

 **steer daves gleave**

HATCH

South of Fraser Rapid Transit

Preliminary Capital Cost
Estimates

Report
March 2018



Our ref: 350135-PM-336-A0-
0001

Client ref: MT01701P



Prepared by:





South of Fraser Rapid Transit

Preliminary Capital Cost
Estimates

Report
March 2018



Our ref: 350135-PM-336-A0-
0001
Client ref: MT01701P

Prepared by:

Anthony Steadman and Associates

1063 Newport Avenue
Victoria, BC, V8S 5E2

Prepared for:

TransLink

400 - 287 Nelson's Court
New Westminster BC V3L 0E7

Steer Davies Gleave & Hatch Joint Venture

Suite 970 - 355 Burrard Street
Vancouver, BC V6C 2G8
Canada
+1 (604) 629 2610
na.steerdaviesgleave.com

Suite 400 – 1066 West Hastings Street
Vancouver, BC V6E 3X2
+1 (604) 689 5767
hatch.com

The Steer Davies Gleave and Hatch Joint Venture [SDG/Hatch JV] has prepared this material for TransLink. This material may only be used within the context and scope for which the SDG/Hatch JV has prepared it and may not be relied upon in part or whole by any third party or be used for any other purpose. Any person choosing to use any part of this material without the express and written permission of the SDG/Hatch JV shall be deemed to confirm their agreement to indemnify both Steer Davies Gleave and Hatch for all loss or damage resulting therefrom. The SDG/Hatch JV has prepared this material using professional practices and procedures using information available to it at the time and as such any new information could alter the validity of the results and conclusions made.

Contents

1	Introduction	1
2	Background	2
3	Key Points	3
4	Basis of Estimate	4
5	Scope of the Work	6
	Utility Relocations.....	6
	Roadworks	6
	Site Preparation	6
	Landscaping and Environmental Mitigation.....	7
	Transitway / Guideway	7
	Systems Structures	7
	Stops	7
	Stop Facilities.....	8
	Operations and Maintenance Facility (OMF)	8
	Trackwork	8
	Power Distribution.....	9
	Train / Transit Control and Signalling	9
	Communication and Controls.....	9
	Testing and Commissioning.....	10
	Stop Security and Emergency Power.....	10
	Fare Collection.....	10
	Property.....	10
	Management, Design and Engineering.....	10
	Insurance and Bonding	11
	Vehicles.....	11
	Contingencies	11
	Interest During Construction	11

1 Introduction

A joint venture between Steer Davies Gleave (SDG) and Hatch was selected by TransLink in February of 2016 to advance the technical design of the Surrey-Newton-Guildford (SNG) Light Rail Transit (LRT) Line to a second concept design freeze – Design Freeze 2 (DF2) which included two stages. The DF2 phase Stage 1 included advancing geotechnical investigations and environmental studies. The DF2 Stage 2 phase focused on further development of a concept design and to reach a +/- 15% planning level cost estimate.

The SNG LRT will run along the following corridors:

- Surrey City Centre to Newton along King George Boulevard
- Surrey City Centre to 152 Street along 104 Avenue

During the Procurement Readiness phase, a cost estimate produced to accompany Design Freeze 2. The capital cost estimate prepared by Anthony Steadman and Associates with technical support from Hatch, SDG, Mott MacDonald and Stantec. The property cost estimate has been provided by TransLink with support from the City of Surrey. This estimate presents the capital costs and property costs associated with this reference case design and is assembled in the same format used in previous estimates.

This report does not include a cost estimate for the Surrey-Langley Line portion of the Project along Fraser Highway.

