Surrey Rapid Transit Study
Design Guide

MAY/JUNE 2011

Bus Rapid Transit

Light Rail Transit

Rail Rapid Transit

BRITISH COLUMBIA
The Best Place on Earth

CITY OF SURREY
the future lives here.

CITY OF LANGLEY

TRANSLINK

About the Design Guide

In October 2010, 10 alternatives for future rapid transit expansion for Surrey and surrounding communities were presented. We have done more work on these alternatives, and this Design Guide provides important information about what we considered in developing the initial design concepts. It is one of the essential documents that will give you the information you need to help shape the alternatives.

Explore this guide, along with the other essential documents, boards, handout material and website at **translink.ca/surreyrapidtransitstudy** to learn more about the alternatives. You can also talk with the study team and interact with other members of the public.

In This Design Guide

ALTERNATIVE DESIGNS (PAGE 5)

Learn about the rapid transit technologies and design assumptions for each alternative, including potential station locations and alignment, as well as key operating characteristics and community integration information.

DESIGN ASSUMPTIONS AND TRADE-OFFS (PAGE 21)

Learn more about the design assumptions and trade-offs to consider when providing your input on the alternative designs, including potential station locations, alignment, how roadspace is shared and intersection priority.

Other Essential Documents

EVALUATION SUMMARY

Learn how each alternative performed in the evaluation.

QUESTIONNAIRE

Use the questionnaire to give us your feedback!

JOIN THE DISCUSSION FROM MAY 26 TO JUNE 24, 2011

We need your input on the work we have done so far to design and evaluate the 10 alternatives.

Did we make the right design assumptions?

Have we considered all the benefits and impacts?

We are not making a decision about a preferred alternative at this stage. We still have more work to do, and your input will help us update the designs and finalize the evaluation.

You'll have more opportunities to get involved in this study in late 2011 / early 2012, where you can have your say on what decision makers should consider when selecting the preferred rapid transit alternative for Surrey and surrounding communities.

Phase 2 Alternative Design Concepts

Using input from the October 2010 consultation and further technical work, the study team has developed design concepts for each of the 10 alternatives being considered in the Surrey Rapid Transit Study.

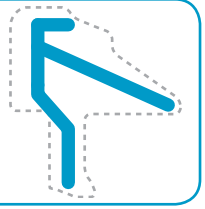
To develop these concepts, we made four key assumptions for each alternative:

1. The number and location of stations
2. Whether the system would operate at street-level and where in the street, in a tunnel or elevated (alignment)
3. How road space is shared between rapid transit and other uses, like travel and turning lanes, and bike lanes and sidewalk space, and
4. The priority given to rapid transit at intersections.

These design concepts helped to evaluate the alternatives across seven different categories in the Multiple Account Evaluation (see the **Evaluation Summary**). All rapid transit alternatives include the same high-level of underlying bus service based on improvements identified in the South of Fraser Area Transit Plan.

BRT Alternative 1

Bus Rapid Transit connects Surrey City Centre to Guildford, Langley Centre and White Rock.



BRT Alternative 2

Bus Rapid Transit connects Surrey City Centre to Guildford, Langley Centre and Newton.

LRT Alternative 1

Light Rail Transit connects Surrey City Centre to Guildford, Langley Centre and Newton. Bus Rapid Transit connects Newton to White Rock.

LRT Alternative 2

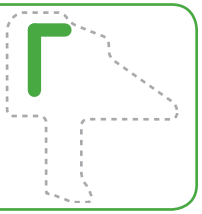
Light Rail Transit connects Surrey City Centre to Guildford and Newton. Bus Rapid Transit connects Surrey City Centre to Langley Centre and Newton to White Rock.

LRT Alternative 3

Light Rail Transit connects Surrey City Centre to Guildford and Newton. Bus Rapid Transit connects Surrey City Centre to Langley Centre.

LRT Alternative 4

Light Rail Transit connects Surrey City Centre to Guildford and Newton.



RRT Alternative 1

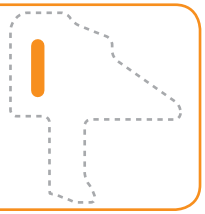
Rail Rapid Transit connects Surrey City Centre to Langley Centre.

RRT Alternative 2

Rail Rapid Transit connects Surrey City Centre to Newton. Bus Rapid Transit connects Surrey City Centre to Guildford and Langley Centre.

RRT Alternative 3

Rail Rapid Transit connects Surrey City Centre to Newton.



Best Bus Alternative

Bus service is further improved between all urban centres in the study area.

Alternative Designs

Bus Rapid Transit Alternatives

Learn about the BRT alternatives on the following pages.

Then check out the "Design Assumptions and Trade-offs" section on page 19 to see how we've designed BRT for Surrey and surrounding communities.

Technology

BRT is a driver-operated, low-floor articulated bus technology that typically operates at street-level. Modern clean diesel propulsion technology was assumed.

Alignment

BRT is assumed to operate primarily in the centre of the street. It is in its own right of way, separated from other traffic by a curb with signal priority at intersections.

Artist rendering of 104 Avenue and 144 Street

Station Type

BRT stations are typically located within the street and connect to both sides of the street with pedestrian crossings. Stations are sheltered and typically feature ticket vending machines, closed circuit TV for security, seating, real-time information and wayfinding.

Source: C-Tran, Vancouver, WA

Integration with Other Modes

BRT alternatives connect to the existing SkyTrain system at King George and Surrey Central stations. Local buses continue to operate in mixed traffic lanes, including in corridors with BRT. There are no changes to pedestrian and cyclist crossings.

Bus Rapid Transit Alternative 1

BRT Alternative 1 connects Surrey City Centre and the existing rapid transit network to key urban centres with two rapid transit services:

- BRT from Guildford to White Rock (along 104 Avenue, King George Boulevard and 152 Street) through Surrey City Centre and Newton, and
- BRT from Langley Centre to Surrey City Centre (along Fraser Highway and King George Boulevard) through Fleetwood.

This alternative operates primarily at street-level, with a bridge where it crosses the Roberts Bank Rail Corridor in Langley.

