

Milan Metro System, Line 4

SUSTAINABLE
MOBILITY

2024

webuild 

FACTSHEET

M4–Milan: East-West The Metro Line built for Europe



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2024

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1. THE M4: MILAN'S NEW METRO LINE

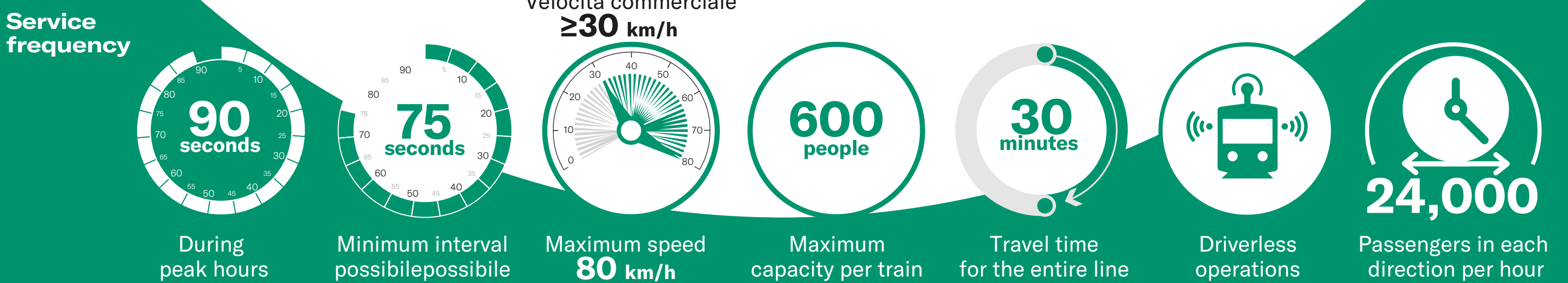
The M4 "Blue Line", which opened in October 2024, connects Milan from West to East, passing through the city center to reach Linate airport.

From the Linate terminus to the San Cristoforo terminus, the 15 km line has 21 stations and a total travel time of just 30 minutes.

The line transports up to 24,000 people per hour, per travel direction. It is expected to be used by **86 million passengers per year**, also due to the train frequency: every 90 seconds during peak hours.

The M4 line has a significant impact on mobility in the city: since it went into service, it has extended Milan's total metro network to **118 km, to become the 6th largest in Europe.**





2. FROM SAN CRISTOFORO TO LINATE: MILAN AN INCREASINGLY CENTRAL EUROPEAN HUB

Just twelve minutes from Linate to San Babila is the time it takes to connect the airport to Milan city center on the "Blue Line " trains. Linate is one of the two end stations on the East-West line, a 15 km track covering 21 stations in a 30-minute journey to the other terminus, San Cristoforo. Opened in October 2024, the **M4 is the airport metro line**, a strategic infrastructure that shortens distances inside Milan and brings the city closer to the rest of Italy and to Europe.

At the Sforza Policlinico and Sant'Ambrogio stops, the M4 intersects with the Yellow Line and the Green Line respectively, and interchanges with the Red Line at San Babila.

This important new transport link is matched by equally important above-ground changes, in line with the crucial **sustainability** concept that better use be made of urban spaces. From East to

West, every M4 station adjoins parks and green spaces, some of which were already present while others were created during construction work on the new line. The access areas of the Tricolore and San Babila stations have been entirely reorganized, giving priority to **pedestrianization**.

Piazza San Babila has been completely closed to traffic to become an important city meeting place enhancing the adjacent space created by architect Luigi Caccia Dominioni. In the area above the line between the Argonne and Susa stations, sports fields, playgrounds and benches have been installed. At the San Cristoforo terminus, a cycle and pedestrian bridge has been built over the Naviglio Grande.

3. TECHNOLOGY AND KNOW HOW

The construction of the M4 line was a complex engineering project involving cutting-edge technology and specialist skills.

The tunnels were excavated with six Tunnel Boring Machines (TBMs), working at an average depth of 20 meters from the surface and up to a maximum depth of 30 meters.

