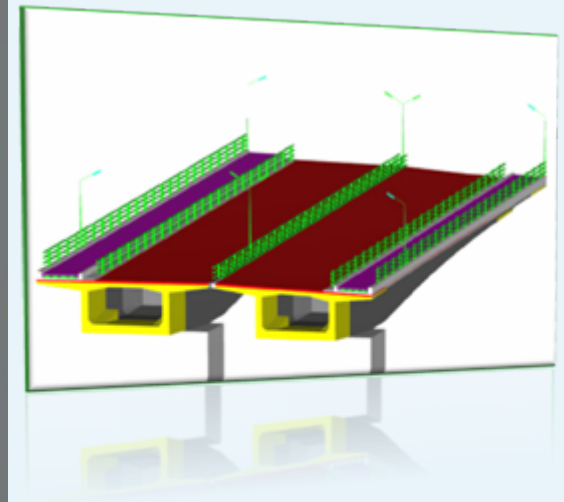
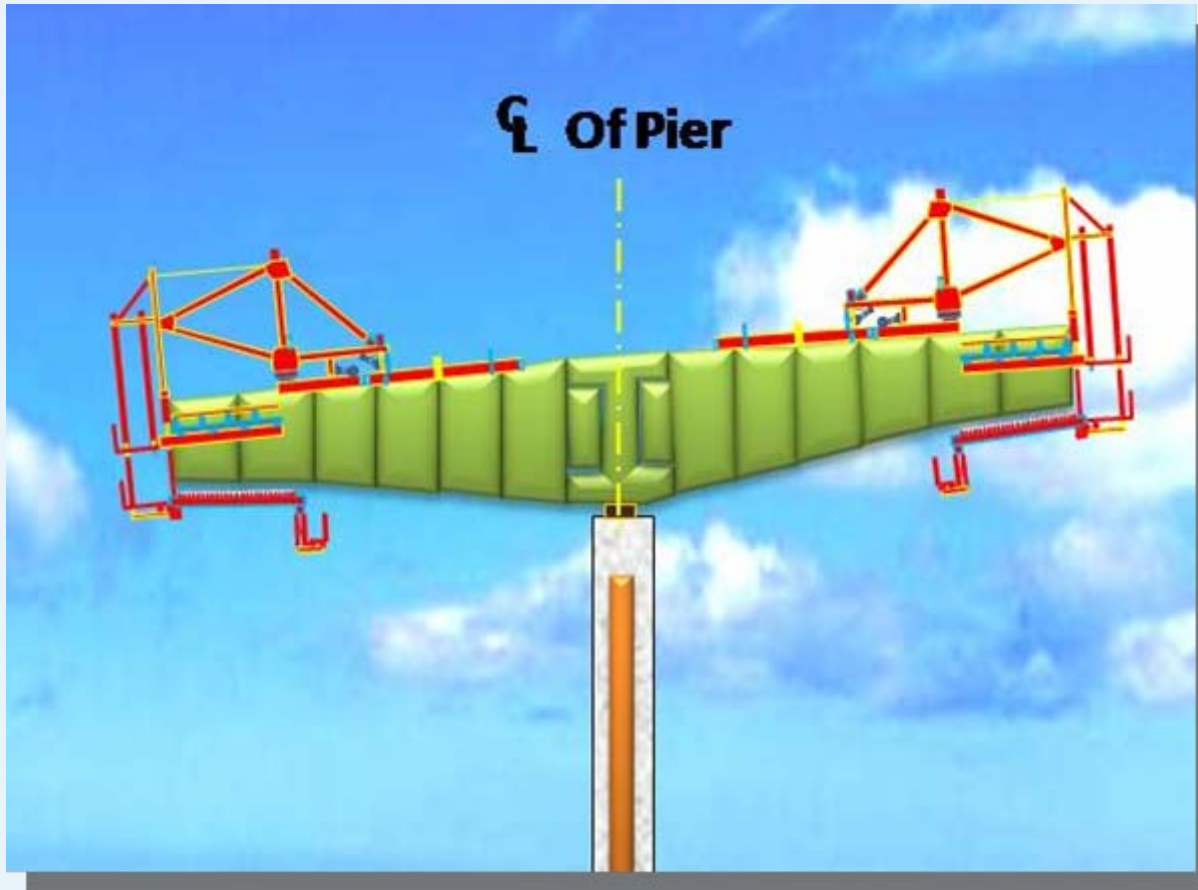


CONSTRUCTION OF BALANCE CANTILEVER SURAMADU APPROACH BRIDGE





PLAN LAY OUT



Lokasi Jembatan
Suramadu



BRIDGE DETAILS

TO SURABAYA

TO MADURA

APPROACH BRIDGE

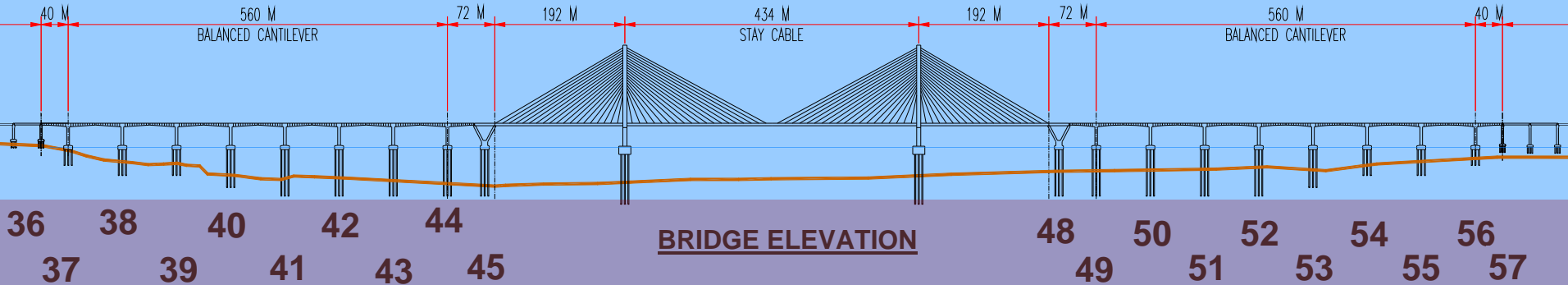
CABLE STAY BRIDGE

APPROACH BRIDGE

672 M

818 M

672 M



A. DATA TEKNIS

1. Panjang Bentang : 672 m P37 ~ p45

2. Jumlah Pier : 8 Pier Sisi Surabaya

3. Pile Casing :

❑ 16 Pier x 18 ttk : 288 Pile (Ø 1.800 mm)

❑ 35 Pile x 2 V-Pier : 70 Pile (Ø 2.200 mm)

4. Bored pile :

5. Pile Cap :

❑ P37 ~ P40, P43+ P44 = 25.5 x 12 x 3 m

❑ P41 + P42 = 25.5 x 16 x 3.5 m

❑ P45 + P48 = 36.8 x 25.8 x 4.5 m

Bored Pile Sby Side		
Pier	Length (m)	Pile (nos)
P37	63.99	18
P38	71.99	18
P39	75.99	18
P40	80.99	18
P41	89.99	18
P42	93.99	18
P43	86.99	18
P44	90.99	18
Total		144
V-Pier		
P45	80.99	35
P48	86.99	35
Total		70

6. Pier Shaft & V-Pier :

Pier Shaft Sby Side				
Pier	Height (m)	Length (m)	Width (m)	Unit
P37	9.84	4.00	7.50	2
P38	13.04	4.00	7.50	2
P39	16.24	4.00	7.50	2
P40	19.44	4.00	7.50	2
P41	22.14	4.00	7.50	2
P42	25.34	4.00	7.50	2
P43	28.24	4.00	7.50	2
P44	29.84	4.00	7.50	2
Total				16
V-Pier				
Pier	Height (m)	Length (m)	Width (m)	Unit
P45	37.80	36.70	9.00	2
P48	37.80	36.70	9.00	2
Total				4

7. Box Girder :

Length = 40 m

Height = 2.1 ~ 4.4 m (variatif)

