North Shore Area Transit Plan

PHASE 1: CONTEXT AND CURRENT CONDITIONS

July 2011

TRANSLINK

Contents

FIGURES

TABLES

Introduction

1.0 INTRODUCTION

TransLink is Metro Vancouver's regional transportation authority, and is dedicated to developing and operating an efficient and sustainable transportation system throughout Metro Vancouver.

TransLink's long-term strategy, Transport 2040, envisions a region where more than 50 percent of trips are by sustainable modes – transit, cycling and walking. An Area Transit Plan (ATP) is a community-focused planning process designed to create a long-term network and prioritize initiatives that will assist TransLink achieve its long-term goals.

The Area Transit Plan program divides Metro Vancouver into seven sub-regions (each with two –five municipalities) to develop a transit network plan and initiatives in coordination with communities' growth patterns and land use plans and respond to communities' interests. TransLink works with municipal, First Nations, regional and provincial staff and creates a planning process involving staff, stakeholders, residents, and businesses.

An ATP contributes to municipal Official Community Plans and Strategic Transportation Plans. An ATP develops a transit network vision based on local land use plans and works with communities to articulate service and infrastructure initiatives to implement the vision. The long-term network and stated transit service and infrastructure priorities will inform future land use and transportation investments choices. In addition to responding to local goals and issues, ATPs are also informed by regional strategic transportation plans and the regional growth strategy.

1.1 PLAN STRUCTURE

TransLink's ATP program has evolved over the past 10 years. Guided by Transport 2040, the ATP program incorporates the best elements of previous area plans, with one significant departure: a new implementation strategy. The ATP is now a three phase planning process and with a phase four monitoring program. The first phase is an analysis of the current network, including a technical review of route performance, an analysis of the travel market, and insight into customers' perception of service. Phase two develops a long-term vision of a transit network for the sub-region, based on communities' land use plans. In phase three, initiatives will be identified and prioritized. Priorities will be implemented as part of the 3 Year Plan and Outlook, which also defines funding and evaluates service and infrastructure priorities throughout the region. As new addition to the ATP program, phase four will formalize reporting and communication of progress to communities and allow for updates as a result of monitoring the plan.

The plan is intended to be considered as a whole, not individual discrete phases. The final ATP report will be put forward for endorsement by TransLink.

The North Shore Area Transit Plan (NSATP) is an approximately 18 month project, plus an interruption in the work program around summer months and a municipal election in the Fall of 2011. Project development requires 6 months and 12 months are dedicated to completing Phases 1 through 3. Phase four is on-going implementation, monitoring and reporting. This phase continues until the next ATP. A project timeline is illustrated below.

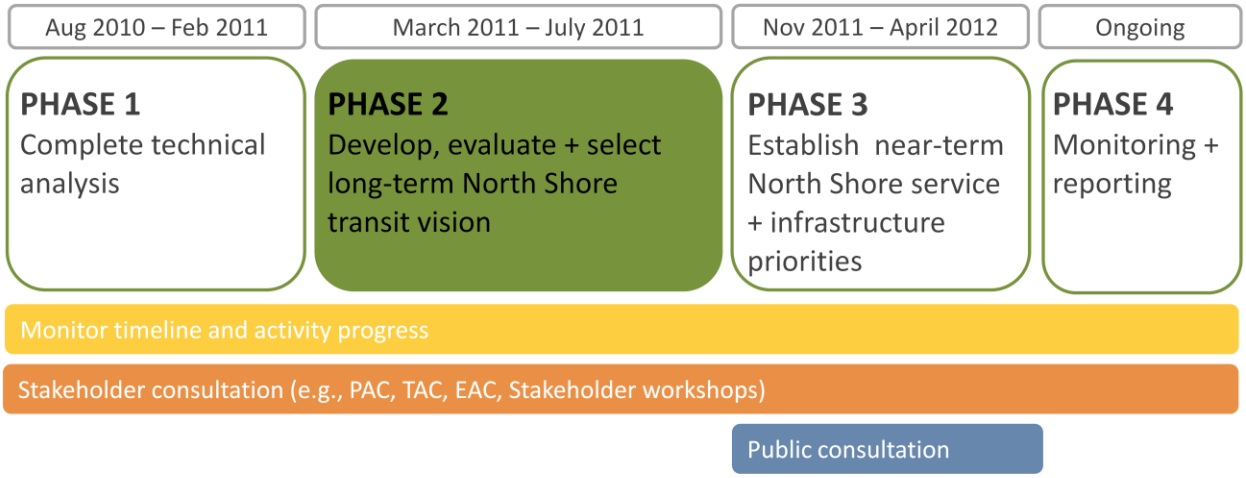

Figure 1. North Shore Area Transit Plan Project Timeline

1.2 Plan Scope

The scope of an ATP is two-fold:

1. Areas within **direct scope** include those most directly related to transit supply and demand:
   - Transit network – routes, service levels and types
   - Transit service quality - customer service
   - Transit infrastructure – fleet requirements, exchanges, stations, bus stops, park and rides, and passenger facilities and accessibility
   - Setting targets for the future transit network
   - Transit priorities and sequencing of priorities

2. Areas within an indirect or **shared scope** include those related to transit demand and shared with other agencies:
   - Transit-supportive municipal infrastructure, zoning and policies (including transit priority measures)
   - Transit-related initiatives to support municipal goals and objectives to reduce GHG emissions, as part of meeting provincially set targets

Areas considered **out of scope** for the ATP include:

- Transit service internal operations (including maintenance & operations facilities)
- An implementation timeline for service priorities and/or other network improvements identified in the Plan
- Fares, vehicle interiors, propulsion, technologies, service delivery models, and the creation of new TransLink policies applicable region-wide

For the North Shore ATP, the geographic scope includes the following five municipalities:

- District of North Vancouver
- City of North Vancouver
- District of West Vancouver
- Bowen Island Municipality
- Village of Lions Bay

The North Shore also includes three significant First Nations' lands (covered by two different First Nations - Tsleil-Waututh and Squamish), park land and ecologically sensitive or protected areas, and a large Vancouver Port Authority holding. The influence of these areas on transit network planning will be considered and incorporated into the Plan.

Additional geographic scope includes areas in Vancouver, UEL, and Burnaby directly connected to the North Shore with transit routes.

1.3 ATP Planning Principles

The Area Transit Plan will guide the transit service and infrastructure investments of the North Shore's five municipalities for years to come. To reflect the significance of this plan and ensure its completion to the highest possible degree of quality and professionalism, the following four principles will apply to the manner in which the planning process is conducted, and the plan conceived.

1. Equitable access and engagement	- The communication and consultation tools used should provide reasonable access for all members of the community, and the process should engage the local community at multiple levels (i.e. general public, Public Advisory Committee, key stakeholders, municipal, and any others determined to be appropriate)
2. Maximum transparency	- All plan and process information should be presented in a clear, legible, and consistent manner
3. Policy consistent	- The plan content should reflect all existing TransLink policies, guidelines, and values (as are relevant), and conflict with none
4. Evidence-based approach	- The content of the plan's Vision and Priorities should balance the results of community consultation with the analytical data findings

These Planning Principles will be used in conjunction with the Area Transit Plan goals and objectives to guide the plan process and overall decision-making.

1.4 PROJECT STRUCTURE, ROLES AND RESPONSIBILITIES

TransLink is responsible for directing all aspects of this project. Subsidiaries' municipalities', and primary stakeholders' support is critical to the success of the project. The Province of BC will be kept apprised of project progress as it pertains to the Provincial Transit Plan and any provincially owned land or corridors.

The project organization has been established to reflect the roles and responsibilities of each of the TransLink departments, subsidiaries and municipalities and stakeholders for these ATPs through their participation on various committees and working groups. A project organization chart is illustrated below.

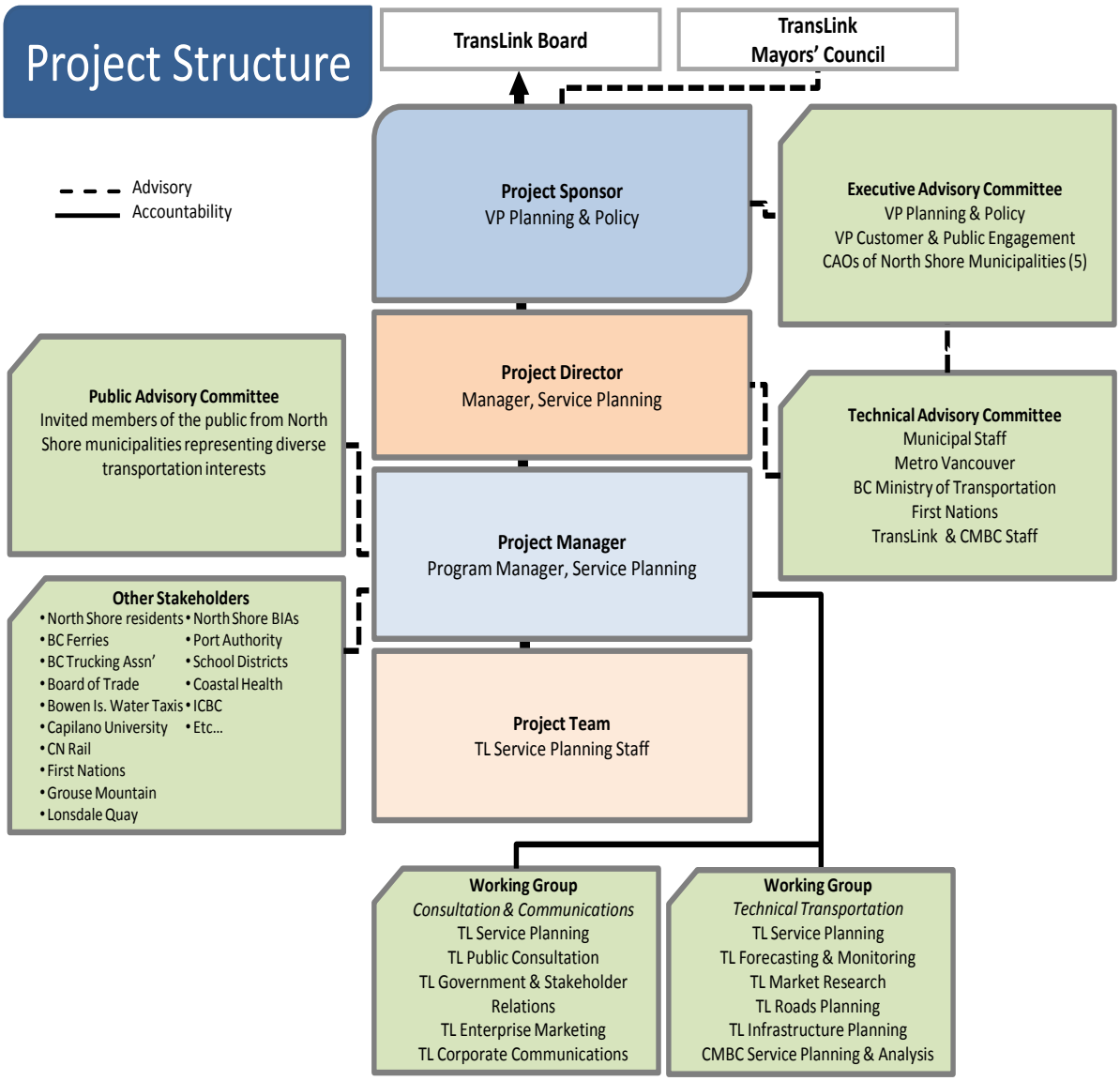

Figure 2. North Shore Area Transit Plan Organizational Structure

Land Use and Transportation

2.0 LAND USE AND TRANSPORTATION

Coordinating land use and transportation policy can create a positive feedback loop, supporting more resilient and sustainable communities. This section identifies policy and planning context for the NSATP. It summaries relevant documents as well as comments on alignment or gaps among the policies and plans. Included in this section is an overview of key current, historical and comparative facts about population, employment, land use, and travel patterns.

2.1 POLICY CONTEXT

An Area Transit Plan identifies both a long term vision of the transit network for a sub-region as well as the shorter term service and infrastructure priorities needed to begin moving toward that vision. The Plan not only provides a basis for future fleet, facility and infrastructure projections, but also for the coordination of transit with municipal decision-making. The implementation of the Plan should result in an effective and efficient transit network with an increased transit mode share. As illustrated in the following image, the ATP is one piece in an inter-related web of supporting plans at multiple levels of government, various time frames and geographical areas.

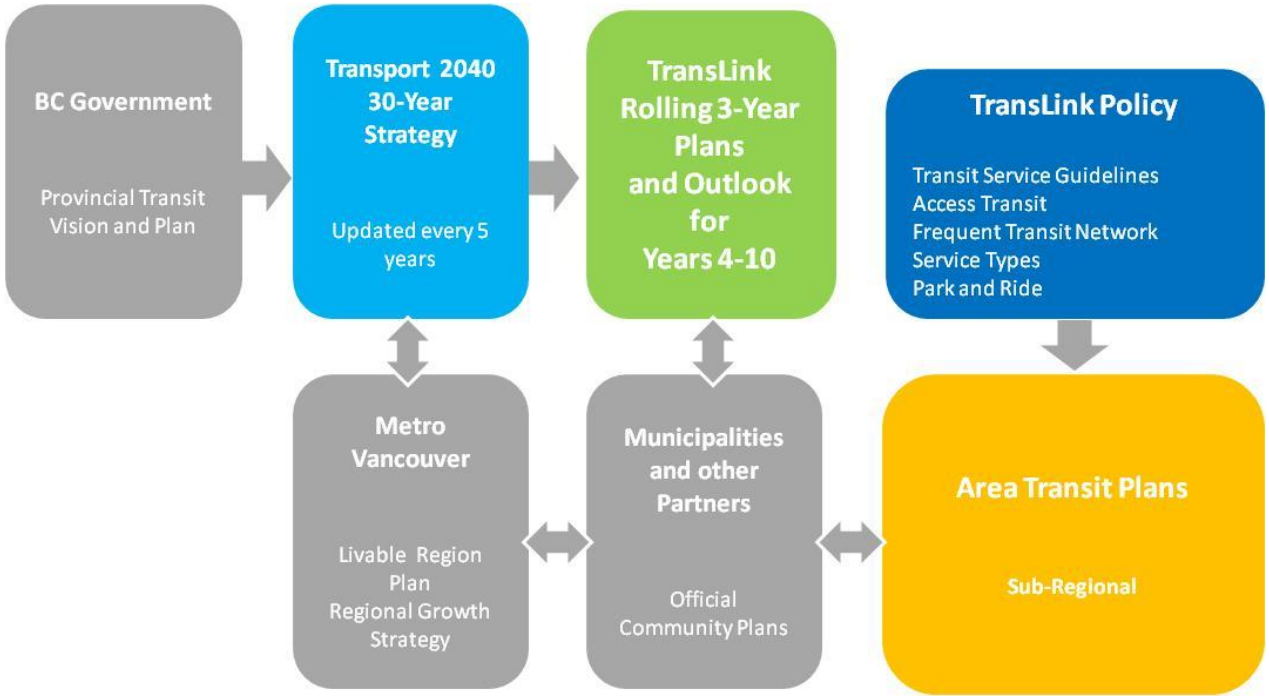

Figure 3. Policy Context of Area Transit Plans

2.1.1 REGIONAL LAND USE POLICY CONTEXT

Metro Vancouver and the five North Shore local governments, as well as the Vancouver Port Authority and First Nations share responsibility with TransLink for managing land use and transportation on the North Shore.

METRO VANCOUVER

Metro Vancouver's recently developed Regional Growth Strategy[1] (RGS) is a growth management plan focusing on land use policies. These policies intend to guide development of the region and to coordinate land use planning to support the efficient provision of regional transportation, infrastructure, and community services to 2041. The draft RGS is anticipated to be adopted in 2011.

The Strategy identifies five goals to achieve its outcomes:

- Create a Compact Urban Area
- Support a Sustainable Economy
- Protect the Environment and Respond to Climate Change Impacts
- Develop Complete Communities
- Support Sustainable Transportation Choices

For the five North Shore municipalities, the draft RGS identifies one regional city centre, Lonsdale, and two municipal town centres, Ambleside and Lynn Valley. Other local centres include Bowen Island's Snug Cove and Capilano/ Marine, Edgemont Village, Lower Lynn, Park Gate and Deep Cove in the District of North Vancouver. The RGS also notes the Horseshoe Bay ferry terminal, Lions Gate Hospital and Capilano University as locations as high activity areas for students, employment and passenger trips.

New to the draft RGS is the concept of Frequent Transit Development Areas (FTDAs). FTDAs are intended to be located along TransLink's FTN and complement the network of urban centres. They are characterized by concentrated, higher density forms of residential, commercial, mixed uses beyond Urban Centres. Urban design should promote sustainable transportation choices.

The draft RGS identifies Metro Vancouver's transit priorities to support regional land use. Among these priorities is "enhancing or extending the Frequent Transit Network and other transit services in regional corridors to reinforce Urban Centres and Frequent Transit Development Areas." With specific reference to the North Shore, the RGS identifies "enhanced service linking the Lonsdale Regional City Centre to North Shore Municipal Town Centres and the Metro Core" as a Metro Vancouver priority.

Under the South Coast British Columbia Transportation Act (SCBCTA), one of the purposes of TransLink is to provide a regional transportation system that supports Metro Vancouver's Regional Growth Strategy. The NSATP may identify near-term transit service and infrastructure priorities that may vary from those of the RGS. The NSATP will look to identify priorities anticipated to perform well and may be subject to change. The NSATP is intended to be consistent with the goals and directions of the new RGS, and the specific transit initiatives and services identified within the ATP will advance the region's vision for managing growth and sustainable development.

[11] Metro Vancouver, Regional Growth Strategy, January 2011

2.1.2 MUNICIPAL LAND USE AND TRANSPORTATION POLICY CONTEXT

Official Community Plans (OCPs) identify strategies to manage land use and services to achieve municipal goals. All OCPs include a regional context statement outlining its relationship with the RGS. Under the draft RGS, municipalities will now be able to identify FTDAs a part of the context statement in consultation with TransLink. OCPs and municipal strategic transportation Plans define policies and plans for municipal infrastructure, as frequent transit infrastructure and services. The five North Shore OCPs, two strategic transportation plans and two bicycle plans were reviewed for this plan. A more comprehensive review is included in Appendix 1.

The North Shore has a low population and employment growth rate compared to the rest of the region. The OCPs reflect these growth rates, and generally concentrate new development in centres. The North Shore OCPs echo the importance of the environment to the communities; OCP policies intend to manage growth to protect the natural surroundings and to maintain compact communities.

VILLAGE OF LIONS BAY

The Village of Lions Bay's OCP (2002) [2] will accommodate its modest population growth through secondary suites in this predominately single-family residential community. The Village centre will continue to be the commercial and institutional focus of the community. The OCP seeks to reduce auto dependency by promoting ridesharing, park and ride use, and multi-modal responses to transportation issues along the Howe Sound Corridor.

MUNICIPALITY OF BOWEN ISLAND

Bowen Island Municipal OCP Update Draft OCP (July, 2010)[3] directs its growth to existing developed areas. Snug Cove continues to be the Island's focus of local commercial and institutional activities. The OCP identifies transit specific objectives (such as improved BC Ferries and transit service scheduling) as well as policies aimed at promoting active transportation and expanded transit service.

DISTRICT OF WEST VANCOUVER

As the District of West Vancouver's Municipal Town Centre, Ambleside is the focus of new commercial and institutional development in the District's 2004 OCP.[4] Residential growth rates in the District are modest however the OCP designates new future neighbourhoods outside the town centre, notably lands north of the Upper Levels Highway.

West Vancouver's OCP and its 2007 Cycling Network and Greenway Plan[5] seek to reduce auto use. The OCP includes a planning principle to "reduce auto dependency by developing a comprehensive transit, transportation and land use plan that incorporates convenient and workable alternatives to the single-occupant car" whereas the cycling and greenway plan seek to increase cycling and walking trips, and to improve safety for cyclists and greenway users. The cycling network and the Spirit Trail Greenway between Horseshoe Bay and the Lions Gate Bridge, provide connections within the District of West Vancouver, to North Vancouver, across the Lions Gate Bridge, and connections to regional transit services.

[2] Village of Lions Bay, Official Community Plan, 2002
[3] Bowen Island Municipality, OCP Draft Plan, First Reading July 2010
[4] District of West Vancouver Official Community Plan, 2004
[5] District of West Vancouver, Cycling Network and Greenway Plan, June 2007

DISTRICT OF NORTH VANCOUVER

In its draft Network of Centres (November 2010)[6], the District of North Vancouver identifies a strategy to concentrate 75-90% of future development in four key locations – Lynn Valley Municipal Town Centre, Lower Lynn, Lower Capilano-Marine, and Maplewood. Two proposed FTDAs, Lower Lynn and Lower Capilano-Marine, are identified in the Plan. This draft Plan suggests redevelopment in these areas to higher density residential, commercial, cultural and/or institutional land uses located and designed to support transit, cycling and walking.

The District is in the process of updating its strategic transportation plan. The draft Transit Strategy seeks to improve transit accessibility and service in the District. The draft Strategy intends to set key direction for investment, including prioritizing corridors for transit service improvements.

CITY OF NORTH VANCOUVER

The City of North Vancouver will be updating its OCP beginning in 2011. The current 2002 OCP[7] concentrates growth in Lonsdale Regional City Centre. The City's 100 Year Sustainability Vision (2009) defines a long-range vision for the City with an aggressive carbon-neutral target. A Community Energy and Emissions Plan[8] (2010) builds on the 100 Year Vision and outlines a plan of action over ten years to reduce energy use and greenhouse gas emissions associated with land use, buildings, transportation and waste. Transit service improvements were expected to contribute significantly to transportation sector related GHG reductions. It is anticipated that the City's forthcoming OCP update will call for continued densification in the City Centre with development forms and design that prioritize transit, cycling and walking. Specific transit-related objectives to support more accessible and efficient transit services are identified.

In the City's Long-Term Transportation Plan (2008),[9] the Transit Strategy recommends increasing transit frequency and coverage with conventional and small bus services. The Strategy suggests the desire for new transit routes, improving accessibility to transit, expanding the Frequent Transit Network, implementing transit priority treatments, expanding the U-Pass program to Capilano University and examining the potential for a resident pass program, and expanded SeaBus service with terminal enhancements.

North Vancouver Bicycle Master Plan (2006)[10] identifies a network of bicycle routes connecting all major destinations and all neighbourhoods within the City and District of North Vancouver, as well as connections to West Vancouver and across Burrard Inlet, and connections to regional transit services. It is in the process of being updates.

ADDITIONAL LAND USE POLICIES

PORT METRO VANCOUVER

The 2008 Port Plan by the Vancouver Port Authority has been incorporated into an overall Land Use Plan,[11] and specifies land use policies its waterfront holdings from Lions Gate Bridge along the Burrard Inlet and Indian Arm. The policies vary by area, supporting marine industrial and commercial operations to public recreational, residential moorage, and mixed use urban development.

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[6] District of North Vancouver Draft Official Community Plan, Draft Two, March 2011
[7] City of North Vancouver, Official Community Plan, 2002
[8] City of North Vancouver, Community Energy and Emissions Plan, April 2010
[9] City of North Vancouver, Long-Term Transportation Plan, April 2008
[10] City of North Vancouver/District of North Vancouver, North Vancouver Bicycle Master Plan, February 2006
[11] Port Metro Vancouver (Vancouver Fraser Port Authority), Port Plan, January 2008

FIRST NATIONS

The Squamish Nation and Tseil-Waututh Nation have land reserves and other interests on the North Shore. The 2004 Capilano Master Plan[12] is designed to offer Squamish Nation an indication of land uses that may be developed on Capilano IR 5 over 20 years. Land uses include mid to high density mixed use residential and commercial developments, with areas designated for the Squamish people. The Squamish Nation's Seymour IR 2 also a site of potential future development. The intention for this area is less defined than for IR 5.

2.1.3 TRANSLINK POLICY CONTEXT

As the regional transportation authority, TransLink's policies and initiatives guide and influence the NSATP. This section of the plan provides the context of these policies within the parameters of the NSATP.

TRANSPORT 2040

Transport 2040[13] is TransLink's long term strategy for the regional transportation system. The 2008 plan is intended to guide TransLink's development and operation of an efficient and sustainable transportation system. The Strategy commits to six goals and identifies four key strategies to achieve them:

Goals

- Greenhouse gas emissions from transportation are aggressively reduced, in support of federal, provincial and regional targets.
- Most trips are by transit, walking and cycling.
- The majority of jobs and housing in the region are located along the Frequent Transit Network (frequent, reliable services on designated corridors throughout the day, every day).
- Travelling in the region is safe, secure, and accessible for everyone.
- Economic growth and efficient goods movement are facilitated through effective management of the transportation network.
- Funding for TransLink is stable, sufficient, appropriate and influences transportation choices.

Strategies

- Make early investments that encourage development of communities designed for transit, cycling, and walking.
- Optimize the use of the region's transportation assets and keep them in good repair.
- Build and operate a safe, secure, and accessible transportation system.
- Diversify revenue sources and pursue new and innovative ways to fund transportation.

Transport 2040 is used to guide TransLink's activities and decision-making, including Area Transit Plans. Over the next two years, 2040 will be updated at a time when the NSATP will be monitoring the implementation of near-term priorities. NSATP monitoring and future plan reviews will reflect new direction and imperatives identified in the updated strategy.

3 YEAR BASE PLAN AND OUTLOOK

[12] Squamish Nation, Capilano IR 5 Master Plan, 2004
[13] TransLink, Transport 2040, July, 2008

Every year TransLink prepares a three-year Base Plan and an Outlook for another seven years. The Base Plan is limited to established funding resources and projected borrowing within the current limit. TransLink can prepare Supplemental Plans that propose increases to revenue sources beyond those permitted in a Base Plan. These Plans describe intended transportation services (and levels), major capital projects, and programs.

In 2010, a Base Plan and Supplemental were approved, permitting TransLink to maintain its current service levels and with a view to increase transit revenues. To achieve the targeted increase in productivity at a regional scale, 2% of bus service hours are to be reallocated (optimized) from low performing services to higher performing services by 2012. Similar to other areas in the region, the North Shore has its share of low and high performing services; North Shore services will be adjusted accordingly.

The 2011 Base Plan maintains current service levels, continuing with the 2010 Plan service optimization initiative. The 2011 Plan allows TransLink to make small steps toward achieving Transport 2040 goals. In addition, TransLink prepared two Supplemental Plans. One of the Plans committed to improving SeaBus evening and weekend service and reducing overcrowding on busy North Shore bus routes. At the time of this report, no 2011 Supplemental Plan was adopted and the Mayors' Council and the Province continue discussions to achieve sustainable, long-term funding for the region.

SUSTAINABILITY POLICY

TransLink's 2009 Sustainability Policy commits the organization to making sustainability a key factor in its strategies, plans, business practices, decisions and operations, including transit services. TransLink's 2010 Sustainability Report and ATPs share some common indicators, an effort to coordinate monitoring and benchmarking progress toward more efficient and effective services and higher transit mode share.

NORTH SHORE AREA TRANSIT PLAN (2000)[14]

The 2000 North Shore Area Transit Plan assumed a significant ridership increase on the North Shore despite the relatively low population and employment growth rates. This assumption was largely based on TransLink's Strategic Transportation Plan (April 2000), including a goal of increasing system-wide transit use by 29% by 2005.

While most improvements have been made, a number of the initiatives identified in the ATP were not implemented because funding was not available as anticipated, and one initiative was not technically feasible. Some of the targets identified in the ATP were not measurable within the timeframe of the ATP plan. Appendix 2 provides a more detailed status update of the 2000 North Shore ATP.

[14] TransLink, North Shore Area Transit Plan Final Summary Report, December 2000

2.1.4 ADDITIONAL POLICY CONTEXT

The Provincial Transit Plan and Greenhouse Gas Emissions Reduction Targets will benefit the region's transit system and will help shape transportation decision-making.

PROVINCIAL TRANSIT PLAN

The 2008 Provincial Transit Plan calls for significant expansion of transit in Metro Vancouver, to achieve a weekday transit mode share of 17 per cent by 2020 and 22 per cent by 2030. While the Plan includes substantial funding contributions for the region, no specific transit initiatives are identified for the North Shore.

AIR QUALITY MANAGEMENT PLAN & PROVINCIAL GREENHOUSE GAS REDUCTION TARGETS

TransLink has committed to supporting the region's Air Quality Management Plan (AQMP) and the Provincial Government's targets for reducing GHG emissions. The aligned AQMP and Provincial targets call for emissions reduction by 33 per cent by 2020 and by 80 per cent by 2050 compared to 2007 levels. The AQMP and Provincial targets will help guide development phases 2 and 3 (vision and priorities) of the NSATP.

2.1.5 TRANSLINK INITIATIVES

FREQUENT TRANSIT NETWORK

TransLink has developed a Frequent Transit Network (FTN) of corridors with service operating from morning to night at least 15 minute frequencies or better, everyday. The FTN provides service that is frequent enough so customers do not need to refer to a public timetable and transfers do not require a timed connection between routes.

Transport 2040 includes a long-term concept for the FTN. The NSATP will consider this long-term concept in the creation of a vision for the North Shore transit network. The specific FTN proposals for the North Shore may represent a refinement of the conceptual network included in Transport 2040. The ATP will look to identify frequent transit corridors anticipated to perform well and may be subject to change if transit supportive characteristics or corridor ridership changes. FTN performance measures are still under development.

TRANSIT PASSENGER FACILITIES GUIDELINES

TransLink is developing Transit Passenger Facilities Guidelines. These guidelines will assist TransLink in ensuring transit facilities, from rapid transit stations to bus stops, provide a consistent and appropriate quality of passenger amenities with a view to improve transit accessibility and overall system attractiveness as a mode of choice. As these guidelines are currently under development, the NSATP's review of passenger facilities lacks a formal assessment framework.

2.2 POLICY SYNTHESIS

This section identifies areas of coordination and gaps in land use and transportation policies. Relevant jurisdictions should work together at required levels to strengthen coordination, bridge gaps and reduce conflicts.

COORDINATED

- TransLink's long term strategic plan and supporting policies support the Regional Growth Strategy, provincial and regional environmental objectives and the economic development within the region.