The soil was consolidated with the jet grouting technique, which injects cement mixtures to ensure stability and prevent infiltrations.

Another state-of-the-art technique employed during the construction of the M4 line was artificial ground freezing, to prevent cave-ins during excavation. Liquid nitrogen was used to freeze the groundwater, causing a thermal shock of around -196° and solidifying the ground as if it were rock, so facilitating excavation operations.



4. THE LINE RUNNING IN MILAN'S HISTORICAL CENTRE

- Safe excavations that safeguard Milan's heritage, to build a great work
- Safeguarding monuments

The M4 has written an important historical chapter inside the circle of Milan's Navigli. It is here, in fact, that the **TBM** excavated, passing under these buildings: the **Waldensian Evangelical Church**, in "via Francesco Sforza", the **Churchyard of the Basilica of Sant'Ambrogio**, in piazza Sant'Ambrogio, the **Ca 'Granda**, the **Columns of San Lorenzo**, the **Torre Merlata**, between via di San Vittore and "via Carducci".

Safe excavations that safeguard Milan's heritage, to build a great work

To protect Milan's historical and artistic heritage above-ground, CMM4, the Consortium led by Webuild, provided for a technical control procedure that combined preventive analyses with continuous monitoring activities.

Previously used by Webuild for the construction of the C metro line in Rome, the procedure involved archaeological assistance during preventive checks for

the construction of stations and other structures, prior to excavation work, which commenced only after authorization from the Milan Metropolitan City Cultural Heritage Superintendency. In short, passing inside a highly populated urban centre involved an exceptional commitment, during the control and analysis phase, both for design purposes and for actually executing the works. Furthermore, in Milan, the M4 tunnels were built to an even greater depth than the standard.

All geometric and structural data of the buildings affected by tunnel excavation works was collected. Eventual critical issues were also identified, to plan for preventive interventions. This was also possible through technical inspections, which led to interventions concerning, among others, **Casa Silvestri** and **Palazzo Serbelloni**, but also **Villa Necchi Campiglio**, which houses an important collection of valuable objects.

