A fully automatic, rubber-tired metro for Lausanne

ALSTOM

Transport

Project Story

Lausanne looks to reduce road traffic and improve its public transport system

In replacing its century-old m2 metro line with a much longer, fully automatic line, the city of Lausanne will significantly improve its public transport system and inhabitants' quality of life.

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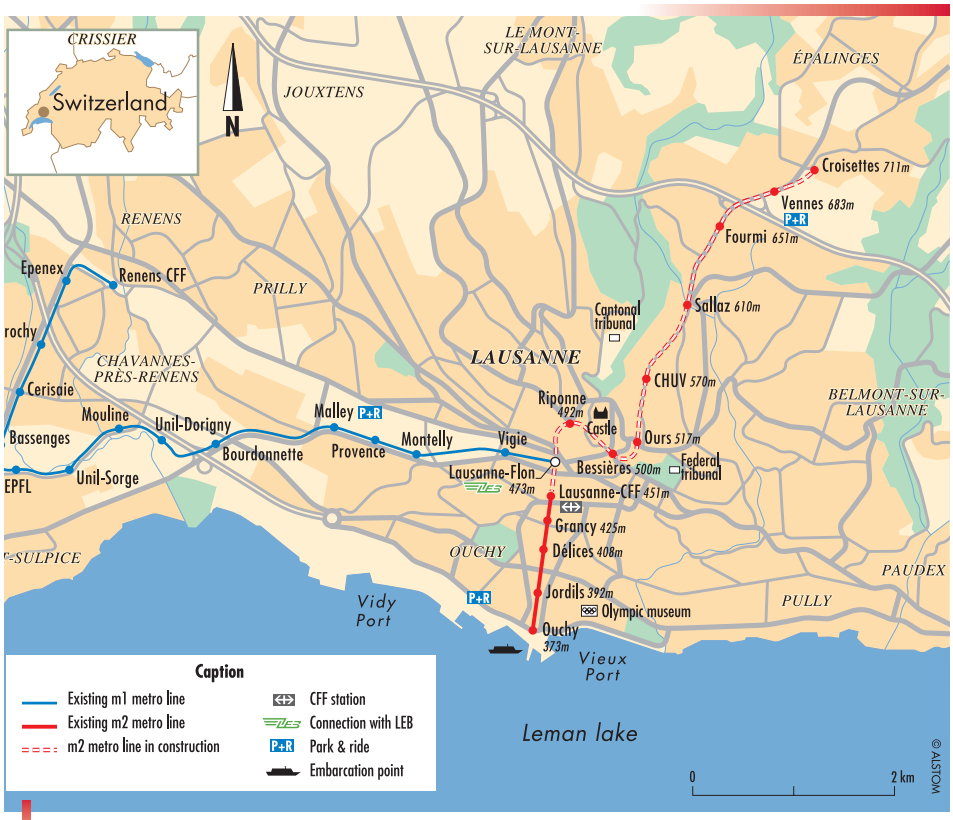


The new m2 metro line will serve as the backbone of Lausanne's transport network.

Authorities and residents agree that traffic is one of Lausanne's main problems: it takes more time to get in and around the city, and principal road axes suffer from chronic traffic jams. Consequent air and noise pollution are also taking away from the local quality of life. With the city's existing transport network already pushed to its limits, rectifying the situation has become a priority.

In late 1999, public operator Metro Lausanne - Ouchy SA (MLO) issued an international call-to-tender for a modern metro line, putting into motion the first steps for a new and improved public transport system. The new m2 is to serve as the "backbone" of Lausanne's transport network, providing an easy connection with national and regional express rail lines, m1 metro line, and LM bus and trolleybus network. With the new metro, the city aims to reduce car traffic into the city by 6,000 vehicles per day. To entice the public to choose the metro over their cars, the MLO has stipulated that the fully automatic metro system offer its passengers high frequency and reliability, reducing route times in comfort and total safety.

Challenging slopes

While adding to Lausanne's beauty and individuality, its steep slopes have also created a challenge. Elevation differs from 711 m at its highest point to 373 m; its maximum gradient is 12% – the world record for a metro – and a real technical challenge, requiring strong, specific expertise and experience.

ALSTOM's winning solution: a fully automatic, rubber-tired metro

A world-leading supplier of metro solutions, including rubber-tired rolling stock and fully automatic metro systems, ALSTOM was able to offer Lausanne the proven technical solutions it needs to suit its topography, budget and passengers.

