

# MRT Routes Under Construction

Parts of the Taipei MRT network under construction include the Xinzhuang Depot, Songshan line, Circular line Phase I, Taiwan Taoyuan International Airport line, and Tucheng extension to Dingpu.

## Xinzhuang Depot

Work completed on the Xinzhuang Depot (of the Xinzhuang line) includes mountain tunnel excavation, 161kV cable ducts, anchor frame beams in slope works, bulk supply substation, No. 1 and No. 2 facility substations, propulsion power substation, maintenance workshop main structure, an overpass connecting new and old areas of Lo-Sheng Sanatorium, and waste water treatment plants.

Work underway on the extension section that leads to the depot includes cut-and-cover tunnel structure, mountain tunnel lining, and maintenance workshop structure and decoration.



Construction of the extension section tunnel top deck    Completed maintenance workshop steel frame

## Songshan Line



捷運松山線路線示意圖

The Songshan line runs north from the Nangang line's Ximen Station along Zhonghua Rd. to Tacheng St., northeast to Tianshui Rd. then turns east along Nanjing W. and E. roads sections 1-5. It then turns southeast onto Bade Rd. Sec. 4 before continuing east to end at the square north of Songshan Railway Station. Its 8.5-kilometer route encompasses eight underground stations, including Ximen Station.

A wide range of transfer stations makes the Songshan MRT line one of the most important routes of the entire Taipei MRT network. It connects with the Xindian line, allowing passengers to transfer to the Nangang, Tamsui, Zhonghe-Xinlu, and Wenhua lines at several stations. It also provides easy access between the MRT system and conventional rail via Songshan Station and its link to the Taiwan Taoyuan International Airport Access MRT System at Taipei Main Station. When completed, the line will disperse large numbers of passengers that converge on transfer stations such as Taipei Main Station, Zhongxiao Xinheng Station, and Zhongxiao Fuxing Station and will alleviate the traffic burden on the east-west Nangang line. It will provide convenient and punctual public transportation to Songshan Railway Station, Taipei City Sports Park, and the Nanjing E. Rd. commercial zone, reducing travel time needed to reach commercial zones in the Songshan area and along Nanjing E. Rd.

## 1. Electric Multiple Units (EMUs)

One of five subcontracts under the Xinyi/Songshan line E&M systems involved the purchase of the latest generation of EMUs for the Xinyi/Songshan line. DORTS bought a total of 24 trains, including 13 trains for the Xinyi line, 10 for the Songshan line, and an additional one for the Tucheng extension to Dingpu.



EMU exterior trademark and decoration



Ring handrails and tri-vertical poles



Passenger Information System

## 2. Circular Line Phase I

Taipei MRT has been developed as a downtown grid-shaped network that links main arteries then radiates outward along major transportation corridors. Plans are for the Circular line to connect with these radiating corridors into a circle network, thereby improving the network through more convenient transfers. Extending across Taipei and New Taipei City, the Circular line, which is 34.8 km in length with 31 stations and two

depots, is being built in two phases. The first phase, which is 15.4 km in length and consists of a 1.2-kilometer underground section and 14.2-kilometer elevated section, is under construction. It starts from Dapinglin Station, passes through Xindian, Zhonghe, and Banqiao then ends at New Taipei Industrial Park Station in Xinzhuang. The route includes 14 stations: Dapinglin (Y6), Shisizhang (Y7), Xiulang Bridge (Y8), Jingping (Y9), Jingan (Y10), Zhonghe (Y11), Qiaohe (Y12), Zhongyuan (Y13), Banxin (Y14), Banqiao (Y15), Xinpu Minsheng (Y16), Touqianzhuang (Y17), Xingfu (Y18), and New Taipei Industrial Park (Y19), along with South Depot, which is located at Shisizhang.

The Circular line will integrate with the grid-shaped network that covers downtown Taipei and other major radial transportation corridors. In the future, through the integration of E&M and ticketing systems, the route will connect to MRT lines that are already in commercial service and other planned routes to form a comprehensive network. Clockwise from Taipei Zoo Station, it will connect with the following lines: the Wenhua line, Xindian line, Ankeng line (under planning), North-South line (under planning), Zhonghe line, Wanda-Zhonghe-Shulin line, Banqiao line, Xinzhuang line, Taiwan Taoyuan International Airport Access MRT System (hereinafter called Taiwan Taoyuan Airport MRT line), Luzhou line, Shezi line (under planning), Tamsui line, and Wenhua line. The integrated network is expected to connect nearly all corners of Taipei and New Taipei City, helping to enhance international competitiveness.



