KONSEP DAN TEKNOLOGI JEMBATAN TERKINI

Geostruktur
13 November 2021

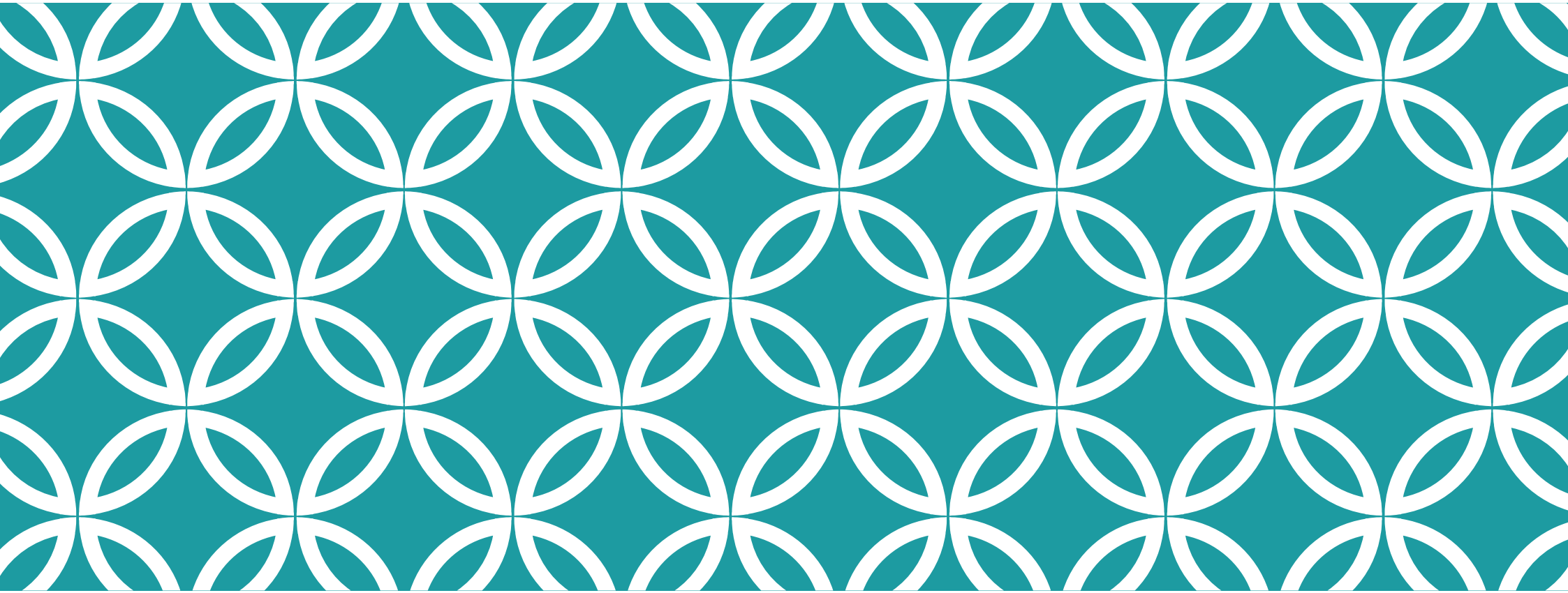
TEKNOLOGI JEMBATAN

Teknologi dalam perencanaan dan pelaksanaan jembatan dihubungkan oleh metoda pelaksanaan untuk konstruksi jembatan dan pengaplikasiannya dalam pemodelan pada saat perencanaan.

Metoda konstruksi pada jembatan terkini yang hampir semua diaplikasikan pada jembatan dengan kategori “khusus”, pada tahap perencanaannya membutuhkan bantuan aplikasi program yang bisa mengakomodir metoda konstruksi tersebut.

METODA KONSTRUKSI DENGAN ALAT YANG MEMANFAAT TEKNOLOGI TERKINI

- Support Shoring
- Crane
- Lifter
- Launching Gantry
- Traveler
- Temporary Strand



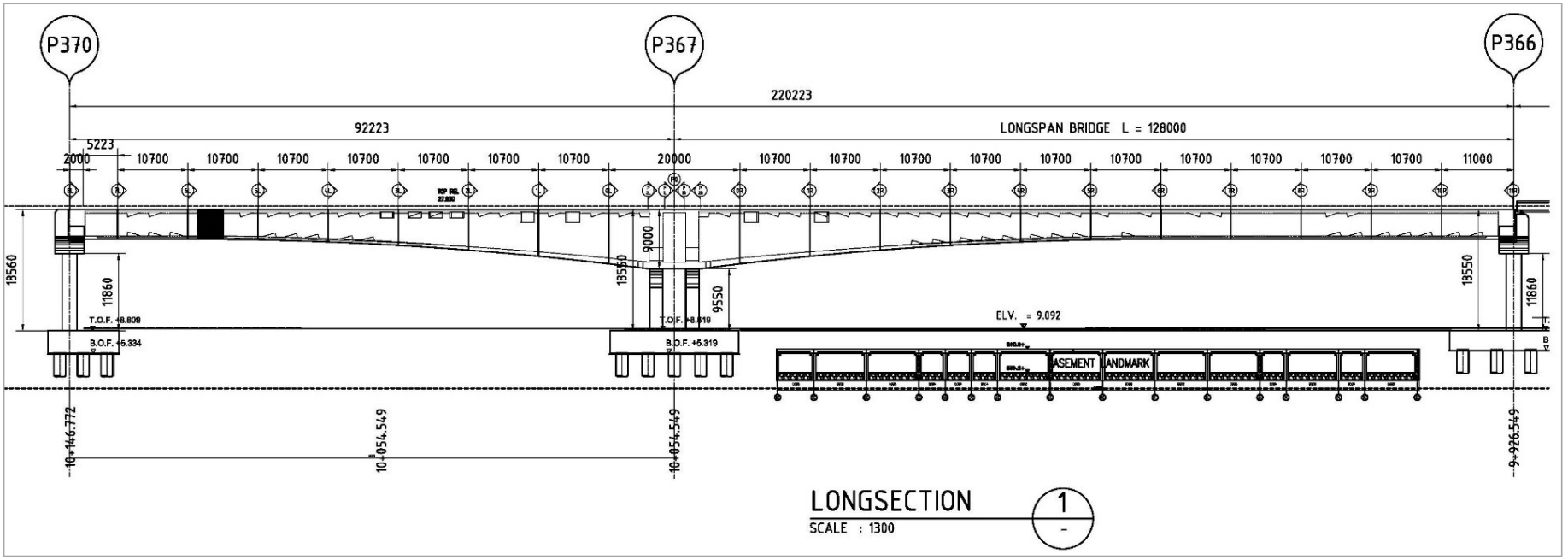
SUPPORT SHORING

DESKRIPSI UMUM

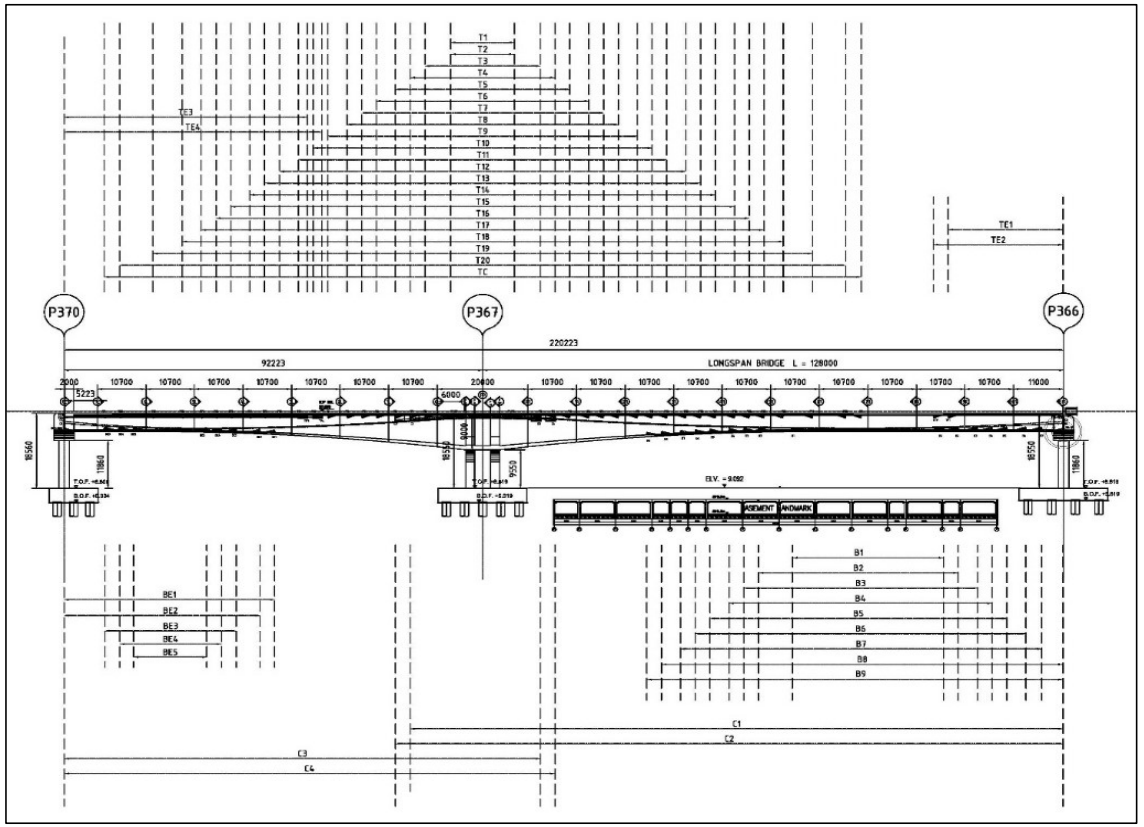
- Merupakan metoda konstruksi yang hanya bisa dilaksanakan bila area di bawah jembatannya boleh diganggu / ditutup / belum dibuka (difungsikan).
- Pengadaan alat yang relative mudah dan banyak tersedia
- Memerlukan ketelitian dalam pemasangan di setiap titik tumpunya baik pertemuan dengna box maupun dengan tanah
- Harus diperhatikan dengan seksama aktivasi shoring bila strukturnya merupakan struktur yang menggunakan prestressed
- Teknologi lama yang terus ditingkatkan untuk metoda konstruksi yang relative paling murah dan mudah didapatkan materialnya.

