

# RACING TOWARDS A PROSPEROUS FUTURE



PHOTO: MANUEL SALAZAR

Dubai has become synonymous with transition, and this is immediately apparent when you see the innumerable pillars of the Dubai Metro, straddling roads and springing up beside major highways and between landmarks. This metro is unique in its scale and the way that it is being threaded into the confines of the city's existing infrastructure. Robin Lyndhurst reports.

It is hard to over-estimate the importance of the metro. Today Dubai needs rail transport as much as it needs tourists and trade. The metro will be a conduit for improving land values and encouraging economic development along its arteries. It will transform Dubai, and provide a clear international signal that the emirate has arrived in the big city league. The metro is being built to address rising road congestion, lengthening travel times and increasing pollution. Dubai's population is expected to reach 5.25 million by 2020, and improving mobility within the increasingly spread out city and its outlying suburbs will lay the platform for future economic growth.

The metro is at the heart of Dubai's transport infrastructure investment programme, accounting for US\$4.2 billion of the Roads & Transport Authority's US\$5.6 billion budget. According to RTA Chairman and Executive Director Eng Mattar Mohammed Al Tayer, the authority's main focus for the next few years is to develop a high-quality integrated transport network which will increase commuting efficiency by encouraging people to use public transport; not just the metro, but also buses, water buses and trams.

The RTA is working hand-in-hand with the Dubai government to help people commute safely and efficiently, in line with the vision of His Highness Sheikh Mohammed Bin Rashid Al Maktoum, ruler of Dubai and Prime Minister and Vice-President of the United Arab Emirates. "As Dubai grows at an astounding pace, commuters must be provided with excellent public transport alternatives," explains Al Tayer. "A compre-

hensive and widely-used public transport system will relieve pressure on roads and eliminate traffic jams." As well as making public transport more attractive, RTA plans to restrict the number of new car licenses in the future. Motorists can also expect higher car registration fees, parking costs and road tolls.

**TWO ROUTES** The decision to build a fully-automated metro network was taken by the government of Dubai following consultants' studies undertaken during the 1990s. After an international tendering process, a US\$3.4 billion contract for the first line was awarded to the Dubai Rapid Link consortium in May 2005. Just over a year later, in July 2006, RTA exercised a US\$1.1 billion contract option for DURL to build the Green Line as well.

Led by Mitsubishi, DURL includes Japanese firms Obayashi and Kajima and Turkish civil engineering group Yapi Merkezi. Capita Symonds was responsible for civil, architectural, mechanical and electrical designs, supported by KBR and Llewelyn Davies.

Construction of the Red Line formally began when the Prime Minister attended a groundbreaking ceremony on March 21, 2006. Construction work on the line is now around half-finished, and is due to reach 80 per cent by the end of 2008. Work on the Green Line has reached around 20 per cent, and the target is to have the line 50 per cent complete by December 31. Revenue service on the Red Line is scheduled to begin on September 9 next year, with the Green Line following on March 21, 2010. ▶



PHOTO: MANUEL SALAZAR

## Work in progress at Dubai Metro



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**Abdulmajid Al Khaja,**  
CEO, Dubai Rail  
Agency

The 52 kilometre Red Line starts at Rashidiya, not far from Dubai's airport, passes through Union Square in the heart of the city, then tunnels beneath the Dubai Creek and crosses Sheikh Zayed Road to run parallel to the coast to reach Jebel Ali, effectively linking one end of the city with the other. The 22 kilometre Green Line follows a horseshoe route linking the business districts either side of Dubai Creek, running from Jeddah through Dubai Healthcare City and Burjuman to Al Ittihad Square at the intersection of Al Nahda and Damascus Road, before terminating in the Al Qusais area.

Both lines will run in tunnels under the city centre and on elevated structures elsewhere. The Red Line will have 3.6 kilometres in the tunnel, and the Green Line around 8 kilometres. Three TBMs are being used to bore the running tunnels, which have an 8.5 metre internal diameter, working outwards from the site of the interchange station at Union Square. TBM1 first excavated the Red Line tunnel from Union Square to Burjuman. TBM2 bored from Union Square to Al Rigga, and broke through on January

6 to complete the tunneling work for the Red Line.