2 Background

Following previous estimates related to the provision of a dedicated Rapid Transit System within the City of Surrey, the Procurement Readiness phase continues with the preparation of estimates based on revised and updated design and engineering information for the construction and implementation of an LRT System along two corridors within the City of Surrey. These two corridors are known collectively as the SNG Line (also referred to as the “L” Line), but are presented separately in the cost sheets:

- King George Blvd: from Surrey City Centre to Newton along City Parkway, 102 Ave and King George Boulevard
- 104 Ave: from Surrey City Centre to 152nd Street along City Parkway and 104th Avenue

This capital cost estimate takes into account information that has been made available from the conceptual engineering work being carried out, and includes a greater level of detail related to site specific information than previously.

Conceptual design work covering engineering, architecture, environmental issues and utility conflicts has been carried out, and information derived from this work is included within the estimate.

A geotechnical investigation program was initiated in the Design Freeze Stage 1 work. The program obtained information on the subsurface conditions with further work to undertake the engineering design in Stage with the investigation data.

During the Design Freeze Stage 1 work, an environmental work program was advanced which included preliminary baseline studies to inform the design work in Stage 2. The studies included Fisheries and Aquatics, Vegetation and Wildlife, Contaminated Sites, Construction and Operational Noise, Air Quality, Agricultural Land, and Heritage, Socio-Economics and Analysis.

During the Design Freeze Stage 2 work, the engineering design included track and road refinement, systems design including traction power, communications, Operations and Maintenance Facility (OMF) and signals, structures, geotechnical and pavement assessment, utilities and drainage.

3 Key Points

Following previous estimates related to the provision of a dedicated Transit System within the City of Surrey, this estimate reflects a cost up-date reflecting the work in progress for the construction and implementation of an LRT to two routes within the City of Surrey. These two routes, known collectively as the SNG LRT, are as follows:

- King George Blvd: from Surrey City Centre to Newton along City Parkway, 102 Ave and King George Boulevard
- 104 Ave: from Surrey City Centre to 152nd Street along City Parkway and 104th Avenue

The estimate follows the format used in previous estimates. This estimate takes into account information that has been made available from the preliminary engineering work being carried out.

4 Basis of Estimate

The construction prices are assuming the use of pricing obtained from competitive tenders, with minimal restrictions on construction methodology and without contractual conditions that would create onerous contractual situations that would be reflected in a contract price.

The alignments are based upon drawings, stops, and plaza concepts, meetings and information provided related to utilities and environmental information as part of the Preliminary Engineering work.

The estimates have been prepared with the use of historical knowledge and current pricing levels.

The estimates are to cover all costs associated with the implementation of the project from the period commencing with the set-up of the project management group until the transit system is ready for revenue service.

The route lengths are as follows:

- Surrey City Centre to Newton – 7,053 meters consisting of in street guideway
- Surrey City Centre to 152nd Street – 3,259 meters consisting of in street guideway

The stops are all 40 metres long and at grade, as follows:

- Surrey City Centre to Newton
 - Surrey City Centre
 - King George Expo Line
 - 96th Avenue
 - 88th Avenue
 - 80th Avenue
 - 76th Avenue
 - Newton
- Surrey City Centre to 152nd Street
 - 140th Street
 - 144th Street
 - 148th Street
 - 152nd Street

The construction prices are assuming the use of pricing obtained from competitive tenders, with minimal restrictions on construction methodology and without contractual conditions that would create onerous contractual situations that would be reflected in a contract price.

The management for this project is anticipated to be a dedicated project management group, similar to that carried out to implement the Evergreen Line.

Procurement will be a complete P3 design, build, finance, operate and maintain. The estimates at this stage set out design and engineering, project management, and construction management separately;

however, some of these elements may be carried out in part or in whole by the Contractor / Concession; which may affect the levels of cost to carry out the work. The estimate does include the services associated with a P3 contract, such as a greater level of effort into procurement requiring legal and financial advice, independent engineer services.

The construction, design and management costs included in the estimate for the Newton and 104th Avenue Lines assume the project management and procurement commencing in 2016, with the project entering revenue service in autumn of 2023, and includes inflation over the construction period.

