

# Turkey's urban rail boom



A flurry of recent openings and vehicle orders illustrates the fast pace of urban rail development in Turkey, which is set to continue. **Türker Ahi** reports.

**T**urkey is undergoing a metro and light rail boom. Many of the 11 cities that already have some form of urban rail (Table I) are expanding their networks, and 16 others have plans to open light rail lines by 2023.

Perhaps unsurprisingly, the country's largest city has the most extensive network. **Istanbul** has four metro and two

modern tram lines, in addition to suburban services running through the Marmaray tunnel under the Bosphorus, which opened last year. From July Marmaray services have been lengthened from five- to 10-car trainsets, doubling capacity to 3000 passengers per train, and in 2014 ridership is estimated to reach 45 million passenger-journeys. Work is still underway to upgrade the suburban lines at either end of the tunnel. The upgraded line is to open as far as Kaynarca on the Asian side of the Bosphorus in 2015, with trains eventually expected to run over the full 76.3 km between Gebze in the east and Halkali in the west.

Istanbul's goal is to have a 400 km urban rail network by the end of 2019 and 776 km by 2023. Ridership across the network is expected to increase to almost 5 million passengers in 2014, 7 million in 2016 and 11 million in 2023. After the opening of the 3.5 km extension of metro Line M2 across the Golden Horn earlier this year (MR 6.14 p10), the next stage to open will be a southern extension of Line M1 to Yenikapı by the end of 2014. On the Asian side, Line M4 is to be extended southeast from Kartal

to Pendik, and subsequently to Sabiha Gökçen Airport, 45 km southeast of the city centre. Line M3 is to be extended south by 9 km and eight stations to Bakırköy on the Marmaray line in 2017.

New lines are planned too. The official opening of Line M5 now under construction on the Asian side is due in 2015. The fully underground 16-station route will link Üsküdar on the Marmaray line to Çekmeköy; it will be 19.7 km long, including a spur to the depot. CAF and Mitsubishi are supplying 21 six-car driverless trainsets under a €119m contract awarded in June. The consortium beat bids from CSR, Hyundai Rotem, Siemens and Alstom. CAF is to produce the vehicles, with Mitsubishi Corp supplying electrical equipment including the automation systems which it says will be deployed in Turkey for the first time. Deliveries are scheduled for 2016-17.

The M6 'mini metro' line will run as a five-station shuttle from Levent on Line M2, which serves the financial district, to Hisarüstü, where interchange will be provided with a cable car over the Bosphorus that is due to open in 2015. The end-to-end journey time on

**Table I. Operational metro and light rail networks in Turkey**

City	Cars	Network length km
Istanbul (light rail, tram, metro)	804	147
Ankara (metro)	432	101
Izmir (metro)	219	91.6
Bursa (light rail, tram)	71	34
Eskişehir (tram)	23	16.5
Adana (light metro)	36	14
Kayseri (tram)	38	17.5
Konya (tram)	60	21
Antalya (tram)	14	11
Samsun (tram)	16	15.6
Gaziantep (tram)	15	9
<b>Total</b>	<b>1728</b>	<b>478.2</b>

**Top:** Istanbul line T4 from Topkapı is worked with a mix of former German Stadtbahn cars and new LRVs from Hyundai Rotem.

**Above:** Line M1 is currently being extended from Aksaray to Yenikapı where it will interchange with M2 and the Marmaray suburban service.



## TURKEY Expansion

Konya is taking delivery of 72 trams from Škoda Transportation.



# 32 million

PASSENGER-JOURNEYS TARGETED FOR KAYSERI LIGHT RAIL IN 2014

Line M6 will be 5 min and ridership is estimated at 10 000 passengers/h.

On February 12 work began on the initial section of Line M7 between Mecidiyeköy and Mahmutbey. The full route from Mahmutbey to Beşiktaş will be 25 km with 18 stations. Construction is yet to start on Line M8, although tendering began in 2012. This 25 km route will start from Bakırköy/İncirli on Line M1A and run west to Beylikdüzü via Küçükçekmece with 17 stations.