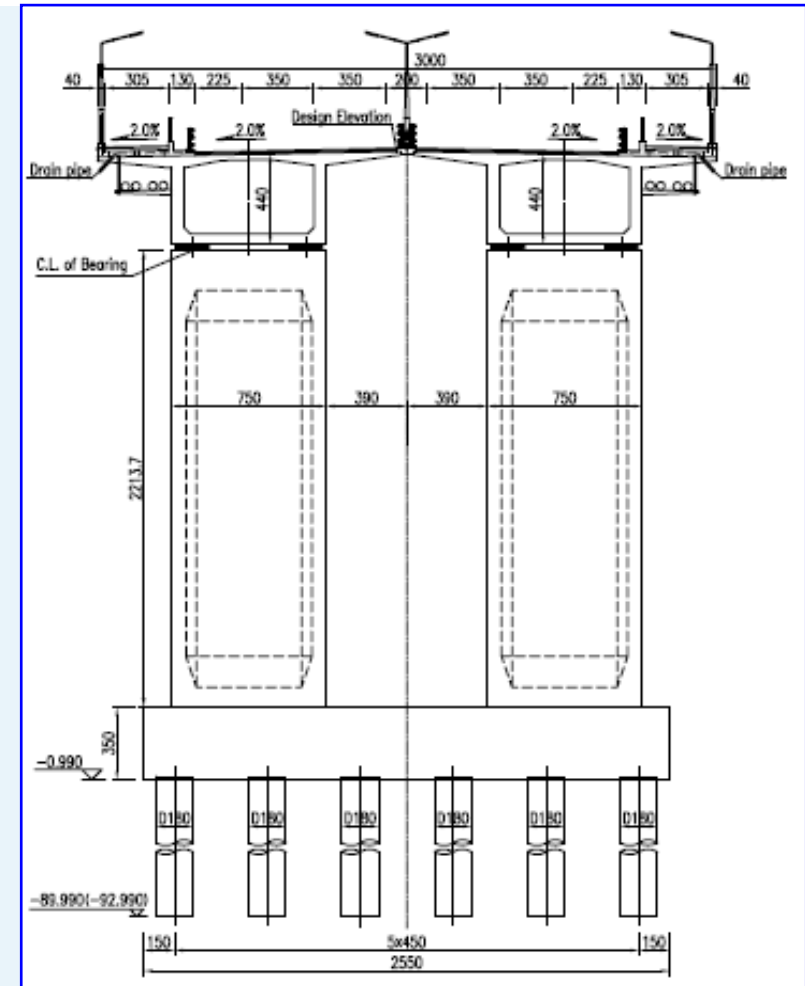
Width = 14.7 m

Balance Cantilever Method :

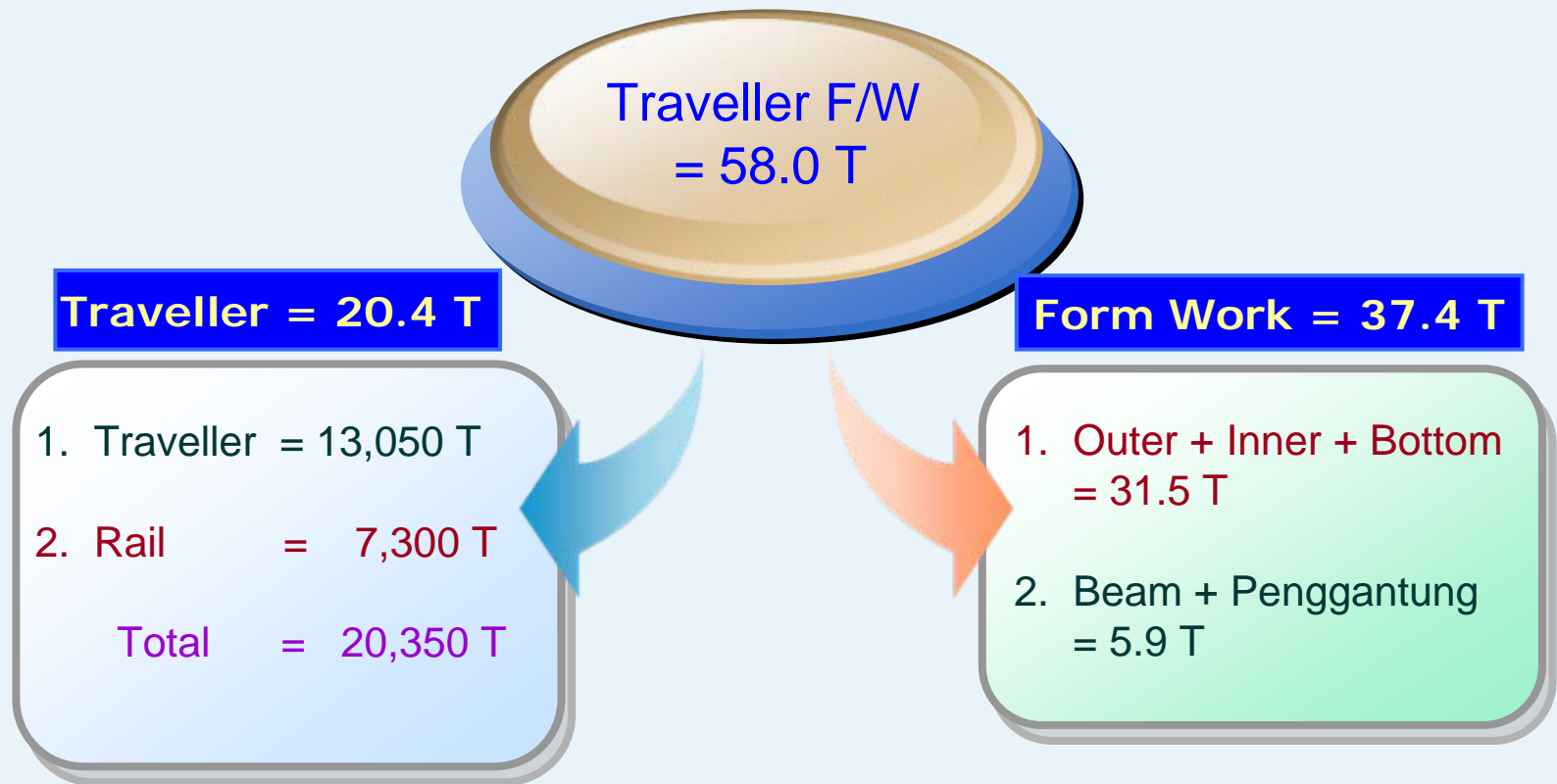
- ❑ Segment = 2 x 7 x 8 segment
- ❑ Closure = 2 x 7 buah

B. CONSTRUCTION METHOD

- ❑ Super structure berupa double box girder yang dilaksanakan secara balance cantilever, cast in situ dengan traveller form.



1. Assembly Traveller



Modul Utama + Truss + Rel



Rear tie down



1. Modul ini yang akan memikul beton segar s/d beton mengeras dan dilakukan pekerjaan stressing.



2. Rel diperlukan utk pergerakan traveller setelah pengecoran.

Rear levelling jack



3. Setelah traveller duduk pada main Jack j_1, traveller harus dalam posisi horizontal.



4. Main hydraulic jack berfungsi untuk mentransfer beban selama pengecoran ke web. Dipakai 2 unit jack yang dipasang dibawah main frame.

Hanger traveller/rear tie down



5. Cantilever hanger, dipakai untuk mendukung form work selama pergerakan traveller.

6. Vertical form hanger/penggantung form work, dipakai untuk mengatur form work dan memikul beban form work selama pengecoran.

7. Angkur belakang / rear tie down, dipakai untuk pengikat main frame/beam selama pengecoran

2. Pengoperasian Traveller

Pergerakan

- ❑ Traveller bertumpu diatas rel
- ❑ Pergerakan traveller dilakukan dg hydraulic jack j_3
- ❑ Outer F/W digantung dg high tensile rebar
- ❑ Inner F/W belum digerakkan.