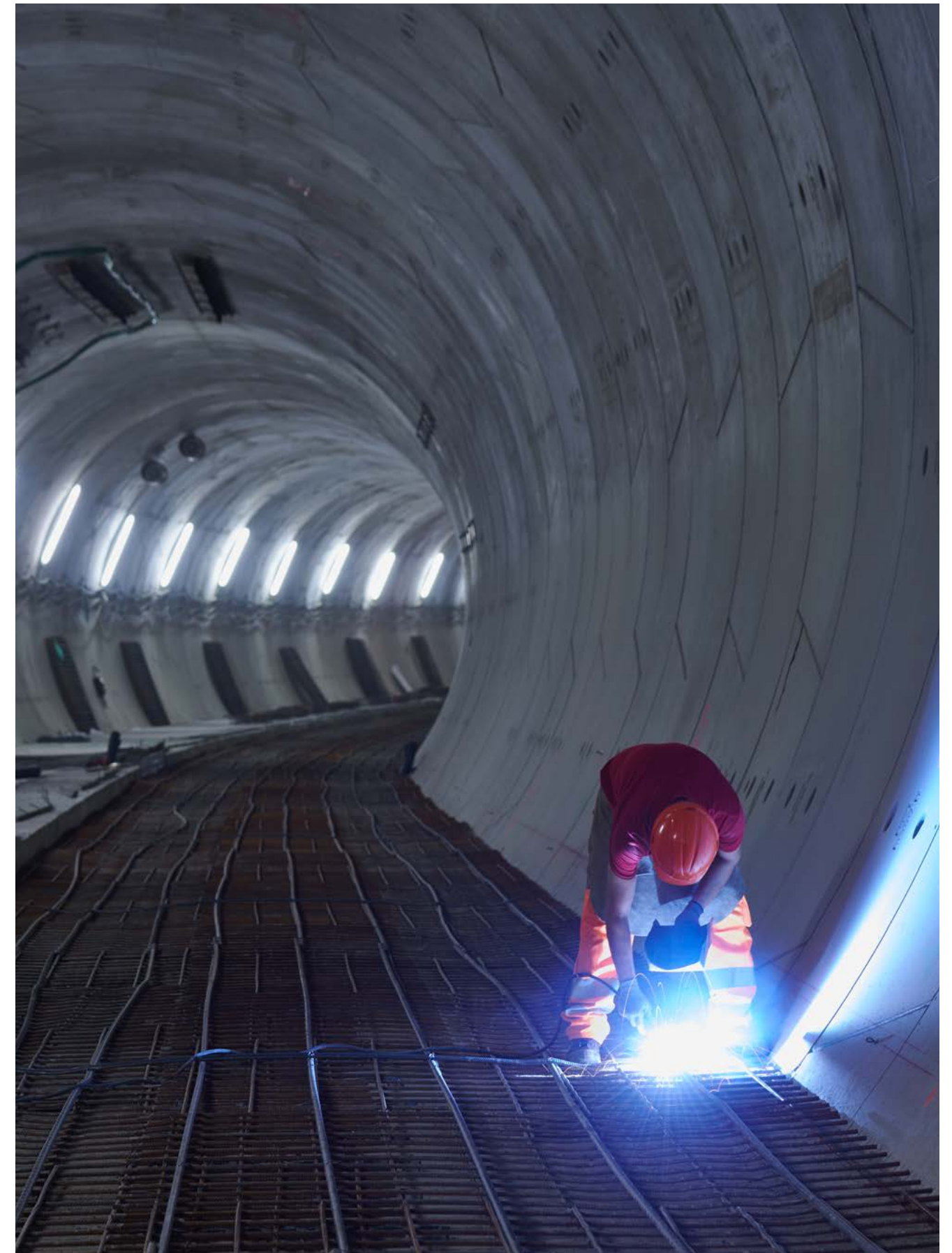
Safeguarding monuments

With the analyses aimed at protecting the heritage on Milan's surface, interventions were also launched to protect historical buildings, particularly their monumental heritage.

Some monuments were moved to avoid risks caused by the passage of the TBM. Just like the **Verziere Column, with the Statue of the Redeemer, in Largo Augusto; the bust of Cesare Correnti, in Piazza della Resistenza Partigiana; the medieval wall in via Francesco Sforza; and the Monument of Our Lady of Resignation.** The monuments have been returned to their original locations, after cleaning and restoration requested by the

Milan Metropolitan City Cultural Heritage Superintendency. During excavation work for the stations and structures, numerous findings of great historical and scientific importance for archaeologists and the Superintendency came to light, such as the necropolises discovered near the Basilica of Sant'Ambrogio, with a wealth of Roman remains.

The operations to safeguard the artistic heritage were carried out with the collaboration of institutions, the client and the Cultural Heritage Superintendency, and thanks to the expertise acquired by Webuild in the construction of underground railways and infrastructure in large complex cities over nearly 120 years of activity.



CONSTRUCTION NUMBERS

The 21 stations

30 m

maximum excavation depth

+240,000 m²

diaphragms (station perimeter walls)

~1.5 mln m³

surface excavation

~1 mln m³

cast-in-place concrete

The tunnels

6

TBM's

+25,000 m

TBM excavation length

+170,000 m³

prefabricated segments to line the tunnels

~1.8 mln m³

earth excavated by the TBM's

5. A SUSTAINABLE METRO



The M4 line provides significant benefits for mobility in Milan: the project has led to the redevelopment of more than 246,000 m² of urban space, including over 66,000 m² of parks and gardens.

When the new line is fully operational, it will see a daily reduction of about 180,000 vehicles in city traffic, with an annual decrease of up to 75,000 tons of carbon emissions.

