2012 Bus Service Performance Review - Summary Report

TRANSLINK

Blank page left intentionally

Contents

Blank page left intentionally

1. Overview

Purpose of the Bus Service Performance Review

As part of the ongoing management of the transit network, TransLink regularly reviews and modifies transit service to promote system efficiency, effectiveness and productivity. TransLink's Bus Service Performance Review is used to inform and guide evidence-based decision-making regarding the allocation of transit service resources.

The annual review tracks trends in bus ridership and productivity at multiple scales using a variety of key performance indicators.

With the understanding that transit ridership is impacted by many external factors beyond the control of transit agencies, such as changes in land use, fuel prices and overall macro-economic conditions, this report focuses on identifying changes in service performance that result from TransLink's efforts to optimize transit services.

How We Analyze Bus Service Performance

ANALYSIS AT MULTIPLE SCALES

The review of the bus-based transit network is conducted on three different scales: systemwide, sub-regionally and route-by-route.

Systemwide Analysis

The purpose of the systemwide analysis is to identify larger, macro-level trends in system performance. Analysis at the system level provides an opportunity to determine average system values for key performance indicators like boardings per revenue hour, capacity utilization and cost per boarded passenger. It also allows for the identification of ranges of performance associated with the top, middle high, middle low and bottom 25 per cent of all service systemwide. These values inform further analysis of the system on a sub-regional and route-by-route basis.

TransLink's Vision and Goals

As the integrated, multi-modal transportation authority for Metro Vancouver, TransLink plans and delivers the transit network to help meet the unique transportation needs of this region. Our vision is to create a better place to live built on transportation excellence. TransLink's strategic goals are outlined in the region's long-term transportation strategy, Transport 2040. They reflect TransLink's critical role in managing a balanced transportation system to achieve regional goals for the environment, the economy, and our society.

Sub-Regional Analysis

While the transit system functions as a coherent network, in some cases it is useful to review performance on a smaller, sub-regional basis. Through a sub-regional analysis we can better understand ridership and productivity trends at a more detailed level. This can be useful when identifying more localized impacts of major additions to the transit network, like the introduction of a new rapid transit line, a new B-Line service, or the ongoing transition of a sub-region through an area transit plan process e.g. the South of Fraser as it transitions from a focal point network to a grid-based network.

For the purpose of this report, the Metro Vancouver area has been divided into 8 sub-regions (see below). These sub-regions are consistent with those used in TransLink's Area Transit Plan process, with the exception of Ladner/South Delta/Tsawwassen which has been separated from the South of Fraser to allow a more detailed analysis of ridership and performance in that area.

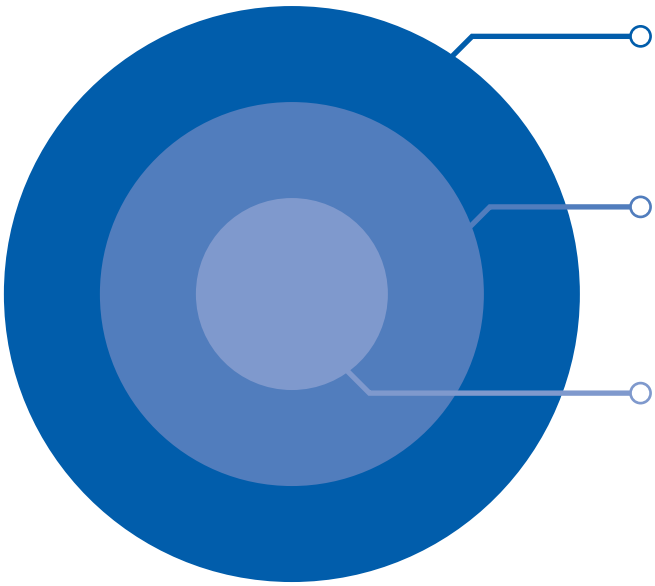
- Burnaby/New Westminster
- Ladner/South Delta/Tsawwassen
- Maple Ridge/Pitt Meadows[1]
- South of Fraser (includes North Delta, Surrey, White Rock, and the City and Township of Langley)
- Northeast Sector (includes Coquitlam, Port Coquitlam, Port Moody, Anmore and Belcarra)
- North Shore (includes City and District of North Vancouver, West Vancouver, Bowen Island and Lions Bay)
- Richmond (includes Sea Island)
- Vancouver/UBC

Route-by-Route Analysis

Analysis on a route-by-route basis gives us a detailed indication of how individual components of the transit system are performing. A route-by-route analysis allows observation of the impacts of service changes made in the past and aids in identifying future opportunities for strategic re-investment.

The criteria by which individual transit services are evaluated are directly related to the performance thresholds determined through the systemwide analysis of ridership and productivity trends. In this manner, the analysis of the transit system on all three levels, systemwide, sub-regionally and by route, are consistent and coordinated. As part of the preparation of this route-by-route analysis, a two page 'route summary' was prepared for each bus route in the system (see Appendix C).

1 Note that in the 2011 Bus Service Performance Review, the North East Sector included Maple Ridge/Pitt Meadows as part of the same sub-region.



SYSTEMWIDE
We look at the whole system to identify big trends, and see how the system is doing from year to year.

SUBREGIONAL
We examine bus services within eight areas in our region, to help us understand local trends in more detail.

ROUTE-BY-ROUTE
We look at every single route to see how they are performing individually.

USING MULTIPLE PERFORMANCE INDICATORS

TransLink uses three key performance indicators (KPIs) when measuring bus service performance. Each provides a slightly different view of how services are performing in terms of productivity and efficiency.

Boardings per Revenue Hour[2]

Boardings per revenue hour is an industry-standard key performance indicator that measures the total volume of ridership as compared to the supply of transit service. Boardings per revenue hour account for total passenger activity and considers the length of time a vehicle is on the road. A disadvantage of this measure is that it does not take into consideration the size of the vehicle or the operating cost of different vehicle types. There are different expectations for the productivity of articulated buses as compared to standard 40' buses as compared to minibuses ("Community Shuttles"). More importantly, there are different operating costs for conventional buses as compared to minibuses. The boardings per revenue hour measure does not account for these differences. As such, boardings per revenue hour should be used in conjunction with other KPI's to give a more holistic view of service performance. This is particularly important when assessing efficiencies achieved through conversions between vehicle types.

