



South Coast British Columbia Transportation Authority

**REQUEST FOR EXPRESSION OF INTEREST  
(RFEOI)**

**Reference No.:** Q12-007

**Title:** Supply of Fully Automated Advanced Light Rapid (ALR) Transit Passenger Vehicles

**Issue Date:** February 10, 2012

**Submission Deadline:** 2:00:00 p.m., Pacific time, **February 24, 2012**, subject to section 3.1.

**Instructions:**

Five (5) complete sets of each submission should be submitted in a sealed envelope addressed and delivered to the following address:

**Reference No. Q12-007**  
TransLink Procurement Department  
1600 - 4720 Kingsway (Metrotower II)  
Burnaby, BC V5H 4N2

**Submissions should not be sent by e-mail or facsimile.**

**Inquiries:**

All inquiries must be submitted **in writing** to the attention of the Procurement Department by fax at: (604) 453-4630 or e-mail at: [procurement@translink.ca](mailto:procurement@translink.ca).

**No telephone queries, please**

**This Request for Expression of Interest does not constitute an offer to enter into a contract with any party.**

## **PART A - GENERAL**

### **1.0 BACKGROUND**

- 1.1 South Coast British Columbia Transportation Authority (“TransLink”) is responsible for planning, financing and operating the public transportation system throughout Metro Vancouver pursuant to the *South Coast British Columbia Transportation Authority Act*. Additional information about TransLink is available on our web-site at [www.translink.ca](http://www.translink.ca).
- 1.2 TransLink’s subsidiary British Columbia Rapid Transit Company Ltd. (“BCRTC” or “SkyTrain”) maintains and operates two (2) of the three (3) Metro Vancouver’s SkyTrain lines on behalf of TransLink. Additional information about SkyTrain is provided in Appendix 1.
- 1.3 As a result of the implementation of the Evergreen Line Project (<http://www.evergreenline.gov.bc.ca>), TransLink will incur service expansion to its current public transportation systems, including anticipated ridership growth for the existing Expo and Millennium Lines.

### **2.0 PURPOSE**

- 2.1 TransLink is requesting expressions of interest for the supply and delivery of additional Fully Automated Advanced Light Rapid Transit Passenger Vehicles (“Vehicles”) as more particularly described in this Request for Expressions of Interest (“RFEOI”).
- 2.2 TransLink intends to procure up to an initial 28 Vehicles (actual number of Vehicles may be increased or decreased at TransLink’s discretion), with potential options for up to an additional 28 Vehicles (actual number of Vehicles may be increased or decreased at TransLink’s discretion). The anticipated service dates for the initial Vehicles is approximately January 2016, and June 2017 for optional Vehicles.
- 2.3 Vehicles must be compatible with the existing SkyTrain infrastructure (guideways and stations), technology (ALRT and Steerable Axle Trucks), propulsion power systems (Linear Induction Motors powered by 650 Volts DC), and SELTRAC automated train control system. Refer to the system overview provided in Appendix 1 and Vehicle Dimensions listed in Appendix 2.

## **PART B – SUBMISSION PROCESS**

### **3.0 SUBMISSION INSTRUCTIONS**

- 3.1 Respondents should comply with the instructions on the cover page. Submissions should be delivered by no later than the date and time shown on the cover page or such other time as TransLink may specify by addendum (the “**Submission Deadline**”).

### **4.0 INQUIRIES AND ADDENDA**

- 4.1 Inquiries should be submitted in accordance with the instructions on the cover page. Information obtained from any other source (including any departments of TransLink, its subsidiaries, staff, board members or consultants) is not official and may be inaccurate.
- 4.2 TransLink may issue addenda for clarification or to alter or supplement this RFEOI, which will be posted to the TransLink web-site at: [www.translink.ca](http://www.translink.ca). TransLink will not be bound by any information not incorporated into an addendum to this RFEOI. Respondents are responsible for ensuring they are kept apprised of all addenda issued. TransLink assumes no responsibility for notifying Respondents of the existence of addenda.

**5.0 CONTENTS OF SUBMISSION**

5.1 Respondents submissions should include:

- (a) Corporate Identity, Contact Information;
- (b) Ability of proposed Vehicle(s) to meet the dimension requirements specified in Appendix 2;
- (c) Ability of proposed Vehicle(s) to meet the technical and performance requirements of the existing SkyTrain systems;
- (d) Ability to meet anticipated in-service dates, which include an implementation plan with key milestone dates);
- (e) Experience in building fully automated advanced light rail passenger vehicles;
- (f) List of past clients and description of the projects, including number of Vehicles, schedule, and key Vehicle features;
- (g) Design and manufacturing capability and capacity;
- (h) Proposed Vehicle(s) specifications;
- (i) Any other applicable information.