The inflation levels assumed in the estimate for the above project implementation period is as follows:

Element	Prior to Contract Award	During Construction
Civil and Building Works	█% per annum	█% per annum
Systems	█% per annum	█% per annum

The estimate is based upon an opinion of cost that creates a preliminary estimate with assumptions and allowances covering work that cannot be quantified, which will need to be reviewed as the project becomes more clearly defined, and adjusted as necessary to reflect any changes in scope and levels of pricing

The estimates exclude the following:

- Early works projects carried out directly by the City of Surrey, which include work to Bear Creek, storm sewer and water mains to 104th and 105th Avenue, Guildford Parking and BC Hydro overhead line relocation
- All special purpose company set up and operating costs, these being included separately by those preparing the Financial Models
- All costs associated with setting up, managing and operating the Concession through operations
- Financing Interest During Construction (IDC), and any financing costs beyond the construction period.
- Re-routing of existing transit services, either temporarily or permanently.
- Street works beyond the transit routes
- Physical barriers at LRT street crossings
- Joint development costs or opportunities
- Studies prior to project commencement
- Park and ride facilities
- Bus loops other than facilities at Newton
- Vehicle mock-ups
- Spares infrastructure elements necessary for operations
- Operating costs
- Any work to the Fraser Langley Line
- GST

5 Scope of the Work

The Scope of the Work is based on the Reference Concept design. This section describes in further detail the scope of the work under a variety of headers and costs are included at the end of the document.

Utility Relocations

A comprehensive study has been carried out to identify possible utility relocations required to carry out the work, however until it is established exactly the quantum of work necessary to relocate each utility, it is not possible to prepare an accurate estimate that reflects the work required. At this stage information has been provided for the Newton and 104th Avenue Lines, allowing a more detailed estimate to be prepared.

The major BC Hydro high voltage and Fortis Gas transmission lines have been identified and costs have been included to account for relocation to avoid conflicts.

Roadworks

The roadworks cover widening and alterations that are directly required to construct the transitway. The works includes the following:

- Removing the road surface, medians, and sidewalks as necessary to accommodate the LRT guideway
- Mill and re-surface all roads where work has been carried out to accommodate the LRT guideway
- Widen the road to compensate for the LRT guideway.
- Bike Lanes and pedestrian boulevards added to both sides of King George Boulevard
- Work to traffic intersections to accommodate the LRT line
- Full replacement of street lights
- Full replacement of pedestrian/traffic signalling systems
- Drainage improvement allowances are included to accommodate additional drainage issues that may become apparent due to the construction of the LRT System.

Site Preparation

A series of allowances covering work to prepare the site taking into account the report prepared on work to existing structures and road widening. The work includes:

- Allowance for culverts to cross the transitway and environmentally sensitive creeks
- Demolition costs are included as an allowance
- Ground improvement
- Ground replacement at the junction of the Newton and 104th Avenue Lines, for the full width of the roads at the junction
- Traffic management, beyond that required for transitway construction
- Work to Quibble Creek
- The retaining walls to King George Boulevard
- Re-configuration of the existing King George ALRT station, to provide an improved pedestrian connection

Landscaping and Environmental Mitigation

A general allowance for environmental mitigation and landscaping along the guideway including:

- Sound barriers or noise attenuation measures to 40% of the SNG Line
- Contaminated material removal
- Low maintenance landscaping and trees at the sides of and along the length of the at grade guideway, together with shrubs within the areas for future platform extensions, shadows of platforms, left turn bays or wherever space allows
- Habitat compensation
- Work to fish bearing and other sensitive issues related to water-ways and streams
- First Nations consultation and mitigation of related issues

Transitway / Guideway

The structure to support and operate the running system which includes the civil works as set out below together with all necessary traffic management necessary to carry out the works.

- The guideway is an at grade transit way in the constructed within roads, consisting of a reinforced concrete structure designed to take embedded trackwork, segregated from road traffic with mountable median curbs.
- An allowance is included for excavation and placement of fill to individual guideway sections, in advance of detailed cut and fill information being provided.