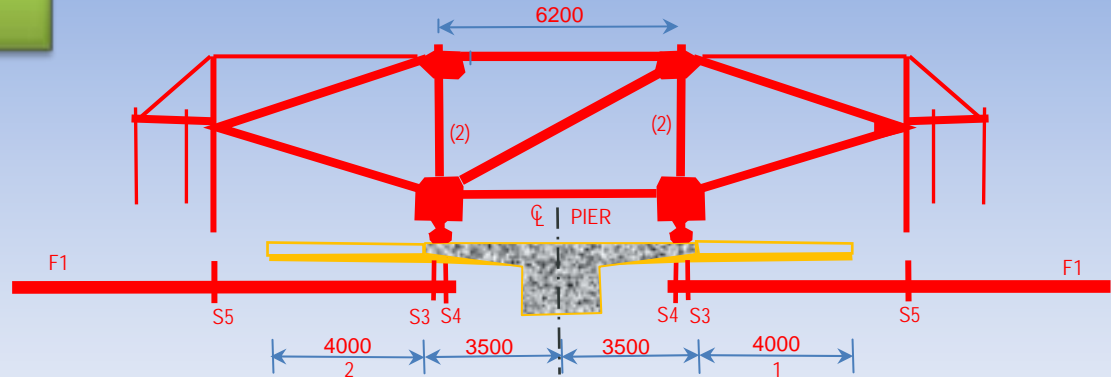
Pengecoran

- ❑ Bagian depan traveller bertumpu pada Hyd. Jack j_1
- ❑ Bagian belakang traveller diangkur ke beton lama dg stress bar, elevasi diatur dg jack j_2
- ❑ Rel tidak ada kontak dg traveller
- ❑ F/W bawah diangkur ke beton lama dg high tensile rebar

CANTILEVER CONSTRUCTION DEVICE LAUNCHING SEQUENCE

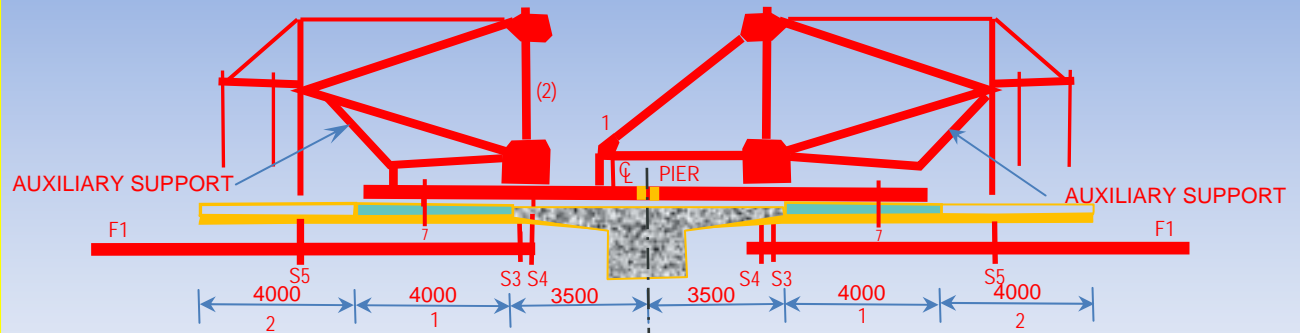
1. ASSEMBLE LEFT DEVICE AND RIGHT WITH " Z " SHAPED CONNECTION
2. ANCHOR THE AUXILIARY TIE DOWN (2)
3. CASTING A SECTION WITH 4000 mm FOR BOTH SIDES SIMULTANEOUSLY

STEP 1



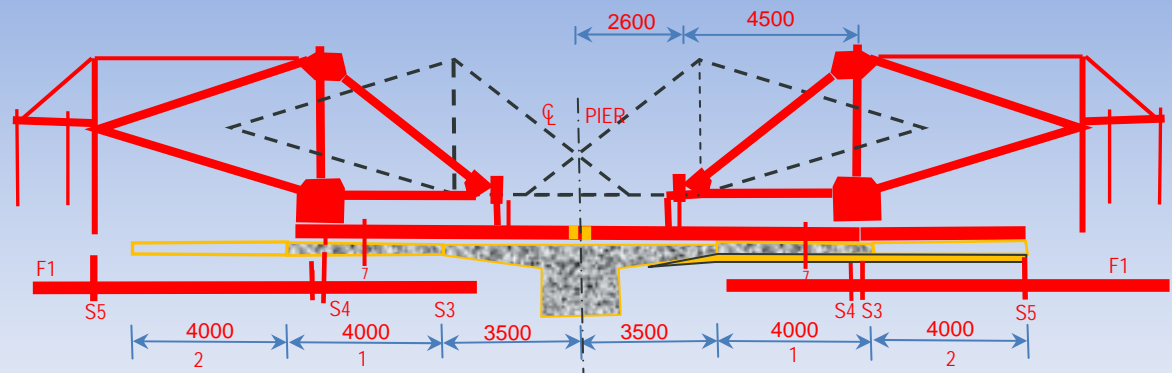
1. SET UP THE LAUNCHING- RAIL WITH TIE DOWN 7
2. INSTALL AUXILIARY SUPPORT FOR BOTH DEVICES.
3. DISMANTLE THE " Z " SHAPED CONNECTION .
4. INSTALL THE TAIL PART OF RIGHT DEVICE FOR LAUNCHING CONDITION.
5. AFTER INSTALLATION REMOVE THE AUXILIARY SUPPORT OF RIGHT DEVICE.

STEP 2

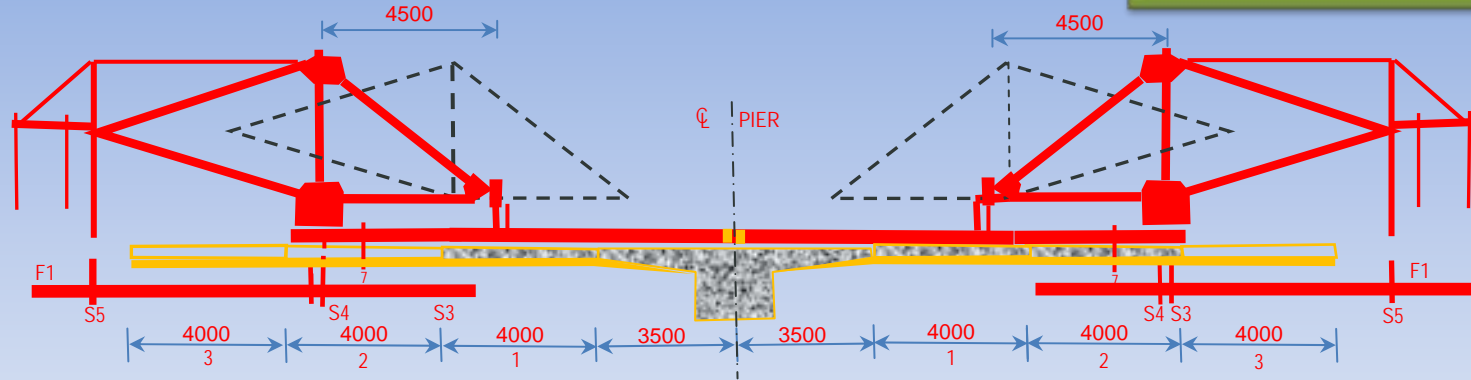


1. FORWARD MOVEMENT OF RIGHT DEVICE BY 4000 mm INTO NEXT CASTING POSITION WITHOUT MOVING LONG. GIRDER F1.
2. ROLL-OFF BEARING S3 IS NEWLY ANCHORED .
3. REAR ROLLER SUSPENSION S4 IS PUT FORWARD AND ANCHORED.
4. FOLLOW THE PROCEDURE AS SAME AS THE RIGHT DEVICE TO LAUNCHING THE LEFT DEVICE
5. BOTH DEVICES ARE IN NEXT CASTING POSITION