Capacity Utilization

Capacity utilization is a KPI that measures the total number of passenger boardings compared to the total number of spaces provided by the transit system. Capacity utilization can be used on a systemwide basis, on a sub-regional basis or on a route-by-route basis to measure the degree to which customers are consuming the number of spaces provided by TransLink services. Capacity utilization considers the size of the vehicle and measures passenger turnover. In many cases it is possible for capacity utilization to be greater than 100 per cent. This indicates a service that is generating multiple passenger boardings and alightings using the same number of spaces. A disadvantage of capacity utilization is that it does not consider the length of time a vehicle is on the road. As such, it favors longer services, with a greater number of stops, which have a greater opportunity to generate passenger activity along the route. Vehicle capacity is based on the Transit Service Guidelines for maximum number of passengers by bus type and time period.

Cost per Boarded Passenger

Cost per boarded passenger measures the cost of providing revenue service compared to the total number of boardings that service generates [Annual Service Cost / Annual Boardings]. The annual service cost differentiates between vehicle types and utilizes the cost per service hour discussed above.

2 Boardings per revenue hour is different from boardings per service hour (service hours include deadhead). This accounts for any differences between the values in this system performance review and values reported through the TransLink Transportation and Financial Plan.

2. Planning Context – Base Plans and the Focus on Optimizing Service

TransLink's 10-Year Transportation and Financial Plans are prepared on an annual basis and identify a three-year base plan and seven-year outlook. The current 2013 Base Plan and Outlook focuses on cutting costs and spending wisely, with almost $100 million/year in efficiencies built into the plan. TransLink is taking a multi-pronged approach, aimed at reducing costs and finding efficiencies, increasing revenue by leveraging our existing assets and services, and drawing down our cumulative reserves to the minimum fiscally responsible level.

In support of the organization's focus on efficiency and effectiveness, TransLink's Service Planning group has developed a program of systematically reviewing the performance of the transit system and strategically reallocating resources to services and time-periods where they are most needed. The table below provides a summary of the transit resources (in annual revenue hours) strategically re-invested from lower performing services to higher performing services by calendar year:

Strategic Reinvestment of Bus Resources 2010-2012

Year	Strategic Re-investment of Annual Revenue Hours
2010	52,000
2011	168,000
2012	56,000
Total	**276,000**

SUMMARY OF SERVICE OPTIMIZATION AND EXPANSION IN 2012

Transit service planning in 2012 began within the context of the approved 2012 Supplemental Plan, titled "Moving Forward". This plan identified a number of key transit service investments as well as an envelope of service hours that could be applied to improve reliability, reduce overcrowding and serve new demand from population growth and the expanded U-Pass BC program. In addition to this expansion of service, a program of service optimization was assumed to continue.

Steps were taken in early 2012 to implement some of the expansion projects. This included the introduction of the 531 White Rock to Langley local bus service and off-peak service improvements on the 99 B-Line, 49 and various other service improvements introduced in April 2012. In December 2012, phase 1 of Highway 1 Express Bus service between Carvolth and Braid Station was introduced. As noted in the table above, TransLink also re-allocated approximately 56,000 annual hours of bus service from lower performing services to areas of higher performance.

IMPACT OF SERVICE CHANGES ON REGIONAL ALLOCATION OF BUS RESOURCES

The optimization of service across the Metro Vancouver region has resulted in increased productivity in almost all sub-regions across a number of key performance indicators. The re-allocation of service from lower performing services to higher performing services has had some impact on the regional allocation of bus resources. The table below shows that impacts in most sub-regions have been minor – between zero per cent and 5.5 per cent. The values in the table below also include the service expansion resources that were introduced in April 2012 and therefore include the impacts of both optimization and expansion in each sub-region.

Revenue Hours vs Service Hours: Revenue hours refer to those service hours that are part of revenue-generating service. They include running time and recovery time at the ends of a route, but do not include deadhead (the time it takes for a vehicle to get to/from its designated route).

Impact of Service Changes on Regional Allocation of Bus-Based Transit Resources

Sub-Region	Annual Revenue Hours (Bus Only) 2010	2012	% Change (2012 versus 2010)
Vancouver / UBC	1,449,000	1,476,000	+1.9%
Burnaby / New Westminster	469,000	470,000	+0.2%
Northeast Sector	307,000	300,000	-2.3%
South of Fraser	629,000	651,000	+3.5%
North Shore	377,000	390,000	+3.4%
Richmond*	309,000	292,000	-5.5%
Ladner / South Delta / Tsawwassen	56,000	57,000	+1.8%
Maple Ridge / Pitt Meadows	87,000	87,000	0.0%

* Service reductions in Richmond are a result of ongoing adjustment of services after Canada Line introduction.

3. 2012 Bus Service Performance

Based on trends observed in 2011, a number of changes to the transit system were made in 2012. The following section outlines the impact these changes had on bus service performance.

Systemwide Performance

The systemwide analysis identifies trends in system performance at the macro level. This provides an opportunity to determine average system values for key performance indicators like boardings per revenue hour, capacity utilization and cost per boarded passenger (see Appendix A for definitions). It also allows for the identification of ranges of performance associated with the top, middle high, middle low and bottom 25 per cent of all service systemwide. These values inform further analysis of the system on a sub-regional and route-by-route basis. The results of the systemwide performance analysis are summarized below.

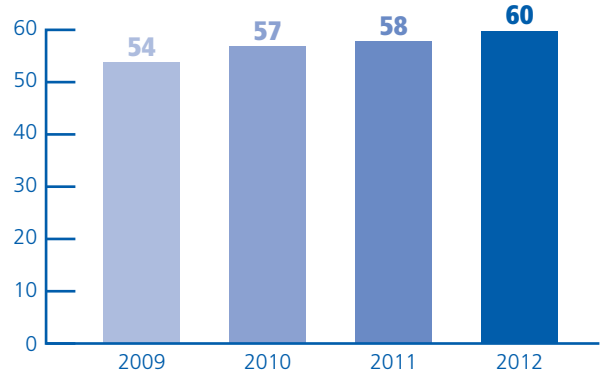
OVERALL FINDINGS ON SYSTEMWIDE PERFORMANCE FOR 2012

The Bus Service Performance Review for 2012 shows a continuing trend of increasing productivity and decreasing costs. Some key findings between 2011 and 2012 include:

- Boardings per revenue hour increased by 3.4 per cent from 58 to 60;
- Systemwide capacity utilization figures remained steady at 88 per cent;
- Cost per boarded passenger decreased by 2.2 per cent from $1.37 to $1.34.