**PART C – REVIEW AND SELECTION**

**6.0 PROCESS**

6.1 Submissions may be reviewed by a committee formed by TransLink and may include employees of TransLink, its subsidiaries and consultants.

6.2 Submissions will be considered on the basis of the information contained therein and on the basis of any information obtained by TransLink as a result of any subsequent clarifications or discussions.

6.3 TransLink will have sole and absolute discretion in considering and evaluating submissions, judging the acceptability of submissions, and selecting Respondents, if any, for further consideration. Submissions will be opened privately.

**7.0 CRITERIA**

7.1 TransLink intends to consider the following when reviewing and evaluating submissions (not necessarily limited to or in the order given):

- (a) Proposed Vehicle(s);
- (b) Ability to meet dimension, technical and performance requirements;
- (c) Ability to meet TransLink's schedule;
- (d) Design and manufacturing capability and capacity;
- (e) Experience and Reputation of Respondent; and
- (f) Other - other information submitted by the Respondent.

7.2 TransLink may consider other criteria it identifies as relevant. Any criteria considered will be applied evenly and fairly to all submissions.

**PART D – ADDITIONAL TERMS AND CONDITIONS**

**8.0 CLARIFICATIONS AND INTERVIEWS**

8.1 Whether or not TransLink elects to establish a shortlist, TransLink may, in its absolute discretion and for any reason:

- (a) conduct interviews, discussions and/or negotiations with some or all of the Respondents, either serially or concurrently;

- (b) terminate interviews, discussions or negotiations with one or more Respondents;
- (c) seek further information or clarifications from some or all Respondents;
- (d) not disclose to any Respondent what information or clarifications were sought from any other Respondent;
- (e) seek different information or clarifications from different Respondents.

8.2 TransLink shall not be under any obligation to interview, enter into discussions or negotiations with, or solicit or receive further information or clarifications from, any Respondent.

#### **9.0 RESERVATION OF RIGHTS**

9.1 TransLink reserves the right to, and may, in its sole and absolute discretion, at any time and for any reason:

- (a) modify, cancel or suspend this RFEOI process or any part of it;
- (b) request clarification of a submission or additional information from a Respondent.
- (c) accept or reject or disqualify any or all submissions;
- (d) extend any date, time, period or deadline provided in this RFEOI;
- (e) re-advertise for new or additional submissions;
- (f) elicit offers from other parties (whether or not such parties have responded to this RFEOI) or engage in another request for expressions of interest;
- (g) issue a Request for Proposals (RFP) for the Vehicles described;
- (h) enter into a contract with persons who have or have not responded to this RFEOI.

#### **10.0 RESPONDENT COSTS**

10.1 Respondents are solely responsible for their own costs and expenses in connection with this RFEOI, including the preparation of their submission or any subsequent proposals.

#### **11.0 CONFIDENTIALITY AND FREEDOM OF INFORMATION**

11.1 The contents of this RFEOI and any information pertaining to TransLink, its customers, or individuals, which is obtained by the Respondent as a result of participation in this RFEOI is confidential and must not be disclosed without the prior written authorization of TransLink.

11.2 All information, including submissions, supplied to TransLink by Respondents becomes the property of TransLink and is understood to be supplied explicitly in confidence, subject to the provisions of the *Freedom of Information and Protection of Privacy Act (FOIPPA)*. All documents and other records in the custody or under the control of TransLink are subject to *FOIPPA* and may be released, in whole or in parts, pursuant to requests under *FOIPPA* and TransLink will comply fully with all provisions of that Act.

#### **12.0 NO CONTRACT**

12.1 This RFEOI does not constitute an offer to enter into a contract with any party and no contract of any kind is formed under, or arises from this RFEOI.

#### **13.0 LOBBYING AND INDIRECT COMMUNICATION**

13.1 Respondents shall not attempt to communicate directly or indirectly with any employee, contractor, officer, director or representative of TransLink or its subsidiaries about this RFEOI other than as expressly stated in this RFEOI. Any such lobbying or other communication will constitute sufficient grounds for disqualification. Without limiting the generality of the foregoing, Respondents are advised TransLink's employee and director codes of conduct impose restrictions on employees, officers and directors with respect to accepting gifts or receiving any personal benefit other than what they are entitled to as employees, officers or directors.