- Municipality's regional context statements within Official Community Plans support the development of centres, regional and local economic growth, and sustainable transportation.
- Staff at TransLink, municipalities and the region work together in developing individual plans (including Transport 2040, the Regional Growth Strategy, Official Community Plans, and Area Transit Plans)to coordinate land use and transportation planning to achieve various organizations' goals.
- Initiatives in the Provincial Transportation Plan were included in Transport 2040 and will be reflected in the NSATP

GAPS

- The draft Regional Growth Strategy includes a new land use element - Frequent Transit Development Areas (FTDAs). The NSATP timeframe will not accommodate identification and approval of FTDAs, beyond the existing RGS Regional and Municipal Town Centres (as a separate and undetermined process). The District of North Vancouver's Draft OCP identifies potential FTDAs. It is unknown if District FTDAs can be approved in NSATP timeframe. Subsequent ATPs will identify approved FTDAs which can be included in the ATP planning process.
- Transport 2040 identifies a sustainable transportation (transit, cycle, and walk) mode share target for the region but does not define sub-regional mode share targets. Additionally, the long term strategy does not indicate desirable or achievable proportion of separate mode shares for transit, cycling and walking. The previous 2000 NSATP also identified very specific mode share targets. The updated NSATP acknowledges this gap and will work with municipalities to fill it. Targets will need to be measurable and monitored through Phase 4 of the plan.
- North Shore First Nations have large land holdings, and unlike municipalities they are not required to have an OCP, although they do produce land use plans. The NSATP will reflect First Nations' future plans and policies as communicated between agency staff. Staff will continue to work together to coordinate planning efforts.
- TransLink has a Frequent Transit Network but does not have supporting Transit Service Guidelines (TSGs). The ATP scope allows visions and priorities to identify potential frequent transit corridors. The ATP will use TSGs and best practices to measure performance.
- The NSATP assesses passenger facilities; however TransLink is in the process of developing comprehensive passenger facility guidelines. In future ATPs, assessment of passenger facilities will benefit from this document.
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2.3 TRANSPORTATION OVERVIEW & TRENDS

The North Shore is one of the slowest growing areas on the Metro Vancouver region, with projected annual growth of approximately 0.9% for population and 1.0% for employment over the next 30 years. This low growth is consistent with past trends, with North Shore growth consistently slower than other sub-regions over the past decade. Within the sub-region, growth has been quicker in small growth centres, including Lower Lonsdale, Lynn Valley and along Marine Drive. Table 1 illustrates the relative population and employment growth rates and absolute increases across the region. Within the North Shore, if current plans are borne out, most absolute population and employment growth growth is expected in the District of North Vancouver, though the highest density is expected to continue in the City of North Vancouver in Lonsdale and Marine Drive areas. Comparatively, total North Shore population and employment is among the lowest of the region, which is expected to remain consistent through to 2041 as illustrated in the following charts.

Table 1: Metro Vancouver Projected Population and Employment Growth

Subregion / Municipality	Population							Employment						
	Total Population				Annual Growth Rate			Total Employment				Annual Growth Rate		
	2006*	2021	2031	2041	2006-2021	2021-2031	2031-2041	2006*	2021	2031	2041	2006-2021	2021-2031	2031-2041
Metro Vancouver Total	**2,195,000**	**2,780,000**	**3,129,000**	**3,400,000**	**1.6%**	**1.2%**	**0.8%**	**1,158,000**	**1,448,000**	**1,622,000**	**1,753,000**	**1.5%**	**1.1%**	**0.8%**
Burnaby, New Westminster	271,000	357,000	406,000	447,000	1.9%	1.3%	1.0%	164,000	206,000	233,000	251,000	1.5%	1.2%	0.7%
Maple Ridge, Pitt Meadows	88,100	117,000	136,000	156,000	1.9%	1.5%	1.4%	28,000	42,000	50,000	57,000	2.7%	1.8%	1.3%
Northeast Sector	205,400	286,600	337,500	364,400	2.2%	1.6%	0.8%	75,390	111,810	134,160	148,470	2.7%	1.8%	1.0%
North Shore	**181,300**	**206,600**	**224,900**	**244,000**	**0.9%**	**0.9%**	**0.8%**	**77,310**	**91,400**	**100,500**	**109,570**	**1.1%**	**1.0%**	**0.9%**
North Vancouver City	47,500	56,000	62,000	68,000	1.1%	1.0%	0.9%	29,000	34,000	37,000	40,000	1.1%	0.8%	0.8%
North Vancouver District	87,000	98,000	105,000	114,000	0.8%	0.7%	0.8%	27,000	33,000	36,000	40,000	1.3%	0.9%	1.1%
West Vancouver	45,400	51,000	56,000	60,000	0.8%	0.9%	0.7%	21,000	24,000	27,000	29,000	0.9%	1.2%	0.7%
Lions Bay	1,400	1,600	1,900	2,000	0.9%	1.7%	0.5%	310	400	500	570	1.7%	2.3%	1.3%
Richmond	182,700	225,000	252,000	275,000	1.4%	1.1%	0.9%	130,000	154,000	169,000	181,000	1.1%	0.9%	0.7%
South of Fraser	653,900	891,000	1,038,500	1,144,000	2.1%	1.5%	1.0%	271,240	382,200	450,400	502,500	2.3%	1.7%	1.1%
Vancouver, Electoral Area A	612,800	697,000	734,000	770,000	0.9%	0.5%	0.5%	412,000	461,000	485,000	503,000	0.8%	0.5%	0.4%

Source: Metro Vancouver Regional Growth Strategy – January, 2011 (as amended), Table A.1
Notes: *2006 Census used as base year

Future growth in the North Shore is planned to be focused in centres, and primarily in a core area within a kilometer or so of the Burrard inlet, roughly bounded by Ambleside in the west to Lower Lynn in the east, and including the Lonsdale and Marine Drive Growth Areas. Within the Regional Growth Strategy, growth centres include one Regional City Centre (Lower Lonsdale) and two Municipal Town Centres (Lynn Valley and Ambleside). Through Official Community Plans (OCPs), local municipalities have also identified areas of growth concentrations at a smaller scale. The location of growth centres on the North Shore supports a number of existing strong transit corridors, including Marine to Dollarton (Ambleside/Park Royal to Lower Lynn, via Marine Drive, 3rd Street, Cotton Road and Main Street) and Lonsdale Avenue. Other smaller centres that are already served by transit include (from west to east) Horseshoe Bay, Dundarave, Edgemont Village, Lower Lynn, Parkgate and Deep Cove.

> The "Core" area of the North Shore is referred to throughout this document. It includes the highest concentration of population and employment of the sub-region, running from Ambleside in the west to Lower Lynn in the east, with a northern boundary of Hwy 1 in District of North Vancouver and 17th Street in the City of North Vancouver.

Land use on the North Shore includes a significant amount of open, undeveloped, protected or park space, as illustrated in Figure 4. Of the developed land, it is primarily single-family residential with pockets of higher densities and mixed uses. Employment is primarily located on the Marine to Dollarton corridor, Lower Lonsdale (including both the Lions Gate Hospital and ICBC) or the waterfront. Other trip generators outside these core areas include the region's Metro Core in Vancouver, Capilano University, Horseshoe Bay ferry terminal, and tourist destinations such as Grouse Mountain and the suspension bridges. Most of the density and activity centres on the North Shore are in a linear pattern close to the shoreline.

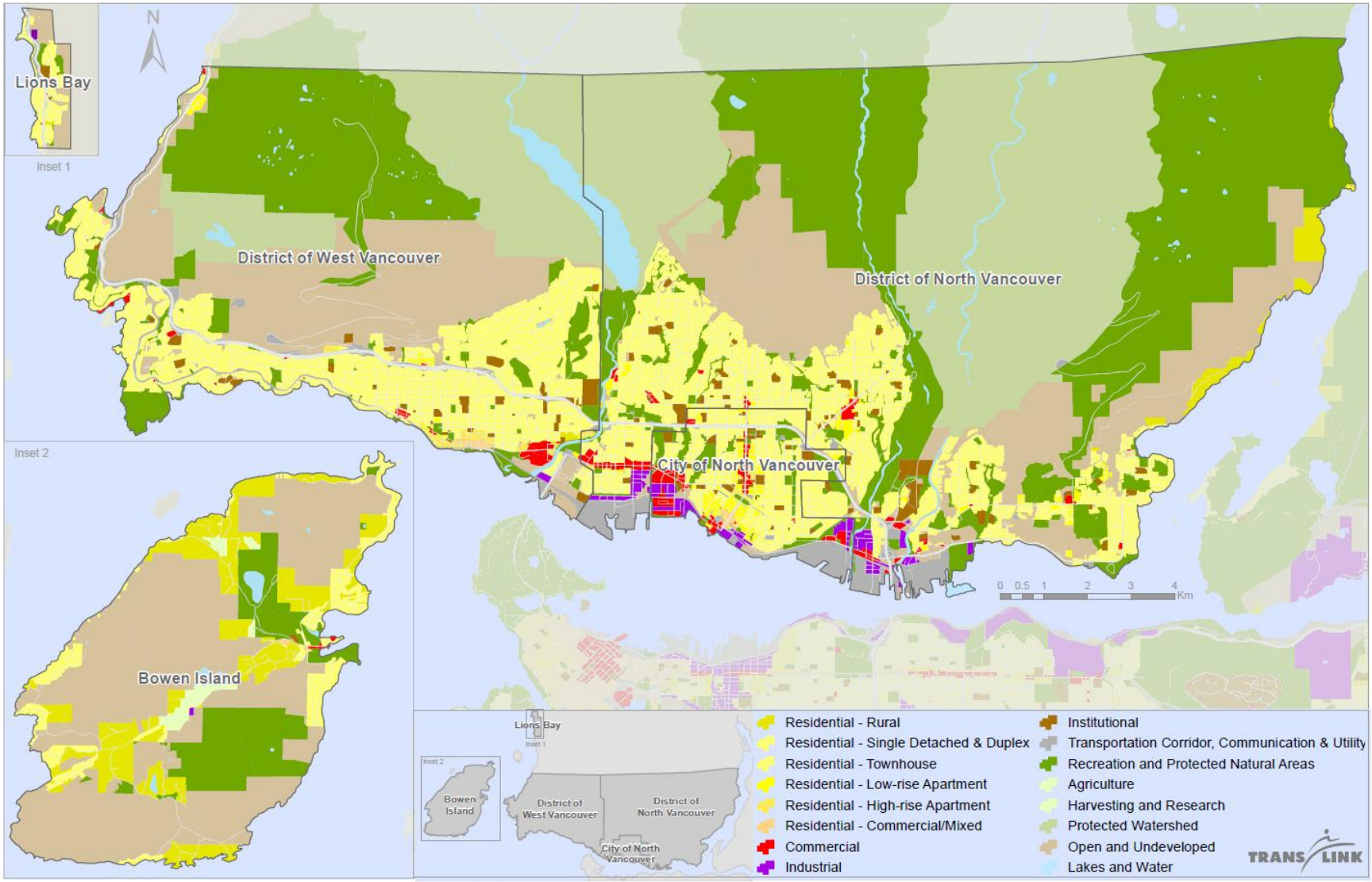


Figure 4. Current North Shore Land Use Designations

Travel on the North Shore is constrained by geography. Connections to other parts of the region require crossing the Burrard inlet via one of two bridges or the SeaBus. Within the North Shore, east-west travel is limited few major roads – primarily the Marine to Dollarton corridor and Highway 1, with other east-west routes rendered discontinuous by steep ravines and creeks. While Highway 1 provides connections to the rest of Metro Vancouver via the Ironworkers Memorial bridge, to island destinations via BC Ferries at Horseshoe Bay and to Highway 99 (including Lions Bay, Squamish and Whistler), it also creates a significant physical barrier between areas north and south of the highway. Travel on Bowen Island is limited to rural areas and a small commercial centre, while travel off the island is focused on the BC Ferry.

Changes in travel demand on the North Shore has been following a similar trend as the rest of Metro Vancouver's sub-regions. The traditional dominant travel pattern of suburb-to-central business district has been replaced by a more dispersed pattern, with predominantly internal movement within the sub-region. This pattern is found in both TransLink's regional travel studies (including the most recent 2008 Trip Diary, as detailed in Table 2) and the census "journey to work" data. Based on the 2008 Trip Diary, 60% of all person-trips starting or ending on the North Shore stay within the North Shore, and 42% of all trips (including those crossing the Burrard Inlet) start or end in the Core North Shore.

Table 2: Total Origin-Destinations Daily Trips by Sub-Area

Trips to and From:	**Total Daily Trips**	**% of Total**
Staying on North Shore		
Rest of North Shore (Internal)	189,000	31%
Rest of North Shore - Core North Shore	118,000	20%
Core North Shore (Internal)	57,000	9%
Crossing Burrard Inlet		
Rest of North Shore – CBD	37,000	6%
Rest of North Shore – Rest of Region	121,000	20%
Core North Shore - CBD	20,000	3%
Core North Shore – Rest of Region	61,000	10%
Total Daily Trips to/from/within North Shore	**603,000**	**100%**

Source: 2008 Trip Diary
Note: Includes all one-way person-trips by all modes over 24-hour weekday with an origin or destination on the North Shore.

Transit mode share varies across the North Shore, with the highest share in the City of North Vancouver. The private automobile still accounts for the largest share of travel overall. Table 3 illustrates the relative mode share of the North Shore municipalities, based on the 2008 Trip Diary 24-hour travel. Comparison to the 2006 Census Journey to Work data also shows highest transit mode share in the City of North Vancouver and the core area of the North Shore.

Table 3: 24-Hour Mode Share by Municipal Residents[1] (2008)

	West Vancouver	District of North Vancouver	City of North Vancouver	*Lions Bay*[2]	North Shore[3]	Metro Vancouver
Auto Driver	63%	62%	55%	*49%*	61%	56%
Auto Passenger	18%	17%	16%	*47%*	17%	18%
Transit	9%	9%	13%	*2%*	10%	12%
Bicycle	1%	1%	2%	*0%*	1%	1%
Walk	6%	11%	12%	*0%*	10%	11%
Other	2%	1%	2%	*2%*	1%	1%

Source: 2008 TransLink Trip Diary
Notes: [1]Trips generated from residents of that municipality
[2]Lions Bay sample size was very small, may not reflect actual trips
[3]Resident of Bowen Island were NOT surveyed

Travel distribution across the day in the North Shore is consistent with patterns across the region. The highest peak of travel demand is during the a.m. peak period of 6:00 to 9:00 a.m., with a second peak during the p.m. that is lower but more spread out. The North Shore also has a distinct mid-day peak, the highest in the region. After 6:00 p.m. the number of trips drops dramatically into the rest of the evening. Figure 5 represents the percentage of total daily trips by sub-region starting in each hour from the 2008 Trip Diary and is for all trip types.

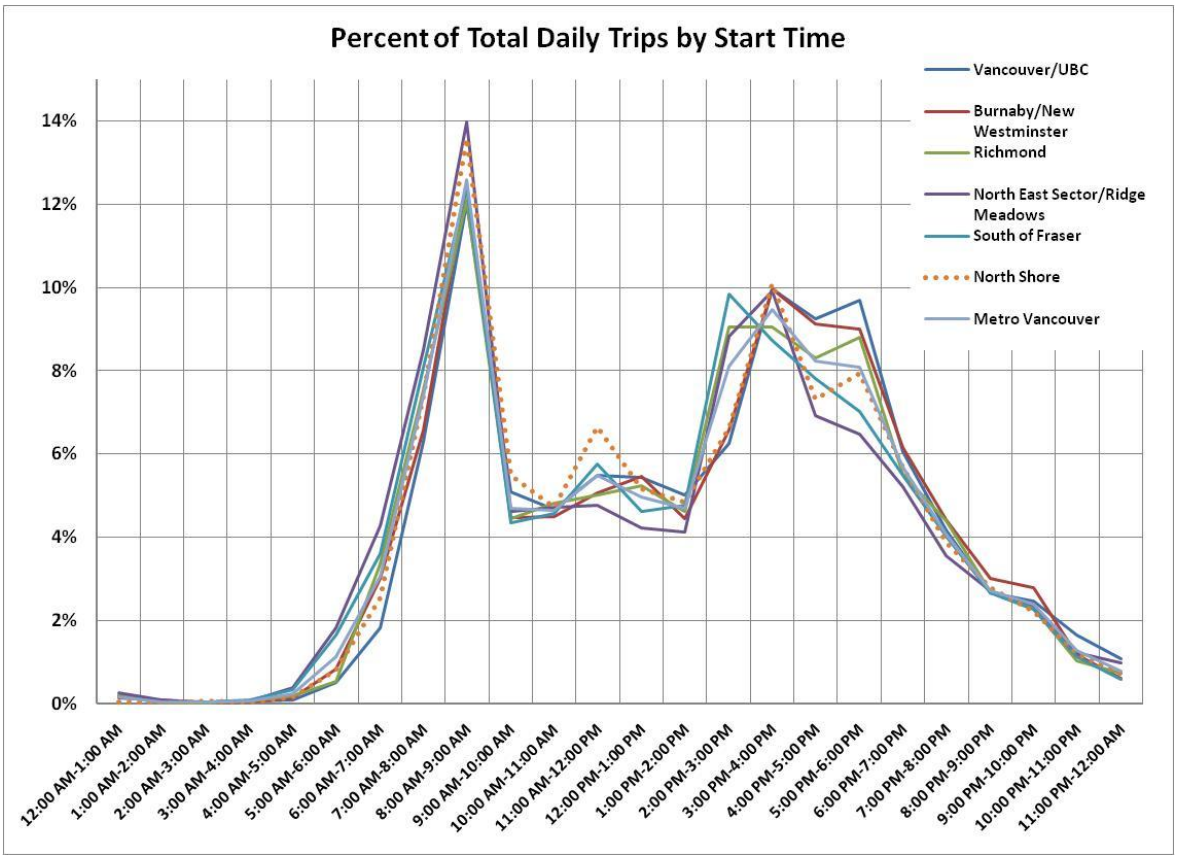


Figure 5. Percent of Total Daily Trips by Start Time

Figure 6 indicates that the most common trip purpose is for personal business (representing 57% of total trips in the North Shore). This category as a proportion of total trips is the highest in the region. These trips are also the most likely to stay within the North Shore, especially when compared to commuting trips (see Table 4).

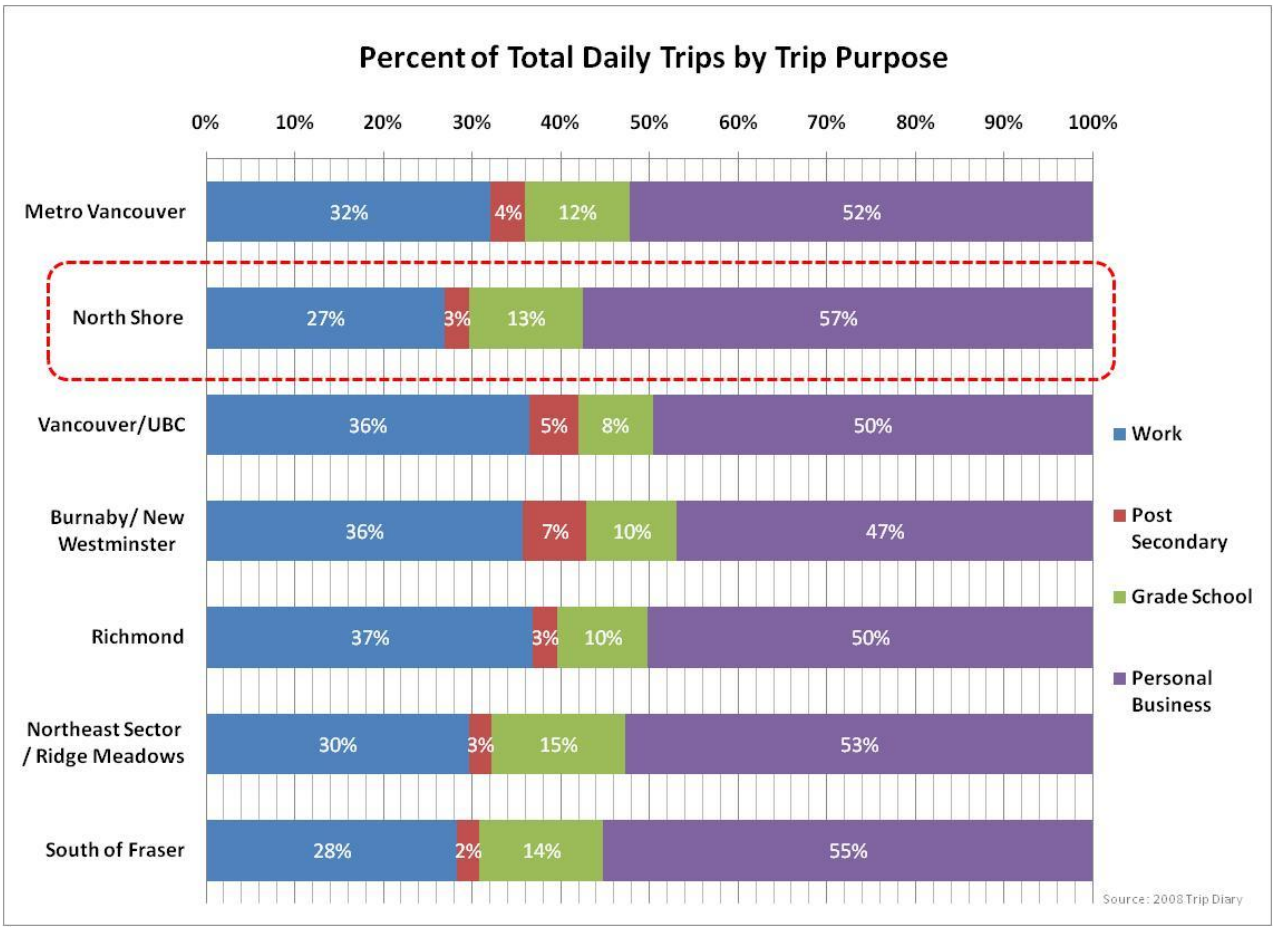


Figure 6. Percent of Total Daily Trips by Purpose

Table 4: Travel Patterns by Trip Purpose

Trip Purpose	Travel within North Shore	Travel outside of North Shore
Personal Business	86%	14%
Work / Post Secondary School	49%	51%

Source: 2008 Trip Diary

Trips distances in the North Shore for work, based on the Journey to Work Census data, are on average lower than the regional average, and have been getting shorter (see Table 5). The City of North Vancouver has one of the lowest commuting distances in the region.

Table 5: Median Commuting distance (km), 1996-2006

	1996	2006
Metro Vancouver, CMA	7.7	7.4
North Shore (weighted average)	*7.2*	*7.1*
North Vancouver City	4.7	4.8
North Vancouver District	8.0	7.5
West Vancouver	8.2	8.2
Lions Bay	21.2	21.4
Bowen Island	n/a	18.0

Source: 1996 and 2006 Census

Another indicator linked to travel demand is the availability of private vehicles. ICBC data from the past three years indicates that the total number of registered personal vehicles has increased, however the number of vehicles per 1,000 people has remained relatively constant. Lions Bay has the highest per 1,000 ownership (639 in 2010), followed by West Vancouver and Bowen Island. North Vancouver City and District (combined as compiled by ICBC) has the lowest ownership ratio, though overall the North Shore is higher than the Metro Vancouver regional average (552 compared to 494 in 2010) (see Figure 7).

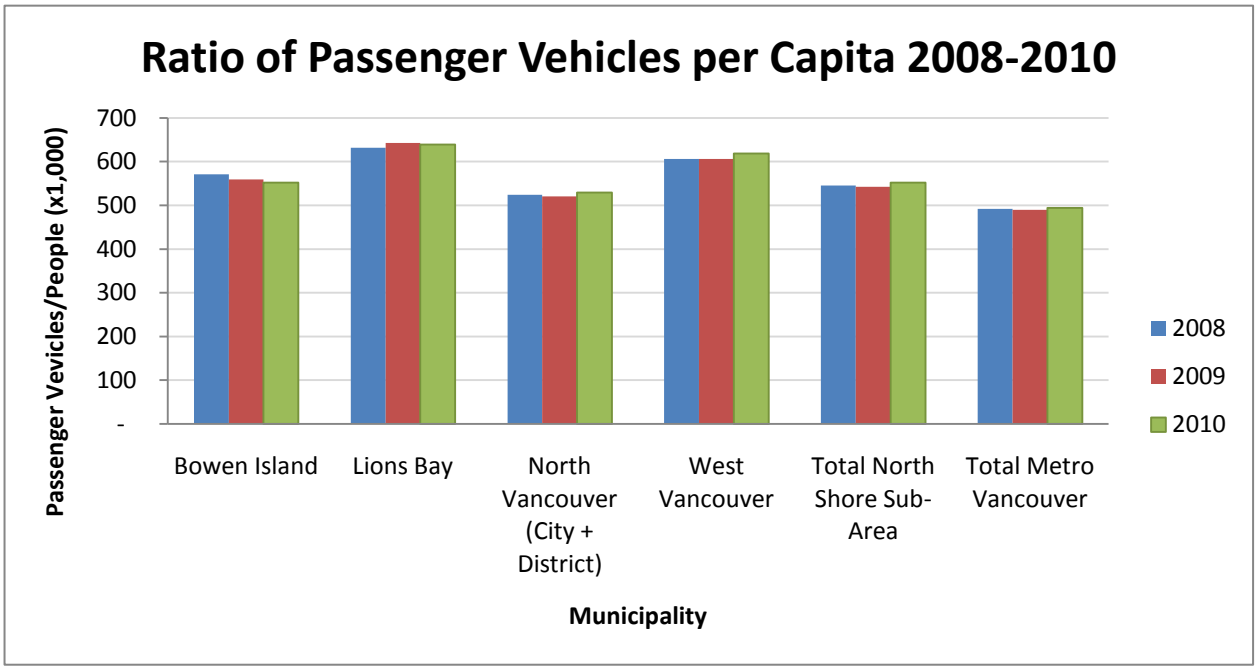


Figure 7. Ratio of Passenger Vehicles per Capita 2008-2010

Sources: ICBC Active Vehicle Count; September Month End. Type 1 Passenger Vehicles.
Population from Metro Vancouver, based on BC Stats – January 2010

2.3.1 EXISTING TRANSLINK NETWORK

The North Shore is currently served by 32 TransLink bus routes and one passenger ferry route (SeaBus) (see Figure 8). Additionally, two bus routes primarily serving Burnaby and Vancouver extend into the North Shore across the Ironworkers Memorial bridge. Service is delivered by three independent operators – Coast Mountain Bus Company (CMBC, an operating subsidiary of TransLink), West Vancouver Blue Bus, and Bowen Island Community Transit – out of four depots (CMBC North Vancouver and Burnaby, West Vancouver and Bowen Island). SeaBus is also operated by CMBC. A glossary of transit terms can be found in Appendix 3.

Figure 8. North Shore Transit Network: 2010

The bus network includes a variety of service types, ranging from Community Shuttle serving local neighbourhoods to longer distance limited stop express routes. The network is designed to provide both access across Burrard Inlet and local circulation to activity centres on the North Shore. It was developed at a time when North Shore to downtown Vancouver was the primary transit market, and the design is largely unchanged. The SeaBus provides a high-capacity (400 passenger vessel), transit-only alternative to the two Burrard Inlet bridges, connecting Lower Lonsdale with downtown Vancouver. Local and cross-inlet service are designed to work together to complete a network where both kinds of trips are possible. There are eight routes that operate only limited hours, primarily during weekday peak hours but also two late night services. The route network also shows variation through the day, with seven routes extending coverage at specific time periods (typically weekday peak periods or daytime-only extensions to downtown Vancouver).

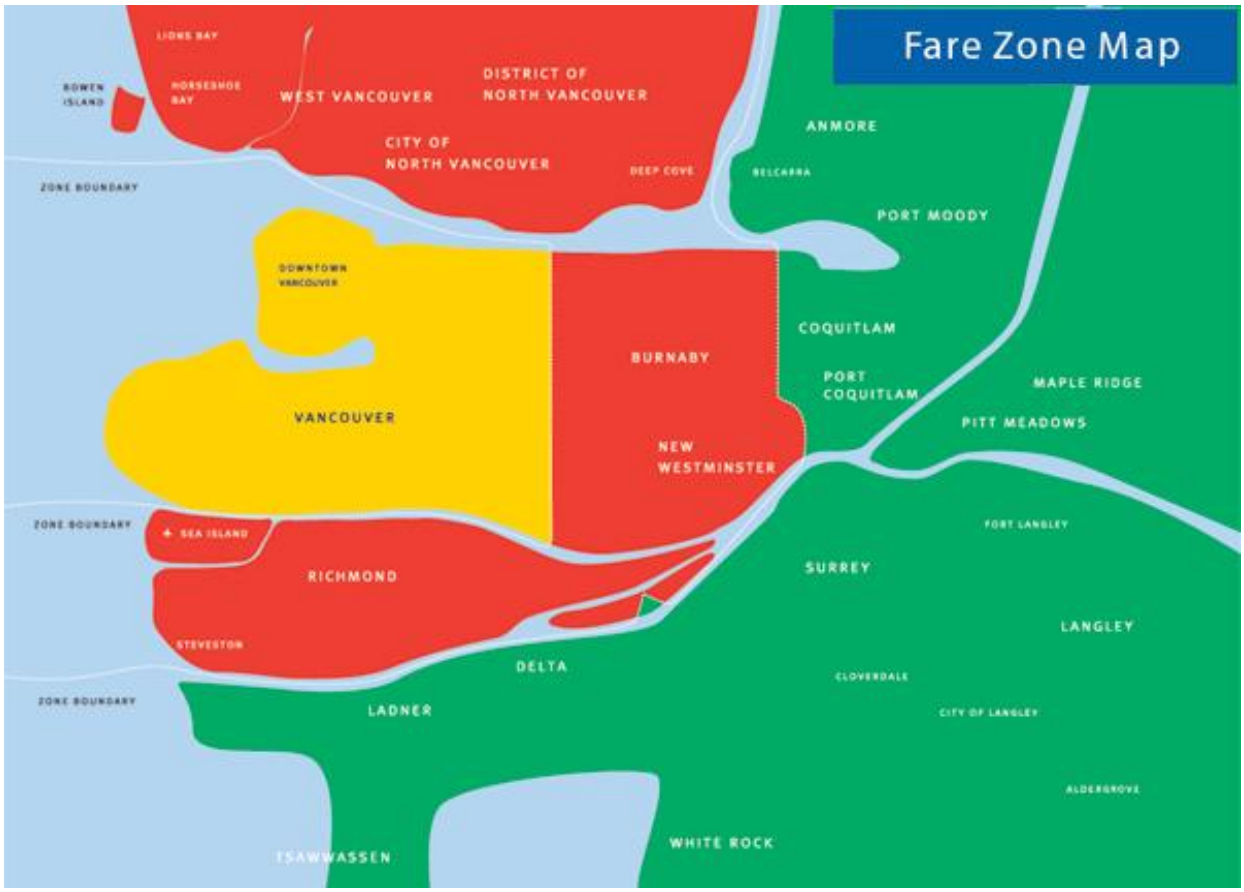


Figure 9. TransLink Fare Zones

All of the North Shore is part of Zone 2 of TransLink's regional zone structure, allowing unlimited travel within 90 minutes for a single fare (see Figure 8). Travel between zones (e.g. between North Shore and Vancouver) during weekdays before 6:30 p.m. requires payment of an additional fare.

Connections between routes are focused on three main transit exchanges:

- **Park Royal** in West Vancouver. This exchange relies on route #250 as its main link to downtown Vancouver. Park Royal's function is to connect the various parts of West Vancouver, including Horseshoe Bay, to services extending into downtown Vancouver or east along the North Shore. Park Royal is the hub for local services covering West Vancouver residential areas, including Dundarave, Westmount, and the British Properties.

