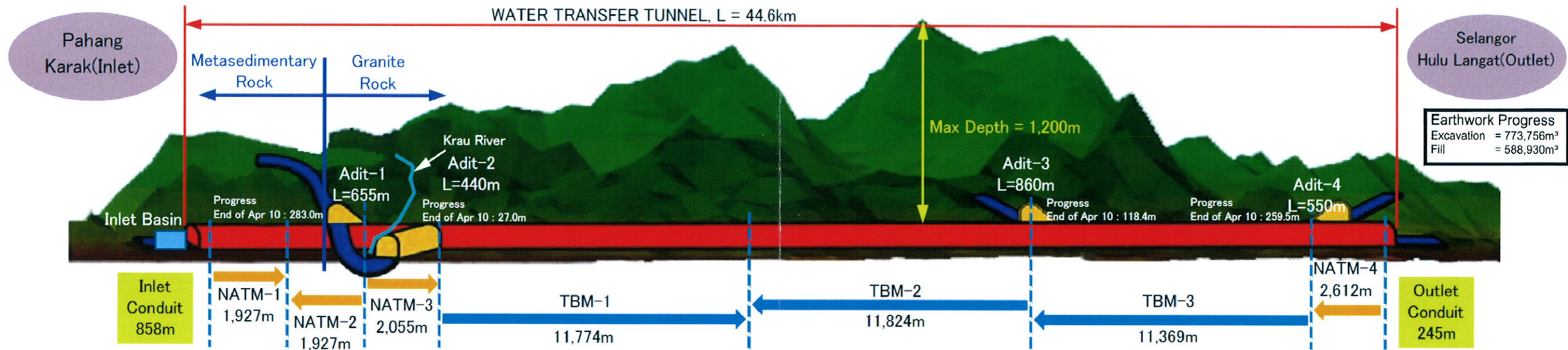




Pahang – Selangor Raw Water Transfer Project

Lot 1-1 Water Transfer Tunnel and Related Works

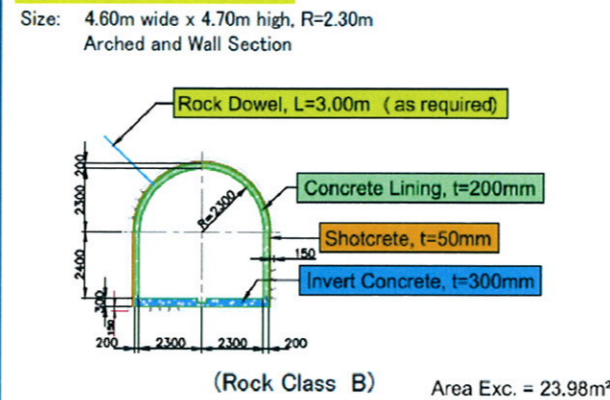
Shimizu - Nishimatsu - UEMB - IJM
JOINT VENTURE



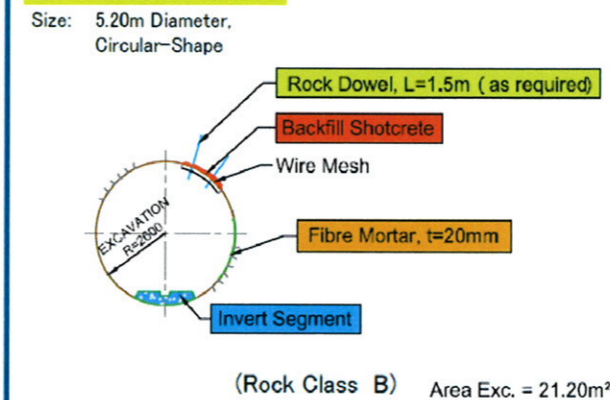
The Objective of the Project

Malaysia has experienced high economic growth from 1980's onwards which has resulted in high demands for water for commercial and industrial development centres. The Selangor/Kuala Lumpur region is the most important focus of high water demand. The water demand in this region is expected to grow at a high rate. The objective of the Project is to construct a tunnel to convey raw water from Pahang State to ensure that there is sufficient water available from Selangor State, Kuala Lumpur and Negeri Sembilan State. Design Discharge of Water Transfer Tunnel is 27.6m³/sec.