(UN)BALANCE CANTILEVER

Long span LRT Dukuh Atas, Jakarta

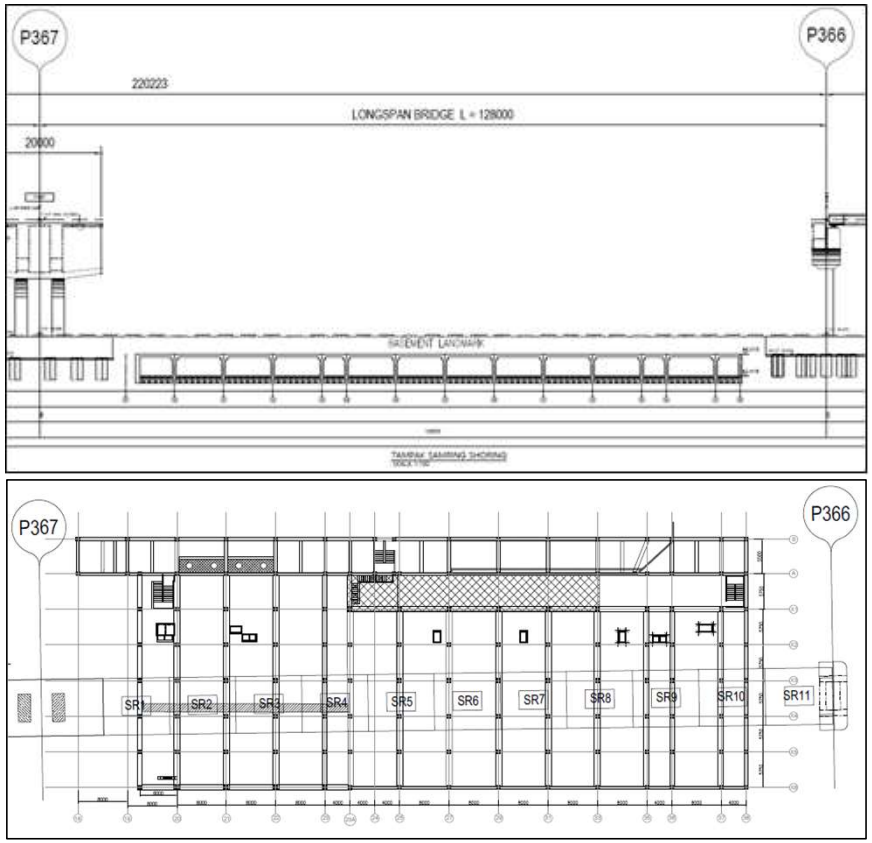


TENDON LAYOUT



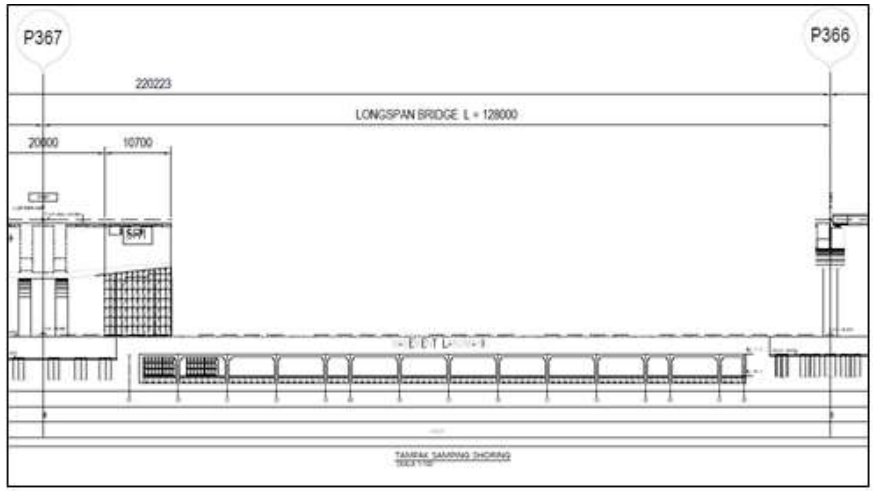
Stage 1 - Piertable

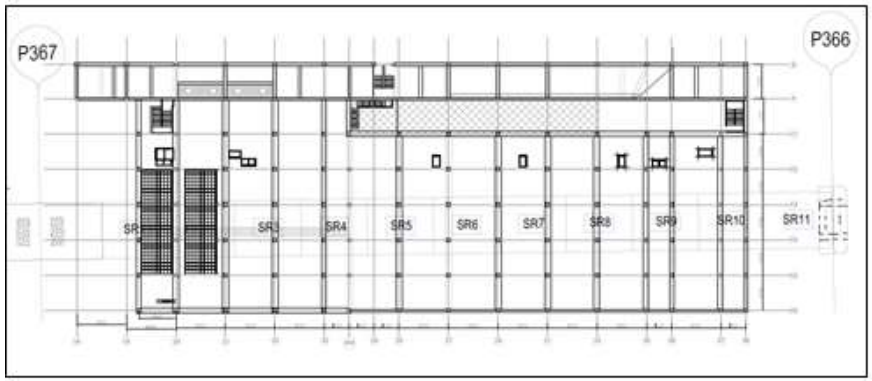
- Install shoring piertable segment
- Install reinforcement
- Pour concrete
- Stressing tendon T1, T2



Stage 2 – Segment S1

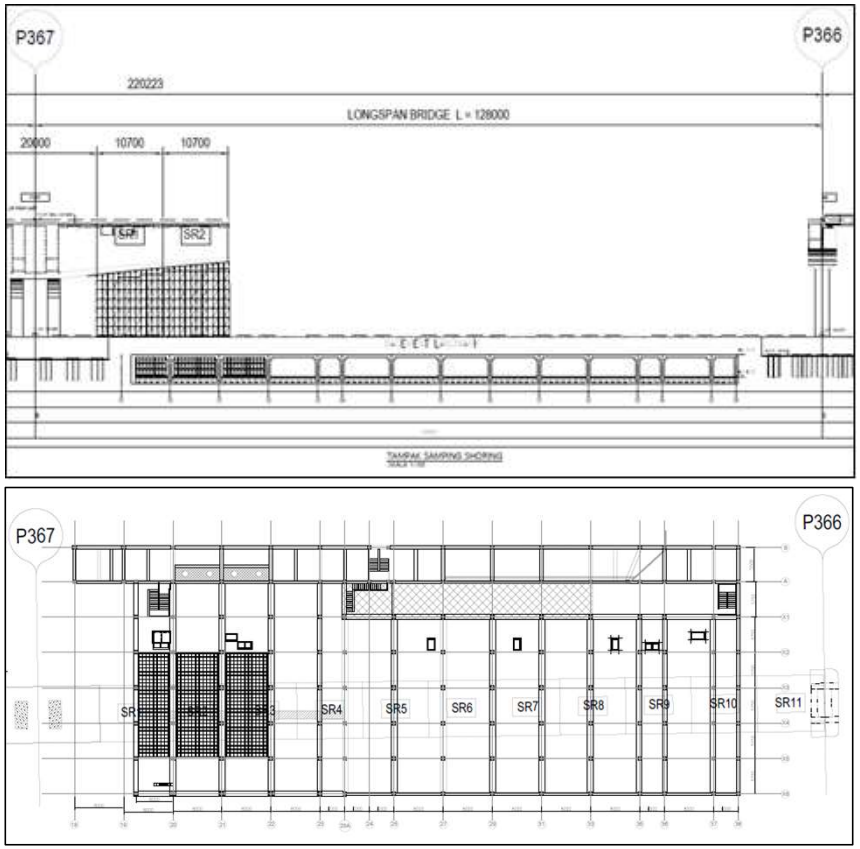
- Install shoring at segment S1
- Install reinforcement
- Pour concrete
- Stressing tendon T3, T4, and T5





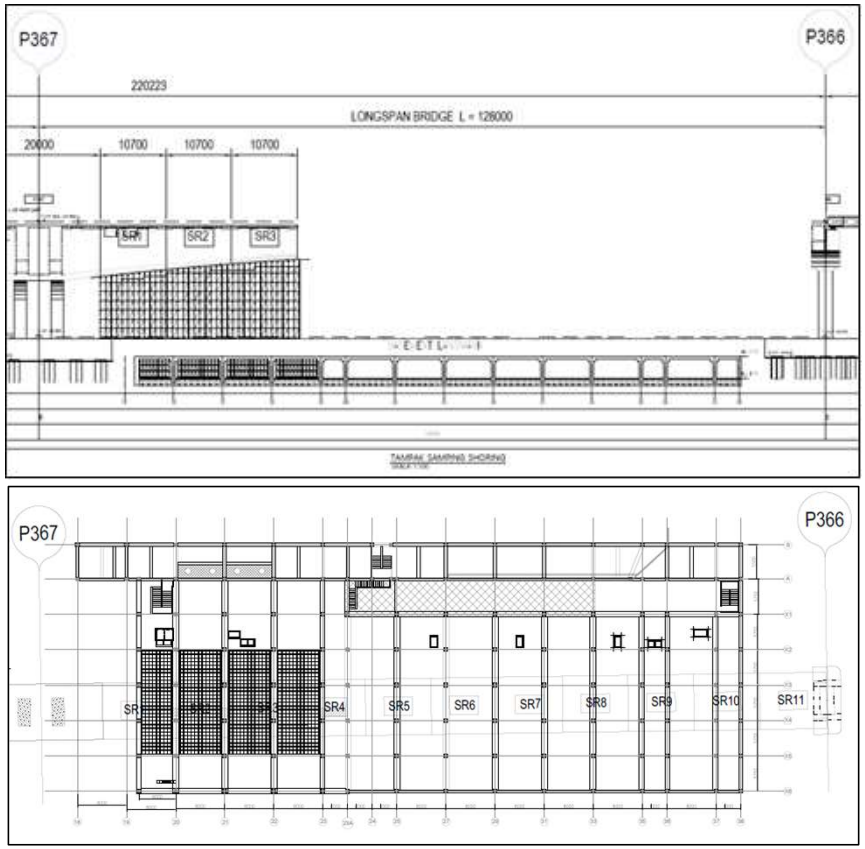
Stage 3 – Segment S2

- Install shoring at segment S2
- Install reinforcement
- Pour concrete
- Stressing tendon T6, T7, and T8



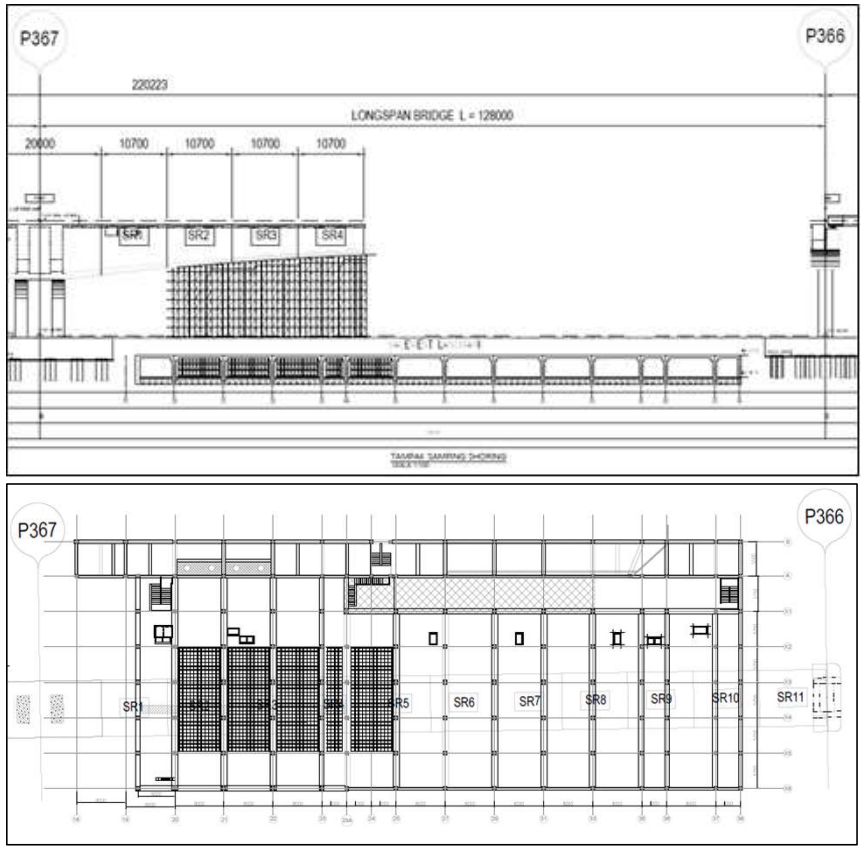
Stage 4 – Segment S3

- Install shoring at segment S3
- Install reinforcement
- Pour concrete
- Stressing tendon T9, T10, and T11