Systems Structures

Structures to accommodate the systems including:

- Seven sub-station buildings, the number per line is set out in the power supply and distribution section of this document
- Foundations and bases to the overhead traction power lines
- Track plinths to elevated guideways
- One nine-way ducts for power distribution and communications under all at grade transitways, and a four-way duct under the guideway to support the single wire overhead traction power supply system

Stops

A separated stop area with a paved platform raised to allow for access to a low floor vehicle. The stops are all 40 metres long.

Each stop platform includes the following:

- Platform structure including foundations
- Platform ramp 10 metres long to one end of the platform
- Based on the information provided no fill or retaining structures are seen to be required for any of the current locations
- An equipment locker for stop systems
- Glazed platform canopy for 50% of the platform length and to the width of the platform
- One equipment kiosk

- Platform finishes, consisting of patterned concrete with a platform edge tile including a tactile strip for impaired access
- Platform drainage
- Lighting to the platform and access ramp
- Signage
- Furniture, including seating, notice board, cabinet and garbage receptacles
- Service connections to the stops
- Safety barriers at back of platform

Stop Facilities

Facilities associated with the stops include the following:

- Provision of 12 to 15 bike lockers per stop
- Furniture to be defined including trash cans, seating etc.
- Operator's facility at each end of line stop and one at Surrey Centre, each facility consisting of two washrooms and a rest area
- Traffic calming paving and curbs to delineate and safeguard stops
- Public Art based on a total value of \$ [REDACTED] in 2018 dollars for all stops
- Signage and furniture
- Service connections to the stops
- Safety barriers at back of platform
- Direction signs to the stops

Operations and Maintenance Facility (OMF)

OMF – A new stand-alone maintenance facility, consisting of a 2.82 hectare site for all LRT alternatives including the following:

- 2,500 square metre maintenance building
- 2,100 square metre control and administration building
- 1,000 square metre operator's facility
- Service pits and vehicle wash facility
- 2,300 metres of yard track and OCS power with 25 switches
- 460 metres of connection track from the facility to the main line
- Perimeter fencing, roads and parking
- Maintenance equipment as an allowance of \$ [REDACTED]
- Non-revenue service vehicles, covered by an allowance of \$ [REDACTED]
- A wheel lathe and its pit
- Traction power sub-station
- Fire Mains and yard Lighting

Trackwork

The provision of trackwork to the main line, the OMF trackwork is included with the OMF.

Street trackwork comprises of insulated embedded track consisting of Ri 50 grooved rail set into the track-bed, or UIC60 direct fixation track where segregated from traffic.

Provision of switches, crossovers and pocket track, as shown on the drawings to the SNG Line, the numbers included are as follows:

- Newton Line special trackwork – 30
- 104th Avenue Line special trackwork – 10

Rail stops at the end of each line.

Power Distribution

The provision of the power supply and distribution system to the main line, the Maintenance and Storage Facility power supply and distribution system is included with the OMF.

- An allowance of \$ [REDACTED] is included for a BC Hydro power up-grade and connection to the LRT system
- Overhead power supply catenary system to King George Boulevard south of 96th Avenue, the remaining overhead power provided by a single wire contact system
- One megawatt traction power sub-station equipment packaged units, comprising of:
 - 5 Units to the Newton Line
 - 2 Units to the 104th Avenue Line
- High voltage power connections between sub-stations
- Low voltage power distribution cables
- UPS power at stops

Train / Transit Control and Signalling

A line of sight, driver operated, radio based train to wayside communication and signalling system

- Supply and installation of switch machines with the necessary cable.
- On-board vehicle equipment
- Track circuits
- Signalling equipment hardware
- System hardware
- System software
- Signalling contractor engineering and management
- Pre-emption at traffic light controlled intersections

Communication and Controls

Communication and control systems related to operations, safety and security of the system:

- Communication cables
- Telephone system
- Operations and maintenance radio system
- S.C.A.D.A. equipment to sub-stations including central control equipment
- Hand held operations radios
- Distribution and access switches

Testing and Commissioning

Testing and commissioning the complete system, including power for testing.