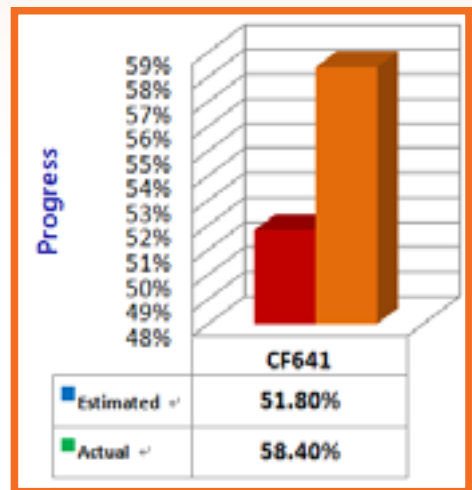
Construction status of each contract is described as follows:

### 1. Civil Works

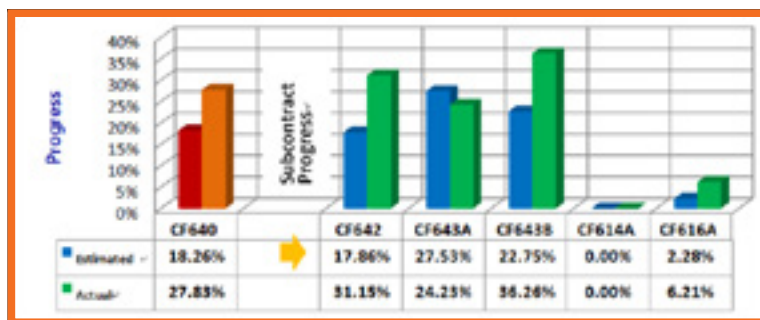
(1) Dapinglin Station: Construction of station structures was underway.

(2) Construction of South Depot and Shisizhang Station:

Construction of cut-and-cover diaphragm walls as well as foundation piles, foundation, piers and pier caps of the section's substructure (including cross-river areas) along with the prestressed beams and steel beams of the upper structure was underway.



Dapinglin Station construction progress



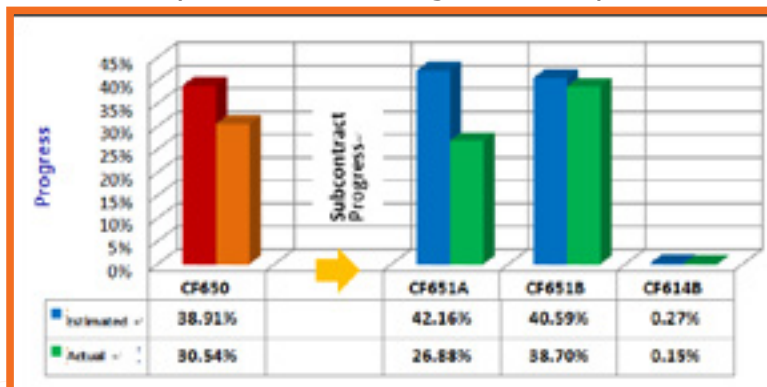
South Depot construction progress



Construction of foundation decks at the South Depot fan-shaped track area

(3) Construction from Xiulang Bridge Station to Banxin Station:

Construction of the foundation piles, foundation, piers and pier caps of the substructure as well as the prestressed piers and steel beams of the upper structure was underway. Construction of land development building basement structures was completed, and the ground level structure of part of the buildings was completed.



Progress of construction from Xiulang Bridge Station to Banxin Station



A viaduct beside ramps leading to Yixia Bridge, Zhonghe on Provincial Highway No. 64

(4)Construction from Banqiao Station to Xinpu Minsheng Station:

The section was built as a viaduct with a 9-meter width for the double-track bridge and a 5-meter width for the single-track bridge.

I.As for civil works at Banqiao Station (Y15) and Xinpu Minsheng Station (Y15) (including land development buildings) and viaduct sections, construction of common ducts and foundation piles along Banxin Rd. was underway.

II.As for civil works of Banqiao Station (Y15) land development buildings, the temporary Banqiao Bus Station (located onsite) was handed over for operations on December 16, 2013, and demolition of old buildings at the original site was underway.