**APPENDIX 1**

**SkyTrain System Overview**

(Attached)

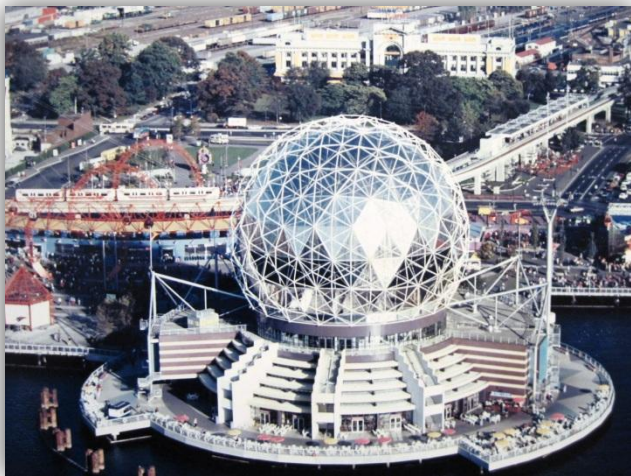


**British Columbia Rapid Transit Company Ltd. (BCRTC)** maintains and operates two of Metro Vancouver's three SkyTrain lines on behalf of TransLink, the regional transportation authority. Launched in 1986, SkyTrain is the first and one of the longest, fully-automated, driverless, rapid transit systems in the world. It boasts an average on-time service performance rating of 95 per cent and moves on average 250,000 passengers per weekday.

The name SkyTrain is derived from the first SkyTrain line, the Expo Line, which runs on a mostly elevated guideway, high above city streets. The Expo Line and the second SkyTrain line, the Millennium Line, comprise of 49 km of dual-track guideway and a fleet of 258 SkyTrain cars. The two lines are operated out of BCRTC's Operations and Maintenance Centre in Burnaby, BC where more than 630 dedicated staff work in the areas of administration, engineering, elevator and escalator maintenance, field operations, vehicle maintenance and wayside maintenance.

#### **Timeline**

SkyTrain opened in January 1986, on schedule and on budget (\$854 million) with an initial 21.4 km (13.3 miles) of guideway, 15 stations, and 114 SkyTrain cars. It was a showcase of the 1986 World Exposition on Transportation and Communication, or simply Expo '86 (pictured below), which was held in Vancouver from Friday, May 2 until Monday, October 13, 1986.



Following the World's Fair, the appropriately named 'Expo Line' grew to 29.0 km of guideway, 20 stations (Waterfront to King George stations) and a fleet of 150 cars during line extensions in 1989, 1990 and 1994 respectively.

The 20 km (12.4 miles) Millennium Line (M-Line) also opened in stages beginning with two stations in January 2002 and another nine stations in August of that same year. A 12th M-Line station was opened at Lake City Way in November 2003, followed by VCC-Clark, the 13th (and 33rd station system-wide) on January 6th, 2006.



#### **Technology**

SkyTrain represents a modern family of automated rapid transit systems also known as Intermediate Capacity Transit System (ICTS), Advanced Light Rapid Transit (ALRT), and Advanced Rapid Transit (ART). The technology is a blend of design principles and philosophies of conventional rapid transit (subway), Light Rapid Transit (LRT), and automated "people mover" systems as well as new applications such as the linear induction motor (LIM), steerable axle bogie, and moving block inductive loop train control system.

#### **Power**

Propulsion power is 600-650 volts DC, as is commonly used in rapid transit systems. Power pickup uses separate positive and negative rails, isolating the normal propulsion power path entirely from the running rails. This avoids electrolytic corrosion problems in both the guideway structure and adjacent underground utilities, as well as provides a more robust power distribution system with ground fault protection and lower voltage drop.

#### **Line Geography**

Like conventional 'heavy' rapid transit, SkyTrain operates entirely on segregated right-of-way, with no vehicular or pedestrian crossings.

The Expo and Millennium Lines run mostly in an elevated guideway, with approximately 8 km of the guideway in cut or at grade.