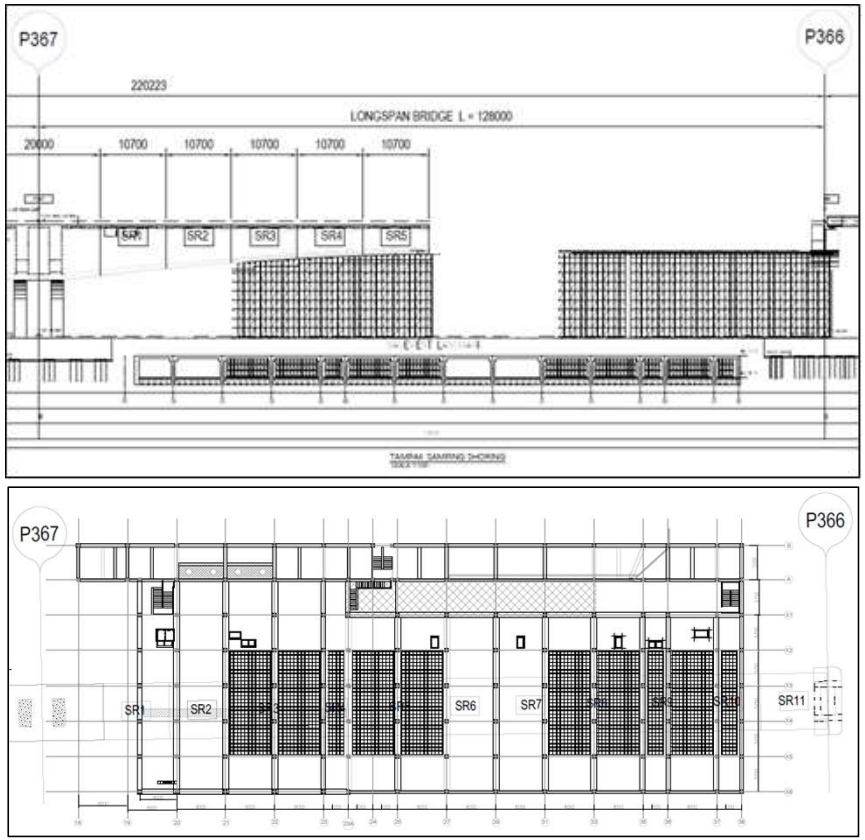
Stage 5 – Segment S4

- Install shoring at segment S4
- Install reinforcement
- Pour concrete
- Stressing tendon T12, T13, and T14



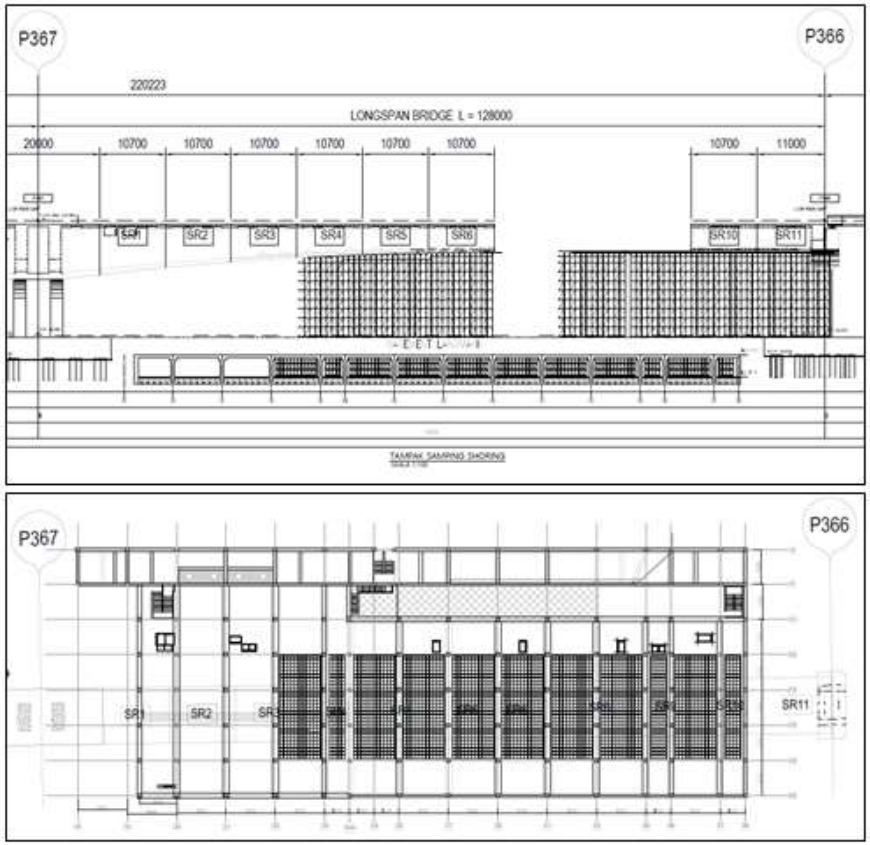
Stage 6 – Segment S5

- Install shoring at segment S5
- Install reinforcement
- Pour concrete
- Stressing tendon T15, T16, and T17
- Preparation for Sidespan shoring



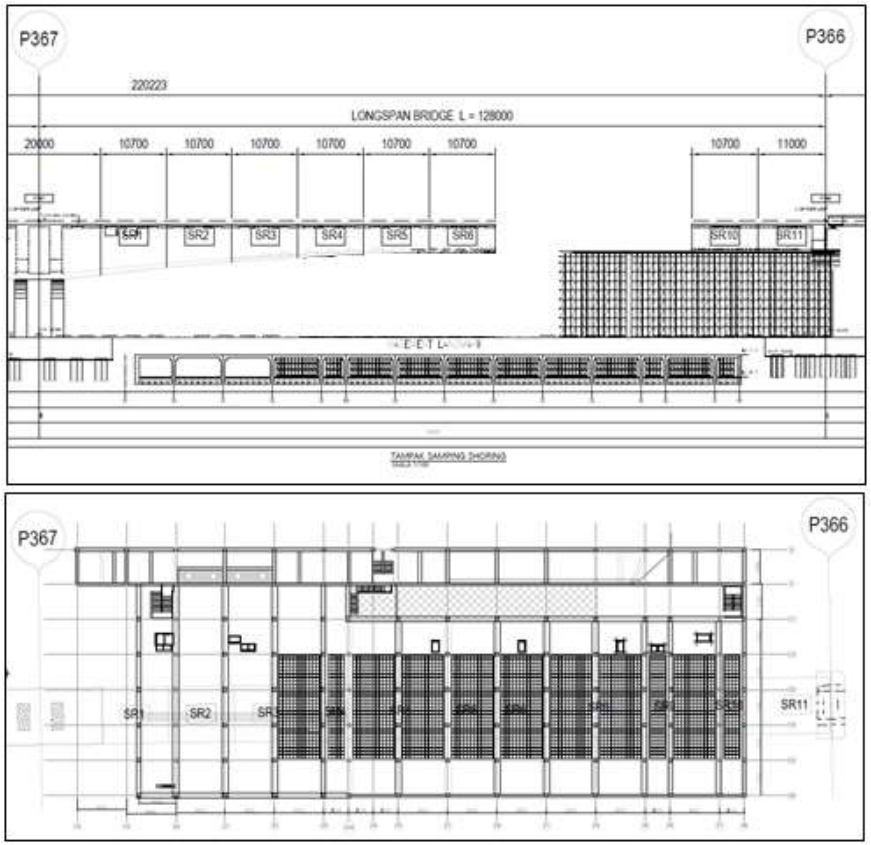
Stage 7 – Segment S6

- Install shoring at segment S6
- Install reinforcement
- Pour concrete
- Stressing tendon T18 and T19
- Preparation for Sidespan segments



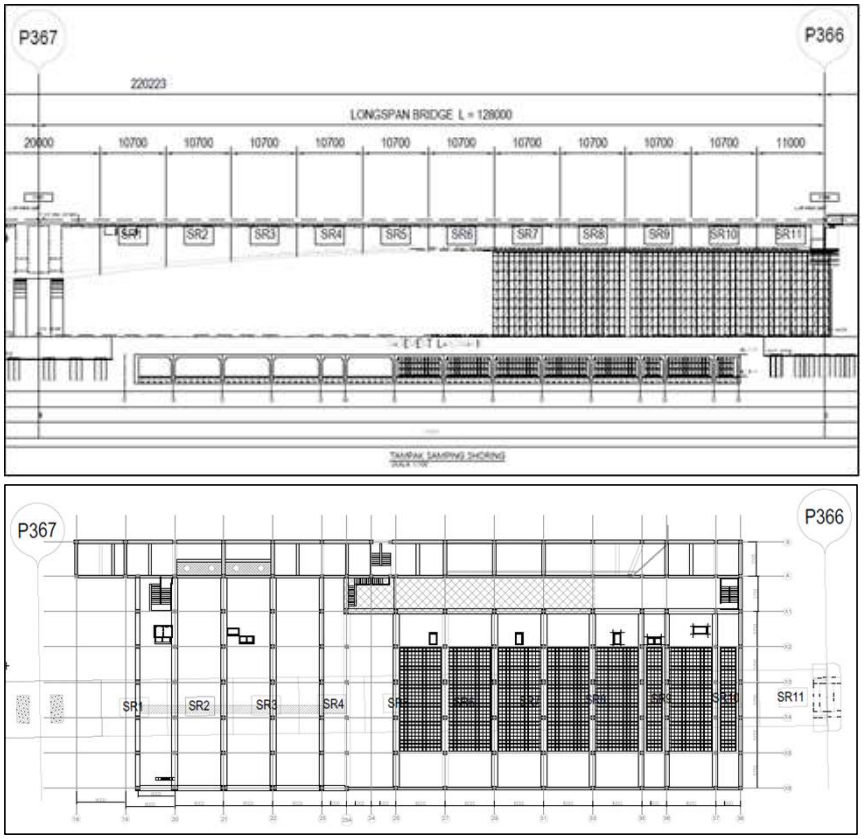
Stage 7a – Remove cantilever shoring

- Remove all cantilever shoring



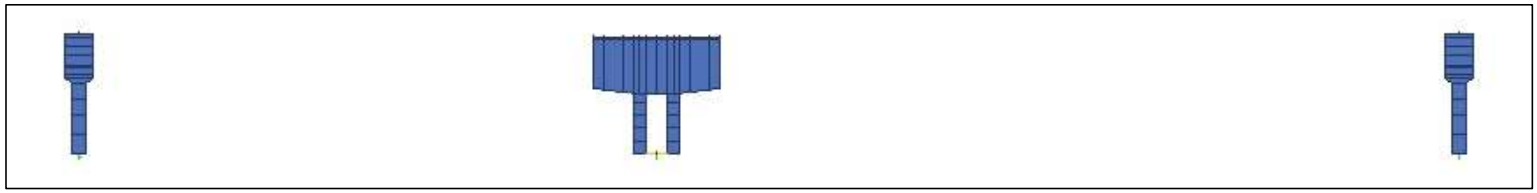
Stage 8 – Segment Sidespan P366

- Install shoring at segment Sidespan P366
- Install reinforcement
- Pour concrete
- Stressing tendon B5-B9, TE1, and TE2



