<td>Secondary Suite</td>
<td>Where a single residential dwelling is the only use on the lot. Subject to the regulations contained in Part 6 of this Bylaw.</td>
</tr>
</tbody>
</table>
Chapter 2.
Literature Review

2.1 Concept of TOD

Transit Oriented Development (TOD) draws back to the notion of building complete urban communities as identified in different planning theories and practices over the past 120 years. That is the core components of TOD date back to approaches identified by Ebenezer Howard, Patrick Geddes, and Le Corbusier. In today’s era, this approach is carried on through the work and writings of urbanists such as Peter Calthorpe, Andres Duany, Elizabeth Plater Zyberk, G.B. Arrington, Hank Dittmar and Gloria Ohland, Robert Cervero, and Peter Newman.

Transit-oriented development (TOD) is a method that supports mixed-use development in close proximity to frequent public transit services. It is a trend that is growing around the world, including many developing countries. TOD has been successfully implemented in many Canadian cities such as the Equinox development in Toronto, The Bridges in Calgary, along with new developments in Halifax, Vancouver, Ottawa, and Saanich. While public transit as a concept dates to the development of government-funded train services in the late 19th century, TOD evolved more recently toward the final decades of the 20th century and now is an established and recognized method of development. Peter Calthorpe is often credited with clarifying the concepts around TOD in his book “The Next American Metropolis” which was published in 1993. TOD has emerged to become a solution to some of the greatest problems vexing modern cities: how to decrease private automobile use, reduces transit congestion, and increase ridership and the functionality of transit services.
While there are various definitions of TOD, one that is often cited is Dittmar and Ohland’s:

“These transit-oriented developments have the potential to provide residents with improved quality of life and reduced household transportation expense while providing the region with stable mixed-income neighborhoods that reduce environmental impacts and provide real alternatives to traffic congestion.” (Dittmar & Ohland, 2012, p. 2)

Peter Calthorpe speaks to the benefits of TOD with:

“Transit Oriented Development is regional planning, city revitalization, and suburban renewal and walkable neighbourhoods combined. It is a crosscutting approach to development that can do more than help diversify transportation systems: it can offer a new range of development patterns for households, business, towns, and cities.” (as cited in Dittmar & Ohland, 2012, p. xii).

In general, TOD’s are intended to result in walkable communities, with streets that are pedestrian and cycling safe, a human scale built environment, high levels of convenience with access to services, a clear sense of place, and high investment in amenities. While these are the basic features, authors Falconer and Richardson (2010), argue that a TOD should also take into consideration the ongoing use of automobiles, and incorporate traffic calming features and reduced travel speeds in transit-oriented design (p. 2). This approach addresses a common criticism of many TODs in that they appear pleasant on paper, but seldom can be fully executed: even TOD must take cars into consideration.
That is, the core idea of TOD is not to make people entirely reliable on public transit, but to reduce auto-dependency as the only practical, accessible, and desirable method of mobility.

Falconer and Richardson (2010) highlight that an additional important aspect of successful TOD developments is the provision of a mix of land uses within a defined area. As is true for other theorists and practitioners who speak to the characteristics of complete communities, the authors advocate for designing places with visible and legible centers, ideally with a mix of commercial, professional, recreational, and employment-generating uses. Transit can then operate perpendicularly/parallel through/from the center. Falconer and Richardson (2010) note that TOD should not be only residential because, “This mix of uses creates the opportunity for some people to live and work within the TOD and for some social, shopping, educational and other trips to be fully contained within the precinct” (p. 2). The development of a center also creates a space for the public to gather and feel a part of the community. Overall, TODs are not entirely distinct from other planning movements such as Smart Growth or the complete communities described by the New Urbanists: each movement seeks to create places where people can shop, find employment, recreate, and live. TOD differs, however, in its emphasis on making transit a part of the earliest stages of planning and development.
2.2 The Historical Context of TOD

The term Transit Oriented Development was not well known before the author Michael V. Dyett put the emphasis on the term “Transit Patterns and Urbanism” in his book Transportation, Urban Form and Environment (1991). In his chapter on “Site Design and its Relation to Urban Form”, Dyett describes how planners should plan cities, streets, developments such as commercials, residential and industrial. He was one of the first authors to bring the idea of uniting people with public transit in neighborhoods that provide places to work, shop, learn, and relax. Dyett argues that urban planners should cooperatively work with engineering departments to “build a framework for built environment and to identify solutions for different types of urban and suburban areas” (Dyett, 1991, p. 118).

According to the Dyett, a good example of this relationship can be seen in San Diego, California, where the City Architect worked with the Engineering Development Department and proposed a new set of design guidelines for transit corridors, which are:

- “Sidewalks on both sides of streets”
- Driveway limits (number and width)
- Sidewalks buffered from traffic
- Pedestrian-oriented lighting
- Minimal use of cul-de-sacs
- Preference for loop roads, alleys, and cross-streets and
- Bicycle facilities where appropriate” (p. 119)
According to the Dyett, the term TOD was later used by Sacramento County in growth strategy planning and included in the region’s General Plan, which specifically addressed TOD as a preferred form of development. As noted in the Plan, “The objective of TOD program is to concentrate moderate and high-density housing in mixed-used clusters centered around regional transit station stops” (p. 120).

Dyett also tackles the issue of the scale and size necessary for a successful TOD. The author provides a range of options that were developed in the Sacramento County General Plan, illustrating how TOD can be realized across a range of settlements, from neighborhood TODs (as small as 40 acres) to Urban TODs (as small as 160 acres) (p. 121).

---

Figure 7: Sacramento County TOD14.
Dyett expands on best practices in designing local streets to converge at transit stops and core commercial areas. He is also adamant about the minimal use of culs-de-sac style street patterns, as well as providing for shared roadway use by transit, automobiles, bicyclists and pedestrians (Dyett, 1991, p. 120). The author also asks urban planners to pay more importance to the organizing elements of project scale, “that can help reinforce larger elements of urban forms and support balanced transportation system” (Dyett, 1991, p. 123)

The idea of Transit Oriented Development was more fully developed and gained attention through the works of Peter Calthorpe. “The Next American Metropolis: Ecology, Community and American Dream”, published in 1993, put an emphasis on designing and rebuilding American cities that resolved land use problems through transportation solutions. The book sets forth design guidelines for building and renewing neighborhoods and identifies different transit solutions for urban TODs versus suburban TODs. Calthorpe derided the subdivision plans of the late 20th century, which were typified by leapfrog development, cul-de-sac patterns, and single dwelling units in a pattern of urban sprawl. Calthorpe could find no benefits to this style of development, other than economic advances for developers and tax benefits for incorporating municipalities. Calthorpe’s (1993) advocated for a new style of development that could amalgamate existing development and create networks that resulted in numerous benefits, including “the open space, supported transit, reduced auto dependency, and affordable housing” (p. 16).
Calthorpe in his book describes it as “part polemic, part tool, part proof by assertion, part manifesto, but mostly, I hope, common sense” (Calthorpe, 1993, p.11). He states that much of the soul of American cities was lost in post-world war development, and adds "The old suburban dream is increasingly out of sync with today's culture." He writes, "Our household makeup has changed dramatically, the workplace and workforce have been transformed, average family wealth is shrinking, and serious environmental concerns have surfaced” (p.15). The author also describes the lacking of planners in building good neighborhoods as planners are building communities as if “families were large and had only one breadwinner” (p. 15). These types of developments have led to a fractured and painful American urban experience, in “environments which often frustrate, rather than enhance everyday life” and adds, “suburban sprawls increase pollution, saps inner-city development, and generates enormous costs” (p. 15).

Calthorpe calls for a new interest in transit to redevelop existing urban areas and advance new places that reduce the need for single-occupant automobile trips. Calthorpe articulates on “why” things are and “how” things can be changed. He draws his ideas of new Urbanism from City Beautiful Movement by Ruskin, medieval Urbanism by Sitte, the Garden Cities of Europe, Leon Krier and Jane Jacobs (Calthorpe 1993, p. 15).

Calthorpe overarching goal directs that “we need to start creating neighborhoods, rather than subdivisions… and diverse communities rather than segregated master plans” (Calthorpe 1993, p. 16). There is a practical lens to Calthorpe’s work, and he identifies specific principles in support of TOD, such as:

- Organize growth on a regional level to be compact and transit supportive;
• Place commercial, housing, jobs, parks, and civic uses within walking distance of transit stops;
• Create pedestrian friendly street networks which directly connect local destinations;
• Provide a mix of housing densities, types, and costs;
• Preserve sensitive habitat, riparian zone and high-quality open space;
• Make public spaces the focus of building orientation and neighborhood activity;
• Encourage infill and redevelopment along transit corridors within existing neighborhoods (as cited in Mepham, 2013).

The ideas around TOD are further developed in “The New Transit Town” by Dittmar and Ohland. In this text, the authors provide clarification and details on the spectrum of development opportunities and lay out the goals to achieve second-generation Transit Oriented Development. The authors explain in detail how to best achieve corridor-enhanced developments through a variety of transit modes. Although Peter Calthorpe advocates for light rail transit, these authors argue for an integrated system that also includes bus rapid transit (Ditmaar and Ohland, 2012, p. Xi). “Now the modes have matured to include bus rapid transit system, DMU (self-propelled light-rail), express bus, streetcars, commuter trains and heavy-rail systems” (Calthorpe 1993 as cited in Ditmaar and Ohland, 2012, p.xi). In terms of housing affordability, the authors expand on linking cost of housing issues with the cost of transportation issues as first noted by Calthorpe and further encourage the live/work in the proximity model as the best method for achieving affordability (as cited in Ditmaar and Ohland, 2012, p. xii).
2.3 Components of TOD

Although TOD is primarily related to integrating land use and transit, it includes other components such as: creating walkable communities with frequent and accessible public transit services; node and corridor development patterns; high density adjacent to transit nodes; easy pedestrian access to transit services; development of “park and ride” facilities where applicable; integrating the use of bicycles into transit; and implementing 10 minute walking distance radii to transit services throughout a development.

Kevin Lynch (1960) argues that a city can be both beautiful and functional, with components such as paths, edges, landmarks, nodes, and regions, each of which relates to the walkable community. On this, author Schlossberg and Brown (2004), elaborate that paths can be considered as roads/walkable streets, walkways can relate to the edges defined by big or arterial roads, landmarks and nodes can be the TOD’s important hubs such as malls, retail/commercial centers, and public spaces, and regions can be interpreted as the concentrated zones within walkable, TOD communities.

2.4 Benefits of TOD

TOD is a method intended to result in healthier, more sustainable communities. Good transit services and high rates of ridership reduce the amount of carbon dioxide (CO2) gas emissions produced in urban and commuting environments. Each transit voyage also starts and ends with a walk, which ideally contributes to the overall health of transit users. TODs are developed to reduce the auto dependency of private cars. Ideally, people will prefer to use public transit instead of their cars because it is easier, cheaper, and faster: any or all of these perceived benefits can help to reduce traffic congestion.
and the urban problems associated with parking. New TODs can also benefit the city by increasing contributions to transit services and to city revenues from taxes. Most importantly, with TOD projects comes reduced dependency on the private mode of transport thereby making the streets safer and ideally more accessible to a range of transportation modes (Bishop, 2015, p.1). To this, Curtis, Renne and Bertolini (2009), argue that, "Support for TOD fits in with a broader concern about sustainable lifestyles, the future, and others, and a concern about social injustice and equity issues, as TOD enables the young, elderly, poor, and disabled to access services where services are clustered together and served by efficient public transport" (p. 174). The authors add, “Transit increases land values around stations, with land being priced up to 30 percent higher due to the presence of a transit system” (p. 243).

2.5 TOD guidelines and framework

TOD guidelines vary depending upon the place and population density, but focus on connectivity and gaining the maximum potential from a site. Although the guidelines may vary based on the land features, population density, and existing transit services, the overarching goal remains the same: to provide a livable community with pedestrian-friendly streets and easy access to transit services within a maximum 10 minutes or 800 meters walk (Cervero, 2004).