The two lines also operate in three sections of tunnel. The first tunnel, the Dunsmuir tunnel, is a 1.3 km section of track under Vancouver's downtown core. The Dunsmuir tunnel was originally a single-track conventional railway tunnel that was excavated and tiered for SkyTrain's stacked-train operation. The second section of SkyTrain tunnel is approximately 0.4 km long and surrounds Columbia Station. The third section of tunnel is 0.7 km long and was built through the cut and cover method along the North Bank of the Fraser River connecting Columbia to Sapperton Station.

Two of SkyTrain's 33 stations are fully in tunnel (both in downtown Vancouver); three are partially underground; three are at, or below grade; and, the remaining 25 stations are elevated.





### SkyBridge

SkyTrain also features SkyBridge (pictured above), a double-tracked, 616 metre cable-stayed bridge. SkyBridge is the only structure of its kind in the world built exclusively for transit use. Opened in 1990, it connects the cities of New Westminster and Surrey which are separated by the north arm of the Fraser River.

### Operating Performance

Trains operate at a maximum speed of about 80 km/hr (50 mph) over much of the line. Trains are at a reduced speed around stations and in some curves.

End-to-end travel time over the 28.3 km between King George and Waterfront stations is 39 minutes, an average of 43.5 km/hr, including the 18 intermediate station stops. The overall system operating speed is 40.3 km/hr when including an allowance at each end to recover automatically from minor delays.

### Automatic Train Control

SkyTrain uses the Thales (formerly Alcatel) SelTrac communications based moving block system to provide the functions of automatic train operation, protection, and regulation, through the following three-tier hierarchy:



#### (1) Vehicle On-Board

**Control (VOBC):** a dual processor computer on the train that controls propulsion, braking, direction and door operation, and monitors speed and critical faults.

(2) **Vehicle Control Centre (VCC):** the computer group located at the BCRTC (SkyTrain) Operations and Maintenance Centre that controls track switches and the safe distance between trains through a radio frequency inductive loop cable that is fixed between the running rails. SkyTrain has four VCC territories (Expo Line West, Expo Line East, Millennium Line, and the yard). Each territory is controlled by its own set of three IBM micro-computers running in synchronization to ensure consistency of safety-critical actions and to provide redundancy in case of failure.

(3) **System Management Centre (SMC):** the supervisory level that performs system-wide schedule regulation of trains and provides the primary interface for SkyTrain Control Operators in routing and monitoring trains. Operator workstations and graphical mimics are

linked to a pair of servers through an Ethernet LAN. A major system upgrade – switching from the OS/2 based Selnet SMC to the Windows-based NetTrac - is scheduled to take place in 2012.

### Vehicle Specifications

The average SkyTrain car operates more than 180,000 kilometres per year – equivalent to 12 hours a day, every day. The initial fleet of 114 Mark I (MK I) cars, acquired in 1984 through 1986, has averaged more than 4 million kilometres per vehicle in 26 years of operation, with several more years of useful service life still remaining.

#### MK I

Built in Kingston, Ontario, by Urban Transportation Development Corporation (UTDC), the MK I car is comparable in dimensions to a bus: 12.7 metres (41 feet) in length and 2.5 metres (8.1 feet) in width.

The MK I cars have a normal capacity of about 80 passengers per vehicle. During special event service conditions, like the annual Celebration of Light fireworks festival, the MK I's carry about 36 seated passengers and an average of 44 standees (standing area of 11m<sup>2</sup>, at 4 pass/m<sup>2</sup>). Cars are permanently joined together in 'married pairs' and can be run as two, four, or six-car trains; although, currently only four and six-car trains are used in regular service.



#### MK II

The Millennium Line extension (pictured above) precipitated the introduction of a new SkyTrain vehicle, the Mark II (MK II). UTDC's successor, Bombardier Transportation Systems, delivered 60 new MK II's from 2002 to 2003. Much of the vehicle assembly took place at the former Bombardier assembly plant in Burnaby, BC.

With an overall length of 17.1 m, the MK II's are 35 per cent longer than their MK I counterparts and can carry about 60 per cent more passengers. The MK II's have the same body width at floor level as the MK I's to fit both Expo and Millennium Line platforms, but the MK II's upper car body is wider by up to 15 centimetres, effectively increasing passenger capacity and comfort. The cars seat about 42 passengers and have a peak capacity of about 130 passengers. The MK II's operate as two-car and four-car trains.