COSTS	
Capital Cost ($2010)	$950M
Annual Incremental Operating Cost ($2010)	$32M
RIDERSHIP	
Projected Daily Boardings (2021 / 2041)	72,000 / 144,000
Projected Total Study Area Daily Boardings (2021 / 2041)	451,000 / 781,000

* This route is considered the most feasible and expected to perform the best compared to other options considered in Phase 1; however, it is subject to change with further technical work and public input.

** Potential station locations are assumed to be every 1-2 kilometres at major roads where demand is expected to be highest. Consistent station locations allow for comparative analysis across all alternatives. Potential station locations are subject to change with further technical work and public input.

*** TransLink's Frequent Transit Network (FTN) is an interconnected network of corridors where transit service is provided every 15 minutes or better throughout the day and into the evening, 7 days a week.

Bus Rapid Transit Alternative 2

BRT Alternative 2 connects Surrey City Centre and the existing rapid transit network to key urban centres with two rapid transit services:

- BRT from Guildford to Newton (along 104 Avenue and King George Boulevard) through Surrey City Centre, and
- BRT from Langley Centre to Surrey City Centre (along Fraser Highway and King George Boulevard) through Fleetwood.

This alternative operates primarily at street-level, with a bridge where it crosses the Roberts Bank Rail Corridor in Langley.

COSTS	
Capital Cost ($2010)	$650M
Annual Incremental Operating Cost ($2010)	$23M
RIDERSHIP	
Projected Daily Boardings (2021 / 2041)	61,000 / 115,000
Projected Total Study Area Daily Boardings (2021 / 2041)	449,000 / 768,000

* This route is considered the most feasible and expected to perform the best compared to other options considered in Phase 1; however, it is subject to change with further technical work and public input.

** Potential station locations are assumed to be every 1-2 kilometres at major roads where demand is expected to be highest. Consistent station locations allow for comparative analysis across all alternatives. Potential station locations are subject to change with further technical work and public input.

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Light Rail Transit Alternatives

Learn about the LRT alternatives on the following pages.

Then check out the "Design Assumptions and Trade-offs" section on page 19 to see how we've designed LRT for Surrey and surrounding communities.

Technology

LRT is a driver-operated, electrically-powered rail technology that typically operates at street-level.

Alignment

LRT is assumed to operate primarily in the centre of the street. It is in its own right of way, separated from other traffic by a curb with signal priority at intersections.

Artist rendering of King George Boulevard and 96 Avenue

Station Type

LRT stations are typically located within the street, and connect to both sides of the street with pedestrian crossings. Stations are sheltered and typically feature ticket vending machines, closed circuit TV for security, seating, real-time information and wayfinding.

Integration with other modes

LRT alternatives connect to the existing SkyTrain system at King George and Surrey Central stations. Local buses continue to operate in mixed traffic lanes, including in corridors with LRT. There are no changes to pedestrian and cyclist crossings.

Light Rail Transit Alternative 1

LRT Alternative 1 combines LRT and BRT. It connects Surrey City Centre and the existing rapid transit network to key urban centres with three rapid transit services:

- LRT from Guildford to Newton (along 104 Avenue and King George Boulevard) through Surrey City Centre
- LRT from Langley Centre to Surrey City Centre (along Fraser Highway and King George Boulevard) through Fleetwood, and
- BRT from Newton to White Rock (along King George Boulevard and 152 Street).

This alternative operates primarily at street-level, with a bridge where it crosses the Roberts Bank Rail Corridor in Langley.

COSTS	
Capital Cost ($2010)	$2.1B
Annual Incremental Operating Cost ($2010)	$48M
RIDERSHIP	
Projected Daily Boardings (2021 / 2041)	69,000 / 135,000
Projected Total Study Area Daily Boardings (2021 / 2041)	453,000 / 780,000

* This route is considered the most feasible and expected to perform the best compared to other options considered in Phase 1; however, it is subject to change with further technical work and public input.

** Potential station locations are assumed to be every 1-2 kilometres at major roads where demand is expected to be highest. Consistent station locations allow for comparative analysis across all alternatives. Potential station locations are subject to change with further technical work and public input.

*** TransLink's Frequent Transit Network (FTN) is an interconnected network of corridors where transit service is provided every 15 minutes or better throughout the day and into the evening, 7 days a week.

Light Rail Transit Alternative 2

LRT Alternative 2 combines LRT and BRT. It connects Surrey City Centre and the existing rapid transit network to key urban centres with three rapid transit services:

- LRT from Guildford to Newton (along 104 Avenue and King George Boulevard) through Surrey City Centre
- BRT from Langley Centre to Surrey City Centre (along Fraser Highway and King George Boulevard) through Fleetwood, and
- BRT from Newton to White Rock (along King George Boulevard and 152 Street).

This alternative operates primarily at street-level, with a bridge where it crosses the Roberts Bank Rail Corridor in Langley.

COSTS	
Capital Cost ($2010)	$1.5B
Annual Incremental Operating Cost ($2010)	$39M
RIDERSHIP	
Projected Daily Boardings (2021 / 2041)	64,000 / 129,000
Projected Total Study Area Daily Boardings (2021 / 2041)	447,000 / 770,000

* This route is considered the most feasible and expected to perform the best compared to other options considered in Phase 1; however, it is subject to change with further technical work and public input.

** Potential station locations are assumed to be every 1-2 kilometres at major roads where demand is expected to be highest. Consistent station locations allow for comparative analysis across all alternatives. Potential station locations are subject to change with further technical work and public input.

*** TransLink's Frequent Transit Network (FTN) is an interconnected network of corridors where transit service is provided every 15 minutes or better throughout the day and into the evening, 7 days a week.

Light Rail Transit Alternative 3

LRT Alternative 3 combines LRT and BRT. It connects Surrey City Centre and the existing rapid transit network to key urban centres with two rapid transit services:

- LRT from Guildford to Newton (along 104 Avenue and King George Boulevard) through Surrey City Centre, and
- BRT from Langley Centre to Surrey City Centre (along Fraser Highway and King George Boulevard) through Fleetwood.

This alternative operates primarily at street-level, with a bridge where it crosses the Roberts Bank Rail Corridor in Langley.

COSTS	
Capital Cost ($2010)	$1.2B
Annual Incremental Operating Cost ($2010)	$28M
RIDERSHIP	
Projected Daily Boardings (2021 / 2041)	64,000 / 120,000
Projected Total Study Area Daily Boardings (2021 / 2041)	450,000 / 771,000

* This route is considered the most feasible and expected to perform the best compared to other options considered in Phase 1; however, it is subject to change with further technical work and public input.