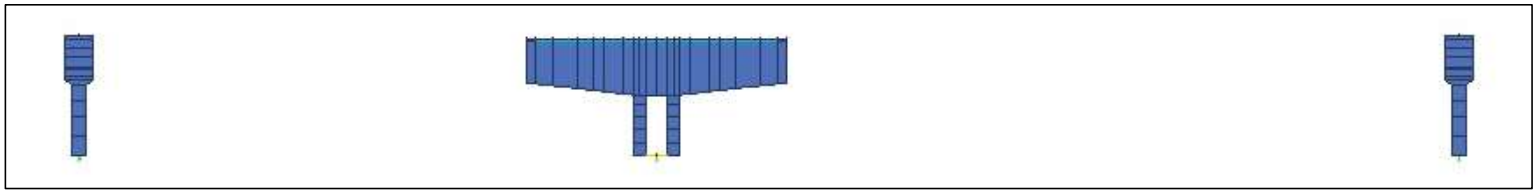
VISUALISASI PADA PEMODELAN DENGAN SOFTWARE RM

Stage 1 Piertable P367



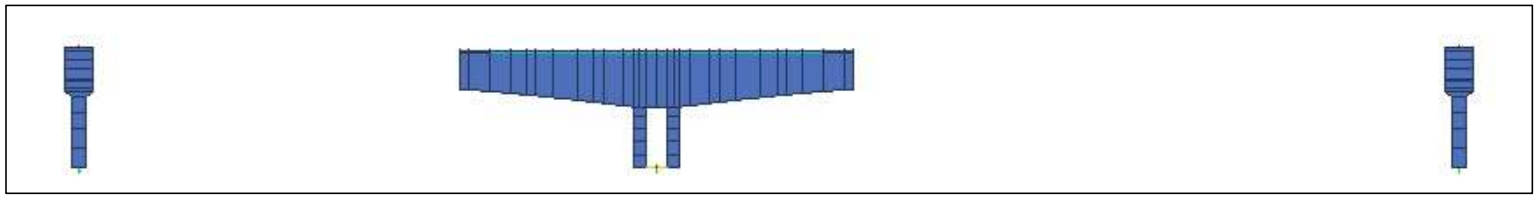
- Install shoring piertable segment
- Install reinforcement
- Pour concrete
- Stressing tendon T1, T2

Stage 2 Segment S1



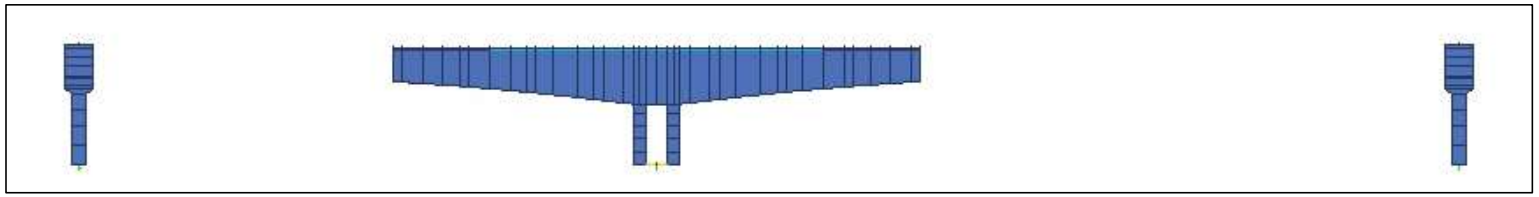
- Install shoring at segment S1
- Install reinforcement
- Pour concrete
- Stressing tendon T3, T4, and T5

Stage 3 Segment S2



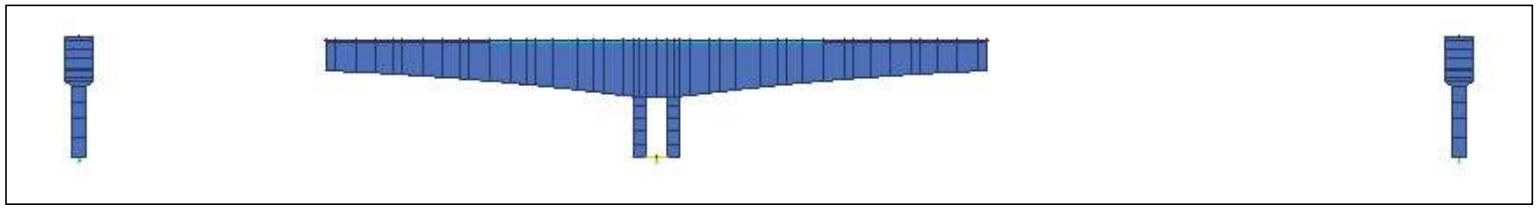
- Install shoring at segment S2
- Install reinforcement
- Pour concrete
- Stressing tendon T6, T7, and T8

Stage 4 Segment S3



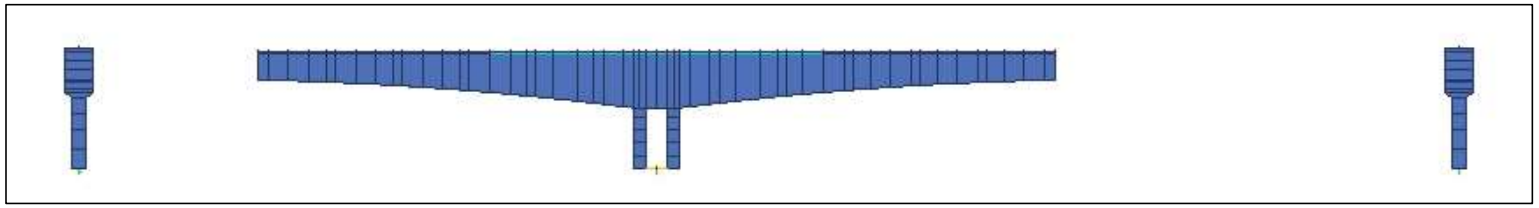
- Install shoring at segment S3
- Install reinforcement
- Pour concrete
- Stressing tendon T9, T10, and T11

Stage 5 Segment S4



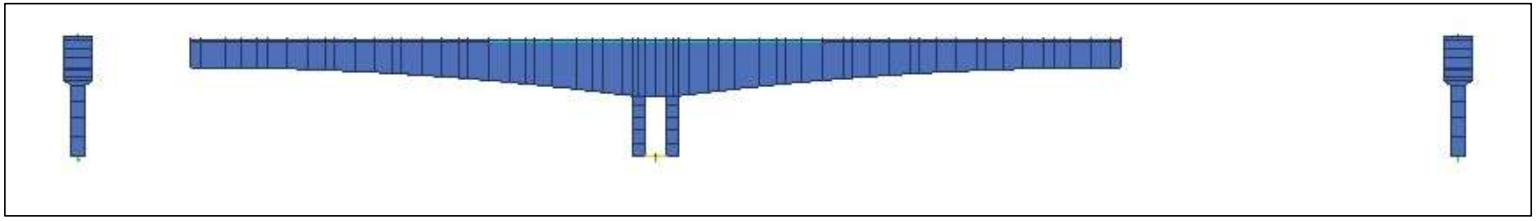
- Install shoring at segment S4
- Install reinforcement
- Pour concrete
- Stressing tendon T12, T13, and T14

Stage 6 Segment S5



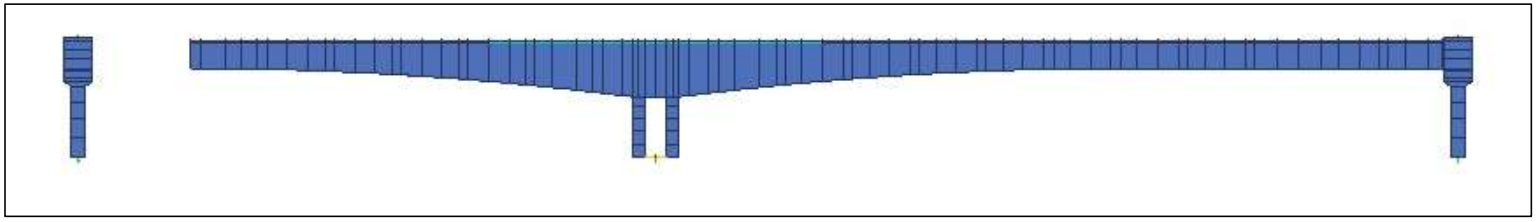
- Install shoring at segment S5
- Install reinforcement
- Pour concrete
- Stressing tendon T15, T16, and T17

Stage 7 Segment S6



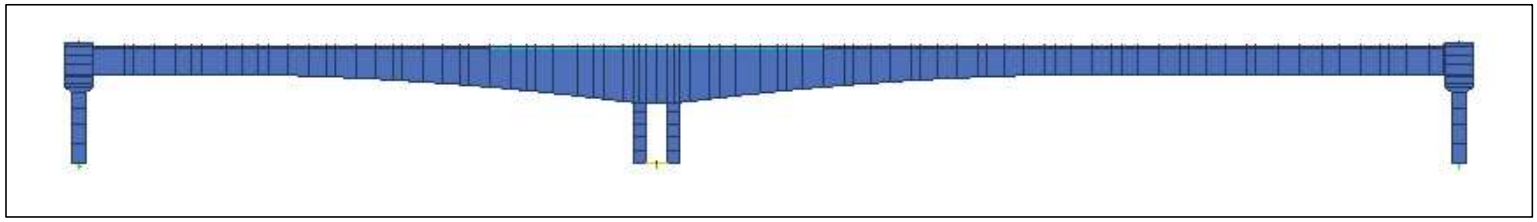
- Install shoring at segment S6
- Install reinforcement
- Pour concrete
- Stressing tendon T18 and T19