- **Lonsdale Quay** in the City of North Vancouver. This exchange is built around SeaBus as its link to downtown Vancouver. Its role is to connect SeaBus to local buses covering all of North Vancouver City and District, and also to connect these local services to each other and to West Vancouver.

- **Phibbs** Exchange, at the north end of the Second Narrows Bridge, in North Vancouver District. This exchange relies on the half-hourly #210 route as its link to downtown Vancouver, but also features two routes (#28 and #130) connecting to Vancouver and Burnaby destinations, including SkyTrain. Local services covering parts of North Vancouver, including Lynn Valley and Deep Cove, meet these cross-inlet services. The #239 provides cross-town service via random transfers at a frequency as high as every 10 minutes.

These three facilities are part of a transfer focal point system on the North Shore. The TTFP is similar to the hub and spoke system used by the airline industry. Buses and ferries are scheduled to meet at specific, consistent times past each hour (e.g. at every :00/:15/ :30 /:45), ensuring maximum system connectivity.

Two additional minor transit exchanges are required at BC Ferry terminals, where buses are scheduled to meet either outgoing or incoming sailings. Consequently, buses converging to meet ferries mean that these buses also connect with each other.

- Horseshoe Bay Ferry Terminal connects the Bowen Island Ferry to local buses serving nearby areas of West Vancouver and Lions Bay, and also to express services (#257) to Park Royal and downtown Vancouver. This terminal is also served by major ferries extending outside of the TransLink service area, to Nanaimo and the Sunshine Coast.

- Bowen Island Ferry Terminal connects the ferry to two Community Shuttle routes covering developed parts of Bowen Island.

Additional facilities, primarily route termini, are located at Grouse Mountain, Capilano University, 15th St at Grand Blvd, and Deep Cove. Additional, more informal, route termini and connection points also exist in primarily residential areas.

Other transit infrastructure on the North Shore includes five Park & Rides (see Table 6), transit priority measures (primarily focused on access to and from the two Burrard Inlet bridges) and over 960 bus stops. Bowen Island, with only one designated bus stop, primarily operates using a flag stop system. Approximately 48% of bus stops on the North Shore are designated as accessible, below the regional average of 57%, which is due in part to topography and road design which do not allow for safe accessible stops. Details on transit infrastructure are included in Appendices 4 (Exchanges), 5 (Transit Prioirty), 6 (Park & Rides), and 7 (Layover & Operator Facilities).

Table 6: Park & Ride Facilities on the North Shore

Name	Location	Total Spaces Provided	Spaces Occupied (2009)	Usage % (2009)
Phibbs Exchange	200 Blk. Orwell Street at Oxford adjacent to Phibbs Exchange.	40	38	95%
Park Royal South	2002 Park Royal, South Mall (upper parking level above Extra Foods)	166	105	63%
Gleneagles	6200 Blk. Marine Drive across from Gleneagles School (under Upper Levels Highway overpass)	120	23	19%
Westmount	Off Upper Levels Hwy Exit 7, and Westridge Ave and Westmount Rd.	30	12	40%
Lions Bay	Isleview Place at Hwy. 99	9	0	0%

Source: 2009 TransLink Regional Park & Ride Survey

The route network on the North Shore is partly determined by the constraints of geography – a long and thin developable area. Transit is limited to the same road network as all vehicles, particularly for east-west travel. The network is also reflective of the distribution of the North Shore's population and employment density; primarily concentrated in the lower slopes in a linear east-west pattern.

2.3.2 Other Transportation Options

In addition to the TransLink transit network, there are a variety of other transportation options available on the North Shore that provide an alternative to the private automobile. This includes the following:

Table 7: Summary of North Shore Transportation Options

Transportation Option	Description
Walking	The most basic mode of travel, representing 10% of all North Shore trips (2008 Trip Diary). Higher share of walk trips in City and District of North Vancouver than West Vancouver. Infrastructure, ranging from fully-accessible sidewalks to off-street walkways and trails varies widely in quality depending on community design and local context.
Cycling	Represents approximately 1% of all daily North Shore trips (2008 Trip Diary). Designated cycling facilities provided, including both on- and off-street, in all North Shore municipalities. May be sensitive to the negative association with steep topography on North Shore.
Ride-share	Approximately 17% of all North Shore trips taken as an auto passenger (2008 Trip Diary), the second highest travel choice. Includes both casual and formal ride-sharing. Jack Bell Ride-Share (JBR) provides online ridematching database to connect drivers and passengers using personal vehicles. JBR also has a fleet of vans for formal, paid, ridesharing throughout North Shore (including Sea-to-Sky corridor).
HandyDART	HandyDART provides shared door-to-door service for people unable to use TransLink's 100% accessible conventional transit fleet without assistance. Service is available via reservations 18 hours a day throughout the Metro Vancouver region.
Private Taxi	Private taxis are available throughout the North Shore, with the exception of Bowen Island which has no dedicated on-island service. Service includes a limited number of wheelchair accessible vans.
Private Bus/Shuttle	Private bus connections are primarily focused on Horseshoe Bay Ferry Terminal and/or the Sea-to-Sky corridor, primarily connecting to downtown Vancouver and/or the Vancouver International Airport. Greyhound service between Vancouver and Squamish makes stops on request at Park Royal and Lions Bay. Other private shuttles connect to tourist and recreational destinations such as Capilano Suspension Bridge, Grouse Mountain, and seasonally to Cypress Mountain & Mt. Seymour.
BC Ferries	BC Ferries provides full-service, scheduled passenger and vehicle marine connections from Horseshoe Bay to Bowen Island, Nanaimo and the Sunshine Coast.
Water Taxi	Scheduled water taxi service is provided by private operators connecting Bowen Island with Horseshoe Bay and Vancouver (Granville Island). Service is also provided between Horseshoe Bay and the Sunshine Coast. Vessel capacities range from approximately 12 to 40 passengers.

Analysis

3.0 ANALYSIS

This section evaluates the performance of the current North Shore transit network. The analysis includes three sub-sections: transit, markets, and customer perceptions. Relevant data sources include TransLink transit and ridership statistics, Census and Trip Diary mode share, travel patterns, and Metro Vancouver Land Use forecasts. The intent is to determine how the transit system is performing, how much and which travel is captured by transit, what land use appears to be supporting transit use and how customers perceive the network and barriers to using transit. The three analyses will be then synthesized to summarize issues and to identify opportunities for the North Shore ATP to address.

3.1 TRANSIT NETWORK PERFORMANCE ANALYSIS

This section focuses on performance of the current transit supply, including both the overall network and individual routes. Transit Service Guidelines and other indicators are used as a measure of transit efficiency and effectiveness.

3.1.1 TRANSIT SERVICE GUIDELINES

TransLink's Transit Service Guidelines (TSGs) are a set of rules and measures established to guide the policy, planning and management of transit services, primarily at a route level. TSGs are used to assist the continual adjustment and/or improvement of transit service to meet varied customer needs across the 21 municipalities in Metro Vancouver. The Guidelines were established in 2004 in order to provide quality and predictable transit service as identified through customer surveys. Purpose of the TSGs:

- Ensure that an acceptable level of service quality is provided to customers on all transit services
- Provide a consistent and fair basis for evaluating proposed improvements to existing transit services and for considering new transit services; and
- Balance improving the level of transit services with the need to use transit resources efficiently.

The Guidelines are tools used by TransLink and its operating subsidiaries and contractors to guide the allocation of resources for transit services. They are used to both improve existing services and determine new services, in combination with the strategic objectives and policies of TransLink' Transportation Plans and the results of TransLink's Area Transit Plans. Performance reviews involve measuring and evaluating the efficiency and effectiveness of the transit system. The NSATP reviews route performance on both an individual and system-wide level. Results will help identify problems or deficiencies within the system, which will in turn help in the development of initiatives to address the problems. The overall objective is to achieve and improve system performance. The Guidelines are customer focused and are intended to provide a service that is: Simple, Comprehensive, Frequent, Convenient, Comfortable, Reliable and Efficient. As the Simple and Comprehensive TSGs relate more to an overall network analysis, rather than a route-level analysis, they have been included in the network section (3.1.2), while the other measures are reviewed in section 3.1.3.

3.1.2 NETWORK ANALYSIS

Overall, the transit network on the North Shore is designed to provide a transit access to major activity centres both internally and outside the sub-region. With a few exceptions, North Shore transit routes meet or exceed the TSGs for frequency, convenience (length of service day), and comfort (crowding). This indicates that based solely on these three TSGs, discussed in more detail in Section 3.1.3, the system at the route-level is performing well. This section assesses the performance and identifies issues

for the network as a whole, including network design and connections, productivity, and simplicity. Two TSGs, comprehensive and simple, are more relevant to the overall network so are included in this overview section.

Transit service is within walking distance to 95% of the North Shore population and jobs, exceeding TransLink Comprehensive Transit Service Guideline (90% of residents and employees should be within 450-m or less walk to a bus stop). This means that there is good transit coverage on the North Shore, as nearly all residents and employment locations are within easy walking distance of a stop. Transit coverage however can be unrelated to productivity or ridership, particularly in areas with lower population or employment densities. TransLink's TSG for the introduction of new transit service provides minimum densities for both Community Shuttle and conventional bus. Figure 10 shows that some areas in the North Shore, particularly outside of the core area (Ambleside to Lower Lynn), have population and employment thresholds lower than the minimum.

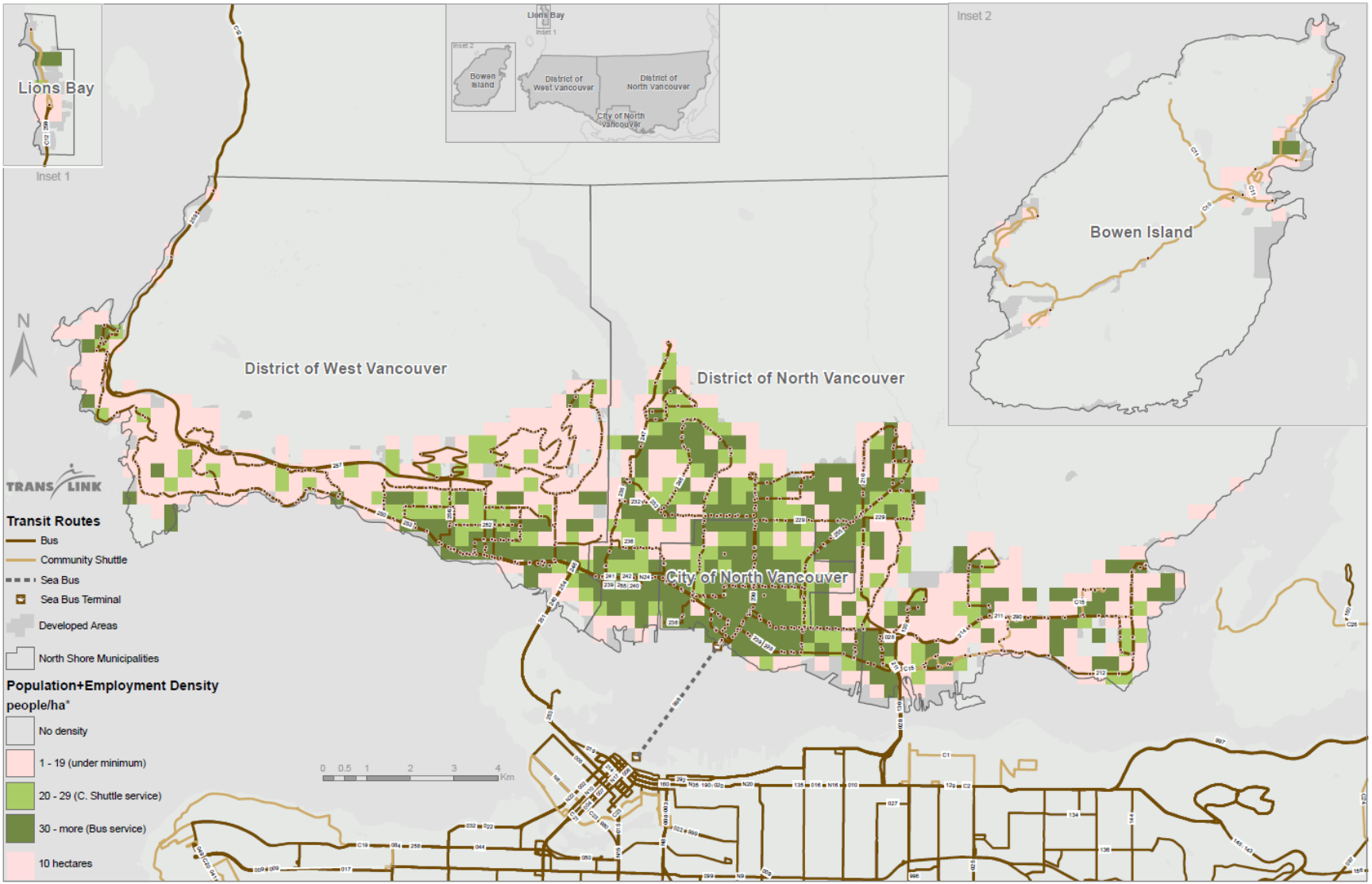


Figure 10. Transit Service Coverage and North Shore Population & Employment Density

NETWORK DESIGN

The North Shore transit network is comprised of a variety of service types connecting via three main exchanges (Park Royal, Lonsdale Quay, and Phibbs) (see Figure 11). The importance of these exchanges to the network is highlighted by the fact that of all full day services, all but one route (#240) connects to at least one exchange. Exchanges facilitate transfers between services providing local North Shore access as well as across the Burrard Inlet and to the rest of the regional network.

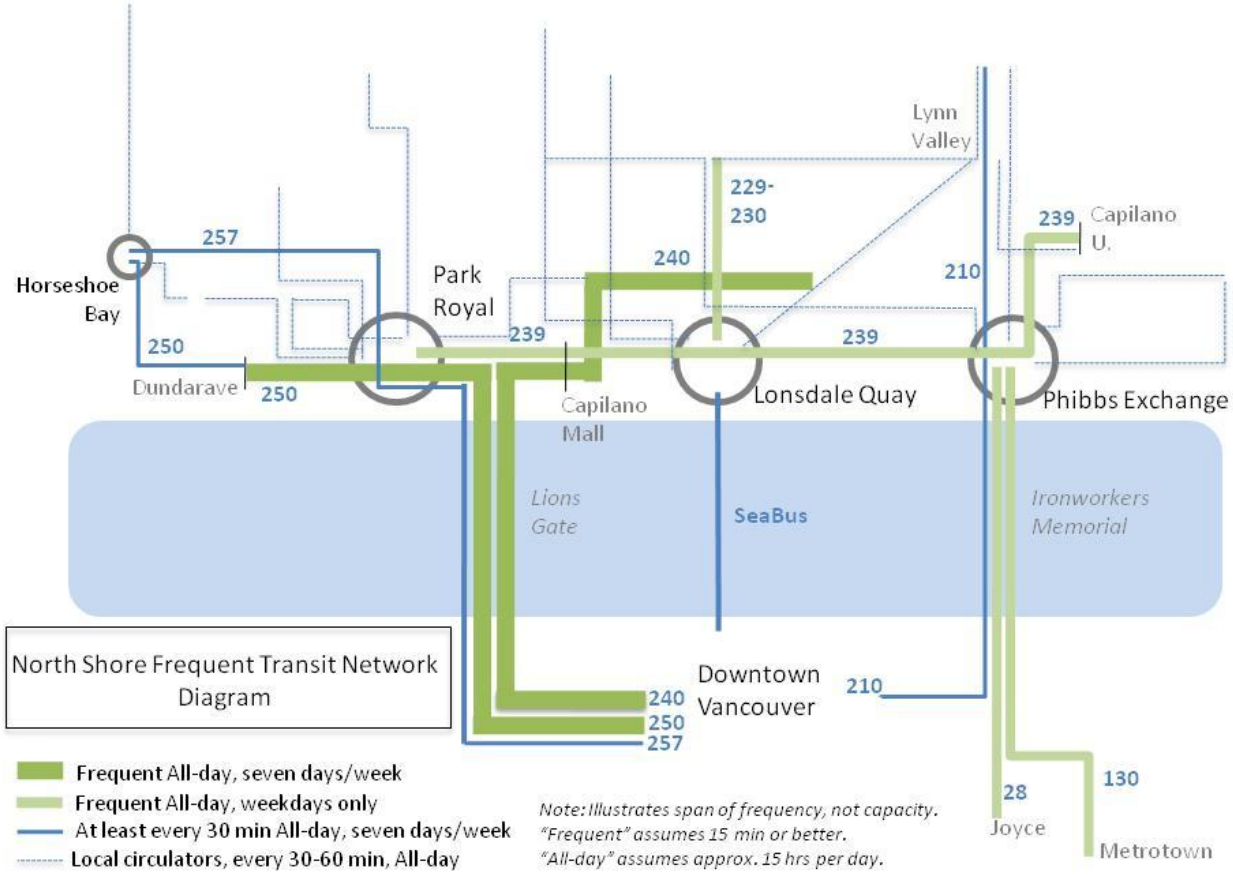
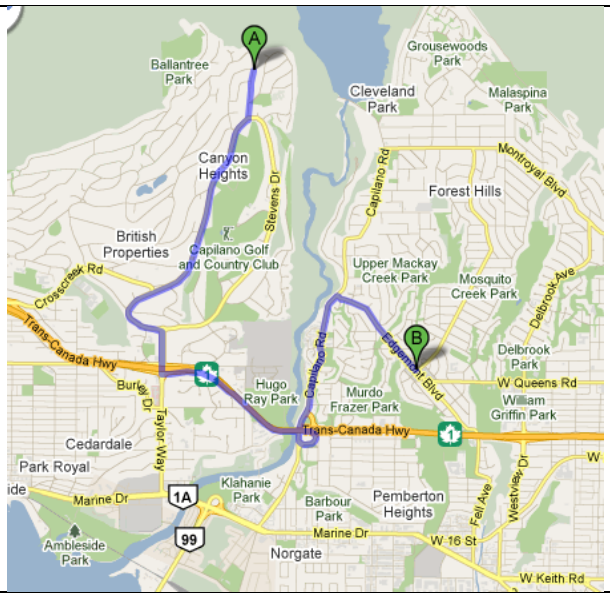
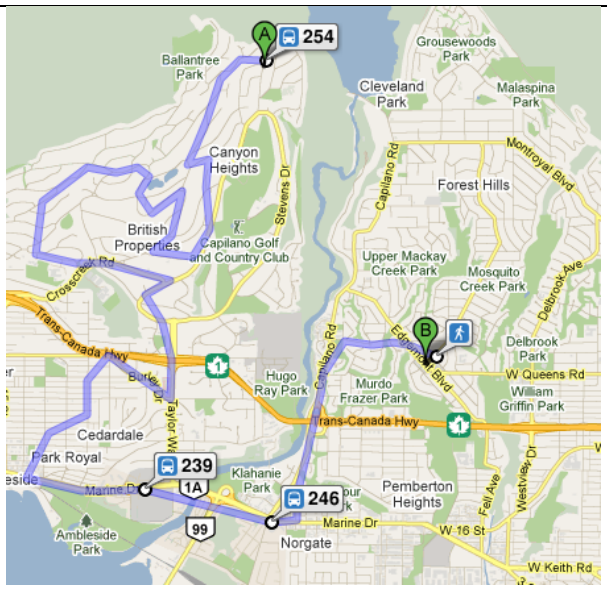


Figure 11. North Shore Frequent Transit Network Diagram

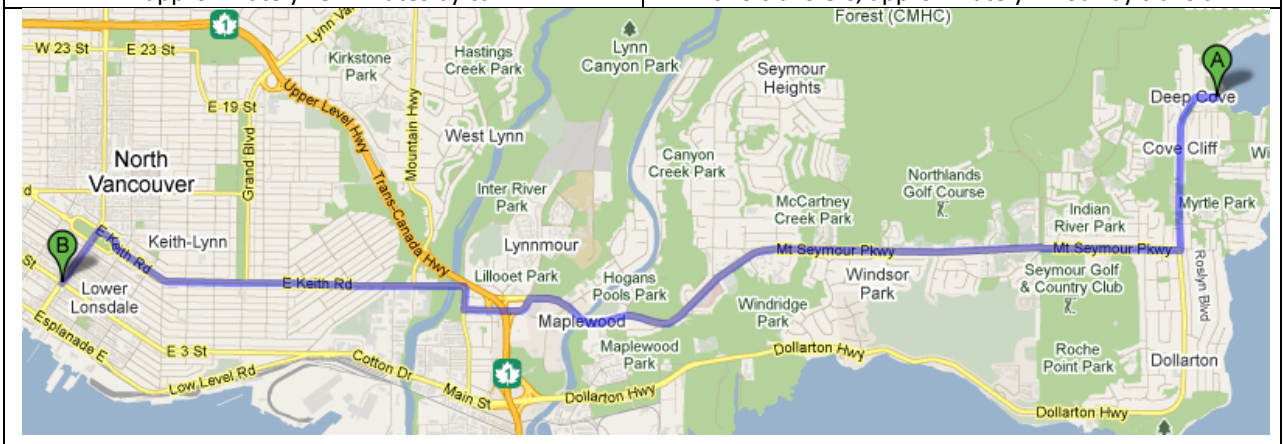
Connections within the North Shore are typically tied to one of these routes, and transfers are often required for travel within the North Shore. This is particularly true for east/west travel, where trip patterns can include a u-shaped trip (e.g. see example from British Properties to Edgemont (Figure 12)). However, with most of the North Shore activity located near or on the east-west corridor connecting the three main exchanges, the network generally follows the demand patterns and most trips can be accommodated with one or less transfer. Improvements to the customer experience at exchanges and ensuring reliable connections can reduce the negative "cost" of transfers.

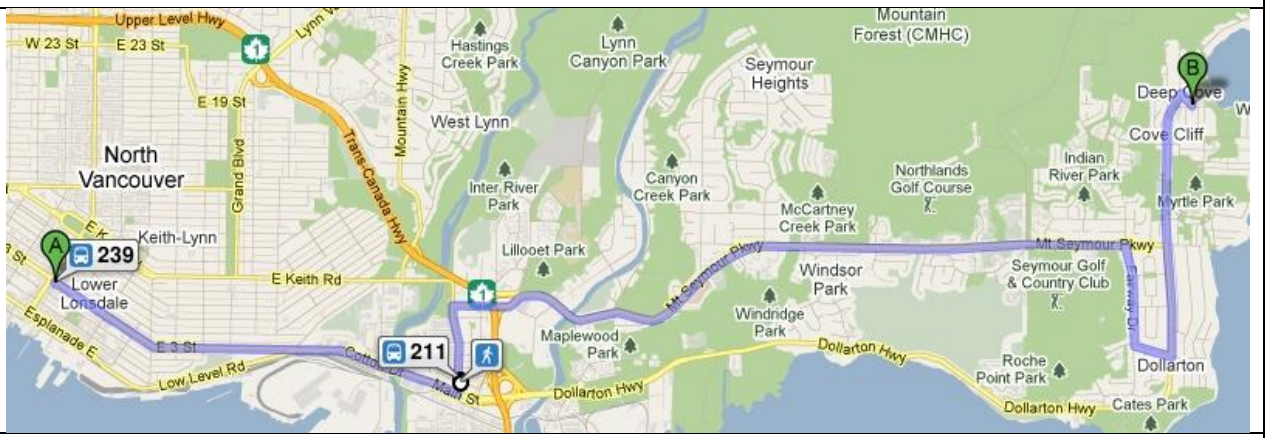


British Properties to Edgemont Village: 7.8 km, approximately 15-minutes by car



British Properties to Edgemont Village: Three routes + two transfers, approximately 1 hour by transit





Comparatively, some east-west travel is more competitive. Example here is Deep Cove to Lower Lonsdale. Routes are similar. Transit travel time is more due to stopping pattern, not meandering route.
Auto: 11.3 km, approximately 20 minutes by car
Transit: Two routes + one transfer, approximately 40 minutes

Figure 12. Comparison of Internal North Shore Trips (Auto vs. Transit, from Google Transit)

NETWORK FREQUENCY

Frequency of North Shore transit service varies through the day and week, reflective of changes in travel demand patterns. Service is more frequent, including the addition of peak-only routes and extensions, during the weekday peak periods. To accommodate irregular demand, additional capacity is provided at the discretion of front-line Operations for atypical demand such as service to/from Horseshoe Bay ferries, Capilano University, special events, and seasonal tourist/recreational destinations. Seasonal service is added to meet increased demand associated with recreational and tourist activities in the summer with additional weekend frequency on the SeaBus and #229.

Another network design element present in the North Shore is combined headways. This involves multiple routes sharing a corridor to be scheduled alternatively, allowing a combined frequency higher than each route alone. For example, when both route #229 and #230 operate every 30-minutes, the shared route section on Lonsdale Avenue between Lonsdale Quay and 29th Avenue has combined service every 15-minutes. This design is also present along Marine Drive in West Vancouver and across the Burrard Inlet bridges.

The Frequent Transit Network (FTN) provides frequent, reliable transit service on designated corridors throughout the day, every day. Currently, only two North Shore routes qualify for this designation, the #240 and the #250 (to Dundarave) (see Figure 11). Other routes and corridors are close to FTN levels, including the #239, the combined service of the #229 and #230 on Lonsdale Avenue up to 29th Street, and the #28, #130, #210 and #211 across the Ironworkers Memorial bridge. These routes meet some, but not all of the criteria of full FTN, typically having reduced service levels (e.g. every 30 minutes) at some time periods or days.

TransLink's Frequent Transit Network is defined as service operating in both directions at a minimum of every 15-minutes, all day (from the start of service in the morning into the early evening), every day (seven days/week. Two North Shore routes currently meet FTN standards.

Combined service on shared corridors also provides higher frequency.

NETWORK CONNECTIONS

With scheduled frequencies of 15-minutes or longer, a timed transfer focal point scheduling design is used at both Lonsdale Quay and Phibbs Exchange. This design has multiple routes scheduled to converge on a focal point simultaneously, allowing guaranteed connections to customers between routes. Scheduled transfer times depend on the particular exchange, but are generally between two and five minutes. When functioning properly, this system guarantees connections between routes with minimal waiting time, minimizing overall travel time while allowing lower frequency services appropriate to the demand. Success of this system depends on schedule reliability, as well as the quality of exchange design from both a customer and operational perspective. Schedule reliability is measured in Section 3.1.3.

The timed transfer focal point system depends on connections being made. Increasing travel times, related to road congestion, can affect reliability of scheduled transit services as well as efficiency. At some point, adding additional bus service hours to maintain reliability, but not improving frequency, may not continue to be an effective use of resources. Conversely, improving frequency without the corresponding demand can negatively affect transit

Time transfer focal points are used at Lonsdale Quay and Phibbs Exchange to facilitate connections between lower frequency routes. There are opportunities for both customer and operational improvements at North Shore exchanges.

productivity. This challenge is likely to continue as some routes increase capacity, breaking from the timed transfer system, while others are maintained.

A final aspect of network design and connections that has been assessed relates to the exchange infrastructure. While generally the three major exchanges succeed at their role in facilitating connections and existing bus operations, improvements can be made. Both Phibbs and Lonsdale Quay have been described as uninviting environments to customers, with safety and comfort issues (see Figure 13). Upgrades to Lonsdale Quay have been proposed, in coordination with City staff and resources, with implementation dependant on additional funding. Phibbs, found in an isolated location without nearby amenities, should be considered for integration with future development plans for the Lower Lynn area – plans which may include a relocated exchange. All three exchanges facilitate convenient connections between routes. Transit capacity, including space for layover of buses, is currently approaching capacity during peak times. Future expansion will require additional space or revised operations. Moving away from a timed transfer system toward random transfers in an environment of improved service frequencies, could allow existing space to be used more efficiently by sharing bays, as not all routes would converge at the same time.

Clockwise from top left: Park Royal, Phibbs and Lonsdale Quay. Transit operations are approaching capacity at all three, and customer experience improvements are desirable at Phibbs and Lonsdale.

Figure 13. Major North Shore Transit Exchanges

In addition to the three main transit exchanges, there are numerous smaller designated transit termini and locations that facilitate both customer exchanges and vehicle operations. This includes 28 informal locations used for bus layovers, and range from simple bus stops at the end of routes and no passenger facilities to larger exchanges and stops with amenities. Dedicated washroom facilities are provided for bus operators at three locations. Appendix 7 provides further detail on other North Shore transit facilities.

While existing transit facilities generally serve the North Shore network well, there are some opportunities for improvement. While Phibbs Exchange has customer and operational issues, the location does illustrate the ideal relationship between an exchange and a chokepoint – in this case the Second Narrows Bridge. All services crossing Ironworkers Memorial Bridge can easily serve Phibbs, so the exchange is well placed to connect cross-inlet trips of a range of destinations throughout North Vancouver City and District.

Due to the design of the north end of the Lions Gate, no exchange plays a similar role there. Park Royal, just west of this point, provides the function for West Vancouver, but it is too far west to be served by Lions Gate services flowing eastward into North Vancouver. To the east of the Lions Gate, some connection possibilities exist at the corner of Marine Drive and Garden Avenue and at Capilano Mall, but again these are too far east to be served directly by services connecting Vancouver to West Vancouver.

Intermodal connections made at exchanges are also considered in a network analysis. In addition to the North Shore's three stand-alone locations (Lions Bay, Gleneagles and Westmount), Park & Rides are available at both Park Royal and Phibbs exchanges, although the former is not well integrated with the exchange and the latter is relatively small. With the exception of Phibbs, which is usually at or over capacity, there is available capacity at all existing North Shore Park & Rides – particularly the large Park Royal location. Improvements to customer experience, including signage (quality and quantity), multimodal integration, and amenities such as lighting would benefit customers at all five locations. Passenger pick-up and drop-off (Kiss & Ride) is informal at Park Royal, available and well used at Lonsdale, and difficult at Phibbs.

All North Shore exchanges have some connection with the cycling network, and all have available cycling infrastructure (e.g. lockers or racks) although of varying quality. Bicycles are accommodated on all vehicles in the TransLink network (two per bus, six per SeaBus). While the APC system monitors when bike racks on buses are deployed, this does not provide a reliable measure of usage and should only be used as a general indicator of use. A bike rack could be deployed down through the entire service day, used by multiple bikes on and off, but only recorded as being used once. The following map provides a general indication of bike rack usage on North Shore buses. Bike racks deployment is concentrated on major corridors (Marine-3rd, Lonsdale) and at major centres (Horseshoe Bay Ferry, Grouse Mountain, Capilano University).The North Shore has a relatively high usage of bus bike racks when compared with other sub-regions in Metro Vancouver, especially considering the amount of transit service compared provided.