The TOD framework includes methods for addressing land use forms and densities along with design considerations for transit station areas. Strong design guidelines are an important component of TODs: they tend to fall more toward the definition of
“master planned communities” created by a single developer or with the guidance of highly detailed and government-supported plans, instead of developing organically through individual actions and choices (FTOD, Florida, 2011) To help understand the framework of TOD, Belzer, Autler and Economics (2002), illustrate a framework that can be used by planners for the analysis of planning projects, which includes:

- Focusing on desired functional outcomes of TOD and not just physical characteristics;
- Acknowledging continuum of success; and
- Adapting different locations and situations (p. 3).

Undoubtedly, TODs need a suitable physical characteristic to attract people but according to Belzer, Autler and Economics (2002), only focusing on physical characteristics can obscure the main goal of making TODs work which is, “not to create a particular physical form but to create places that function differently from traditional development” (p. 3). The quality of project and characteristics of place helps understand how good TOD project fulfills certain goals (Belzer et al., 2002). The author adds that other important factors that affect the success of TOD are the transit systems and locations which vary depending on suburb or core downtown area (Belzer et al., 2002). The integration of transit planning early in the development process is also a hallmark of TODs. The circulation patterns of buses and connectivity to light rail transit or higher speed transit must be carefully considered, along with pedestrian access to transit stops and nodes. Higher density development around transit nodes can also be used to encourage the inclusion of affordable housing through bylaw requirements or density bonusing. A mix of land uses (residential, commercial, institutional) is also part of the
framework and is intended to limit the need to use private automobiles as services and functions are available within reasonable walking distances. Identifying a proper framework is an important aspect for the success of TOD (Belzer et al., 2002).

It is important to note that the frameworks identified are not entirely adaptable from location to location; for example, a framework set up for core metropolitan area will not necessarily be successful in a distant suburban area due to travel distances, costs, density, land usage, and other factors. According to Belzer, Autler and Economics (2002),

“...many projects that are billed as successful transit-oriented development don’t function very well. They may have overcome the main barriers to creating dense mixed-use development next to a transit station, but they fall short when measured by performance rather than physical characteristics. A focus on outcomes allows a better benchmark of success and a better measure of the tradeoffs that most projects must make.” (p. 8).

While there are no single set guidelines for establishing TODs, Robert Cervero establishes the core principles of any TOD as the 3 Ds of TOD: Density, Design, and Diversity (as cited in Tumlin & Millard-Ball, 2003, p.1). *Density* is the population of people living within a 10-minute walking distance of transit station. Integrated into the residential land uses are commercial, institutional, and public spaces, creating jobs and shopping opportunities. Walking is encouraged within these high-density nodes to access local services, then links to transit are provided for trips out of the node to employment, recreation, and other commercial services. A secondary focus is on
TRANSIT ORIENTED DEVELOPMENT: MAKING IT POSSIBLE IN A LOW DENSITY CITY

providing a range of housing types and a variety of price points, including affordable housing. While there may be a place for single unit development, a focus is on providing the highest densities immediately adjacent to transit services, and carefully integrating higher densities throughout the development with careful attention to design.

The Design aspect of TOD addresses the physical form of the community. The built form includes street fixtures, public spaces, retail units, transit infrastructure, pedestrian friendly streets, parking, and trail connections. The density and design aspects of TOD are interlinked: carefully designed streets and pedestrian friendly transit corridors encourage walking and pedestrian movement through these spaces. Generally, a grid pattern is favored over the more curvilinear street patterns of the 1970s and 1980s. As noted by Niles and Nelson (1999):

“TOD design would have street patterns oriented along a grid, as opposed to the cul-de-sac and curvilinear street designs of many post World War II US suburbs. Within the grid are sidewalks and streetscapes that encourage walking, and narrow streets and other traffic calming features that discourage driving.” (para. 24)

As defined by Translink (2012), regional transportation authority, in Vancouver area of province British Columbia, “A vibrant mix of land uses helps to create complete, walkable neighborhoods around transit stations and stops, and supports a transit system that is well-utilized throughout the day. Transit-oriented communities encourage a mix of land uses at both the neighborhood and corridor scales” (p. 11).
The term *Diversity* is not bound to any definitions in this context. By putting transit connections at nodes where other transits fail, provides a reach to all parts within a city. For example, a rail system can be connected to frequent bus service, the bus service can be connected to a ferry, and the ferry can link to the airport. These all can be achieved by designing mixed-used developments. It also leads to less auto travel, which leads to less traffic congestion, less use of fossil fuels, and less spending on travel.

There is limited research on Bus Rapid Transit Systems being shaped by TOD in developed countries. However, there is evolving evidence that bus rapid transit can have the same positive economic benefits as light rail or other rail uses.

The Transit Cooperative Research Program (TCRP) published a guide in 2007 titled the “Bus Rapid Transit (BRT) Practitioners Guide.” It provides direction to practitioners and city planners for designing cities that support frequent transit services and to build communities that are transit-oriented. The report concludes that density increases around transit can be achieved by BRT. Another asset it includes is the design guidelines, which helps other cities in designing TOD with BRT.

“The guidelines are intended to help public agencies (i.e., transit agencies, local government agencies, and metropolitan planning organizations) assess the potential land development benefits of BRT system development by identifying data sources, identifying analysis tools, and providing guidance on conducting future surveys of the various stakeholders in the development process.” (TCRP, 2007, p. 6-1)

There are successful TODs that have been implemented in several Canadian cities. As defined by Translink (2012), the regional transportation authority in the Metro
Vancouver area of British Columbia, a transit-oriented community facilitates “a decreased reliance on the automobile through the provision of convenient access to transit, walking and cycling, and supportive infrastructure and amenities” (p. 2). Translink establishes that they have been successful in supporting transit-oriented communities that allow people to walk, drive less, ride on pedestrian-friendly streets, have easy access to public transit services, provide a network of streets which is well connected, walking and cycling friendly pattern of streets, and also has proven to be efficient and less expensive/cost-effective (compared to auto travel). Translink sees all of these metrics as indicative of the success of Translink and local municipalities in building more transit-oriented communities (Translink, 2012).

In Vancouver, the Collingwood Village is specifically noted as a successful TOD site by Translink and other researchers. The Sky Train serves as the primary connector to Downtown for residents in the neighborhood: this light rail mode provides frequent service and brings riders Downtown in approximately 15 minutes. The success of this TOD in part resulted from the redevelopment of 11 hectares of underused industrial land which was transformed into a mixed-used residential development with a variety of price points (Anders, 2013). According to Anders (2013), “Some 56% of residents in the area commute via transit versus only 11% for the Vancouver Census Metropolitan Area (CMA)” (p. 23). The mix of uses in the area, high walkability, high rates of Sky Train use, and the connectivity of the area to other neighborhoods by bus transit, all contribute to defining Collingwood Village as a successful example of Transit Oriented Design in a redeveloped community (CMHC 2009).
The City of Kelowna in the “Central Okanagan Smart Transit Plan Final Report” (COSTP 2008) also cites TOD as an important driver in city design and states that the current transit system has achieved a higher than average of ridership compared to other similar Canadian cities (COSTP, 2008, p.1). The report includes transportation guidelines that closely integrate cities land use issues with transit solutions, and further encourage the development of pedestrian-friendly streets along with defined spaces for cycling. The City intends to seek out new sites to create infill communities based on TOD principles with a targeted approach that builds on developments proximate to existing transit corridors that maximize the use of current services (COSTP, 2008, p. 2)

Another important resource for this project were the various sources of guidelines which seek to integrate land use planning with transit services. A seminal article prepared by Edward Beimborn and Harvey Rabinowitz speaks to this relationship. A key aspect of their work is that the guidelines are prepared from a market-based perspective: that is, the report addresses the economics of TOD and the relationship to land use planning.

According to the authors (1991):

“Demonstration projects have been attempted and new services have been offered with the hope of finding a “magic” transit solution to suburban travel problems. While these efforts certainly have merit they tend to ignore the underlying land use planning and design issues that are the root of many of these problems.” (p. 2)
The above figure depicts how transit is closely related to social, sustainable, and economic factors in the real world. Social factors include making people aware of their relationship to others in the world. For example, from a social perspective, is transit use viewed as a positive, safe, interactive, community-supporting method of transportation, or is it only used by people with no other transportation choices, and is perceived as unsafe, dirty, or inadequate? Sustainable factors include the evaluation of the “footprint” of transit use and the trade-offs one may achieve by using transit. TODs can be viewed as sustainable because they help reduce GHG gas emissions. Many transit buses in North American cities are fueled by Compressed Natural Gas (CNG), which generates less carbon emission in the atmosphere than diesel and petrol cars. Sustainability factors tie to perceptions on the environment and may relate to how “environmental” one is perceived by themselves and how one perceives others who use/do not use transit. From an economic perspective, TOD helps in building a community where one can choose to walk, cycle or ride public transit for reasons of affordability: all these options are more cost effective than the use of an automobile, and are not accompanied by the
additional costs of purchasing a car, paying for fuel and maintenance, and the high price of parking.

The authors further expand on the second level of relationships between TOD and land use planning, dividing the latter into three major concepts: Land Use Design, Accessibility, and Transit Service (1991):

Land Use Design:

“The land use plan should have at its core a mix of uses and a pedestrian orientation which will encourage walking and bicycle use and reduce the use of the automobile” (Beimborn et al., 1991, p. 12). Land use design when integrated into transit services deals with the arrangement and relationships among competing and supportive land uses, such as multi-family housing, single family housing, downtown businesses, commercial centers, business corridors, residential, and industrial uses. Land use should be understood and designed accordingly to decide whether transit services should be provided in that area or not. For example, transit services in areas such as institutional, business centers, and malls become an integral part because people visit these places often. On the other hand, transit services for land-use such as parks may be viewed as less important. It may be true that some aspects of the urban environment are most economically accessed by the automobile over the provision of transit services that will have low ridership and viability.

As also stated earlier, land use has a major impact on transit efficiency. “Land use management system has a good potential in ensuring a good urban environment,
particularly if the land use system could manage the people mobility” (Hasibuan, et. al., 2014, p. 623). There is a connection between land use and transit ridership that interrelates with the goal of developing a sustainable community. Transit nodes would generate ridership if and only if it connects all the major centers in the city and to connect all the major centers, land use should me designed accordingly. For example, a multinational company employment node designed at center A may or may not have good transit service because people working in such area would afford a car to travel to an employment center. But on the other side, consider a mall/restaurant at center B, in a city attracting lots of people. Center B possesses more potential for transit services being efficient and frequent because there are employees working who are paid minimum wages who won’t be able to own a car, hence transit services would work effectively in those areas. This way, it will also develop a sustainable community, by reducing the number of private car trips.

![Bus route without connecting to node B](image1)

**Figure 9:** Bus route without connecting to node B\(^6\).

![Bus route connecting to node B](image2)

**Figure 10:** Bus route connecting to node B\(^7\).
Accessibility:

Another important step in designing guidelines for a transit-oriented community is providing accessibility to transit service. Accessibility can simply be defined as the ease with which the rider can access the transportation service. As noted previously, TODs goal is to bring transit closer to the public: accessibility is part of that relationship. Pedestrian-friendly streets, buildings design keeping human scale in mind, and creating a sense of place are all applications that can assist in shifting perceptions around the use of transit. In transit-oriented communities, accessibility plays a vital role, which determines how often people choose to travel through public transit rather than their private cars. Author Beimborn, et al., (1991), states that transit stops should be wide open, and have high visibility from a reasonable distance that is viewed as sufficient for both automobile drivers and transit riders. One might think of providing the infrastructure that provides ease of access for people with limited mobility. “Links and pathways between the transit stops and these (urban nodes) destinations should be provided to ensure that the transit-related goals of the project will be met” (Beimborn, et. al., 1991, p. 12).

Accessibility approach of TOD is also explained by urbanists Wegnener and Furst (1999) in the figure below which integrates the transport system – accessibility – land use and human activities to understand the land use transport feedback cycle.
TRANSIT ORIENTED DEVELOPMENT: MAKING IT POSSIBLE IN A LOW DENSITY CITY

Figure 11: Land use transport feedback cycle\textsuperscript{18}.