III.Planning was underway for the utilities and HVAC systems for Banqiao Station (Y15) and Xinpu Minsheng Station (Y16) (including land development buildings) and viaduct sections.

IV.Installation of elevators/escalators at Banqiao Station (Y15) and Xinpu Minsheng Station (Y16) was underway.

(5)Construction from Touqianzhuang Station to New Taipei Industrial Park Station:

Primary work underway in 2013 included a temporary bridge and working platform for the Dahan River section construction, foundation piles, and foundation excavation and supporting on the viaduct section, station exit/entrance diaphragm walls, station exit/entrance excavation and supporting, and new dewatering culverts.



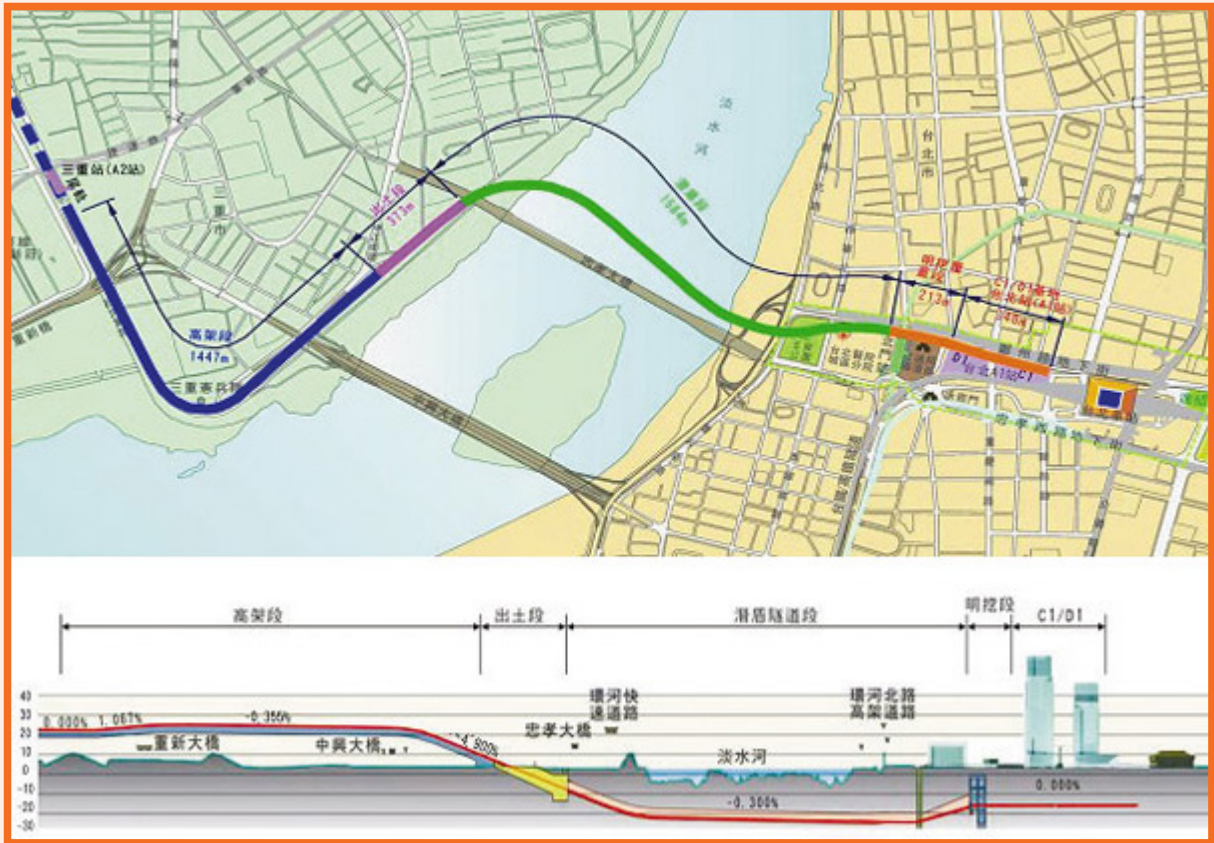
Building a temporary bridge and working platform for the Dahan River section construction