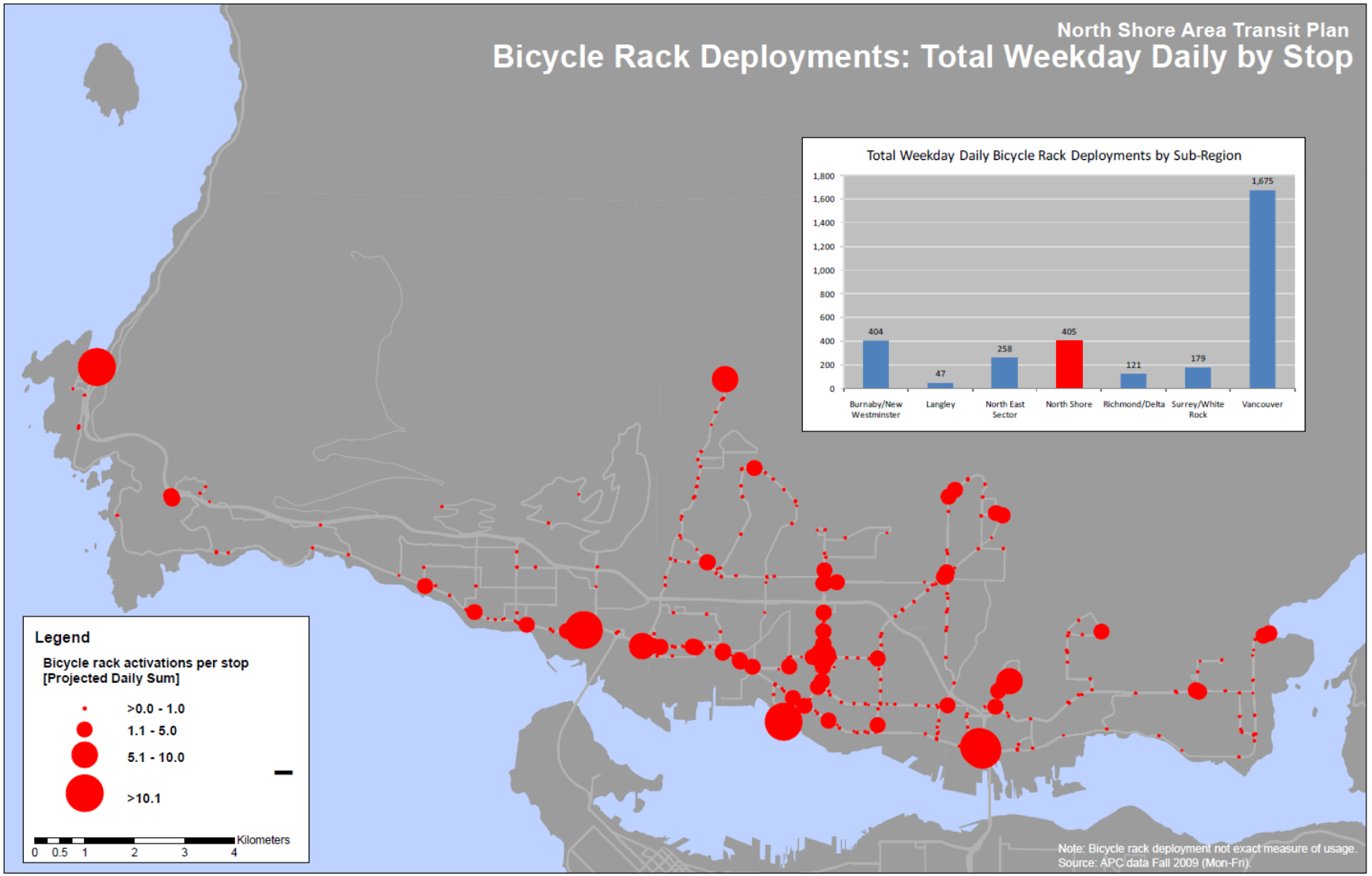


Figure 14. Weekday Bicycle Rack Deployments

Further details on Exchanges and Park & Rides is found in Appendix 4 and 6

NETWORK PRODUCTIVITY

With one of the stated goals of this ATP to improve effectiveness and efficiency of the network, an overall review of productivity is important. Generally, transit service supply in the North Shore matches the traditional demand patterns. This has resulted in significantly higher service levels during the weekday peak periods when compared to midday, evenings and weekends. This is particularly evident in a high focus on the commute to downtown Vancouver, with route extensions and service increases accommodating direct trips across the two Burrard Inlet bridges.

The highest performing routes, with capacity well utilized in both directions through multiple time periods and days, are those serving the main North Shore corridors: #230 on Lonsdale, #239 and #255 on the Park Royal-Lower Lonsdale-Lower Lynn core, and the #250 in West Vancouver to Dundarave. Resources are also better utilized in the "peak" direction – e.g. towards downtown Vancouver in the a.m. peak. To provide a peak period direct travel choice, some of the additional routes provided during peak periods duplicate other connecting services to SeaBus. As an example, the #247 connects the Upper Capilano neighbourhoods directly to downtown during the peaks, rather than the regular #236 connection to SeaBus. Similarly, the peak-only #241 route connects Upper Lonsdale direct to downtown, rather than the regular connection to SeaBus via the #230. Figure 15 shows the relative overall performance of North Shore transit routes.

Productivity is highest for peak-direction commuter services and routes serving the main North Shore corridors (Marine-Dollarton and Lonsdale). Low productivity occurs in lower density areas, on weekends and evenings, and operate in the reverse-peak directions. Travel speed, reliability and imbalanced directional service can also affect network productivity.

Lower performing routes, from a capacity utilization perspective, tend to be the local routes serving North Shore residential neighbourhoods. As illustrated earlier in Figure 10 some of this service is provided to maintain basic coverage and does not have densities or design that support productive transit. Generally the weekend and evening time periods are also have a less efficient usage of transit resources. This is likely relative to lower demand during this time period and corresponding reduced service levels. Finally, trips operating in the reverse peak direction (e.g. to the North Shore from the CBD in the a.m. peak) tend to have lower utilization.

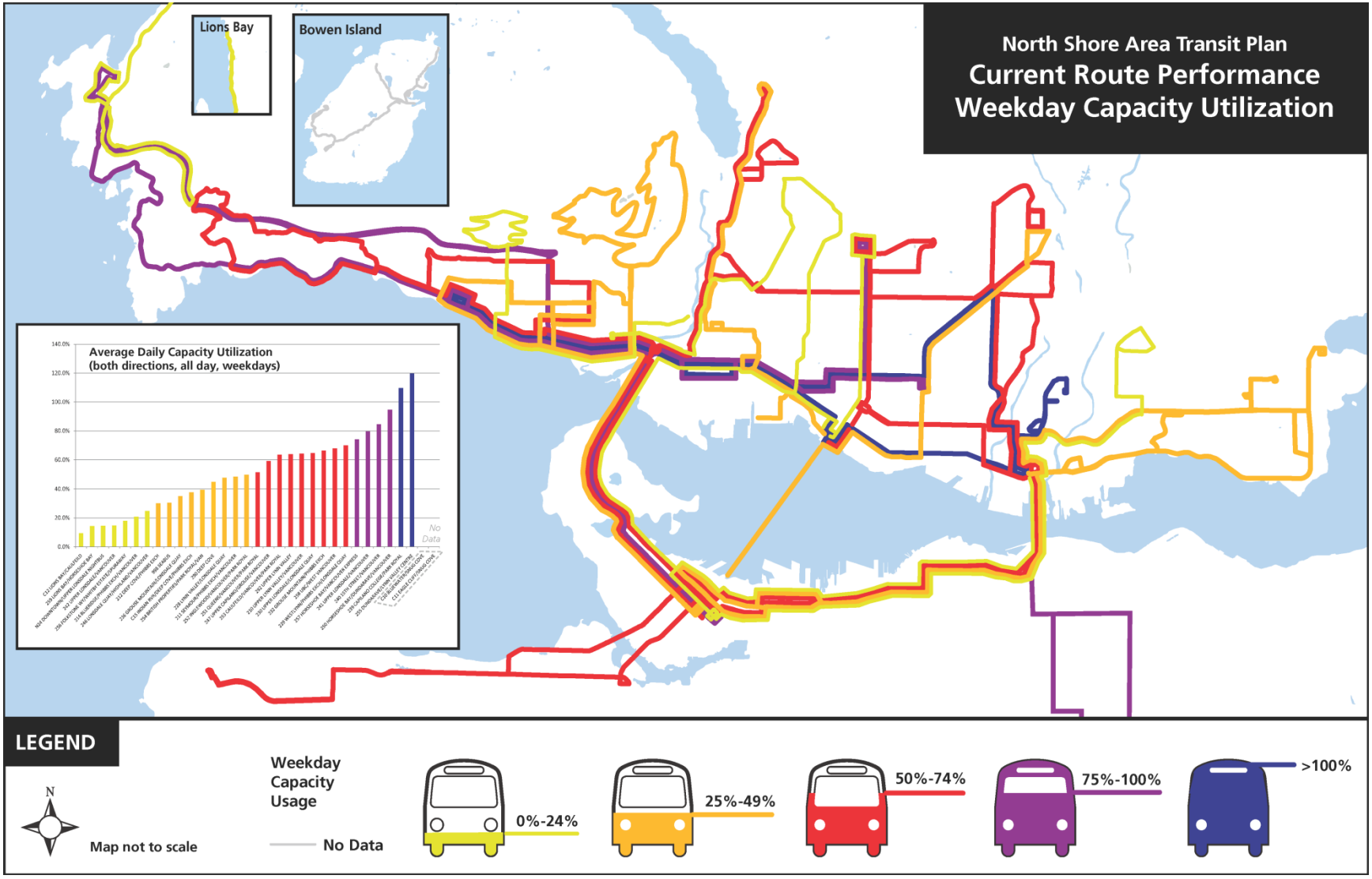


Figure 15. Overall Route Performance: Capacity Utilization

A final aspect of productivity relates to the travel speed and variability of transit vehicles. Adding transit resources to maintain schedule reliability rather than frequency is not a productive use of service hours and vehicles. While traffic congestion on local North Shore routes is relatively low, or concentrated in peak periods, it is affected by the natural choke points – including access to the two Burrard Inlet bridges. With the upcoming addition of all-day transit priority lanes at the north end of the Lions Gate bridge, transit will have a travel time advantage for access to both bridges. Transit priority is also used for access to and from major exchanges. Engagement with front-line staff indicated that expanded hours of transit/HOV priority lanes on Georgia Street was desirable. Initial analysis of travel time variability indicates that the priority measures improve travel times when in effect compared to other time periods. Further analysis will determine potential opportunities for expanded hours of operation of the measures.

In addition to travel time variability, transit productivity is increased by minimizing the required non-revenue service (the time vehicles travel "not in service" and are unavailable to customers). In general, balanced service in both directions can reduce the need for non-revenue travel, rather than operating "not in service" in the off-peak direction, identified as an opportunity to improve operations. Simplifying the network by rationalizing peak-directional only services, either through scheduling or route consolidation can improve productivity. This must be balanced with the need to match service supply with demand. In this aspect of transit operation, the maturity of the North shore is shown. That is, services are generally in revenue service in both directions, thereby minimizing the NIS portion of bus operation.

LEGIBILITY

The final attribute of the network is the overall legibility of the system. A more legible network is simpler and intuitive for customers, both existing and potential, to understand. A legible network can be defined as one using TransLink's Transit Service Guideline for "simplicity" as follows:

- Transit services should easy for customers to understand and use. This means that routings, schedules and service types are consistent throughout the day and across the region where necessary. TransLink and its operating subsidiaries and contractors must also ensure that customer information is easily accessible for customers to make the best use of the transit network.

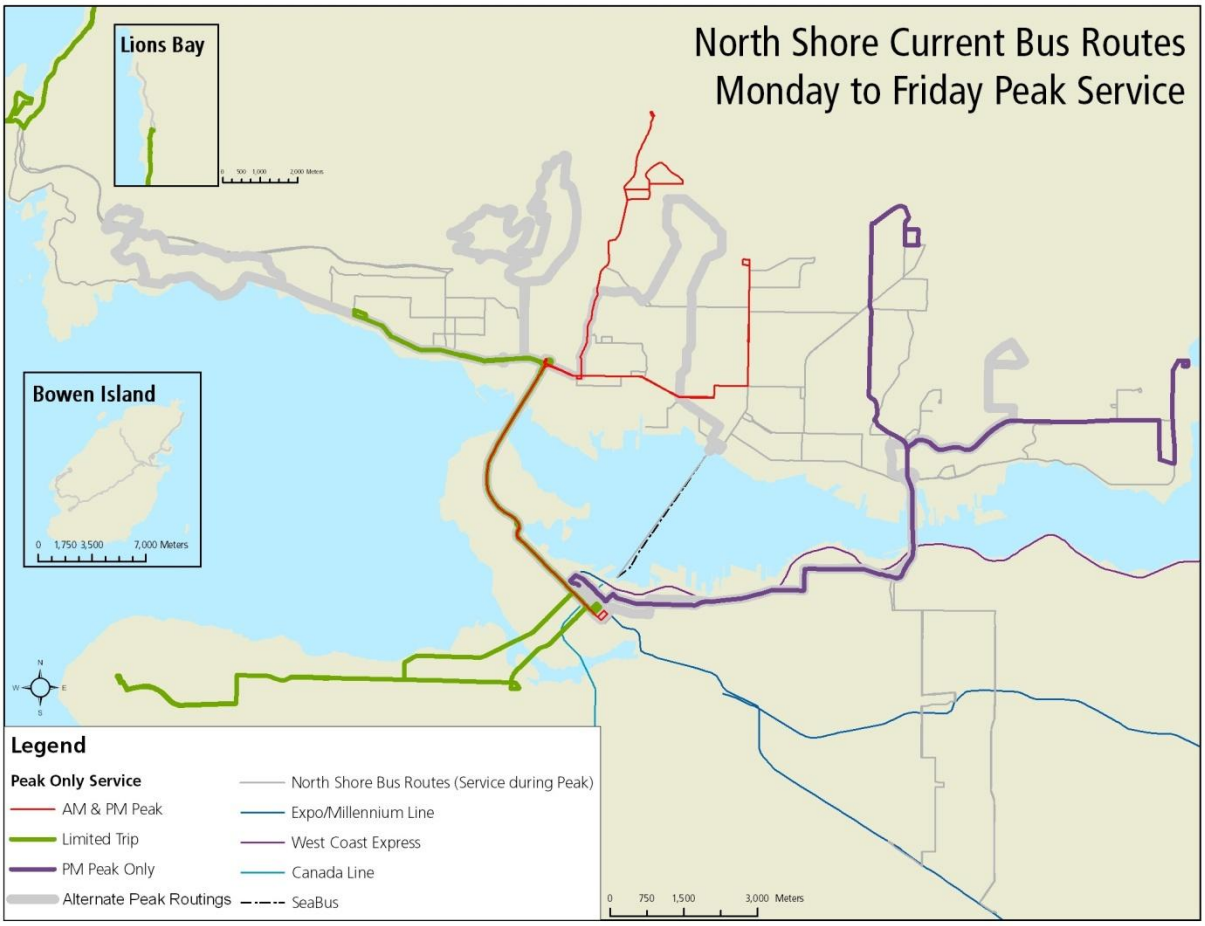
While this is an important indicator, it is not a measurable one and we must use subjective means to determine how we are meeting up to this indicator.

The most legible networks tend to be those serving a traditional grid-based street pattern; however given the topography of most of the North Shore that is not an option. The high-frequency east-west corridor along Marine Drive serves as a good basis for a basic grid, with connections to the north-south made either along the corridor or at one of the three major exchanges. However the lack of existing service on other east-west corridors, including most of Highway 1 presents a challenge to expanding the grid up the slope. Serving the upper slopes of the area further breaks down a potential grid pattern, given the typical curvilinear street patterns, natural barriers and lower density with corresponding low travel demand.

The West Vancouver network in particular has complex legibility. This includes long, meandering one-way loops (e.g. #253, 254 and 256), and closely overlapping loops (e.g. #251 and 252). An opportunity to streamline routes, including segmenting local service to Park Royal and to downtown Vancouver clearly exists in this area. One way loops also occur in the District of North Vancouver, including the #230 at the top of Lonsdale and the peak-only #247 extension off Capilano Road.

> Network legibility is influenced by the topography, street network and travel demands on the North Shore. There are opportunities to simplify route and schedule designs.

Finally, legibility of the network is challenged by the variation of routes through different time periods. A full quarter of the North Shore routes operate only during limited hours, primarily during weekday peak periods only. Additionally, seven all-day routes have significantly varying routing in different time periods. This system is designed to provide more direct service to downtown Vancouver, typically eliminating the need for connections at an exchange. Simplification of this network design requires a balance of meeting travel demand, using resources efficiently, and providing attractive travel times. The variation in route networks at different times is illustrated in Figure 16.



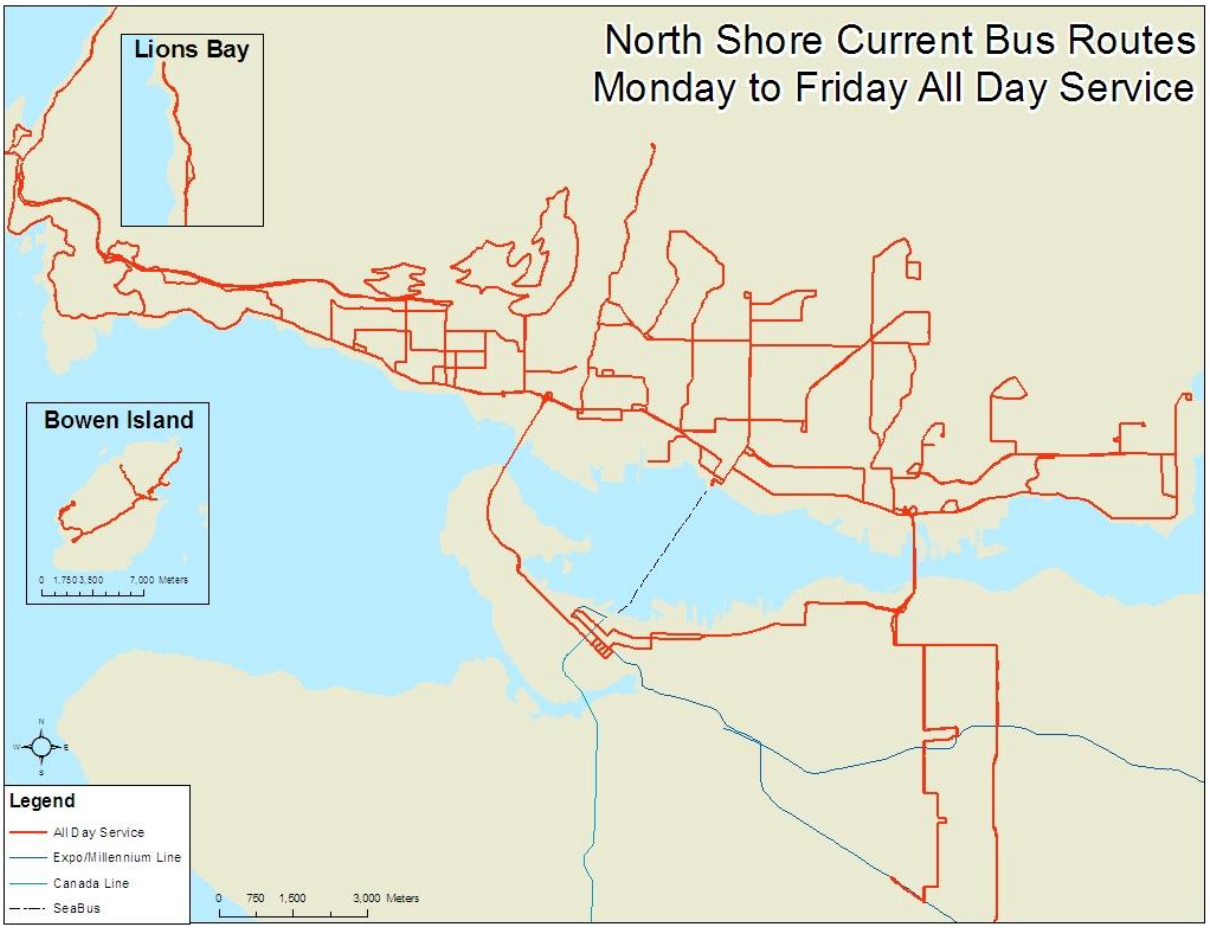


Figure 16. North Shore Peak and Off-Peak Network Variation

3.1.3 ROUTE ANALYSIS

This section reviews current data on the performance of the North Shore's transit network and evaluates the findings. The purpose for reviewing the network's performance is to compare actual performance (obtained from operational and ridership data) with pre-set performance targets and standards, set out in the Transit Service Guidelines (TSGs). Data collected for comparisons to targets and standards were primarily obtained from the Automatic Passenger Counting (APC) system. The system measures and records the boardings and alightings of passengers from a vehicle, plus additional information such as the arrival and departure of a vehicle at a stop. Data used for the purposes of the ATP were between September 2009 and November 2010. The system was able to capture a large sample of the network's transit ridership and vehicle statistics, therefore making a reliable projection of the network's performance. Details on the performance statistics for each route can be found in Appendix 8.

Although the APC system (installed on 15% of the total bus fleet) was able to collect a large sample of scheduled vehicle trips for a majority of the North Shore routes, not all routes were sampled. Routes not sampled with APC included the #257, C10 and C11. To make up for the loss of required information, manual on-street point checks and in-vehicle ride checks were performed. Point checks were conducted on route #257 at key locations along the route to record the number of passengers on a bus. Ridership

activity on routes C10 and C11 was manually collected by the operator. Data collected through manual point checks and ride checks were obtained between August 2010 and November 2010.

Two other transit-specific data sources are used for the ATP analysis: the Transportation Management and Communications system (TMAC) and Cognos Scheduling Cube. These help to further examine the performance of existing services. Unlike the APC system which is placed on only a small percentage of the network's total bus fleet, the TMAC system is installed in all CMBC vehicles (with installation planned for West Vancouver in 2011). TMAC provides route specific information, such as schedule adherence and vehicle speed, but is not capable of recording the comings and goings of passengers. Cognos Scheduling Cube provides schedule specific information, such as scheduled bus and operator service hours. Measuring and comparing routes with one another through scheduling information illustrates how operational supply is distributed throughout the network.

Frequency and Stop Spacing

Frequency

Service frequency is typically identified by customers as the most important attribute of public transit. Frequent service defines the capacity of a particular route and can make using transit convenient by minimizing wait times.

Service frequency for North Shore routes varies throughout the day to correspond with demand. Service during peak time periods is higher than during off-peak time periods with a strong orientation of scheduled trips to downtown Vancouver. Additionally, multiple routes sharing a common corridor can provide combined frequencies if scheduled in coordination. This is common on the North Shore along Marine Drive and Lonsdale Avenue.

TransLink's TSG for Frequency recommends that peak period and midday bus service frequency should not exceed 30 minutes. Special services to schools and rural services are excluded from this guideline.

Most routes in the North Shore meet the minimum TSG for Frequency during the midday. The exception is West Vancouver routes providing service to the primarily low density residential areas north of Marine Drive. Table 8 lists routes that do not meet the guideline.

Table 8: Routes Not Meeting the Frequent Service Guideline

Line	TSG Guideline	Frequency (Actual)
251 Queens/Vancouver/Park Royal	30	60
252 Inglewood/Vancouver/Park Royal		60
253 Caulfeild/Vancouver/Park Royal		60
254 British Properties/Vancouver/Park Royal		60
256 Folkstone/Whitby Estate/Spurway		60
257 Horseshoe Bay/Vancouver Express		60
C12 Lions Bay/Caulfeild		60

Frequency: Observations/Comments

- Route frequency must be considered along with the productivity TSG, balanced with ridership.
- Most routes meet the midday frequency guideline
- West Vancouver routes serving lower density residential areas have low frequency during the midday and off-peak periods
- Nearly all North Shore routes that operate during the peak time periods meet or exceed the guideline with the only exception being route C12 Lions Bay/Caulfield, which operates hourly.
- Ridership data shows that during the midday time period for all directions on all North Shore routes, the average passenger load is less than half the capacity guideline of 45 passengers per trip within a peak 60 minute period

Stop Spacing

To further support frequent service along a route by avoiding stopping too often, a minimum bus stop spacing guideline is recommended (see Table 9). There is no maximum stop spacing guideline. The guideline attempts to balance access with speed. Limited stop[15] routes can improve speed and reduce travel time, although this intrinsically affects service coverage by having fewer stops. Table 10 shows the average stop spacing for North shore transit routes.

Table 9: Minimum Bus Stop Spacing Transit Service Guideline

Service Type	Minimum Stop Spacing
Standard Bus	250-m (with both near and farside stops permitted at major transfer points)
B-Line	500-m to 1,500-m (average spacing along route)
Community Shuttle	Flexible to serve local conditions

Bowen Island's two routes – C10 Bluewater/Snug Cove and C11 Eagle Cliff/Snug Cove – have not been included under this guideline assessment as they operate under a "flag stop" form of service, whereby customers are allowed to alight and/or board a vehicle at safe locations - deemed by an Operator - along the route.

[15] Limited stop routes bypass minor stops, but stop at major stops (e.g.. transfer points, main activity centres).

Table 10: Average Stop Spacing for North Shore Transit Routes

Route Number	Route Name	Service Type	Average Stop Spacing [m]
210	UPPER LYNN VALLEY/VANCOUVER	12 Metre Bus	410.8
211	SEYMOUR/PHIBBS EXCHANGE/VANCOUVER	12 Metre Bus	411.8
212	DEEP COVE/PHIBBS EXCHANGE	12 Metre Bus	431.5
214	BLUERIDGE/PHIBBS EXCHANGE/VANCOUVER	Community Shuttle	356.3
228	LYNN VALLEY/LONSDALE QUAY	12 Metre Bus	265.5
229	WESTLYNN/PHIBBS EXCHANGE/LONSDALE QUAY	12 Metre Bus	263.7
230	UPPER LONSDALE/LONSDALE QUAY	12 Metre Bus	229.7
232	GROUSE MOUNTAIN/PHIBBS EXCHANGE	12 Metre Bus	280.0
236	GROUSE MOUNTAIN/LONSDALE QUAY	12 Metre Bus	377.8
239	CAPILANO UNIVERSITY/PARK ROYAL	12 Metre Bus	366.1
240	15TH STREET/VANCOUVER	12 Metre Bus	404.2
241	UPPER LONSDALE/VANCOUVER	12 Metre Bus	363.1
242	UPPER LONSDALE/VANCOUVER	12 Metre Bus	347.0
246	LONSDALE QUAY/HIGHLAND/VANCOUVER	12 Metre Bus	304.0
247	UPPER CAPILANO/GROUSE/VANCOUVER	12 Metre Bus	410.7
250	HORSESHOE BAY/DUNDARAVE/VANCOUVER	12 Metre Bus	412.0
251	QUEENS/VANCOUVER/PARK ROYAL	12 Metre Bus	335.8
252	INGLEWOOD/VANCOUVER/PARK ROYAL	12 Metre Bus	359.7
253	CAULFEILD/VANCOUVER/PARK ROYAL	12 Metre Bus	320.2
254	BRITISH PROPERTIES/PARK ROYAL/VAN	12 Metre Bus	354.1
255	DUNDARAVE/LYNN VALLEY CENTRE	12 Metre Bus	315.7
256	FOLKSTONE WY/WHITBY ESTATE/SPURAWAY	12 Metre Bus	450.4
257	HORSESHOE BAY/VANCOUVER EXPRESS	12 Metre Bus	1339.7
258	UBC/WEST VANCOUVER	12 Metre Bus	1925.5
259	LIONS BAY/HORSESHOE BAY	12 Metre Bus	1528.5
290	DEEP COVE	12 Metre Bus	524.0
292	UPPER LYNN VALLEY	12 Metre Bus	541.0
998	SEABUS	SeaBus	N/A
C10	BLUEWATER/SNUG COVE	Community Shuttle	Flag Stop
C11	EAGLE CLIFF/SNUG COVE	Community Shuttle	Flag Stop
C12	LIONS BAY/CAULFEILD	Community Shuttle	1407.1
C15	INDIAN RVR/DEEP COVE/PHIBBS EXCHANGE	Community Shuttle	351.0
N24	DOWNTOWN/UPPER LONSDALE NIGHTBUS	12 Metre Bus	373.3

NOTE:
Route 214 Blueridge/Phibbs Exchange/Vancouver operates with 12-m buses during peak time periods.

Stop Spacing: Observations/Comments

- Stop spacing is important as it provides an access point to service. However, passenger travel time may increase along with "dwell" time as the number of stops increase. This also impacts cost as increased running time requires more resources.
- Areas that routes serve influence stop spacing. Local service routes in dense locations with high population, employment and amenities require more stops than less dense areas. Express routes that serve dense locations for only a portion of its routing with a majority in low density areas will have higher stop spacing and passenger speed.
- All North Shore routes meet or exceed the recommendation with route #230 Upper Lonsdale/Lonsdale Quay the only exception (average stop spacing is 229.7 metres).
- Although the stop spacing for route #230 falls below the guideline the geography of its routing must be considered. A portion of its routing is along the Lonsdale Ave corridor that is not only high in density with several cross-streets, but has steep sections. The lower stop spacing along the #230 route allows easier access for most customers.

- The following routes provide limited stop service on all trips: 257, 258, 290 and 292.
- The following routes provide limited stop service through the City of Vancouver only on specific trips that extend into Vancouver: 210, 211 and 214.

SPAN OF SERVICE

Span of service is defined as the start and end times of transit service in the day. The TSG for Convenient service is intended to meet customers' travel needs by promoting a span of service that provides convenient connections between services at town centres, transit exchanges and stations. Measurement of this Guideline is performed by comparing current actual scheduled trip start and end times with recommended time values. The measurement is divided into two major categories with sub-categories based on day and service type:

1. Span of Service - span of service for transit by each day (morning and evening between downtown Vancouver, nearest town centre or any adjacent town centre)
2. Evening Service - earliest end of service in the evening by each day type (weekday, Saturday, and Sunday) and type of service (i.e. conventional bus)

The following guidelines promote a convenient service for customers in terms of the start and end times of service and being able to make easy connections between services at town centres, transit exchanges and stations.

- The scheduled hours of service for transit should ensure that 95% of trips identified in Table 11 could be completed at the times shown. Service should be provided to major regional activity centres to correspond to customary opening and closing times.

Table 11: Span of Service Guidelines

SPAN OF SERVICE GUIDELINES*			
LATEST ARRIVAL TIME OF FIRST TRANSIT TRIP IN MORNING			
SERVICE	WEEKDAYS	SATURDAYS	SUNDAYS & HOLIDAYS
From any point to Downtown Vancouver	7:00 a.m.	8:00 a.m.	9:00 a.m.
From any point to nearest town centre	7:00 a.m.	8:00 a.m.	9:00 a.m.
EARLIEST DEPARTURE TIME OF LAST TRANSIT TRIP IN EVENING			
SERVICE	WEEKDAYS	SATURDAYS	SUNDAYS & HOLIDAYS
From downtown Vancouver to any town centre	Midnight	Midnight	11:00 p.m.
From town centre to any adjacent town centre	Midnight	Midnight	11:00 p.m.
* Note: These are minimum Guidelines. Service can be provided beyond these hours if it is cost-efficient.			