Wegnener and Furst (1999, p. VI) summarizes the inter-relationship as:

- Distribution of land use determines locations of human activities;
- Transport system is dependent on human activities to overcome distance between the activities locations;
- Distribution of infrastructure within transportation system generates opportunities which can be measured as accessibility; and
- Distribution of accessibility determines location decisions which result in changes of land use system.

According to the authors, questions that would be addressed in evaluating transit accessibility include:

- How accessible are the roads?
- How far does a person need to walk from their workplace/home place to access public transit?
• Is accessibility safe?

Planners need to answer these questions while designing the accessibility roads and transit services and consider walking, cycling, and the automobile along with the accessibility of public transit.

Detailed analysis on how accessibility impacts TOD’s framework is further examined by Todd Litman, 2012. In an academic article, writer Todd Litman (2012) states that transportation planning should be based on accessibility, because it is the ultimate goal of most transit activities (Litman, 2012, p. 48). According to Litman (2012), “In pedestrian planning and facility design, accessible design (also called universal design) refers to facilities designed to accommodate people with disabilities. For example, a pathway designed to accommodate people in wheelchairs may be called accessible” (p. 5). Litman depicts that accessibility can be explained by how convenient is the transportation network connectivity? Accessibility increases with better connection options for a particular transit service (p. 21).

Connectivity between shorter blocks with a dense road network (Figure 11), provides better accessibility because of multiple routes and direct connections between destinations, hence reducing trip distance and also the streets are narrow which poses lower speed limits making streets better suited to walking and biking (Litman, 2012, p. 21). Again the connection is further made easy between destinations if the streets are two-way instead of one-way (Gayah 2012 cited in Litman 2012, p. 21)
Streets with hierarchical road network (figure 12), tends to have higher than average traffic speeds but due to longer travel distance, it possesses less accessibility for walking and bicycling. Also, accessibility for walking is reduced due to more congestion on arterial streets (p. 21).
Transit Service:

Transit service is at paramount in building a car-free community. The frequency and efficiency of bus services will decide the ridership number. In order to have a successful transit service, the service should be efficient, frequent and reliable at the same time. The efficiency of bus service dictates the level of comfort a person feels in the bus as well as the timing of bus services. But frequency deals with time in a bus service context. There is no point if a bus provides frequent service but does not address context or connections. Generally, people prefer to take one bus instead of transferring to multiple buses to make a trip: each connection exacerbates the possibility of missed opportunities to complete a trip.

The authors provide extensive criteria based on compatibility between transit and land uses, which relate to land use problems, accessibility issues, and transportation services (Beimborn, et al., 1991, p. 6). These criteria are presented here in detail, as they are integral to the development of design guidelines later in this document:
Another impact of transit service is where to put them? It is very important to put transit services that serve best for the community. For this, Beimborn et al (1991), uses the Institute of Transportation Engineers (ITE, 1990), Trip Generation Manual 4th edition, a
method to determine places that should be served by transit versus places that are generally auto-oriented. ITE trip general manual provides trip rates for 74 different land use categories which are often used by traffic engineers to foresee the effects of development on traffic. (p. 9)

<table>
<thead>
<tr>
<th>Places that should have high frequency of transit service</th>
<th>Places that are auto-oriented and transit services can be neglected</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Commercial Airport</td>
<td>• Water Port</td>
</tr>
<tr>
<td>• Park and Ride Station</td>
<td>• General Aviation Airport</td>
</tr>
<tr>
<td>• General Heavy Industrial</td>
<td>• Truck Terminal</td>
</tr>
<tr>
<td>• Apartments</td>
<td>• Mini-Warehousing</td>
</tr>
<tr>
<td>• Residential Condominiums</td>
<td>• Utilities</td>
</tr>
<tr>
<td>• High Density Residential</td>
<td>• Recreational Homes</td>
</tr>
<tr>
<td>• Retirement Community</td>
<td>• Resort Hotel</td>
</tr>
<tr>
<td>• Hotel -- non-CBD</td>
<td>• Marina</td>
</tr>
<tr>
<td>• Stadium</td>
<td>• Golf Course</td>
</tr>
<tr>
<td>• Elementary School</td>
<td>• Day Care Center</td>
</tr>
<tr>
<td>• High School</td>
<td>• Nursing Home</td>
</tr>
<tr>
<td>• Junior/Community College</td>
<td>• State Motor Vehicle Department</td>
</tr>
<tr>
<td>• University</td>
<td>• Building Materials and Lumber</td>
</tr>
<tr>
<td>• Hospital</td>
<td>• Hardware/Paint Store</td>
</tr>
<tr>
<td>• General Office Building</td>
<td>• Nursery/Garden Center</td>
</tr>
<tr>
<td>• Office Park</td>
<td>• Quality Restaurant</td>
</tr>
<tr>
<td>• Shopping Center</td>
<td>• New Car Sales</td>
</tr>
</tbody>
</table>

Table 7: TOD potential nodes for transit service.22
TRANSPORT ORIENTED DEVELOPMENT: MAKING IT POSSIBLE IN A LOW DENSITY CITY

Summary

The literature review in this document covers the history of TOD to the impacts of TOD today. Streets and patterns, densities, accessibility, personal choices, terrain, transit services, and land use all impact the success of transit-oriented communities and whether or not this approach is considered in the development of new or the infilling of existing neighbourhoods. A municipality’s approach to mixed-use development can also impact the success and applicability of a TOD approach to development.

The literature also examines the TOD guidelines that are best-suited to a community with fairly low densities and wide-spread development. A key learning from this literature review is that there is limited literature on how to make transit work efficiently in a low-density neighborhood, in this case, Nanaimo. The studies generally conclude that sufficient density is needed in a given neighborhood to make transit efficient and effective. It is recognized that Nanaimo does not achieve what appear to be the required densities for service: however, it remains important to examine how the principles of TOD can be used to improve an existing neighbourhood. As is true for many urban interventions, it needs to start somewhere.

The last section of the chapter deals into choosing the best framework and characteristics for the framework to make a TOD successful.

The case studies considered in Chapter 4 expand on this framework. The literature review and the research and case studies are all components in the TOD guidelines developed later in this project.
Footnotes/Endnotes:

14 Source: Michael V. Dyett (1990), P. 121
15 Source: By Author
16 Source: By Author
17 Source: By Author
19 Source: Litman, T. (2011)
21 Source: Beimborn and Rabinowitz (1991)
22 Source: Beimborn and Rabinowitz (1991)
Chapter 3. 
Case Study

3.1 Short Street, Saanich, B.C

Short Street is a residential area bordered by commercial development, under the jurisdiction of District of Saanich, which is considered as an inner suburb within the Capital Regional District of British Columbia. The site area of the project is 4,584 square meters (1.1 acre) comprising of 72 condominium units 70 to 100 square meters and 3 commercial retail units totaling 630 square meters (CMHC Report, 2007)

Figure 14: Short Street Saanich Project. The project was selected as it has close proximity to nearest center Uptown Mall and it has a 5-10-minute walking distance to nearest transit station which connects it directly to downtown Victoria.

Streets and Transportation:

The Uptown Shopping Centre (a new mixed-use commercial, office, and future residential complex which replaced an aged commercial-only development) is located
only a short distance of approximately 100 meters from the Short Street Project, as shown in the map above.

Figure 15: Uptown Center, Galloping Goose Trail, and Short Street Saanich.

The second map (Figure 15) illustrates the proximity of the Galloping Goose Trail, which is a well-used pedestrian and cycling trail that links Downtown Victoria with the suburban communities. The Uptown development is frequently served by buses that are operated by BC Transit, provincial bus authority. The available bus routes connect to a variety of key destinations, from downtown to University of Victoria and carry passengers every 12 to 20 minutes. The Trail is further connected to other arterial trails.
The commercial streets in the area are generally typified by pedestrian-friendly development concepts, with windows at the street level, differentiation in the façade development to create interest and rhythm in design, and high-quality landscaping adjunct to building perimeters.

From the CMHC report (2007, p. 5), it is noted that other arterial streets such as Blanshard, Saanich Road, and the Trans-Canada Highway remain busy and isolate the Short Street Project from Uptown as well as other destinations. These streets are mostly automobile-focused which makes it very difficult for other mode of travelers such as bikers and walking pedestrians to use/cross these streets. There are no overhead walkways, pedestrians and bicyclists need to cross the road at signal crossings to get pass to Blanshard Street and Trans-Canada Highway from Saanich Road to get to Uptown Shopping Center. The Galloping Goose Trail does not connect the Short Street Saanich project to the Uptown shopping center but can surely be used by hikers and bicyclists to get to Downtown Victoria.

This project had a unique incentive of providing bus passes for two years which was paid by the developer who made an agreement with BC Transit. The agreement included that BC Transit would invoice the developer a discounted rate of $1.75 per trip to a maximum of $60 per month per occupant (CMHC, 2007, p. 4). The developer provided a free bus pass to all the occupants which were valid for 2 years to which professionals at BC Transit generated an electronic record to measure the uptake and effectiveness of the program. The record so generated measured 18 trips per pass per month (p. 4).
The other highlight of this project was the car-share program. The developer, in order to attract customers, purchased one-time membership of $400 in Victoria Car Share Co-op, to create a dedicated on-site parking space (p. 5).

Figure 16: Short Street Saanich Plan view\textsuperscript{25}.

The CMHC Report (2007) states that the project is a residential building with 72 condominiums with each unit varying from 70 to 100 square meters. The development footprint also includes 3 commercial units with a total area of 630 square meters. The building is equipped with underground parking which can accommodate 82 parking spots for residents and 38 surface spaces at grade level. It has windows and doors oriented towards streets and do not exceed 5 storeys in height to maintain a human scale. The project includes a landscaped open space area of about 750 square meters and a balcony or patio is provided with each unit, the latter for units at grade level.
Figure 17: Building design and frontage, Short Street Saanich.

The project is surrounded by commercial outlets, in close proximity to the Galloping Goose trail and to bus stops, making this site ideal for the transit-oriented community.

The objectives of this project were:

- Support mixed-used developments with commercials and retails below residential and behind businesses.
- Providing sidewalks and surfacing to outline pedestrian areas.
- Providing parking on street, below and behind the buildings.
- Presenting a uniform row of buildings surfacing street by reducing front yard setbacks.
3.1.1 Conclusion/Key takeaways for Nanaimo

This case study serves a good example of TOD in a small scale community, supporting the official community plan and regional growth strategy in densification of urban areas (Short Street Saanich, 2008). The streets are landscaped with plantation/buffers/trees and buildings are surrounded with high-quality landscaping, which makes the streets pedestrian-friendly as a buffer between streets and walkways are helpful in giving pedestrians a sense of place and buildings give a pleasing sense of “human scale” making the project walkable, safe, comfortable and reliable.

This project was a result of a high level of co-operation between the local transit authority (BC Transit), the municipality (District of Saanich) and the developer (Short Street Ventures). This case study also serves a good example of how to promote transit services. Each resident of the building was given a photo ID that enabled free bus service for one year (FCM Webinar, 2007) but the bus pass was available for first two years of the project only. The project also provided unlimited access to HandyDart services for one year (FCM Webinar, 2007). This creative strategy of providing bus passes to residents hence allowed the developer to cut parking requirements.

The Short Street project provides an excellent example of how a developer can provide incentives to residents and thereby combine development with transit service, making people use more public transit rather than private cars. Also, this case study provides a good example of small-scale TOD project in the suburban community. The case study also proves to be the result of excellent co-operation between developer and, municipality and transit authority.
In Nanaimo, according to senior planner at the City, the Hospital area is expected to grow in terms of development. Hence, the City could put some positive pressure on developers to consider incentives for residents in a way that helps transit services to run effectively, as was provided by the developer in this case study.

Other key takeaway for Nanaimo from this case study would be jurisdictional cooperation between different agencies. In this case study, the success of this project was due to the fact that developer effectively co-operated with the municipality and transit authority (BC Transit). During the interviews, the research found that there is a jurisdictional separation between different government agencies in Nanaimo. Hence, if some kind of collaborative effort is shown by these government agencies in Nanaimo, it would not only help these agencies in working efficiently and knowing the flaws and gaps when they communicate to the developer but also would be beneficial to residents in a way acquiring the benefits of combined jurisdictions.
3.2 METROPOLE, Ottawa, Ontario

Metropole is a residential tower situated in the Westboro neighborhood of Ottawa, Ontario. The tower site covers approximately 2.8 hectares (7 acres). It accommodates 153 apartments, ranging from 90–240 square meters; 68 townhouses approximately 165 square meters. A bus rapid transit system serves as main transit for the people in the region. According to CMHC (2004), the closest stop is approximately 200 meters from the tower.