Stop Security and Emergency Power

Safety and security systems to stations

- MNS and BMS to stops, including central control equipment
- CCTV cameras to stations
- Stop public address system
- Dynamic arrival notification signs
- UPS Systems to stops

Fare Collection

A fare collection system compatible with the “Compass” fare collection and control system currently being implemented on the existing transit lines:

- 4 Fare card vending machines per stop
- 2 Add fare machines per stop
- 4 Fare tap on / off machines per stop
- 1 Stop central equipment per stop

Property

Property estimates as provided by Translink in 2015 dollars, these have been inflated by [REDACTED] for the Newton and 104th Avenue Lines; in addition, costs have been added for lay-down areas. Property estimates include [REDACTED] contingencies, and these costs are included with Property, and not in the general contingency item.

Management, Design and Engineering

Design of the complete system by the Contractor, including architectural, civil and system works through construction.

Project management services for the project that cover the design, engineering, and general management by project staff and consultants for the duration of the project. This will include overall management, design, engineering, planning, procurement, systems integration, cost and schedule control, estimating, quality assurance, environmental control, offices, construction management and operational costs. The estimate is derived from a detailed assessment of resources currently applied to the project, and of those resources required to complete the project, based on the project schedule. The cost driver for this element of the project is time, in place of estimated project costs as previously used.

Construction management services during the construction stage of the project. This includes overall construction management to be carried out by the contractor, in addition to the site establishment and overheads included within the construction costs, including contract management, safety monitoring, environmental monitoring, and general administration. [REDACTED]

Legal costs are included in the project management estimate.

Independent Engineering Services to monitor payment for funding purposes are included in the project management estimate.

A Procurement stipend of \$ [REDACTED] to cover a stipend of \$ [REDACTED] to be paid to each of two unsuccessful proponents submitting proposals to design and construct the project.

Environmental Assessment and Permitting.

Public communications and consultation are included in the project management estimate.

Finance and accounting over the project implementation, including accounts payable, financial control and management accounting are included in the project management estimate.

The provision of security to the system between completion of construction and opening.

Planning of operations including general planning and training prior to opening.

Insurance and Bonding

Overall project insurance and bonding covering all construction and professional liability insurance together with bonding is included at [REDACTED] % of the total costs.

Vehicles

16 articulated low floor light rail transit vehicles 30 metres long.

Contingencies

Contingencies to the Newton and 104th Avenue Lines has been based on an allowance against each cost item reflecting a current assessment of risk, resulting in a contingency of approximately [REDACTED] %. The percentages are the value of the contingencies applied as percentage of construction, design, and management estimates to cover risks and contingency events, [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Interest During Construction

IDC is excluded, and accounted separately within the business case.

SURREY-NEWTON-GUILDFORD LRT AT GRADE LRT 27th February 2018 As Spent Dollars	
	\$
Utilities	██████████
Site Preparation	██████████
Roadworks	██████████
Guideway	██████████
Systems Structures	██████████
Stops	██████████
Bus Loops and Exchanges	██████████
Landscaping	██████████
Environmental	██████████
Maintenance Facility	██████████
Trackwork	██████████
Systems	██████████
Testing and Commissioning	██████████
Vehicles	██████████
Design	██████████
Project Management	██████████
Construction Management	██████████
Property	██████████
Insurance	██████████
Operational Readiness	██████████
Contingencies	██████████
GST	EXCLUDED
Interest During Construction	██████████
TOTAL ESTIMATE	██████████
Items Transferred from Previous Estimate to Direct Works	██████████
Bear Creek Bridge	██████████
104th and 105th Avenue Utilities	██████████
Guildford Exchange	██████████
BC Hydro	██████████
TOTAL	██████████
Total with Transferred Items	██████████

