Japanese Construction Technology

to be utilized for

Construction Projects in Thailand and Neighboring Countries

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17 September 2015
We wish that the flood damage situation in Ibaraki, Tochigi and Miyagi prefectures, will be recovered the soonest.

Kinukawa river in Joso, Ibaraki prefecture broke its bank. Shibui river in Miyagi prefecture overflowed its banks to inundate the agricultural areas. The 50-yr return period rainfall made the statistics of the 500 mm/day and 600 mm/3 days by Tropical Storm, Etau. More than 410,000 people has to be evacuated, 3 were dead, 26 are missing and 8 are seriously injured and 19 are injured.
1. Tunneling Projects

- *Existing Projects* need Maintenance & Repairing Technology
- *On-going and Potential Projects* need Construction Technology

2. Earthwork and Soil Improvement Projects
Japanese Technology : 17 September Session

Construction Technology

- **F-navi Shield: Front-Navigation Shield Technology** *(SHIMIZU CORPORATION)*

- **SR-JP Method: Shield Roof Pre-supporting System for Junction as a Permanent structure** *(SHIMIZU CORPORATION)*

Maintenance & Repairing Technology

- **Infrastructure Survey by using High-speed Mobile 3D Mapping Technology** *(PCKK)*
Water Diversion Project: Kok-Ing-Nan

In the year 1998, Japanese Government by JICA was interested in this project and sent the Japanese experts to study this project in parallel with the Thai team. Both teams finished their study in the year 1999.

Kok-Ing (56.7 km)
- Open Channel: width 15 m. depth 3.85 m. length 41.32 km
- Horse Shoe Shape Tunnel: Diameter 8.70 m. length 6.93 km
- Expanded Horse Shoe Shape Tunnel: Width 10 m. Height 7.50 m. Length 8.45 km
- Maximum Capacity 140 cu.m/sec

Ing – Yod (Nan) (67 km):
- Open Channel width 20 m. depth 3.80 m. Length 2.20 km.
- Horse shoe shape Tunnel: Diameter 9.5 m. and Length : 9.64 km.
- Expanded Horse shoe Tunnel: Diameter Width 11 m. Height : 8.175 m. Total length 52.88 km.
- Maximum Capacity 175 m³ / second
Water Diversion Projects in the Northeast: Pakchom - Ubolrat

Nam Ngum-Huai Luang
Nong Han – Lam Pao
2500 million cu.m/year

Khong-Loei – Chi-Mun
1200 cu.m/second
10 million rai

Diversion Tunnel for Pakchom – Ubolrat is divided into 2 alignments:
1. Kong Esarn Diversion: 56-72 km.
Highlight Projects: Geotechnical & Tunnel Engineering

Flood Drainage Tunnel in Bangkok

1. Rehabilitation Survey of 5 old Tunnels (20-30 years) Total length = 10 km.

2. Existing (Length : 19 km)

3. Under Construction
   - 3.1 Bang Sue: 6.4 km.
   - 3.2 Nong Bon: 9.4 km.

4. Bang Bua: 13.5 km. (Potential)
Prayaratchamontree Tunnel: diameter 6.5 m, length 9 km
Taweewatana Tunnel: diameter 3.5 m, length 2 km. (Second Phase: 16 km.)
Rama IX drainage tunnel, draining water from Klong Sanseab and Klong Ladprao to Chaopraya River with total length of 5,123 m.

**Intake Structure:** Shaft diameter of 15 m. with 60 cms capacity

**Tunnel:** Tunnel diameter of 5 m and 275 mm thick of reinforced concrete segments

**Pump Station:** 4 pumps with total capacity of 60 cms.
### High Speed Rail: Bangkok - Chiangmai

The table below summarizes the key details of the high-speed rail project from Bangkok to Chiangmai:

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Total Distance Bangkok-Chiangmai</td>
<td>km.</td>
<td>669</td>
</tr>
<tr>
<td>2 Travel time Bangkok-Chiangmai</td>
<td>hour</td>
<td>3.14</td>
</tr>
<tr>
<td>3 Station</td>
<td>Station</td>
<td>12</td>
</tr>
<tr>
<td>4 Estimated Passengers</td>
<td>person/day</td>
<td>34,700</td>
</tr>
<tr>
<td>5 Tunnel Length</td>
<td>km</td>
<td>65</td>
</tr>
<tr>
<td>6 Bridge and Elevated way</td>
<td>km</td>
<td>264</td>
</tr>
<tr>
<td>7 Estimated Land Reclamation</td>
<td>ha</td>
<td>1,235</td>
</tr>
</tbody>
</table>

The project includes 12 stations: Bang Sue / Don Muang / Ayudhaya / Lopburi / Nakhonsawan / Pichit / Pitsanulok / Sukhothai / Srisatchanalai / Lampang / Lampun / Chiangmai.