STEP 3

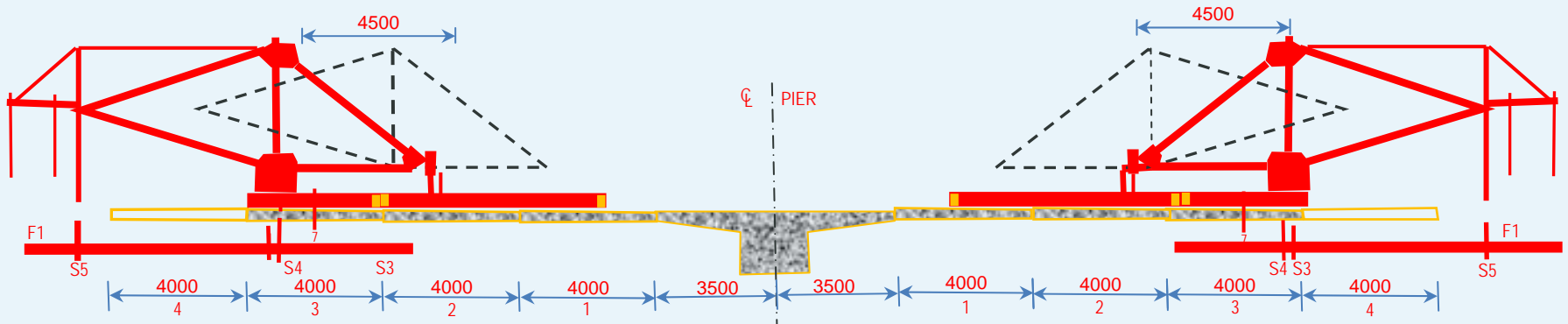


CANTILEVER CONSTRUCTION DEVICE LAUNCHING SEQUENCE



STEP 4

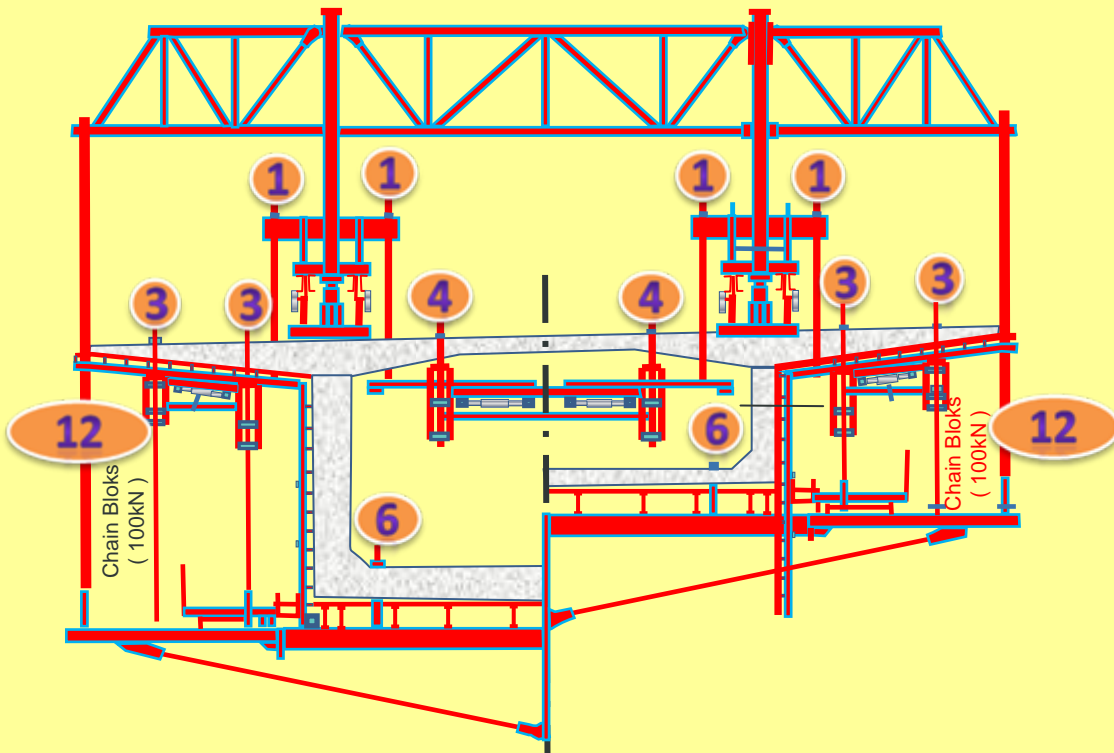
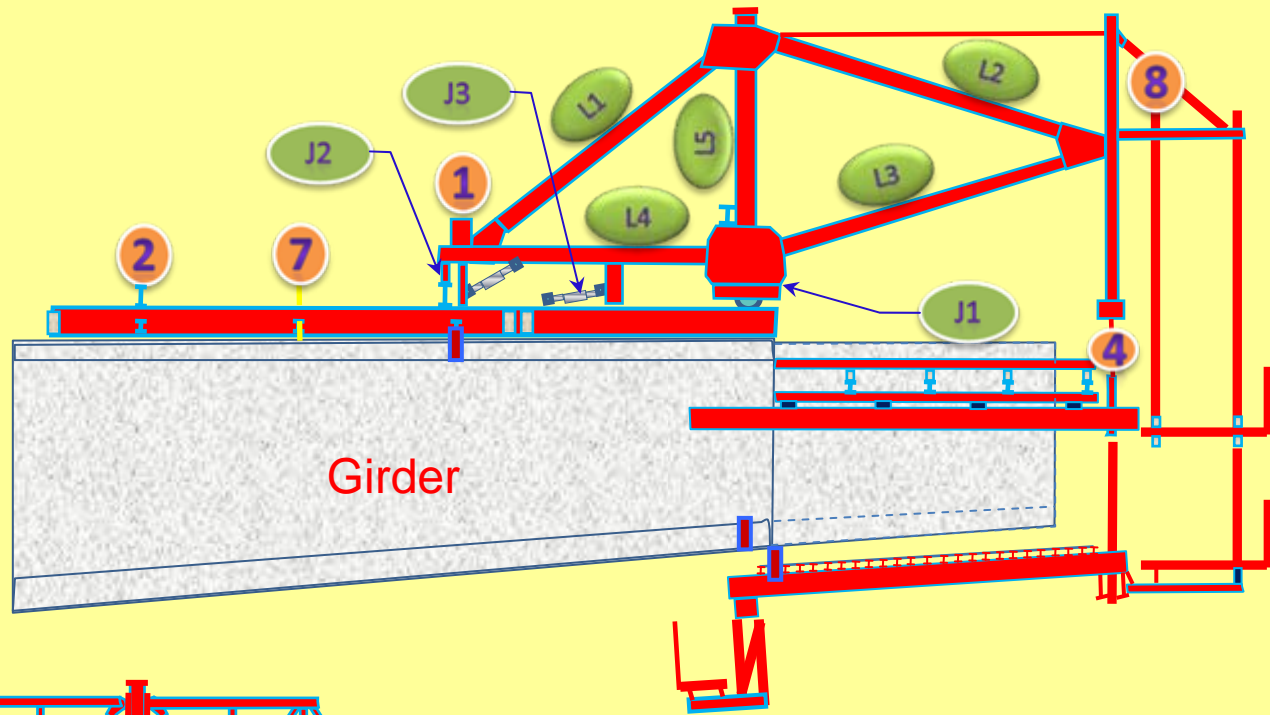
1. CASTING A SECTION WITH 4000mm FOR BOTH SIDES, SET UP LAUNCHING-RAIL WITH TIE DOWN 7.
2. MOVING FORWARD BOTH DEVICES BY 1000mm WITHOUT LONG F1.
3. FORWARD MOVEMENT OF BOTH DEVICES AND LONG, GIRDER F1 BY 3000 mm INTO NEXT CASTING POSITION
4. ROLL-OFF BEARING S3 IS NEWLY ANCHORED, THEN REAR - ROLLER S4 IS PUT FORWARD AND ANCHORED