Stage 8 Segment Sidespan P366



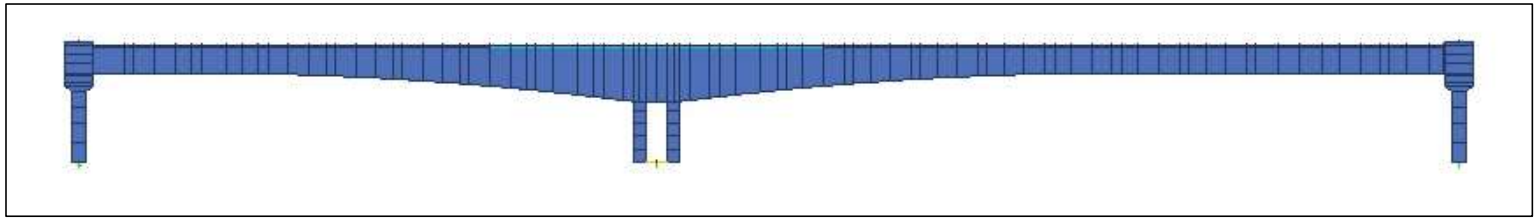
- Install shoring at segment Sidespan P366
- Install reinforcement
- Pour concrete
- Stressing tendon B5-B9, TE1, and TE2

Stage 9 Segment Sidespan P370



- Install shoring at segment Sidespan P370
- Install reinforcement
- Pour concrete
- Stressing tendon BE1-BE5, TE3, TE4, C3 and C4
- Stressing tendon T20
- Stressing tendon B1-B4, C1 and C2

