FABRICATION AND INSTALLATION BOX GIRDER
PROYEK REVITALISASI SEMANGGI

Disampaikan dalam forum IAPPI
Bimbingan Teknis Inovasi Pracetak untuk Konstruksi Jalan Raya dan Adopsinya dalam
Sistem Pengadaan Jalan Nasional serta Kerjasama Pemerintah dan Badan Usaha
ICE BSD CITY
Tangerang, 17 Mei 2017
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1 PROJECT INFORMATION
Project: Pengembangan Simpang Susun FO Semanggi
Location: Jl. Gatot Subroto / Jl. Jenderal Sudirman Jakarta Selatan
Contract Term: Lump Sum Fixed Price – Design and Build (WIKA Scope)
Design & Construction Schedule: 540 days
  ➢ Design: 60 days
  ➢ Construction: 480 days
Maintenance: 365 days
Owner: PT Mitra Panca Persada
Asset: Dinas Pekerjaan Umum Bina Marga Provinsi DKI Jakarta
PROJECT CHALLENGE:

1. Located in crowded place for business and central government district in Jakarta
2. Planned to be second iconic place in Jakarta after National Monument (MONAS)
3. The longest curve viaduct (80 m with 176m radius) using precast segment box girder in Indonesia
4. Short schedule for design and construction (540 days)
5. New elevated viaduct should be harmony with the existing bridge
6. Safety, speed and cost is the main priority for this project
PROJECT INFORMATION
PERGESERAN LOOP
Pelebaran Jalan = 264 m
EXTENDED BOX = 9 m
Bore Pile dia. 0.6 m = 9 titik

PILED SLAB
Bore Pile dia. 0.8 m = 24 titik
Piled Slab = 52.5 m

STRUKTUR JEMBATAN
Bore Pile dia. 1.2 m = 104 titik
Pile Cap = 10 pilecap
Pier = 8 Pier
Abutment = 2 Abt
Box Girder = 160 segmen
Parapet = 1080 m
Aspal = 8640 m²

PEKERJAAN LED

PERGESERAN LOOP
Pelebaran Jalan = 274 m
EXTENDED BOX = 9 m
Bore Pile dia. 0.6 m = 8 titik

PILED SLAB
Bore Pile dia. 0.8 m = 48 titik
Piled Slab = 127.5 m

STRUKTUR JEMBATAN
Bore Pile dia. 1.2 m = 95 titik
Pile Cap = 11 pilecap
Pier = 9 Pier
Abutment = 2 Abt
Box Girder = 175 segmen
Parapet = 1240 m
Aspal = 4960 m²

PEKERJAAN LED

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## PROJECT INFORMATION

<table>
<thead>
<tr>
<th>ITEM</th>
<th>RAMP 1</th>
<th>RAMP 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panjang Total</td>
<td>796 m</td>
<td>826 m</td>
</tr>
<tr>
<td>Tinggi Pier Min.</td>
<td>7,67 m</td>
<td>7,60 m</td>
</tr>
<tr>
<td>Tinggi Pier Maks.</td>
<td>13,43 m</td>
<td>12,55 m</td>
</tr>
<tr>
<td>Bentang Terpendek</td>
<td>38 m</td>
<td>29 m</td>
</tr>
<tr>
<td>Bentang Terpanjang</td>
<td>80 m</td>
<td>80 m</td>
</tr>
<tr>
<td>Lebar Jalan</td>
<td>8 m/jalur</td>
<td>8 m/jalur</td>
</tr>
<tr>
<td>Jenis Girder</td>
<td>Box Girder Segmental Precast</td>
<td>Box Girder Segmental Precast</td>
</tr>
<tr>
<td>Jenis Pondasi</td>
<td>Bore Pile (dia. 0.6, 0.8 m; 1,2 m)</td>
<td>Bore Pile (dia. 0.6, 0.8 m; 1,2 m)</td>
</tr>
<tr>
<td>Kedalaman Bore Pile</td>
<td>± 20 &amp; 30 m</td>
<td>± 20 &amp; 30 m</td>
</tr>
<tr>
<td>Perkerasan Jalan</td>
<td>Flexible Pavement</td>
<td>Flexible Pavement</td>
</tr>
</tbody>
</table>
PROJECT INFORMATION

SEGMENT: TYPICAL (bottom slab thick. = 350 mm)

- $V = 14.74 - 15.12 \, m^3$
- $W = 39.0 - 40.0 \, ton$

SEGMENT: TYPICAL (bottom slab thick. = 250 mm)

- $V = 13.68 - 14.05 \, m^3$
- $W = 36.2 - 37.1 \, ton$
**PROJECT INFORMATION**

**SEGMEN : PIER TYPICAL**

- \( V = 20.92 \, m^3 \)
- \( W = 55.3 \, \text{ton} \)

**SEGMEN : EJ (Expansion Joint)**

- \( V = 20.54 \, m^3 \)
- \( W = 54.3 \, \text{ton} \)
SEGMENT: DEVIATOR TYPICAL