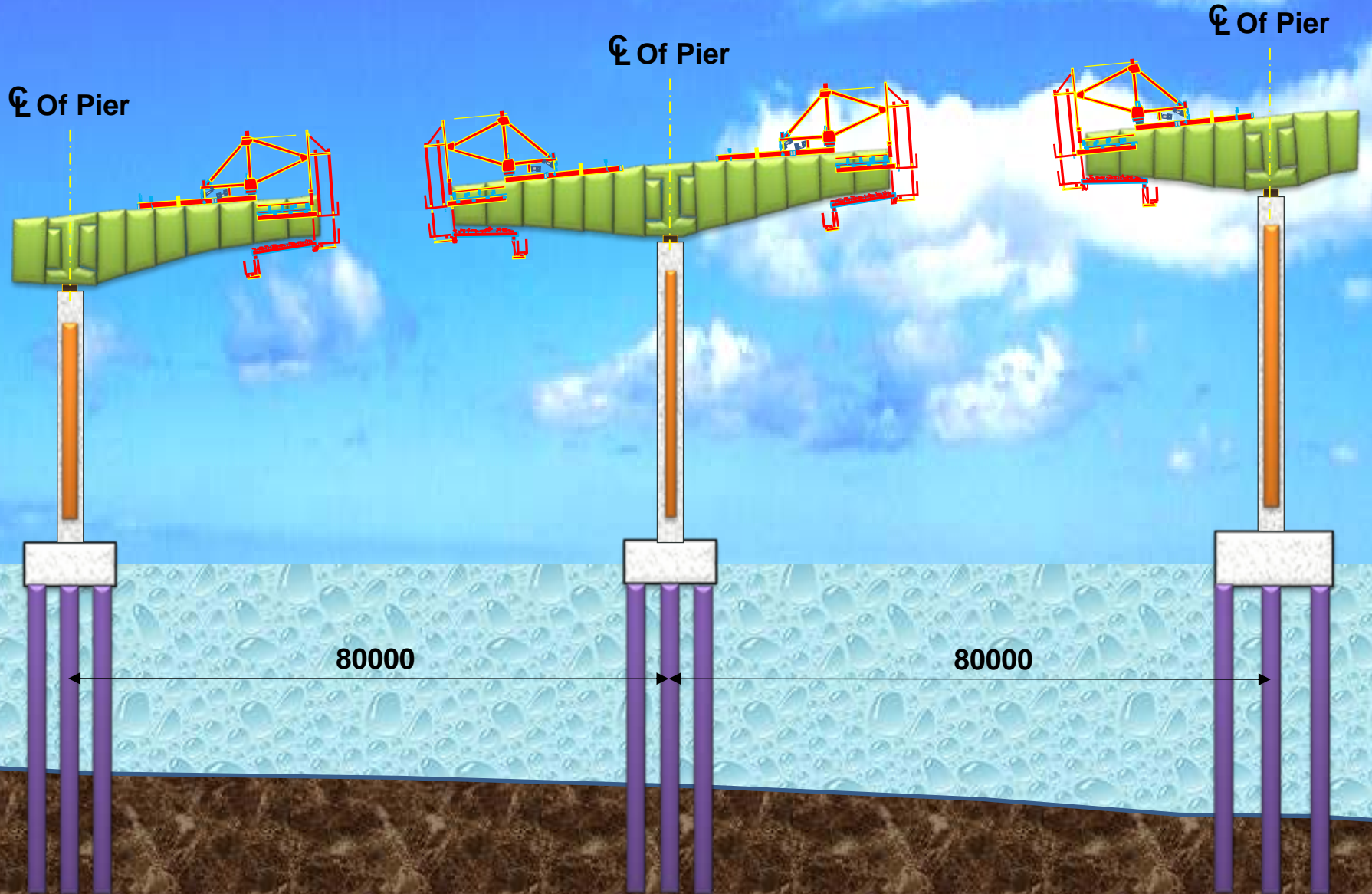
STEP 5

1. CASTING A SECTION WITH 4000mm FOR BOTH SIDES, MOVING FORWARD THE LAUNCHING-RAIL WITH TIE DOWN 7 & 2
2. MOVING FORWARD BOTH DEVICES AND LONG. GIRDER F1, INTO NEXT CASTING POSITION.
3. ROLL-OFF BEARING S3 IS NEWLY ANCHORED , THEN REAR-ROLLER S4 IS PUT FORWARD AND ANCHORED