![High Speed Rail Map](image-url)
Highlight Projects: Geotechnical & Tunnel Engineering

MRT Projects in Bangkok

MRT 10 Routes (Distance 450 km)

To be completed in 2020

MRT 10 Routes

1. Crimson Line
   - Thammasat-Mahachai
   - 80.8 km.

2. Light Red Line
   - Siriraj-Salaya-Taling Chan-Hua Mak
   - 54.0 km.

3. Airport Link
   - Don Mueang-Bang Sue-Phaya Thai-Suvanaphumi
   - 50.3 km.

4. Green Line
   - Lumlukka-Samutprakan
   - 60.0 km.

5. Green Line
   - Yotse-Bang Wa
   - 14.5 km.

6. Blue Line
   - Bang Sue-Hua Lamphong-Tha Phra-Phutthamonthon 4
   - 47.0 km.

7. Purple Line
   - Bang Yai-Rat Burana
   - 42.8 km.

8. Orange Line
   - Taling Chan-Min Buri
   - 32.5 km.

9. Pink Line
   - Khao Rai-Min Buri
   - 36.0 km.

10. Yellow Line
    - Lat Phrao-Samrong
     - 30.4 km.

Total: 448.3 km.
MRT Orange line will be about 37.5-km long, mostly underground, with 29 stations (7 elevated stations and other 22 underground stations, including the current Thailand Cultural Centre Station of MRT Blue Line).
Highlight Projects: Geotechnical & Tunnel Engineering

MRT Initial Project (Blue Line): Chaloem Ratchamongkhon (EXISTING)

- Underground 20 km.
- 18 Stations
- Twin Tunnel ID 5.7 m.
- 1 Park & Ride
Highlight Projects: Geotechnical & Tunnel Engineering

MRT Initial Project (Blue Line): Chaloem Ratchamongkhon (EXISTING)
Highlight Projects: Geotechnical & Tunnel Engineering

MRT Blue Line Extension

MRT Blue Line Extension Project is under Construction with 5.4 km is underground tunnel.

Underground Stations

Soft Ground Tunneling

3D FEM Analysis
Highlight Projects: Geotechnical & Tunnel Engineering

MRT Blue Line Extension

MRT Blue Line Extension Project is under Construction.

Geotechnical Instrumentations for investigations during construction: (1) Inclinometer (2) Piezometer (3) Observation Well (4) Settlement Point/Plate (5) Crack meter (6) Load Cell (7) Strain Gauge

Real Time Monitoring System
Highlight Projects: Geotechnical & Tunnel Engineering

Xe-Pian Xe-Namnoi HPP, Lao PDR (under Construction with tunnel of 5.0 m diameter and length of 13 km.)
Highlight Projects: Geotechnical & Tunnel Engineering

Xe-Namnoi Diversion Tunnel

TBM Launching Tunnel

Double Shield TBM (D = 5.74 m)

Xe-Pian Xe-Namnoi HPP, Lao PDR (under Construction)
The Klang Valley Mass Rapid Transit (KVMRT) Line 2 (SSP Line) will run from Sungai Buloh to Serdang and extends southwards to Putrajaya. The proposed alignment is approx. 52 km of which 13.5 km is underground. A total of 36 stations, of which 25 are elevated and 11 are underground. The construction is expected to commence in 2016. The SSP Line is expected to be fully operational by 2022 with the expected ridership of 529,000 passengers per day.
1. Tunneling Projects

Existing Projects need Maintenance & Repairing Technology

On-going and Potential Projects need Construction Technology

2. Earthwork and Soil Improvement Projects
Soil Improvement

- **TERRAMAC**
  *(Unitika Ltd., Thai Unitika Spunbond Co., Ltd.)*

- **MUDIX Method** *(Itochu Construction Machinery Co., Ltd.)*

- **D・BOX** an innovative method of Special Countermeasure against the soft ground *(PCKK)*

- **HGS - Air-Foam Mixed Stabilized Soil Method** *(High Grade Soil Consortium)*
Motorway: Bang Yai - Kanchanaburi

Soft Clay (Sta.0+000 to 31+000)

Stage 2 \( (H \leq 3.50) \)

Stage 1 \( (H \leq H_{cr1}) \)

Soil Improvement: Preloading Technique
Highlight Projects: Geotechnical & Soil Improvement

Drainage Canal
Max. Capacity: 100 cu.m/s
Canal Length: 12.65 km
Canal Bottom Width: 48 m
Canal Depth: 3.36 m

Drainage Canal: Suvarnaphumi Project (EXISTING)
Highlight Projects: Geotechnical & Soil Improvement

Drainage Canal: Suvarnaphumi Project (EXISTING)
Guideline for Construction of Road on Soft Clay Area

Soil Improvement Techniques

Prefabricated Vertical Drain, PVD

Soil-Cement Column

EPS Foam