Key dates

- 1997: MLO issues a call to tender
- 1999: ALSTOM submits its proposal
- 2000: MLO selects ALSTOM for Rolling Stock, Automatic Signaling, Energy supply
- 2002: Contract signing for Track; finalisation of technical description with customer; Lausanne citizens vote in favour of project in referendum
- 2003: Contract signing for ALSTOM systems support and project management assistance
- 2006: Delivery of first metro (scheduled)
- 2008: Commercial service launch (scheduled)

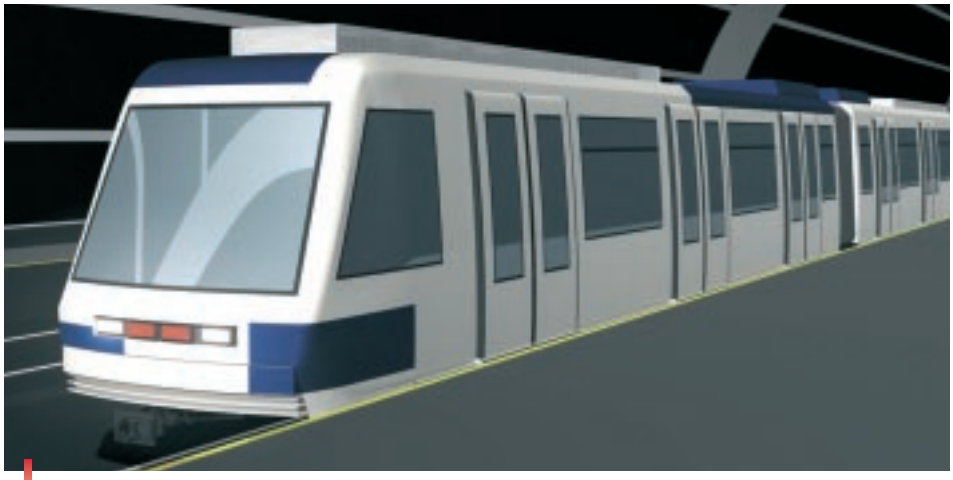
Lausanne found ALSTOM to be the best choice for its new metro. In all, ALSTOM has been awarded five contracts for respectively: rolling stock, signaling, track, substations and support for the customer's project management. In short, ALSTOM will transform the m2 from a short, aging line into one of the world's most technologically advanced and highly performing.

m2: today and tomorrow

The current Lausanne-Ouchy metro, or m2, has been in existence since the late 1890s in its present form and length of roughly 1km, and as such, is the world's shortest metro. Running mostly on the surface, its cogwheel metro cars date back to 1958 and are at the end of their useful life. This m2 line will be completely dismantled and its cars retired. ALSTOM is replacing the infrastructure completely and extending the route a further 5 km on dedicated track, mostly underground, supplying the new track, signaling and electric substations. ALSTOM is also providing the line's new rubber-tired rolling stock, respecting the customer's preferred technical solution.

Ready to meet the challenge

ALSTOM has long experience in the technologies it will provide; some 3,000 of its rubber-tired metro cars are in service worldwide and Singapore's NEL line has been operating faultlessly under our innovative automatic signaling system since 2003. A major technological feat, this are the first time that the two technologies are associated — while accommodating Lausanne's world record 12% gradient!



The new automatic metro for Lausanne is based on technology already proven in similar ALSTOM systems operating successfully around the world.

Sharing our resources through long-term Systems support

Using specially designed software, ALSTOM project management and systems engineering experts will assist over the m2 project's five-year construction period, from early systems definition through commissioning and training.

At the project's inception, Swiss authorities had initially decided to retain the responsibility for system integration. But after conferring the four main packages of the transport system on ALSTOM, they could see the further benefit to be gained by having ALSTOM provide assistance in system project integration and management. ALSTOM has wide experience in managing complex transport projects, including Singapore's fully automatic North East and Circle Lines, similar metro projects.

Long-term partnership

ALSTOM signed a contract with its customer MLO, in December 2003, to provide systems support over five years. The support covers two main areas: project management and systems engineering, which covers technical definitions of the m2 system, interfaces between subsystems and validation of the global system.