## 2. Sanchong-Taipei Section of the Taiwan Taoyuan International Airport Access MRT System

Construction of the Taipei City section of the Taiwan Taoyuan International Airport Access MRT System (hereinafter called Taiwan Taoyuan Airport MRT line) will start from the temporary tail track located at the south of Sanchong Station (A2) then run alongside Sanchong Dike. It will go underground after passing over Zhongxing Bridge, follow a shield tunnel beneath Zhongxiao Bridge then turn north, passing beneath the Tamsui River and continuing along both sides of the dike. After entering Taipei, it will run along the south side of Civic Blvd., pass underneath Yucheng Park and Xining N. Rd. then run east along the temporary reserve to the west of Parcel D1. It will then intersect with the MRT Songshan line's Beimen Station and end at the MRT section of Taipei Main Station (A1), located on Taipei Main Station District Parcel C1 and the east part of D1, west of the Taiwan Railways section of Taipei Main Station. It will terminate on the third basement level of Taipei Main Station.

The MRT section of Taipei Main Station sits on Taipei Main Station District Parcel C1 and the east part of D1, west of the Taiwan Railways section of Taipei Main Station. The site faces Civic Blvd. to the north, a planned 15-meter-wide road to the south, the west section of Parcel D1 to the west (bordered by Yanping N. Rd.) and the west side of the Taipei Main Station green belt to the east. Parcel C1 and the east part of D1 are

separated by Chongqing Rd. Parcel C1 covers an area of 13,078 m<sup>2</sup>, and the east part of Parcel D1 is 18,515 m<sup>2</sup>. Two commercial buildings will be built on Parcel C1 and the east part of D1 above Taipei Main Station: one a 243-meter-high, 56-story building on Parcel C1, and the other a 322-meter-high, 76-story building on the east part of Parcel D1.



Plane and longitudinal section view of the Sanchong-Taipei section of the Taiwan Taoyuan International Airport Line

### 3. Civil Works of the Taipei City Section from Sanchong Station to Taipei Main Station

The section of the Taiwan Taoyuan Airport MRT line that runs from Sanchong Station to Taipei Main Station is 3,617 m long. It includes a shield tunnel area that runs beneath the Tamsui River and is the first of its type in Taiwan to use the double-O-tube (DOT) shield tunneling method. Under close cooperation between DORTS' North District Project Office, contractor Da Cin Construction Corporation, and Japan-based Shimizu Corporation, excavation of the 1,585-meter-long tunnel began on December 2, 2009, and was completed on December 5, 2010. Work on the full section was completed on December 22, 2012.

The DOT construction method used in the shield tunnel section between Sanchong Station (A2) and Taipei Main Station (A1) was launched from the workshaft beneath Zhongxiao Bridge in Sanchong. It passes beneath the Huanhe Expressway viaduct foundation and through the riverbed and dikes on both sides of the Tamsui River before entering Taipei. It then runs beneath Yuquan Park, along the south side of Civic Blvd., and under Taipei Hospital Chengzhong Branch, before ending at the west side of the MRT Songshan line's Beimen Station. The 1,585-meter shield tunnel features a