Moving the cantilever construction device into the new concreting position

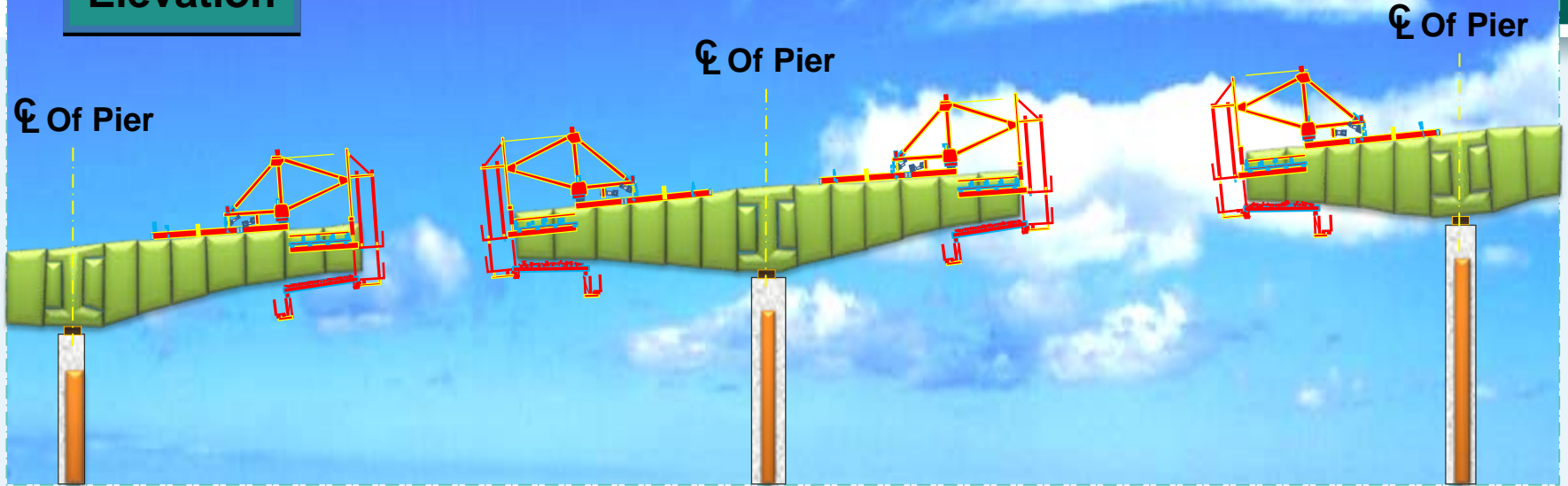


Skema Pergerakan Traveler Antar Pier

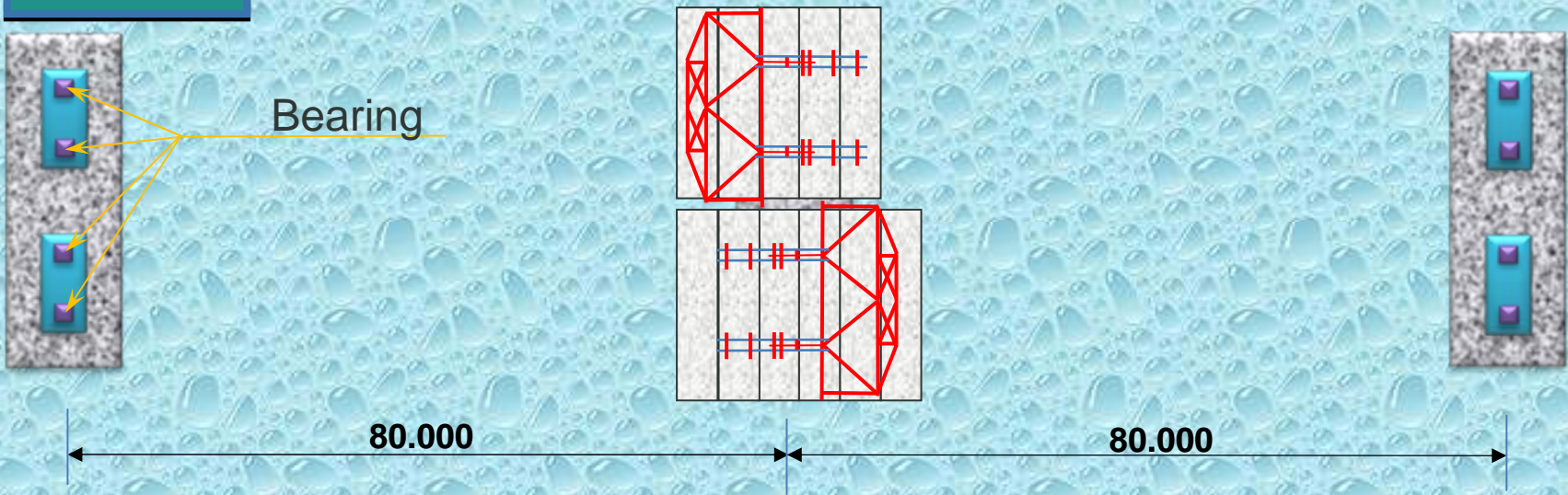


Skema Pergerakan Traveler Antar Pier

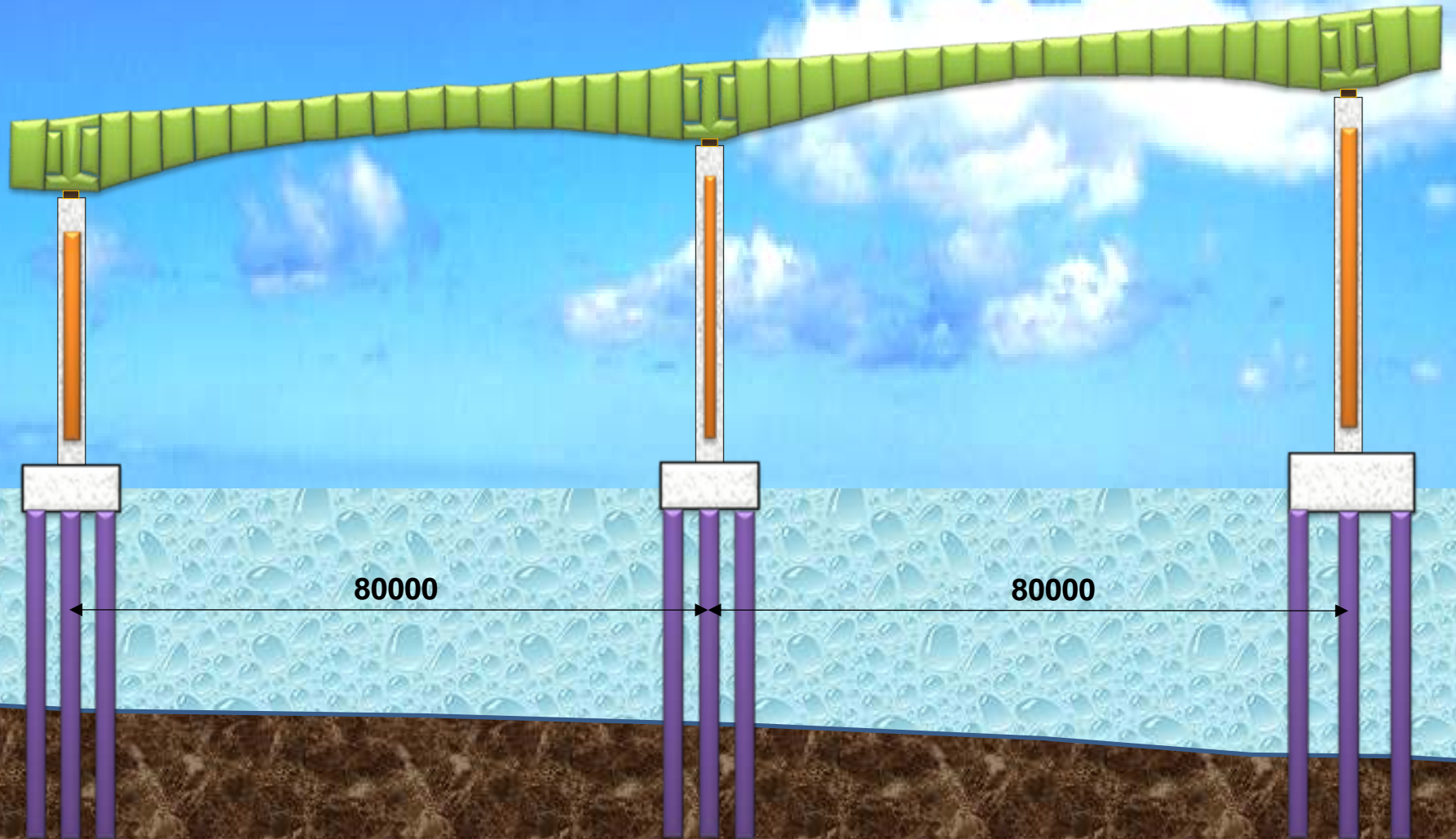
Elevation



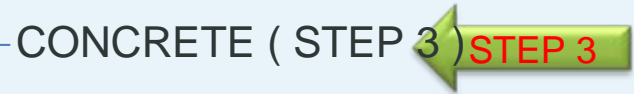
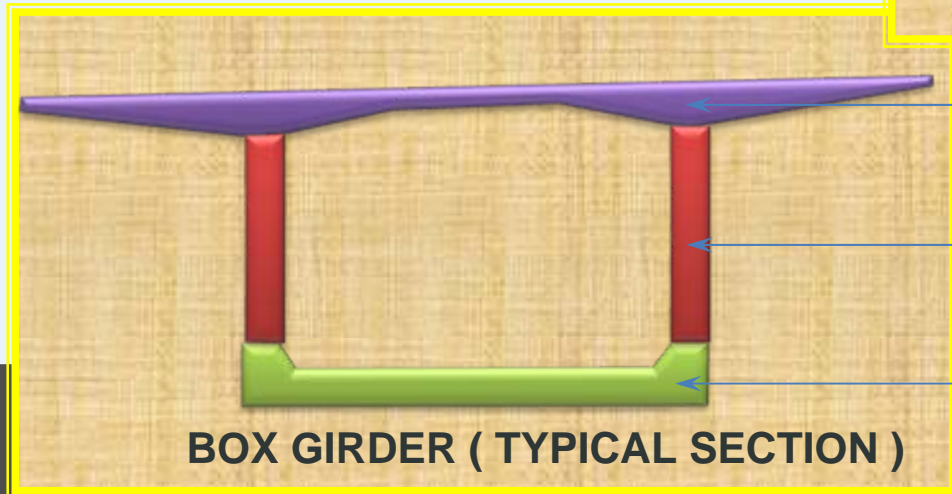
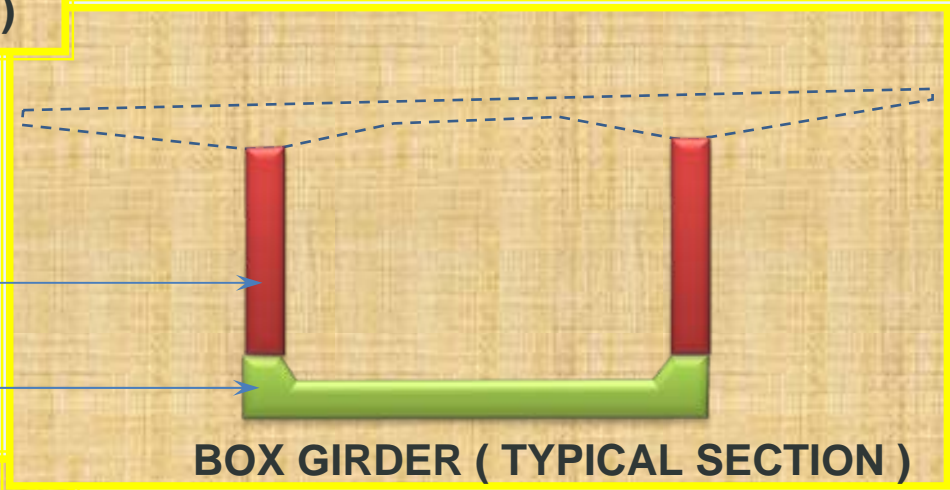
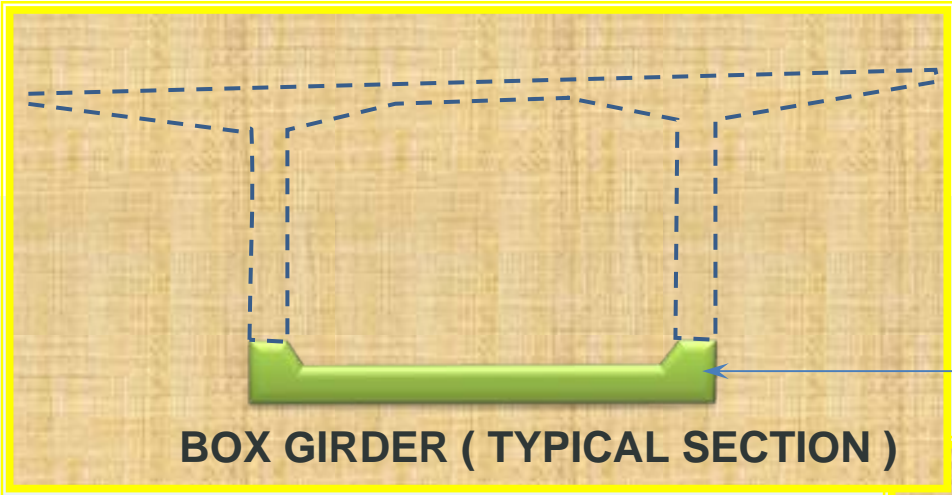
Plan



Skema Pergerakan Traveler



SEQUENCE OF CONCRETING BOX GIRDER



4. Cycle time pengecoran

No	DESCRIPTION	Duration	Days											
			1	2	3	4	5	6	7	8				
1	Strip form work & Advance rail	0.5	■											
2	Advance traveller + setting outer F/W	0.5	■											
3	Install bottom+web rebar & ducting	1.5		■	■	■								
4	Setting inner F/W	0.5				■								
5	Install top rebar & ducting	1.5					■	■	■					
6	Concrete pouring	0.5								■				
7	Curing	2									■	■	■	■
8	Install strand and wedges	1										■	■	
9	Stressing	0.5												■