** Potential station locations are assumed to be every 1-2 kilometres at major roads where demand is expected to be highest. Consistent station locations allow for comparative analysis across all alternatives. Potential station locations are subject to change with further technical work and public input.

*** TransLink's Frequent Transit Network (FTN) is an interconnected network of corridors where transit service is provided every 15 minutes or better throughout the day and into the evening, 7 days a week.

Light Rail Transit Alternative 4

LRT Alternative 4 connects Surrey City Centre and the existing rapid transit network to key urban centres with a single rapid transit service:

- LRT from Newton to Guildford (along 104 Avenue and King George Boulevard) through Surrey City Centre.

This alternative operates entirely at street-level.

COSTS	
Capital Cost ($2010)	$800M
Annual Incremental Operating Cost ($2010)	$15M
RIDERSHIP	
Projected Daily Boardings (2021 / 2041)	26,000 / 53,000
Projected Total Study Area Daily Boardings (2021 / 2041)	433,000 / 726,000

** Potential station locations are assumed to be every 1-2 kilometres at major roads where demand is expected to be highest. Consistent station locations allow for comparative analysis across all alternatives. Potential station locations are subject to change with further technical work and public input.

*** TransLink's Frequent Transit Network (FTN) is an interconnected network of corridors where transit service is provided every 15 minutes or better throughout the day and into the evening, 7 days a week.

Rail Rapid Transit Alternatives

Learn about the RRT alternatives on the following pages.

Then check out the "Design Assumptions and Trade-offs" section on page 19 to see how we've designed RRT for Surrey and surrounding communities.

Technology

RRT is an automated or driver-operated rail technology that is powered by electricity. In Metro Vancouver, RRT (e.g. SkyTrain) is automated and operates separately from other road users.

Alignment

RRT is assumed to operate primarily on an elevated guideway above the centre of the street.

Artist rendering of King George Boulevard and 96 Avenue

Station Type

Stations are elevated above the roadway and accessed by elevators, escalators and stairs. Stations feature ticket vending machines and faregates, closed circuit TV for security, seating, real-time information and wayfinding.

Integration with other modes

RRT alternatives are an extension of the Expo Line beyond King George Station. This allows transfer-free service to and from the existing rapid transit system into Burnaby and Vancouver. Local buses continue to operate in mixed traffic lanes, including corridors with RRT. There are no changes to pedestrian and cyclist crossings.

Rail Rapid Transit Alternative 1

RRT Alternative 1 extends the existing Expo Line to key urban centres with a single rapid transit service:

- RRT extends beyond King George Station (along Fraser Highway) to Langley Centre via Fleetwood.

This alternative operates on an elevated guideway above the street.

COSTS	
Capital Cost ($2010)	$1.95B
Annual Incremental Operating Cost ($2010)	$25M
RIDERSHIP	
Projected Daily Boardings (2021 / 2041)	81,000 / 119,000
Projected Total Study Area Daily Boardings (2021 / 2041)	460,000 / 771,000

** Potential station locations are assumed to be every 1-2 kilometres at major roads where demand is expected to be highest. Consistent station locations allow for comparative analysis across all alternatives. Potential station locations are subject to change with further technical work and public input.

*** TransLink's Frequent Transit Network (FTN) is an interconnected network of corridors where transit service is provided every 15 minutes or better throughout the day and into the evening, 7 days a week.

Rail Rapid Transit Alternative 2

RRT Alternative 2 combines RRT and BRT. It connects Surrey City Centre and the existing rapid transit network to key urban centres with three rapid transit services:

- RRT extends the existing Expo Line south from King George Station (along King George Boulevard) to Newton
- BRT from Guildford to Surrey City Centre (along 104 Avenue), and
- BRT from Langley Centre to Surrey City Centre (along Fraser Highway and King George Boulevard) through Fleetwood.

The RRT component of this alternative operates on an elevated guideway above the street. BRT operates primarily at street-level, with a bridge where it crosses the Roberts Bank Rail Corridor in Langley.

COSTS	
Capital Cost ($2010)	$1.4B
Annual Incremental Operating Cost ($2010)	$26M
RIDERSHIP	
Projected Daily Boardings (2021 / 2041)	95,000 / 170,000
Projected Total Study Area Daily Boardings (2021 / 2041)	465,000 / 790,000

* This route is considered the most feasible and expected to perform the best compared to other options considered in Phase 1; however, it is subject to change with further technical work and public input.

** Potential station locations are assumed to be every 1-2 kilometres at major roads where demand is expected to be highest. Consistent station locations allow for comparative analysis across all alternatives. Potential station locations are subject to change with further technical work and public input.

*** TransLink's Frequent Transit Network (FTN) is an interconnected network of corridors where transit service is provided every 15 minutes or better throughout the day and into the evening, 7 days a week.

Rail Rapid Transit Alternative 3

RRT Alternative 3 extends the existing Expo Line to key urban centres with a single rapid transit service:

- RRT extends beyond King George Station (along King George Boulevard) to Newton.

This alternative operates on an elevated guideway above the street.

COSTS	
Capital Cost ($2010)	$900M
Annual Incremental Operating Cost ($2010)	$9M
RIDERSHIP	
Projected Daily Boardings (2021 / 2041)	43,000 / 76,000
Projected Total Study Area Daily Boardings (2021 / 2041)	447,000 / 740,000

** Potential station locations are assumed to be every 1-2 kilometres at major roads where demand is expected to be highest. Consistent station locations allow for comparative analysis across all alternatives. Potential station locations are subject to change with further technical work and public input.

*** TransLink's Frequent Transit Network (FTN) is an interconnected network of corridors where transit service is provided every 15 minutes or better throughout the day and into the evening, 7 days a week.

Best Bus Alternative

What is Best Bus?

The Best Bus Alternative demonstrates how well future demand can be met through improvements to conventional bus service without significant infrastructure investment. Bus service is improved between urban centres in the study area beyond those service improvements already planned through TransLink's South of Fraser Area Transit Plan. Improvements are achieved through a range of measures, including:

- Increasing bus frequency on existing routes
- Adding new B-Line and express routes
- Improving transit priority (e.g. bus lanes, signal priority), and
- Providing amenities such as real-time information displays.