Under the slogan 'metro everywhere, metro to everywhere', Istanbul Metropolitan Municipality is continuing to invest in urban rail to help relieve traffic congestion, and 10 longer-term projects are planned (Table II). The first to open would be a 33 km line linking Halkalı and the planned third airport in the north of the city via Arnavutköy; revenue services are due to start in 2019.

The new airport is also to be linked to Gayrettepe with a 32 km line that is to open after 2019. Also due to open after 2019 is a 6.8 km line linking Sabiha Gökçen Airport with Tuzla.

### Trams in Izmir

**Izmir**, Turkey's third-largest city, currently has one metro line and a two-line suburban rail network branded Izban. There are plans to build three tram lines by 2017 to replace current bus routes. This is part of the city's 2010-30 sustainable development plan, intended to relieve the bus network and improve accessibility to the historic city centre.

The 12.6 km Konak Line with 19 stops would run from Fahrettin Altay Meydanı to Halkapınar via Konak. The 9.7 km Karsiyaka Line in the north of the city would link Alaybey and Mavişehir via Karşıyaka with 16 stops.

Construction is expected to cost €211m. Izmir Metropolitan Municipality will provide 25% of the funds, with the remainder covered by Treasury loan guarantees. A €165m financing agreement with the International Finance Corp, Agence Française de Développement and ING was signed earlier this year, and construction tenders are to be called in 2015.

Gülermak and subcontractor Durmazlar Makina have been selected to supply 21 bidirectional 32 m long low-floor trams for the Konak Line and 17 for the Karsiyaka Line for TL182.1m, having beaten 14 other bidders.

A third route is planned to run from Şirinyer to Dokuz Eylül University in Tınaztepe. This 6 km line would be operated by a fleet of 10 vehicles and ridership is estimated at 230 000 passengers per day; construction cost has been put at US\$24m. Ground surveys have been completed following project design and feasibility reports prepared by Yüksel Proje.

The municipality recently announced plans for three more tram routes, with construction tenders due to be called next year. The Yenisehir Line would run

for 5.5 km from Fevzipaşa Caddesi to Halkapınar, the 4.5 km Bomova Line would link Bomova Merkez and Bayraklı Adliye and a 2.2 km single track circular route would link Cumhuriyet Myd and Alsancak TMO Silos. Governor of Izmir Aziz Kocaoğlu has said that a metro line to Buca in the south-east of the city would be built in the longer term.

### Expanding networks

**Bursa** has a light metro, a 6.5 km single-track circular tram route in the city centre and a short heritage tramway. An 8 km eastern extension of the Bursaray light metro network from Arabayatağı to Kestel opened in three stages this year, and the network is expected to double in size over the next five years (Table III).

The municipality is giving priority to a 10.2 km route connecting the planned high speed station with the existing line at Osmangazi. Five firms have been shortlisted for consultancy services: Altınok Müşavirlik, Botek, Emay Mühendislik, Prota Mühendislik and Yüksel Proje. Tenders have also been called for the procurement of 60 LRVs.

Until the first Škoda Transportation ForCity Classic 28T tram entered passenger service in February, the 21 km tram line in **Konya** was operated by second-hand Duewag trams from Köln. A follow-on order from Škoda for 12 trams capable of catenary-free operation was placed in May. These are to be delivered next year, and bring the total order value for 72 trams to KC3.4bn.