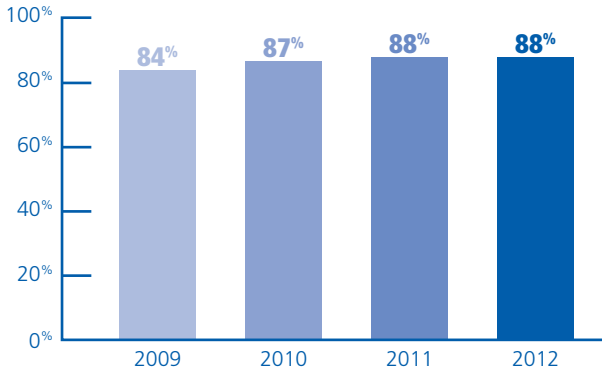
These increases in productivity may be partially due to the ongoing impact of service optimization, particularly on the metric of boardings per revenue hour which has seen an increase of 11.1 per cent over the last 4 years.

Systemwide Trend in Boardings per Revenue Hour



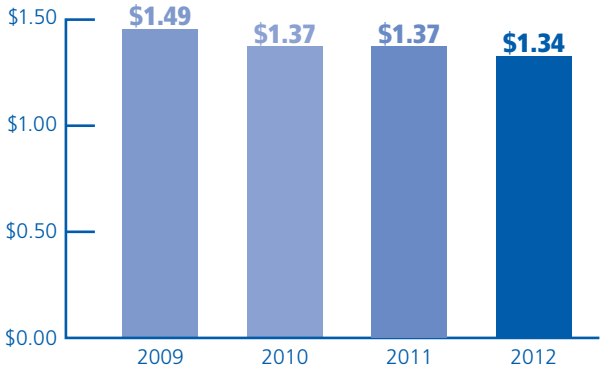
1-Year Trend: 2011 to 2012	4-Year Trend: 2009 to 2012
3.4%	11.1%

Systemwide Trend in Capacity Utilization



1-Year Trend: 2011 to 2012	4-Year Trend: 2009 to 2012
0.0%	4.8%

Systemwide Trend in Cost per Boarded Passenger



1-Year Trend: 2011 to 2012	4-Year Trend: 2009 to 2012
-2.2%	-10.1%

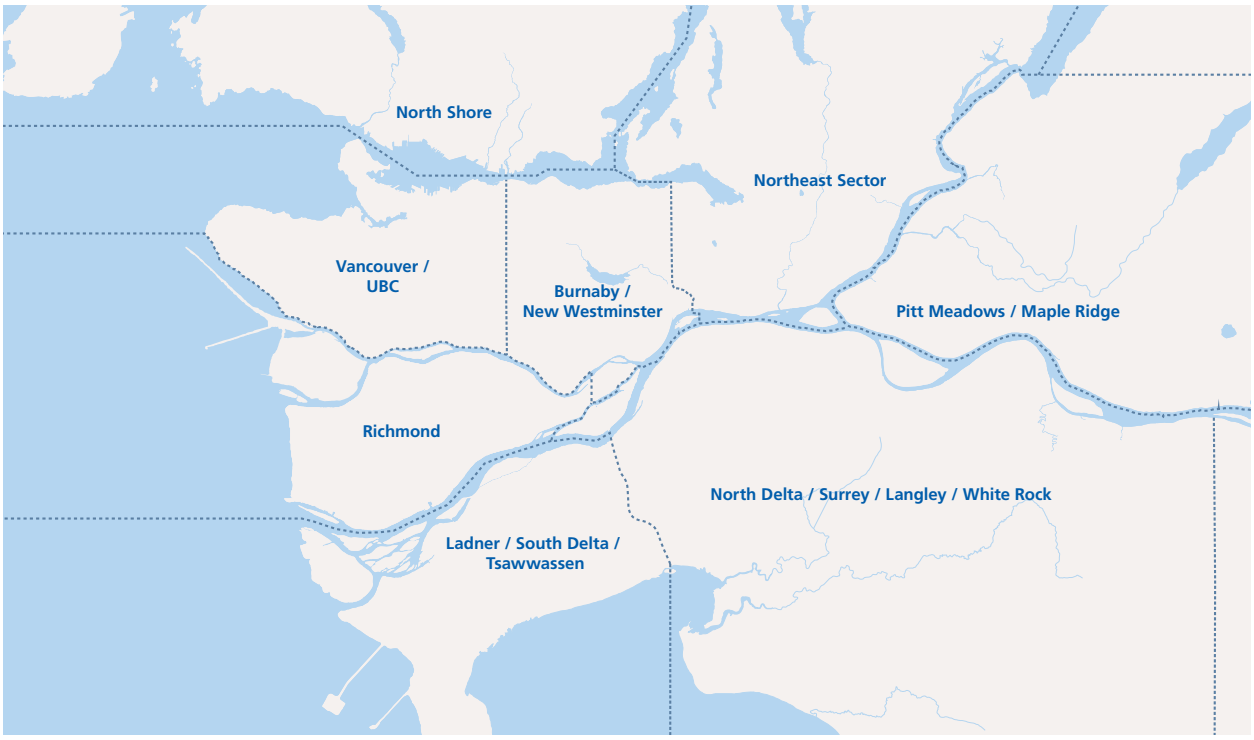
Findings Consistent with other TransLink Performance Indicators

Analysis of systemwide productivity by TransLink Finance and Strategic Planning are consistent in scale and magnitude with the findings of this Bus Service Performance Review. Of particular note, the results of 2012 also show an increase in fare revenue of $15M, or 3.5 per cent for 2012 over 2011.

2012 Financial and Service Performance Results (All Modes)

	2011	2012	
Systemwide Boardings (All Modes)	354.4M	361.6M	2.0%
Systemwide Fare Revenue (All Modes)	$431M	$446M	3.5%
Systemwide Boardings per Service Hour (All Modes)	55.9	57.0	2.1%

Source: TransLink Finance and TransLink Strategic Planning



Sub-Regional Performance

In addition to analyzing performance of the overall bus system, the performance of individual sub-regions is also tracked. Tracking performance on a sub-regional basis allows for a more detailed look at the impact service changes are having on particular parts of the region. Variation in performance across sub-regions is expected due to different levels of transit demand, urban structure, land use and network design.