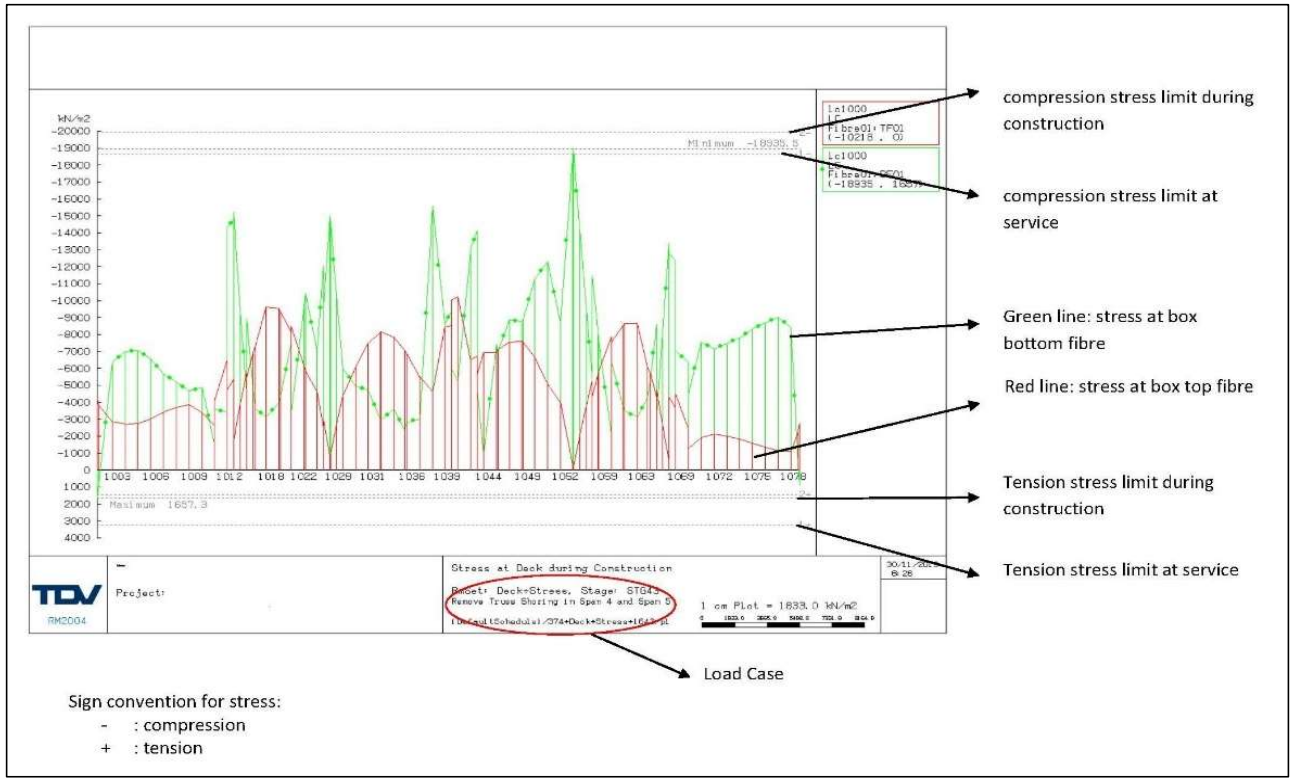
Stage 10 Final



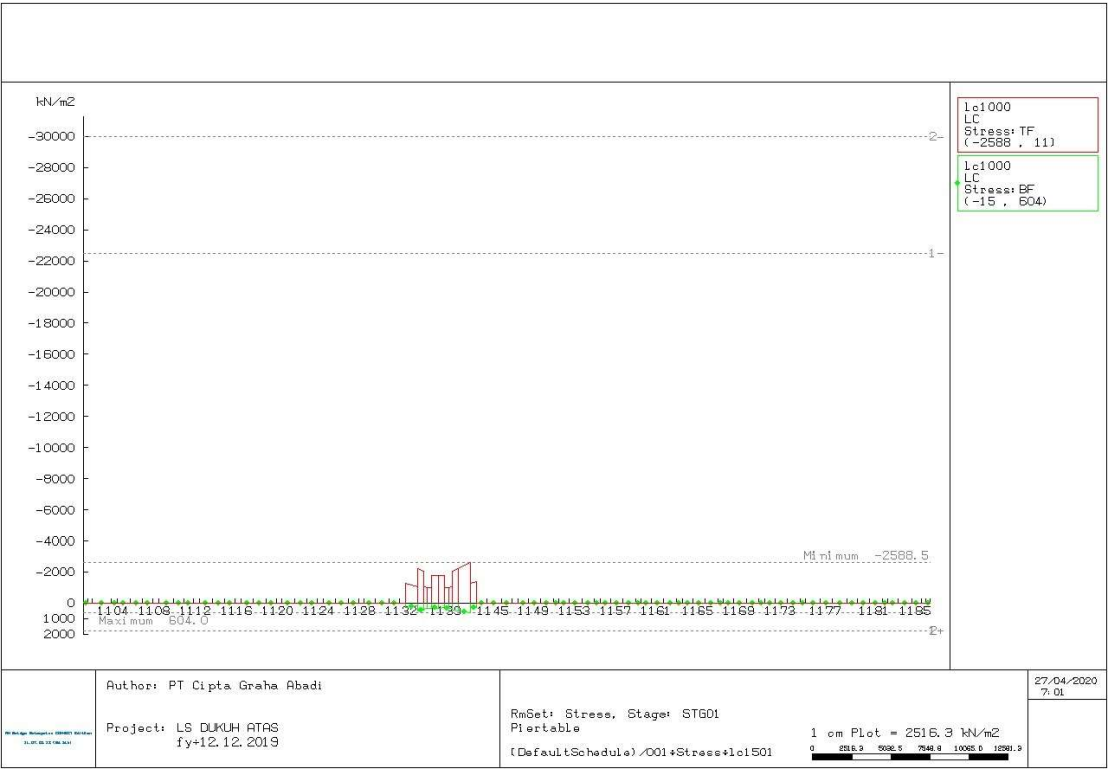
- Install SDL : Slab track and barrier

OUTPUT – STRESS DURING CONSTRUCTION

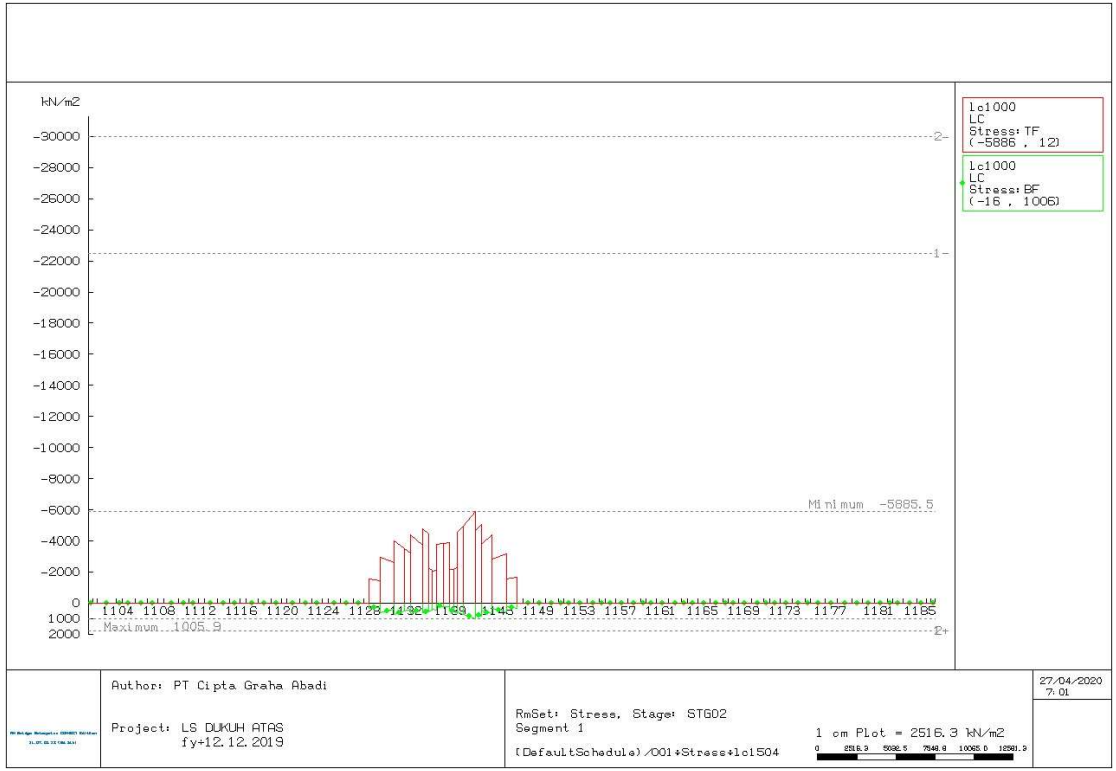
Diagram reading guidance



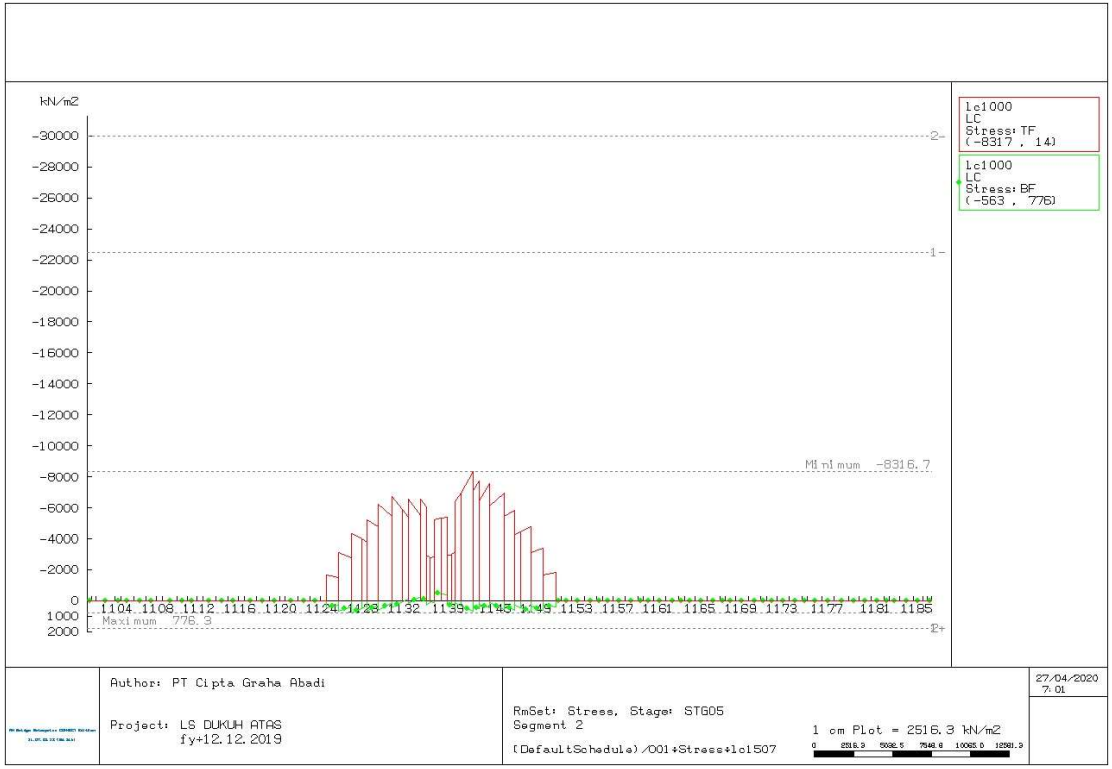
Stage 1 - Piertable



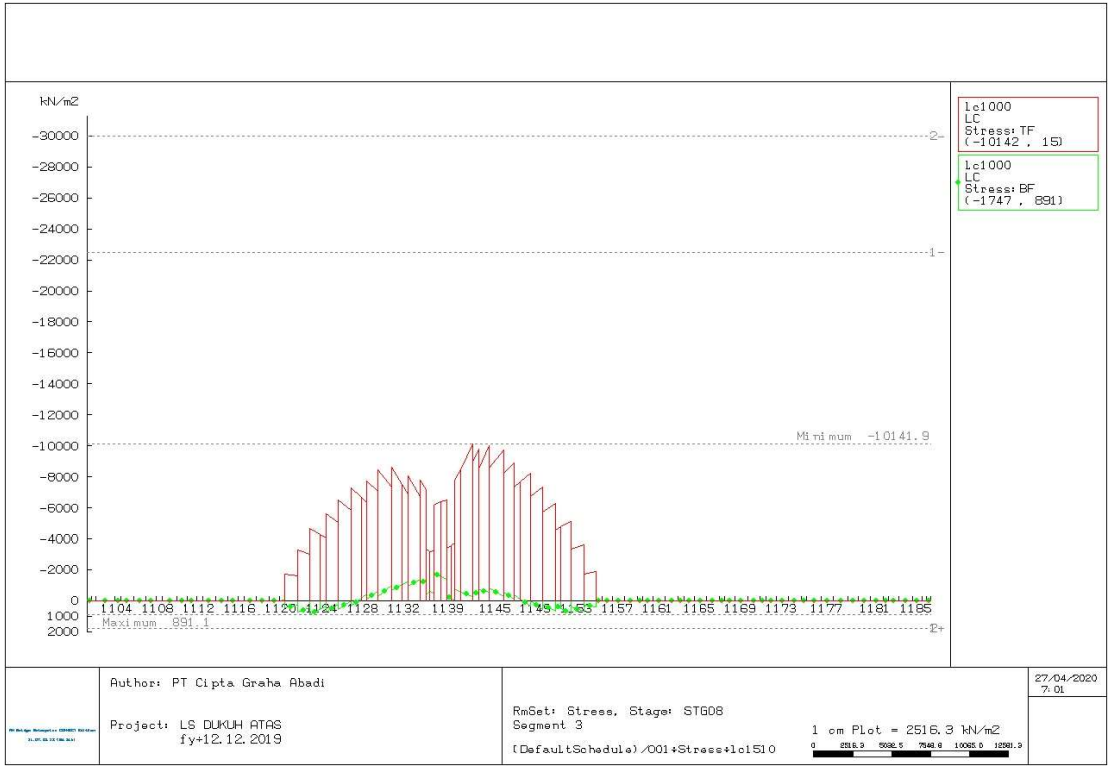
Stage 2 – Segment S1



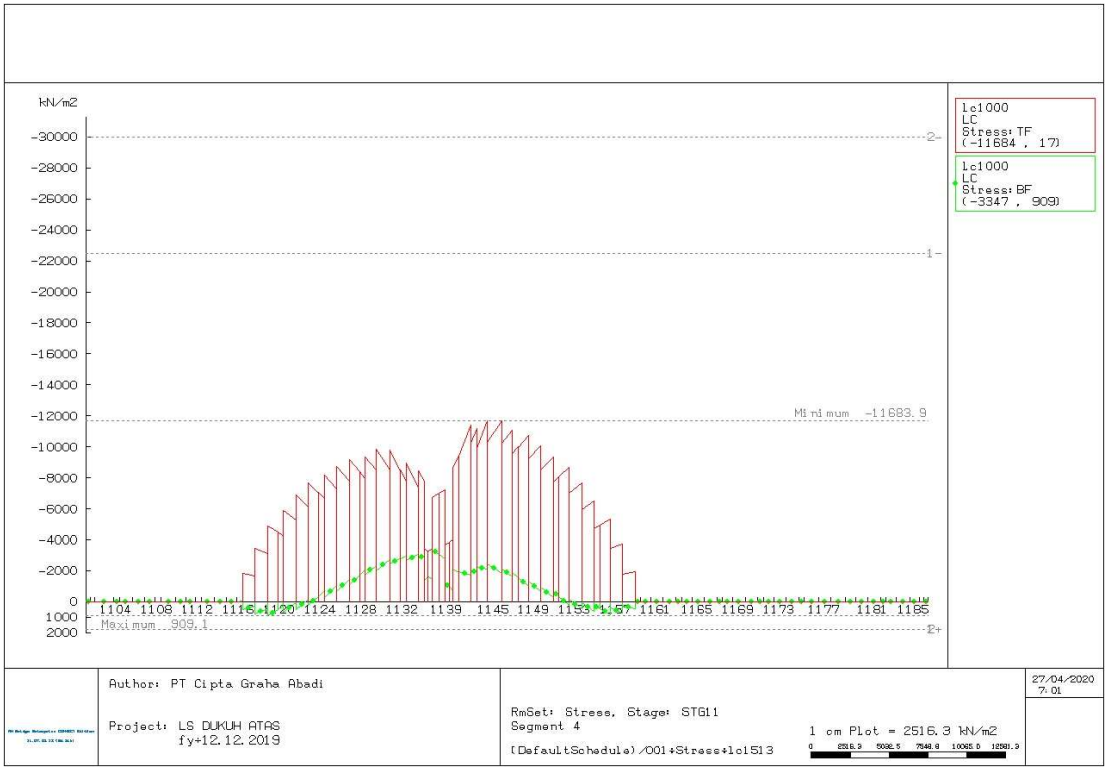
Stage 3 – Segment S2



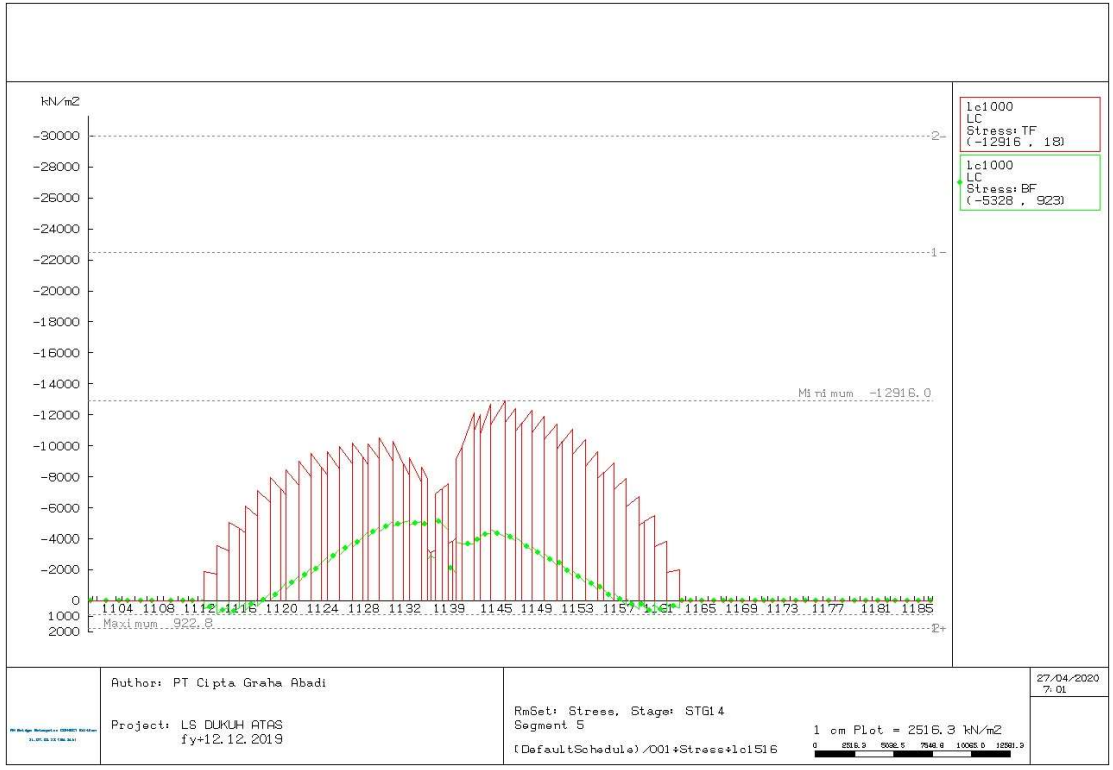
Stage 4 – Segment S3



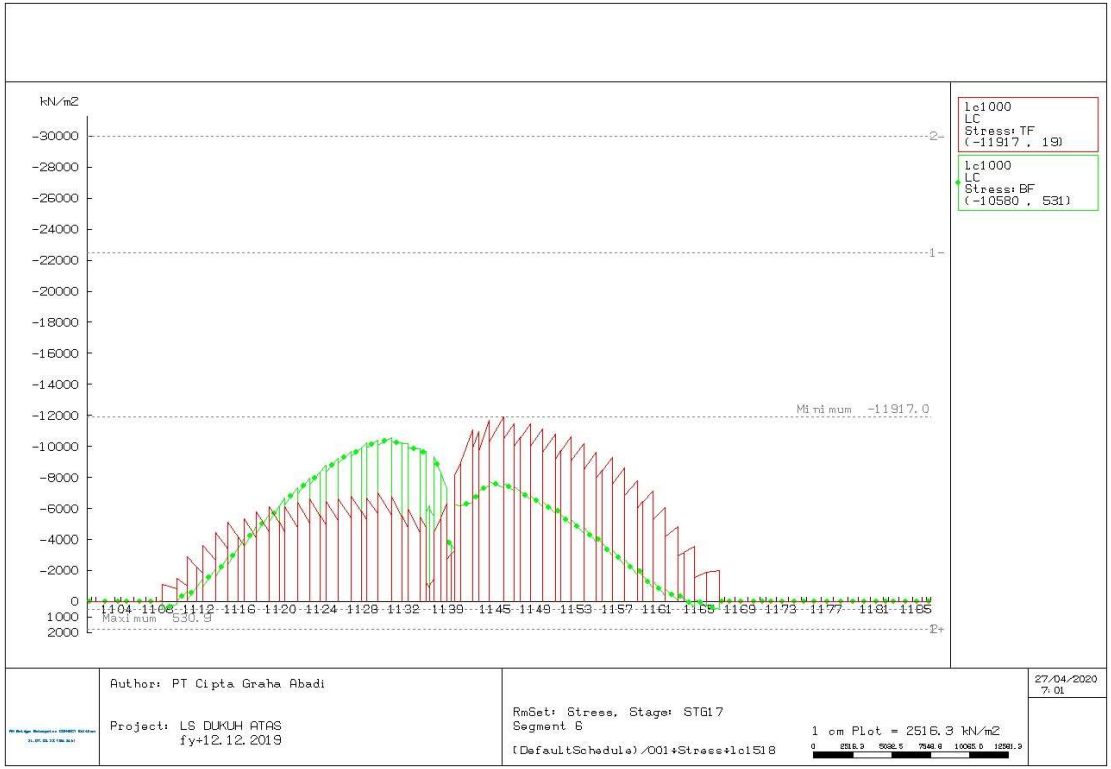
Stage 5 – Segment S4



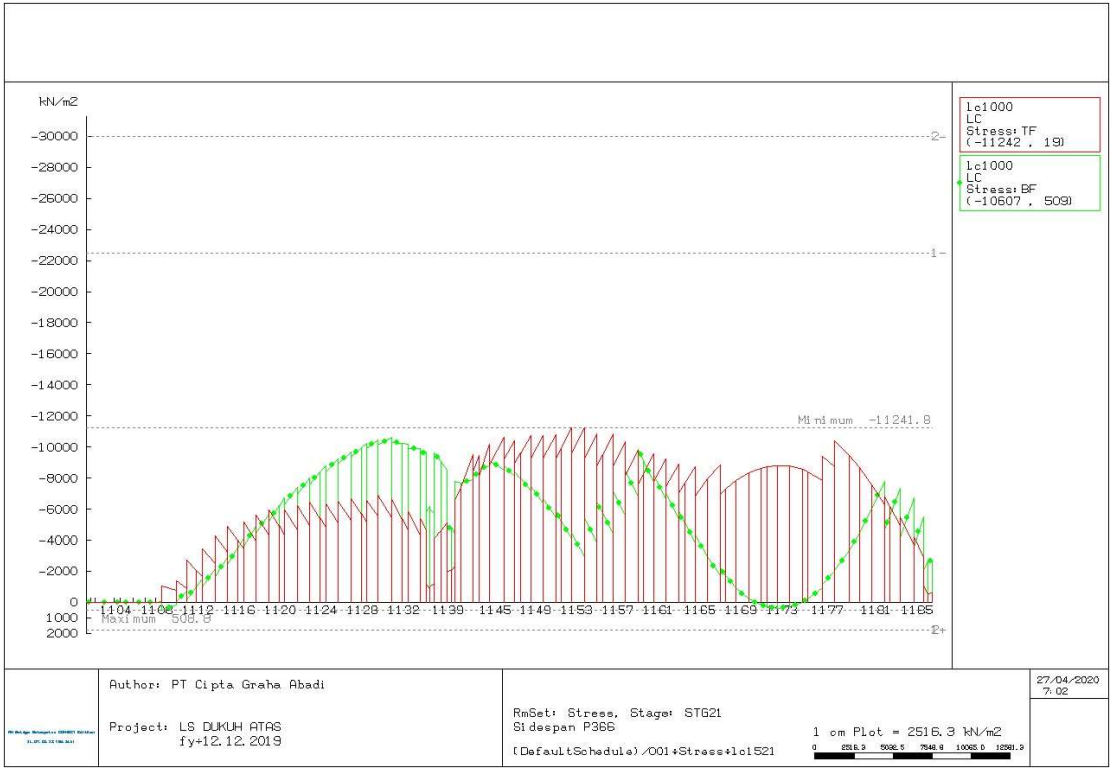
Stage 6 – Segment S5



