

Craig Moore (May/Sept 2018)

Urban Rail in Nanjing

The Nanjing Metro has grown rapidly in recent years. As recently as 2014 the system totalled only 85km, but with new line openings, the system now boasts 10 lines and runs to 368.4km (196.3km underground). Most of this growth is, however, in the suburban/regional form of Metro – indeed, Nanjing is the most prominent exponent of this model in China, and now has five lines branded as ‘S’, covering over half of the entire network length. Yet to complicate things, some of the S lines could qualify as full metro services in terms of urban-ness, service intensity and station style (especially S3).

Urban Metro

In the main urban area, the system is centred on a two line ‘north-south’ alignment through the central area, and two significant east-west lines running below important commercial corridors. There is also an adjunct line (10) in the west. Thus, the central area is well served by a selection of lines and stations, all well located at main junctions, with predominant entrances and integration into shopping complexes and underground passageways. This 5 Line network of 172.2km runs mainly underground (142.9km).

Line 1 is 38.9km (23.0km underground) and, unlike other lines which run from 0600-2300, this line has a 0530 start with 3/4min base headways and a journey takes 60mins. This is the main north-south line connecting both Nanjing and Nanjing South Railway Stations with the main commercial areas such of Xinjiekou and Zhonghuamen. Line 1 also has interchange with all lines except S8 and S9. At both north and south extremities, the line runs above ground, as well as the grade running section around the interesting two-island station of Andemen. Most trains run the entire length although 1 in 4 services use Hedengqiao as the southern terminus. **Line 2** is 36.9km (27.9km underground) and runs from the north east, then east-west along the main Zongshang East Road in the centre, to the new commercial district around Yuantoncun (where the 7.8km Hexi Tram operates). The line has transfer with all other full metro lines and operates 7/8min base headways, the entire journey taking 56mins. Most of the above ground sections lie in the north east where there are interesting views of newly developed parts of the city and the skyline of central Nanjing (from underground running to Maqun elevated station there is a significant gradient change). **Line 3** runs from Linchang in Pukou (where, at Taifenglu, it provides a transfer to the rather isolated S8 Line) and crosses the Yangtze. It compliments Line 1 as it heads south down the eastern part of central Nanjing, and connects the bus station, and both main railway stations. The 43.8km line runs has 8min base headways, taking 1h12 to travel the 29 stations, only 1 of which (Linchang), and a short 2.1km section, is above ground. As the newest addition to the Metro network, **Line 4** has a smarter, more stylised appearance with stations offering artistic interpretations, clean lines and interesting platform features, although all the main attributes of the wider system remain. The line runs east-west across the north of the city, calling at many of the main universities, and is 32.7km (31.2km underground). The journey takes 44mins, with base headways of 6mins. Every other eastbound service terminates at Dongliu, and so the reduced patronage toward Xianlinhu is adequately met with 5 services per hour. The final full metro line, **Line 10**, originated as a branch of Line 1 and was the first line to cross the Yangtze. The 21.2km line runs from

Andemen (with an interesting external escalator linking its underground station to the elevated Line 1 platforms) and heads west with a 2.1km elevated section giving access to stabling at Xiaohang, one of the more interesting stations on the line. Further west is Olympic Stadium station with its colourful atrium ticket hall and underground platform with only half screens. At Yuantong, the line offers transfer to Line 1 and also the Hexi Tram. The line has 8min base headways and the journey takes 34mins to complete.

Suburban Metro

Outside of the central area, the system maintains a dominant presence, thanks to its significant dispersion across the city-region through its network of five suburban metro lines that add significantly to the network (196.2km/53.4km underground) and act as an important feeder to the main system. This system is fully integrated and branded as Nanjing Metro and there is barrier free access at all transfer stations. The 'intensity' of the lines varies significantly, with S1 offering a hybrid urban/suburban run with important trip generating points as termini, whilst Line 8 firmly operates in the periphery as a suburban line serving outlying new towns. The two newest additions to the system (S3 and S9) are extreme opposites. S3 operates within the urban area east of the Yangtze with a large number of standard underground stations, and high service intensity (8min headways – most services terminate at Liucun - this could easily be considered a full metro line), whilst S7 and S9 are more regional lines serving peripheral townships (Gaochun (S9) is 90km from Nanjing Centre!) with 12/15min headways – a far cry from the intensive services of the urban metro lines in the urban area. The underground stations are similar to those of the full metro services, and the many elevated stations are modern and airy and have half screens and standard facilities, as do the ticket halls. Line S9 has smaller and, being new, brightly coloured platform walls and interesting canopies above the platforms.