Best Bus Alternative

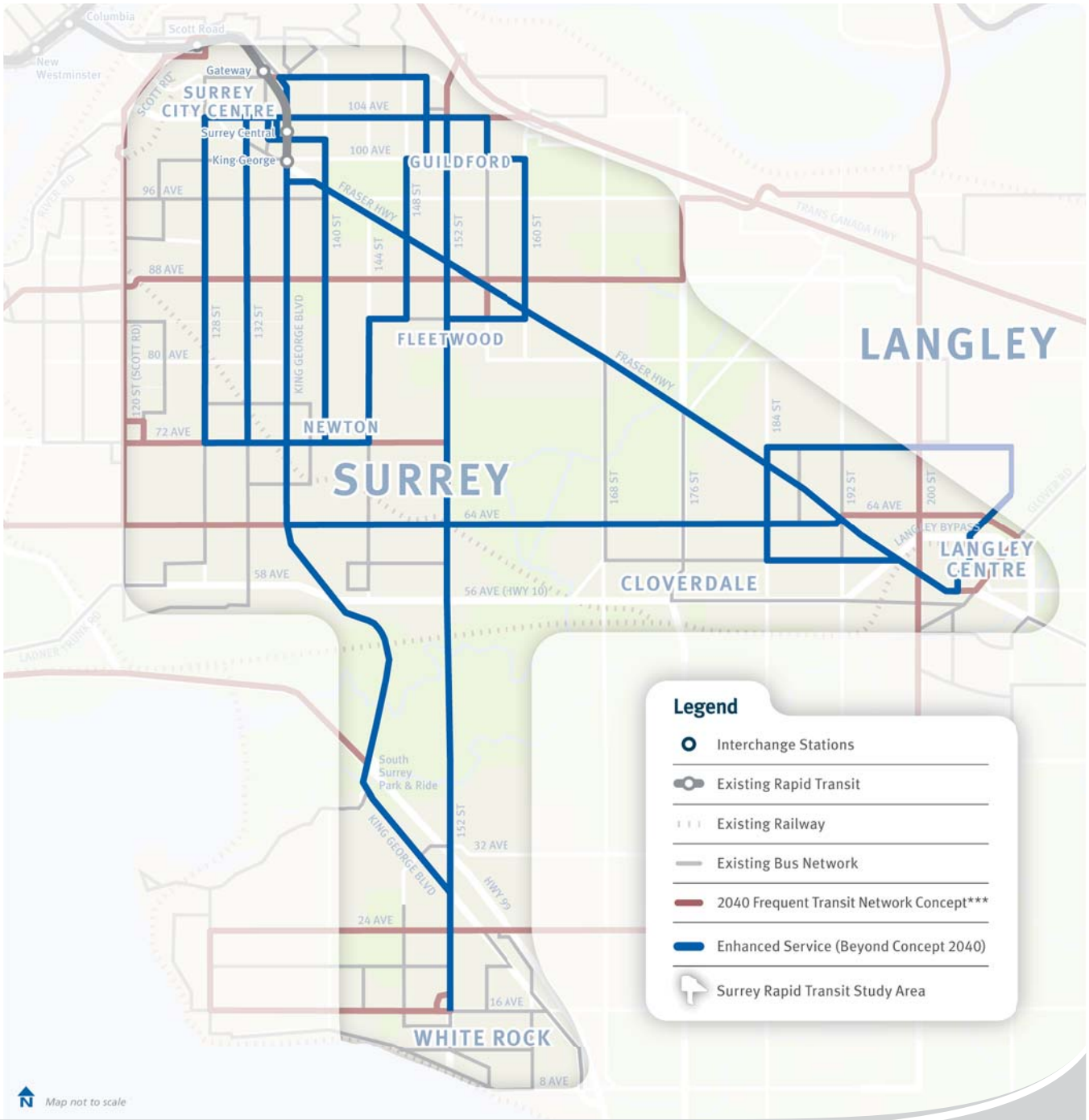
Measures to Improve Service

- B-Line service on King George Boulevard, 104 Avenue, Fraser Highway and 64 Avenue
- Non-stop express bus service on King George Boulevard, 152 Street and Fraser Highway
- Improved frequency on parallel routes (128, 132, 140, 144, 148 and 160 streets, and 108 and 72 avenues)
- Potential to introduce curbside bus lanes along portions of King George Boulevard, and install queue jump lanes at key intersections along King George Boulevard and Fraser Highway to help transit bypass congestion, and
- Transit signal priority at intersections on key corridors to improve transit speed and reliability.

COSTS	
Capital Cost ($2010)	$250M
Annual Incremental Operating Cost ($2010)	$61M
RIDERSHIP	
Projected Daily Boardings (2021 / 2041)****	42,000 / 55,000
Projected Total Study Area Daily Boardings (2021 / 2041)	439,000 / 710,000

*** TransLink's Frequent Transit Network (FTN) is an interconnected network of corridors where transit service is provided every 15 minutes or better throughout the day and into the evening, 7 days a week.

**** Best Bus ridership is on proposed new B-Line and limited stop service in the study area.



Design Assumptions & Trade-offs

1. Station Locations

Where and how many stations are located along each rapid transit route

DESIGN ASSUMPTIONS WE MADE

For comparative analysis, potential station locations are assumed to be the same for all alternatives. To make the best use of the system, stations are typically located in high population and employment areas and usually connect to the existing transit system. Station locations are often chosen to balance speed and access.

Potential station locations are assumed to be spaced on average 1 to 2 kilometres apart at major roads where demand is expected to be highest. The geographic extent of the alternatives affects the number of potential station locations. Potential station locations are subject to change with further technical work and public input.

DID WE MAKE THE RIGHT ASSUMPTIONS?

Would you add or remove a station location?
Consider the trade-offs as you provide your feedback.

Trade-offs to Consider	Adding a Station Location	Removing a Station Location	
Cost	-	+	Capital and operating costs go up as stations are added. Costs range from $2-5 million for a BRT/LRT station to $20 million for an elevated RRT station.
Accessibility	+	-	Accessibility improves with more station locations, reaching more people, job centres and other destinations.
Travel Times	-	+	Travel times decrease with fewer station locations and increase with additional ones.
Ridership	+ / -	+ / -	The number of station locations affects the number of people served by rapid transit, but also influences travel times, which can affect ridership.
Urban Development	+ / -	+ / -	More station locations may increase development opportunities but may also spread development along the corridor. Fewer station locations may focus transit-oriented development activity.

