

Eko Rail wins Lagos Blue Line concession



INNOVATION Under a 25-year BOT concession, trains should be running within three years on the first of seven planned metro lines in the Nigerian city of Lagos.

Work is well advanced constructing the first stations in the expressway median.

After decades of debate and false starts, sub-Saharan Africa's largest city is finally getting a metro. Lagos State Government is building the 27 km Blue Line, running west from the city centre along the Badagry Expressway. Eko Rail will provide equipment including rolling stock, signalling, and electric power, recouping its investment of around US\$400m from passenger fares through a 25-year build-operate-transfer concession. Eko Rail will employ staff and pay concession fees to the state.

Lagos State is home to around 10% of Nigeria's 160 million inhabitants; it is the nation's commercial capital and a burgeoning economic centre. Situated on Africa's west coast with a good climate, Lagos has a deep-water port and access to natural resources, making it well placed to become a regional hub similar to Singapore or Hong Kong. Since his election in 2007, State Governor Babatunde Fashola has gained a reputation for improving previously neglected public services and infrastructure. Streets are being cleaned and

rebuilt, rubbish removed, and parks restored. There is also substantial investment in schools, hospitals and public water works. While most of the other Nigerian states rely on federal oil revenues, Lagos State generates most of its income from local taxes, enabling it to operate with considerable independence. The state has its own credit rating and is able to borrow money on international capital markets.

From the historic centre on Lagos Island, the city spreads in three arms, north, east and west, separated by lagoons and mangrove swamps. Although the city has a comprehensive expressway network, built in the 1970s and 1980s, burgeoning growth has led to severe congestion, and it can sometimes take 4 h to travel 20 km.

A concept plan for a seven-line metro network was drawn up by French consultants in the early 1980s. A contract to build it was actually signed, but this was cancelled in 1985 by the incoming military government. In the following years Lagos urban transport actually deteriorated as municipal bus routes were abandoned and replaced

by thousands of barely-regulated 'danfos', offering frequent but irregular transport between 'motor parks', with fares often set arbitrarily by the drivers.

Metro scheme revived

With improving political stability and support from the World Bank, the Lagos Metropolitan Area Transport Authority (LAMATA) was established in 2003. It developed a strategic transport plan, and made an early start on a north-south Bus Rapid Transit route. This opened in 2008 and now carries almost 200 000 passengers per day. The project was implemented as a PPP, with the state building the infrastructure and the buses financed and operated by two private concessionaires.

LAMATA also decided to proceed with two of the metro lines (RG 10.08 p818), which will share a common bridge from Lagos Island to the mainland. The Blue Line runs west along the coast and the Red Line heads north alongside the existing Nigerian Railways Corp line — which is also being rehabilitated.

Much of the Blue Line will run on the surface, in the median of the Badagry Expressway, which runs west from Lagos towards Benin and Ghana. Although a federal highway, it is being rebuilt as a 10-lane toll road at the state government's expense.

Blue Line infrastructure, including civil works, stations and track, is being built by Chinese Civil Engineering Construction Corp under a design-build contract based on conceptual plans prepared by Canadian consultants CPCS Transcom. Construction is already well advanced with four stations taking shape in the median of the expressway. Support piers are being erected for the elevated line, which will run past the iconic National Theatre before crossing the lagoon to Lagos Island.

Operating concession

LAMATA held an international competition during early 2009, receiving a wide range of bids for a 25-year concession to operate and maintain the line. Eko Rail was named as preferred bidder in 2010. It is led by emerging-markets investment firm Verod Capital Management, with technical and commercial expertise assembled by UK-based rail management consultancy First Class Partnerships. Project finance is being arranged by Investec Bank. Legal advisers include SNR Denton and Nigerian firm Udo Udoma & Bello-Osagie.

According to Michael Schabas, who is leading the FCP team, it was initially a challenge to find people with the right combination of skills who were willing to make the commitment to work in Lagos. 'In fact, Lagos is arguably an easier place to work in than many richer countries. The security situation has greatly improved. Government officials are very determined to make things work, operating in a transparent and effective manner, while the use of the English language and English law, and proximity to lawyers and bankers based in London, make it easier to transact business than, say, in the Middle East or central Asian countries.'

Operations are being led by John Self OBE, who was General Manager of London's Jubilee Line during the commissioning of the extension to Canary Wharf. David Potter, with a background at London Transport, Network Rail and Transnet Freight Rail, leads the Engineering team, which is supported by the UK office of URS. Eko Rail is also recruiting managers from



the Nigerian diaspora, many of whom now work in the rail industry outside Nigeria.

Risk sharing

The key to a successful PPP is the sharing of risks between the public and private partners. Under the agreement, the concessionaires must pay for everything except the track, including trains, signalling, power supplies, fare collection and information systems. During the operating period, the concessionaires will pay a percentage of total revenue to the state government, even if the revenues do not cover the operating costs.

Eko Rail believes it was selected because it offered an innovative,

affordable technical solution, detailed and practical implementation plans, and a balanced sharing of risks based on realistic traffic projections. Eko Rail commissioned its own 'investment grade' traffic forecasts from Steer Davies Gleave, using data from more than 25000 interviews with existing Lagos commuters.