Figure 18: Metropole, Ottawa, Ontario site. The bus rapid transit system started in 1982 and operates on unused railway lines as their route to transit hubs. Since the 1980s the system has “increased in size, to six routes and 37 stations, and in ridership” (CMHC, 2004 p. 2)
The bus rapid transit line bisects perpendicularly to the project, making it ideal for TOD. Arterial streets from the tower lead to the Ottawa River and downtown, and to other amenities such as a walkable shopping district, additional public transit services, and parks. A benefit for this development is its proximity to Tunney's Pasture transit, which is considered as an employment node (federal government) for people. Hence, this generates more ridership for public transit. Frequency is paramount, with service every 5 minutes to downtown Ottawa. During the consultation process developed for the rezoning of the subject lands, traffic congestion issue was raised as an issue by the neighboring residents, however, subsequent data has shown that traffic congestion has not increased as a result of the completion of the project (CMHC, 2004).

Figure 19: Tunney’s Pasture Station in proximity to Metropole site. The Tunney’s Pasture Transitway Station offers a diverse mix of transit supportive uses which makes it a multi-purpose destination that helps to enable people to meet their daily needs, eventually reducing their overall need to travel. Tunney’s Pasture Transitway Station in itself possesses several large federal government office buildings which fulfills the idea of TOD of providing highest density of mixed uses closest to a transit hub. (TOD Guidelines Ottawa, 2007)
Building Design:

The tower is accommodated with 158 units of condominiums and row of 68 townhouses each of approximately 168 square meters. The key factor in that contributes to the success of such a project is its design of the building. The building was designed for 32 storeys and townhouses on adjacent empty/undeveloped parcel lots. The tower is designed in such a way that all the units of the building can take full advantage of the view of Ottawa River. Designing the building in a unique way by “intersecting rectangular and curvilinear forms”, made this building project to be named as “best high-rise residential project in 2004” (CMHC, 2004). During the survey for the development of the tower and townhouses, it was noted that respondents preferred to use their car to get to work instead of using public transit, but agreed that access to transit would elevate their chances of using it.
The relationship between proximity and use has proven to be true for this development, as 28% of residents now use transit as their primary mode of travel to and from work (CMCH, 2004). Another important factor to note is that the previous zoning on the site would have forced the development of a massing of mid-rise buildings. Following public involvement in visioning the site, the zoning was amended to allow for a high-rise tower and additional open space. Also, the tower was built on a corner, making it better accessible to public transit service. This is an ideal example of mixed housing, as a second area was reserved for a townhouse-style development that has added a second housing option and further density in the area.

Ottawa’s Transportation Plan and the Official Community Plan each support high density near transit nodes (CMHC, 2004). Before the tower, there were empty parcels of land that were either greenfield sites or brownfield sites that had been abandoned after previous industrial use. When Transit-way arrived in 1982, there were still empty parcels of land to be developed: this project was one of the new infill sites (CMHC, 2004). A series of rezoning’s following an extensive public consultation process has resulted in a mix of residential uses with the inclusion of local commercial and service uses that provide benefits to the residents and create accessible and desirable features in the neighborhood.
3.2.1 Takeaway for Nanaimo TOD

From this case study, we understand how a high rise building can facilitate the development of a larger transit-oriented community when there are government support and available site area. Ottawa’s official community plan designates this site as “General Urban” which means a mix of land usage is permitted in this area for residents but their location will ultimately be regulated through detailed zoning (OCP Ottawa, 2003). In its design guidelines for Transit Oriented Development, the 12th guideline states that “Create highly visible landmarks through distinctive design features that can be easily identified and located” (Ottawa TOD guidelines, 2007). While successful in some respects, when the tower is considered in isolation it could be argued that the project does not achieve a human scale. In addition, subsequent surveys of residents have noted there is a lack of amenities in the area, specifically access to the waterfront and parks (CMHC, 2004).
3.3 Lessons Learnt from Case Studies for Nanaimo context:

In context to Nanaimo, there are a number of residential developments that are expected to grow near Hospital Area\textsuperscript{30}. The opportunity is available for developers to provide incentives such as free bus passes, car share co-op on-site facilities, and shared parking such as in this case study to reduce automobile trips and to increase transit ridership as developments along Hospital Area also implies increased ridership in that area.

New development will also spur additional vehicle traffic in the area and City, and opens a second opportunity to address and mitigate traffic congestion. The Hospital area is one of the busiest traffic nodes in Nanaimo during peak hours. This congestion peaks in the afternoon commuting hours (4:00 pm to 6:00 pm) when shifts are changing or day shifts ending, or citizens are otherwise traveling to events and activities. The Bowen Road corridor, which connects the Hospital area to Woodgrove, Country Club, and Downtown (all additional traffic generators) bears much of the impacts of the increased commute. Travelers may also access the Island Parkway, a bypass road around Nanaimo, but would be less likely to do so unless their commute pattern supported the use of a more distant but faster-traveling route. A co-operative effort between developers, city planners, regional planners, and the regional transit authority on how to mitigate traffic congestion issue and incentivizing the projects with above-noted benefits would help in making the project more financially viable.

Similarly, from Metropole case study, we understand that Nanaimo could consider a more mixed-use form of development that provides a variety of housing typologies,
including high-rise apartments and townhouses, along with local commercial development. Height for any new development will be an issue: from a context perspective, a maximum height of 6 storeys would be appropriate to the area, but Nanaimo could also consider the provision of a visual landmark with the approval of a much higher tower (18 to 20 storeys) that serves as a reference point for the area, similar to the Beacon Tower, which is part of the Cameron Island development in the Downtown area.

Other literature that provides useful information for developing TOD communities in Nanaimo was in an article by Newman & Kenworthy (2013). Their article lays out very precisely in what are the key checklist that should be taken care of while planning for TOD. The authors highlight 4 points to be checked to make TOD strategically planned;

1) "A strategic policy framework that asserts where centers need to occur and at what kind of density and mix;

2) A strategic policy framework that links centers with rapid transit base, almost invariably electric rail;

3) A statutory planning base that requires development to occur at the necessary density and design in each center, preferably facilitated by a specialized development agency, and

4) A public-private funding mechanism that enables the transit and the TOD to be built or refurbished through a linkage between the transit and the centers it will service.” (Newman & Kenworthy, 2013, p. 228).
Summary/Conclusion

From these case studies, we can see the results of different development philosophies and the application of amenity provisions (for example, incentives for developers, car-share programs, working jointly with transit service authority and providing visual landmark) that make these projects successful. Just as the literature review helped in identifying the base of TOD (i.e. concept, definition, framework, guidelines, design characteristics and theoretical knowledge) the case studies help in identifying the real-life problems and positive impacts of TOD in action.
Footnotes/Endnotes:

23 Source: Google Maps

24 Source: Google Maps


27 Source: Google Maps & City of Ottawa

28 Source: Google Maps


30 Source: Interview with Senior Planner at the City of Nanaimo, November 2016
Chapter 4. Methodology

This research employs qualitative methods to gain an understanding of how a Transit Oriented Design (TOD) project might be successfully achieved in the Hospital area of Nanaimo. Local officials from different agencies such as BC Transit, RDN and the City of Nanaimo were engaged in-depth interviews to determine and evaluate the potential success of this project. To clarify the purpose of the project, the following research question and sub-questions were developed.

Primary Research Question:
“What urban design guidelines can be developed to encourage a transit supportive landscape, and what are the features that should be emphasized to design a neighborhood which promotes and encourages transit use, and by extension improves transit usage rates and the extent of the transit system in Nanaimo, British Columbia?”

4.1 Research Sub Questions

This research question was divided into five sub questions, to delineate the information that was needed to address specific aspects of the research. The sub-questions are listed below with answers on how each sub-question was addressed.

Sub-question 1: What is the concept of TOD, what are the benefits, and costs that can be applied to a city in Canada with less than 100,000 people?
The purpose of limiting my research to a population of less than 100,000 was to ensure that the data had relevance for Nanaimo. This answer was mainly addressed by detailed research on TOD on past TOD guidelines and the basic framework of TOD. The source of best practices and case studies was primarily achieved through archival and internet research.

Sub-question 2: What are the land use and public transit problems in Nanaimo that could be addressed through TOD? AND what are the TOD design guidelines recommended for Nanaimo and which areas in Nanaimo have the greatest potential for development that could conform to the proposed design guidelines?

The research subjects interviewed for this study are planning and engineering professionals involved in transit planning/implementation in small communities in BC (less than 100,000 in population) as well as individuals employed by BC Transit (as transit is partially funded by the province in BC). This research does not include the general public as there is up to date information available on transit use (quantitative data) and user surveys are conducted frequently by BC Transit: while a large-scale quantitative study on transit users/nonusers would have been interesting, that research will be addressed in a future study. Instead, this research focuses on the technical aspects of design and implementation that have been proven through the application of Transit Oriented Design principles and imagining how these might be applied to the Hospital Area in Nanaimo.
The series of open-ended interview questions asked of the research subjects are outlined here. They were developed instead of using a more closed-answer survey format or an on-line format as it was hypothesized that research subjects would be more likely to provide a more detailed and full response. Given the amount of data collected from the interviews, this was certainly the case. The questions included:

1. Are you aware of any residential/commercial projects developed in the past which were intentionally oriented towards public transit?

2. Are you aware of any proposed residential/commercial projects to be developed that will be oriented toward transit?

3. What would you see as the main reasons/issues that support better integration of development and transit in Nanaimo?

4. What would you see as the main issues that make the integration of transit and development challenging?

5. How would you evaluate/rate current transit service in Nanaimo?

6. How would you improve transit services?

7. Note: only for individuals involved in providing transit services:
   a. What is the current ridership? Forecasts?
   b. What routes have the highest use?
   c. What are future plans/changes for transit service?

8. Where do you see the potential for the expansion of transit-oriented development (fully developed as a TOD site) in Nanaimo?

9. Are you familiar with any TOD sites in other places that could serve as a model for Nanaimo?
10. How can a range of alternative forms of transportation (transit, bike lanes, walking routes separated from traffic, other) be better integrated into the City?

11. The outcome of this project is design guidelines for transit-oriented development in Nanaimo. What do you think should be included in this design guidelines?

12. Follow up: Anything you would like to add on Transit Oriented Development in Nanaimo?

Sub-question 3: What are the different TOD case studies, which include design guidelines as well as design characteristics of transit corridor, that are relevant to Nanaimo?

My research sought out the best practices and most successful examples of TOD case studies, particularly those that offered guidelines, frameworks, or characteristics that had transferability to the Nanaimo context. The selection of case study was done carefully, specifically for designing the transit corridor within Nanaimo context. The two most useful case studies were Short Street in Saanich, B.C., and Metropole in Ottawa, Ontario. The case studies were analyzed based on documents and sources available on the internet.

While Saanich and Ottawa are larger in population than Nanaimo, there is good direction for the development of design guidelines in these documents/case studies. In addition, the direction provided by both case studies speaks to principles of good design and accessibility that are transferable to any community of any size.
Sub-Question 4: What can be learned from those case studies to create guidelines for TOD in Nanaimo?

This question was again addressed by deeply analyzing the case studies on document basis and finding solutions that were practical in a Nanaimo context.

The interview subjects indicated several sites had TOD potential in Nanaimo. All subjects agreed on the suitability of the Hospital site. Design guidelines were characterized from the case studies and interviews based on questions related to transit and land use, as mentioned in questionnaire. In totality, the information gained from the interviews, case studies, and extensive research has been used to develop local guidelines applicable to the study site that can be used by local planners, city officials, developers, transit authorities and others who intent to understand Transit Oriented Development in Nanaimo.
Chapter 5.
Results and Findings

During the research, qualitative data was collected in form of depth interviews from stakeholder group representing RDN, BC Transit, and City of Nanaimo staff officials to comment on Transit Oriented Development design guidelines for the Nanaimo and defining a list of potential areas in Nanaimo that could serve as TOD site in Nanaimo.

