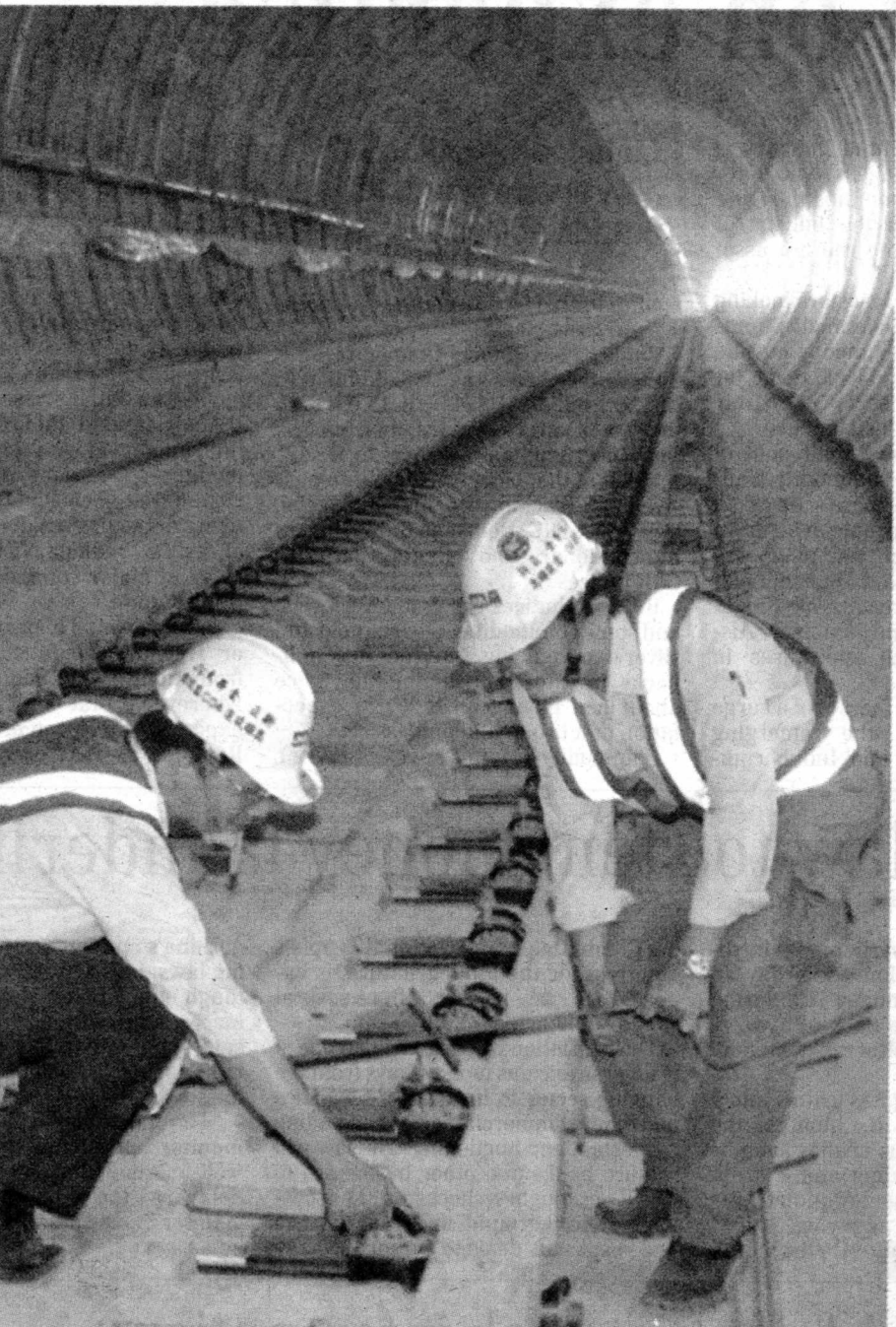
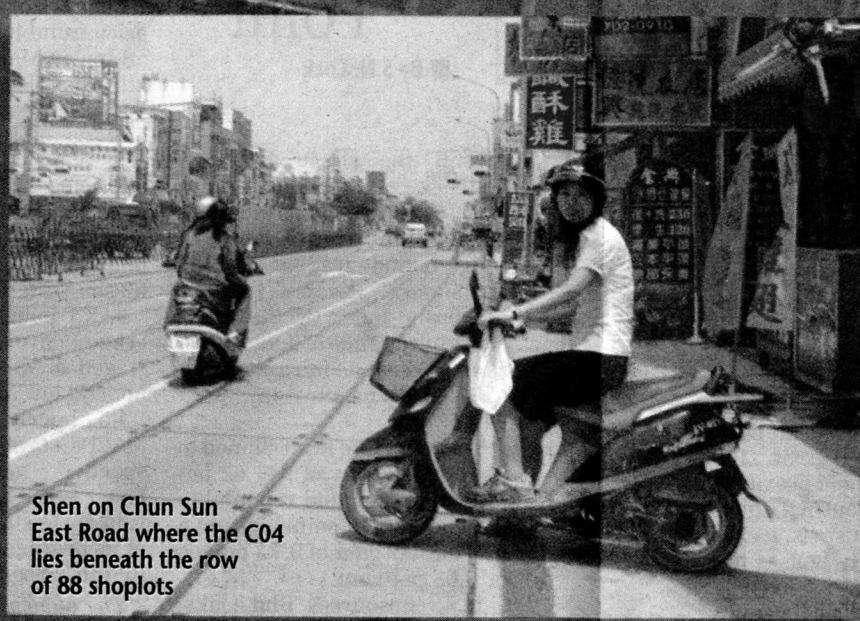