The Blue Line is expected to attract more than 300000 passengers per day. Eko Rail believes the projections are reasonable and consistent with experience of comparable lines in cities at a similar stage of development. Eko Rail has learned lessons from other developing city metros and is working closely with LAMATA to integrate the metro with local bus services. LAMATA is also committed to provide bus interchange

The line will run on viaduct from National Theatre across the lagoon to Lagos Island. Most columns are already constructed for the first section, and tracklaying should commence later this year.



facilities at key stations. Many Lagos streets lack usable pavements, and Eko Rail plans to work with local government to ensure these are provided.

Rolling stock

Bidders for the concession were given the option to use diesel trains, as the Nigerian electricity grid does not have sufficient capacity. However, Eko Rail decided very early to go for electric trains, and it will build its own 25 MW power station. The financial tradeoff was relatively easy, because Eko Rail was also able to purchase a fleet of subway trains from the Toronto Transit Commission.

The cars are air-conditioned, have solid-state traction and robust mono-coque bodyshells. With a width of 3.1 m and length of 25 m, they are among the largest metro cars in the world, ideally suited for a new surface metro in a large city. Eko Rail will need to replace the bogies, because Toronto has a non-standard track gauge of 1485 mm, and the cars will be completely refurbished prior to shipping to Nigeria. The chopper traction control provides full regeneration and gives most of the benefits of the latest IGBTs, but can be repaired using simple 'TV repair shop' technology.

Eko Rail is purchasing TTC's entire fleet of 255 Hawker Siddeley cars, more than enough for the Blue Line and the Red Line, so it is looking for other cities that need this type of car. According to Schabas, 'even after rebuilding, they are about one-third the price of new cars, while offering operational performance and comfort that is indistinguishable from new trains. By using the Toronto cars, we are able to save about US\$100m in capital costs, which is being passed onto Lagos State. It also made the decision to use electric traction easy — we were unable to find a suitable fleet of existing diesels, and new trains would have been far more

expensive.'

The Blue Line stations are being designed to accommodate eight-car formations, but Schabas says the intention is to start with shorter trains at 5 min headways, which will provide sufficient capacity. As traffic grows, Eko Rail will lengthen trains and increase frequencies. The initial operation would require 10 four-car sets, so the intention is to convert 56 cars to provide around 25% cover and leave some spare capacity for growth.

Admitting that financiers are still cautious about investing in the Nigerian market, Danladi Verheijen, the CEO of Verod Capital Management, says the hardest part of the deal was balancing risk and return. 'If it isn't going to be profitable, investors won't take the risk. Saving US\$100m on the cost of trains allows us to offer a good deal to Lagos State and an attractive return to private-sector funders.'

Wire-free train control

Another innovation will be the use of a wireless train control system, based on differential GPS for train location rather than track circuits or inductive cables. GE Transportation has been working with Eko Rail and will supply its Incremental Train Control System, developed by Harmon and first used on Amtrak's Niles – Kalamazoo line in Michigan. Giving a theoretical capacity for up to 24 trains per hour, ITCS is seen as ideal for Nigerian conditions.

GE will also take responsibility for other station and train communications. Apart from a 33 kV feeder for traction and station power, and a fibre cable for communications, trackside cabling is limited to switch interlockings. Each station will have a substation and most will have a microwave antenna for communication with trains.

After some consideration of using high voltage overhead power, Eko Rail

settled on 600 V third rail DC electrification, in part because it is considered less vulnerable to damage during tropical storms. While economics are more of a driver than aesthetics, using third rail means there will be no overhead wires, which should make the elevated route onto Lagos Island less visually intrusive. Eko Rail is now inviting bids to provide the power generation and distribution system.

Rapid deployment

Eko Rail has already begun procuring long lead items. The first car was moved in late August from Toronto to GMI's plant in Hornell, New York State, for testing, and the rest of the fleet should be released during 2012.

Stage 1, really a 'demonstration' with a simple shuttle service over the 8 km between National Theatre and Mile 2, should open in 2014. Passenger services to Okokomaiko, where there will also be a depot, should begin about a year later.

The bridge to the island will follow, and the whole of the Blue Line with a total of 13 stations will probably be complete sometime after 2016. The section from Iddo to Marina, with just three stations, will cost almost as much to build as the rest of the line, but will be shared with the Red Line and further increase revenues. Eko Rail hopes the final section will follow on quickly, especially as it already has the cars. In the meantime, it expects commuters will change to express buses shuttling from National Theatre to Lagos Island and running further to the new business districts on Victoria Island.

'Eko Rail looks forward to delivering a world-class service to support Lagos's development as a global megacity,' says Verheijen. 'What's more, we are confident that the innovative technical and financial solutions pioneered here can serve as a model for other projects in Nigeria and beyond.' ◀

Most Eko Rail stations will be located in the centre of the Badagry Expressway. Tracks will be at ground level, with access by pedestrian bridges. Eko Rail is working with Lagos State Government to provide bus interchange facilities at each station.



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