5.1 Potential TOD sites in Nanaimo

The first criteria used were access to a concentration of employment opportunities: this criterion spoke to the trip generation potential of the site. The measure used was 800 meters from the potential development site to the concentrated employment site. The study found a number of potential sites that can be developed as a TOD in Nanaimo. As mentioned in the literature, a TOD can be understood as a mixed-used residential with additional commercial aspects located along or proximate to a corridor that is served with high-frequency public transit. This definition was used to select the TOD site for Nanaimo.

From South to North, the sites identified as potential TOD hubs were:

- Downtown Nanaimo
- North Nanaimo Town Center
- Nanaimo Regional General Hospital Area
Downtown Nanaimo

During research interviews, it was found that the RDN is proposing a new transit hub in coordination with City of Nanaimo officials at #1 Port Drive, Nanaimo, BC. Currently, the transit shelter that served as a major exchange in Downtown Nanaimo is the Prideaux Exchange which lacks connection to retail. The site was never intended to serve long-term as a permanent transit exchange and lacks weather protection, connections with Downtown, and signage to indicate that it is the City’s primary transit hub.

According to the planner at the RDN, “permanent and well-designed transit shelters is lacking. Traditionally in Nanaimo, transit shelters have been a flag on a telephone pole, just a bus stop sign (single) or they’ve gone through a phase where there were plastic benches with advertising on them, not necessarily angled or oriented to even support.”

According to a planning consultant in Nanaimo, “the sooner transit hub is established and the public gets familiar with it and advantages of it the sooner it will trigger adjacent development. Transit hub has to be more than a transit hub, it has to be a transportation hub, so you have got taxis, bicycles, pedestrian linkages, it’s got to be both public and private sector transportation options and then even the seaplane option, then the fast ferry.”

According to another consultant in Nanaimo, “Downtown is in need for the transit hub. The Prideaux exchange does not function well for pedestrian connection to the
retail and commercial businesses. So I think if it’s going to act as a hub it needs to be more centrally located.”

Nanaimo North Town Centre

Another site in Nanaimo that some interviewees noted as having potential as a TOD site was Nanaimo North Town Center. It is an aging enclosed shopping mall that has recently experienced some new construction and development with the addition of exterior-accessed big box retail establishments (Canadian Tire and Lowes) and is surrounded by a range of residential densities. However, Nanaimo North Town Center is not viewed by the City as a major employment generator nor is the existing commercial development perceived to be a major draw for shoppers when compared to the Woodgrove Shopping Centre approximately one kilometer to the north.

In future, this might be the site which can be developed as TOD site in Nanaimo but that again depends on density and employment increase. Hence, for these reasons, for this document, this site currently is not chosen as a site that could be currently developed as a TOD site in Nanaimo.

Given the issues with these two noted sites, it was determined that the research should focus on the Hospital site.
5.3 Existing and New TODs in Nanaimo

After interviewing the local staff and officials from different transit agencies, it was clear that Nanaimo had not undergone a lot of TOD inspired projects in the past. Transit has been a consideration in recent developments: the student housing project at 440 Wakesiah Avenue is of note as the original development proposal contained no onsite parking. Instead, the developer proposed that future residents would rely on transit, biking, or walking to reach their destinations. The City reached a compromise with a small number of onsite parking spaces but also recognized that the location of the development, across the street from Vancouver Island University and within walking distance of the current transit hub, were considerations in reducing parking requirements.

Figure 21: Proximity of Student Residence Project on Wakesiah to Vancouver Island University\textsuperscript{31}. The Great-West project is on Wakesiah street which is perpendicular to Vancouver Island University’s 5\textsuperscript{th} street. The Great-West project is 5 minutes walking distance from bus exchange at the university.
Figure 22: Elevation view of Great-West student residence on Wakesiah. The project serves very close to Vancouver Island University, which is another major transit hub other than Prideaux Exchange, Country Club and Woodgrove. Its 5-minute walking distance to University and right adjacent to the bus stop which is served by 40 number bus.

In a small way, TOD principles shaped the Wakesiah project. The RDN, in coordination with School District 68, built a temporary transit shelter to service the residents of this new development. According to the senior planner, “The RDN worked with the City of Nanaimo, and School District 68 to construct a transit shelter, pave a loading/unloading area, install a pedestrian refuge and install fencing along the school’s property on Wakesiah Ave.”

Some other projects that were intentionally oriented towards public transit include individual site developments in the Hospital area and Downtown area.
According to the planner at the City, there are several significant developments that are proposed for Hospital area. Initially, the hospital area was just an institutional/commercial center, but with the influx of higher density residential development in past, the hospital area has morphed into a true mixed-used neighbourhood with additional potential for growth. According to the senior planner at the City, the hospital area had 50 units per hectare in the 1980s which have now increased to 150 units per hectare. The beginnings of TOD are here: various changes in past included improvising the temporary shelters along the Dufferin Crescent, improving sidewalks, and providing better accessibility to public transit.

In downtown Nanaimo, the transit hub, locally known as the Prideaux Exchange, is the only transit exchange in the downtown area. The site is surrounded by residential development and has an easy access to commercial and retail center in downtown, hence planners at the City term this transit hub as an intentionally planned transit-oriented community. Another major exchange in the City is Country Club Bus Exchange. According to the transportation manager at the City, the Country Club exchange is the busiest exchange in Nanaimo with average buses halt numbers ranging from 130 to 135 per day. Bus #40 runs through this exchange; there is some potential to expand the key identifiers of TOD in this area in the future.

Out of all the officials interviewed, five interviewees agreed that the Hospital site had the greatest potential for TOD given the range of land uses in the area and existing as well as projected population densities. The same five interviewees also agreed to downtown as a future potential TOD site, and other suggestions for future TOD sites
included Country Club Mall, as it has the highest bus exchanges per day in Nanaimo, and North Nanaimo Town Center, as it has some mixed use developments.

5.4 Reasons that support better integration of development and transit in Nanaimo

Most of the interviewees responded that healthy community criteria, sustainable development, reduced carbon footprints, better transit services linking to better walking and cycling opportunities, and access to mixed use development as the main factors that support better integration of development and transit in Nanaimo.

In Nanaimo, the municipality has jurisdiction over land development and plays a major role in incorporating development with transit. Nanaimo does not have jurisdiction over city transit and instead, must work with the Regional District of Nanaimo and BC Transit to bring land use planning and transit planning together. According to Transportation Manager at the City, Nanaimo has long-term goals for increasing the percentage of trips that are made by transit. Therefore, if a greater proportion of future development is well integrated with transit, that means there is a higher potential for increasing the transit modes over time, which aligns with the goals and objectives of OCP and Transportation Master Plan.

The City is also looking for opportunities to increase the percent of the modal split of transit users to respond to environmental and social issues: reducing ecological footprints and making the City accessible for all are important goals within Plan Nanaimo. According to the Transportation Manager, comparing Nanaimo 15 years
before from today and 15 years ahead of today, 15 years ago it was harder to get around
if you did not have a car. Today, the situation is markedly better and is trending toward
being, even more, transit friendly in the future. This will increase social inclusivity and
reduce the environmental footprint for traveling around the City.

The planner from Regional District of Nanaimo felt strongly that the City has the highest
authority in integrating development and transit. Employees in RDN are constrained
because BC Transit, the provincial authority, makes the major decisions and RDN has a
more limited role to play in transit. According to the planner at RDN, the City has
limited land base, a growth expectation, and is constrained by the highway system, so
City should look into these issues through a transit lens to find new ways to integrate
transit and land use planning.

Another planner from BC Transit suggested that any development in Nanaimo that is
identified as a key activity center or transit trip generator (e.g. high/medium density
development, shopping mall, employment center and health center) should take into
consideration how people are going to get to and from it. This again answers that City
has a major role in the integration of development and transit.

While professionals working in transit and land-use development, reacted to this answer
as the efficiency of different jurisdictional agencies, consultants in Nanaimo find better
use of (existing) infrastructure, reduced carbon footprint, affordable housing and access
to mixed use as other issues that helps support better integration of transit and
development.
It would be a strategic move if the new transportation infrastructure (transit hub) could be developed to increase ridership (which is currently the main concern) as well as to give the public a greater sense of reliability and comfort around transit use. In addition, increasing the “sense of place” of the transit hub could make it more attractive to potential users.

When referencing a reduced carbon footprint, most of the respondents agreed that people choose transit not by choice, but by the necessity of traveling. Major transit users in Nanaimo are university students, employees and old age residents who (all) could not afford a car. In Nanaimo, people who possess car would not take transit as an option, reasons being less frequency of transit services and time-consuming. That said, although there are locations which are best served by transit such as Country Club and Vancouver Island University. In these locations, there is reduced footprint that people are not using their automobile and using transit more in a more efficient way. Also, more use of transit results in less GHG emissions which again contribute to the environment as a sustainable factor/planning for urban development.

5.5 Current Transit Service and Improvements

A recent study completed by BC Transit and the City quantifies current ridership at 2,724,000 passenger trips per year, with Bus # 40 (serving along the spine) as having the highest usage in the current transit network.
This study concluded that the current transit service in Nanaimo works well for its size of the population. Conversely, most of the interviewees asked about levels of transit service suggested that the system has room for improvement but respondents generally tied the lack of service to low densities in the city. In a low-density population city, it becomes very difficult to serve everyone within the city when there are different chunks of land with population density. It is also a cultural thing, people are married to their cars and if they find public transit to be convenient, in a sense that it takes equal or less amount of time then their automobile trip, then they might think of taking public transit. Summing up, the performance of public transit is average but not at a level where people can rely on it. Although RDN is working effectively in upgrading the current transit service in Nanaimo, there seems to be some lacking. Internet schedules are an important issue to look at. Maps schedules defer from internet schedules which often confuses the riders to take the bus at right time.

Another big improvement that Nanaimo needs is more frequency of connector buses. The answer to the question, “how to connect different density areas in Nanaimo to transit corridor i.e. bus number 40 route” was challenging. According to the statistics shown in Table 1 (p. 7), it is clear that people, regardless of whether they can bare the expense of a car or not, find it convenient to travel by car rather than taking the bus as their mode of transportation. A solution to this, as suggested by the senior planner at the City, can be small connector buses and make traveling experience more convenient, which serve the dense area within the city such as Fairview, Harewood, and Hammond Bay and connect to major route/spine which is from Downtown to Woodgrove. Making
the connector buses frequent and developing a route for bus #40 such that it stops less and is frequent can help solve this big problem of connecting pedestrian pockets.

According to the City, they see the issue of less density in certain areas with a different perspective and try to solve the issue by densifying the area. Planners try to build infrastructure and projects that generate density and then transit service is put in that area accordingly. The Senior Planner at the City when asked about how to deal with the transit services in low density area, replied as, “what we have been doing is under the Official Community Plan, we organised corridors in certain areas, such as Wakesiah, Wakesiah was never given that level of density, but with the University, when you get sort of pockets of density you get the redevelopment…. all those things help build the density.”

Another solution to improve bus transit in Nanaimo, suggested by a consultant, was to make people aware of public transit and to make it more attractive. As said by the consultant, “I think we got to get away from the notion of mass transit, we got to provide services to people to make it attractive for people to use the bus and that it is more attractive than their automobile. Maybe better seats, air conditioning etc. making it more attractive”

It was also suggested by the planner at the City, that signage, mapping and letting people know about transit is in itself improving the transit services. Many bus shelters in Nanaimo just have a red bus sign on a utility pole. This could be improved by installing proper signage at those locations. By mapping, the planner suggested that maps could be
provided at each bus stop of the bus route. Also, buses lack in providing maps inside the bus, which helps riders by showing the bus stops and giving them an idea on which bus stop to get off at.

5.5 Integrating alternative forms of transportation into the City

The study included a question on how to integrate a range of alternative forms of transportation such as transit, bike lanes, and walking routes separated from traffic be integrated into the City. A common finding for this question was to build a mobility hierarchy, keeping road use planning and budget allocation as a priority. Consider it as a pyramid with pedestrians at the top, following by cyclists and public transit users with keeping private cars at the bottom of the pyramid. This pyramid helps to promote complete streets, pedestrian safe crosswalks, increasing the investment into public and bike infrastructure.