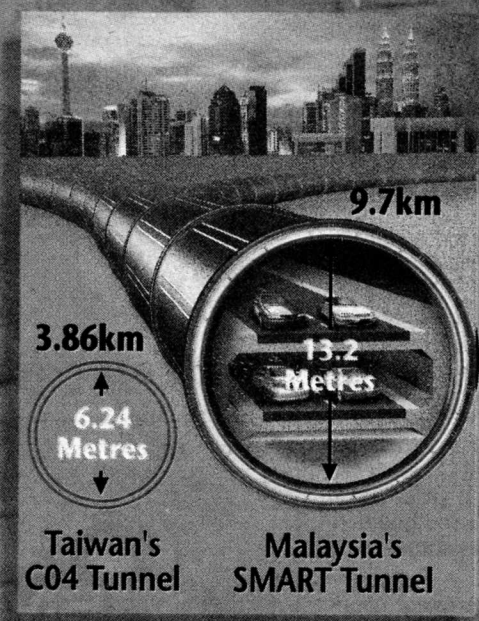
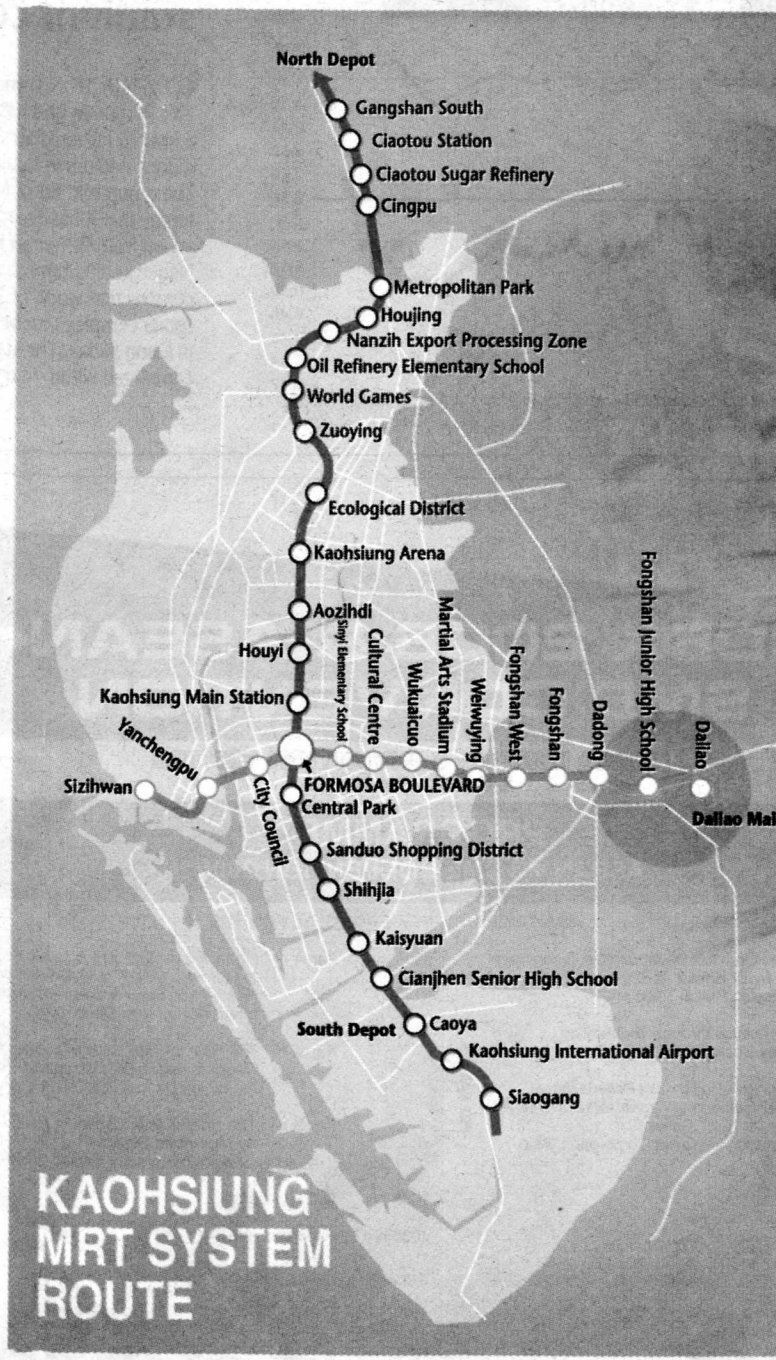