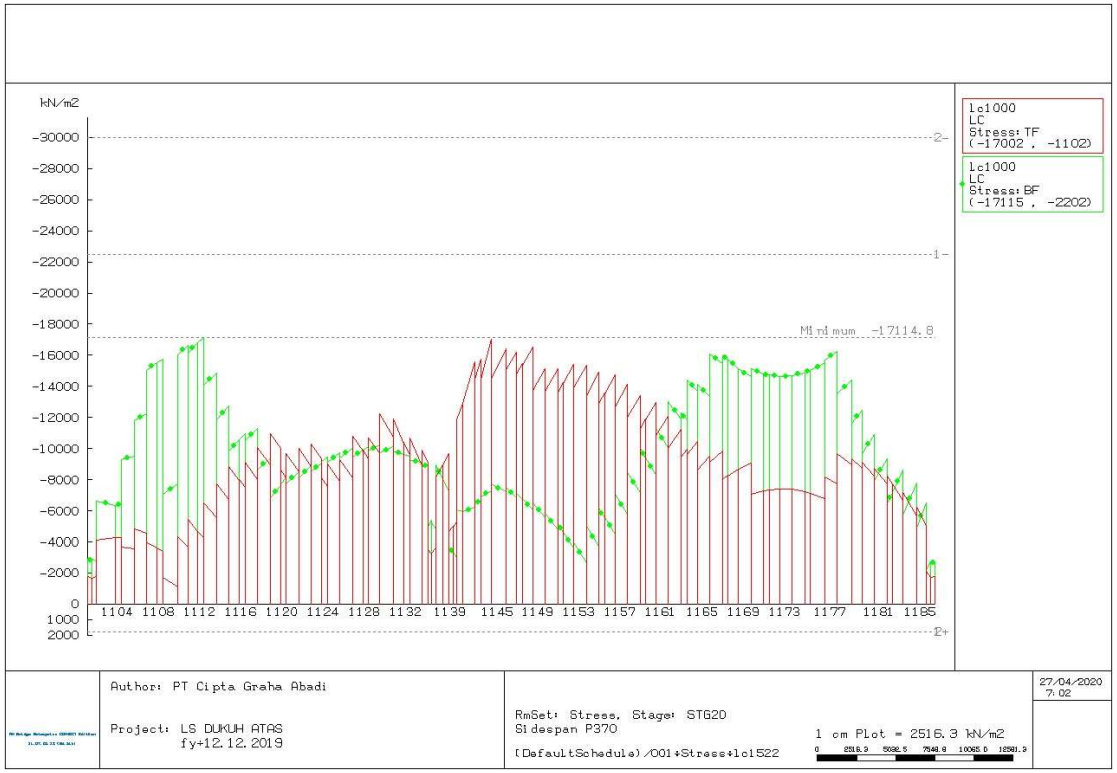
Stage 7 – Segment S6



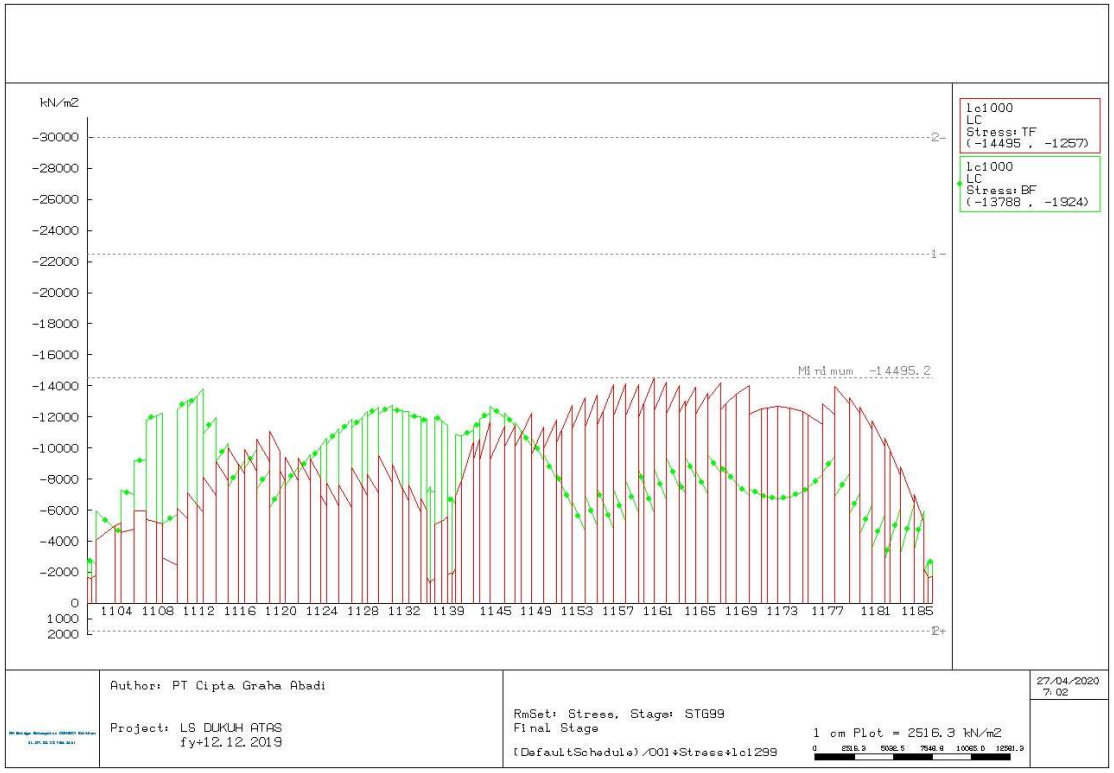
Stage 8 – Segment Sidespan P366



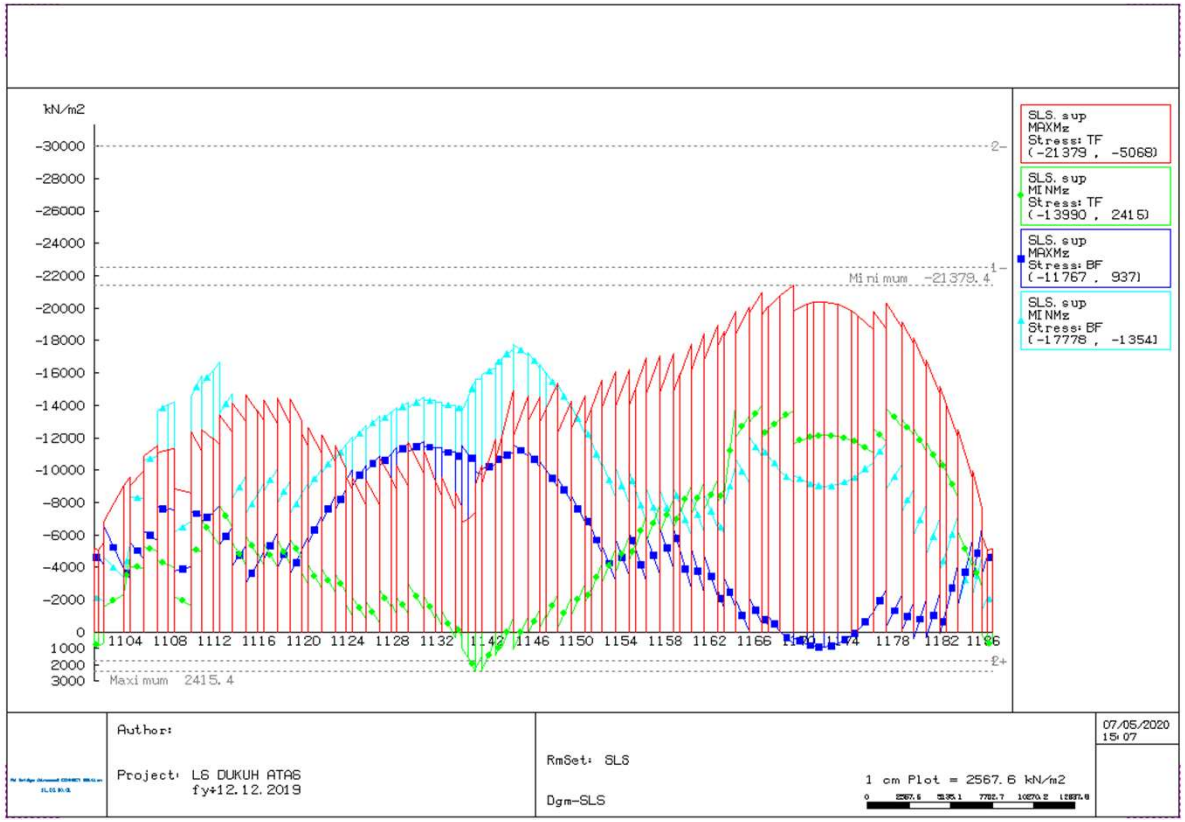
Stage 9 – Segment Sidespan P370

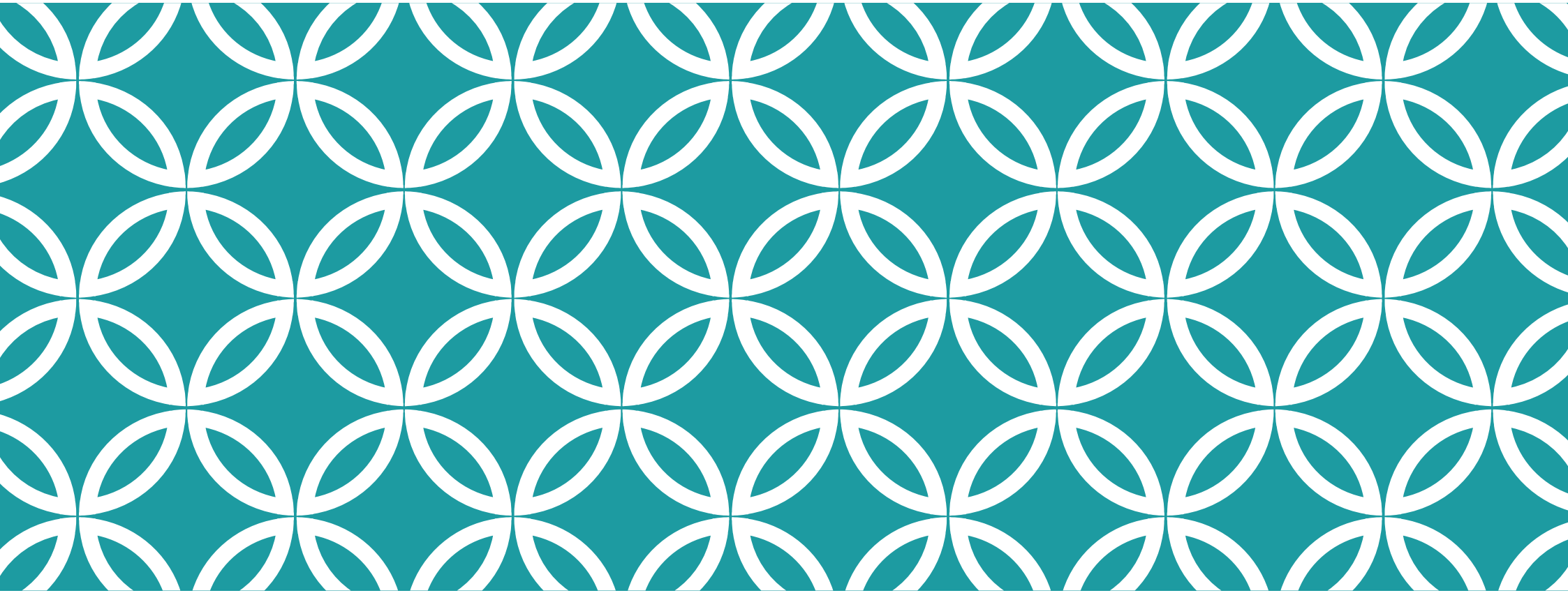


Stage 10 – Final, Permanent Load



At service condition (SLS)





CRANE

DESKRIPSI UMUM

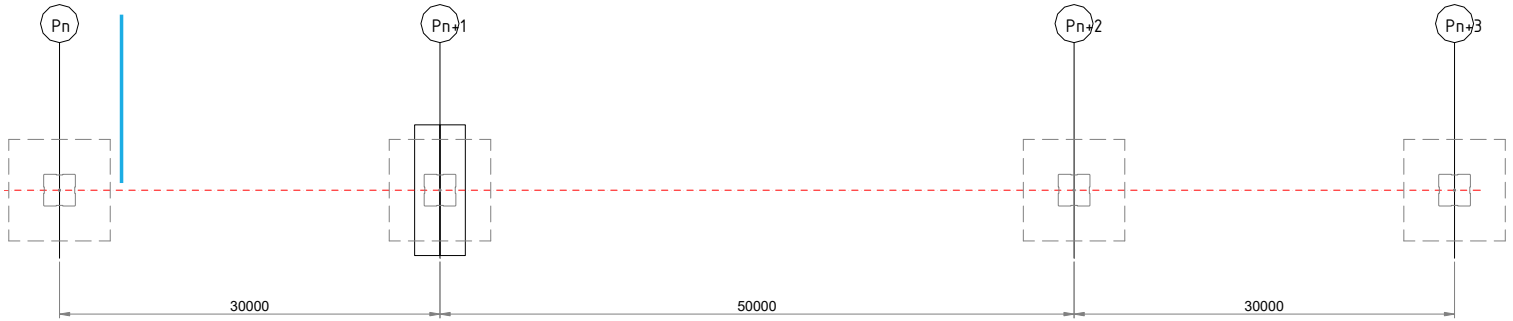
- Untuk struktur precast segmental, panjang bentang bisa lebih fleksible, tergantung dari berat per segmen yang akan diangkat.
- Untuk precast per bentang, dibatasi oleh panjang bentang dan berat segmen, karena crane memiliki keterbatasan dalam panjang boom dan kapasitas berat yang dapat diangkat