OVERALL FINDINGS ON SUB-REGIONAL PERFORMANCE FOR 2012

Overall, the majority of sub-regions are showing positive growth in boardings per revenue hour and capacity utilization, with corresponding decreases in cost per boarded passenger. The graphs that follow illustrate these trends in detail.

Burnaby/New Westminster – Transit services in the Burnaby/New Westminster area are typically at or near regional averages in all performance metrics. These services have also seen little change in those metrics over the last four years, shifting plus or minus two to three per cent in boardings per revenue hour, capacity utilization and cost per boarded passenger. Optimization efforts in Burnaby/New Westminster have focused mainly on increases to services experiencing heavy crowding and pass-ups, conversions between conventional bus and minibus and small reductions in service frequency to better service supply and customer demand.

Ladner/South Delta/Tsawwassen – While transit services in the Ladner/South Delta/Tsawwassen area are the lowest performing services in the system on all key performance metrics, those services have also seen significant improvement over the last four years. The four-year trend for the area shows gains of 21 to 26 per cent, likely due to efforts to optimize service as well as increased productivity on services connecting to the Canada Line. The majority of service changes in this area have focused on scheduling efficiencies and the delivery of services, with some improvements in service levels on key commuter services.

Maple Ridge/Pitt Meadows – The productivity of services in the Maple Ridge/Pitt Meadows area has increased continuously over the last 4 years. Most significant are increases in boardings per revenue hour

which has increased 56.5 per cent since 2009. Service changes in this area have focused on peak improvements on key commuter services like the 701 and 791.

North Delta/Surrey/Langley/White Rock – The South of Fraser area is rapidly growing and TransLink has supported that growth with improved service on a number of key corridors including Scott Road, Fraser Highway and 128th Street. New service has also been added linking South Surrey/White Rock and Langley. The South of Fraser area has seen across-the-board gains in boardings per revenue hour, capacity utilization and cost per boarded passenger.

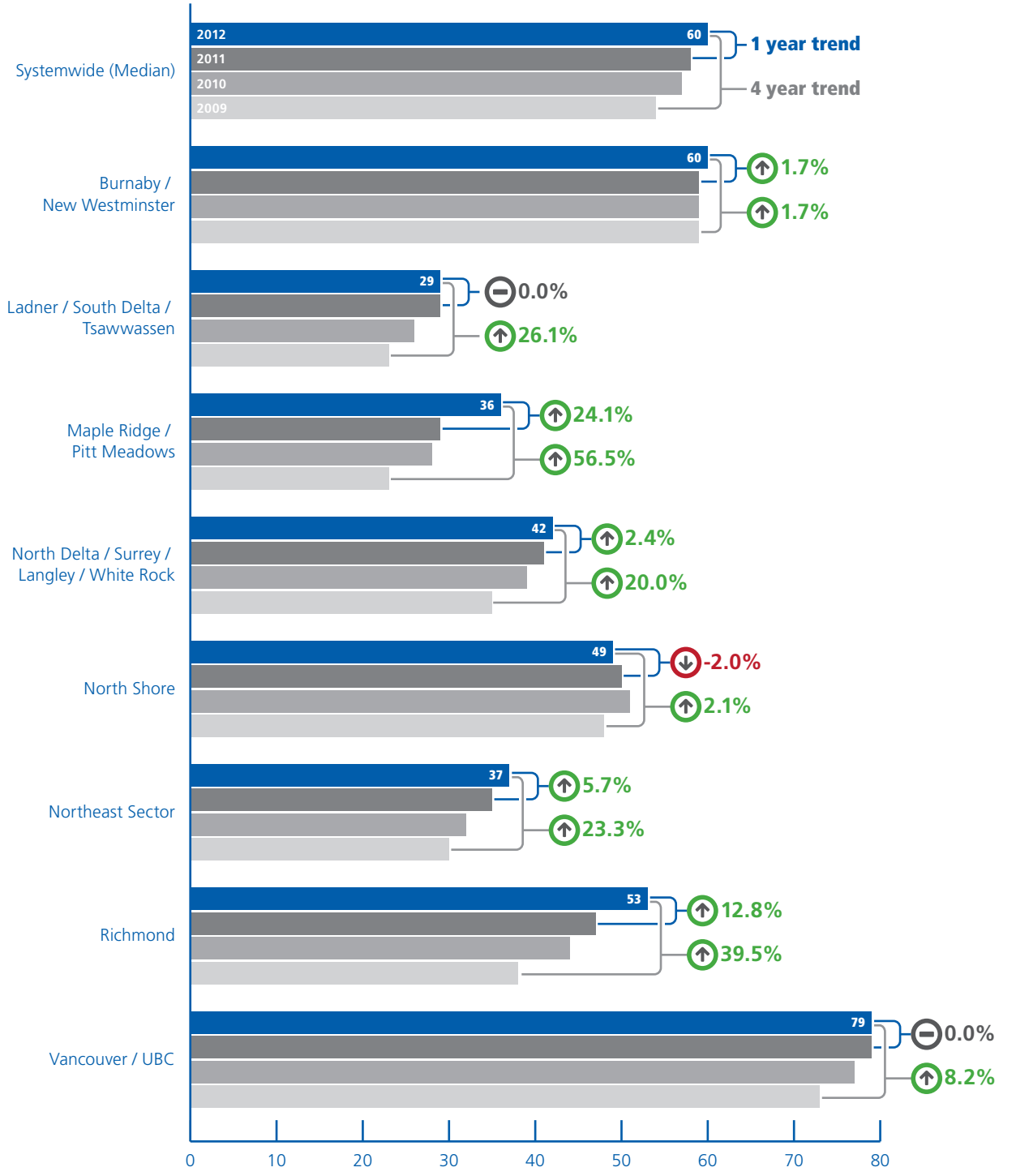
Northeast Sector – Despite its lower overall performance, the Northeast Sector has made gains over the past four years, responding to TransLink's efforts to optimize service in the area. The sub-region has increased boardings per revenue hour and capacity utilization by 21-23 per cent, with a 12-13 per cent reduction in cost per boarded passenger. TransLink's optimization efforts in the area have focused on changes to service frequency to better match service levels with passenger demand. A number of initiatives in TransLink's upcoming 2013 Bus Service Implementation Plan are intended to address service issues in this area and are expected to improve overall service performance.

