World's first 2-in-1 tunnel — SMART

The Kuala Lumpur Stormwater Management and Road Tunnel project (SMART), a dual-purpose tunnel that incorporates a double-decked highway and a big drain at its base, is 90 per cent complete and expected to be operational by March 2007. OOI TEE CHING delves into this civil engineering feat.

Azmi (left) briefing Keizrul on the progress of the dual-purpose tunnel. The project is expected to be the long-awaited solution to massive flooding and traffic woes on the key Sungei Besi roadway leading into the city centre.

Work on the world's first two-in-one RM1.93 billion Stormwater Management and Road Tunnel (SMART) is entering critical final phases.

And Kuala Lumpur's administrators eagerly wait to savour the long-awaited solution to massive flooding and traffic woes on the key Sungei Besi roadway leading into the city centre.

The SMART project is a vital component of the Klang Valley flood mitigation masterplan, which includes other measures such as the construction of holding ponds, dams and deepening of the Klang River.

"The SMART system will divert excess stormwater away from the upstream of Ampang and Klang rivers through the Kampung Berembang holding pond in Ampang, a bypass tunnel and a storage reservoir in Taman Desa before it is released back downstream of the Klang and Krayong rivers," Department of Irrigation and Drainage director general Datuk Keizrul Abdullah told Business Times.

The 6km highway is set to be accessible to traffic in March 2007, while the tunnel for flood drainage is expected to be ready by June 2007, he said.

The contractor, Syarikat Mengurus Air Banjir dan Terowong Sdn Bhd, is a 50-50 joint venture company between MMC Corp Bhd (MMC) and Gamuda Bhd.

Gamuda executive director Datuk Azmi Mat Nor says the project has helped develop homegrown expertise in tunneling.

In the early 2000s, Gamuda ventured into tunneling out of necessity when it built the linkage between Lebuhraya Damansara-Puchong (LDP) and Lebuhraya Sprint at Kampung Sungai Penchala in Petaling Jaya.

Azmi said the choices at the time was either to cut the hill slopes to build the road or tunnel through the hill. Feasibility studies showed the loss of primary jungle from cutting hill slopes would have been 20 times more than digging through the mountain.

"Coupled with the fact that tunneling was the fastest construction method, it was 5.5km of 'drill & blast' through the Kampung Sungai Penchala mountain," he said in an interview.

In October 2002, Gamuda got acquainted with Tunnel Boring Machine (TBM) technology when it took on the job to design and construct a 4.8km underground tunnel including two underground stations in Taiwan. TBMs are like giant moles that burrow into the ground.

From using the three-metre diameter TBMs for the Kaohsiung mass rapid transit (MRT) system, Gamuda went a step further in Malaysia by using 13-metre diameter TBMs for the SMART project.

These "giant moles" were recently featured on Discovery Channel's "Extreme Engineering" programme.

In March 2006, the contractors, Gamuda and MMC Corp, sponsored the "International Conference and Exhibition on Tunneling and Trenchless Technology in the 21st Century".

Held in Kuala Lumpur, the seminar saw 200 tunneling experts fly in from around the world to see for themselves the construction progress of the SMART project.

The Government is financing two-thirds or RM1.31 billion of the project through a deferred payment scheme involving the Employees Provident Fund (EPF). The Government is expected to repay the EPF in five instalments from the middle of next year.

The remaining RM620.7 million project cost is equally funded through equities of SMART's parent companies and loan from Bank Pembangunan Bhd.

The Department of Irrigation and Drainage (DID) Malaysia and the Malaysian Highway Authority are supervising the dual-purpose tunnel project.

Engineers at SMART check every stage of a project themselves despite engaging consultants. "Even when consultants and sub-contractors are brought in, we do not rely completely on them," Azmi said.

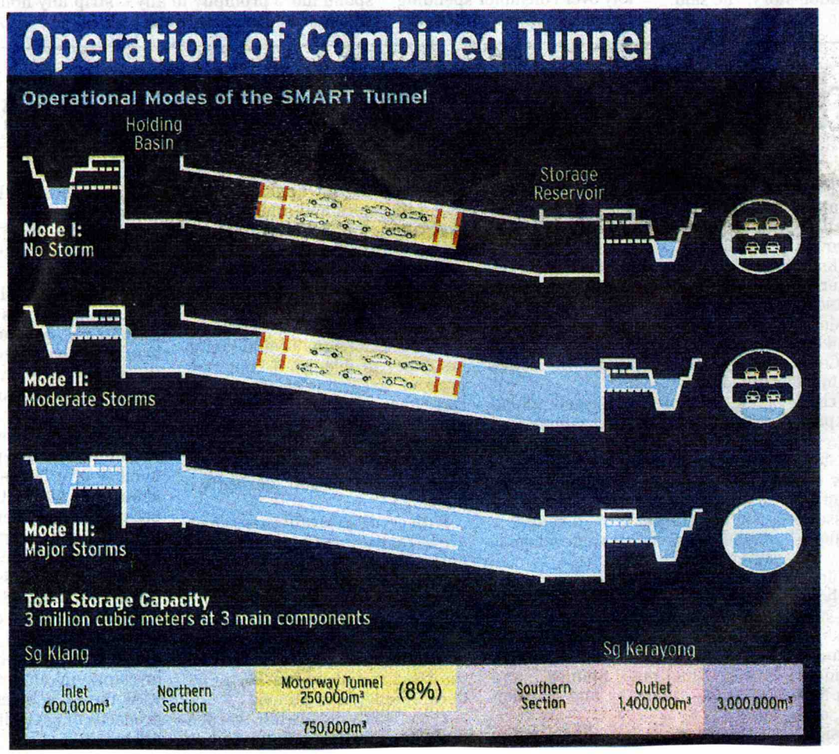
"When jobs are taken on, we expect our people to troubleshoot and follow through with solutions that save time and money," the executive director added.

Azmi said one of the advantages of massive infrastructure jobs, such as the SMART project, is how they benefit a wide range of businesses and professions within the construction community.

"There are immense spin-offs. We estimate that the electricity needed in powering the Tunnel Boring Machines will come up to RM35 million throughout the construction period. So far, we're one of Tenaga Nasional Bhd's biggest clients in Kuala Lumpur," he said.

Azmi said the SMART project is also engaging 1,800 sub-contractors, 100 construction material suppliers and 10 consultants. Overall, there are close to a thousand people involved in the construction process.

Engineering consultant Sepakat Setia Perunding Sdn Bhd and Mott MacDonald (Malaysia) Sdn Bhd were engaged to design and supervise the tunneling project. Also, second board-listed Industronics Bhd is installing a fully-automated and computerised flood monitoring system.



SMART

- The monitoring system of the catchment area pre-warns the occurence of floods. Under normal condition where there is no storm or low rainfall, no floodwater will be delivered into the system (Mode I)
- During moderate storms, the SMART system will be activated and floodwater is diverted into the bypass tunnel in the lower channel of the motorway. Up to this stage, the motorway section is still open to traffic (Mode II).
- During major storms, Mode III is activated and the motorway will be closed to traffic. Sufficient time will be allocated to allow the last vehicle to exit the motorway before the automated watertight gates are opened for floodwater to pass through. In this event, the full cross section of the tunnel is available for water storage and diversion. The motorway will be re-opened to traffic within 48 hours after closure.