2. Alignment – Vertical

Whether rapid transit operates underground, elevated or at street-level

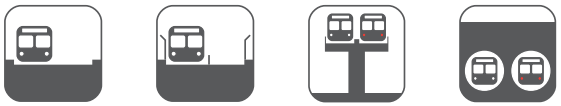
DESIGN ASSUMPTIONS WE MADE

Alternatives using BRT and LRT are designed at street-level, in their own rights of way, and separated from other traffic by a curb. This is typical of most BRT and LRT systems around the world. Tunneled or elevated alignments are possible for all or part of the route, but cost more and are typically only considered if required to increase speed and capacity, or to avoid traffic impacts. As an example, BRT and LRT are assumed to be on a bridge to cross over the Roberts Bank Rail Corridor in Langley.

Alternatives using RRT are designed to be elevated and completely separate from other traffic. Tunneled or street-level alignments are possible; however, a tunneled alignment has higher capital costs, and street-level RRT must be fully segregated by a fence, similar to the Canada Line near the airport.

DID WE MAKE THE RIGHT ASSUMPTIONS?

Would you make any changes to the vertical alignment? Consider the trade-offs as you provide your feedback.



Trade-offs to Consider	Street-level (BRT/LRT)	Street-level (RRT)	Elevated (All)	Tunneled (All)	
Passenger Accessibility	+	-	-	-	Accessibility improves with street-level systems (BRT/LRT) because they are convenient and visible. It takes longer to access street-level RRT and grade-separated systems because elevators, escalators or stairs are required.
Cost	+	+	-	-	Construction costs increase substantially for tunneled or elevated systems, and are highest for tunneled alignments.
Speed	-	+	+	+	Street-level systems (BRT/LRT) are typically 10-15km/hr slower than elevated or tunneled systems.
Traffic and Road Space Impacts	-	-	+	+	Street-level systems can affect traffic and how road space is shared. This may include reducing space for travel lanes, boulevards, sidewalks, and restricting turning movements except at signalized intersections.
Community Integration	+	-	-	-	BRT and LRT systems can contribute to the urban environment by encouraging activity on the street. RRT requires physical barriers for safe operation, limiting community connectivity. In grade-separated systems, visibility is reduced between passengers and the surrounding area. Elevated systems also involve visual impacts due to the prominent guideway and station structures.

2. Alignment – Horizontal

Whether rapid transit is in the centre of the street, on one side or in the outside lanes

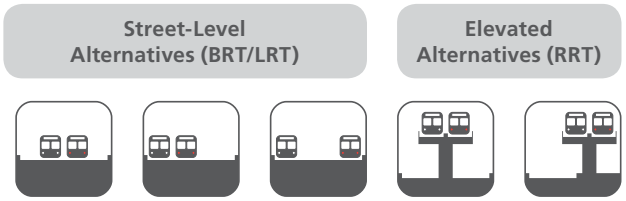
DESIGN ASSUMPTIONS WE MADE

Alternatives using BRT and LRT are designed to operate primarily in the centre of the street, which is most similar to existing traffic operations and minimizes impacts on access along the route. Running BRT and LRT on one side of the street or in the outside lanes on both sides of the street is also possible. The specific alignment could vary along the route depending on street width, land use along the street and room required for other transportation modes, such as transit, bikes and other vehicles.

Alternatives using RRT are elevated and assumed to operate primarily above the centre of the street. In some places, the elevated track may be side-running above the sidewalk or through an off-street right of way.

DID WE MAKE THE RIGHT ASSUMPTIONS?

Would you make any changes to the horizontal alignment? Consider the trade-offs as you provide your feedback.



Trade-offs to Consider	Centre Running	Side Running	Outside Lanes	Centre Running	Side Running	
Passenger Accessibility	-	+ / -	+	-	-	Centre-running systems allow stations to be located in the centre of the street, equally accessible from either side of the street. For side-running systems, station access is more convenient for passengers on only one side of the street.
Right of Way Requirements	-	+	+	+	-	The right of way space required for street-level systems is reduced when station platforms can be built into existing sidewalk space. Elevated alternatives may require greater rights of way in side-running sections.
Vehicular Access	+	-	-	-	+	Street-level systems running in outside lanes or along one side of the street limit access to frontages and driveways. They can also cause operational issues associated with illegal parking/stopping and emergency vehicle access. Centre-running systems largely maintain frontage access but limit left turn movements to signalized intersections. In elevated systems, turning movements are often restricted across centre-running systems for safety reasons because support columns impede visibility.

3. Use of Road Space – How road space is shared with other users

The BRT and LRT alternatives are designed to operate at street-level. To fit these alternatives in the street, roughly six to seven metres of space is required along most of the route, and nine to 12 metres at stations. This requires adjusting how road space is shared with other users (pedestrians, cyclists, transit, goods movement vehicles and private cars). See the illustration on the next page to learn more about the assumptions we made on how road space is shared.

DESIGN ASSUMPTIONS WE MADE

A Bike Lanes
Outside traffic lanes are designed to be bike-friendly; and where space allows, dedicated bike lanes are included. Integration of cycling and rapid transit will be designed in more detail once a preferred alternative is selected.

B Station Platforms
Stations are designed to be in the centre of the street and accessed from both sides by crosswalks at the nearby intersection. Some additional road space is required for station platforms, which may involve narrowing traffic lanes, boulevards or sidewalks, or purchasing property.

C Traffic Lanes
Assumed right of way widths are based on expected future conditions, including planned road-widening by the City of Surrey. In some areas, the number and/or width of vehicle lanes may be reduced to accommodate rapid transit. In all areas, the overall capacity of the street is increased because rapid transit allows more people to be moved by transit, shifting trips from cars. Displaced traffic volumes may be accommodated on parallel corridors through planned widening by the City of Surrey.

D Left Turn Bays
To fit in platforms and give priority to rapid transit vehicles, some left turn bays may be shortened or removed. At most major intersections left turn bays are maintained but may be removed at minor intersections and vehicle movements restricted (see page 28).