Figure 23: Pyramid for integrating alternative mode of transportation33.
Some other findings from the research included constructing *car co-op* for people to transfer to public transit from their cars. If people cannot give up on cars completely, build an environment where trips generated from cars are reduced to a certain degree and transit ridership increases. *Car co-op* can be a solution to that question to which most of the interviewees found an answer to contain automobile trips. The study indicated that City did not work on a lot of projects dealing with complete street stuff, City has done a lot to put pedestrian routes but not a lot in bike routes. There are many streets that do not possess separated bike routes. A Planner from RDN suggested integrating building permits into these modes of transit, whereas consultant finds the lack of commitment at political level during various planning exercises such as long-term planning, allocating capital for transit infrastructure and development application approvals. At what stage is the City in integrating these different modes of transportation, a planner from the City replied to it as, “*Nanaimo is obviously incorporating these other modes of transportation into the engineering design standards for roads and that could be implemented through development and obviously investing in that infrastructure to accommodate those modes of transportation*”

It is important to note that Nanaimo possesses E&N trail which stretches over 8-kilometer-long from Rosehill Avenue in the south to East Wellington in North (City of Nanaimo website), it is utilized for jogging, cycling, walking, skateboarding and is also wheelchair accessible and is also used to connect to recreation facilities. Most of the respondents wanted to see the E&N trail to be expanded all over Nanaimo. According to the City, there are plans to expand the length of the trail in future. This trail is regarded as the most important trail, frequently used by people and expansion to be made in
future. The City is also working on parking bylaws which integrate facilities for bike infrastructure, accommodate sidewalks through new developments.

Challenges to TOD in Nanaimo:

From everything that can be learned from the literature, case studies, and interviews, the following issues are identified as challenges to TOD in Nanaimo:

1. The biggest challenge to support transit in Nanaimo is its geography. Nanaimo is linearly spread out. Most of the interviewees responded to this question as the demography of Nanaimo to be challenging. It is very challenging for an efficient transit system to work in such linearly spread city, said by a planner at the City.

2. In Nanaimo, land use is controlled by the City of Nanaimo but transportation and funding are governed by other regional transportation authorities such as BC transit and Regional District of Nanaimo. To plan and achieve success for TOD projects requires inter authorities’ cooperation, public-private partnerships joint funding at all levels and better land use decisions. Most of the respondents from interviews said that there needs a better co-operation between different agencies of Transit such as BC Transit, Regional District of Nanaimo and City of Nanaimo. According to the Senior Planner at the City, “One of the big issues is we don’t have any connection with regional transit authority, so when there is a conversation about development, they are not part of it.”

3. Transit ridership acts as the hindrance to providing an efficient TOD plan. However, it not only will require changing land use patterns which encourage compacts and mixed use developments but also should provide reliable, safe and
convenient alternatives to transport and some kind of organizational promotions spreading transit awareness attracting choice riders.

4. In Nanaimo, capital investments regarding the right bus for right choice is required. Small buses with frequent routes are a better option rather than big buses with less frequency and most of which are empty on certain routes.

5. Nanaimo climate plays a big role in creating a hindrance for walking and biking in certain parts of the city.

6. Encouragement for mixed-income housing policies along with providing incentives to developers can help create TOD community that promises diverse housing and walking distance to transit.

7. Jurisdictional barriers often act as an obstacle for TOD communities. For example, in Nanaimo, the Regional District can plan for transit services within Nanaimo region, but connecting other regions such as Ladysmith, Cedar, and other regions does not come under the jurisdiction of Regional District of Nanaimo, and hence riders from these regions remain unheard from enjoying the benefits of transit service. According to the planner involved in transit service, “one challenge in our transit service is that I think we have the opportunity to move people within our regions and our population centers, Ladysmith is another regional district so we are not connected.” Hence, planning for TOD across such jurisdictional boundaries is challenging.

8. Another challenge was the scattered population. Due to the linearity of Nanaimo, the population in Nanaimo is scattered. Downtown core can be considered as a dense area, with commercial and residential both at the same place. Another dense area was Harewood, Wakesiah Ave, Nanaimo Regional General Hospital
and Woodgrove Mall. It becomes very difficult for transit agencies to connect such pieces of densely populated land and make transit efficient. The challenge remains connecting such dense pieces of land through transit and running transit along the spine (connecting all the urban nodes from downtown to Woodgrove).

9. Another challenge was the jurisdictional separation. Most of the interviewees also responded lack of coordination as a major hindrance in making transit effective in Nanaimo. According to a consultant, “Most important limiting factor is the fact that transit is responsibility of Regional District and BC transit on one hand and even there, there is sometimes a division, and then there is the City of Nanaimo that’s responsible for planning and development of community, so at times they are not connected as well as they should be.”

10. The RDN is the branch that deals with transit within a regional district, Nanaimo in this case, whereas BC transit is a provincial authority that deals with transit within the province. The difference is that former is an authority that specifically deals with land use and later is the authority that politically governs the other agencies of transit. And then there is the City, which deals with development and planning within the City. Hence, often there are risks in keeping various parties coordinated.

11. Another challenge can be considered as affordability of the land/land use. Generally, major developments within the city are built on land that is affordable, hence along the periphery of the urban nodes. It becomes challenging when major developments occur outside those nodes for transit to serve it effectively. For example, a subdivision of 400 units along 8th street (Harewood
Area) will not be appreciated by transit as effectively as it would have been in downtown or another area where transit is frequent.

12. Some general comments on challenge also included the traditional land use practice such as major investments in single family dwellings and expansion of local roadways.

5.6 Recommendations for TOD in Nanaimo

Based on the research, suggestions for improving the bus transit services include the following:

- WIFI
- Improving current condition of transit shelters
- Indicating the next bus arrival time
- Clear route maps and bus schedules
- A map of the route in map, indicating the stops
- Air conditioning of all buses
- Better seats
- Small and Frequent bus services
- Better connection to spine (Downtown to Woodgrove Mall)

An issue that often came into the study research was that the big generators of riders did not participate in the transit service. In this case, Vancouver Island University. The University is one of the biggest rider generators in the City. For TOD to work efficiently in Nanaimo, it is highly anticipated that the University takes part in transit service by
giving some benefits to students on using bus transit or including transit service fees in overall fees, which would increase the student’s reliance on transit.

Most of the interviewees also responded to this question as improving transit services all along the highway, which is from Victoria to Nanaimo. Victoria is the capital of British Columbia province in Canada and the largest city on the Vancouver Island. Hence some linkage from Nanaimo to Victoria would definitely be helpful for people commuting between the two cities. It is important to note here that some of the services from Victoria to Nanaimo are already provided by some private sectors. Hence, it becomes necessary for the public and private sector to be blended so that people can have better travel experience. Some kind of integration in public and private sector needs to be done at this stage as so to connect Victoria to Nanaimo.

**Format of the transit hub**

As concluded from the research, the City is planning to develop a new transit hub at #1, Port Drive, Nanaimo. Hence, interviewees were asked accordingly on what amenities and facilities would they like to see in the new transit hub. This part discusses on the format of the transit hub.

The proposed transit hub should possess features such as weather protection shelters, facilities for elderly access, easy transfer of passengers, better/attractive as well as simple visualization of routes and schedules, a clear indication of next bus arriving time, as well as bathroom facilities.
Also according to the senior planner at RDN, the RDN is working with BC Transit to redevelop three transit exchanges within the RDN transit system.

A permanent transit shelter not only helps develop the area as a transit exchange but also brings the development along that node. You can take transit and development as two sides of the coin. If you put transit (frequency as a priority) permanently at a particular place, the developers are sure to develop the area because they know the shelter is permanent and will bring more and more customers in that place. Whereas a temporary shelter does not necessarily bring development in that area. According to the Senior Planner at the City, “in a sense that TOD’s to be really successful you should have light rail because developers when seeing the infrastructure going in for rail they are convinced that if they built there, they are safe, but bus routes wander, which makes developers heartburn. Somebody needs to start with the concept of TOD in Nanaimo. I think there are some degrees to it if you could show the developer that the system is there to stay and work, which will attract developers and invest money here”

All these discussions on transit shelter not only contributes to developing a new permanent transit shelter in Nanaimo, but also encourages to develop more semi-permanent shelters and to rebuild the shelters along the major transit corridor to make travel experience better aesthetically, safer from the visual point as well as from weather, and durable.
Footnotes/Endnotes:

31 Source: Google Maps

32 Source: Google Maps

33 Source: BC Transit Planner, edited by author
Chapter 6.
Guidebook for TOD

Based on the interviews, case studies, and literature review, a series of urban design guidelines were established with a focus on increasing ridership, generating a frequent bus service, and a creating a dense mixed use place to live and work. It is important to note that the guidelines so mentioned are designed keeping hospital area as the base for transit-oriented community and on basis of research from interview and case study analysis.

Design Guidelines:
The guidelines are divided into land use planning guidelines and transportation planning guidelines.

Land-Use Planning Guidelines
Sidewalks are the basic needs for pedestrians and cyclists to walk and bike on. All the transit services start or end at sidewalks on which travelers walk/bike to get to their destination. In order to make the last mile walk experience better for pedestrians and cyclists, the sidewalk should be built as comfortable and reliable as possible which gives users a “sense of place” along with segregating them from the surrounding automobiles and businesses and also giving them natural pleasing views. As in Short Street Saanich case study, sidewalks were provided of 2.0 meters’ width to help pedestrians bypass each other easily giving them a sense of safety and convenience. Sidewalks should be nicely paved and present on both sides of the transit corridor. Sidewalks are the basis for
pedestrians to commute to transit, hence sidewalks should have a minimum of 2.0 meters of width in order to be designed as safe, comfortable, convenient, reliable and free of obstructions.

Figure 24: Cross-section of the street in Victoria\textsuperscript{34}.

Figure 25: Sidewalks with buffer in City of North Vancouver\textsuperscript{35}. The buffer creates a separation from traffic and creates a safe, comfortable and convenient walking and biking experience along the streets.
Complete detached sidewalk along with treed boulevards separates pedestrians from traffic. Treed boulevards help in retaining the noise from traffic and allow the public to enjoy their leisure time, being completely oblivious of traffic right across the boulevards. Plants and trees create a visual effect with a unique atmosphere. Encourage buffer between roadways and adjacent sidewalks using tree plantation giving pedestrians a design element that looks attractive and appealing as well as comfortable. Buffers are a very important architectural obstacle that helps in giving pedestrians a sense of separation from traffic. A buffer of minimum 1.0 meter should be provided along 40 number bus route (mostly along Bowen Road). The buffer can be done by plantation, streetlights, trees, or others, giving pedestrians a sense of safety.

Figure 26: Countdown timer in one of the busiest streets, Burrard Street in Vancouver.

Moving on from sidewalks, the other important aspect of TOD is pedestrians and cyclists because they are the main users of transit services. Hence efforts should be made to prioritize them, which could be achieved by designing safe cross-streets. Crossings if
not properly designed, confuses pedestrians and cyclists to cross the streets in a given amount of time. The above figure (Figure 25) shows the time indicator signals on crossings in Burrard Street which is one of the busiest streets in Vancouver. Hence, encourage in designing safe crosswalks with time indicating to cross sidewalks safely within indicated time and providing necessary accessibility on street to make it better wheelchair accessible. Not all of study area contains crossings that have time indicators (especially along hospital area). Providing some safe crosswalks such as signage, lightings, bumpers will give drivers a sense of the area to drive slowly and cautiously.

Figure 27: Dedicated Bike Lane in Vancouver. Vancouver possesses dedicated bike lanes for safe and easy commuting.

Cyclists are an important user of transit services because they run parallel to transit services and also use sidewalks. In automobile dominated streets, it becomes very difficult for cyclists to travel through. However, if lanes are designated for cyclists, it helps cyclists to be in their own space and also gives automobile drivers a visual
identification of their space on streets. Alternative forms of transportation should be integrated into City to reduce automobile trips and to develop a sustainable community with less amount of GHG emission in the environment. Therefore, encourage designing shelters which possess bike stands, “park and ride”, car share co-op directly connected to transit stops, and streets should be designed such that it possesses dedicated bike lane.