Specifically, ALSTOM will help the customer's project team by providing key resources and by assisting specific missions, such as establishing tools to manage the project's planning, documentation and quality. ALSTOM specialists, acting as support and based at the customer's headquarters in Lausanne, will hold key positions on the project management team. Another team based in ALSTOM's head office near Paris is in charge of technical definitions, testing and commissioning processes.

More than just a supplier of rail products, ALSTOM is committed to long-term partnerships with its customers.

ALSTOM specialists can handle project management and systems integration within a turnkey project or offer support to customer teams under a separate contract.

Optimising performance

ALSTOM will deliver15 fully automatic, two-car metros for the m2 line. Running on rubber tires at up to 60 km per hour, they will offer passengers a smooth, swift and safe trip through Lausanne.

Key facts

- Number of passengers expected annually: 25 million
- Capacity per direction per hour: 6,600 people
- Route time: 18 minutes from end to end
- Frequency: 2 minutes minimum in central section, 10 minutes maximum
- Capacity per train: 252 people (58 seated)
- Maximum speed: 60 km per hour
- Number of vehicles: 15 two-car trains
- Number of motorized bogies: 4
- Access: 6 sliding doors per train, circulation the length of the interior

Our motorized bogies with rubber tires are the best solution for Lausanne's record gradient of 12%.

The automatic metro cars for Lausanne have been designed for easy access, with six sliding doors per train and open circulation throughout the interior. Security features include on-board video surveillance and a communication system for direct contact with an agent at the central command post.

Providing proven technology, ALSTOM based this rolling stock on its six-car MP89 for the Paris metro, with some significant redesigning: for this two-car version, the four bogies are all motor driven, and equipment has been redistributed beneath the car and on the roof. Lausanne's metro cars have been designed to maintain optimal performance however rough climatic conditions including snow and rain may be. Features also include a heating and cooling system.

Why rubber?

Using rubber tires instead of steel wheels offers several advantages. Firstly, they can best cope with a maximum slope of 12%. They also assure a comfortable ride for passengers while permitting excellent performance for rapid acceleration and deceleration between stations. And they are fast! Trains operate at up to 60 km per hour in Lausanne – and offer waiting times of just three minutes at peak hours.

ALSTOM has been designing and building metro cars for 70 years. Today, one in four metros operating worldwide was supplied by ALSTOM. In all, ALSTOM has sold some 25,000 cars, including the first rubber-tired metro, back in 1951!

Comfortable conditions inside the m2 metro cars.

From Singapore to Lausanne

When the new m2 metro line goes into service in 2008, the city of Lausanne will have something in common with the island of Singapore: they will both be relying on the same proven automatic signalling system: URBALIS™ 300, an automatic metro system for risk-free operations.

While highly innovative, the automatic signaling system for Lausanne is completely reliable and risk-free, as it is based on concepts and components already in use. The highly performing URBALIS 300 system has been operating successfully on Singapore's NorthEast Line since 2003. Of course, the system for Lausanne takes into account the specificities of the m2 line. Its integrated, standard products and systems are all designed and manufactured by ALSTOM: a central command and control center; a computerized itinerary management system; an automatic traffic control system (ATC) based on SACEM technology; a bi-directional radio communication system using leaky wave and large band for voice and image transmission, as well as for signaling and train localisation data; and track-side signalisation.

On-board passenger information from the AGATE e-Media range.

The passenger information and security system features are implemented using AGATE™ e-Media and Guardian. The AGATE e-Media system can broadcast audio messages which help visually impaired people during travel and play recorded station announcements, emergency messages and be used for train departure, train officer and passenger calls or alarms.

The AGATE Guardian security solution includes on-board CCTV video surveillance. Wireless communication along the route enables every camera from any train to be accessed at any time by the control center which can then take immediate action if suspicious events occur. This integrated AGATE e-Media and Guardian solutions provide a more efficient and dynamic mode of operations between the central command post and the train environment.

ALSTOM is the world's leading supplier of automatic control systems for metros.

Why automatic?

Fully automatic metros can adapt in real-time to fluctuations in traffic to serve fast-changing needs. They also provide better operational safety. Passengers are reassured by the system's precision, as well as relaxed from the comfortable ride. Thanks to the central command center, any problem can be quickly resolved. Automation also means reduced operational costs: maintenance can be carried out quickly, easily and precisely; and systems operations require less staff. Lausanne's m2 system will be run by 70 trained employees.