Digging tunnels in Taiwan: The story of GA



AS SOON as the traffic light turned green, Coco Shen Ching-Hui revved her scooter's accelerator and roared ahead.

The 29-year-old secretary joined the many scooter riders, who appear to outnumber carowners in the island nation of Taiwan, weaving their way through the heavy traffic.

As the roads of Kaohsiung become more congested, efforts to improve the city's public transportation have gained priority with the construction of a mass rapid transit (MRT) system, which is essentially a network of underground railway lines.

Made up of the north-south Red Line and the east-west Orange, the lines intersect in the city centre of Kaohsiung, Taiwan's second biggest city.

At the corner of Chun Sun East Road, Shen made a turn and parked her scooter on the five-foot way of a restaurant to buy lunch for her colleagues working at the Taiwan branch office of Malaysia's construction giant Gamuda Bhd.

below the spot where she has parked her scooter.

This is where the C04 stretch of the Kaohsiung MRT project is being built by Gamuda and its Taiwanese joint-venture partner, New Asia Construction & Development Corp, since October 2002.

The C04 stretch, valued at RM808.68 million, is one of 11 packages in the 43km alignment that has 37 stations.

Gamuda is building two parallel underground tunnels which are 3.86km long as well as underground stations, the Fengshan Junior High School and the four-level Dadung.

Last week, project manager Eric Foong Vooi Ling and finance manager Chung Tze Ye spoke with Business Times in the port-city of Kaohsiung.

They are two of the handful of Gamuda engineers seconded to Taiwan three-and-a-half years ago to manage construction of the C04 package.

"We're targeting to complete this project by July, five months ahead of schedule. So far,

“Dadung area is clustered with tall buildings. We had no choice but to construct the tunnels in a very narrow strip, one stacked on top of the other”

subcontractors to fit in the railway tracks, ventilation jet fans, escalator and lifts. The high-risk tunnelling works are over," Foong said.

Last month's completion of tunnelling works, using four tunnel-boring machines, marked a significant milestone in the project's progress.

While the Fengshan Junior High School station is sited only two levels underground, the Dadung station is four basement levels, or 30 metres, below ground. It is the deepest and the most difficult to construct in the entire MRT system.

"As a general rule, tunnels are usually constructed underneath main roads because we want to avoid disturbing the pilings of high-rise buildings and apartments. On parts where we need to go under the foundations and pilings of buildings, the tunnelling machines go deeper," he said.

"Dadung area is clustered with tall buildings. We had no choice but to construct the

"This means that the tunnels, which were running side by side in other packages, take a turn to run one on top of the other through a narrower corridor," Foong said.

He compared the engineering feats in constructing the two stations.

While the tunnels at the two-level Fengshan Junior High School station could be bored simultaneously, the tunnels at the four-level Dadung station were bored one at a time, starting with the bottom one.

"As we bore the bottom tunnel, we carry out extensive soil test and grout every inch of the way. That way, we harden and stabilise soil before we burrow the top tunnel. It's very important to take precautions every step of the way to prevent sink-holes," he said.

By being methodical and meticulous, Gamuda and New Asia has managed to stay ahead of their schedule, compared with other packages undertaken by other international contractors.

Back in Malaysia, Gamuda is also under-

A 9.7km flood water diversion tunnel which incorporates a 3km motorway is being created 25-30m underground in Kuala Lumpur.

Gamuda executive director Datuk Azmi Mat Nor, in explaining the structure which goes by the name of "SMART Tunnel", promises to relieve the city's flood woes and at the same time reduce traffic congestion.

"We're the first country in the world to construct a tunnel incorporating a double-decked highway as well as a trench at the bottom to drain away flood water," he said.

"The international tunnelling community are keeping a close watch on the engineering challenges of this project. Even documentary producer Discovery Channel flew over to film the step-by-step progress of this SMART Tunnel," he added.

With a diameter of 13.2 metres, or almost as tall as a four-storey building, the tunnel is bored underneath public roads and does not go beneath private property.

The SMART Tunnel, now 78 per cent com-