BRAND OF SERVICE	EVENING SERVICE (Last trip leaving route terminus outbound) should be provided at least until		
	WEEKDAYS	SATURDAYS	SUNDAYS
CORE HOURS SERVICES			
SkyTrain	1:00 a.m.	1:00 a.m.	12:00 a.m.
B-line	1:00 a.m. or meets last SkyTrain		
SeaBus	0:30 a.m.	0:30 a.m.	11:00 p.m.
Express Coach	Midnight	Midnight	11:00 p.m.
Bus	9:00 p.m.	7:00 p.m.	6:00 p.m
Community Shuttle	9:00 p.m.	7:00 p.m.	6:00 p.m.
LATE NIGHT SERVICES			
NightBus (starts at 2:00 a.m.)	3:00 a.m.	3:00 a.m.	3:00 a.m.

Span of Service: Arrival Time of First Transit Trip in Morning

For North Shore routes that operate with direct service to downtown Vancouver, during the weekday[16], less than half provide a first scheduled trip that meets the TSG measure of arriving in the downtown area by 7:00 a.m. Most of these routes - #211, 246, 247, 251 and 253 – are over the TSG by less than 10 minutes. On the weekends, when TSG measures are set at later times (8:00 a.m. for Saturdays and 9:00 a.m. for Sundays and Holidays) the percentage of routes that meet the Guideline increases to greater than half.

Latest arrival times for first scheduled trips to the nearest town centre (e.g. Lonsdale) were also measured. Based on this end location criterion a high proportion of routes on the North Shore for all day types have a first scheduled trip that allows a customer to reach the nearest town centre by the recommended guideline time of 7:00 a.m.

Span of Service: Earliest Departure Time of Last Transit Trip in Evening

Routes that provide scheduled trips from downtown Vancouver to any town centre on the North Shore were measured against recommend TSG values. A comparison was performed between the earliest departure time of the last trip in the evening to recommended TSG time values – midnight for both Weekdays and Saturdays, and 11:00 p.m. for Sundays and Holidays. Based on this measurement, most routes with a direct connection from downtown Vancouver to any town centre on the North Shore do not meet the TSG; services ends too early and are well before the minimum Guideline value. The greatest variance between actual trip leave times and TSG measure are on the weekend.

In a similar approach, earliest departure time of last trips in the evening between adjacent town centres were measured based on the same recommended Guideline time values by day type. Under this measure, of the hand-full of routes that provide a town centre to an adjacent town centre last trip connection – routes #228, 229 and 242 – all comply with the Guideline for each applicable day.

[16] Transit schedules vary by day type, used to categorize individual days into groups with generally different schedules. Monday-to-Friday is classified under the weekday schedule, Saturday under the Saturday schedule and Sunday/Holiday under the Sunday/Holiday schedule.

Span of Service: Last Trip Leaving Route Terminus Outbound

The TSG indicates that conventional bus and community shuttle should provide service at least until 9:00 p.m. during Weekdays, 7:00 p.m. on Saturdays and 6:00p.m. on Sundays and Holidays. All relevant routes meet this Guideline. Routes that have a limited span of service (e.g. #258 UBC/West Vancouver) are not included since they provide express service during peak time periods and have last trips leaving well before the Guideline measures. Guideline measures for SeaBus and NightBus (12:30 a.m. and 3:00 a.m., respectively) are met for all days of the week.

Span of Service: Observations/Comments

- Some opportunity exists to increase the span of scheduled service for routes close to TSG criteria, however this must be balanced with productivity indicators
- Late night connections between the town centres of Lower Lonsdale and Lynn Valley via routes #228, 229 and 242 meet TSG on all days.

CROWDING

The Comfortable TSG recommends that the average number of passengers onboard a bus at the busiest point on the route[17] should not exceed specified maximum values (see Figure 17). The objective is to ensure that customers on all types of vehicles have enough space for a comfortable ride. The Guidelines are for the highest passenger loads averaged[18] for all bus trips on route within the busiest 15 and 30 minutes in peak periods and over 60 minutes in off-peak periods. Maximum values vary under each time interval category with the assumption that customers have a higher tolerance for crowding during the busiest periods of the day, so there is a separate threshold for the busiest 15 and 30 minute periods during the a.m. and p.m. peak, and busiest 60 minute period in the off-peak. As well, maximum values differ depending on the vehicle type used.

The comfort guideline does not take into account or provide information regarding pass-ups[19] that may occur during certain times of the day. Therefore, actual demand may exceed measured values, which only indicate the amount of passengers on-board a vehicle.

As per the Canada Marine Act, SeaBus cannot exceed 400 passengers. Passengers can only board at two locations – Lonsdale Quay and Waterfront Station – therefore, the maximum number of passengers on-board a vessel is measured when trips leave either location. Assessment of SeaBus comfort will be discussed in the section on boardings.

The TSGs do not include a specific vehicle capacity for Community Shuttles. For the ATP, all Community Shuttle routes were assigned a maximum capacity of 24 passengers, including four standees, based on the licensing requirements of these vehicles.

Assessment of Comfort level on a route during a given time period, in a specified direction, is based on the Average Peak Load Factor, per trip shown as a percentage. Calculation of this value is the Average

[17] The number of passengers onboard a bus at the busiest point on a route is also referred to as the peak passenger load or peak load factor when expressed as a percentage.

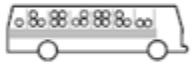
[18] Passenger loads on some individual bus trips may exceed the guidelines.

[19] Pass-ups are when an in revenue or in service trip fails to allow potential customers to board at designated bus stops. They predominately occur during peak time periods when Operators deem that a vehicle has met or exceeded the maximum passenger capacity.

Peak Passenger Load, per trip divided by the maximum number of passengers within the time period interval and/or day that a trip(s) start time falls within. Measurements were performed in hourly intervals. According to the applied calculation a percentage value greater than or equal to 100% of the Comfort level during a given time interval is considered to not comply with the TSG. Values are recommended to be less than 100%.

For each measurement, the maximum or highest Peak load Factor percentage value was used for each hour time interval. For example, if the Peak Load Factor percentage value was 120% between 5:00 p.m. and 5:15 p.m. and 87% between 5:15 p.m. and 5:30 p.m., then the highest or maximum percentage value (120%) was used for that hour.

MAXIMUM NUMBER OF PASSENGERS by Bus Type and Time Period

BUS TYPE	Peak 15 minutes in AM & PM peak periods	Peak 30 minutes in AM & PM peak periods	Weekday Midday & Evening, Weekends (peak 60 min.)
	Maximum Number of Passengers On-Board (number of standing passengers shown in brackets)*		
12 METRE LOW FLOOR BUS (38 seats)	 55 (17)	 50 (12)	 45 (7)
18 METRE LOW FLOOR ARTICULATED BUS (54 seats)	 85 (31)	 75 (21)	 65 (11)

* These Guidelines are for the highest passenger loads averaged for all bus trips on a route within the busiest 15 minutes and 30 minutes in peak periods and over 60 minutes in off-peak periods. Passenger loads on some individual bus trips may exceed the guidelines.

Figure 17. Comfort TSG by Vehicle Type and Time Period

Weekday Capacity – Peak 15 minutes in peak periods

Approximately 40% of the transit routes serving the North Shore exceed the recommended maximum number of passengers in at least one direction during the peak 15 minutes in either the a.m. or p.m. peak period. Only route #250 Horseshoe Bay/Dundarave/Vancouver experiences overcrowding in both directions within the same time interval – 5:00 p.m. to 6:00 p.m. A majority of instances where crowding exceeds the the TSG occurs during the p.m. peak period, particularly on bus routes that provide connections with either downtown Vancouver or the SeaBus terminal at Lonsdale Quay. In almost all cases where a route exceeds the TSG in a particular direction, the reverse direction Peak Load Factor value complies with the recommended Guideline value. Furthermore, the direction of crowding in all instances during the p.m. peak period is either away from downtown Vancouver or from the SeaBus terminal. On average, the instances where the TSG is not met exceed the Guideline by 5%, or three additional customers, indicating that while there is crowding, it is only slightly over the comfort level of TSG.

Weekday Capacity – Peak 30 minutes in peak periods

Identical to peak 15 minute Guideline measurements, approximately 40% of the transit routes serving the North Shore exceed this TSG in at least one direction during the peak 30 minutes in either a.m. or p.m. peak period. A majority of the instances occur during the p.m. peak period, but is not concentrated within a specific hour time interval compared to during the peak 15 minutes. There are more instances of exceeding the TSG during a.m. peak 30 minute period compared to during the a.m. peak 15 minute period. Similar to the peak 15 minute capacity measurement during the p.m. peak, the direction where crowding occurs is away from downtown Vancouver or from the SeaBus terminal. Of instances where the TSG is exceeded, the peak load averages 120%, indicative of a lower TSG capacity compared to during the peak 15 minutes. Routes that do not comply under the peak 15 minutes are, for the most part, the same routes that do not comply during the peak 30 minutes; with variation in the hour time intervals where the TSG is exceeded.

Weekday Capacity – Peak 60 minutes in Pre-a.m. Peak, Midday and Evening periods

The recommended maximum number of passengers during the peak 60 minutes for weekdays outside of the a.m. and p.m. peak time periods is 45 on a standard 12 metre bus. All routes that provide service during the Pre-a.m. peak period were well within the Guideline measure. Peak Load Factor values indicate that during this Pre-a.m. peak time period there is a significant imbalance in loads in the reverse direction for these routes; also observed during the peak 15 and 30 minute a.m. and p.m. peak periods. Higher loads are experienced on trips going towards downtown Vancouver and the SeaBus terminal, while in the reverse direction the loads are significantly lower.

For the most part during the weekday midday time period sufficient capacity is provided on all routes on the North Shore. Only routes #239, 255 and 257 exceeded the TSG value, although the average loads were 4 passengers over the guideline. The Peak Load Factor, per trip for all routes during this time period averages just below 50% and there are no significant load imbalances when comparing both directions for a route. This indicates demand is relatively equal in both directions through the midday periods. Peak Load Factor values gradually increase towards the latter part of the midday period, but are still within the TSG.

During the evening time period, virtually all routes have loads within the Comfort TSG. Routes exceeding the guideline are #229, 230, 250 and 253. Similar to the midday time period the overage duration and amount is small (average excess is 118% or eight passengers over the guideline). Towards the latter part of the time period Peak Passenger Load Factor values gradually decrease. Similar to the pre-a.m. peak time period and in contrast to the midday time period, there is an imbalance in loads when comparing both directions on a route, which gradually increases towards the latter part of the evening.

Saturday Capacity – Peak 60 minutes

Crowding is experienced on Saturdays, and concentrated in the late-afternoon to early-evening times of the day with a majority between 3:00 p.m. and 6:00 p.m. Some routes that exceed the TSG measures during a given hour time interval also exceed the Guideline in successive time intervals for the same direction or both directions (as observed on route 250 Horseshoe Bay/Dundarave/Vancouver). The following routes exceeded the TSG in more than one time interval and/or direction: #229, 230, 236, 239, 240, 250, 255 and 257. Average loads on these routes at these times are 111%, or five passengers over the guideline. Unlike on weekdays where crowding is concentrated in one direction depending on the time of day, data suggests crowding during Saturdays is experienced in both directions within the same time interval. For example, route #250 exceeds the guideline value for both West and Eastbound trips

between 3:00 p.m. and 6:00 p.m. Again the amount over the TSG is minor, at 109% or four passengers over the guideline.

Sunday and Holiday Capacity – Peak 60 minutes

Compared to Saturday, crowding is experienced on fewer routes and fewer time intervals. Routes where the TSG is exceeded in multiple time intervals and/or the reverse direction within the same interval are #229, 230, 236 and 250. Crowding is predominantly during the late-afternoon time period between 4:00 p.m. and 7:00 p.m. The direction of crowding during this time period is away from key destinations.

Crowding: Observations/Comments

- Crowding occurs on only a few routes. Those that connect to key destinations – downtown Vancouver, Lonsdale Quay, Capilano University, Horseshoe Bay Ferry Terminal and Grouse Mountain. These destinations are high in density with places of employment and various available amenities.
- Not all time periods experience crowding. A majority occur during the a.m. and p.m. peak time period with a.m. peak experiencing high ridership for trips going to downtown Vancouver and Lonsdale Quay, while in the p.m. peak high ridership is away from these destinations. This concentration of high ridership coincides with journey to work times with customers travelling to high density places of employment in the a.m. peak and the reverse during the p.m. peak. In all cases during these time periods the reverse direction trips have significantly lower peak passenger load values.
- On weekends, crowding is experienced during the late afternoon to late evening coinciding with the closing time of many amenities (e.g. shops). General travel patterns are not concentrated in a specific direction with crowding occurring at different times, direction and routes. This indicates that destinations other than places of employment found during the week are key generators of transit ridership.

RELIABILITY

Transit reliability and speed are qualities that customer's value and influence ridership, and both affect the overall system efficiency. Higher speeds and reduced variability in trip times reduce cost of providing service, thereby increasing the quantity of service that can be provided for the same dollar.

The purpose of the reliability TSG is to measure schedule adherence of actual "in service" transit trips. On average, a minimum of 85-95% of trips should meet the recommended TSG values, depending on the location along the route. Variable traffic conditions and congestion, variable boarding passenger volumes, adverse weather, accident delays and other uncontrollable factors will affect on-time performance of some trips.

Measurement of the TSG was performed for each route across the three scheduling days (Weekdays, Saturdays and Sunday/Holidays). Three points – start and end terminus and mid-route scheduled timing point - along a route were measured against the TSG within each day. The guidelines states:

- 90% of bus trips on each route should depart each terminus not more than two minutes late and not early;
- 85% of bus trips on each route should depart each mid-route scheduled timing point not more than three minutes late and not early; and
- 90% of bus trips on each route should arrive at each terminus not more than three minutes late.

Measurement for this Guideline was obtained through TransLink's Transportation Management and Communications (TMAC) system. Currently, routes with vehicles operated by West Vancouver Blue Bus and Bowen Island Community Transit are not equipped with this system and are not included as part of this TSG measure. West Vancouver and Bowen Island routes should be monitored for reliability through Phase IV of the ATP.

Reliability: Weekdays

None of the measured routes met with the Guideline when measured at their respective start terminus and mid-route scheduled timing points. Approximately 60% of measured trips meet the TSG when departing their starting point. Reliability drops to approximately 50% at the mid-route scheduled timing point. Only two routes met the TSG for terminus arrival, #210 and 212. Average arrival reliability for measured routes is approximately 80%, much higher compared to terminus departure and mid-route scheduled timing point reliability.

Reliability: Saturday s

Only late-night route #242 Upper Lonsdale/Vancouver met the terminus departure TSG measure. All trips measured for this route left within the Guideline. Approximately 70% of trips on Saturdays leave a start terminus on time. The reliability for mid-route scheduled timing points drops to an average of 55% of trips. Three routes meet the terminus arrival Guideline - #212, 214 and 230. Overall approximately 80% of trips meet the arrival terminus TSG.

Reliability: Sunday and Holidays

Route #229 Westlynn/Phibbs Exchange/Lonsdale is the only route that meets the TSG for terminus departure reliability on Sundays and Holidays. Approximately 70% of all trips measured leave within the Guideline measure. Mid-route scheduled timing point reliability is lower at 55% with no routes meeting the TSG. Four routes meet the arrival terminus Guideline measure – #212 (94%), 214 (100%), 229 (91%), 230 (93%) and 242 (90%). Overall, approximately 85% of trips on Sunday and Holidays arrive at a terminus within the Guideline measure.

Reliability: Observations/Comments

- In general, North Shore routes perform poorly when measured against reliability Guidelines.
- Weekday reliability is worse than on weekends. This can be partially be explained by higher traffic congestion and demand during weekday peak periods. Passengers experience longer dwell times at bus stops and intersections along with longer commute times. Operators will find it more difficult to maintain the schedule.
- Schedule reliability is worse at mid-route timing points than at terminus locations. Mid-route timing points are in place so that transit services can connect with one another at specific times and locations, maintain a consistent frequency along a route, and to provide more certainty to customers on the arrival times. Compared to terminus points where schedules include recovery time and the greater ability to get back on schedule, mid-route timing points typically provide very little to no time. The principle is that passenger dwell time is reduced and congestion minimized.

Given the relatively poor performance against the TSG, further analysis was conducted to determine the potential effect on customer connections at timed transfer locations. It was determined that although TSGs were often not achieved, the impact to customers may not be as noticeable if connections can still

be made. As illustrated in Table 12, at both Phibbs Exchange and Lonsdale Quay a high percentage of trips, while not always on schedule, still allow customers to connect. The p.m. peak period on weekdays performed the lowest in this analysis. Further analysis of this issue will be reviewed with CMBC Scheduling and Service Delivery to determine what role scheduling and operating practices may have in improving scheduled connections.

Table 12: Trip Connections at Timed Transfer Focal Points

Connection Point	Weekdays a.m. peak	Weekdays off-peak	Weekdays p.m. peak	Saturdays	Sundays/ Holidays
% Trips Arriving within connection time (1-minute): Phibbs Exchange	89%	91%	77%	91%	88%
% Trips Arriving within connection time (2-minutes): Lonsdale Quay	90%	85%	64%	78%	84%

Note: Reports percent of actual trips arriving on-time, early or within 1-2 minutes after scheduled arrive time, the minimum window to allow connections to other departing routes given that on average, routes dwell at timed transfer focal points for 2-3 minutes.

SPEED

In conjunction with reliability, speed is another indicator of how well the system is performing. The attractiveness and efficiency of transit is dependent on operating speed and its variability, with high speed and less variability preferred. Analysis was performed on how well operating speed compared with scheduled speed at hourly intervals throughout each day type. The following charts show all routes within the North Shore and how actual operating speed compares to scheduled speed throughout the day. Speed is calculated based on how much scheduled run time (or actual time) is required from a start terminus to an end terminus. It is the average speed experienced by a passenger. Layover and recovery time are excluded, but boarding time and intersection delays are included and factored into a schedule. In most cases, not only within the North Shore, but throughout the entire region, more scheduled run time is given during the a.m. and p.m. peak time periods compared to off-peak time periods. This is due to more traffic congestion on roadways and higher passenger volumes during peak times.

Figure 18 shows average speed versus scheduled speed for all routes on the North Shore on weekdays. Results from Saturdays and Sundays/Holidays are very similar to weekdays.

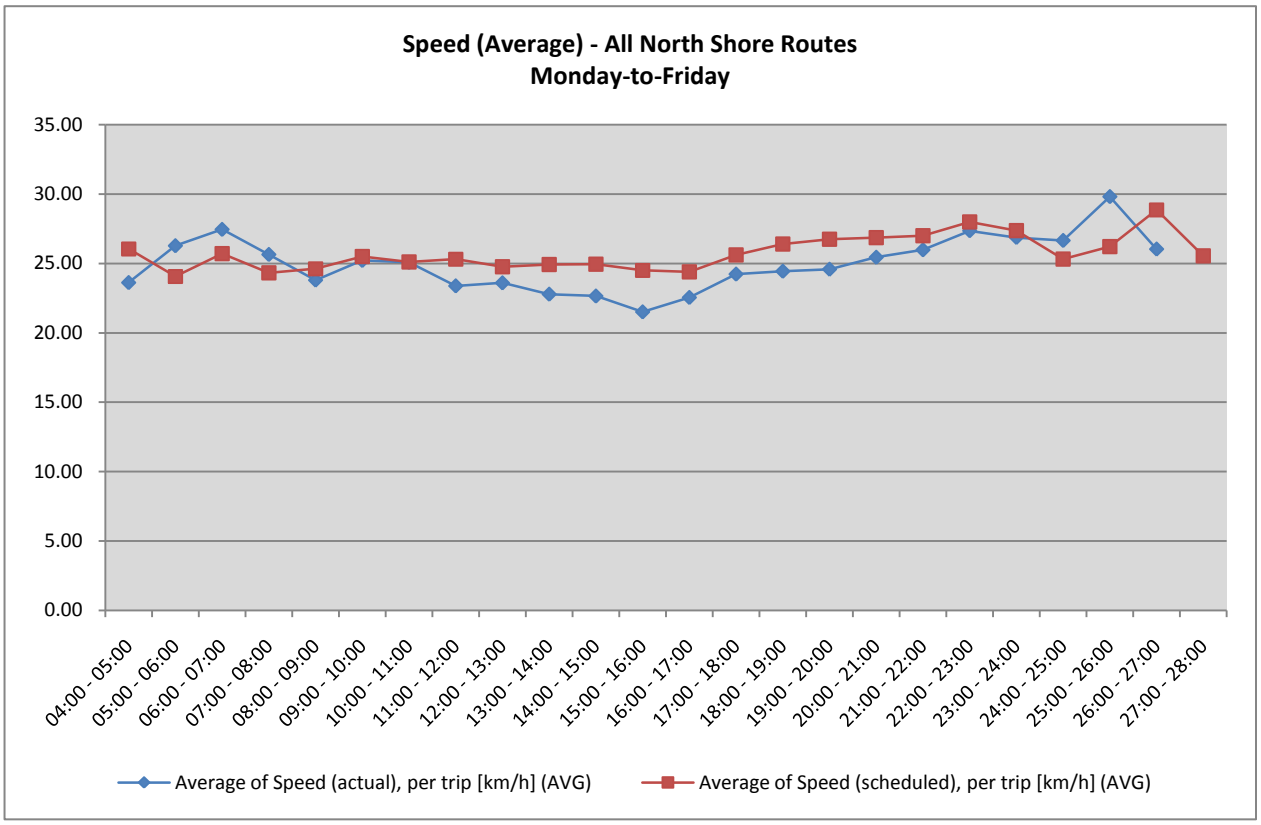


Figure 18. Actual Versus Scheduled Speed by Hour (Weekday)

Speed: Observations/Comments

- Overall, actual speed is slightly below scheduled speed. This is most noticeable with the greatest variance occurring during the midday to early evening time periods - 11:00a.m. to 7:00p.m. – for all days. Actual scheduled speed is on average approximately 2 km/h less than scheduled speed during this time. In the early morning time period and late evening actual and scheduled times are relatively equal.
- The fastest routes, averaging greater than 30 km/h on weekdays, are #214, 257, 259 and C12. These routes have limited or express stop portions, including travel on highways.
- Routes that average low speeds throughout the day, such as route #230 which averages 17 km/h, are among the highest productive routes and pass through relatively high density and high commercial areas such as the Lonsdale corridor. As well, these routes operate for the most part, if not all, within a dense urban area in a congested road network.
- Consistent average actual speeds below scheduled speeds during the midday for all days indicate that schedules may need to be adjusted on all or some routes. When performing an analysis a route's actual total running time and applicable segment running time must be examined on a per trip level[20]. Factors that impact speed should also be investigated, such as on-street parking and signalization. In addition, transit priority measures can be considered as possible means to increase actual speed.
- The addition and expansion of transit priority lanes at the north end of the Lions Gate bridge and Marine Drive, currently under construction, is expected to improve speed and reliability through the corridor.

EFFICIENCY (SERVICE UTILIZATION)

TransLink has a strategic financial objective to provide a cost-efficient transit service to ensure that the most effective service is delivered within the available budget. The Efficiency Guidelines support this overall objective by ensuring that each individual transit route is reasonably efficient in serving customers by providing an appropriate frequency, vehicle and type of service given the level of demand.

The original TSG efficiency indicator identified a minimum numbers of passengers as measured by the average percentage of seats occupied over the full length of the route. This has been replaced by other indicators related to service utilization that provide more easily measureable indicators of productivity. The TSG noted that in most cases, the efficiency guidelines would takes precedence over the other Transit Service Guidelines.

Efficiency: Boardings

Boardings are defined as the number of passenger entries onto a transit vehicle[21]. This information provides a detailed profile of route ridership and the effectiveness of service design. Figure 19 shows the average number of daily boardings per route on the North Shore on weekdays. The average for the entire TransLink system is indicated for comparison.

[20] Actual total running time is the actual time a vehicle trip operates in service between a start and end terminus. This time includes all dwells and other lost times between stops and therefore also termed "gross run time". Segment running time refers to a multiple-stop-subsection of a route pattern. The sum of segment running times for an individual trip equals total running time.

[21] If not explicitly specified otherwise, it is always the sum of all boardings on a measured trip.

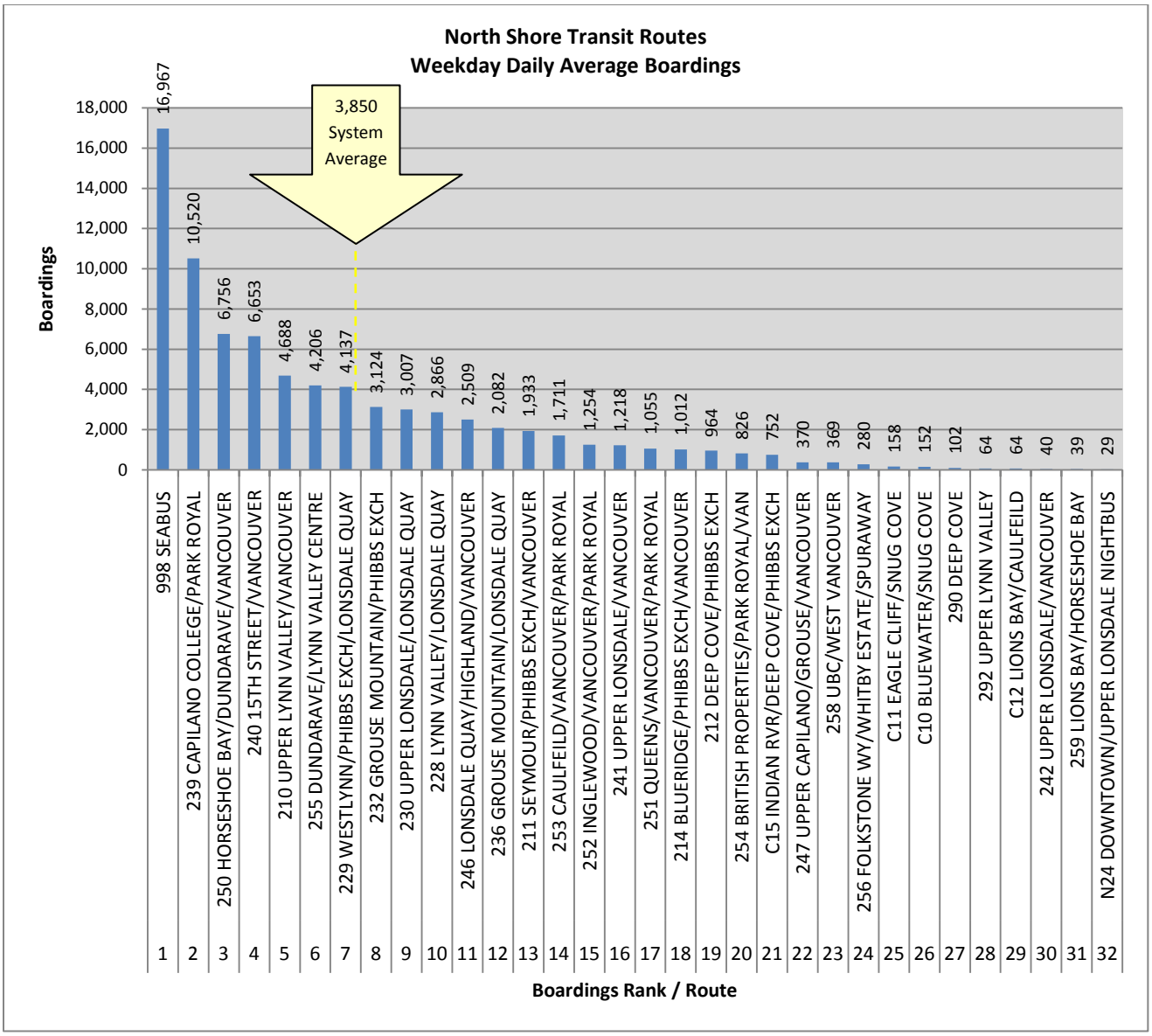


Figure 19. North Shore Transit Routes Average Daily Boardings

Boardings: Observations/Comments

- The vast majority of boardings in a week on the North Shore occur during weekdays. On an average weekday, just over 80,000 boardings occur for all routes, with SeaBus carrying over 20% of these. Routes with the highest boardings are, in most cases, those that provide connections between Vancouver or the Lonsdale Regional City Centre.
- Most routes on the North Shore have average boardings that fall below the entire system average of 3,850.
- On average approximately 60,000 and 45,000 boardings occur per day on Saturdays and Sunday/Holidays, respectively. The lower number of boardings compared to weekdays (80% and 55%) is met with reduced service through lower service frequency and less operating routes. Similar to weekdays, a majority of routes on weekends have average daily boardings lower than the entire system daily averages of 3,400 for Saturdays and 2,700 for Sunday/Holidays.

SEABUS

SeaBus provides high-capacity ferry service across the Burrard Inlet between Lonsdale Quay on the North Shore and Waterfront Station in downtown Vancouver. Each vessel can carry a maximum 400 passengers. It connects to six bus routes at Lonsdale Quay and with local buses, the SkyTrain rapid transit system and the West Coast Express commuter rail system at Waterfront Station. Service frequency is reduced from every 15 minutes to every 30 minutes in the evenings and on Sundays/Holidays.

Given the relatively high level of investment required to operate SeaBus compared to bus, further analysis was conducted to determine the approximate catchment area of SeaBus ridership. Figure 20 shows the start location, by general area, of all daily trips using SeaBus, based on the 2008 Trip Diary. SeaBus ridership comes primarily from the areas within the City of North Vancouver and downtown Vancouver. The zone including Lynn Valley is the source of a relatively high number of trips, considering customers have the option of a direct bus service to downtown Vancouver via the #210. Virtually no ridership comes from West Vancouver or east of Seymour river.