#### New MK II's

In 2009, an additional 48 Mark II vehicles, built by Bombardier, were added to the fleet, increasing peak hour capacity by about 30% (pictured, page 1). The new MK II's as they are known have 34 seats and increased standing and wheelchair, stroller and scooter capacity.

### Olympic Sized Performance

The new MK II's also played a key role in ensuring SkyTrain's successful operations during the Vancouver 2010 Olympic Winter Games (February 12-28, 2010). In fact, SkyTrain had an estimated 7,223,000 passenger boardings during the 17-day event and had a weekday average of 393,818 passengers – an increase of 64 per cent more passengers than in the same time period in 2009. Plus – the Expo and Millennium Lines combined for a single-day record of an estimated 567,000 passenger boardings (February 20).

### Stations

Station platforms are exclusively high level for passenger convenience and loading efficiency. They are 80 metres long and can accommodate trains of up to six MK I cars or four MK II cars, and potentially a future five-car MK II configuration.

### System Safety Features

**On-train Passenger Silent Alarm** is a yellow strip above every window, which allows passengers to silently alert SkyTrain control operators in the event of a security concern.

**On-train Speakerphone** is located inside each car near the doors. Speakerphones provide two-way voice communication with SkyTrain control operators for urgent assistance.

### In-station Designated

**Waiting Areas** are located on all platforms. These areas have enhanced lighting, red emergency telephones and a bench, and are recorded by closed-circuit television.

### In-station Emergency

**Cabinets** are located on SkyTrain platforms and are equipped with a red emergency telephone, fire extinguisher and emergency train stop buttons.

**Closed-circuit TV** records platforms, elevators, escalators and ticket concourse areas.

### Accessibility

SkyTrain stations are fully accessible, i.e. have elevators, to people of all abilities. Escalators are provided in most stations for at least the 'up' direction. Any passengers who require assistance can use the emergency platform phone, station entrance information phone and/or contact transit staff or police in person.

### Customer Service & Safety

While SkyTrains regularly operate in 'driverless' or 'automated' mode, SkyTrain field staff, known as

SkyTrain Attendants are trained in hosting (driving trains), train-troubleshooting and station operations. They also provide customer service and level 1 first aid and emergency response.

SkyTrain is also serviced by the Transit Police. Launched in 2005, Transit Police is the first fully-dedicated transit police service in Canada. Transit Police officers have the same authority and powers of other municipal police officers in British Columbia, as well as issue violation tickets for fare evasion and other infractions.



### Fare Payment

SkyTrain has been operating under a 'self-service proof-of-payment fare system' since its launch in 1986. This will change in 2013 with the introduction of the Compass card (pictured above) and faregate system supplied by Cubic Transportation Systems. Passengers will also be able to purchase their fares with 'contactless' credit cards.

### Service Summary

SkyTrain operates approximately 20 hours a day on weekdays with the first train leaving King George station at 5:08 a.m. and the last train departing Waterfront station at 1:16 a.m. Saturday service starts one hour later, at 6:08 a.m. Sunday service starts at 7:08 a.m. and ends one hour earlier, at 12:15 a.m.

Headways during peak service (55 trains) averages 108 seconds (1 minute, 48 seconds) between Waterfront and Columbia stations; 162 seconds between Columbia and King George; and, 324 seconds on the Millennium Line between Columbia and VCC-Clark.

During off-peak times, trains run every three to four minutes between Waterfront and Columbia and every six to eight minutes on the outer branches.

SkyTrain service is augmented as required, e.g. for special events at the 19,000 seat Rogers Arena and/or the 60,000 seat B.C. Place Stadium.

### System Capacity

During morning peak service hours, the operation of 236 cars (91.5 per cent of the 258 car fleet, in a mix of four and six-car MK I, and mostly four-car Mark II trains) provides capacity for approximately 14,000 passengers per hour, per direction. Capacity has been increased during morning peak service to 15,000 passengers per direction per hour through the operation of two shuttle trains connecting Broadway and Waterfront stations exclusively.

Over the longer term, capacity can be nearly doubled, to the original system target of 25,000 per hour in each direction, through fleet and





yard expansion, increase in substation capacity, conversion to all MK II cars, the use of longer trains (five-car Mark II's), and shorter headways, i.e. 90 seconds.



**Service Integration**

As an operating company of TransLink, the regional transportation authority, there is full fare integration (transfer privileges) amongst SkyTrain, buses, SeaBus, and West Coast Express commuter rail. Bus routes have been extensively modified to connect with the rail service, eliminating duplication of routings, and strengthening the inter-suburban connections. More than 50 per cent of SkyTrain passengers transfer to or from a second transit mode.