## Turkish cities planning to open light rail lines by 2023

Trabzon	Aydın
Malatya	İskenderun
Denizli	Rize
Izmir	Şanlıurfa
Kahramanmaraş	Elazığ
Adapazarı	Diyarbakır
Mersin	İsparta
Afyon	Erzurum

Table II. Planned metro lines in Istanbul

Route	Length km	Stations	Journey time min
Halkalı – 3rd Airport	33		33
Sultangazi Habibler – Arnavutköy	11.5	10	35
Gayrettepe – 3rd Airport	32	5	32
Halkalı – Çatalca	33	4	N/A
Sabiha Gökçen Airport – Tuzla	6.8		10
Şişhane – Kabataş	1.7		2½
Esenyurt – Avcılar	17		26
Büyükkçekmece – Esenyurt	10.5		16
Büyükkçekmece – Silivri	32.5		49
Beşiktaş – Sarıyer	14.6		22
Üsküdar – Beykoz	15		23





## Expansion **TURKEY**

They are to be used on a 14 km line under construction between Alladdin and Adliye. This will include a 1.8 km wire-free section in the area surrounding the historical centre and a 4.5 km tunnel. These features mean that the trams will meet high standards for fire safety and will be equipped with roof-mounted nano-lithium-titanium batteries for catenary-free operation (p55).

After long delays, **Ankara** now has a three-line metro network. Following the opening of lines M2 and M3 in early 2014 (MR 6.14 p10), the next to open will be Line M4 between Keçiören and Tandoğan. According to Prime Minister Recep Tayyip Erdoğan, passenger service will begin by the end of this year. As on Line M3, Ansaldo STS is installing communications-based train control on Line M4, and has upgraded the signalling on the older Line M1 to the same standards to enable interoperability. Full functionality of the upgraded signalling will only be available once all metro lines are completed.

A feasibility study is underway for a 29 km line linking Kızılay with Esenboğa International Airport, and there are also plans to build a line from Kızılay to Ankara Gari main line station in the longer term.

**Eskişehir** has the only metre gauge tram network in Turkey. A 6 km branch southeast from Yunusemre to Açelya opened in March, and in June testing began on a southern branch from Atatürk Lisesi to Çankaya via Yıldıztepe and Yenikent.

**Table III. Light rail lines planned for Bursa**

Route	Length km
Gar – Osmangazi	10.2
Mudanya – Güzelyalı	5.3
Cumhuriyet Caddesi – Siteler	5.9
Cumhuriyet Caddesi – Erikli Mahallesi	7
Hüdavendigâr Kent Parkı – Bilgiler Caddesi	7.3
Karafatma Meydanı – Hürriyet Meydanı	4.1
Merinos – Kanal Boyu	2.4
Uluyol – Eski Gemlik Yolu	3

### Procuring new vehicles

A limited service commenced on the third phase of **Gaziantep**'s tram network in March. No date has been given for the start of full service on the Ibrahimli branch, which was built by Comsa EMTE under a €20m contract. The branch leaves the Gar – Burç Kavşağı route at Harikalar Diyarı to run north for 6.5 km to Adilye.

Two further branches are at the planning stage. The fourth phase of the network would link Cumhuriyet University with the main line station, and the fifth phase will run west from the station along Ali Fuat Cebesoy Bulvarı. The city plans to procure 25 vehicles for these extensions; it recently took delivery of 28 second-hand vehicles from Rouen to operate the existing three routes.

The Kayseray light rail line in



**Kayseri** is operated with 22 AnsaldoBreda five-section Sirio vehicles, and the expansion of the network is necessitating a fleet expansion. Kayseri Municipality Rail & Transportation Department has tendered for 30 vehicles with a budget of €57.7m. Bozankaya Otomotiv was announced as the winner in July. According to mayor Mehmet Özhasseki, the ridership goal for 2014 is 32 million passenger-journeys.

Delivery was completed this year of five 42 m long trams which **Samsun** Metropolitan Municipality ordered from CNR Tangshan in 2012. They offer a 25% increase in capacity compared to the 32 m long Sirio trams which AnsaldoBreda supplied for the opening of the 17 km tramway in October 2010, as ridership has grown from 13 million passengers in 2011 to 17 million in 2012. ■

Bozankaya Otomotiv vehicles will join the existing fleet of AnsaldoBreda Sirio vehicles in operation in Kayseri.

The SilkWorm trams for Bursa have been manufactured in Turkey by Durmazlar subsidiary Durmaray.