Once pedestrians and cyclists are prioritized the next thing that demands the attention of planners is aesthetics or design element. The elements that add to aesthetical beauty on streets is colored walkways or crossings for pedestrians/cyclists. It not only adds a unique atmosphere for pedestrians but also gives drivers a sense of crosswalk, alerting them to go slow or stop at these crossings. Generally, plain roads are difficult to attract drivers. Hence, design the roads with architectural aesthetics. Using different materials such as concrete, or colored paving materials for crosswalks provides a visual sense of crosswalks as well as adds to landscaping. Planting on both sides of the roadway, attractive bus stops, and human scale signage adds to landscaping aesthetics of the study area.
Figure 28: A colored walkway along urban node in City of Vancouver\textsuperscript{38}. People find it attractive and drivers find it as a sign to drive more slowly through the area.

Figure 29: Metropole\textsuperscript{39}. It serves as a visual landmark near Westboro Transit Station in Ottawa Ontario

Next factor that along with aesthetic beauty adds contribution physically is providing landmarks. Physical landmarks are an important element of urban design that helps in
visual identification of place from the far end. As was done in Metropole, Ottawa, Ontario case study, the Metropole tower provided a visual landmark for the Westboro Transit station in its proximity. The 32 storey tower delivers a visible landmark with its unique design characteristics which help in locating the site and adds to architectural beauty next to a transit station.

Moving on from physical attributes to functional characteristics of TOD, next thing that should be taken into consideration is encouraging TOD programs. Efforts should be made to increase car-sharing programs to increase ridership of public transits. For this, in proximity to transit service areas/transit stations, taxi services, pick up and drop off services should be encouraged that gives riders to use benefits of private as well as the public mode of transportation. Car-sharing helps people park their car and use public transit to commute to work and also design parking lots such as it provides parking at rear of buildings to make streets aesthetically appealing. Encourage developers to promote car share programs as in Saanich case study, and allowing residents to use public transit at discounted price.

However comfortable, reliable, aesthetically appealing and safe the streets are, they do not attract people to use them until and unless they are straight or are easily accessible. Cul-de-sac or dead end roads are often very confusing for cyclists and pedestrians. Hence, streets should be designed as fine-grained interconnected streets with no cul-de-sacs and a better connection between major centers and transit services. The Hospital area contains many cul-de-sacs with disconnected streets. Disconnected streets result in
less walking options and inefficient transit options. A better connection is needed in the hospital area and connecting the streets directly to Bowen Road at transit shelter.

Figure 30: Aerial view of site Hospital Area and Bowen Road. There are many cul-de-sacs, disconnected street ends between hospital area and Bowen road.

Figure 31: Collingwood village, Vancouver. It serves to be one of the best mixed used developments in Vancouver which possesses residential towers aligned along Sky Train station.
The main essence of transit-oriented community is to provide a mixed-used community, both horizontally and vertically. Retail, commercials, housing, could be located side by side adjacent to each other whereas vertically also it could be developed by providing retail, commercials at lower floors and housing on other levels of floors, or by providing different uses in a single land parcel, such as in Saanich case study. Also, these mixed-use developments should be designed with keeping transit services in mind.

Development should be designed in close proximity to transit which allows residents to take full advantage of public transit bringing activity closer to public. Hence, encourage mixed-used commercial and residential developments along the transit corridor to generate opportunities to live and work within the community. A priority for the urban region is to have a frequent transit service and development in that region. With increase transit services, comes opportunities for commercial, businesses, and office, retail and leisure activities.

While designing development, transit shelters and transit stops should also be carefully designed such that the frequency of buses are not affected. One way to achieve this is by reducing the stops along major transit corridor to help service faster and better. There are various transit stops along Bowen Road, most of which are rarely used, hence by eliminating those stops and modifying the existing stops with permanent transit shelters will help transit service faster along the corridor and also will benefit the developments as ridership increases, thereby bringing more customers along the corridor.
Transportation Planning Guidelines

Land use guidelines dealt with development and physical functionalities of TOD, whereas transportation guidelines speak to transit services. The first aspect that helps improve transit services are transit shelters. Transit shelter should be designed keeping in mind protection from weather, safety during night and making it attractive while at the same time keeping it comfortable and reliable, to encourage people to use public transit by choice and not by necessity. Shelters should be permanent, safe from weather, reliable and comfortable and easily accessible and visible. Bus exchanges/stations should be an asset of urban design and should be designed accordingly to merge them with their surroundings. Passenger amenities such as maps, shelters, schedules of bus routes, passenger information, provisions for public toilets and security should be provided in stations. All the stations should be designed accordingly so that they reflect the same visual elements/theme of transit shelter.

There are lots of transit shelters along Bowen road that possesses just a sign stating “Bus Stop” on a post. Also on other transit corridors there are signs showing symbol of bus on a tree or wooden post. Hence modify such transit shelters into permanent transit shelters, by providing protection from weather, a feeling of safety and reliance.
Figure 32: Bus stop at Bowen Road. Most of the bus stops on Bowen road have a sign post and a bench. There is protection from sun or rain. These temporary shelters on Bowen road needs to be changed to permanent shelters as this road is most used by transit riders.

Connection plays a major role in designing transportation services and amenities. The frequent bus service should be fast and easily accessible by other connector buses. There is no point in making a bus service frequent if it is not connected by other bus services that serves different pedestrian pockets in a community. The buses occupancy also plays a key role in determining the size of bus services. It is usually acceptable in providing large buses and frequent services and smaller buses that connects different pedestrian pockets to these frequent transit services bus. In Nanaimo, smaller connector buses along the transit corridors such as 5, 6 and 7 are connected to frequent transit provider that is number 40. But the frequency of these small buses itself is fairly poor. Hence these small connector buses should be made frequent which helps generate more ridership, as these neighborhoods are occupied with residents who use public transit. Major identification in this report was that “big buses but less public” is more prevalent, especially outside the urban centers transit corridors. Design bus schedules in a way that
these buses are frequent and adopt smaller buses along such corridors so that these buses can connect easily to urban centers transit corridor i.e. 40 number bus.

Once buses are connected it becomes important to connect the major nodes in city with frequent and efficient transit service. Major nodes in city should be connected according to their land usage. For example, riders from all urban centers would like to reach University in morning, making it the peak time and Malls should be best served with riders during afternoon and evening times. As identified in this project, the major urban nodes are country club, woodgrove mall, downtown Nanaimo and Vancouver Island University, which are not well connected. Hence bus routes should be designed in a way that all these major nodes are connected and easy to reach specially during peak time of each employment center.

In order to make people use more public transit, and generate more ridership, transit services should provide incentives that attract people. A solution to this can be investments in technology for making public transit experience quick and easy, like including WIFI, clear indication of bus routes and schedules, air conditioning of all buses, countdown indication of next bus arrival along all the transit shelters on major transit corridor. Nanaimo bus shelters need investments to improve its transit service experience. Design buses such that people are attracted to use bus service, so if bus services provide free WIFI and if they are reliable, for example if they provide exact bus arrival time at urban transit shelters that would encourage people to use public transit.
Figure 33: Pedestrian Display in BRT\textsuperscript{43}.

Figure 34: Pedestrian Display in BRT\textsuperscript{44}.
Footnotes/Endnotes:


35 Source: City of Vancouver

36 Source: Google maps


38 Source: City of North Vancouver


40 Source: Google maps

41 Source: Concert Properties, https://www.google.ca/search?q=collingwood+vancouver&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiC-ZDq5uPSAhUN22MKHb66BUEQ_AUICsC&biw=1266&bih=890#imgrc=cFAIUzvPGMQM

42 Source: Google maps


Chapter 7.
Discussion

The study finds Bowen Road, (bus number 40 route) to be the urbanist node in Nanaimo. There are already lots of projects proposed on the site which will be implemented in near future which mostly includes single and multifamily residential. Also, there are plans to build towers on the site which would accommodate in a total of 400 units of condos with duplexes and five-plexes and high rise buildings.

The overall goal of this project is to improve the travel experience and make people’s life better. Most of the trips that people choose to travel in public transit have some form of alternative transportation involved in it. For example, you need to travel at least 400 to 1000 meters to reach a public transit. For this travel, you either need a bike or you prefer to walk to public transit. Hence, the guidelines so provided helps understand how to have a better experience in making that walk more comfortable. On the other side, people who afford a car, are more likely to prefer to walk if it’s within 200-400m. If the walk is more, they would prefer car as their mode to commute.

Also, the destination is not necessarily the bus stop. The bus stop is often an interim destination a rider often has another journey (walk to home or another destination). People commuting through bus have to walk or ride other 400-800 meters to get their original destination. Hence by creating an environment, developing public realm, making streets pleasing and safe at the same time, making it look aesthetically better, helps to make people’s life better. This is the first step to TOD.
TRANSIT ORIENTED DEVELOPMENT: MAKING IT POSSIBLE IN A LOW DENSITY CITY

Other steps involved in developing a TOD would be to improve the transit shelters, as my guidelines already touched on this part. Consider the transit shelter being aesthetically pleasing but possessing no weather protection, no WIFI connection, no routes, no maps and take a cab or would prefer to take an automobile ride/carpooling rather than travelling through the bus. Given the other scenario, consider a transit shelter located close to coffee shop, having access to WIFI, clear and concise representation of maps and indication for next bus arrival, all these features give people a psychological sense that they are not left alone, which makes them use public transit often as these all features make people convenient in using public transit. Hence, it is not always about time, but it is how to make travel experience comfortable and reliable. And often these three aspects of transit are misunderstood by many planners as they focus solely on faster service but neglect reliability and comfortable aspect.

For Transit-Oriented Development to work effectively, all the transit authorities such as BC TRANSIT, RDN, and the City have to work together at all levels of making decisions for transit. This can be achieved by better cooperation and better stakeholder participation between these different parties. Another way is to always involve a member of different stakeholder during discussion such that all the representatives from different agencies are present at the table for discussion. This way, it would help better communication and allow different agencies to know where they are with transit and what their roles in transit are.

A site as a permanent transit hub is planned to be established at 1 Port Drive Nanaimo, BC. Previously the transit shelter that served as the major exchange in Downtown
Nanaimo was Prideaux Exchange which lacked connection to retail. As the site was never intentionally meant to be serving as a Transit exchange, it lacks in weather protection, better connection with downtown, and no indication of it being a Transit Hub, according to the planner at RDN.

Obviously if RDN in collaboration with BC TRANSIT is planning to make a permanent transit hub in downtown then efforts should be made to eliminate the fallbacks of previous transit shelter and include them in the new proposed transit shelter, which might include weather protection, facilities for elderly access, easy transfer of passengers, better/attractive as well as simple visualization of routes and schedules, clear indication of next bus arriving time, as well as toiletry facilities.

There are certain further studies that need to be done in order to make Nanaimo a city that contributes a major share of riders in public transit. As researched in this project, the City of Nanaimo along with Regional District of Nanaimo and BC Transit are planning to provide a separate bus exchange in downtown Nanaimo at #1 Port Drive, Downtown, Nanaimo. Hence studies need to be done;

- Number of estimated riders using the exchange
- Providing the facilities (washrooms, handicap accessible sidewalks, and others) to accommodate riders
- Appropriate Permanent Transit Shelters
- Impact on Prideaux Exchange (which is currently main exchange in downtown)
- Rescheduling of buses
Chapter 8.
Conclusion

Nanaimo is a city of the population less than 100,000, hence the guidebook developed is designed understanding the context of Nanaimo, and might not necessarily apply to other communities with a population more than 100,000.

The guidebook is designed as a framework to start with the concept of TOD in Nanaimo. The guidebook is not developed to have a detailed description of design characteristics of the site area such as buildings, streets, sidewalks, blocks etc. but it helps in identifying what Nanaimo lacks in terms of improving its transit service experience and too some extent guidebook is intended to start the conversation of TOD in Nanaimo.