Boring for the Green Line is well advanced, according to the CEO of RTA's Rail Agency Eng Abdulmajid Al Khaja. TBM3 has excavated from Union Square to Salahuddin, and TBM1 is about to break through at Al Ras to begin a 2.7 kilometre drive through Al Gubaiba and Khalid Bin Al Waleed to Burjuman. TBM2 is being reassembled at Union Square for the final 1.8 kilometre drive through Baniyas to Palm Deira, this should see the Green Line tunneling completed by early 2009.

The underground stations at Union Square and Burjuman will provide the main interchanges between the two routes. Construction of the cut-and-cover station at Union Square is making substantial progress, with concreting works nearly complete. Piling and excavation for the Green Line stations serving the Deira and Bur Dubai districts is in progress, while the traffic and utility diversions are underway on a large scale.

On the elevated sections of the Red Line, most of the piers have now been erected and the viaduct structures are taking shape. Most of the

line will have spans of less than 44 metres, which can be installed with launching gantries. However, there are 17 locations where a balanced cantilever viaduct construction is being used to permit span lengths up to 72 metres. RTA confirmed in February that the first three of these cantilever spans had been completed.

The steelwork is now being erected for the elevated stations on the Red Line. Nearly 25,000 tonnes of steel is required for this work, most of which is being supplied from Malaysia and Singapore. A further 5,000 tonnes will be used for the construction of the depots. The erection of the first steelwork started at Jebel Ali Industrial station in October 2007, and construction has recently begun at Dubai. Around 2,500 workers are employed on the construction of the stations, a figure which is anticipated to increase significantly as work gathers momentum.

**PEARL DIVING HERITAGE** The metro stations will have eye-catching architectural finishes based around the elemental themes of earth, air, fire and water. The 24 stations along the elevated ▶



PHOTO: MANUEL SALAZAR

section of the Red Line have been designed to reflect the modern metropolis, with distinctive curved and shell-shaped roofs evoking the city's pearl diving heritage. The elevated stations are elliptical in shape, with the principal design philosophy being to wrap the station around the tracks.

Daytime temperatures average 39 degrees Celsius in August, and so the question of getting to and from the metro is particularly important for passengers. The stations will be air-conditioned, and RTA says covered walkways and air-conditioned footbridges incorporating travelators will be provided, with step-free access throughout. All platforms will have screen doors, to save energy and ensure safety.

The stations will have dedicated car parks, and integrated links taking passengers to buses, taxis and abras (traditional water taxis). Bus feeder routes serving air-conditioned stops will be organised to help commuters plan their travel, while park and ride facilities at Rashidiya and Jumeirah Island will each have 3,000 parking spaces.

**GOLD AND SILVER** Last June RTA named Serco as preferred bidder for a contract to operate and maintain the metro. The initial contract covers a two and a half year planning phase, followed by a five year operations contract starting when the first line opens in 2009. ▶



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This is renewable for a further five years, and Serco says the contract is potentially worth more than US\$787 million over the full 12½ years.

The Red and Green lines will be operated by a fleet of 87 driverless train sets, which are being built by Kinki Sharyo in Japan. The first train began pre-delivery test running in November at up to 60 kilometres/hour on the Mihara Test Track near Hiroshima, including tests of the ATO equipment and braking systems. A second train set was sent to the Nippon Sharyo plant in Nagoya for climatic trials to test the air-conditioning equipment.

The first vehicles arrived in Dubai last month, and all sets for the Red Line are due to be delivered by the end of this year. The Green Line cars will follow in 2009. The five-car trains are designed to carry 643 seated and standing passengers, with one Gold class and four Silver class cars. To encourage high-income residents to use the metro, passengers using the Gold class saloon in the leading vehicle will experience a luxurious interior, with just 18 wide leather seats providing a panoramic view through the front window of the train.