Bisa dipendek

5. Sequence stressing

Urutan pekerjaan stressing

Cantilever stressing

- Tes tekan beton > 85 %
- Stressing 75 % UTS

Transversal stressing

- Stressing 40-50 % UTS

Continuity stressing

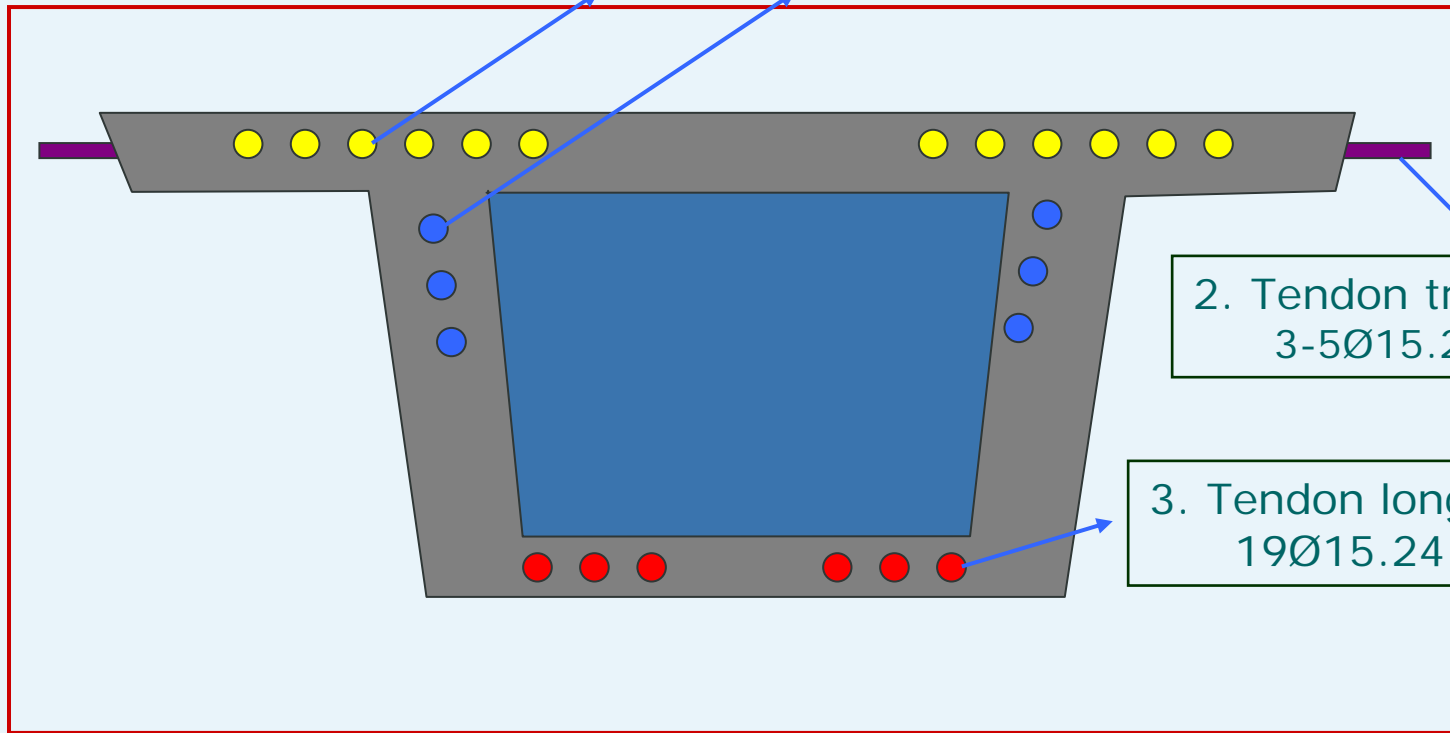
- Cor closure

Tampang Tendon

1. Tendon cantilever
15Ø15.24 mm(top) + 19Ø15.24 mm (web)

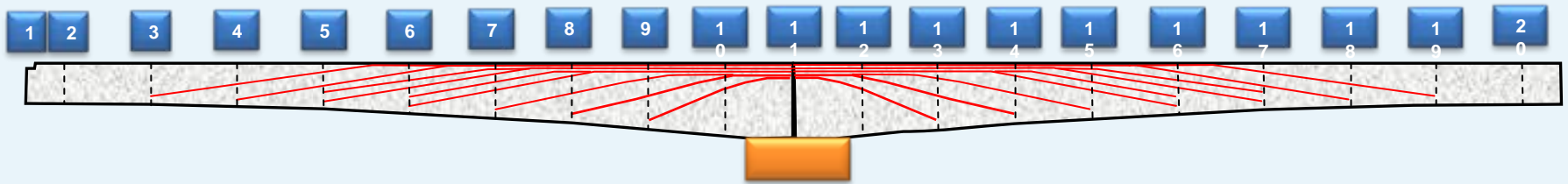
2. Tendon transversal
3-5Ø15.24 mm

3. Tendon longitudinal
19Ø15.24 mm

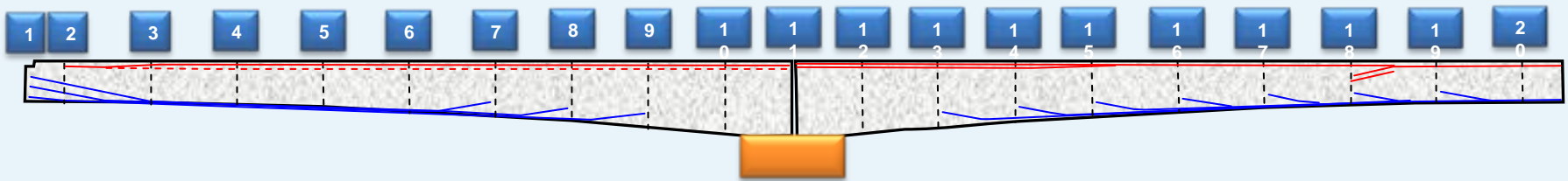


Lay out kabel

ELEVATION FOR WEB TENDONS





ELEVATION FOR TOP AND BOTTOM TENDONS



½ PLAN OF TOP PLATE

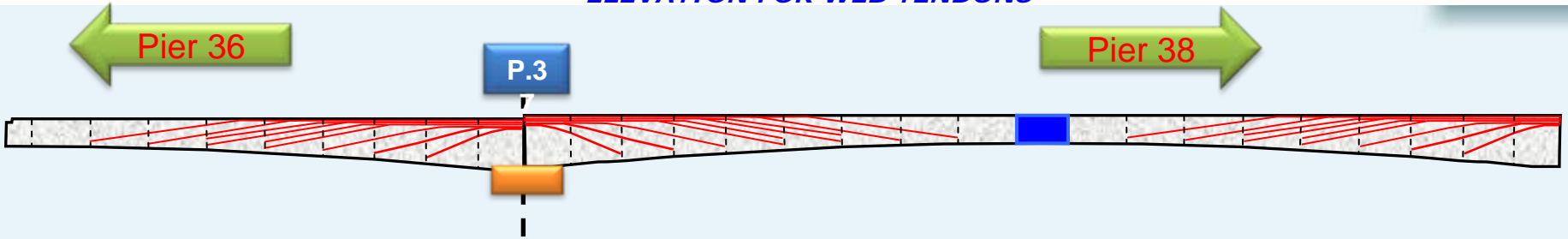
½ PLAN OF TOP PLATE

NOTE :

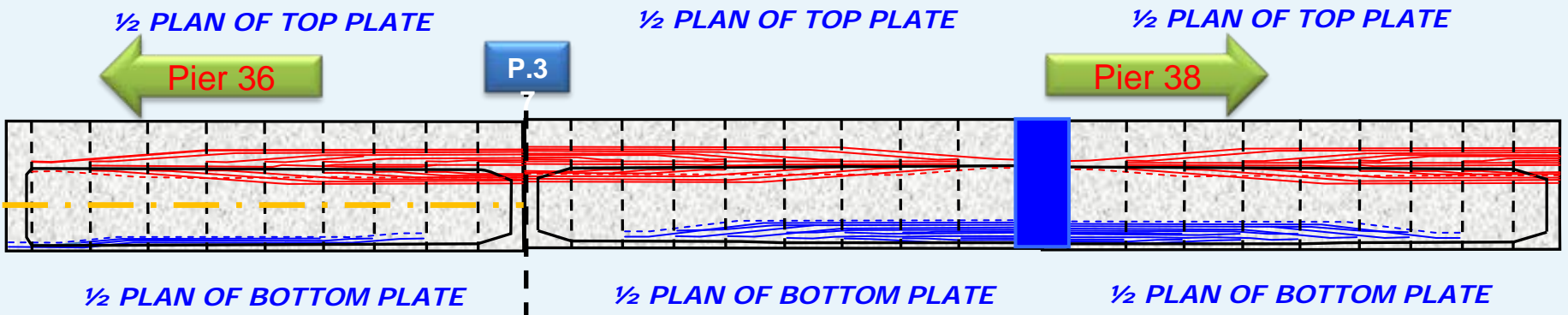
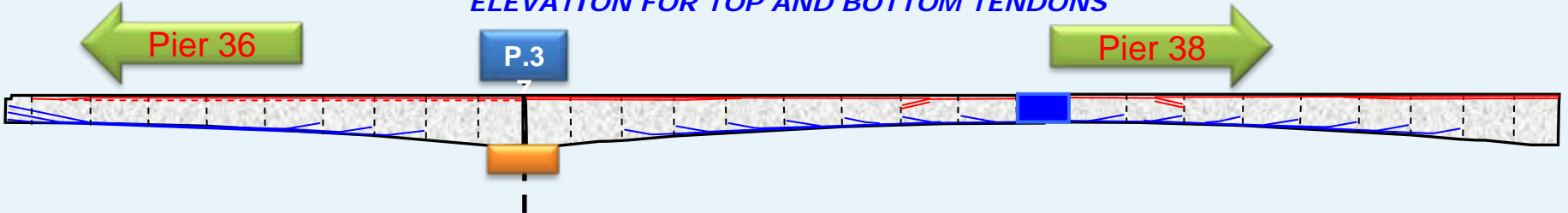
- FOR TOP = 
- FOR BOTTOM = 