- $V = 15.72 - 16.09\ m^3$
- $W = 41.5 - 42.5\ ton$
PROJECT INFORMATION

VARIABLE SPAN

Closure

Special Span

Deviator

Deviator

Deviator

Closure

14500 (CAST IN SITU)

1650

SP6U2

SP6U3

DV1

SP6U4

SP6U5

SP6U6

DV2

SP6U7

SP6U8

SP6U9

DV3

• V = 13.99 – 22.13 m³
• W = 37.0 – 58.5 ton

DIMENSI BOX DEVIATOR SPECIAL SPAN (side span)

SCALE 1:100

2500

4026

3400

4000

9000
2 PRODUCTION OF BOX GIRDER
<table>
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<th><strong>PRODUCTION</strong></th>
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<td><strong>Project</strong></td>
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<td><strong>Location</strong></td>
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<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td><strong>No. of Precast Segments</strong></td>
</tr>
<tr>
<td>a. Variable segment</td>
</tr>
<tr>
<td>b. Typical segment</td>
</tr>
<tr>
<td><strong>Production Schedule</strong></td>
</tr>
<tr>
<td><strong>Realisation of Production</strong></td>
</tr>
</tbody>
</table>
PRODUCTION METHOD: SHORT LINE

- **Tahap 1**
  - FLOATING BULKHEAD
  - "S.1" MATCH CAST
  - "S.1" NEW CAST

- **Tahap 2**
  - "S.1" MATCH CAST
  - "S.2" MATCH CAST
  - "S.2" NEW CAST
  - "S.3" NEW CAST

- **Tahap 3**
  - "S.2" MATCH CAST
  - "S.3" MATCH CAST

- **dst.**

**ARAH PRODUKSI**

**ADJUSTABLE SOFFIT TABLE**

1 2 3 4 5 6 7 8 9 10 11

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PRODUCTION METHOD: SHORT LINE

- TRANSFER CART
- ADJUSTABLE SOFFIT TABLE
- OUTER MOULD
- INNER MOULD
- CAT WALK
PRODUCTION METHOD: SHORT LINE

MATCHCAST

NEW CAST

MOULD

TOWER SURVEY
REBAR INSTALLATION
POURING CONCRETE

- Compressive Strength \( f'c \): 41.5 MPa
- Slump flow: \( 60 \pm 5 \) cm

- Concrete Pump
- External vibrator
- Internal vibrator

- Curing: curing compound (non-steam)

- Demoulding: \( \pm 10 \) hours after pouring
  (> 50% \( f'c \))

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PIER CONSTRUCTION AND INSTALLATION OF BOX GIRDER
PIER COLUMN TYPE 1

PIER COLUMN TYPE 2
(BOX ACROSS SUDIRMAN)

TENDON PIER
PIER P1
a. 5 x 19M15
b. 3 x 19M15

TENDON PIER
PIER P2
a. 2 x 19M15
b. 2 x 19M15
PIER COLUMN TYPE 3
(BOX ACROSS GATOT SUBROTO AND TOLL ROAD)

TENDON PILECAP
PIER P7 RAMP 2
4 x 12M15

TENDON PILECAP
PIER P6 RAMP 1
5 x 12M15
PENGGUNAAN TEKNOLOGI LED

COLUMN CONSTRUCTION

START

1. Pembesian

2. Pemasangan Bekisting

3. Check Verticality

4. Check Elevation Stop Cor

5. Pengecoran

6. Curing (Bekisting Belum Lepas)

FINISH

- Pembesian
- Pemasangan Bekisting
- Cek Vertical
- Pengecoran
- Lepas Bekisting
- Pekerjaan Curing Compound
- Proses Curing dengan wrapping

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COLUMN CONSTRUCTION
NOTE:
1. P6, P7, P1, & P2 using segment lifter
2. Others span installation using shoring system
SHORING SYSTEM

FINAL STAGE FOR TEMPORARY FALSEWORK ARRANGEMENT (ELEVATION VIEW)
SECTION A-A
SCALE: 1/30
FALSEWORK

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SEGMENT LIFTER SYSTEM
PARAPET WORKS

PARAPET WITH TRADITIONAL BETAWI PATTERN AND SEMANGGI SYMBOL
Presiden Joko Widodo

Yesterday at 4:48 PM


Saya mengunjungi dua proyek besar ini pada Kamis siang.


Lokasinya merupakan titik pertemuan antara pengendara dari Jalan Getot Subroto dan dari Jalan Sudirman sehingga sering kali membuat lalu lintas tersendat. Ini menjadi salah satu solusi bagi kemacetan di Semanggi yang sudah bertahun-tahun kita rasakan, pagi, sore dan malam.
KEY OF SUCCESS

Accurrations:
- Tolerance = $L/1000 = 8\text{cm}$
- Realization = $1\text{cm}$

Human Resources
- Team Work

Accurration of Precast Product

Keyword:
1. Progressive Cantilever
2. Banana Effect
3. Self correction Segment using Geometry Control (Geompro)
4. Superelevation
5. Traffic Management

Accurration:
- Tolerance = $L/1000 = 8\text{cm}$
- Realization = $1\text{cm}$
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TERIMA KASIH