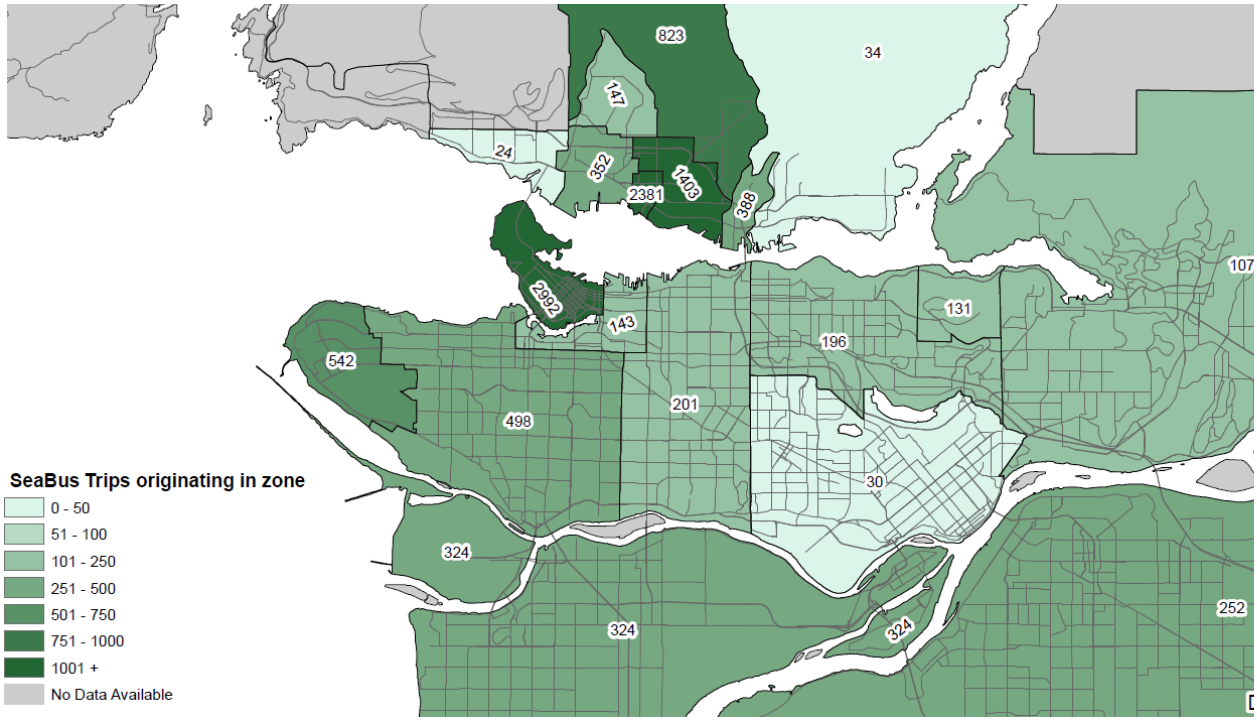
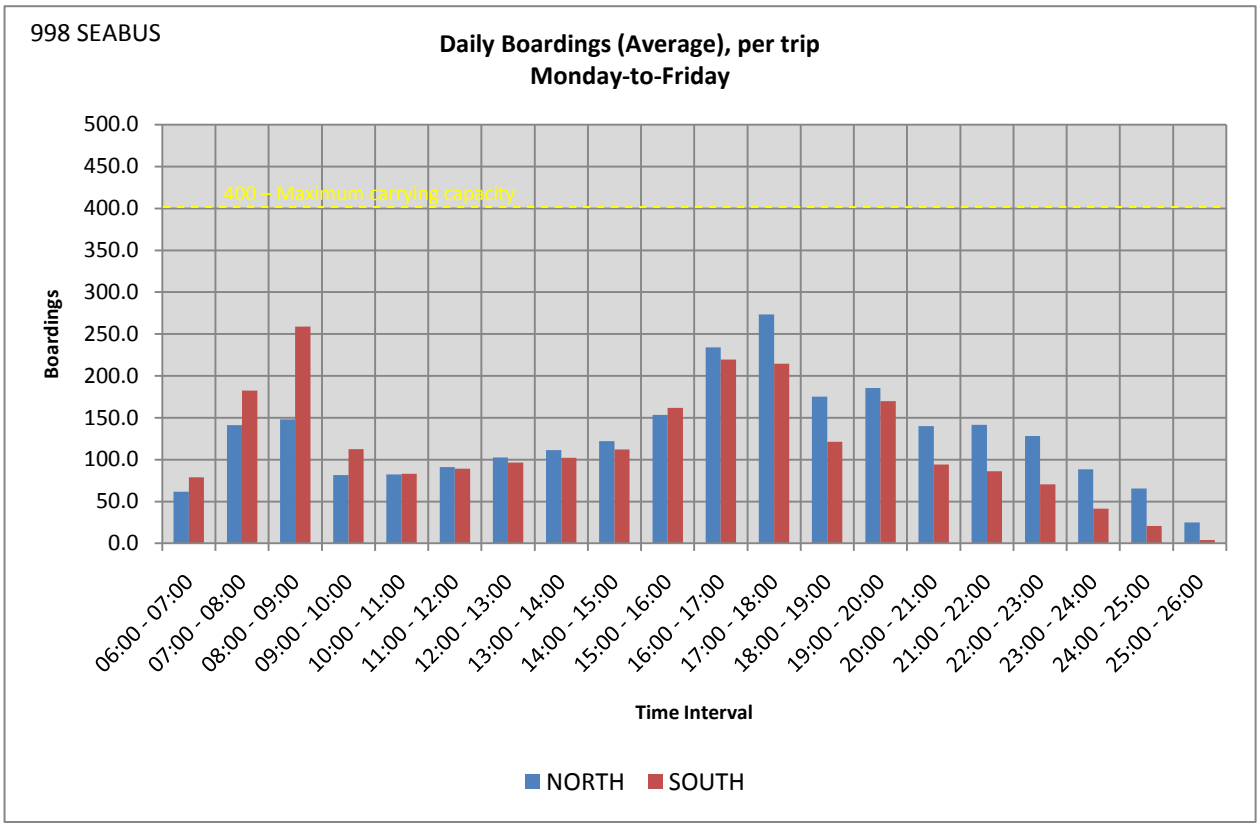
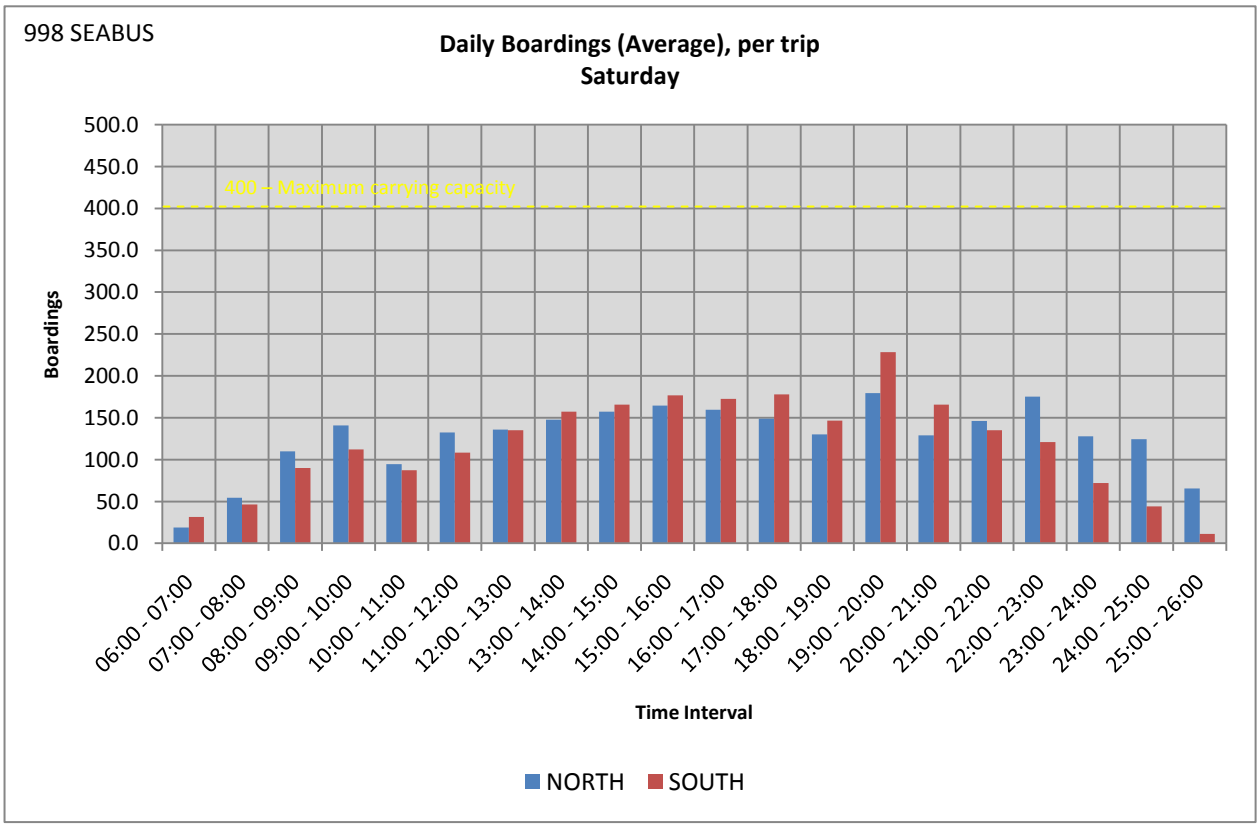


Figure 20. Origin of Weekday SeaBus Trips (2008 Trip Diary)

Figure 21 shows hourly average daily boardings, per SeaBus trip throughout the day for each weekdays, Saturday, and Sunday in both directions. Northbound trips are from Waterfront Station to Lonsdale Quay with southbound trips in the reverse direction.


998 SEABUS
Daily Boardings (Average), per trip
Monday-to-Friday
500.0
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
400 – Maximum carrying capacity
Boardings
06:00 - 07:00
07:00 - 08:00
08:00 - 09:00
09:00 - 10:00
10:00 - 11:00
11:00 - 12:00
12:00 - 13:00
13:00 - 14:00
14:00 - 15:00
15:00 - 16:00
16:00 - 17:00
17:00 - 18:00
18:00 - 19:00
19:00 - 20:00
20:00 - 21:00
21:00 - 22:00
22:00 - 23:00
23:00 - 24:00
24:00 - 25:00
25:00 - 26:00
Time Interval
NORTH
SOUTH


998 SEABUS
Daily Boardings (Average), per trip
Saturday
500.0
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
400 – Maximum carrying capacity
Boardings
06:00 - 07:00
07:00 - 08:00
08:00 - 09:00
09:00 - 10:00
10:00 - 11:00
11:00 - 12:00
12:00 - 13:00
13:00 - 14:00
14:00 - 15:00
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19:00 - 20:00
20:00 - 21:00
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24:00 - 25:00
25:00 - 26:00
Time Interval
NORTH
SOUTH

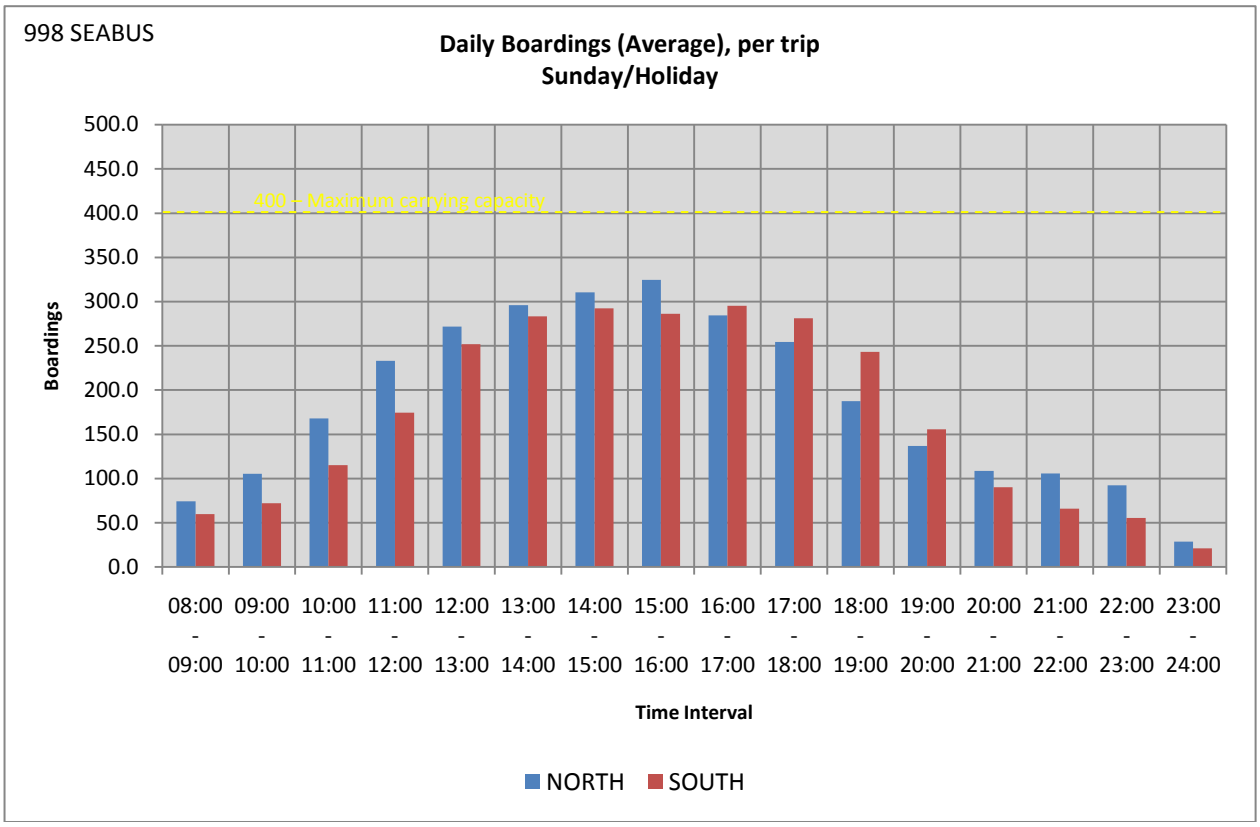

Figure 21. SeaBus Daily Boardings by Day of Week

SeaBus Boardings: Observations/Comments

- On average throughout the week there is adequate capacity provided by SeaBus. All trips are able to meet the current demand. Outside of weekday peak periods and Sundays (when frequency is reduced), the SeaBus typically operates at less than 40% capacity.
- During the week, the majority of boardings in the a.m. peak are on southbound trips from Lonsdale Quay to Waterfront Station. A majority of passengers are connecting to SeaBus from various North Shore transit routes to commute to downtown Vancouver. As well, there is an imbalance in loads between trips in opposing direction, especially between 8:00 a.m. and 9:00 a.m.
- During the p.m. peak there is a gradual increase and decrease in boardings for both directions. In contrast to the morning, most boardings occur on northbound trips, but there is less difference in load values between trips in opposing direction.
- Unlike weekdays, Saturdays when 15 minute service is provided do not experience high peak boardings in the a.m. and p.m. peak period. Throughout most of the day average boardings per trip are below 200. Ridership slightly increases towards the late afternoon and continues into the evening. Number of boardings are relatively equal for trips in opposing direction during the same time interval, but less so during the late evening when there is a greater amount of boardings on trips destined for the North Shore
- Sundays/Holidays, when 30 minute service is typical, experience the highest amount of average boardings, per trip when comparing all trips throughout the week. Trips in both direction between late morning to early evening experience greater than 200 boardings. Although average total daily boardings on Sunday/Holiday is less than weekdays and Saturdays[22] the observed higher average boardings, per trip is due to reduced service frequency.

OTHER UTILIZATION INDICATORS

Two standard measures of transit route performance that incorporate boardings into its calculations were applied and used in route assessment – boardings per revenue km and boardings per revenue hour. Both compare the level of usage to the amount of service operated, one applying revenue distance while the other revenue time. A third measure, boardings per revenue space km, was applied to account for the different carrying capacities of vehicles. This measure allows equal comparison of routes, regardless of the vehicle type being used (i.e. articulated bus, conventional bus, Community Shuttle).

Boardings per revenue kilometre

The total number of passenger boardings divided by the revenue distance in kilometres. A revenue kilometre is the distance travelled by an "in service" vehicle and allowed a passenger to board, from the first stop where passengers may board a vehicle to the last stop before the vehicles goes out of service.

Table 13 shows the average number of daily boardings on a route for every revenue kilometre provided on the same route in the North Shore during weekdays.

[22] Average total daily boardings: Weekdays – 16,967, Saturdays – 15,054 and Sunday/Holidays – 11,448.

Table 13: Weekday Average Boardings Per Revenue Distance and Rankings by Route

Line	Boardings, per rev distance (km)	Boardings, per rev distance (km) - System Wide Rank	Boardings, per rev distance (km) - North Shore Rank
998 SEABUS	41.8	1 / 212	1 / 32
230 UPPER LONSDALE/LONSDALE QUAY	6.1	11 / 212	2 / 32
229 WESTLYNN/PHIBBS EXCH/LONSDALE QUAY	5.1	19 / 212	3 / 32
239 CAPILANO COLLEGE/PARK ROYAL	4.8	22 / 212	4 / 32
255 DUNDARAVE/LYNN VALLEY CENTRE	3.5	44 / 212	5 / 32
240 15TH STREET/VANCOUVER	3.5	46 / 212	6 / 32
241 UPPER LONSDALE/VANCOUVER	3.3	50 / 212	7 / 32
228 LYNN VALLEY/LONSDALE QUAY	3.3	52 / 212	8 / 32
232 GROUSE MOUNTAIN/PHIBBS EXCH	3.0	55 / 212	9 / 32
252 INGLEWOOD/VANCOUVER/PARK ROYAL	2.7	64 / 212	10 / 32
250 HORSESHOE BAY/DUNDARAVE/VANCOUVER	2.6	70 / 212	11 / 32
210 UPPER LYNN VALLEY/VANCOUVER	2.6	71 / 212	12 / 32
253 CAULFEILD/VANCOUVER/PARK ROYAL	2.5	76 / 212	13 / 32
247 UPPER CAPILANO/GROUSE/VANCOUVER	2.4	77 / 212	14 / 32
251 QUEENS/VANCOUVER/PARK ROYAL	2.1	83 / 212	15 / 32
236 GROUSE MOUNTAIN/LONSDALE QUAY	2.1	86 / 212	16 / 32
258 UBC/WEST VANCOUVER	2.0	91 / 212	17 / 32
292 UPPER LYNN VALLEY	1.8	97 / 212	18 / 32
254 BRITISH PROPERTIES/PARK ROYAL/VAN	1.8	99 / 212	19 / 32
212 DEEP COVE/PHIBBS EXCH	1.8	104 / 212	20 / 32
211 SEYMOUR/PHIBBS EXCH/VANCOUVER	1.6	106 / 212	21 / 32
214 BLUERIDGE/PHIBBS EXCH/VANCOUVER	1.6	107 / 212	22 / 32
246 LONSDALE QUAY/HIGHLAND/VANCOUVER	1.4	120 / 212	23 / 32
C11 EAGLE CLIFF/SNUG COVE	1.4	123 / 212	24 / 32
256 FOLKSTONE WY/WHITBY ESTATE/SPURAWAY	1.3	127 / 212	25 / 32
C15 INDIAN RVR/DEEP COVE/PHIBBS EXCH	1.1	140 / 212	26 / 32
290 DEEP COVE	1.0	141 / 212	27 / 32
242 UPPER LONSDALE/VANCOUVER	0.8	165 / 212	28 / 32
C10 BLUEWATER/SNUG COVE	0.5	194 / 212	29 / 32
N24 DOWNTOWN/UPPER LONSDALE NIGHTBUS	0.4	200 / 212	30 / 32
259 LIONS BAY/HORSESHOE BAY	0.4	203 / 212	31 / 32
C12 LIONS BAY/CAULFEILD	0.1	212 / 212	32 / 32

Note: due to data unavailability, routes 257, 609, C8, C60 and C64 are not included in System Wide Rankings.

Boardings per Revenue km: Observations/Comments

- Routes connecting with the core North Shore have the highest boardings per revenue distance (km) with these routes not only performing well within the North Shore transit network, but also ranking well on a system-wide comparison. Assessment of Saturday and Sunday/Holiday boardings per revenue distance (km) information also reveals similar values and rankings.
- North Shore routes are above average when comparing the total average boardings per revenue distance (km) for all routes on the North Shore with averages for the entire system. During weekdays North Shore routes average with 3.5 boardings per revenue distance (km) with the system at 2.4 boardings per revenue distance (km). On weekends the difference between averages is larger with Saturdays at 4.2 and system wide at 2.6, and Sunday/Holidays at 5.0 and system wide at 2.4. These results indicate that North Shore network is most effective on weekends when service is lower, but the boardings to service km provided ratio is higher compared to weekdays.
- Per route values and rankings along with sub-region to system wide average comparisons should be examined with attention as not all routes are equal. There are varying route travel distances and carrying capacity of vehicles throughout the system. For example, SeaBus significantly elevates the boardings per revenue kilometre value for the entire North Shore region (as shown

above) with its short distance (approximately 3 km) and large carrying capacity (400 passengers).

Boardings per revenue hour[23]: The total number of passenger boardings divided by the revenue time in hours. Similar to boardings per revenue kilometre, this measure compares the level of service usage to the amount of service operated. A revenue hours is the time operated by an "in service" vehicle and allowed a passenger to board, from the first stop where passengers may board a vehicle to the last stop before the vehicles goes out of service.

Table 14 shows the average number of daily boardings on a route for every revenue hour provided on the same route in the North Shore during weekdays.

Table 14: Weekday Average Boardings per Revenue Hour with Rankings by Route

Line	Boardings, per rev hour (daily)	Boardings, per rev hour (daily) - System Wide Rank	Boardings, per rev hour (daily) - North Shore Rank
998 SEABUS	662.8	1 / 212	1 / 32
229 WESTLYNN/PHIBBS EXCH/LONSDALE QUAY	101.4	16 / 212	2 / 32
230 UPPER LONSDALE/LONSDALE QUAY	93.2	20 / 212	3 / 32
239 CAPILANO COLLEGE/PARK ROYAL	87.0	27 / 212	4 / 32
255 DUNDARAVE/LYNN VALLEY CENTRE	75.4	40 / 212	5 / 32
240 15TH STREET/VANCOUVER	73.1	44 / 212	6 / 32
250 HORSESHOE BAY/DUNDARAVE/VANCOUVER	67.3	57 / 212	7 / 32
228 LYNN VALLEY/LONSDALE QUAY	67.1	61 / 212	8 / 32
241 UPPER LONSDALE/VANCOUVER	66.7	64 / 212	9 / 32
232 GROUSE MOUNTAIN/PHIBBS EXCH	63.1	67 / 212	10 / 32
247 UPPER CAPILANO/GROUSE/VANCOUVER	62.3	69 / 212	11 / 32
253 CAULFEILD/VANCOUVER/PARK ROYAL	60.7	71 / 212	12 / 32
210 UPPER LYNN VALLEY/VANCOUVER	59.2	74 / 212	13 / 32
212 DEEP COVE/PHIBBS EXCH	56.6	77 / 212	14 / 32
252 INGLEWOOD/VANCOUVER/PARK ROYAL	56.0	78 / 212	15 / 32
236 GROUSE MOUNTAIN/LONSDALE QUAY	54.7	80 / 212	16 / 32
258 UBC/WEST VANCOUVER	54.2	82 / 212	17 / 32
254 BRITISH PROPERTIES/PARK ROYAL/VAN	48.7	95 / 212	18 / 32
292 UPPER LYNN VALLEY	46.8	98 / 212	19 / 32
251 QUEENS/VANCOUVER/PARK ROYAL	45.9	101 / 212	20 / 32
211 SEYMOUR/PHIBBS EXCH/VANCOUVER	42.0	107 / 212	21 / 32
214 BLUERIDGE/PHIBBS EXCH/VANCOUVER	41.4	110 / 212	22 / 32
246 LONSDALE QUAY/HIGHLAND/VANCOUVER	31.4	137 / 212	23 / 32
C15 INDIAN RVR/DEEP COVE/PHIBBS EXCH	29.7	143 / 212	24 / 32
290 DEEP COVE	27.2	151 / 212	25 / 32
C11 EAGLE CLIFF/SNUG COVE	22.3	165 / 212	26 / 32
256 FOLKSTONE WY/WHITBY ESTATE/SPURAWAY	22.3	167 / 212	27 / 32
242 UPPER LONSDALE/VANCOUVER	21.2	174 / 212	28 / 32
259 LIONS BAY/HORSESHOE BAY	19.3	179 / 212	29 / 32
C10 BLUEWATER/SNUG COVE	15.2	190 / 212	30 / 32
N24 DOWNTOWN/UPPER LONSDALE NIGHTBUS	11.3	202 / 212	31 / 32
C12 LIONS BAY/CAULFEILD	6.4	212 / 212	32 / 32

Note: due to data unavailability, routes 257, 609, C8, C60 and C64 are not included in System Wide Rankings.

[23] Not all revenue hours are equal since different vehicles have different operating costs – i.e. conventional bus, community shuttle.

Boardings per Revenue Hour: Observations/Comments

- Strong performing routes based on boardings per revenue kilometre are for the most part the same routes that perform well when measuring boardings per revenue hour. This also applies for the low performing routes on both measures. Therefore, route rankings are also for the most part identical when comparing the two measures on a sub-region and system wide level. A similarity across Saturday and Sunday was also observed.
- The above average values observed when comparing all North Shore routes a s a whole to the entire system for boardings per revenue kilometre is also apparent in boardings per revenue hour. During weekdays all North Shore routes combined average 68.5 boardings per revenue hour with the system wide average at 52.6 boardings per revenue hour. The difference between the two is larger during weekends where on Saturdays the North Shore has 82.7 boardings per revenue hour and the system wide average is at 54.7 boardings per revenue hour. For Sundays/Holidays the North Shore averages 98.1 boardings per revenue hour while system wide the average is 52.0 boardings per revenue hour. These results indicate that North Shore network is most effective on weekends when service is lower, but the boardings to service hours ratio is higher compared to weekdays.
- The carrying capacity provided by a single SeaBus (equivalent to eight 12 metre long conventional buses) along with the short travel time of each trip between Lonsdale Quay to Waterfront Station (12 minutes) elevates its boardings per revenue hour value and skews the North Shore's total average for this measure. As stated above, careful examination and comparison between routes and sub-region to system wide must be taken due to different route vehicle types and distances.

Boardings per revenue space kilometre:

Calculated as the total number of boarded passengers divided by the revenue space-kilometres provided. Revenue space-kilometres is the sum of the distances that each vehicle-space travelled on a route. It is the total revenue distance travelled by a vehicle, multiplied by the average spaces on that vehicle. Similar to the above two indicators it too compares the level of service usage to the amount of service operated, however, unlike these indicators, this measure accounts for the different vehicles that operate on a route, at different times of day (e.g. route #214 operates with conventional buses during peak times and community shuttle during off—peak times).

Boardings per revenue space kilometre overcomes the inequality of vehicle types and, therefore, reduces the difference between routes. However, similar to the two route effectiveness indicators discussed above, route distance, required to calculate the boardings per revenue space kilometre measure, affects resulting values with longer routes not performing as well, even in urban areas.

Table 15 shows the average number of daily boardings on a route for every revenue space kilometre provided on the same route in the North Shore during weekdays.

Table 15: Weekday Average Boardings per Revenue Space Kilometre with Rankings by Route

Line	Boardings, per rev space km (daily)	Boardings, per rev space km (daily) - Systwem Wide Rank	Boardings, per rev space km (daily) - North Shore Rank
230 UPPER LONSDALE/LONSDALE QUAY	12.44%	9 / 212	1 / 32
998 SEABUS	10.46%	17 / 212	2 / 32
229 WESTLYNN/PHIBBS EXCH/LONSDALE QUAY	10.16%	19 / 212	3 / 32
239 CAPILANO COLLEGE/PARK ROYAL	9.73%	22 / 212	4 / 32
240 15TH STREET/VANCOUVER	7.09%	43 / 212	5 / 32
255 DUNDARAVE/LYNN VALLEY CENTRE	6.88%	47 / 212	6 / 32
228 LYNN VALLEY/LONSDALE QUAY	6.65%	49 / 212	7 / 32
241 UPPER LONSDALE/VANCOUVER	6.59%	51 / 212	8 / 32
232 GROUSE MOUNTAIN/PHIBBS EXCH	6.09%	57 / 212	9 / 32
C11 EAGLE CLIFF/SNUG COVE	5.70%	62 / 212	10 / 32
210 UPPER LYNN VALLEY/VANCOUVER	5.26%	71 / 212	11 / 32
252 INGLEWOOD/VANCOUVER/PARK ROYAL	5.23%	72 / 212	12 / 32
250 HORSESHOE BAY/DUNDARAVE/VANCOUVER	5.08%	78 / 212	13 / 32
253 CAULFEILD/VANCOUVER/PARK ROYAL	4.91%	84 / 212	14 / 32
247 UPPER CAPILANO/GROUSE/VANCOUVER	4.75%	85 / 212	15 / 32
C15 INDIAN RVR/DEEP COVE/PHIBBS EXCH	4.40%	89 / 212	16 / 32
236 GROUSE MOUNTAIN/LONSDALE QUAY	4.20%	97 / 212	17 / 32
251 QUEENS/VANCOUVER/PARK ROYAL	4.15%	99 / 212	18 / 32
214 BLUERIDGE/PHIBBS EXCH/VANCOUVER	4.06%	101 / 212	19 / 32
258 UBC/WEST VANCOUVER	3.85%	109 / 212	20 / 32
292 UPPER LYNN VALLEY	3.67%	116 / 212	21 / 32
212 DEEP COVE/PHIBBS EXCH	3.57%	122 / 212	22 / 32
254 BRITISH PROPERTIES/PARK ROYAL/VAN	3.56%	123 / 212	23 / 32
211 SEYMOUR/PHIBBS EXCH/VANCOUVER	3.34%	129 / 212	24 / 32
246 LONSDALE QUAY/HIGHLAND/VANCOUVER	2.86%	146 / 212	25 / 32
256 FOLKSTONE WY/WHITBY ESTATE/SPURAWAY	2.56%	159 / 212	26 / 32
290 DEEP COVE	2.07%	169 / 212	27 / 32
C10 BLUEWATER/SNUG COVE	2.01%	173 / 212	28 / 32
242 UPPER LONSDALE/VANCOUVER	1.65%	188 / 212	29 / 32
N24 DOWNTOWN/UPPER LONSDALE NIGHTBUS	0.87%	208 / 212	30 / 32
259 LIONS BAY/HORSESHOE BAY	0.78%	210 / 212	31 / 32
C12 LIONS BAY/CAULFEILD	0.26%	212 / 212	32 / 32

Note: Due to data unavailability, routes 257, 609, C8, C60 and C64 are not included in System Rankings.

Boardings per Revenue Space km: Observations/Comments

- According to this indicator route #230 Upper Lonsdale/Lonsdale Quay surpasses the SeaBus to become the top performing route on the North Shore during weekdays. It too is the top performing route for Saturdays with most routes having the same rank both during the week and on Saturday. On Sunday/Holidays, both SeaBus and route #230 are bettered by route #254 British Properties/Park Royal/Vancouver. Most routes rank above the 50th percentile when compared to all routes in the system for all days.
- Slightly below average values were observed when comparing the average of all routes on the North Shore to the system wide average with values of 4.84% and 4.94%, respectively. During Saturdays North Shore routes perform above the system wide average of 5.08%, with 5.57%. this also applies to Sunday/Holidays with all routes on the North Shore averaging 5.71% and the system wide averaging 4.56%.