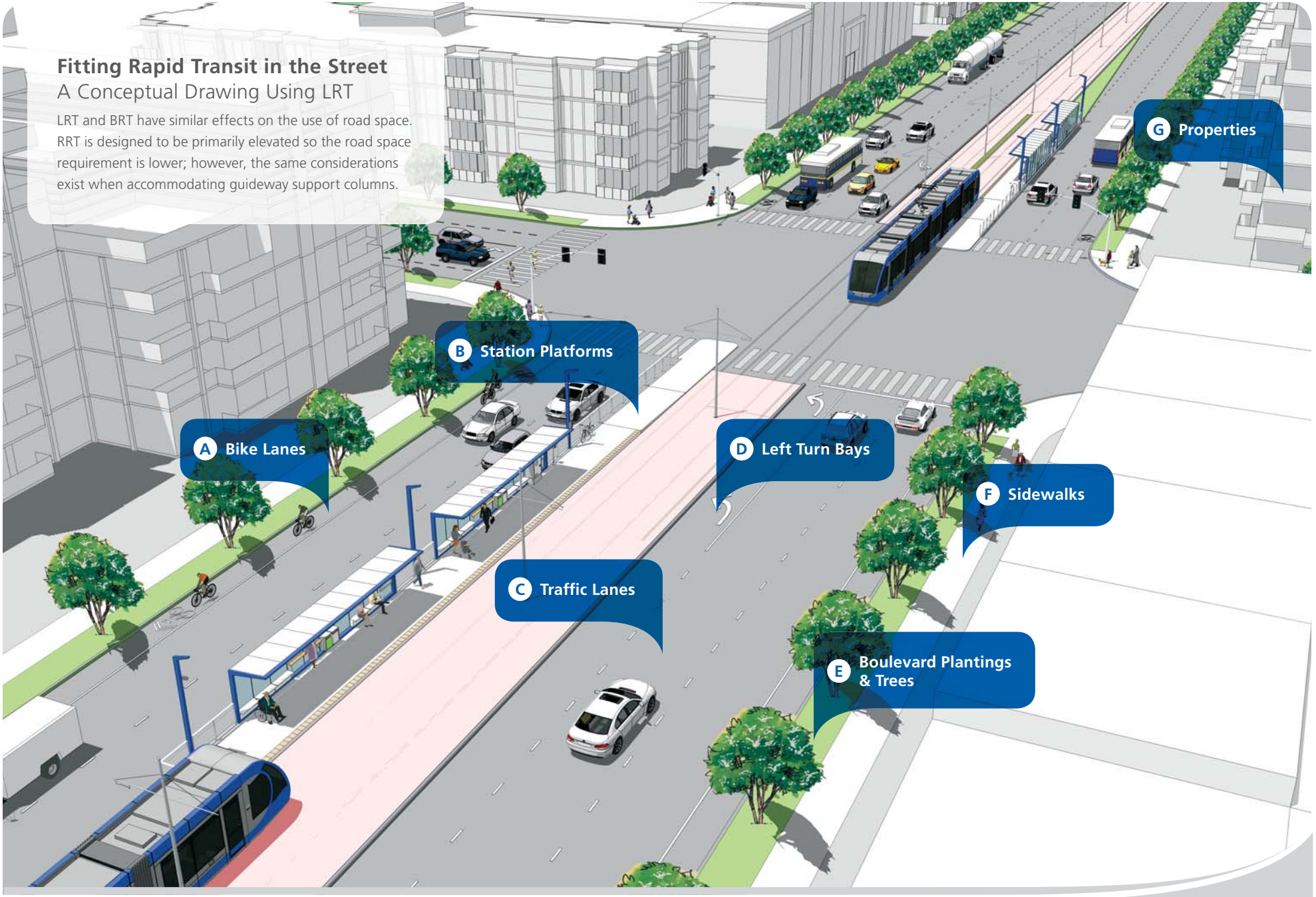
E Boulevard Plantings & Trees
Boulevards may need to be removed or narrowed to fit in BRT or LRT. Street trees removed for construction would be replaced. Where space allows, planting strips and buffers will be maintained. Opportunities for planting trees and enhancing urban design will be considered once a preferred alternative is selected.

F Sidewalks
Fitting rapid transit into the street requires reconfiguring the whole right-of-way. This may include reducing sidewalk widths in some areas or widening sidewalks where streets are reconstructed to accommodate rapid transit.

G Properties
To fit rapid transit in the street, some properties may be affected. Purchasing property may be done in some cases to widen the available road space for all road users. This is a costly measure and only considered if other measures are not sufficient or acceptable.

DID WE MAKE THE RIGHT ASSUMPTIONS?

What are your thoughts on how road space is shared?

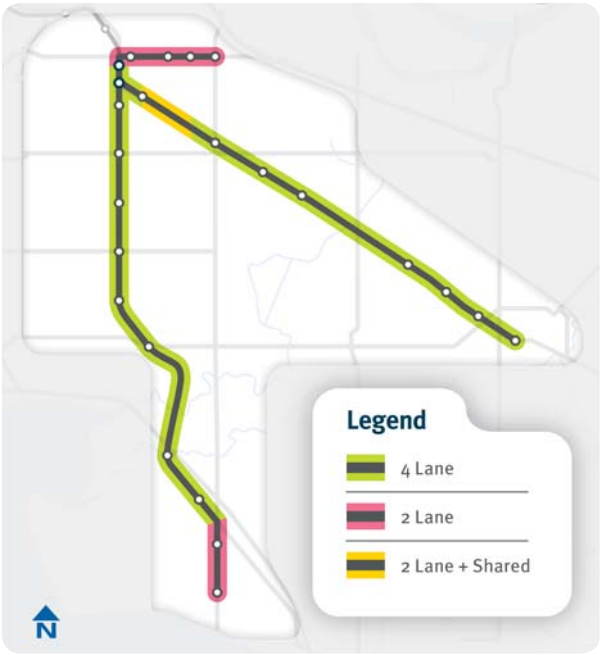

Fitting Rapid Transit in the Street
A Conceptual Drawing Using LRT
LRT and BRT have similar effects on the use of road space. RRT is designed to be primarily elevated so the road space requirement is lower; however, the same considerations exist when accommodating guideway support columns.
A Bike Lanes
B Station Platforms
C Traffic Lanes
D Left Turn Bays
E Boulevard Plantings & Trees
F Sidewalks
G Properties