**Ridership**

Ridership in 2010 reached 79.2 million passengers, in part boosted by the Winter Olympics. During the morning commute's peak hour, passenger volume from Commercial-Broadway Station into Vancouver's downtown core averages 13,000 passengers, equivalent to six full freeway lanes of private automobiles.

**Canada Line**

In August 2009, the 19 kilometre, 16-station Canada Line opened, connecting downtown Vancouver and the city of Richmond, with a branch to YVR, Metro Vancouver's international airport. The line is in subway through Vancouver, crossing the Fraser River on a dedicated bridge, and operating on an elevated guideway within the City of Richmond. Built through a public, private partnership (P3) contract, it is operated by Protrans BC, a subsidiary of SNC Lavalin. Using rotary motor propelled trains built by Rotem in Korea, but with train control technology similar to the Expo and Millennium Lines, Canada Line also operates in a fully-automated, driverless mode. As part of the integrated TransLink network, passengers can transfer to/from Canada Line and the Expo Line at Waterfront or Granville stations, as well as buses at many stations, without additional fare.

**Evergreen Line**

A fourth SkyTrain Line, the Evergreen Line, is scheduled to open in 2016. This five-station, 11 km extension will connect the cities of Coquitlam and Port Moody to the Millennium Line at Lougheed Town Centre Station and will integrate with regional bus and West Coast Express networks. A joint funding agreement was reached between the federal and provincial governments and TransLink in 2011. This project includes a fleet of 28 additional MK II cars. For more information visit: [evergreenline.gov.bc.ca](http://evergreenline.gov.bc.ca)

**Future Extensions**

Studies are underway about possible SkyTrain extensions (or bus rapid transit and or light rail) along two other corridors: (1) the Broadway corridor, linking SkyTrain with the University of British Columbia, and (2) in Surrey, beyond the existing SkyTrain terminus station King George. For more information visit: [translink.ca](http://translink.ca)



## APPENDIX 2

**Dimensional and Weight Requirements for  
Fully Automated Advanced Light Rapid Transit Passenger Vehicles**

The Vehicles must comply with the following governing dimensions and weight requirements:

**1.0 Vehicle Dimensions**

Description	Dimension
Length of Vehicle coupler to drawbar centre line (end car)	17.35 m
Length of Vehicle drawbar to drawbar centre line (centre car)	16.70 m
Length of Vehicle over body ends	16.44 m
Distance, centre-to-centre of trucks	12.0 m
Truck axle centre spacing	1.90 m
Width of Vehicle overall	2.65 m
Width of Vehicle over threshold	2.50 m
Top of rail to top of roof	3.275 m
Top of rail to top of floor covering, car empty	0.800 m (+0, - 0.003) m
Top of rail to top of floor covering at side door threshold, car empty	0.775 m (+0, - 0.003) m
Top of rail to centre line of coupler	0.539 m
Interior height, floor to ceiling	2.038 m
Width of side door openings	1.60 m
Height of side door openings (from threshold)	1.910 m
Width of side windows	1.400 m
Height of side windows	0.858 m
Wheel diameter, new	0.585 m
Wheel diameter, worn	0.549 m
Wheel gauge (back-to-back flanges, new wheels)	1.371 m to 1.373 m
Number of cars in a basic unit	4
Maximum number of basic units in an operating train	1

**2.0 Track Dimensional Constraints on Vehicle**

Description	Dimension
Minimum operational lateral radius at centre line of tracks – maintenance yard	35 m
Mainline, special track work	57 m
Mainline <ul style="list-style-type: none"> <li>Curves with a radius of less than 57 m shall have power rail installed on the outside of curves only.</li> <li>All curves on mainline shall have cubic spiral entry and exits as required to meet passenger comfort.</li> </ul>	70 m
Maximum superelevation	10%
LIM rail vertical tolerance relative to running rail plane	+3, -0 mm
Radius (equivalent) of minimum vertical curve (convex or concave)	800 m
Maximum gradient (full performance Vehicle design criteria)	6.0%
Maximum gradient design criteria for system expansion	6.0%
Maximum system gradient (rare locations on existing guideway)	6.5%

**3.0 Vehicle Weight**

3.1 Maximum weight of fully operational Vehicle shall not exceed 21,500kg.