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Translohr STE5 Line Medellín, Colombia

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Ayacucho, the first tramway on tyres line in Latin America

On March 31st 2016, the city of Medellín, in Colombia, inaugurated the first tyre-based tram line in Latin America. The Ayacucho line is 4.2 km long and includes 9 stations.

For NTL, the Ayacucho line is doubly significant:

- It is part of the "social urbanization" project being undertaken by the Medellín city government to connect far-flung neighborhoods to the downtown area using green-electric mass transit, like the Metrocable and now the tramway.
- It's the first line to feature the Translohr tram's ability to mesh with existing street systems in a unique topographic environment with some segments having a maximum grade of 12%, and curves with a turning radius of 20 m.



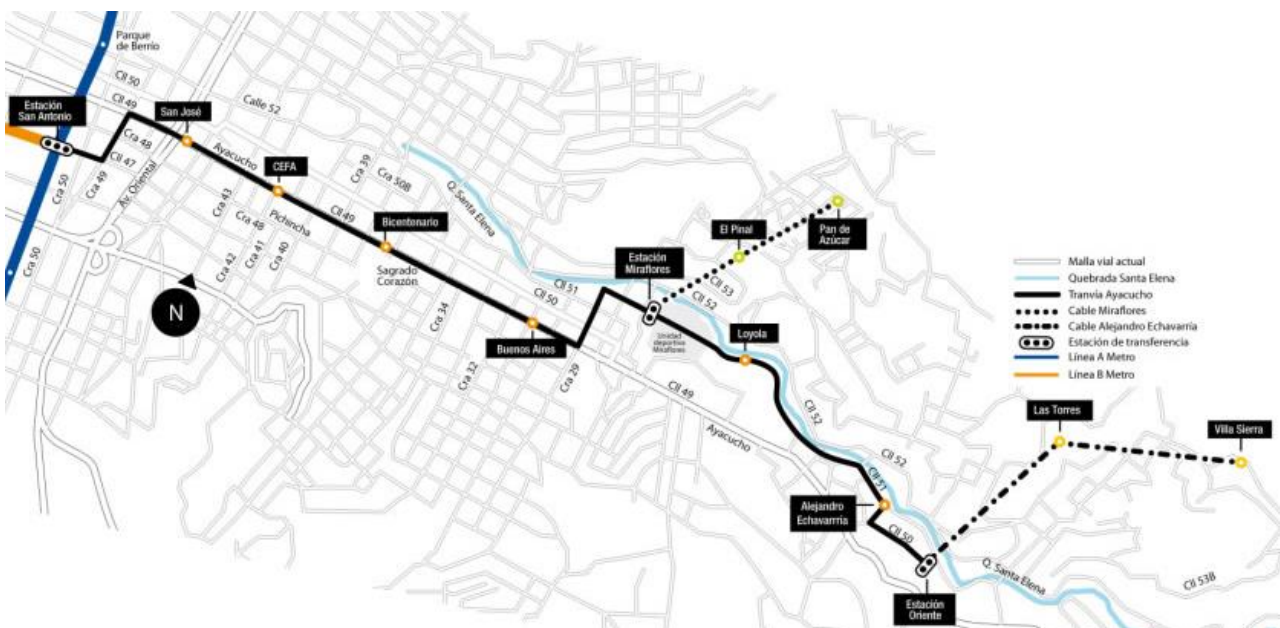
▲ Translohr STE5 tramway on the tracks of the Ayacucho line.

- Contract signature: April 2012
- Order amount: 42,3 M€

Route and key data of the line

The Ayacucho line creates a link between San Antonio metro station in downtown, and the neighborhoods of Buenos Aires (Comuna 9) and Hermosa (Comuna 8) east of Medellín. It is connected to two Metrocable lines that are currently being constructed, as a part of the "Corredor Verde" project:

- From Miraflores station (Maintenance depot) to the neighborhoods of El Pinal and Trece de Noviembre.
- From Oriente station (the last stop on the line) to the neighborhoods of San Antonio, Las Torres, and La Sierra



▲ Route of the Ayacucho tram line, connected to two Metrocable lines. (Source: Metro Medellín)

Key figures

- Altitude: 1500 m
- Length of the line: 4.2 km
- Number of stations: 9 (two central)
- Number of passengers expected per day: 83,000
- OCS along 100% of the route
- Minimum radius: 20 m
- Maximum grade: 12%
- Average grade: 5%
- Number of tramways delivered: 12
- Model: STE5 (39m long)
- In operation since : March 31st 2016

Rolling stock

For the Ayacucho line, the Medellín city government and the company Metro Medellín ordered 12 Translohr STE5 trams in April 2012 for a total amount of 42.3 million euro. Translohr STE5 is a two-way model 39m long, made up of 5 cars.

Medellín's 12 trams are identical to other STE tramways on tyres. However, they were designed for large capacity, with fewer seats. Each one can carry up to 311 passengers (or 6 people/m²).

Translohr tramways are electrical transport systems guided by a central driving rail. These high-capacity above-ground public transit vehicles with low built-in floors can travel in dedicated lanes or in mixed-use lanes.

Translohr tramways have a **narrow gauge**, ensuring that they stick to their route in any environmental conditions (5.18 m on two tangent tracks).

Benefits of tyres

Tire/road adhesion gives the tram powerful dynamics, particular on **steep grades** (up to 13%) and in curves. The use of tyres that **run silently**, with a tire/road connection free of vibrations and screeching, even in sharp curves with a turning radius of up to 10.5m.

Tram construction

The trams are formed from car modules:

- The end modules, which include the cabs
- The passenger modules
- The connecting modules, which allow movement between passenger modules
- Medellín's Translohr STE5 has six axles, three of which are motorized.