3. Use of Road Space – Typical Cross-Sections

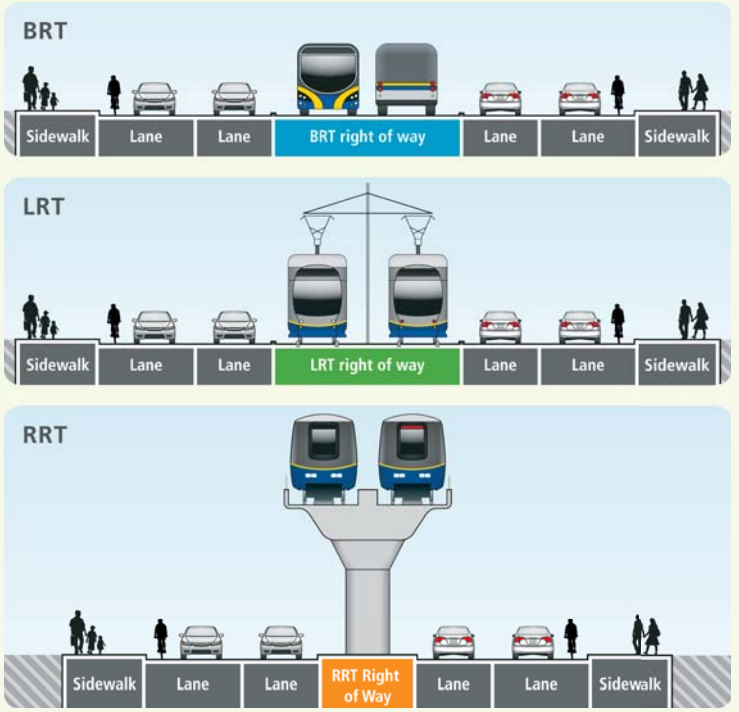
This section shows how rapid transit is assumed to fit in the street at typical two-lane and four-lane street segments throughout the study area (see the legend below for typical locations).

The rapid transit right of way through Green Timbers Urban Forest is assumed to be shared with other traffic, with transit priority at intersections (see page 27).

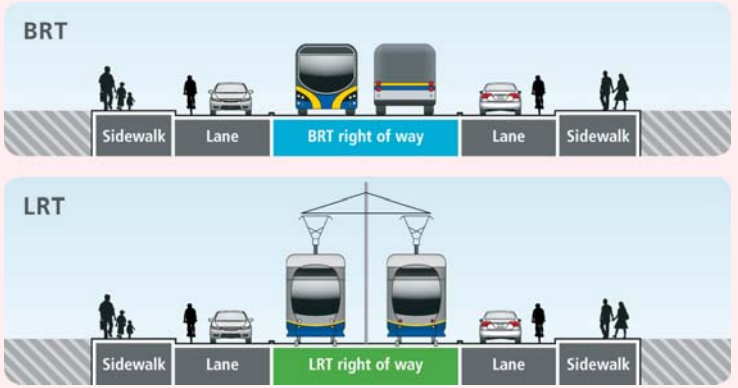
RRT operates solely in four-lane segments.



Four-lane segments, two general purpose traffic lanes in either direction plus the two-way rapid transit right of way. These are typical cross-sections along King George Boulevard and Fraser Highway.



Two-lane segments, one general purpose traffic in either direction plus the two-way rapid transit right of way. These are typical cross-sections along 104 Avenue between Surrey City Centre and Guildford and along 152 Street in South Surrey.

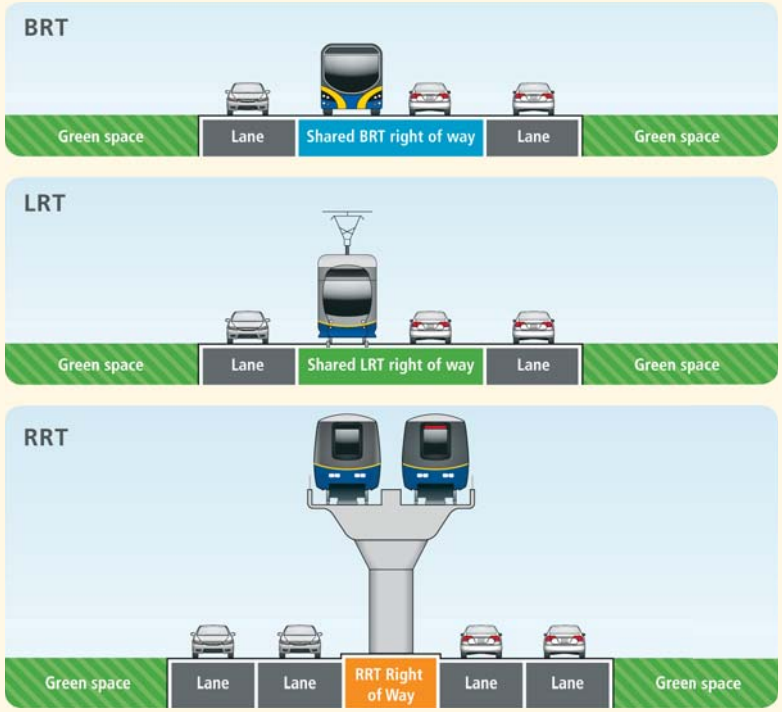


Typical Cross-Section Through Green Timbers

The Green Timbers Urban Forest is a 185-hectare park with significant historical, ecological and recreational value. The rapid transit design assumptions through this area consider these values, along with the City of Surrey's plans for a four-lane road, traffic volumes along Fraser Highway and safety for all road users.

Rapid transit is assumed to share the planned right of way (see Typical Cross-Section). While this minimizes additional tree or vegetation loss, it also somewhat reduces rapid transit reliability and speed, as well as vehicle traffic capacity. Transit priority at intersections throughout Green Timbers helps ensure rapid transit can safely advance ahead of general purpose traffic (see below).

Pedestrian and cyclist movements through Green Timbers would continue to be accommodated on off-street paths through the park.

