

Rail Transit 101

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In recent years the term Light Rail has been used to cover several types of passenger trains, but it can be confusing for the general public as the term LRT (Light rail Transit) is used to describe a Tram style passenger train as well.

This information is to help explain the different passenger trains and whether they can run with freight trains or not.

There are four main categories of passenger trains.

- 1. Tram (Streetcar-LRT-VLR-ULR)**
- 2. Metro**
- 3. Mainline**
- 4. High Speed Rail**

1. Tram (Streetcar-LRT-VLR-ULR)

- In Quebec and most of Europe the term Tram is used instead of Streetcar and LRT (Light Rail Transit).
- A Tram can run in the same lane in the street with the general traffic or a Tram can run in its own lane separated from the general traffic.
- A Tram can run on a mainline railroad with certain conditions. The Tram in Waterloo runs on a section of a mainline railroad carrying freight traffic. The freight trains are not allowed to enter the section of track the Tram is using until after the service hours of the Tram. There are waiver requirements with specific restrictions from the regulators to allow the Tram and the freight train to run on the same track.
- The same situation would apply between a Tram and other category passenger trains (Metro, Mainline, HSR) as they would not be allowed to run on the same tracks at the same time. The trains would be separated in the same manner as a Tram and a freight train.
- Trams from different manufactures can usually run on the same Tram Line.

Types of Trams

- Alstom Citadis (Quebec City & Ontario)
- Alstom Flexity (Ontario & Edmonton)
- CAF Urbos 100 (Calgary)
- Hyundai Rotem (Edmonton)
- Siemens S700 (Seattle)
- Stadler CityLink (Salt Lake City)
- Stadler Tina (Europe)
- WMG VLR In development in Coventry. First line to open as early as 2027.

Trams Capacity

- Using the four section Alstom Citadis similar to the one used in Ottawa as a reference, each train can carry 300 passengers and two trains coupled together can carry 600 passengers. The length of one train is 48m and the length of two trains coupled together would be 96m long.
- The maximum frequency of trams with level crossings and priority signaling is five minutes. Any higher frequency would cause cross traffic backup at the intersections. The maximum number of trains per hour is 12. The total capacity for the Alstom Citadis with four sections is 3600pphpd for one tram and 7200pphpd for two trams coupled together.
- Higher frequency can be accomplished without priority signalling, but the trains would have to stop at all traffic lights in the same manner as the general traffic and the travel time would increase.
- **Bus Capacity Reference:** An 18m bus with a frequency of every two minutes at 30 buses per hour would have a total capacity of 4500pphpd.

2. Metro Rail

- The Metro Rail trains are electric multiple units on a line that is fully segregated from traffic. The rail line can be built on the surface, elevated, or underground.
- A Metro Rail train can have drivers or are fully automated with no drivers.
- This category would also include People Movers and Monorail systems as they are fully segregated from traffic as well.
- Each Metro Rail car can be of different dimensions and different number of cars. The term light and heavy is sometimes used for a Metro but it is irrelevant.
- A Metro Rail train cannot run on tracks with freight in Canada.

Types of Metro Rail Vehicles

- Alstom Mk V (Metro Vancouver)
- Hyundai Rotem EMU (Metro Vancouver)
- Alstom Toronto Rocket (Toronto)
- Hitachi Rail (Toronto)
- Alstom Metropolis (Montreal REM)
- Alstom Azur (Montreal)
- CAF Inneo (Europe)

Metro Rail Capacity

- The capacity of the Metro Rail depends on the size of the car ordered and the number of cars in a train.
- A fully automated system will allow up to 40 trains per hour and with Sel Trac allowing for up to 48 trains per hour.
- For example, each five car Alstom Mk V in Metro Vancouver can carry 672 passengers and is 85m long. At 40 trains per hour the capacity is 26,880 pphpd, at 48 trains per hour the capacity is 32,256 pphpd.
- Each 4 car Alstom Metropolis in Montreal can carry 600 passengers and is 80m long. At 40 trains per hour the capacity is 24,000 pphpd.

Average Speed of Trams and Metros in Canada

City	Toronto Streetcar	Toronto LRT	Toronto LRT	Canceled Surrey LRT	Waterloo Ontario	Vancouver Skytrain	Vancouver Skytrain	Montreal
Line	Tram 501	Finch West	Eglinton	SNG	ION	Canada Line	Expo Line	REM
Average Speed	14.5km/hr	15km/hr	23km/hr	24km/hr	26km/hr	36km/hr	45km/hr	50km/hr
Average Distance Between Stations	275m	605m	800m	1050m	1266m	1250m	1500m	2000m

Note: The average speed is calculated using the distance of the line and the time it takes to travel that distance including the station stops.

3. Mainline Rail

- Mainline rail passenger trains are used on mainline railway tracks with freight running on the line.
- There are two types of passenger trains, a locomotive hauling passenger coaches or a multiple unit built to run on Mainline railroads. All Mainline trains have drivers.
- Mainline Rail passenger trains cannot run with other category passenger trains (Tram, Metro, HSR).

- There are three terms generally used on Mainline Rail.
 - **Commuter Rail** is a train bringing passengers from the suburbs into the city centre in the morning rush hour and then returning to the suburbs in the evening rush hour.
 - **Regional Rail** is usually an all day passenger service connecting cities and towns.
 - **Intercity Rail** is a term used for longer distance express passenger services between cities.

- The West Coast Express in Metro Vancouver and the Go Trains in Toronto are a Locomotive with Bi Level coaches. The WCE is a Commuter Rail and although the Go Trains are still called a Commuter Rail, they are more of a Regional Rail as they run all day long.
- The Ottawa Trillium Line is a mainline track separate from the Ottawa Confederation Line and uses the Stadler Flirt to provide rail rapid transit. These multiple units have electric motors on the bogies with a diesel generator to provide the electricity.
- The UP Express runs between Pearson International Airport and Union Station in downtown Toronto. These multiple units have a diesel motor with a drive shaft to the bogies.
- The Stadler Flirt and the Nippon Sharyo are the only multiple units that are FRA compliant at this time.

Types of Mainline Rail Vehicles

- Siemens Charger with Venture Coaches (Via Rail)
- Locomotive with Bi Level Coaches (Metro Vancouver, Toronto)
- Stadler Flirt DEMU (Ottawa)
- Stadler Kiss EMU (California)
- Nippon Sharyo DMU (Toronto)
- Alstom Coradia (Test run in Quebec, may not be allowed to run with freight)

Mainline Rail Capacity

- The capacity of the Mainline trains will depend on the number of trains per hour which depends on the number of freight trains running, the number of coaches or multiple units on a train, and the number of trains coupled together.

4. High Speed Rail

- High Speed Rail trains have dedicated tracks and do not run with standard freight trains.
- High Speed Rail trains are always powered by overhead lines.
- High Speed Rail stations are usually a minimum of 50km apart but generally are much farther apart.
- The High Speed Rail from the Charles de Gaulle Airport in Paris runs nonstop to Lille which is 200km.

- There are a few countries that handle freight on HSR lines, but they are HSR passenger trains with some coaches dedicated for time sensitive packages and not bulk goods. Some countries have entire trains dedicated for time sensitive packages, but they are converted HSR passenger trains.

Types of High Speed Rail Vehicles

- Alstom Avelia Liberty (US Northeast)
- Siemens American Pioneer 220 (California, Nevada)
- Stadler Smile (Europe)
- CAF Oaris (Europe)
- Hitachi AT400 (Japan, Europe)

High Speed Rail Capacity

- The capacity of High Speed Rail will depend on the number of coaches per train, the number of trains coupled together, and the number of trains per hour.