Comfort and accessibility

Braking precision ensures a **smaller gap** between the vehicle and the platform, making it easier to enter and leave the tram. **Access** and **free movement** are facilitated by the low built-in floor made for everyone, including wheelchair users.

Passengers can travel within the tram from one end to another, using the continuous floor. The trams have large glazed windows that are highly **transparent**, with modern **design**.

Main characteristics

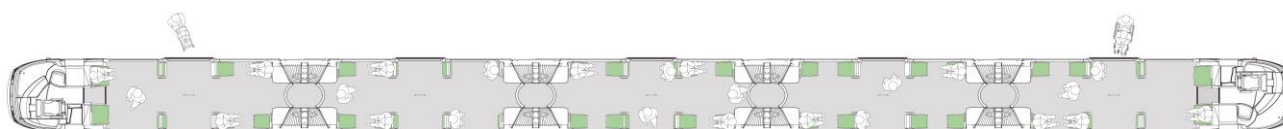
	Unit	STE5
Lifespan	years	30
Number of passenger modules/axles		5/6
Number of motorized axles		3
Total length	m	39
Total width	m	2.22
Total height at pantograph	m	3.05
Floor level	m	0.25
Minimum turning radius	m	10.5
Maximum speed	km/h	70
Number of doors		10
Power consumption	kWh/km	3 to 5
Acoustic level	dB(A)	69/75
Mass when unoccupied	T	35.7
Number of EL6 passengers (6 pass/m ²)		311



▲ Perspective view of a Translohr STE5 Ayacucho.



▲ Interior view of a Translohr STE5 tramway.



▲ Standard interior arrangement of a Translohr STE5 tramway on tyres for the Ayacucho line

The Benefits of Translohr Tramways

Translohr tramways on tyres combine the benefits of a guided system with its central rail and the advantages of a tire-mounted vehicle, which make it unique for meshing with an existing network of streets: A narrow radius of gyration, ability to overcome grades of up to 13%, and silent running.

What are the benefits to passengers?

- **Accessibility:**
 - Low built-in floor 25cm from the ground with a narrower gap in stations
 - Easy to move within a tram in motion
- **Comfort:**
 - Silent running (inside and outside)
 - No vibrations or screeching in curves (no iron/iron contact)
 - High level of comfort with many seats
- **Safety:**
 - Improved braking performance thanks to tire grip
 - Controlled path thanks to guide rail
 - Cab with panoramic view for conductor
- **Frequency & Regularity:**
 - A single-route guided system on a dedicated lane
 - Modular design (3 to 6 cars) and capacity (up to 358 passengers)

What are the benefits to the operator?

- **Eco-mobility:**
 - A non-polluting electrical guided system without CO₂ or fine particle emissions
 - A 30-year lifespan
 - A high-capacity tramway system (up to 358 passengers¹)
 - Compatible with catenary-free solutions (Wipost system)
- **Seamless fit:**
 - A tram that adapts to the city's unique features, with a narrow turning radius: 10.5 m
 - Overcoming slopes of up to 13% thanks to tire grip and additional motors
- **Economical:**
 - A system with speedy implementation (18 to 24 months): Only one rail to install
 - Less cumbersome infrastructure: platform only 25 to 30 cm deep
 - Lower footprint: Less surface area to acquire (eminent domain, demolition), smaller footprint for depots

¹ Maximal capacity with 6 people/m² for an STE6.



A project supported by France's international development agency (AFD)

Believing that the violence in the city was being caused by deep social inequalities, since 2004 the Medellín city government has been conducting a policy of "social urbanization" primarily targeting the poorest neighborhoods.

The transportation aspects of this original approach have involved the construction of a "Corredor Verde" ("green corridor") with a tram line and two urban cable car lines, the Metrocable. This thinking behind this project is both social and environmental. First, the tram line and the Metrocable make it possible to connect outlying neighborhoods where 300,000 people live to the downtown area, which improves access to public services, jobs, education, etc. Second, this urban infrastructure is in keeping with the international community's recommendations for dealing with environmental issues and climate change.

France's international development agency (AFD) awarded the municipality a \$250 million loan on July 8, 2010 for the transportation aspects of the Medellín Central-Eastern Urban Integration Project.

Source: www.afd.fr



▲ Aerial view of Medellín (Source: Wikimedia Commons)



NTL, Manufacturer of Translohr tramways on tyres

NTL is a provider of innovative solutions for public transport. The company designs and manufactures a range of Translohr easy-access tramways that run on rubber tyres. NTL's new generation of electrically-powered, high-capacity urban transport systems addresses the eco-mobility objectives of municipalities around the world. NTL's tramways combine the advantages of a guided system using a single central rail, tight turn-capability for easy insertion into the existing urban road systems, rubber-to-road adhesion to climb steep slopes up to 13%, and near-silent operation in cities.

Created in October 2012, the company is based in Duppigheim in the Alsace region of France, and has 220 employees. NTL is owned by Alstom (51%) and Bpifrance (49%) and posted €73.3m in sales in 2014-2015.

Translohr cities

8 cities have opted for Translohr technology:

	Clermont-Ferrand	Padua	Venice-Mestre	Teda-Tianjin	Shanghai	T5	T6	Medellin
Model	STE4	STE3	STE4	STE3	STE3	STE3	STE6	STE5
Tram length	32 m	25 m	32 m	25 m	25 m	25 m	46 m	39 m
In service since	2006	2007	2010	2007	2009	2013	2014	2016
Length of line (km)	14	10,3	20	8	9	6,6	14 km	4,2
Number of pass/day (predicted)	35000	-	-	-	-	35000	82000	85000
Number of pass/day (actual)	65000	22000	15000	-	-	50000	-	-
Trams running	26	18	20	8	9	15	28	12



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