CAPACITY UTILIZATION

Capacity Utilization is a measure that represents the total number of passengers boarding a particular service as compared to the total capacity provided by that service. While average load, or load factor, measures the "fullness" of a bus, capacity utilization can measure the effect of "turnover" or the productivity of a service. Figure 22 illustrates the difference between average load, load factor and capacity utilization:

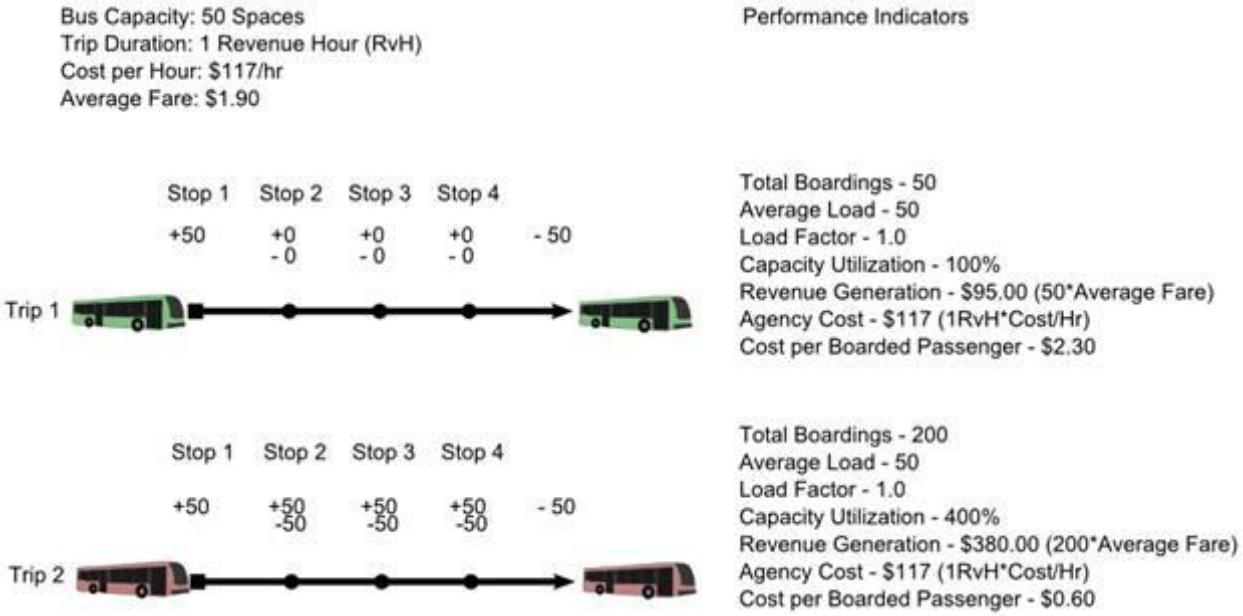

Figure 22. Capacity utilization illustrative example

In the example above, two trips leave Stop 1 with 50 people occupying 50 spaces. On Trip 1 the bus passes through three additional stops without boarding or alighting a single passenger. From the perspective of the observer, Trip 1 seems productive; there are 50 boardings, the average load of the bus is 50, the load factor is 1.0 (all the available spaces on the bus are filled), capacity utilization is 100%.

Trip 2 demonstrates a different ridership pattern. On Trip 2, as with Trip 1, the bus leaves Stop 1 with 50 passengers, but at each of the three subsequent stops 50 passengers get off the bus and 50 passengers get on. Some of the performance measures for Trip 1 and Trip 2 are equivalent; Trip 2 has an average load of 50 and a load factor of 1.0. The difference between Trip 1 and Trip 2 is in the number of boardings and the capacity utilization. Trip 2 generates 200 passenger boardings and has a capacity utilization of 400%, 200 boardings over 50 spaces, compared to Trip 1 at 50 boardings and 100% capacity utilization. Both trips could be seen as successful and productive, but from the perspective of Service Optimization Trip 2 is more productive because Trip 2 earns four times the revenue as Trip 1 and has a lower cost per boarded passenger.

Capacity Utilization: Weekdays

Weekdays experience the highest amount of capacity utilization when compared to weekends. The greatest amount of utilization or "turnover" occurs during the p.m. peak period, especially on westbound trips on routes #239 Capilano University/Park Royal and 255 Dundarave/Lynn Valley Centre/Capilano University. During this time period and direction the combined average capacity utilization is greater than 160% with trips averaging higher than 80 boardings. This observation coincides with the fact that there are multiple destinations along these routes that are readily accessible with transit, together with strong anchor points on each end – Ambleside/Park Royal and Capilano University. Although high capacity utilization is experienced on some North Shore routes during key time periods and directions for the most part utilization is below 100%. When examining all routes during all time periods the average capacity utilization per trip is 57% meaning that the average trip on all routes experiences 28 boardings.

Capacity Utilization: Saturdays

Compared to weekdays, Saturdays experience fewer time periods with trips having greater than 100% capacity utilization. Average for these trips is 124% with all trips throughout the day averaging 57%, identical to weekdays. Also similar to weekdays, routes #239 and 255 rank the highest in capacity utilization per trip. However, trips in both directions experience high "turnover". This primarily occurs during the late afternoon and early evening time periods.

Capacity Utilization: Sunday/Holidays

The daily average per trip during Sundays or Holidays is 51%, lower compared to either weekdays or Saturdays. There are fewer routes and time periods that experience capacity utilization greater than 100%. Routes #239 and 255 once again are strong performing routes with trips in both directions doing equally well. Route #250 Horseshoe Bay/Dundarave/Vancouver also has high capacity utilization on Sundays/Holidays. Some trips during the late afternoon have capacity utilization values greater than 150%

The most "turnover" occurs during the late afternoon, but does not carryover as much into the early evening as discovered on Saturdays. Earlier closing times of services at key destinations along routes can partially explain this observation.

Capacity Utilization: Observations/Comments

- Highest capacity utilization values are during peak time periods with off-peak times, particularly during the late evening after 12:00 a.m. having the lowest. Time periods with low capacity utilization are also periods that generate the lowest revenue.
- High capacity utilization may not necessarily be an issue along busy segments with crowding on a route. Other indicators must also be examined, such as peak passenger load and the amount of pass-ups occurring along a route.

3.1.4 NETWORK PERFORMANCE SUMMARY

Overall the route network effectively provides both local and external service to the entire North Shore. Three major exchanges play a crucial role in the network design, partially related to the unique topography of the sub-area. This topography, combined with service levels relative to demand, makes direct routing a challenge, particularly for connections to areas outside the core of the North Shore. The network design is still largely focused on traditional commuter patterns, focused on downtown Vancouver. This includes much higher service frequencies and route availability in peak periods. Network legibility is affected by this variation, along with complex routing. Infrastructure issues include desired improvements to customer experience at exchanges and Park & Rides. Transit priority measures are focused on the two Burrard inlet bridges and provide improvements to travel time and reliability. It is anticipated that the new transit priority lanes at the Lions Gate bridge will improve transit speed and reliability.

A review of routes against the Transit Service Guidelines and other indicators suggest issues are focused on a few key routes and time periods. Minimum service frequency guidelines are met on most North Shore routes, with the notable exception of those serving the lower–density residential areas of West Vancouver. Span of service guidelines are not typically met for connections to downtown Vancouver, but are met for travel within the North Shore. TSGs for frequency and span must be balanced against demand and productivity. Crowding is experienced on only a few key routes, primarily in the a.m. and p.m. peak direction (to downtown Vancouver in the a.m. and reverse in the p.m.). SeaBus ridership is also primarily peak-oriented, with the service typically operating at less than 40% of capacity. Relatively low ridership in the "reverse peak" direction does not correspond with travel demand data suggesting commuters to the North Shore from south of the Burrard inlet is an increasing market. This could be influenced by the relative ease in automobile travel (e.g. free parking, lower congestion) for these trips compared to the commute out of the North Shore, particularly to downtown Vancouver.

Reliability, as measured against TSG is poor; however subsequent analysis of actual connection times at timed transfer locations suggests customer impacts not as visible except in the p.m. peak. Utilization of service varies, reflecting the variety of route purposes. Those connecting to major centres or serving peak direction commuters are better used. Capacity utilization, measuring turnover, is highest on the two major east-west routes (#239 and 255) with multiple destinations along the corridor and major anchor destinations at each end.

3.2 TRANSIT MARKET ANALYSIS

This section focuses on the demand for travel and built environment and demographics that may be influencing that travel. This ATP is focusing on transit travel and travel demand not currently met by transit. Multi-modal travel and integration will be considered; goods movement travel is beyond the scope of this project.

3.2.1 CURRENT TRAVEL MARKETS

To determine the patterns of travel demand across the North Shore, two data sources were assessed – the TransLink Trip Diary and the Census Journey-to-Work data. In addition to an overall view of the North Shore patterns, data was assessed using similar sub-area analysis zones, which grouped neighbourhoods with similar characteristics, illustrated in Figure 23. Where sample sizes were low in a particular pattern, analysis zones were grouped as follows:

- North Shore West: Horseshoe Bay – Westmount, Upper West Vancouver, Bowen Island and Lions Bay
- Core North Shore: Ambleside - Park Royal, Capilano, Lonsdale, Keith Lynn and Lynmour - Capilano University
- North Shore East: Upper Lynn, Delbrook, and Seymour – Deep Cove

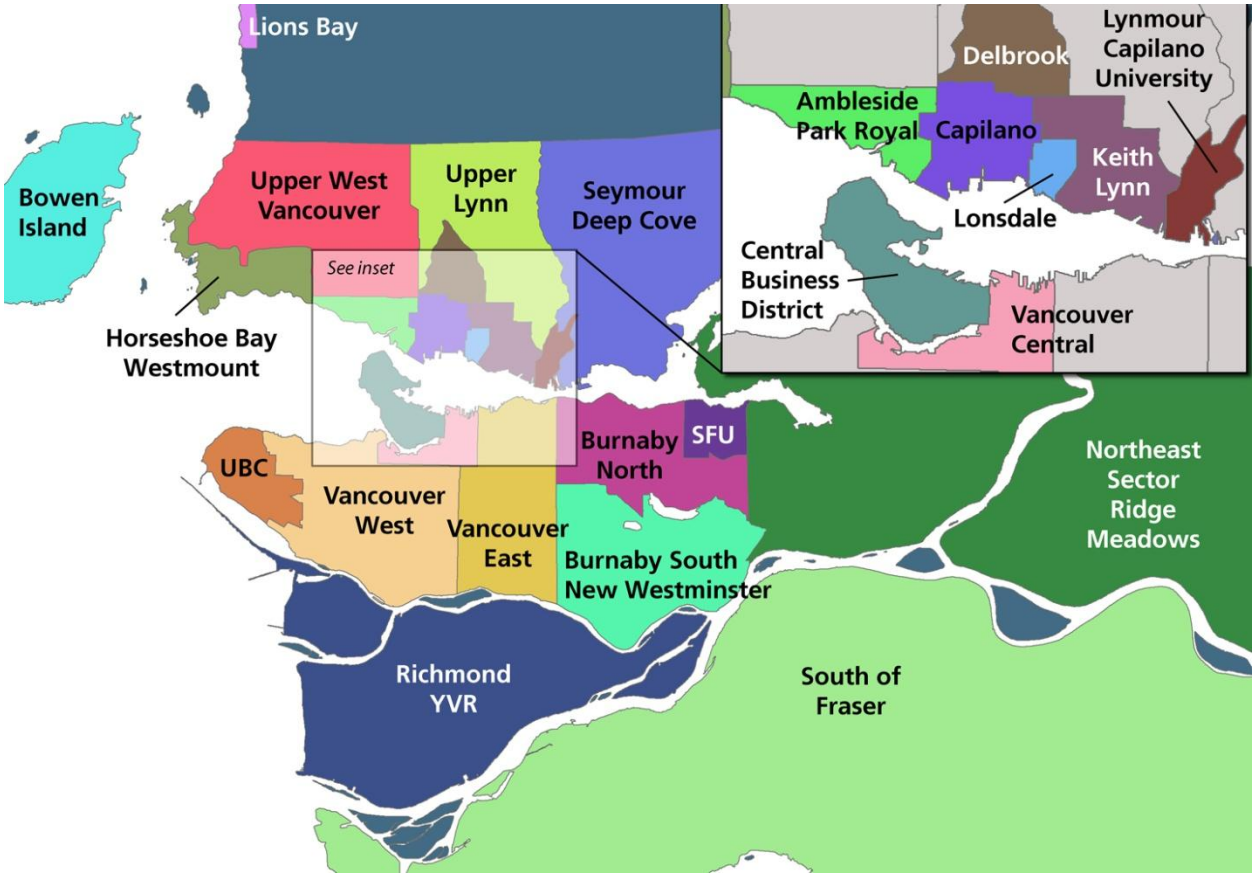

Figure 23. Sub-Area Analysis Zones

Recognizing the distinct nature of commuting trips, non-commute trips, and grade school trips, patterns by analysis area were separated by trip purpose. For this analysis, 2006 Census data was used for commute trips (taking advantage of a larger sample size) while 2008 Trip Diary was used for the non-commute and grade school trips.

OVERALL NORTH SHORE

Based on Census Journey-to-Work data, commuting patterns to and from the North Shore have been changing since 1996, although the number of commuters has not changed much over the decade (see Table 16). There has been overall growth in trips by transit (3% increase), but the mode share has increased only slightly from 13% to 14%. The transit strike in 2001 affected commute trips by transit in that Census year. Though the percentage mode share represented by walking and cycling commuters was both low and constant, the absolute number of this category increased by 13% from 1996 to 2006.

The total employed labour force grew slightly, by 2.5% from 1996 to 2006, but the number of people who commuted to a usual place of work outside of their home dropped slightly. The biggest growth in a specific category was in people who do not work at a fixed location. Importantly, this group, including trades people, is often less likely to use transit. Working from home accounts for 13% of the total employed labour force on the North Shore.

Table 16: Journey-to-Work: North Shore Resident or Employee

	Census Year				As Percent of Total Fixed		
	1996	2001	2006		1996	2001	2006
Total Fixed Place of Work	70,865	69,740	69,220		-	-	-
Vehicle Driver	51,270	51,410	48,505		72%	74%	70%
Vehicle Passenger	4,230	4,085	4,110		6%	6%	6%
Motorcycle	50	100	220		0%	0%	0%
Public Transit	9,315	7,995	9,610		13%	11%	14%
Walk to Work	3,825	4,460	4,310		5%	6%	6%
Bike to Work	905	1,095	1,035		1%	2%	1%
Other	505	310	350		1%	0%	1%
Taxi	30	80	70		0%	0%	0%
					As Percent of ELF		
Total Fixed Place of Work	70,865	69,740	69,220		80%	78%	76%
Work Not Fixed	7,530	8,685	9,750		8%	10%	11%
Work at Home	10,260	10,680	11,950		12%	12%	13%
Employed Labour Force (ELF)	88,655	89,105	90,920		100%	100%	100%

Note: ELF = (Total Fixed + Not Fixed +At Home)

Looking at commuter movement patterns, overall there has been a decrease in the number of both total trips and transit trips from the North Shore to Vancouver's Central Business District (CBD), although transit mode share has remained fairly constant (28.6% in 2006). The largest fixed employment destination for North Shore residents is the Core North Vancouver and Core West Vancouver area (Park Royal to Lower and Central Lonsdale), which has seen an increase in the number of trips since 1996 and increase in transit mode share (from 9.5 to 12.4%). There has been surprising growth (7.9% from 1996-2006) in the number of commuters travelling to the Core North Shore area from outside the North

Shore, the largest increase of any commuting pattern. This market has also seen an increase in absolute transit use and in mode share (increasing from 18.8% in 1996 to 22.1% in 2006). Current transit ridership data however, indicates that capacity is still underutilized in this direction.

Non-commute trips, which overall make up the majority of trips through the day, have seen similar trends. Most personal business and school trips stay on the North Shore, however transit share is lower than for commuting trips. These non-commute trips also have higher auto occupancy, with approximately one third of automobile travel trips have more than one passenger. Non-commute trips also tend to be shorter than commute trips

The number of North Shore residents commuting to downtown Vancouver has been decreasing, though transit mode share is consistently high. Commuting to the North Shore Core is increasing, including from south of the Burrard inlet.

Most non-commute trips stay on the North Shore, are shorter and have low transit use.

Comparing and contrasting travel patterns of differing parts of the North Shore illustrates the relationship with the built environment. The core area of the North Shore generally shows different patterns than the non-core area for most trip purposes. Table 17 summarizes this analysis.

Table 17: Summary of Travel Patterns by Sub-Area and Trip Purpose

	Sub-Area		
Trip Purpose	**Core North Shore**	**Outside Core North Shore**	**All North Shore**
Commute (Census)	-Increasing walk/bike mode share -Growth in transit commuting to Core North Shore (including from outside North Shore)	-Most transit use is to CBD	-High, but not growing, transit mode share to CBD; absolute commute to CBD is decreasing -Commuting is highest mode share of all trip purposes, especially to CBD
Non-Commute (Trip Diary)	-Increasing walk/bike mode share -Higher transit mode share to core North Shore than to outside core	-	-Most non-commute trips stay on North Shore, large potential transit market
Grade School (Trip Diary)	-Higher walk and transit mode share than outside Core	-	-High auto passenger mode share
All Trip Purposes	-	-Lowest transit use compared to Core area	-

VARIATIONS BY TIME OF DAY

To assess the demand for travel through the day, trip purposes were grouped into three categories: commute (to both work and post secondary schools); to/from grade school; and non-commute. Time-of-day variations are as expected, with higher demand in the a.m. and p.m. peaks with strong impact from grade school trips in the peak hours (see Figure 24). Additionally, overall demand drops off steeply after 6:00 p.m.

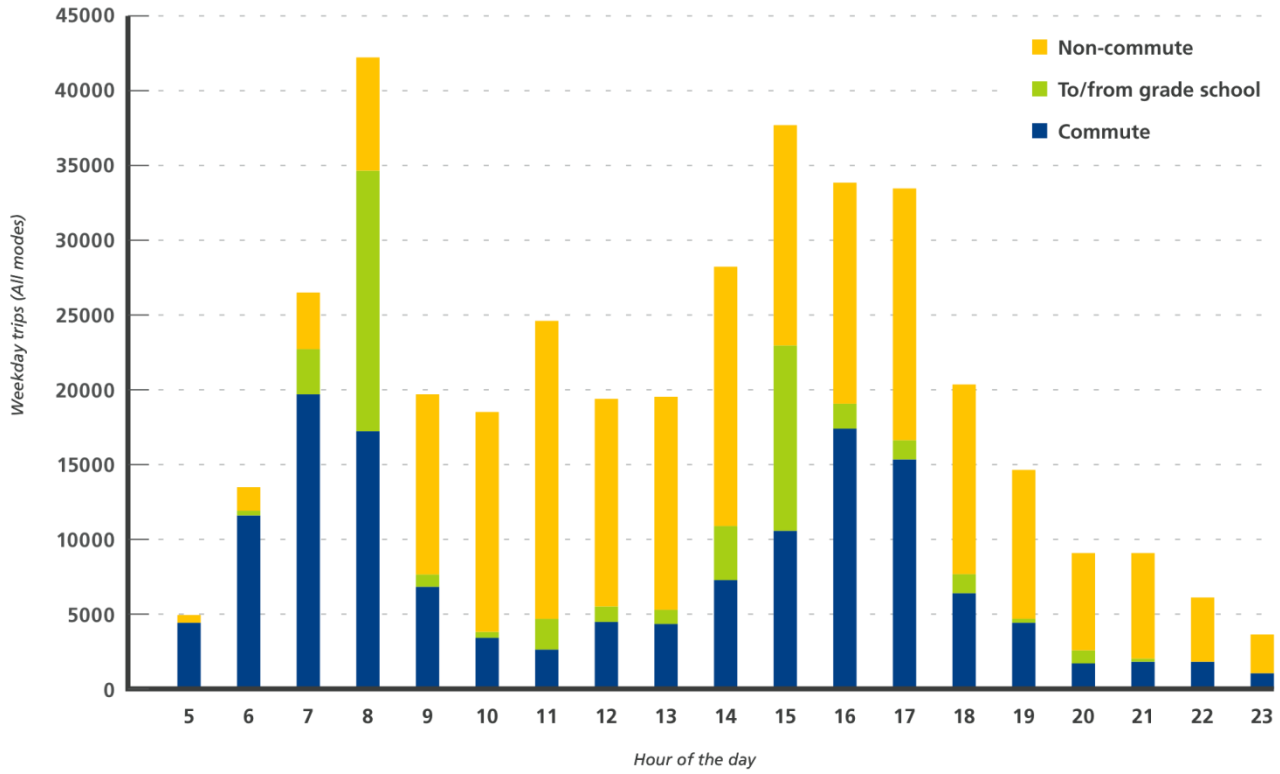

Figure 24. Weekday Trips to / from and within the North Shore by Time of Day (all modes)

Source: 2008 Trip Diary

Travel to/from grade school is dominated by auto passengers (50%) followed by walking (38%). Transit mode share is 8% overall but 10% during peak periods. As noted in the above section, there is variation in this pattern depending on the location, with higher walk/bike and transit use in the core area of the North Shore.

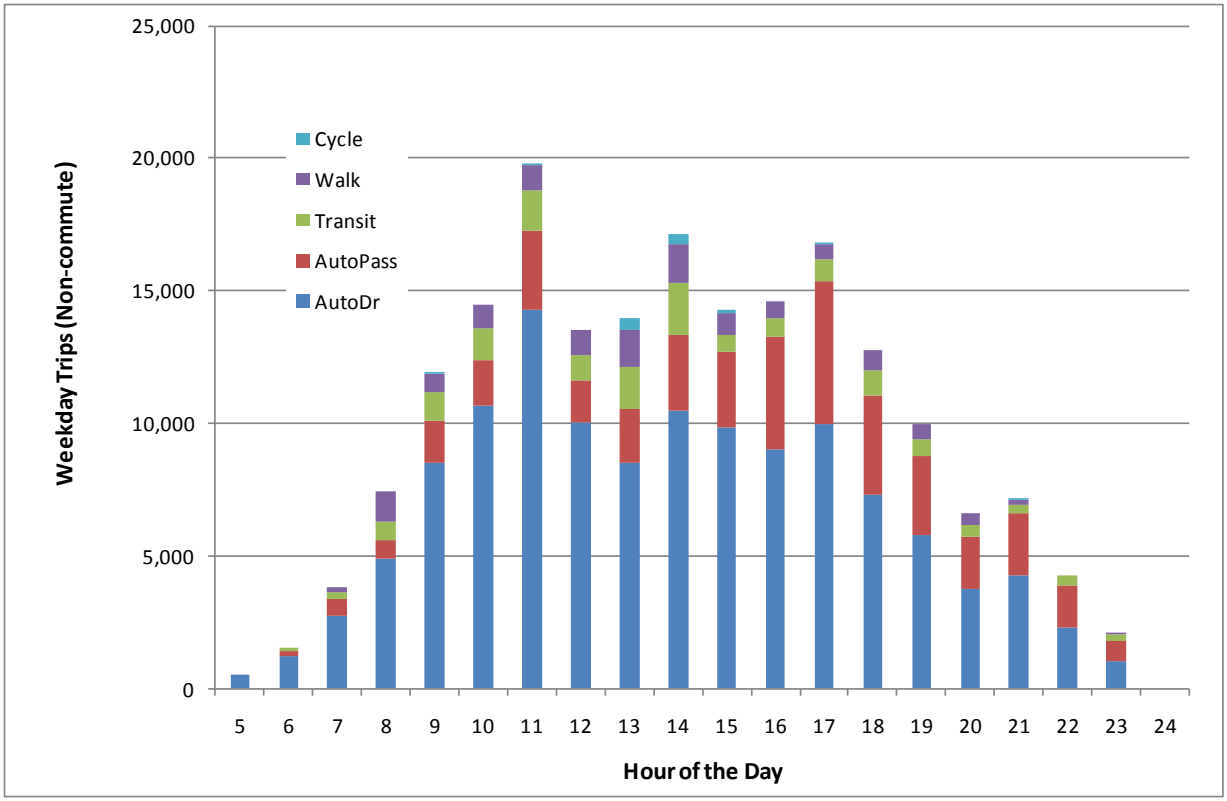

Figure 25. Non-Commute Trips by Mode and Time of Day

Source: 2008 Trip Diary

For non-commute trips, again the dominant mode is auto drivers (65%) followed by auto passenger (21%) and transit (8%). Compared to commuting, there is a high percentage of ridesharing; typically making these trips more difficult to attract to transit . Peak demand occurs midday; peak hourly trips are same order of magnitude as commute trips (see Figure 25). Since trips are shorter than commute trips and auto driver percent is lower (65%), there are fewer cars on the road; however, road capacity may also be lower due to relaxation of peak period parking restrictions.

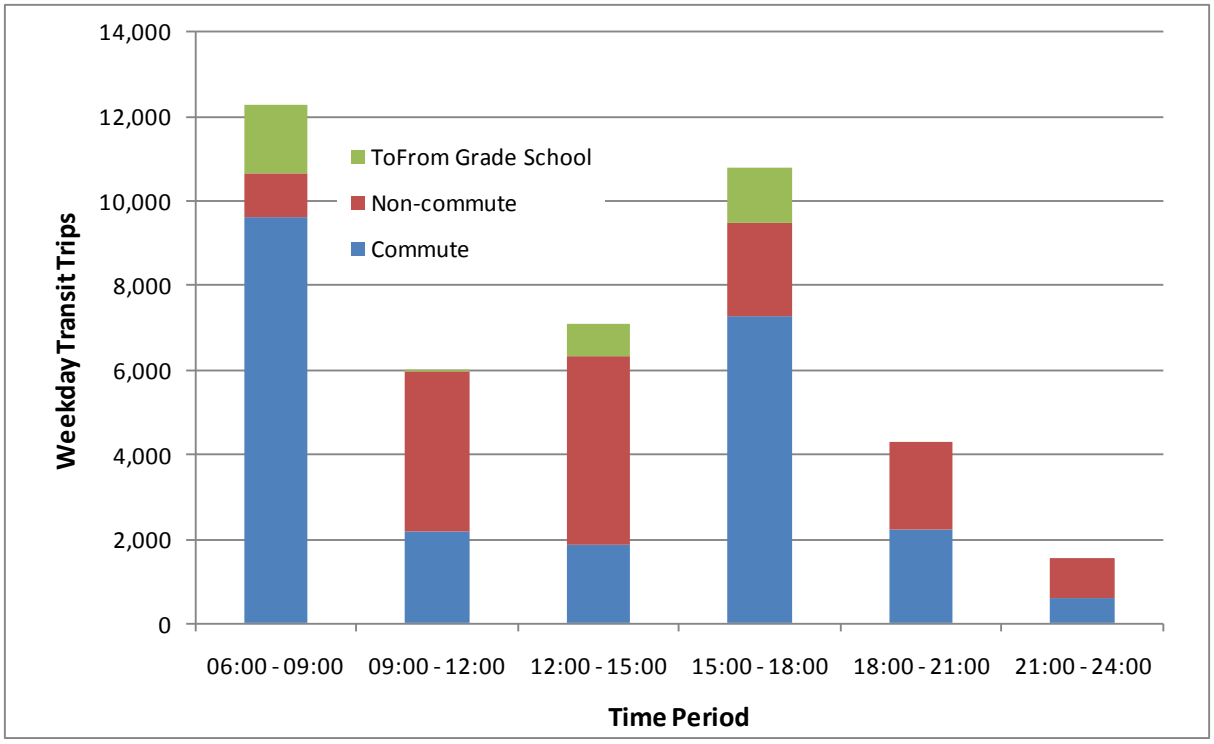

Figure 26. Transit Trips by Purpose and Time Period

Source: 2008 Trip Diary

Overall, transit use during the peak periods is dominated by commute trips (see Figure 26). Transit trips drop in evening hours, but this drop occurs across all modes.

3.2.2 DEMOGRAPHICS

Demographics relates to transit markets because different age cohorts have different travel patterns. Projections are based on the Metro Vancouver estimates to 2041. Two main demographic trends are expected to affect travel demand over the next 30 years – an increase in seniors and changes in prime commuter-age population.

The number of seniors aged 65 and above is expected to more than double between today and 2041, increasing from about 15% of total population to 25% of the total. The impact on travel is that while seniors have lower daily trip rates, their midday trip rates are higher. As a result, the overall demand for midday travel can be expected to increase relative to the rest of the day.

Comparatively, growth in commuting age population is forecast to grow by only 20% over the next 30 years. Related to this, the total employment on the North Shore is expected to increase by 38% over the same time horizon – almost double the growth in prime commuters. This implies that more workers will be able to stay on the North Shore for employment and/or more workers will commute to the North Shore from points south (or Squamish). Jobs

> Over 30 years, it is expected the number of seniors will more than double, likely increasing midday demand. The growth in jobs outpaces the growth in commuting age population, suggesting more workers will be able to stay on the North Shore and/or commuting from outside the sub-region will increase.

per 100 non-senior adults are expected to go from 66 to 75.

As seen in Figure 27, adults in the age range 30 to 64 have the highest daily trip rates. After age 65, the number of trips per day gradually falls. However, the highest use of transit is for young adults (age 15 to 29), and proportionally higher over age 80; likely related to auto availability and ability to drive. These rates translate to about 25% transit mode share for teens/young adults, 12.5% for older seniors (80+), and just over 6% for adults aged 30 to 79.

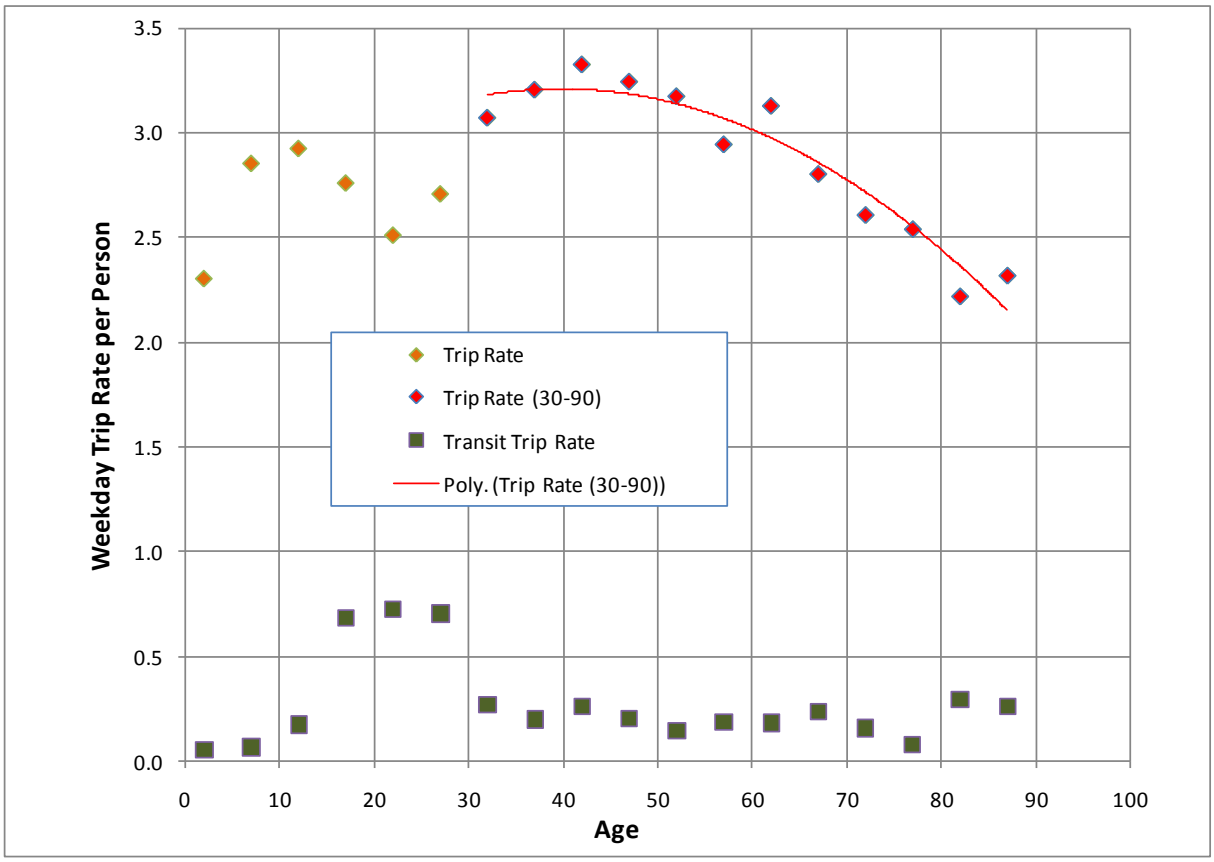

Figure 27. Trip Rates by Age Group

Source: 2008 Trip Diary

Finally, it is worth noting that while the North Shore is not growing fast, overall regional population growth will increase demand for travel to the unique destinations of the North Shore, as well as to the Horseshoe Bay ferries. Major natural recreation sites such as Lynn Canyon, Capilano Canyon, and Grouse Mountain will face more parking demand that are likely to lead to stronger incentives for transit use.