North Shore – The performance metrics for the North Shore are down slightly from last year, likely due to a lag time between when investments in service improvement are made versus customer uptake of those investments. In the past few years TransLink has increased service on key corridors in the area such as Marine Drive and Lonsdale Avenue – improving service on both corridors to match Frequent Transit Network (FTN) levels of service. In the last four years boardings per revenue hour and capacity utilization are both trending in a positive direction. Cost per boarded passenger is trending up but is expected to recover as the new added capacity is absorbed.

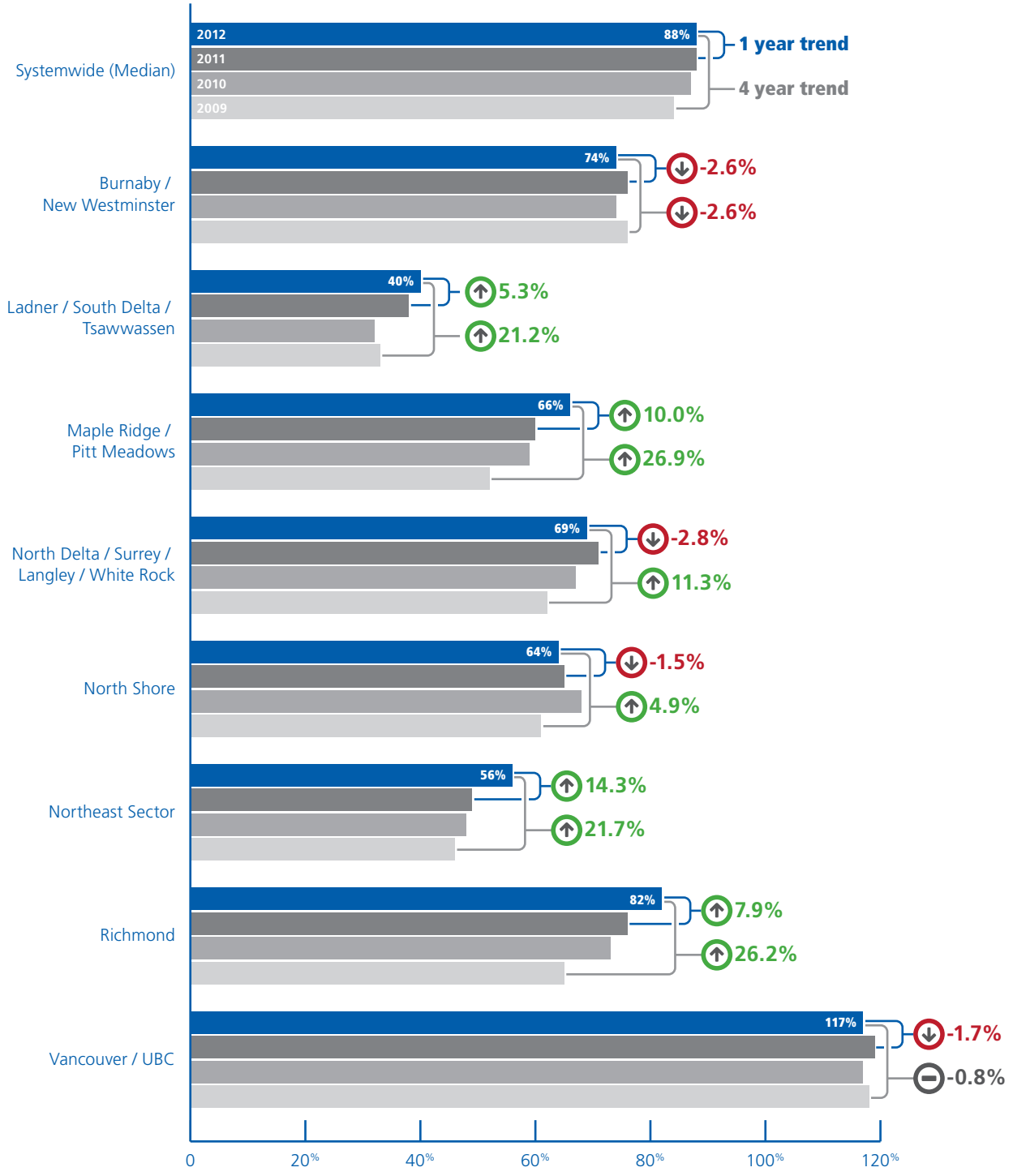
Richmond – The Richmond area has experienced significant performance gains in the past year, as customers have responded well to changes made to service frequency on key corridors. Boardings per revenue hour and capacity utilization are both up (13 per cent and eight per cent respectively), with an eight per cent decrease in cost per boarded passenger. Over the past 4 years the productivity of services in the Richmond area has made gains in the range of 26 to 40 per cent. This is likely due to the introduction of the Canada Line in late 2009 as well as ongoing efforts to optimize service in the area.

Vancouver/UBC – Performance metrics for the Vancouver/UBC area have stayed relatively stable in the one-year and three-year terms. The largest change in boardings per revenue hour took place between 2009 and 2010 (coinciding with the introduction of the Canada Line). Stable metrics over the last four years is a noteworthy result considering the level of re-investment TransLink has made in the area to address issues of overcrowding and pass-ups. This suggests that added capacity has been absorbed quickly and has been well allocated to areas where latent demand existed.