This will not be the only benefit for the environment brought by the new line. The "Blue Line" construction sites were designed to enable **169 trees to be retained and reduce felling by 24% compared with the initial project plans.**

And not merely that: once the works were completed, in fact, the Municipality of Milan undertook to plant 1,900 new trees, along the line, connecting many green areas on the route: from Forlanini Park to the Idroscalo, to the "Parco delle Risaie". But even during the construction phase, activities were carried out to try to minimize the environmental impact.

Decisions were in fact made to minimize the impact of the construction site on citizens: i.e. disposing of excavated tunnel earth with underground conveyor belts, instead of **trucks driven in the city centre**.

This system has allowed a significant reduction of urban traffic. The outdoor urban route was, in fact, limited to just a few hundred metres: i.e. from the unloading points of the conveyor belts in Forlanini and Ronchetto, to the ring roads, in the immediate vicinity. Approximately 75,000 truck trips were required to transport the excavated earth (a long column from Milan to Naples!). But these were "avoided" in the historical centre.

A SUSTANABLE PROJECT

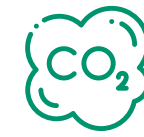
THE LINE IN OPERATION



VEHICLES

-180,000

per day



CO₂ EMISSIONS

-75,000

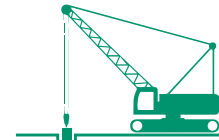
tons/year



NEW TREES

1,900

planted along the line



over **240,000 m²**

perimeter walls for stations



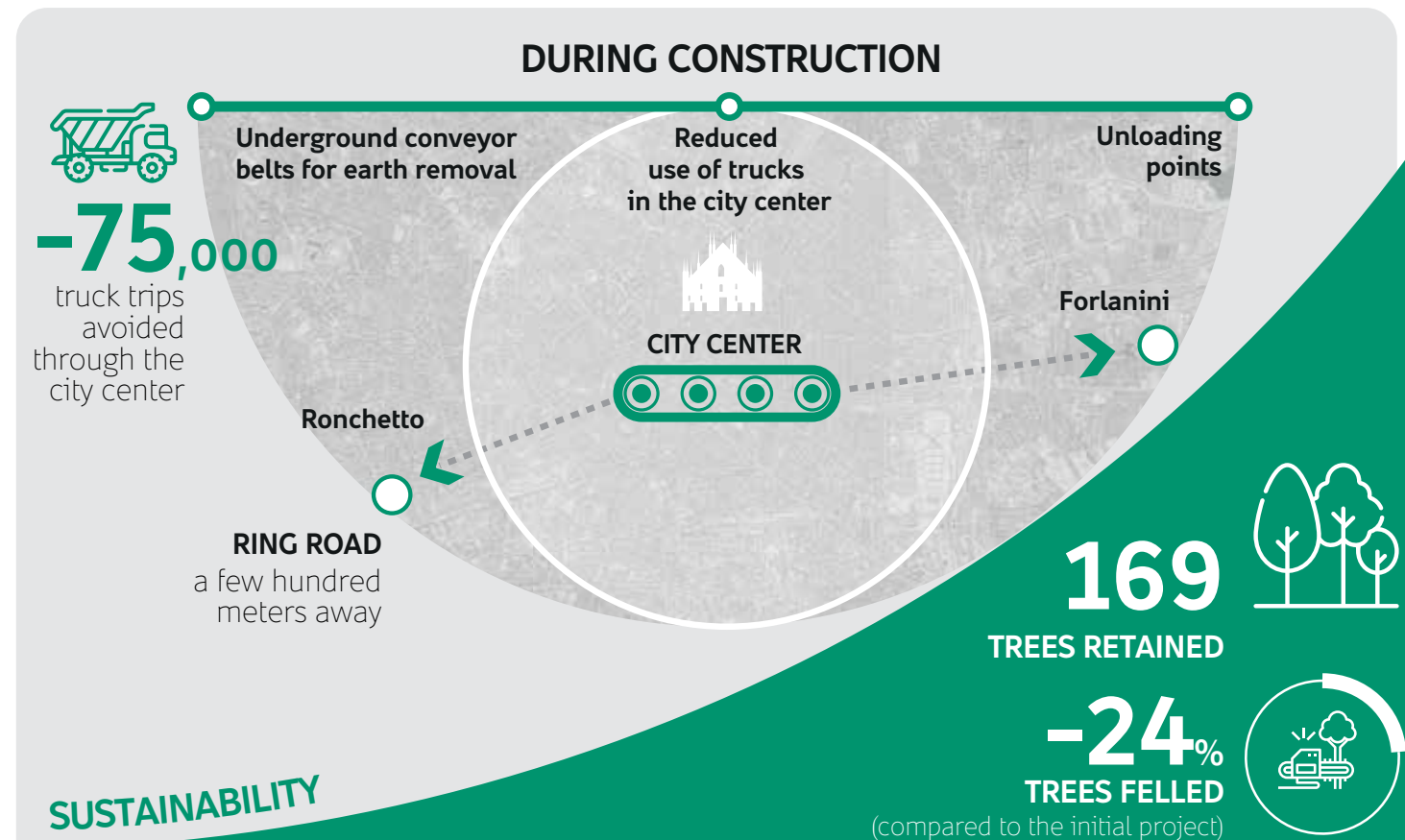
~1.5mln m³

earth excavated for the stations



~1mln m³

cast-in-place concrete



over **246,000 m²** redeveloped urban areas



including **66,000 m²** of green space

6. THE M4'S TECHNOLOGICAL RECORDS, THE INTELLIGENT LINE

- Driverless and WI-FI
- Safety: automatic doors opening at the platforms

Driverless e WI-FI

Milan's new metro line is built with **"driverless"** technology. It does not, in fact, require a driver on board.

This innovative transport model has already been used in very significant projects. The driverless lines built and under construction by the Webuild Group include Copenhagen's **Cityringen**; **Rome's line C**; **Riyadh's** new metro; and Paris' **Grand Paris Express**.