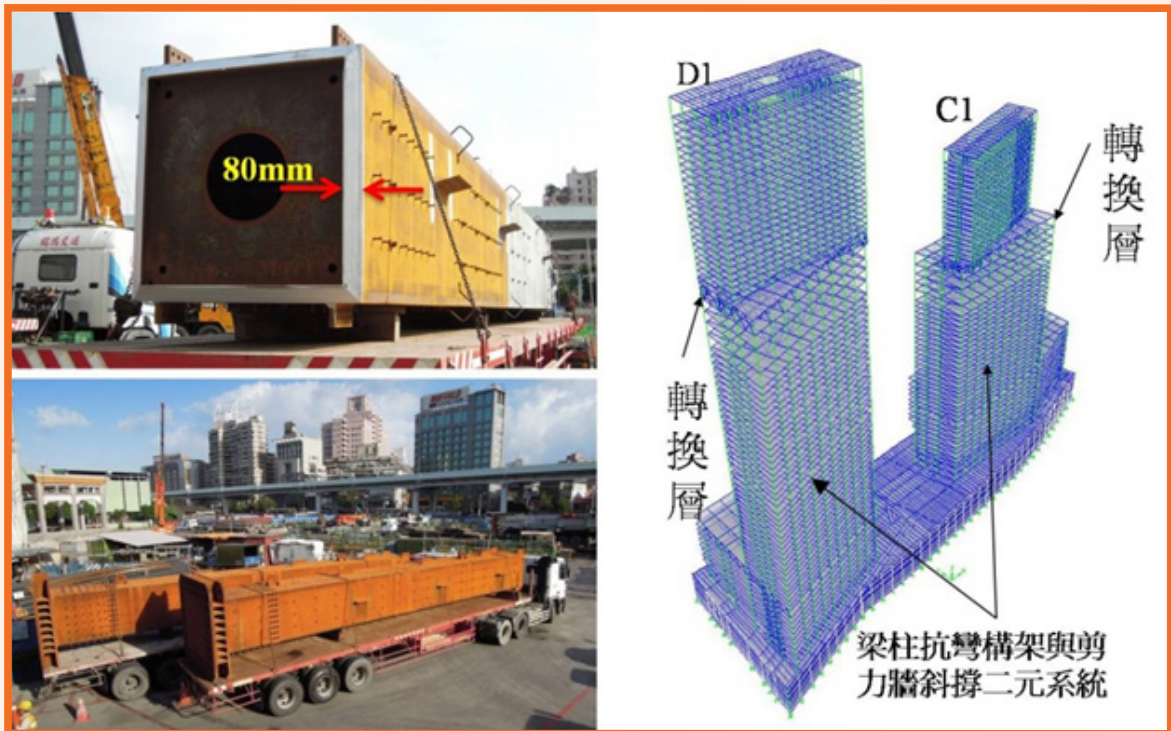
maximum gradient of -4.9% with external and inner diameter widths of 11.4 m and 5.6 m, respectively. Each ring, which is 30-centimeter thick and 1.2-meter long, consists of 11 pieces of precast concrete segments in four shapes, including eight pieces labeled shape "A" and one piece each of shapes "B," "C," and "D."

At the 2nd Distinguished Public Construction Awards, eight public constructions were recognized by judges. Civil works of the Taiwan Taoyuan Airport MRT line's Taipei City section, from Sanchong Station to Taipei Main Station, was the most outstanding winner. Of note was the pioneering adoption of the DOT method in shield tunnels passing across the riverbed of the Tamsui River. This contributed to a significant reduction in earth excavation, construction period, and risks. The award was presented to the DORTS construction team on August 22, 2013, by Taipei Mayor Hau Lung-bin.



Contract CA450A was a winner at the 2<sup>nd</sup> Distinguished Public Construction Awards

#### 4. Joint Construction of Civil Works for Taipei Main Station (A1) and JD Buildings on Taipei Main Station District Parcels C1 and D1



Ultra-high-strength special steel SM570 (M) was used for the construction of Taipei Main Station (A1)

Civil works of Taipei Main Station (A1) were launched on December 24, 2008. There are three subcontracts supervised by DORTS' North District Project Office that are related to civil and architectural works, utilities and HVAC systems on B1 and the ground level of Taipei Main Station: 1. Work on diaphragm walls and vegetation relocation at Parcel C1 and the east part of D1, 2. Taipei Main Station civil works, and 3. Taipei Main Station utilities and HVAC systems. Construction of escalators, elevators, and the moving walkway at Taipei Main Station was supervised by DORTS' Systemwide Electrical & Mechanical Project Office. Construction of Taipei Main Station was integrated with JD buildings above Parcel C1 and the east part of D1, with a 27-meter-deep excavation and 53-meter-deep diaphragm walls. B4 will be used as a car parking lot and the remaining three basement levels will primarily be used for the terminal station of the airport line. The station will include airline departure check-in counters and provide baggage check-in and boarding pass issuance for passengers bound for Taiwan Taoyuan International Airport, making it an extension of the airport. Civil works for the Taipei City section from Sanchong to Taipei Main Station were completed and handed over to the Bureau of High Speed Rail in May 2013 for follow-up.

### Tucheng Extension to Dingpu

The Tucheng extension to Dingpu starts from the west end of Yongning Station (excluded), runs west along Zhongyang Rd. sections 3 and 4, and ends at Dingpu Station. Built as a high-capacity underground system, the extension is 1.95 km in length with one station, one crossover section, and two shield tunneling sections. Shield tunnel excavation and station main structures were completed. Work on station decorations and exit/entrance structures was underway. The route is scheduled for completion at the end of 2014.



Assemblage of flood prevention cover plates at track input port