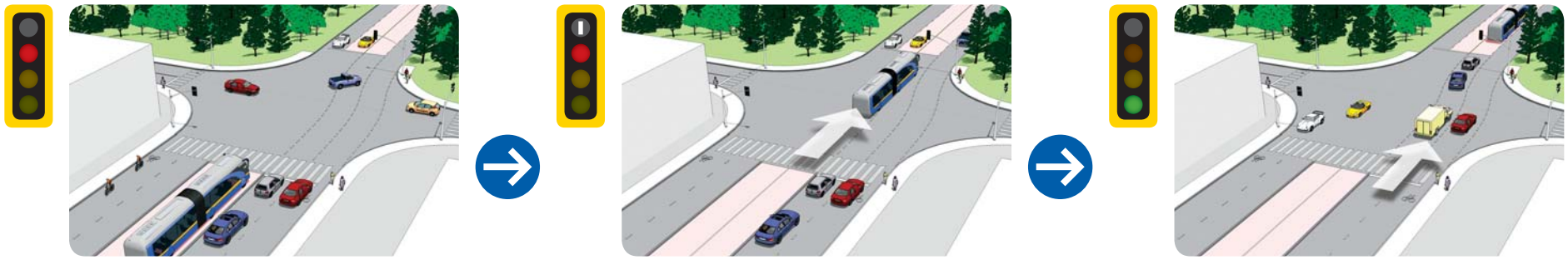


Rapid Transit Priority into Green Timbers

Red light – all traffic

Advance signal – rapid transit vehicles

Green light – general purpose traffic

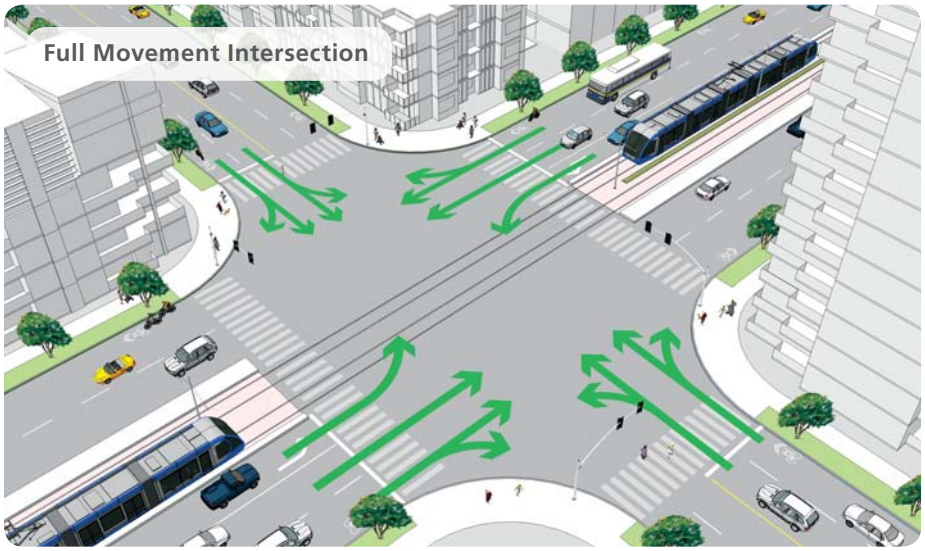


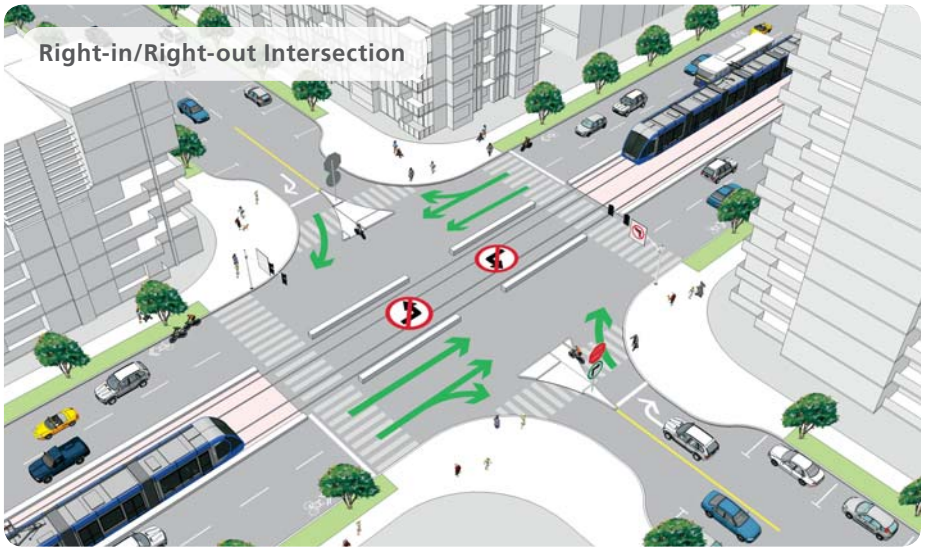
Representative artist rendering

4. Intersection Priority

DESIGN ASSUMPTIONS WE MADE

To fit rapid transit into the street and ensure that it is fast and reliable, intersections throughout the study area would change into one of two main types: full movement or right-in/right-out intersections. Full traffic movements would be maintained at all major intersections while some minor intersections would be converted to right-in/right out. See the illustration below, which shows conceptually how BRT and LRT are assumed to function at intersections. RRT assumes no significant changes to intersections in the study area.





Trade-offs to Consider	Full Movement Intersections	Right-in/Right-out Intersections	
Vehicular Movements	+	-	At full movement intersections, all through-movements are accommodated and left turns from the rapid transit street have dedicated lanes and signal phases to separate them from LRT or BRT traffic. At right-in/right-out intersections, cross-movements are not permitted across the rapid transit street for general-purpose traffic, and left turns are not permitted to or from the rapid transit street.
Rapid Transit Movements	-	+	Rapid transit vehicles can have more consistent priority through right-in/right-out intersections, reducing travel times and improving reliability. This results in greater ridership and improved system performance.
Pedestrian & Cyclist Movements	+	+	Full movements for pedestrians and cyclists are accommodated at all intersection types through crosswalks and signal phasing. Safe crossing times for pedestrians and cyclists are always maintained.

Give us your feedback!
Please fill out the Questionnaire

For more information, contact:

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Thank you for being part of the plan!

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