3.2.3 BUILT ENVIRONMENT

Metro Vancouver as a region has long supported a transit-oriented land use approach, with compact urban centres linked by transit corridors being a core part of regional growth plans. All municipalities in the North Shore highlight the benefits of coordinated land use and transportation in their respective Official Community Plans (OCPs). While varying according to the size and development pattern of each jurisdiction, all include specific land use policies that facilitate a decreased reliance on the automobile.

Transit-Oriented Communities (TOC) are places that help reduce reliance on the automobile by:

- focusing higher-density, mixed-use pedestrian-friendly development within walking distance of existing or future frequent transit; and
- implementing mobility demand measures to discourage unnecessary driving.

Several attributes have been identified that are common in nearly all places with high levels of transit demand and productive transit service:

- Major **Destinations** and centres are lined up in reasonably direct corridors making them easy to serve efficiently by frequent transit;
- Walking **Distance** to frequent transit is minimized by creating a fine-grained urban structure of well-connected streets around which to focus:
    - people-friendly urban **Design** including safe, comfortable, and direct pedestrian and cycling routes;
    - the majority of residential and employment **Density**;
    - a rich **Diversity** of land uses and housing types; and
    - **Demand** management measures that discourage unnecessary auto trips.

With no single measure truly effective in isolation, together these "six Ds" are implemented in concert in successful transit-oriented communities. The complexity of urban travel behaviour means there are no magic thresholds for density or any other variables that, once achieved, will automatically produce certain travel outcomes. Instead, each of the "six Ds" work together at all spatial scales to support higher levels of transit and reduced levels of automobile dependence. Additionally, no single tool is available to measure or evaluate the "six Ds". Instead, a mix of quantitative and qualitative analysis of the North Shore built environment can help identify existing or potential transit-oriented communities.

Examples of the individual TOC elements can be found in the North Shore, although often separate or not integrated. The Lower Lonsdale and Lonsdale corridor area provides the best example of a full TOC, with aspects of each of the "six Ds" present. Additionally, the Marine Drive corridor, from approximately Ambleside to Lower Lynn is planned to develop further to be more of a TOC. These locations are already served by frequent transit, and land use projections indicate they will be the focus of future growth - a benefit to transit. Appendix 9 provides illustrative examples of TOC on the North Shore.

The best examples of TOC on the North Shore are in Lower Lonsdale, and are included in plans for designated growth centres. Overall growth is expected to be low over the next 30 years, primarily with changes expected to the intensity, not location, of existing density.

Additionally, there are a number of smaller centres that exhibit some existing TOC attributes at some scale, and/or are planned to develop further as transit-oriented communities. These include:

Ambleside, Lynn Valley, Horseshoe Bay, Dundarave, Edgemont Village, Lower Lynn (planned), Parkgate and Deep Cove. Conversely, much of the sub-region is comprised of automobile-oriented development.

While transit supportive policies for town centres may be part of most North Shore municipal OCPs, overall growth is expected to be low relative to the rest of the region. Overall, total population is expected to increase by one third over 30 years; less than 1% per year growth rate. As illustrated in Figures 28 and 29, this limited growth is forecast to concentrate in the core North Shore area and to some extent in the Lower Lynn and Lynn Valley centres. These locations are also the focus of future employment growth. It should be noted that some additional growth is anticipated for designated centres in the District of North Vancouver, based on the draft Official Community Plan, not currently reflected in Metro Vancouver estimates.

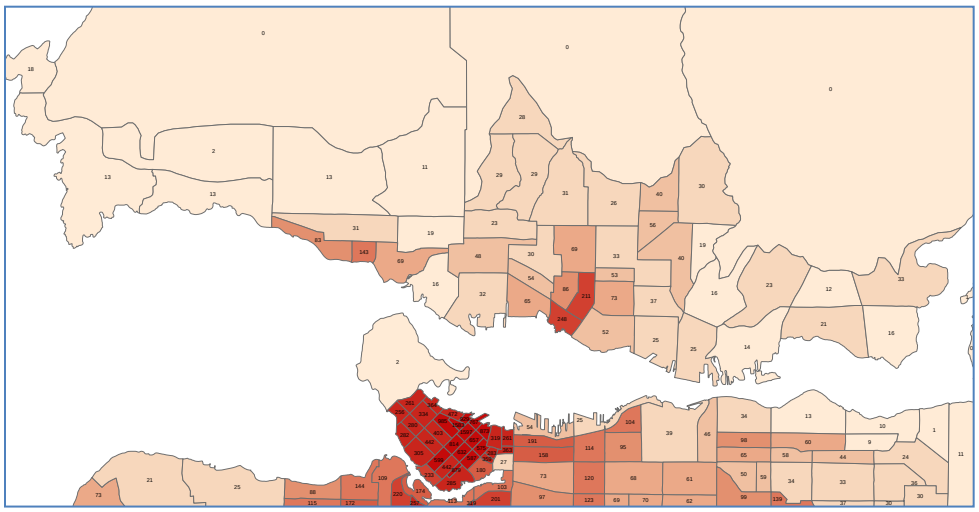

Figure 28. Population plus Employment per Hectare 2008

Source: Metro Vancouver

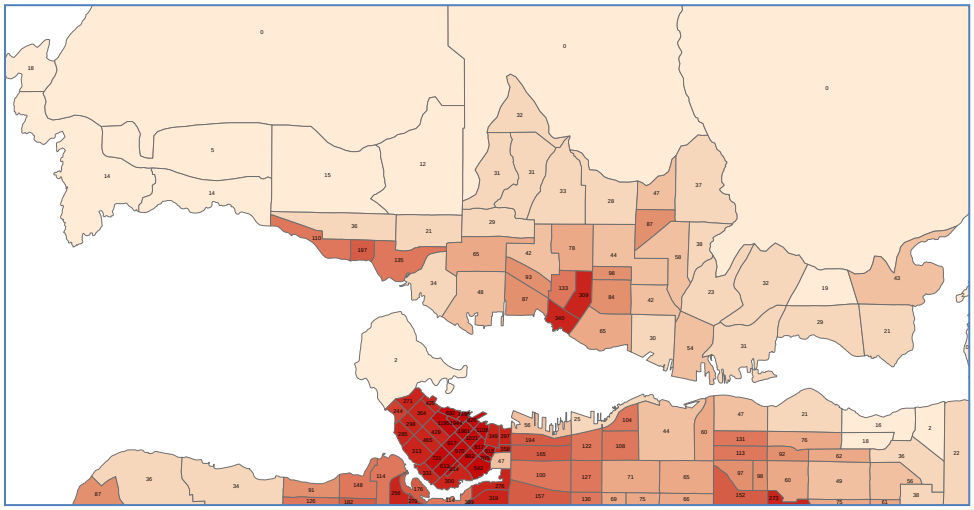

Figure 29. Population plus Employment per Hectare 2041

Source: Metro Vancouver

3.2.4 TOPOGRAPHY

Any discussion of the North Shore urban environment must include topography. Built on the slopes of the North Shore mountains, there are steep inclines on many north-south streets. This can create a potential barrier to transit use, affecting the walkability of neighbourhoods. Accessibility can also be challenged, both from the perspective of the added barrier for those who have difficulty walking and from maximum slope limitations on bus wheelchair ramps and lifts (slopes exceeding 8%).

Additionally, natural barriers created by rivers and creeks limit east-west movement to a small number of road and pedestrian corridors. Major east-west travel is limited to Highway 1 and Marine Drive. A similar constraint is involved in travel off the North Shore. Two bridges and one transit route (SeaBus) provide the only connection with the rest of the Metro Vancouver region.

Figure 30. Steep slopes can create barriers to transit use

3.2.5 MARKET ANALYSIS SUMMARY

Variations in trip purposes, demographics and the built environment all influence travel demand in the North Shore. There is a distinct difference in travel patterns between the core area of the North Shore and the rest of the sub-region. The core has higher non-auto mode share, and is increasingly the major destination of employment for residents both on and off the North Shore. Compared to the reducing market for commuting travel to downtown Vancouver, the core North Shore represents an opportunity for increasing transit markets. Travel within the North Shore, including midday trips for non-commuting reasons, also represents a large market that could be attracted to transit.

Travel demand by time of day varies dramatically, with school travel significantly emphasizing the peak periods. Midday travel is dominated by non-commute trips, and demand for travel drops greatly after 6 p.m.

The built environment includes a network of centres, with some transit-oriented community attributes, as well as a main east-west corridor (Marine to Dollarton) that supports transit. Future growth is planned to increase density in these same areas, however overall growth is expected to be relatively low.

3.3 CUSTOMER PERCEPTIONS ANALYSIS

Customers' perceptions of transit are important to understand what characteristics of the system enhance or impede use. This section reviews the findings of a surveys delivered to North Shore residents and travelers via TransLink Listens, a Stakeholder questionnaire and operators' input. A summary will be provided, with comment on significant correlation and conflicts.

3.3.1 TRANSLINK LISTENS ATP SURVEY

To gauge the overall perceptions of North Shore transit service and to identify key barriers to increased transit use, a survey was conducted using the TransLink Listens online panel in December 2010. The survey included residents of North Vancouver, West Vancouver, and residents of Vancouver and Burnaby who regularly travel to the North Shore. Results were weighted to reflect eh age, gender, region and main transportation mode parameters of these areas. It should be noted that TransLink Listens panelists, due to their deeper engagement with transportation issues, are typically more critical overall of all transportation services, giving lower ratings than ongoing telephone tracking research.

Overall perceptions of the North Shore transit system are average, with a mean score of 5.6 (out of 10). Perceptions of quality vary according the familiarity with the system, with more frequent riders rating the system higher.

To identify the importance of various transit attributes to potential changes in travel behavior, panelists were asked to rate the importance of 11 suggested changes. The top five most important changes identified were:

1. Adding more frequent bus service (mean score of 7.9 out of 10),
2. improving bus connections (7.8),
3. making the existing bus service more direct (7.8),
4. improving travel time for existing routes (7.4); and
5. providing direct bus service between North Shore neighbourhoods which do not currently have direct service (7.1).

Suggestions for change with a relatively smaller impact on transit ridership potential included improving reliability, later service at night, increased SeaBus frequency, increasing bus stop amenities and bicycle lockers at exchanges. Further details on the methodology and results of the TransLink Listens survey are found in Appendix 10.

3.3.2 NORTH SHORE STAKEHOLDERS SURVEY

In addition to the perceptions of the general public captured in the TransLink Listens survey, stakeholders representing North Shore interests were surveyed in December 2010. In total, 94 groups were invited to participate in an on-line survey. Invited stakeholders represented a variety of interests and activities, including community associations, municipal advisory committees, business contacts, schools, and seniors groups; the full list of stakeholders and the report summary are found in Appendix 11. Completion rate of the survey was 18% (17 organizations), with an additional five providing incomplete responses. Results are considered with caution, as a maximum response of 22 does not provide results that can be considered with any statistical significance.

Consistent with results from the Customer Satisfaction surveys, the most important aspects of transit reported were direct convenient connections and routes, frequency, and on-time reliability. Stakeholders reported the lowest scores (average below 6.0 on 10 point scale) for how well frequency, direct connections and routes, and trip duration were meeting the needs of their group. On-time reliability was rated the highest of all attributes (average 7.3), followed by bus stop customer information (7.0) and bus stop amenities (6.7).

A common theme among comments received was the importance of transit providing a competitive option to the private automobile, primarily relating to travel time and direct financial cost (fare policy is outside the scope of an ATP). Travel time on transit is a factor of a number of service attributes, including frequency (as the waiting time is included in total travel time), directness of routing, connections, and travel speed.

> *"It shouldn't take 2 to 3 times as long as a car ride to get to places on the North Shore."*
> -North Shore Stakeholder

While not statistically significant, stakeholder responses do suggest barriers to transit use vary with different transit markets. For example, while directness was generally important to all groups, students and commuters value directness for the faster travel times, while seniors may value point-to-point connections. Span of service, particularly late night and weekends/holidays was identified by stakeholders representing tourism and recreational travel as a barrier to increased transit use but less so for commuters.

3.3.3 FRONT-LINE EMPLOYEE ENGAGEMENT

TransLink's front-line employees, including Transit Operators and SeaBus Marine Attendants, have firsthand experience with the values of customers and the operating conditions on the North Shore. Staff at North Shore Transit Centres (depots) and the SeaBus terminal was consulted in December 2010, focusing on getting their interpretation of customer experiences. In total, 59 questionnaires were completed, including conversations recorded by consultation staff. Additionally, the operator of service on Bowen Island Community Transit was consulted independently, also in December 2010.

Generally, input from employees was specific to the routes served by the operating centre. Some specific issues identified are better addressed outside of the ATP process (e.g. detailed scheduling suggestions) and were forwarded accordingly. Employees at SeaBus suggested that the most common issue heard from customers is for more evening and weekend service. At all bus Transit Centres, service reliability was identified as an issue, including the concentration of routes on Georgia Street in downtown Vancouver. Crowding was noted as a frequent issue at North Vancouver and Burnaby centres, but less so in West Vancouver, where service span was highlighted.

The unique transportation needs on Bowen Island were reported by TransLink's transit operator on the island. While operators report that existing transit customers are generally satisfied with service, particularly the more flexible nature afforded by flag-stop operations, reported issues include requests for later operations, expansion of the service area and consistency in customer information. Other suggestions relate to issues outside the scope of the ATP, including introduction of new service types (including one oriented to seniors and those with accessibility needs), fare policy, and vehicle types. Appendix 12 includes a more detailed summary of the front-line employee engagement results.

3.3.4 SYSTEM-WIDE CUSTOMER SATISFACTION SURVEYS

TransLink collects transit performance ratings via a quarterly phone survey of Metro Vancouver residents age 16+ who have used transit in the past 30 days. Perceptions of "overall service" are reported along with five service attributes[24] and six system attributes[25] (i.e. not tied to a specific route). Attributes are rated by customers on a scale from one to ten, where "ten" means "excellent" and "one" means "very poor". An average rating of less than 7.0 suggests that improvements should be considered for that route.

All of the routes with the minimally accepted number of evaluations (35 in a given time period) have acceptable overall service ratings, surpassing 7 out of 10 on average. Overcrowding is the main variable affecting overall service scores. For many of the remaining routes with smaller sample sizes, both overcrowding and frequency of service, which are related problems, are perceived as problematic.

> For respondents of TransLink's quarterly surveys, overcrowding is the main variable affecting perception of transit service, and is related to frequency of service. North Shore routes are generally rated high overall.

Most North Shore routes are rated higher than the system average in all attributes, and North Shore residents generally rate system level attributes higher than the rest of the system. In the 2010 Q3 report, North Vancouver residents were the most positive for "operation of service during convenient hours", "value for money", "on-time, reliable service" while West Vancouver residents were the most positive for "enough shelters at stops" and the lowest in the system for "service frequency" and "adequacy of transit information at stops and stations". West Vancouver riders' perception of overall service quality has been trending downward through 2010. West Vancouver residents were the least likely to report taking multiple buses or modes, but those that to rate "having good connections" very positively; while North Vancouver riders were among the most likely in the system to use multiple modes. This can be related to the network design and possible the types of trips being taken in the two areas.

Customer perceptions of SeaBus are generally the most positive of all modes, and have been relatively consistent over the past year. 83% of riders rated "overall service" a good-to-excellent rating, compared to 76% for SkyTrain and 59% for bus (West Coast Express ratings are conducted differently so not comparable). The rider profile for respondents using SeaBus is also different from other modes. SeaBus riders have been riding transit for the shortest period of time (8.3 years versus 9.0 years, overall), are the oldest (average 45 years vs. 39), most apt to have a university education (49% vs. 40%) and higher household income (34% over $75,000/yr vs. 26%). Reported trip purposes of SeaBus riders are also different than other modes across the system; they are the most frequent users of transit when it comes to entertainment/social venues (56% vs. 41% overall), shopping (46% vs. 34%) and personal business (39% vs. 23%). SeaBus riders are also predominantly North Shore residents (50%) followed by City of Vancouver (23%).

Further information on Customer Service Performance can be found in Appendix 13.

[24] Service attributes: Frequency of Service, Not Being Overcrowded, Trip Duration, On-Time Reliable Service and Direct Route (SeaBus is not measured on Direct Route)

[25] System attributes: Transit Service Overall, Value for Money, Good Connections, Adequate Transit information at Stops and Stations, Convenient Hours and Enough Bus Shelters

3.3.5 SEABUS CUSTOMER PERCEPTIONS

Recognizing the unique service provided by SeaBus, a survey of customers was conducted during the morning and afternoon peak periods in December 2010. A total of 648 questionnaires were completed, though the survey is not considered to be a statistically significant sample of customers. Consistent with the TransLink quarterly system surveys, respondents rated SeaBus service highly, with more than 80% of respondents rating overall service 8 or higher (on a 10-point scale where 10 means "excellent"). The attributes contributing most to reported perceptions were reliability, staff and cleanliness. The survey revealed strong support for more frequent service, particularly evenings and weekends, and later evening on weekends. Other suggestions for improvement include infrastructure improvements of the SeaBus terminals. A full summary of the questionnaire and results is included in Appendix 14.

3.3.6 PERCEPTION SUMMARY

Overall, North Shore transit customers view the network positively, especially when compared with customers in the rest of the region. Crowding is the largest factor affecting overall perception, so higher overall ratings suggest crowding is not a common occurrence. Compared to previous surveys, including work for the last North Shore ATP, there has been little change in the perception of and issues related to North Shore Transit.

The most common barriers to increased transit use identified were frequency of service and improved travel times. This last point includes better connections, more direct routings on routes, and travel that does not require connections. It is suggested that transit needs to be more competitive with private automobile travel, including travel time cost as well as up-front financial cost. This indicates that providing better value for money is an opportunity to grow transit markets on the North Shore. It is notable that this may involve different value for different trip types and destinations. For example, the additional cost of two zone transit fares to downtown Vancouver may still provide better value when congestion and parking costs are factored in. However, the same two zone fare for commuting to the North Shore across the Burrard inlet does not compete with the same factors (with generally free parking and congestion). In this case, other measures of providing better value for money should be considered – including frequency of service, travel time improvements through transit priority or stop spacing, and reliability.

Some issues were specific to particular markets or locations. Commuter and students value improved overall travel time with less sensitivity to transferring if they are reliable, while seniors value point-to-point direct access (without required transfers). Longer service hours were identified as a desire in some areas, particularly where service ends earlier – e.g. West Vancouver and Bowen Island.

Issues & Opportunities

4.0 ISSUES AND OPPORTUNITIES

This section summaries trends relevant to the ATP, synthesizes the transit performance (supply), urban environment (demand) and customers' perceptions. It will identify issues and potential opportunities to meet ATP objectives.

4.1 TRENDS

To increase transit ridership and productivity, it is important to identify where changes are occurring, both historically and looking towards the future.

Changes affecting transit demand primarily relate to development patterns and demographics. Overall, the development pattern on the North Shore is not expected to change significantly, with most anticipated growth being focused on existing centres and corridors. The North Shore population is aging, with two main items of interest. First, the percentage of seniors is expected to exceed 25% of the population by 2040. Secondly, the number of jobs is increasing faster than the number of employed work force residing on the North Shore. This is expected to continue a historical trend of more trips staying on the North Shore, and more commuting to the North Shore from outside the sub-area.

Commuting trips have historically represented the largest transit market. There is increasing transit commuting markets, both absolute and mode share, to the core area of the North Shore. The opposite has been occurring to downtown Vancouver, with declining absolute trips by all modes and by transit – although transit mode share remains high (approximately 29%). Transit currently accounts for a smaller portion of non-commute trips, which make up the largest proportion of all trips through the day.

SUMMARY OF MAJOR NORTH SHORE TRENDS

- *Population and employment growth is low*
  - *Percentage of seniors rising*
  - *Job ratio will improve slightly*
- *Development pattern will not change significantly*
  - *Growth focused on centres and along Marine Corridor and Lonsdale Regional Town Centre, similar to existing patterns*
  - *Anticipated increased diversity housing types and affordability in centres*
- *More trips staying on North Shore*
  - *Declining absolute number of commute trips to Vancouver (but existing high % transit mode share maintained)*
  - *More non-commuting trips are within North Shore (low transit mode share)*
  - *More commuters travelling to North Shore are choosing transit (transit mode share and absolute transit market is rising in the reverse peak direction)*

4.2 SIGNIFICANT FINDINGS

Through the analysis of the North Shore, a number of important and analytical findings were identified. These are considered when identifying issues opportunities for improving the transit network.

A large potential travel market is revealed when matching age with transit mode share and trip rates (the number of trips taken per day). Youth (age 15-29) are the most likely age group to use transit, with a 25% mode share. This is compared to people aged 30-79 (there were similar patterns through this entire age range) who take the most trips per day but only demonstrate a 6% transit mode share. Older seniors (80+) have a mode share of 12.5%, but make the fewest trips.

Non-commuting trips represent a challenging market for transit, however represent the largest number of total daily trips. Most of these trips occur during the midday, average 7 km and are by car. Fully one third of these car trips are with passengers, which tend to be more difficult to attract to transit. Finally, evening trips, also predominantly non-commute, represent a very small market. After 6 p.m. the total number of trips on the North Shore, by all modes, drops significantly. After 8 p.m. total trips per hour is less than 9,000 (compared to over 40,000 in the peak hour and between 20,000 and 25,000 in the midday).

Other interesting points relate to the transit network and performance. The importance of the three major North Shore exchanges - Park Royal, Lonsdale Quay and Phibbs – is highlighted by the fact that all but one route travels through at least of these exchanges. With connections being an essential element of the network design, a review of transfer reliability found fluctuation in the p.m. peak period but overall connections made.

Generally, the current transit network functions well. Some crowding occurs, primarily during the peak periods, however it is not a widespread issue. Peak hour demand is different in both size and orientation from midday. The transit network reflects this change in demand, with more frequent service during the peak periods. It is still oriented to peak Vancouver commuter travel, a shrinking transit market. Transit use and mode share is highest in the peak periods and to Vancouver.

Customer perceptions of North Shore transit are generally positive overall. Surveys and stakeholder engagement suggests that people are looking for attractive options to auto travel. Key barriers to increased transit use relate to travel time, more frequency, and direct routing. They also want to see value for money (which relates to transit fares, travel time, comfort and reliability).

4.3 ISSUES AND CONSIDERATIONS

Comparing trends, patterns and analysis of transit network performance, travel markets, and customer perceptions together identifies both issues and opportunities for future transit. Specific considerations are identified for each issue, to be addressed further in Phases II and III of the ATP.

VARIATION IN PERCEPTIONS FROM DATA FINDINGS

Customer comments suggest that there is demand for more transit service in the evening periods. While most North Shore routes meet the minimum Transit Service Guideline for evening service span, there are some that do not. These requests conflict with actual demand and ridership data however. Trip diary data suggests all trip activity reduces significantly after 6 p.m., while existing route ridership is very low during the evening.

This variation also exists regarding SeaBus. Customer, and front-line staff, perceptions suggest additional frequency and hours of SeaBus is desired. However, there is sufficient capacity, often exceedingly so, throughout most of the week.

- *Consider looking further into potential latent demand for evening/night services*

LOW-TRANSIT POTENTIAL AREAS

Low performing transit routes are typically in low density, low activity areas – all outside the core of the North Shore. Analysis of ridership data suggests that existing service is underutilized. Land use plans to do not envision densification of these areas, so it is not expected that demand for transit will increase substantially from current levels.

- *Consider opportunities to improve demand, reallocate resources, research new service strategies*

HIGH-TRANSIT POTENTIAL AREAS

The North Shore includes two strong transit corridors, the Marine to Dollarton corridor (from Ambleside to Lower Lynn), and the Lonsdale corridor. The Lynn Valley town centre can be considered an anchor connecting to the Lonsdale corridor, although there is limited development potential on corridors between Lonsdale and the town centre. Route analysis and travel data suggest these corridors perform well, even when compared to other routes outside the North Shore. Transit mode share within these areas, and to/from Vancouver, is comparatively high. Anticipated growth appears to support further densification and diversity of land use along these corridors and centres, representing an increasing market already well served by transit. Customers have suggested that time travel is a barrier to transit use, especially when compared to the private car. As these high transit-potential areas are in a well defined corridor, there is opportunity to better compete with autos for a concentrated market. There is currently only one express/limited stop routes on the North Shore, and none in high-transit potential areas.

- *Consider improving transit travel time and comfort to maintain attractive transportation options*

GEOGRAPHY CAN BENEFIT AND HINDER TRANSIT TRAVEL

The unique geography of the North Shore provides both opportunities and challenges to transit. Natural choke points, primarily at Burrard inlet bridges, are well defined. Transit priority through these choke points give transit a time travel advantage over auto. Conversely, the curvilinear (generally hillside) road network adds time and kilometers to a transit trip, reducing effectiveness and attractiveness of transit.

- *Consider improving transit priority at choke points on the North Shore, and review existing transit priority for optimal use*
- *Consider opportunities for re-aligning hill-top service to improve directness*

RETAIN THE DOWNTOWN COMMUTER MARKET

Transit already captures a large portion of North Shore commuters working downtown. However, this market is shrinking in both the number of total trips and in total transit trips, although transit mode share remains high.

- *Consider opportunities maintain mode share (including improved travel time, comfort, reliability, and value for money)*

GROW A REVERSE TRANSIT COMMUTER MARKET

The number of commuters travelling to the North Shore from across the Burrard inlet for work is increasing. Expected changes in the North Shore job/population ratio suggests this will continue. Route performance data illustrates the relative number of reverse peak passengers is still low, especially given the existing available capacity.

- *Consider options to change network to attract a larger proportion of transit passengers, perhaps with more direct and fast routing to North Shore employment centres, ensuring reliable connections, and convenience*

MORE MIDDAY TRIPS STAY ON THE NORTH SHORE

Currently, the North Shore transit network has different peak hour and non peak hour routing and services, reflecting the historical orientation toward commuting to downtown Vancouver. However, the largest number of trips through the day are non-commute, and stay on the North Shore.

- *Consider if midday network is appropriate for growing travel demand (currently auto travel) and opportunities to increase transit share of midday travel with convenience, transit priority or with assistance of municipal parking availability, pricing*

OPERATIONALLY, NORTH SHORE EXCHANGES ARE FUNCTIONING WELL

The North Shore transit network is very focused on three major exchanges. Timed connections are required for low frequency routes, which primary connect lower density neighbourhoods to higher frequency services via exchanges. While exchanges facilitate these transfer connections, they have both operational and customer limitations. Operationally, timed connections affect the required size of the exchange; random connections could use space more efficiently by sharing bays. For customers, a timed transfer system requires services to be reliable. The afternoon peak connection is the least reliable; customers' miss connections on between 23% and 36% of trips. Additionally, the overall customer experience is poor at the major exchanges – they are places people *have* to be rather than *want* to be.

- *Consider opportunities to work with municipality to improve land use integration and customer environments*
- *Consider options for improving afternoon peak reliability, reducing customer travel time*

OPTIONS FOR INTER-REGIONAL TRAVEL

Growth outside the Metro Vancouver region, including communities on the Sea-to-Sky corridor, suggest demand for transportation options will grow. Lions Bay's location on the corridor suggests is should be included in a review of options.

- *Consider transportation options for Sea-to-Sky corridor, including Lions Bay*

THE CURRENT NETWORK IS COMPLEX

The legibility of the North Shore transit network – how it is understood by customers – is low, which can be considered a barrier to attracting new transit customers. Some routes only operate during peak periods, or change routing through the day. There are a number of long, meandering one-way loops, and some loop routes reverse direction at different times of the day. Overall, it is difficult to understand the network map and transit options.

- *Consider opportunities to simplify network while maintaining comprehensive and convenient services*
- *Ensure customer information is consistent with regional system standards while appropriate to local North Shore markets*

4.4 CONCLUSION

The first phase of the North Shore Area Transit Plan provides the context and current conditions that can be incorporated into the long term vision and short term priorities for implementation, with an overall aim to improve transit effectiveness and efficiency. The review included analysis of transit network performance, travel markets and customer perceptions to identify opportunities and considerations for improvement. Both past trends and future plans informed this analysis. Some issues identified through Phase 1 are out outside the scope of an ATP, and will be added to existing processes for resolution. Most issues however, will be addressed through short term priorities building toward the long term vision identified in upcoming phases of the ATP.

PHASE 1 APPENDICES

APPENDIX 1 – BACKGROUND REVIEW: LAND USE & TRANSPORTATION
APPENDIX 2 – 2000 AREA TRANSIT PLAN STATUS UPDATE
APPENDIX 3 – GLOSSARY OF TERMS
APPENDIX 4 – EXCHANGE SUMMARIES
APPENDIX 5 – TRANSIT PRIORITY INVENTORY
APPENDIX 6 – PARK & RIDE SUMMARY
APPENDIX 7 – LAYOVER AND OPERATOR FACILITIES
APPENDIX 8 – ROUTE PROFILES
APPENDIX 9 – ILLUSTRATIVE EXAMPLES OF TRANSIT-ORIENTED COMMUNITIES ON NORTH SHORE
APPENDIX 10 – TRANSLINK LISTENS ONLINE SURVEY SUMMARY
APPENDIX 11– STAKEHOLDER QUESTIONNAIRE & LIST
APPENDIX 12 – FRONT-LINE STAFF COMMENTS SUMMARY AND RESULTS
APPENDIX 13 – CUSTOMER SATISFACTION SURVEY
APPENDIX 14 – SEABUS CUSTOMER QUESTIONNAIRE