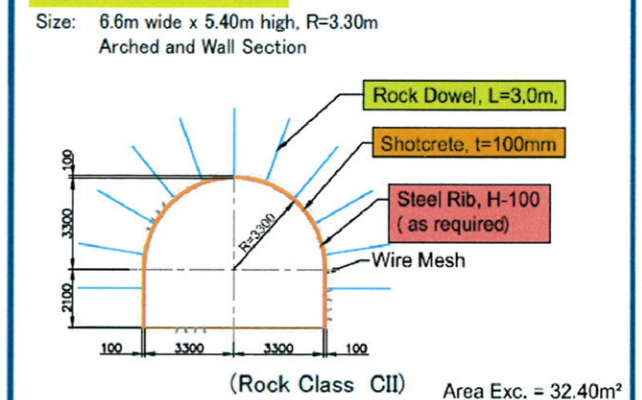
Typical Section of NATM



Typical Section of TBM



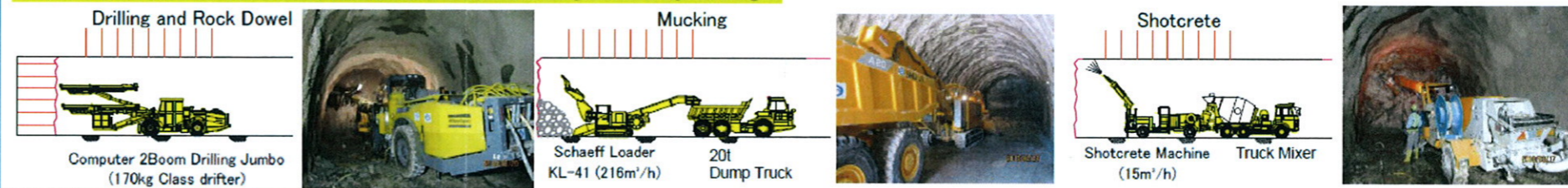
Typical Section of Adit



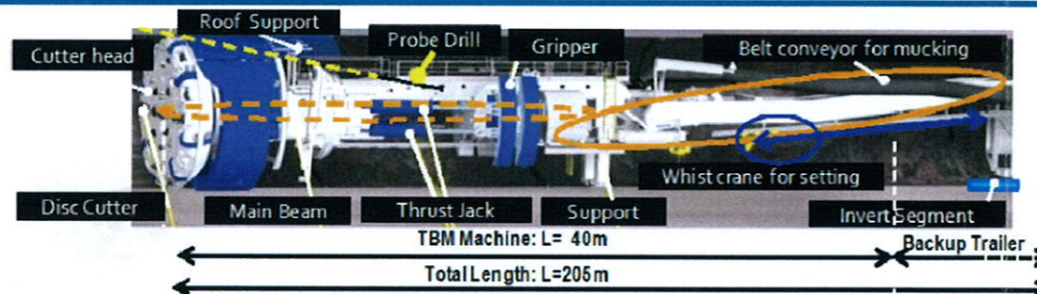
Project Detail

Employer: Ministry of Energy, Green Technology and Water, Malaysia (KeTTHA)
Engineer: TEPSCO(JPN) – SMEC(AUS) – SMHB
Contractor: Shimizu – Nishimatsu – UEMB – IJM Joint Venture
Duration: 1st June 2009 – 30th May 2014 (1,825 days)

Tunnel Excavation Procedure for NATM (New Austrian Tunnelling Method) by Blasting



Tunnel Boring Machine (Mechanical Method)



Diameter	5,2m
Type	Open type TBM
Max. Stroke	1.8m
Cutting Power	7x315kW = 2,205kW
Max.Thrust Force	14,000kN
Numbers of Cutter Discs	19inch 27 nos, 17inch 8 nos

Max. Cutter Load	312kN (19inch)
Torque (Maximum)	3,504kN·m (at 6 rpm)
Cutterhead Rotation Speed	0 ~ 12 rpm
TBM Machine	Length=40m, Weight=250ton
Machine (Include Backup Trailer)	Length=205m, Weight=420ton
Belt Conveyor	895 m ³ /h (914mm Width)