The main benefit of the new driverless lines is to vary the operating programme, i.e. change the number of operating trains according to public demand. This naturally entails greater operating efficiency linked to the frequency variation in passages, greater safety at stations, and lower operating costs, being that there is no driver.

The high train frequency for the M4 is possible thanks to the driverless technology, which allows trains to communicate with each other through a **Wi-Fi network**. Each train knows exactly how far the previous one or the next one is. It can, therefore, approach it without risking accidents. This system will allow the line to transport 24,000 passengers, per hour, in each travel direction.

Safety: automatic doors opening at the platforms

The new line has **doors that open automatically at platforms**, guaranteeing top quality passenger safety. The doors consist of a fixed frame, sliding doors and emergency exit doors.

The sliding doors are equipped with an emergency opening mechanism, which also allows manual opening from the platform. Passengers can exit from a vehicle in case of an emergency directly to the platform, if the vehicle is aligned within normal stopping tolerances.

SAN BABILA
Uscita Exit



Uscita Exit

Con segnale attivo abbandonare la stazione



ATTENZIONE LINEE ORARI in arrivo

7-L

HITACHI

7. CITIZENS' METRO

The M4 line has been financed with public-private funding and built by a consortium of companies led by the Webuild Group. From the very start, it was designed to promote on-going citizen participation.

Tens of thousands of people, in fact, participated in the numerous **open days** organized to "open the doors of the future stations" to citizens. From neighbourhood committees to representatives of the production industries, to individual citizens, the M4 project remained available to anyone who wished to have their say, or to present a proposal, raise a criticism or a personal concern.

Just like the decisions made, in collaboration with the Archaeological,

Fine Arts and Landscape Superintendence, to enhance the finds found during the excavation phase, and then put on display at Milan's Archaeological Museum.

These distinctive features, not surprisingly, have made the M4 known and become "**the citizens' metro**": a project that values citizenship, and not only during the project's inauguration, but also in every construction phase.