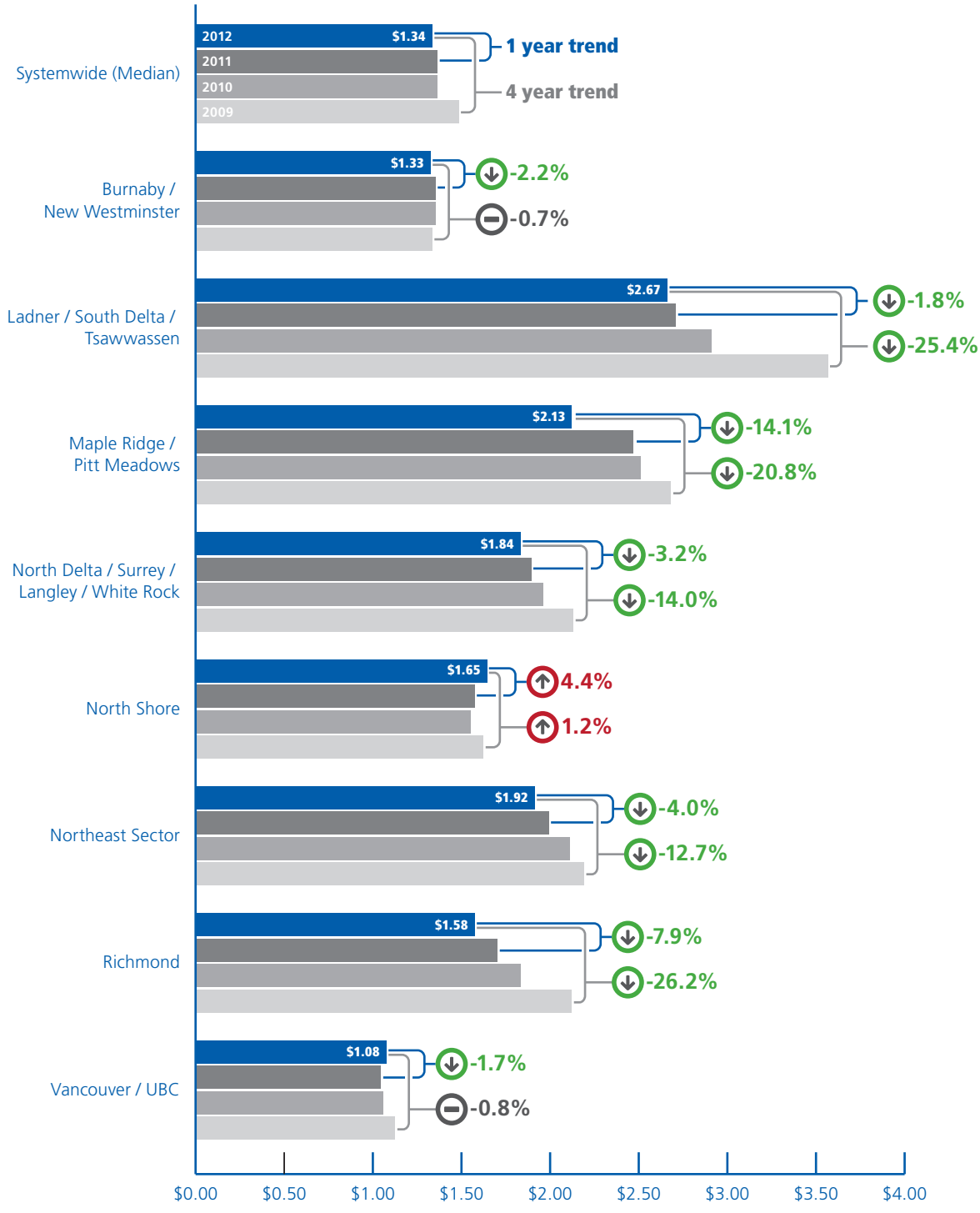
Boardings per Revenue Hour by Sub-region



Capacity Utilization by Sub-Region



Cost per Boarded Passenger by Sub-Region



Route-by-Route Performance

Analysis on a route-by-route basis gives a detailed indication of how individual components of the bus system are performing. A detailed summary for each route in the network has been prepared.

Three appendices have been prepared to document the route-by-route analysis:

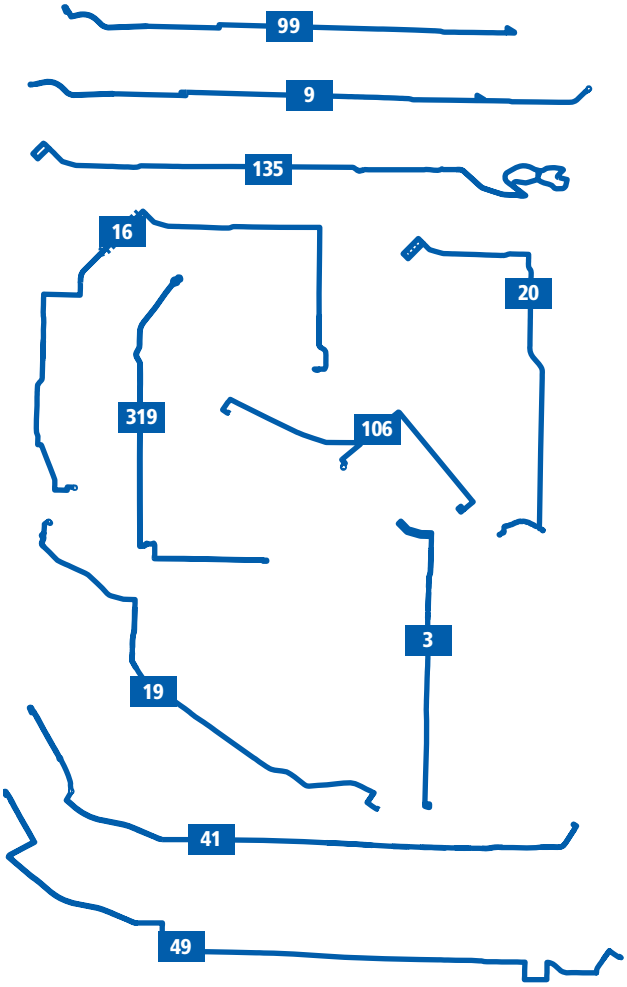
- **Appendix A** includes information on key assumptions, definitions and key performance indicators;
- **Appendix B** includes instructions on how to read route summaries;
- **Appendix C** includes all 218 route summaries; and
- **Appendix D** includes the methodological details on how route summaries are prepared.

The criteria by which individual transit services are evaluated are related to the performance thresholds determined through the systemwide analysis. In this manner, the analysis of the transit system on all three levels, systemwide, sub-regionally and by route, is consistent and coordinated.

By utilizing this data and analysis, TransLink Service Planning is able to identify the highest and lowest performing services under different categories and indicators. Bus services across the region serve a variety of functions within the transit network, and we expect different levels of performance from different routes. Many low-performing routes are maintained despite their low ridership, as they provide basic access to the transit network in lower-demand areas. The following maps illustrate the routes that appear in the top and bottom 25 of all routes against all three key performance indicators.