Density of Nanaimo imposes a huge impact on development of TOD in Nanaimo. There are different pedestrian pockets such as Harewood neighborhood, Fairview Neighborhood, Vancouver Island University, Downtown, Hospital area, North Nanaimo Town Center and Woodgrove Mall. All these neighborhoods are big generators of riders in the City. It becomes very difficult for transit to connect all these nodes because all these nodes are located far from each other. Regional District of Nanaimo will have to work on how to connect these nodes in most efficient way along with local municipality, City of Nanaimo and the provincial transit authority, BC Transit.

The next step of this research would be the implementation of the guidelines developed in this report. In order to implement these guidelines, series of land-use rezoning will
need to be considered, and different authorities will have to have a round-table conversation including local public and stakeholders, to discuss the impacts and benefits of these guidelines.

The Hospital area is the densest community in Nanaimo surrounded by the Northfield neighborhood on the north and Townsite Neighborhood to the south. The Hospital is one of the biggest employer in the City and thousands of people live and work in this community.

Nanaimo is a sustainable City with beautiful waterfront in core downtown area. Nanaimo possesses all the qualities to be a sustainable City. However, all the pieces of urban design need to be connected to have a place that is safe and reliable on public transit. The community of Nanaimo is growing and as such density is growing, concentrated at urban nodes. If TOD is to be developed anywhere in Nanaimo, then Bowen road is the most preferable site and hence guidebook will help in designing a community that is transit-friendly. It should be taken into consideration that everyone will have different perspective and ideas and needs of community would change over time.
References


Falconer, R., & Richardson, E. (2010). Rethinking urban land use and transport planning - opportunities for transit oriented development in Australian cities case study perth. Australian Planner, 47(1), 1. doi:10.1080/0729368090351051


Online Sources:

Official Community Plan, Nanaimo, 2008. Retrieved online at:  

District of Saanich, Retrieved online at  

Statistics Canada 2011, Nanaimo Census. Retrieved online at  

Statistics Canada 2011, Central Okanagan Census. Retrieved online at  

Nanaimo Transportation Master Plan (2014) Retrieved online at  

https://www.nanaimo.ca/assets/Departments/Engineering~Public~Works/Transportation~Master~Plan/Nanaimo%20Existing%20Conditions%20Final%20Apr%202013.pdf

Nanaimo Community Profile (2010). Retrieved online at  

Transit Future Plan, Regional District of Nanaimo, 2014. Retrieved online at  
http://www.rdn.bc.ca/cms/wpattachments/wpID279atID26200.pdf

http://ottawa.ca/cs/groups/content/@webottawa/documents/pdf/mdaw/mdyx/~edisp/con029008.pdf

Short Street Saanich (2008), Official Community Plan. Retrieved online at

FCM Webinar (2007) on Transportation, Short Street Saanich Development Project. Retrieved online at

City of Nanaimo, Zoning Bylaw No. 4500, 2015. Retrieved online at:
http://www.nanaimo.ca/ByLaws/ViewBylaw/4500.pdf#nameddest=TOC

City of Nanaimo, Zoning Map of Nanaimo. Retrieved online at:

City of Nanaimo, Urban Containment Boundary. Retrieved online at:
http://www.nanaimo.ca/assets/Departments/Community~Planning/Offical~Community~Plan~~10~Year~Review/Background~Information/UCBmap.pdf


Regional District of Nanaimo, population statistics, 2016. Retrieved online at:
http://www.rdn.bc.ca/cms.asp?wpID=440


General Development Permit Area Design Guidelines, 1992, City of Nanaimo. Retrieved online at:
Appendices
APPENDIX A - Interview Questions
Elected Officials and Staff

Date/Time/Location: __________________________

1. Are you aware of any residential/commercial projects developed in past which were intentionally oriented towards public transit?

2. Are you aware of any proposed residential/commercial projects to be developed that will be oriented toward transit?

3. What would you see as the main reasons/issues that support better integration of development and transit in Nanaimo?

4. What would you see as the main issues that make the integration of transit and development challenging?

5. How would you evaluate/rate current transit service in Nanaimo?

6. How would you improve transit services?

7. Note: only for individuals involved in providing transit services:
   a. What is the current ridership? Forecasts?
   b. What routes have the highest use?
   c. What are future plans/changes for transit service?

8. Where do you see potential for the expansion of transit oriented development (fully developed as a TOD site) in Nanaimo?

9. Are you familiar with any TOD sites in other places that could serve as a model for Nanaimo?

10. How can a range of alternative forms of transportation (transit, bike lanes, walking routes separated from traffic, other) be better integrated into the City?

11. The outcome of this project is design guidelines for transit oriented development in Nanaimo. What do you think should be included in this design guidelines?

12. Follow up: Anything you would like to add on Transit Oriented Development in Nanaimo?

For additional information or to follow up on any aspect of this research:
Rushi Gadoya Master of Community Planning, Student
Vancouver Island University rushigadoya@stumail.viu.ca

Pamela Shaw Ph.D. (Supervisor)
Director, Masters of Community Planning Program
Vancouver Island University Pam.Shaw@viu.ca

Chris Turner
Research Ethics Board Officer
(250) 740-6631 reb@viu.ca
Good Morning/Afternoon:
I am a Masters in Community Planning student from Vancouver Island University in Nanaimo, British Columbia, Canada and I am conducting research for my major project. I am looking at Transit Oriented Development (TOD) as a design format that intentionally links development to transit by integrating transit into the early stages of project planning. Ultimately I am intending to develop guidelines that could be used in the City of Nanaimo by planners, elected officials, and others engaged in community involvement to better integrate transit and development. The guidelines will identify best practices and techniques that are applicable to Nanaimo.

During this study you will be asked a series of questions about your experiences with public transit. It is expected to take about 30 minutes.

There are no known harms associated with this research. The potential benefit is the development of a design guidelines for Transit Oriented Development in Nanaimo which can be used as a tool for planners and developers to design communities in future.

If you want to participate anonymously I will make every effort to protect your identity but it is possible that contextual information, such as employment position or place of work, may indirectly disclose your identity.

You will be provided with an opportunity to review the transcript of your interview and will have full control over editing or removing any statement/s you make during their interview, prior to the interview data being used in the analysis. It is possible that a quotation from you would be useful to the research. No text will be directly attributed to you without your written consent, and you will have the opportunity to change/modify any statement prior to inclusion or refuse to have it included in the research without any negative consequences.

Your participation is completely voluntary. You may withdraw at any time for any reason without explanation and without consequence. You may choose not to answer any question for any reason. If you choose to withdraw from the study, any information you have provided will be withdrawn from the study and immediately destroyed.
Are you interested in participating in this research?

☑ Yes

☐ No

*If yes, set time for the interview.*

If you have any concerns about your treatment as a research participant in this study, please contact the VIU Research Ethics Officer, by telephone at (250) 740-6631 or by email at reb@viu.ca.

If you have any questions about this research project, or would like more information, please feel free to contact me at the e-mail address below:

Rushi Gadoya
MCP Student, Vancouver Island University
rushigadoya@stumail.viu.ca
Transit Oriented Development: Making it possible in a low density city

Major Project Research
Rushi Gadoya, Master of Community Planning Student
Vancouver Island University, Nanaimo British Columbia Canada

APPENDIX C- Consent Form

**Purpose:** I am a Masters in Community Planning student from Vancouver Island University in Nanaimo, British Columbia, Canada and I am conducting research for my project. This research requires me to contribute to the field of Planning. As such, I have designed a project to create design guidelines for Transit Oriented Development in a low density city, Nanaimo.

**Description:** I am examining the relationship between existing and future development and a concept broadly known as Transit Oriented Development (TOD) in Nanaimo. I am planning to develop design guidelines that could be used in future developments to better integrate transit and site design. I am also hoping that the information I gather will be useful to planners and professionals related to transit to develop projects considering transit as a means of commuting for local public. Also, if the participant requests on forwarding the final product of this research, that is the design guidelines, to their employer, a copy of final product will be sent through email to respective employers of participants.

Your participation will require about 30 minutes of your time.

**Potential Harms:** There are no known harms associated with this research. The potential benefit is the development of a design guidelines for Transit Oriented Development in Nanaimo which can be used as a tool for planners and developers to design communities in future.

**Confidentiality:** All records of participation will be kept strictly confidential. Only my supervisor and I will have access to the information. Data will be destroyed by shredding at the end of the project in June 2018. Electronic files will also be deleted at that time. The results from this study will be reported in a written research project and an oral report during a university presentation, and I will also seek out opportunities to present my research at relevant conferences and hope to publish in at least one planning journal. Information about the project will not be made public in any way that identifies individual participants without their expressed written consent.

If you to participate anonymously, I will make every effort to protect your identity but it is possible that contextual information, such as employment position or place of work, may indirectly disclose your identity.
Your comments/suggestions will not be tied in any way and will be aggregated so that they cannot be tied to a specific place, person or position.

You will be provided with an opportunity to review the transcript of your interview and will have full control over editing or removing any statement/s you make during their interview, prior to the interview data being used in the analysis. No text will be directly attributed to you, and you will have the opportunity to change/modify any statement prior to inclusion or refuse to have it included in the research without any negative consequences.

**Participation:** Your participation is completely voluntary. You may withdraw at any time for any reason without explanation and without consequence. You may choose not to answer any question for any reason. If you choose to withdraw from the study, any information you have provided will be withdrawn from the study and immediately destroyed.

**Concerns About your Treatment in the Research:** If you have any concerns about your treatment as a research participant in this study, please contact the VIU Research Ethics Officer, by telephone at (250)-740-6631 or by email at reb@viu.ca.

If you have any questions about this research project, or would like more information, please feel free to contact me at the e-mail address below:

Rushi Gadoya  
MCP Student, Vancouver Island University  
rushigadoya@stumail.viu.ca

**Questions on your participation:**

Do you consent to being audio recorded?

☐ Yes

☐ No

I have read the above form, understand the information read, understand that I can ask questions or withdraw at any time. I consent to participate in today’s research study.

**Participant’s Signature:**  
**Date:**
APPENDIX D- Dissemination of Results

Information Release
All participants will be provided with a draft of the design guidelines in approximately December 2016 for your review/comment. All participants will be provided with a copy of the final report, with a pdf version of the report so it can be disseminated to others you may think would find the research of interest.

In addition, I plan on presenting my findings to the Vancouver Island University community through my major project work for the Master of Community Planning program requirements. I am also hoping to present my findings at a conference (Planning Institute of British Columbia or Canadian Institute of Planners) and publish my results in a reputable academic journal (Plan Canada, Planning Policy).

If you are interested, a link to the final major project report will also be provided to you.

Yes – send me the following (please check):

☑ Draft design guidelines and major project for review and comment

☑ Final version of the design guidelines and major project

☑ pdf copy of the design guidelines and major project

☑ Link to any publications or presentations that are publically available.

Please provide your name and mailing address. Please note that if you provide your name and address here, this paper will be stored in a separate place than the interview. Your contact information will not be connected to your interview.

Name: ______________________________ Email: ______________________________

Mailing Address:

____________________________________________________________________
October 24, 2016

Rushi Gadoya  
Master of Community Planning  
Faculty of Social Sciences  
Vancouver Island University  
900 Fifth Street  
Nanaimo, BC V9R 5S5  

Dear Rushi Gadoya:

The Vancouver Island University Research Ethics Board is pleased to grant approval for the project entitled "Transit Oriented Development: Making it possible in a low density city," as submitted for review by Prof. Pam Shaw on September 19, 2016 and as revised and resubmitted on October 20, 2016.

Please be aware of your obligation to carry out the research as stated in the revised proposal and to comply with guidelines as posted on the VIU REB website at [http://www.viu.ca/reb/guidelines.asp](http://www.viu.ca/reb/guidelines.asp).

Your protocol information is below. Please retain this copy for your records.

<table>
<thead>
<tr>
<th>VIU REB Reference No.</th>
<th>2016-069-VIUS-GADOYA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of Approval</td>
<td>October 24, 2016</td>
</tr>
<tr>
<td>Date of Expiry</td>
<td>October 23, 2017</td>
</tr>
</tbody>
</table>

Sincerely,

[Signature]

Aggie Weighill, Ph.D.  
Chair, Vancouver Island University Research Ethics Board