Ilustrasi Lay out kabel

ELEVATION FOR WEB TENDONS



ELEVATION FOR TOP AND BOTTOM TENDONS

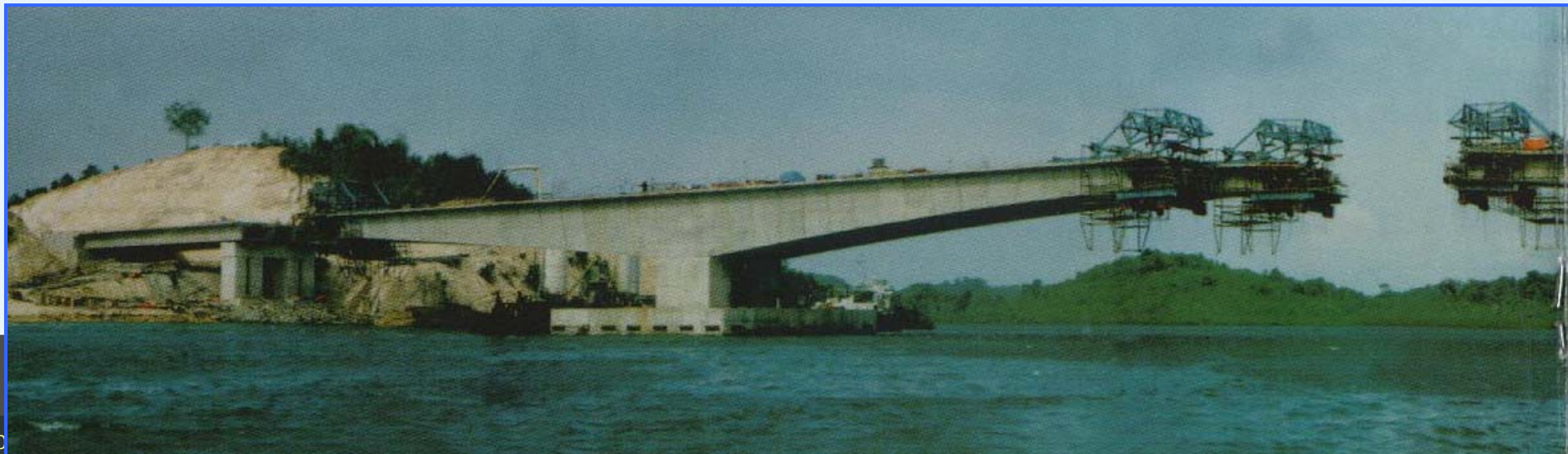


NOTE :

- FOR TOP = —
- FOR BOTTOM = —

6. Deflection control





4. Closure

Segmen penutup antar span

A

Selama pelaksanaan
terlindungi thd muai

B

Selama pelaksanaan terlindungi terhadap
susut

C

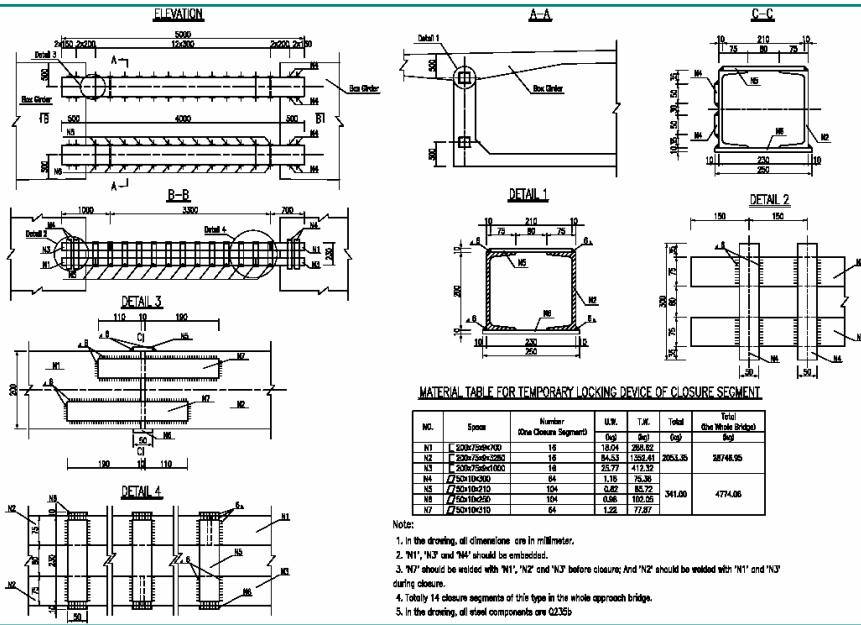
F/W memakai traveller / profil

D

Closure

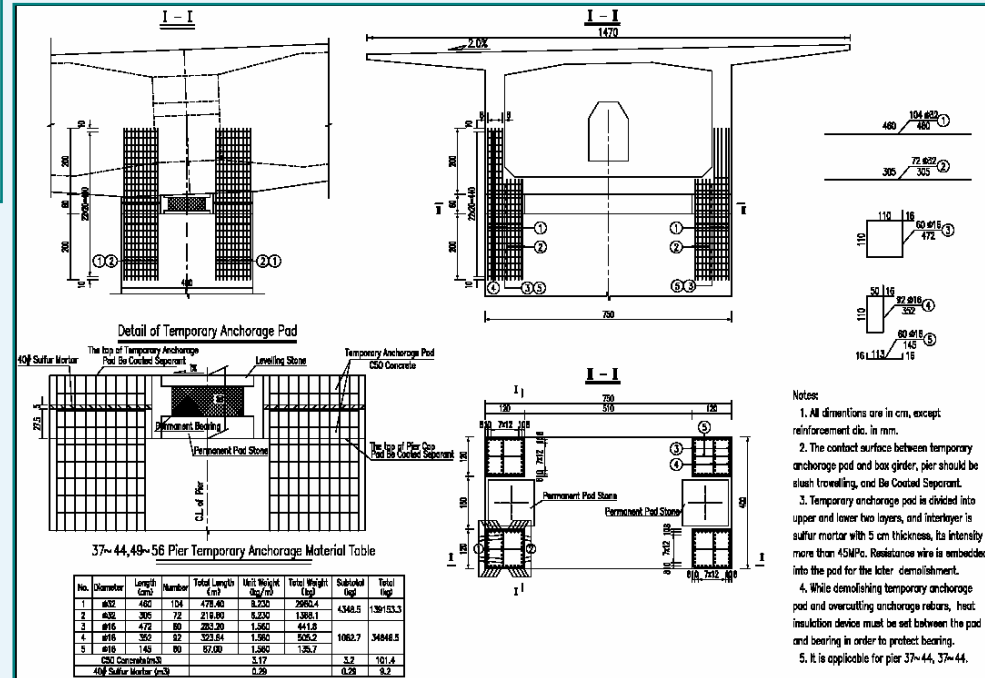
1. Desain Temporary Lock untuk Closure

Temporary Lock ini diperuntukkan untuk menahan pemuatan dan penyusutan beton pada pelaksanaan closure.



2. Desain Temporary Angkur untuk Pier Head

Temporary angkur difungsikan untuk menahan posisi Piertable tetap stabil saat pengecoran segmen girder.



Traveller yang sudah terpasang diatas pier table





Thank You!