Highest and Lowest Performing Routes

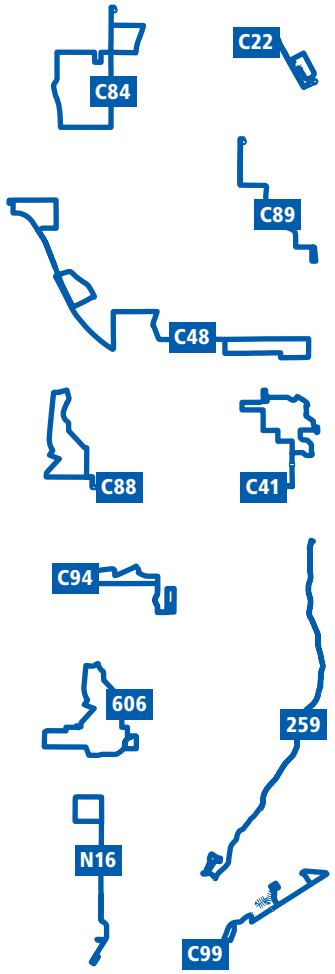
SERVICES THAT APPEAR IN THE TOP 25 OF ALL THREE KEY PERFORMANCE INDICATORS:



Common characteristics:

- Direct, simple and consistent routing
- Serve areas of strong demand
- Activity centres at both ends (strong anchors) and along the route
- Services are designed to maximize ridership

SERVICES THAT APPEAR IN THE BOTTOM 25 OF ALL THREE KEY PERFORMANCE INDICATORS:



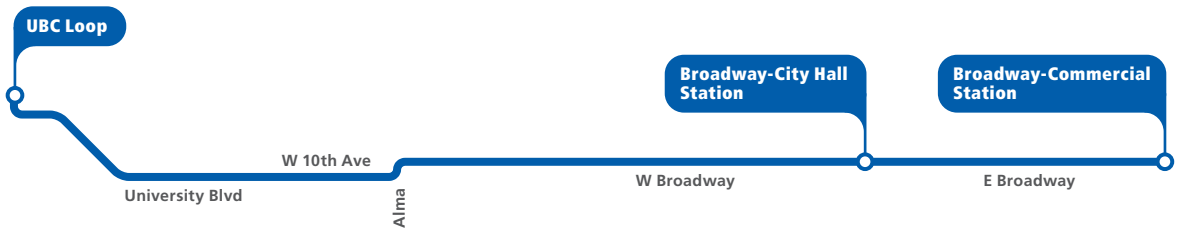
Common characteristics:

- Circuitous, indirect routing
- Serve lower-density, auto-oriented areas
- Limited activity centres (weak anchors)
- Serve mainly a basic access role in the transit network

4. Highlights from 2012 Service Changes

As discussed in Section 2 above, in 2012 TransLink re-invested approximately 56,000 annual revenue hours through dozens of service changes across the region. This section highlights the outcomes of a few of these service changes. To see the detailed route-by-route outcomes of all service changes please refer to the route summaries in Appendix C.

99 B-Line Broadway Station/UBC – Service Improvements to Address Overcrowding



SERVICE CHANGE:

Based on the 2011 Bus Service Performance Review, heavy passenger loads and overcrowding were observed during many times of day and on many days of the week (17 time periods). While service on the 99 B-Line during peak periods is maxed out under the current infrastructure, there was an opportunity to improve off-peak service through increased frequencies.

In response, in April 2012, TransLink invested significant resources to improve service during specific off-peak periods where overcrowding was observed. This represented a 10% increase in revenue hours allocated to the 99 B-Line.

OUTCOMES:

- *Reduced instances of overcrowding during off peak periods*
- *Time periods when average peak passenger loads exceeded TransLink's Transit Service Guidelines reduced from 17 to 10*
- *Small reduction in productivity due to service investment*

99 B-Line Broadway Station/UBC	2011	2012	Change
Annual Boardings	16,384,000	16,879,000	+3%
Boardings per Revenue Hour	187	176	-6%
Capacity Utilization	179%	167%	-7%
Cost per Boarded Passenger	$0.53	$0.57	+8%

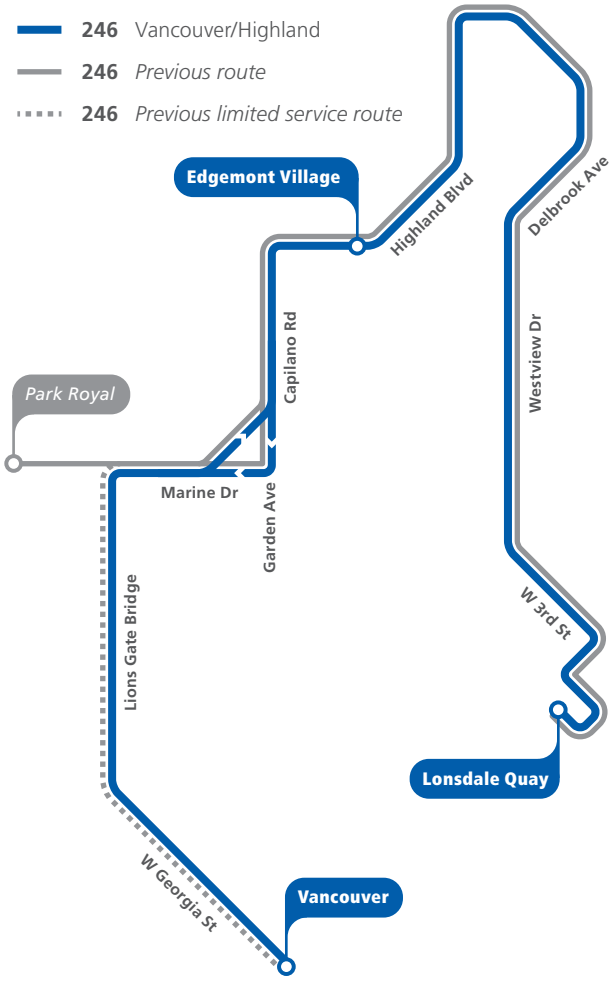
246 Highland/Vancouver – Update on Network Architecture Change

SERVICE CHANGE:

In June 2011 TransLink made a change to the structure of the 246 to make it more consistent, legible and user friendly by making all trips connect to Downtown Vancouver. This change raised some concerns in the local community as it would require transfers for customers accessing Park Royal shopping centre at a location with poor pedestrian facilities.