The inner half of the Gold class coach will be reserved for women and children, and will have extra space for prams and bags. Every car will have wheelchair spaces and priority seats for elderly, disabled and pregnant passengers. Wi-fi and GSM will be provided to enable passengers to make effective use of the time spent commuting, time which would be wasted when travelling by road. To permit fully-automated operation, Alcatel is supplying its SelTrac S40 communications-based train control and Net-Trac central control technology. This is configured for a minimum headway of 90 seconds. Maximum speed of the trains will be 90 kilometres/hour, giving a round-trip time of two hours 23 minutes for the Red Line and an hour and 23 minutes for the Green Line. Red Line trains will initially run every seven minutes off-peak, with a minimum headway of three minutes 45 seconds provided during the peaks, when 38 train sets will be in service. From 2010,

when 51 trains will be in service, the line will have a peak-hour capacity of 11,675 passengers/hour in each direction. The theoretical maximum design capacity is 25,720 passengers/hour, which would require 106 trains.

The Green Line will have an initial capacity of 6,395 passengers/hour per direction, with 16 trains in service. The design capacity of this route is put at 13,380 passengers/hour, with 60 trains in service. The exact fare structure is still to be determined, but Director of Rail Operations Eng Ramadan Abdullah says fares will be based on distance and time. Smart card ticketing will be used, with different coloured cards for Gold and Silver classes. The future unified fare collection system will cover all public transport in Dubai, including the metro, buses, taxis, the Palm monorail and the proposed Al Sofouh tram. It will also be used to pay for car parking. The infrastructure will be able to handle six million transactions a day, and will be expandable to accommodate future growth. Stored value technology will be used, with add-value facilities at ticket offices, self-service machines at the metro and bus stations, and at approved vendors. Ramadan says internet and mobile phone ticketing are also under consideration “so passengers needn’t wait at the gates or queue up at ticket vending machines.”

A separate stabling depot is being provided to service the trains on each line, with the main depot, workshop and control centre complex occupying a 110,000 metres<sup>2</sup> site at Jebel Ali. The air-conditioned stabling facilities here will accommodate 44 five-car trains. The third rail electrification will be at 750 V DC. Power for the network will be provided by local supplier DEWA at 132 KV at three locations, where it will be stepped down to 33KV to feed the 750 V traction substations. Another project milestone was achieved on February 13 when the first of the 160 MVA main power supply stations was energised at Jebel Ali. The other two are under construction at Union Square, where they will feed the Red

and Green lines separately. According to RTA's Rail Construction Director Eng Adnan Al Hammadi, energisation of the Jebel Ali power supply will pave the way for the start of test running on a 4 kilometre at-grade section of the Red Line near Jafzal as soon as the first train is ready.

**AN EXPANDING NETWORK** Recent reports have suggested that the metro network could eventually be expanded to as many as eight lines, depending on the growth of the city. RTA is currently working on plans for two more routes, designated the Blue and Purple lines. On May 23 last year, Al Tayer announced the go-ahead in principle for the 49 kilometre Purple Line, which will provide express services between the existing international airport and the new airport at Jebel Ali (Dubai World Central), running along Al Khail Road, parallel to but further inland than the Red Line. The Purple Line would be worked by nine car trains with checked baggage accommodation. Three of the eight stations will have full airline check in facilities. With trains running at up to 100 kilometres/hour, end-toned journey time is put at 40 minutes. Appointed as design consultant last year; Parsons Brinckerhoff is shortly expected to complete initial design work on the US\$2.7 billion project. RTA says tenders for construction will be called later this year, with the opening of the line anticipated in December 2012. In the longer term, RTA is looking at introducing a local service on the Purple Line, serving more intermediate stations as the southern side of the region becomes more developed. The east-west Blue line would run along Emirates Road, serving the area between the Red Line to the north and the Purple Line to the south. Another project under discussion is an extension of the Red Line to the border with Abu Dhabi.

Speaking at the Metro Rail conference in Roma last year, Rail



Agency CEO Abdelmajid Al-Khaja announced plans for seven light rail routes totalling 268 kilometres. These are intended to act as feeders to the metro, with the first routes planned to link hotel and office developments along the coast west of the city centre with stations on the Red Line. MVA Consultancy has been appointed to develop ridership forecasts, and RTA could call tenders for construction of the first routes by the end of this year. The metro stations serving some of the

larger developments will have links to privately-promoted transit systems, including the 5.5 kilometre Palm Jumeirah monorail which is expected to open in December. Built at a cost of US\$382 million, this straddle monorail will be operated by Singapore MRT subsidiary SMRT Engineering and will use a fleet of driverless train sets supplied by Hitachi. 🌅

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