



# Hong Kong West Drainage Tunnel Newsletter Issue 6 January 2011

**Together We Build the Drainage Tunnel  
Together We Alleviate Flooding**

To alleviate the flooding problem of Northern Hong Kong Island, we are constructing a drainage tunnel of about 11km long and 34 intakes to intercept stormwater and discharge it directly to sea. For details, please visit the Project website [www.dsd.gov.hk/HKWDT](http://www.dsd.gov.hk/HKWDT).

## Completion of 4km Long East Tunnel

The construction of Hong Kong West Drainage Tunnel reached an important milestone in October 2010. With deployment of "Nuwa", the second largest hard rock Tunnel Boring Machine (TBM) in Hong Kong, the construction of the 4km long eastern drainage tunnel section between Tai Hang and Wan Chai Gap was successfully completed on 7 October 2010. The rock excavated can fill up 77 standard swimming pools.

"Nuwa" began her excavation work in early June 2009 and has overcome many formidable challenges. One of the challenges was passing through 3 highly water permeable fault zones. To prevent excessive ground water from flowing into the tunnel before "Nuwa" boring ahead, we need to inject grout to properly fill up rock fissures.

Another challenge for "Nuwa" was to drill over the Aberdeen Tunnel which is located at a distance of only several metres away from our drainage tunnel. Therefore, any alignment deviation of the tunnel boring works may affect the Aberdeen Tunnel. To overcome this challenge, "Nuwa" has been equipped with a sophisticated computer system which can accurately control the tunnel alignment, with a deviation of less than 5cm. Besides, we kept monitoring the structure of the Aberdeen Tunnel throughout the tunneling operation to ensure the Aberdeen Tunnel would not be affected.

Despite numerous difficulties encountered, "Nuwa" completed the tunneling mission on time with minimal impacts on the surrounding environment. "Nuwa" has completed her task, and will soon be removed from site.



Bye  
Bye

A sophisticated computer system



TBM operations were closely monitored inside the computerized Control Centre



Monitoring works conducted at Aberdeen Tunnel



## Progress updates



The construction works at Intake SM1 are conducted smoothly

### Breakthrough of the Main Tunnel

In addition to completing the East Tunnel, 95% of the West Tunnel has been completed. Breakthrough of the whole 11 km long tunnel is expected in early 2011.

### Intake construction

Construction of all intakes is in full swing. 90% of the intake SM1 construction at Smithfield has been completed.

### Adit excavation

Adit excavation works by drill and blast method are in progress. Excavation works for 9 adits, including E7, THR2, GL1, TP4, TP5, TP789, M3, MB16 and MBD2 have already been completed.

# Dropshaft Excavation by Raise Boring Machine

Dropshafts are built to convey the stormwater collected by the intakes to the adits and drainage tunnel. The maximum depth of the dropshafts is about 170m below ground which is approximately equivalent to the height of a 56-storey building. The dropshaft construction is therefore a great challenge to the Project team.

To minimize construction nuisance, most of the dropshafts will be excavated by using the Raise Boring Machine (RBM). Four raise boring machines have been delivered from Australia to Hong Kong for this Project. It is the first Project in Hong Kong where the RBM is extensively adopted.

Raise Boring Machine (RBM)	
Manufacturing Country	Australia
Weight	20-tonnes
Height	5.5m
Reamer Diameter	2.44m - 3.05m
Pulling Force	500 tonnes



Before the dropshaft excavation, we will install a reamer at the end of the adits, which is the bottom of the dropshaft. The reamer will then bore upwards to the ground surface and excavate the dropshaft along the way. The dust and noise nuisance can therefore be confined underground.

RBM was firstly used to excavate the dropshaft of the Intake at Mount Butler Road (Intake No. MB16) in July 2010. The excavation works was satisfactorily completed within a month with a maximum rate of about 8m a day. As at end December 2010, 3 dropshafts have been excavated by using RBM.



The reamer will bore upward to the ground surface and excavate the shaft along the way.

5



The reamer bores through the ground surface.

6



A pilot drill hole with smaller diameter is drilled down to the adit.

1



The large reamer is being transported from the main tunnel to the bottom of dropshaft.

2



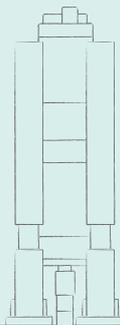
Workers install the reamer.

3



The reamer is installed to the rod.

4



MAIN TUNNEL

ADIT

# Safety First

Site safety is our prime concern during implementation of construction projects. As this Project involves extensive underground tunneling and blasting works, safe working method and adequate safety provisions are of paramount importance.

For safety, electronic access control system installed at the tunnel entrance to record the entry and exit of workers.



## Safety Provisions inside the Tunnels

In the planning stage, we liaised with Fire Services Department and Labour Department to discuss detailed tunneling and blasting arrangements. The necessary safety requirements, such as provision of communication system and refuge chamber inside the tunnels, were incorporated into the tunnel contract.

