RIYADH Metro

The rollout of the first trainset marks a milestone in the Riyadh metro project. Karol Zemek reports.

Since the groundbreaking ceremony for the Riyadh metro on April 3, 2014, around one-third of the US$28bn scheme has been completed, with the help of 35,000 workers from 30 countries. Work is progressing at 184 sites around the city, with roughly 0.5 km of tunnel being bored every week. More than 1 km of viaduct is being built per month, requiring the erection of 50 piers a day.

Visible progress is being made away from Riyadh as well. The first two trainsets for a fleet that will eventually total 190 were recently completed at Siemens’ Simmering plant in Wien. One is being tested at the Rail Tec Arsenal climate chamber nearby, and dynamic trials at the Siemens test centre at Wil denrath in Germany were scheduled to begin in May.

These form part of the fleet of 29 two-car sets that Siemens is supplying for Line 2 of the driverless metro. Based on the Inspiro family now in service in Kuala Lumpur and Warszawa, the trains are 37.9 m long with capacity for 251 passengers. There are 63 seats including eight tip-up seats in three classes: first, family and single. A button-operated door separates the first and family compartments, with a locked door between family and single class. First class is chiefly distinguished by more space, and features wider seats with higher backrests and golden headrests. Headrests in single class match the line colour. All three classes include wheelchair spaces. Each car has three double doors, and the interiors feature dynamic line maps and passenger information screens supplied by Ruf. Audio-visual passenger information is also to be provided on the platform screen doors at stations.

Work to adapt the Inspiro design to local conditions includes modified bogies, traction systems, brakes and doors specially designed to reduce sand ingress. The powerful air-conditioning units require more room in the roof than is usual. Maximum design speed of the trains is 90 km/h and maximum operational speed will be 80 km/h.

Siemens is also producing 45 four-car trainsets for Line 1, the only line of the six that will not operate two-car sets. The first of these 75.7 m long trains is nearly complete; it will have capacity for 522 passengers, including 123 seats and six tip-up seats.

The aluminium shells are being friction stir welded and are fireproofed so that flames from below will not penetrate into the passenger compartment for at least 30 min. Once series production of the Riyadh cars begins, Siemens expects to turn out one car body every 1½ to two days.

### Three rolling stock suppliers

Work on the metro has been split into three packages, with a different rolling stock supplier for each. All three are working to the same design guidelines, although the train dimensions are slightly different between the six lines.

Siemens is supplying the most trains, and therefore had to start production earlier than the other two builders. The company is part of the Bechtel-led BACS consortium that also includes Almabani General Contractors and Consolidated Contractors Co. Siemens’ €1.5bn share of the US$9.45bn turnkey contract also includes signalling and electrification.

Line 3 will be operated using 47 two-car Innovia 300 trainsets that Bombardier is supplying under its US$383m share of the US$5.21bn contract awarded to the Arriyadh New Mobility
Work on the Doha metro is also progressing well, with Qatar Rail reporting that the overall project is now around 40% complete.

Tunnelling on the Green Line was completed on March 30, when TBM Al Messila broke through at Education City. This followed the completion of tunnelling on the Red Line North with a TBM breakthrough between Legtaifiya and Qatar University stations on March 21. Boring of the 11.3 km Red Line North tunnel had started on July 19 2014. The four earth pressure balance TBMs achieved an average of 30 m per day at their peak, with the best daily rate of 42 m set by Lebretho on March 29 2015.

Work on the Red Line North package is being carried out by the ISG joint venture of Impregilo, Carillion, Amal and the Italian consortiums.

Management for lines 1, 2 and 3 is being carried out by the Riyadh Metro Transit Consultants consortium of Parsons, Egis and Systra under a US$556m contract, while that for the other three lines is the responsibility of the Riyadh Advanced Metro Project Execution & Delivery consortium of Louis Berger and Hill International, which has a US$264m contract.

The 176 route-km network with 85 stations will include seven depots of between 60 000 and 150 000 m² and one control centre for all lines, which will also oversee the bus network. Four new power grid stations are being built, with passenger information and security systems coming from Madrid. A further challenge has been to place the metro at the heart of the city. To this end, a great deal of stress is being placed on enhancing the corridors and amalgamated for the whole city.

Further back in the construction process, ADA worked with contractors and customs authorities to accelerate the establishment of the seven precast segment factories in Riyadh (and one more outside the city) that are dedicated to building the 84 route-km of viaduct with an average span of 36 m.

Further challenges have been to gain public support. A public relations campaign is underway, which includes initiatives like a competition to name the seven tunnel boring machines being used for the project; this attracted 60,000 entries. Herrenknecht has supplied six of the 10 m diameter TBMs, and NFM Technologies the other.

Part of the publicity campaign targets children, as it is especially important to change their mindset, according to ADA Metro Project Director Alwad Alkreish. ADA expects an initial 1-16 million passenger-journeys per day to grow to 3-6 million, but he accepts that further work must be done to encourage metro use. Park-and-ride sites and integrated ticketing with the new bus network aim to encourage intermodal travel, but perhaps a more important part of the project is the aim to change Riyadh into a more walkable city. To this end, a great deal of stress is being placed on enhancing the corridors through which the metro lines will run.

ADA has said that the main stations are expected to start test running in Kingston, Ontario, later this year.

Final testing and commissioning of the metro is now 90% finished, with completion expected in the autumn. On May 5 QR announced that the US$1.4bn design and build contract awarded to a Samsung C&T-led consortium in 2013 for construction of the major interchange stations at Msheireb and Education City was being ‘terminated’, and the work would be completed by the local Consolidated Contractors Group. QR said it was working to minimise any risk of delay to the project. Opening of the first three lines is expected in the fourth quarter of 2019.

Qatar Rail says that the styling of its metro trains has been inspired by the Al Faras Arabian mares.

The ambition of the Riyadh metro has shielded the project to a large extent from low oil prices, which have affected other construction schemes. However, some of the more expensive station designs have been scaled back, according to Samer Tamimi of Hill International. Small delays have also appeared in the design work and land acquisition.

The feeder monorail serving the King Abdullah Financial District, which is being developed separately from the metro, is also nearing completion. Bombardier has manufactured all of the rolling stock, and says it is awaiting completion of the civil works in order to start the final testing and commissioning.

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Tamimi contrasts the priority given to Riyadh with other metro projects in Saudi Arabia: work on the Makkah metro is practically on hold, while those in Madinah, Dammam and Jeddah are still in the early stages.