OUTCOMES:

- *Improvements across all key performance indicators:*
  - *Increased ridership*
  - *Improved productivity*
  - *Decreased cost per boarded passenger*



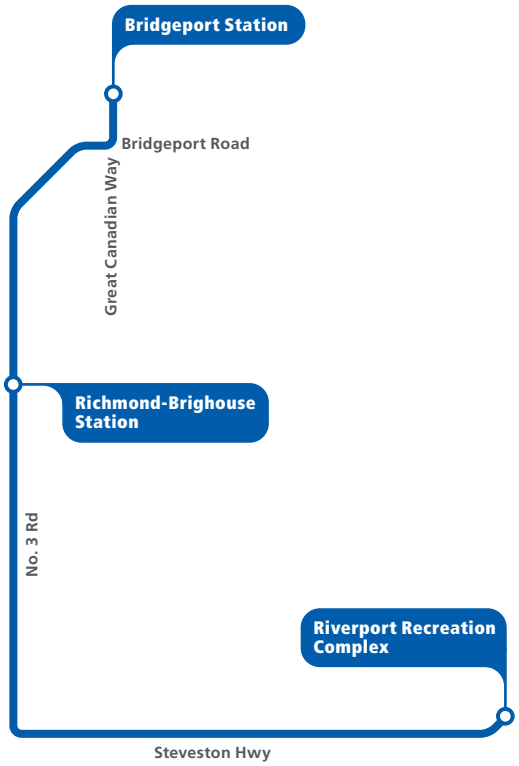
246 Highland/Vancouver	2010	2011	2012	Change (2010 to 2012)
Annual Boardings	996,000	1,086,000	1,150,000	+15%
Boardings per Revenue Hour	41	41	44	+7%
Capacity Utilization	32%	40%	41%	+28%
Cost per Boarded Passenger	$2.46	$2.42	$2.29	-7%

403 Bridgeport Station/Three Road – Service Reduction to Better Match Demand

SERVICE CHANGE:

Based on the 2011 Bus Service Performance Review, route 403 was identified as an underperforming service with excess capacity during most time periods and relatively low capacity utilization.

In response, TransLink reduced service levels on all days during all time periods representing a 24 per cent reduction in revenue hours allocated to the service.

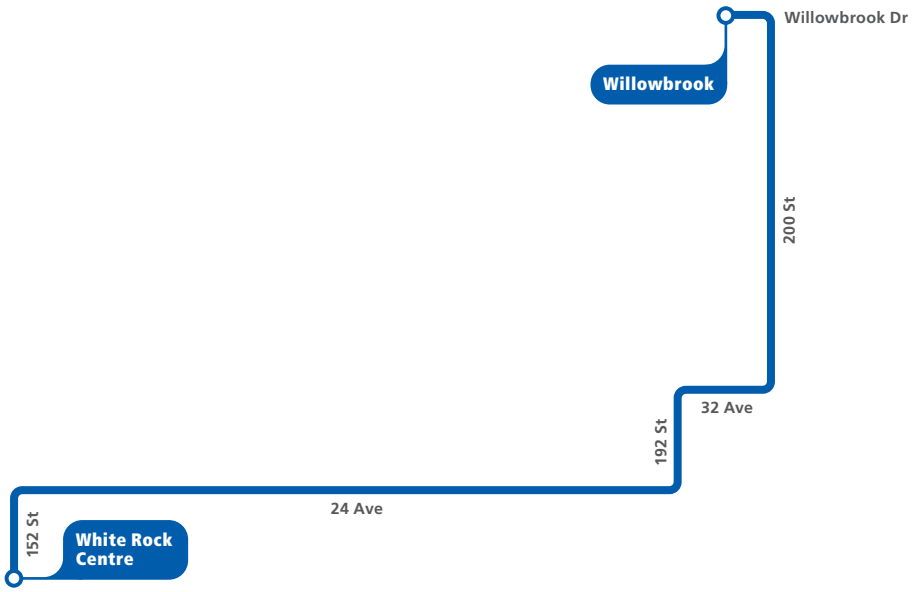


OUTCOMES:

- *Maintained ridership and experienced increase in productivity*
- *Reduced cost per boarded passenger*
- *Service reductions did not result in increased passenger overcrowding*

403 Bridgeport Station/Three Road	2011	2012	Change
Annual Boardings	1,930,000	1,922,000	-0.4%
Boardings per Revenue Hour	56	73	+30%
Capacity Utilization	60%	74%	+23%
Cost per Boarded Passenger	$1.80	$1.37	-24%

531 White Rock Centre/Willowbrook – New Service (Expansion)



SERVICE CHANGE:

The introduction of a new service linking South Surrey/White Rock with Langley/Willowbrook was an identified expansion project of the 2012 Supplemental Plan ("Moving Forward"). In April 2012, TransLink introduced the 531 with half-hour all-day service seven days a week. The service was introduced using full-size buses as these vehicles were readily available and demand for this new service was uncertain.

EARLY ASSESSMENT:

- *Average daily boardings of 850*
- *Off-peak ridership is low*
- *Some loads of 25 passengers have been recorded during peak periods*
- *May represent an opportunity for off-peak conversion to minibus (community shuttle)*

531 White Rock Centre/Willowbrook	2012
Annual Boardings	183,000
Boardings per Revenue Hour	10
Capacity Utilization	27%
Cost per Boarded Passenger	$9.54

5. Outlook for 2013

The current 2013 Base Plan and Outlook outlines strategic initiatives, transportation programs and services that TransLink will deliver between 2013 and 2015 using current existing revenue sources. The 2013 Base Plan and Outlook focuses on cutting costs and spending wisely, with almost $100 million/year in efficiencies built into the plan.

Service optimization will continue to be a core and ongoing component of the Network Management program within Service Planning, and TransLink will continue to achieve productivity gains by re-allocating services in 2013.

Throughout 2013, Service Planning's Network Management program will:

- Continue to optimize service based on the results of the 2012 Bus Service Performance Review;
- Implement network architecture changes as outlined in the 2013 Bus Service Optimization consultation process completed in December 2012. These changes are aimed at improving the efficiency and effectiveness of bus services through changes to route structure and vehicle type.

Acknowledgements

This document was prepared by TransLink's Network Management Group: **Peter Klitz** (Project Manager), **Aldo Nunez** (Project Lead), **Adam Hyslop** and **Mary Riemer**, under the direction of **Marisa Espinosa** (Senior Manager of Service Planning) and **Brian Mills** (Director of Service and Infrastructure Planning).

Special thanks to *CMBC Service Analysis*, *TransLink Financial Planning and Monitoring* and *TransLink Forecasting* for their data collection support.

FOR MORE INFORMATION AND RESOURCES:

Visit our website at **translink.ca/networkmanagement**

May 2013

Blank page left intentionally