## Communication System



Mobile phone network for normal communication



Emergency Route inside the tunnel



Lined telephone at each 90m along tunnel



A designated FSD radio communication system inside tunnel



Local telephone network inside TBM

## Refuge Chamber



Refuge Chamber



Oxygen candle



Carbon Monoxide Scrubber



Inside the Refuge Chamber

During the construction stage, Labour Department frequently inspects our sites to ensure the works are carried out safely and in compliance with the safety legislations. Fire Services Department also visits our site from time to time to familiarize themselves with the latest site conditions.

## Fire Drill

To enhance the rescue operation in the event of emergency inside the tunnels, the contractor establishes close contact with the Fire Services Department and carries out fire drills jointly. Training has also been provided to the firemen for controlling the locomotives inside the tunnels.



Fire drill inside the tunnel



Man car for evacuation



Firemen taking man car to the tunnel

# We Care We Connect

- Across:
1. Stormwater
  2. Adit
  3. Flooding
  4. Raise Boring Machine
- Down:
5. Tai Hang
  6. Dropshaft
  7. Stilling Chamber
  8. Eleven
1. Precast Segment
- e. Nuwa
  - f. Cyberport
  - g. Reamer
  - c. Tunnel Boring Machine
  - h. Intake
- a. Drill and Blast
  - b. Oshin
  - d. DSD

## Reaching Out to Community

With the commencement of intake construction, we maintain close contact and communication with representatives from property management offices, schools and residents in the vicinity of intake construction sites.



A talk on the Project at Singapore International School.



Meeting with Hong Kong Japanese School.



## Community Involvement

The Project contractor, Dragages-Nishimatsu Joint Venture, sponsored the Annual Fun Day held by Marymount Secondary School and Marymount Primary School in July 2010.

## Site Visit

The Hong Kong West Drainage Tunnel Project attracts large number of local and overseas' visitors. Students from Swiss Federal Institute of Technology visited Western Portal at Cyberport on 11 September 2010.



## Cross-Word Puzzle *Let's try to see how much you know about this project!*

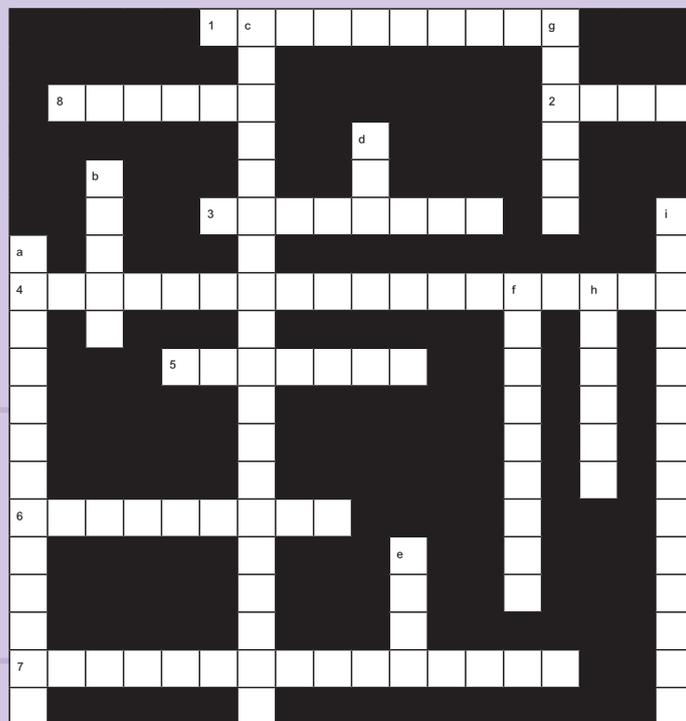
### Across

1. What does the Hong Kong West Drainage Tunnel collect?
2. The structure connecting the dropshaft and main drainage tunnel.
3. What problem does the Hong Kong West Drainage Tunnel alleviate?
4. The machine for excavating dropshafts from bottom upwards.
5. Location of the Eastern Portal.
6. The vertical underground structure which conveys stormwater to tunnel.
7. The structure at the bottom of the dropshaft.
8. Length of the main tunnel in kilometer.

### Down

- a. The method for excavating adits.
- b. The name of the Western Tunnel Boring Machine.
- c. The machine for excavating main drainage tunnel.
- d. The abbreviation of the government department which undertaking this project.
- e. The name of the Eastern Tunnel Boring Machine.
- f. Location of the Western Portal.
- g. One of the important parts of Raise Boring Machine for boring upward to the ground and excavate the dropshaft.
- h. The structure for collecting stormwater.
- i. The structure to provide permanent support and smooth surface to the tunnel.

Look for hints on [www.dsd.gov.hk/HKWDT](http://www.dsd.gov.hk/HKWDT)



## Key Facts

The Employer	: Drainage Services Department
Consultant	: Ove Arup & Partners Hong Kong Ltd.
Contractor	: Dragages - Nishimatsu Joint Venture
Project Commencement Date	: November 2007
Anticipated Completion Date	: 2012

## Contact Us

We value your views on the Project. Please feel free to contact us.

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