Line S1 is 34.2km (16.2km underground) and has 8 stations (5 underground). The line runs 10min headways and links Nanjing South Station (main CRH station) with Lukou International Airport, with its huge atrium at the station entrance, and beyond to the terminal station of Konggangxinchengjiangning. There are significant distances between stations and speeds are high, with the line taking only 34min to complete the journey. This is a very busy route and well used, as is **Line S3 which** serves the south western suburbs with new and beautiful underground stations, before crossing the Yangtze on the Dashengguan Bridge. It is the first line in Nanjing to have passing tracks at select stations, allowing from some express services to the outer area, although currently most services terminate at Liucun. The full 35.7km trip (14.1km underground) takes 49mins. **Line S7** is the newest line on the entire network with 9 stations and a 28.9km revenue run – services operating 12min base headways with 4 car sets. The line has cross platform transfer with Line S1 at Konggangxinchengjiangning with services on both lines dovetailing. After a short underground section the service becomes elevated for 21.2km, running through semi-rural areas, before returning underground again at Lishu. Underground stations are of standard Chinese arrangement, whilst the elevated stations have island platforms (for 4 car trains) and lovely twin arched roofs. **Line S8** is a peripheral line in the north west of the city operating over 43.6km from Taishanxincun to Jiniuhu on mainly elevated sections (11.3km underground/6 stations). The line is isolated from the bulk of the network and there is a hollow feel to the line in many ways. This is borne out by the 15min headways that operate from Taishanxincun to Fangzhouguangchang (36mins) where only every other train

continues to the Jinniuhu terminus, this bi-hourly service, taking an additional 14mins. The 51.7km **Line S9** connects with Line S1 at Xiangyuluyunan (two inner tracks of the 2 Island station). After a complex flying junction, the line has a 1.7km underground stretch under the airport and then is elevated through remote communities, with views of the villages and mountains. The highlight is the 7min journey across Shilu Lake where the railway is flanked on both sides by a new road. This is a speedy and smooth ride with interesting and different stations, but certainly not urban.

Stock on the Nanjing Metro is constructed locally at the CRRC Nanjing Puzhen Rolling Stock Works, which supplies automated carriage doors for most metros in China. The standard 6 carriage sets have a streamlined frontage with two unequally spaced windows and are operated with a colour-coded front plate and thick band down the side of the train. The interior has colour coded side seating of plastic bucket style and electronic strip maps/on-train schematics, like audio information, is bi-lingual. The older stock is understandably shabbier than trains on the newer lines but there is uniformity in style across the network, with the exception of Line S9 stock which operates 3 car sets and is of different style with only a single window at the front and a bright yellow livery. The interior is also bright yellow with paired seating.

Using the system is straight forward. Station entrance halls host banks of ticket machines (fares are distance based with values from 2-10 Yuan-small RFID blue token), security scans, customer service offices and ticket barriers. Ticket machines accept notes and coins although these can be quite temperamental with bank notes and at important stations the queues for the machines can be long. The underground platforms are mostly island platforms with full screens, whilst elevated platforms are a mix of island/side platforms with half screens. All entrances halls and platforms have good quality wayfinding (transfer is very well signed), RTI and wall mounted information boards including large versions of a beautiful geographic map (Chinese only) with insets for the peripheral S lines, and the new schematic. Although the maps has lost some of their original style as the system has expanded with flailing lines, this twin map display is delicately lit and located within a tasteful chrome housing - it is the most stylish mappage display in China. In addition, most stations have a supply of a booklets about the Metro (Chinese only) with a different schematic version.

In **summary**, as one of the older systems in China, it has held up well. With staggered expansion the system has managed to maintain, and even advance uniformity. Coverage is great and there are many quirky parts of the system that add to its enjoyment. The Nanjing Metro is now up there with those interesting, larger systems in East Asia.

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