8. MILAN'S METRO: A BRIEF HISTORY AND SOME NUMBERS

The Milan metro network currently consists of five lines (M1, M2, M3, M4, M5) and covers 118 kilometers.



The network is managed by ATM (Azienda Trasporti Milanese - the Milan Transport Company), owned by the Municipality of Milan, in charge of managing transport in Lombardy's capital and in 51 Municipalities of the Province, serving an area with a total population of 2.4 million citizens.

ATM was founded on **May 22, 1931**; in the first thirty years of its history, it invested heavily in road transport development activities. In, **1964** the first underground line in the city was inaugurated, the M1 (the "**Red Line**") on the Lotto-Sesto

Marelli route. In October **1969**, the M2, the "**Green Line**" was inaugurated. The M3, the "**Yellow Line**", opened in **1990**. And the M5, the "**Lilac Line**", was inaugurated in 2013, being Milan's first fully automated driver-less line.

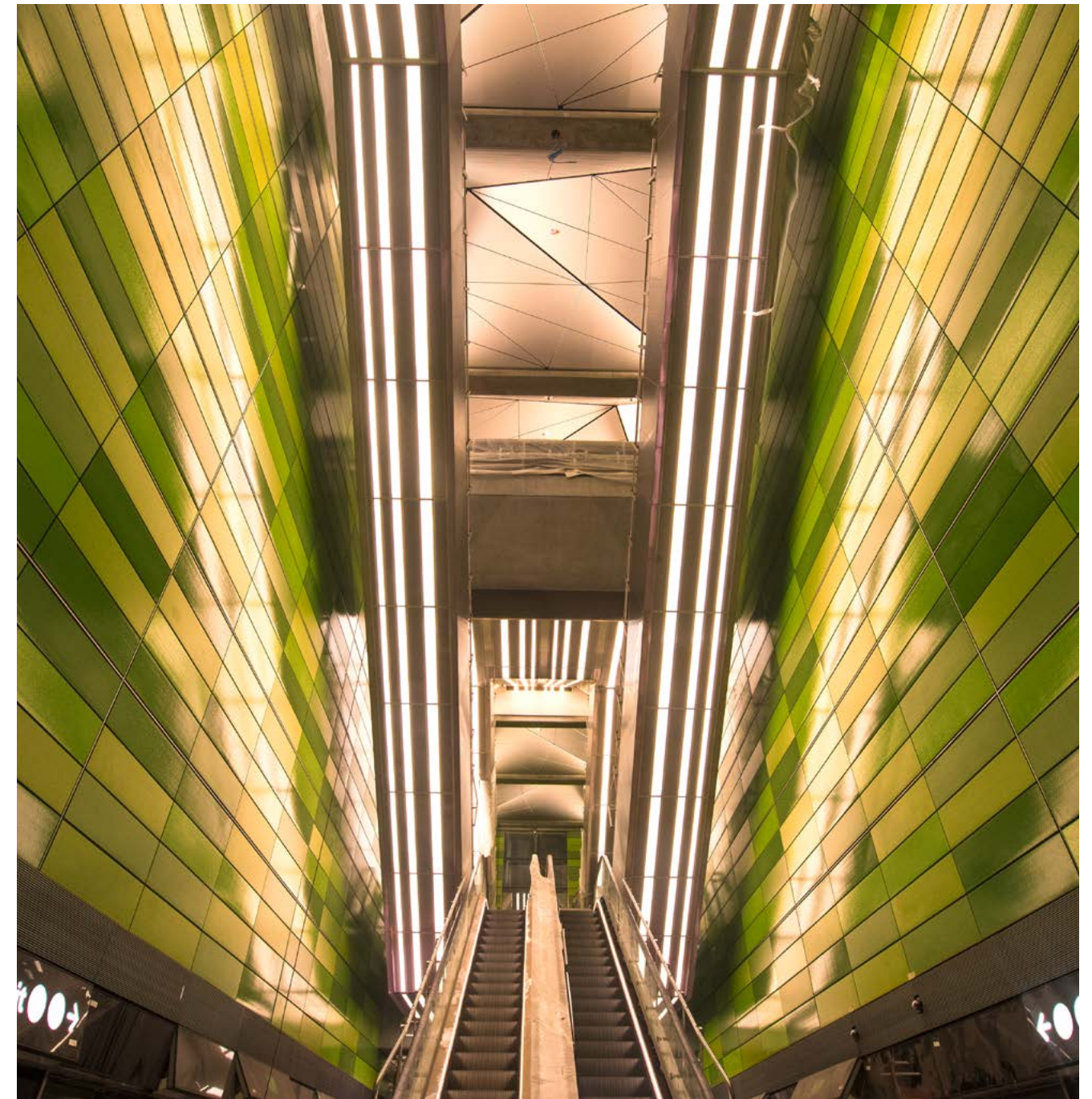
In 2014, new stations were opened on the M5 line (Isola and Garibaldi FS), which was completed in 2015. From 2022 to 2023, the first six stations were opened from Dateo to Linate. In the fall of 2024, the entire M4 line went into service. Webuild was involved in the construction of all of Milan's metro lines.