Laying and powering the line

The m2 metro line from Ouchy to Epalinges will be composed of 14 stations over 5.9 km of double track, of which 70% underground. It will provide easy access to Lausanne's city centre and to infrastructure serving the entire canton.

Among the other aspects of this metro line, ALSTOM is supplying the track system. Specifically, ALSTOM is responsible for the detailed design, procurement and construction of the track. This includes 6 km of double track mainly in tunnels and crossing two viaducts, and 2 km of various track types in the depot. The track comprises a track slab with concrete bibloc sleepers, steel running rails, guidance rails and power rails mounted on insulators, rail fasteners, turnouts. Track construction will include more than 10 000 m3 of concrete, 18 000 sleepers, 4 000 tons of steels rails.

Paris, France

ALSTOM is also responsible for the power supply sub-system in partnership with Sécheron (for the design and supply of power traction). This includes the detailed design, procurement and installation of two medium voltage switchboards (24kV), four traction substations (750VDC – 2x1.1 MW each), nine auxiliary transformers of 1000 kW feeding nine low voltage switchboards (400V).

Barcelona, Spain

Istanbul, Turkey

ALSTOM has decades of experiences in all types of track laying and electrification worldwide

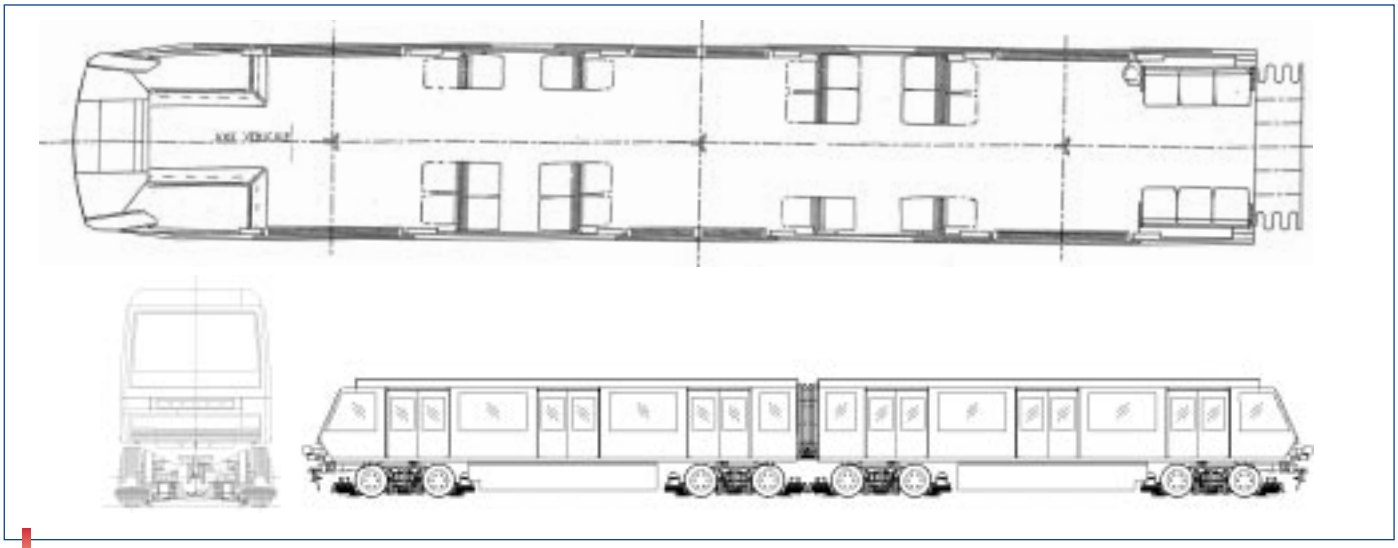


Diagram of the bi-directional, two-car metro for Lausanne

Technical features

Vehicle type	Bi-directional
Vehicle length	15340 mm
Vehicle width	2450 mm
Maximum vehicle height	3473 mm
Track gauge	1435 mm
Minimum negotiable radius	40 m
Floor height	1130 mm
Entrance height	1905 mm
Entrance doors per side	3
Seats (for complete train)	
- fixed	36
- tip-up	20
Dedicated locations for disabled people	2
Standing facilities (4 pers. per m^2)	194
Power supply	750VDC
Axle arrangement	B'B' + B'B'
Axle motoring	100 %
Maximum speed	60 km/h

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