Subway Project in Jakarta and Contribution to Sustainability
Mass Rapid Transit Project Contract CP106

SUMITOMO MITSUI CONSTRUCTION CO., LTD
MOTOTAKA MOROTA

Embassy of Japan

Bunderan HI Station

Tunneling (φ 6800 mm)
OUTLINE OF CP106

- **Client**: PT. Mass Rapid Transit Jakarta
- **Contractor**: SMCC-HK JO
- **Consultant**: Oriental Consultants JV
- **Schedule**: Aug-2013 ~ May-2018 (247 Weeks)
- **Contract Method**: Design-Build Contract
[Outline]
Elevated Section: 9.8km
Underground Section: 5.9km
① Construct Underground Station (Diaphragm Walling, Earthwork, Concrete Work)
② Assemble TBM
③ Tunneling (Bunderan Hi → Dukuh Atas)
④ Tunneling (Dukuh Atas → Setiabudi)
⑤ Dismantle TBM
⑥ Restore (Earthwork, Pavement, etc.)
## PROPOSED SCHEDULE

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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<tbody>
<tr>
<td>Month</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
<td>1</td>
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<tr>
<td></td>
<td>2013</td>
<td>2014</td>
<td>2015</td>
<td>2016</td>
<td>2017</td>
<td>2018</td>
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</tbody>
</table>

- **Bunderan Hi**
  - Station Handover of Concourse and Platform (30 Jul 2017: 47th month)
  - Dukuh Atas Station
  - Bunderan HI – Dukuh Atas L=662m
  - Bunderan HI – Setiabudi L=710m
  - Complete constructing structure by shield machines reach

- **Dukuh Atas**
  - Station
  - Handover of Concourse and Platform (30 Jul 2017: 47th month)
  - Bunderan HI – Dukuh Atas L=662m
  - 1st TBM for Down Track
  - Dukuh Atas L=210m
  - 2nd TBM for Up Track

- **Setiabudi**
  - Station
  - Handover of Concourse and Platform (30 Jul 2017: 47th month)
  - Bunderan HI – Dukuh Atas L=662m
  - 1st TBM for Down Track
  - Dukuh Atas L=210m
  - 2nd TBM for Up Track

- **Utility Relocation**
  - Detail Design
  - Road Decking
  - King Post

- **Diaphragm Wall**
  - Construct Structure

- **Road Decking**
  - Shield Machine Machine Assemble

- **Slope Protection**
  - Temporary Facilities

- **Construct Structure**
  - Shield Machine Machine Disassemble
Proposed Dukuh Atas Station

1. Public Space
2. Road
3. Proposed Station
Proposed Bunderan HI Station

Road

Proposed Station

1

2

03.07.2013

03.07.2013
Construction Method (1)

【Dukuh Atas STA】
General Structure
- Inside width : 19.3m
- Digging Depth : 24.5m
- Diaphragm Wall (t=1.2m)
  ※ Single wall system as permanent

- Top-Down Construction Method
- Falsework × 1stage
- Temporary & Partial Road Decking
【Bundaran Hi STA】
General Structure
- Inside width: 20.3m
- Digging Depth: 19.0m
- Diaphragm Wall (t=1.0m)
※ Single wall system as permanent

- Top-Down Construction Method
- Falsework × 1stage
- Temporary & Whole Road Decking
Reduction of Environment impact by using Diaphragm wall as Permanent wall

【Conventional method】

① Excavated Soil
② Transport by Dump Truck
③ Using Cement & Rebar
④ Disposal of Excavated Material, Slurry

SECANT PILE (Temporary)

Dimensions:
- 22.1m
- 24.5m
【Diaphragm wall as permanent wall method】

1. Excavation width reduce
   ⇒ Reduction of excavated soil volume
   - Reduction of Environment impact
   - Reduction of machine works for excavation & transport by dump truck

2. No Secant pile
   - Reduction of Environment impact
   - Cement & Rebar reduce
   - Excavated material & Slurry reduce
Reduction of Environment impact by using Diaphragm wall as Permanent wall

1. Structural Excavation
   - Conventional Method: 540 m³/m (1.00)
   - Combined Use of Temporary Wall Method: 470 m³/m (0.87)
   - Reduced: 70 m³/m

2. Temporary Wall Excavation
   - Conventional Method: 0 m³/m
   - Combined Use of Temporary Wall Method: 0 m³/m
Improvement of durability for underground structure (D-wall)

JOINT (Vertical) for DIAPHRAGM WALL is important to be considered "WATERPROOF" and "EARTHQUAKE-RESISTANCE" of structure"
Common type Joint in South East Asia

Rigid Connection Joint

Improvement of durability by changing type of Joint

1. Water leakage
2. Earthquake
3. Durability
REDUCTION OF ENVIRONMENTAL IMPACT

CO₂ Emissions in the Transportation Sector (FY2001)

- Private Car: 192.2 gCO₂/passenger-kilometer
- Commercial Car: 416.8 gCO₂/passenger-kilometer
- Omnibus: 94.2 gCO₂/passenger-kilometer
- Charter Bus: 32.1 gCO₂/passenger-kilometer
- Plane: 104.2 gCO₂/passenger-kilometer
- Train: 15.0 gCO₂/passenger-kilometer
- Subway: 10.8 gCO₂/passenger-kilometer

Reduce to 1/18

19% Reduction in CO₂ Emissions!

CO₂ Emissions Reduction

<table>
<thead>
<tr>
<th>Present</th>
<th>Anticipated Figure</th>
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<tbody>
<tr>
<td>Private Car 100%</td>
<td>Private Car 80%</td>
</tr>
<tr>
<td>Subway 20%</td>
<td>Subway 20%</td>
</tr>
</tbody>
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192.2 → 155.92 gCO₂/passenger-kilometer

19% Reduction in CO₂ Emissions!
REDUCTION OF ENVIRONMENTAL IMPACT

Traffic Congestion

Mitigate Traffic Congestion

- Improve fuel efficiency
- Reduce the noise of car horn

19% Reduction in CO₂ Emissions + α