9. THE WEBUILD GROUP FOR SUSTAINABLE MOBILITY

Webuild is one of the top ten global groups in the sustainable mobility sector. It has built and is currently building some of the most modern and complex metro lines, globally.

These include Paris' **Grand Paris Express**; Cityringen, the metro ring circling **Copenhagen**, with its 240,000 daily passengers; Line 3 of the new **Riyadh** metro network, the world's longest, currently under construction for a total of 176 kilometers; and the Lima, Sydney, Rome and Naples underground railways.

Altogether, the Group has constructed more than 14,118 kilometers of railways and metro lines.



OUR METROS, GLOBALLY: MAIN COMPLETED AND ONGOING PROJECTS

Canada

- Montreal Line 1 • 1975
- Hurontario Light Rail Transit Project

France

- Paris Subway • Eole and Meteor Line 1998

Denmark

- Cityringen Metro Copenhagen 2019

Russia

- Saint Petersburg Subway 2004

Poland

- Warsaw Metro Line 2, Rondo Daszynskiego - Dworzec Wilenski Section 2015

United States

- San Francisco Central Subway • 2015
- New York Subway • 1984
- LYNX Blue Line Extension, North Carolina • 2017
- Metromover Extension Project Miami, Florida • 1993

Portugal

- Porto • Light Subway 2006

Venezuela

- Metro De Caracas, Line 3 Plaza Venezuela el Valle Section 1995

Peru

- Lima Metro

- Grand Paris Express, Line 15 Lot 2
- Grand Paris Express, Line 16 Lot 2

- Extension of Line 14 South to Orly Airport within Grand Paris Express Project Lot 4 2023

- Marseille Metro Line 1 1991

Italy

- Milan Metro Line 1 1985
- Milan Metro Line 2 1985
- Milan Metro Line 3 1990
- Milan Metro Line 4 2024
- Milan Metro Line 5 2015
- Genoa Metro • 2012
- Rome Metro Line A 1985
- Rome Metro Line B 1991
- Rome Metro B1 Line Bologna-Conca d'Oro and Conca d'Oro-Jonio Sections 2015
- Rome Metro Line C

Greece

- Athens Metro Line 3 2009

- Naples Metro Line 1 2012
- Naples Metro Line 6 1998
- Naples Metro, Capodichino Station

Romania

- Bucharest Subway Line 4 2017
- Bucharest Subway Line 5 2020

Saudi Arabia

- Riyadh Metro Line 3

Qatar

- Doha Metro System "Red Line North Underground" 2020

Turkey

- Istanbul Subway Line 4 2012

Australia

- Forrestfield-Airport Link, Perth 2022
- Sydney Metro Northwest 2018
- Western Sydney Airport Project
- Melbourne Metro 1981

Metros
 Mass Transit
 Light Rail Transit
 IN PROGRESS
 XXXX COMPLETION DATE



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