- Alat bantu yang cukup banyak dan mudah didapat, serta pengoperasiannya yang cukup mudah.
- Hanya bias dilakukan di lokasi yang memungkinkan adanya dudukan crane
- Harus diperhitungkan dengan seksama maneuver dan kekuatan dudukan / pondasi crane

BALANCE CANTILEVER

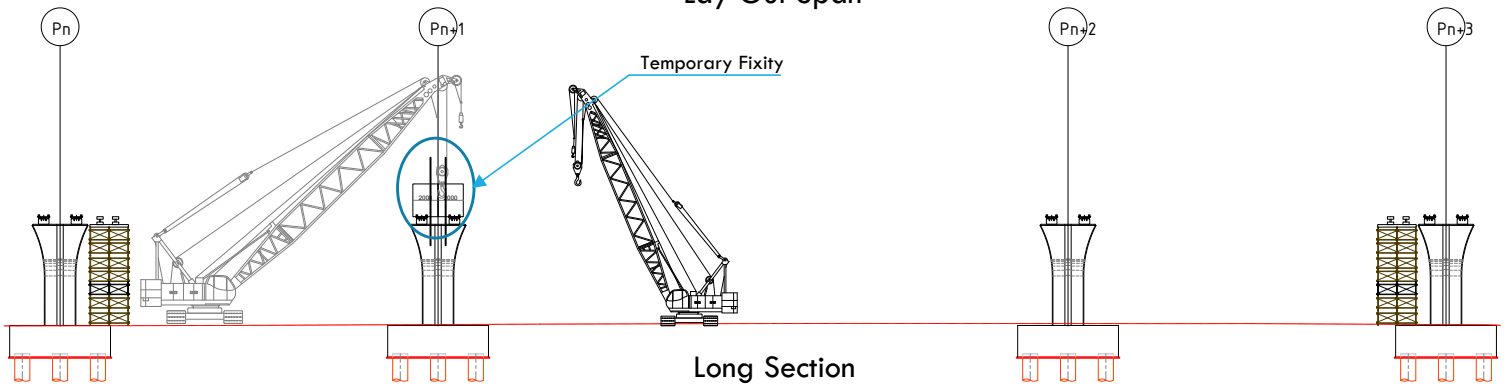
- Box precast, bisa dimensi yang sama ataupun variable
- Tidak ada tambahan beban alat pada struktur permanen

ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

STEP : INSTALL TEMPORARY FIXITY



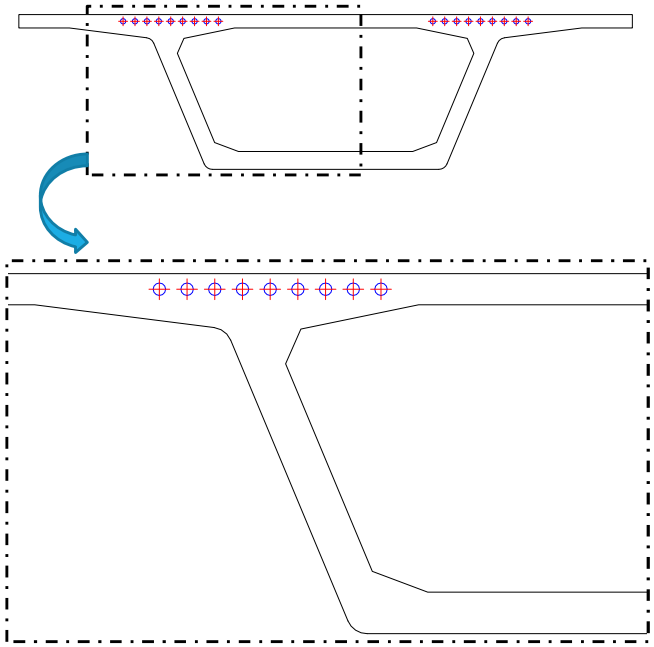
Lay Out Span



Long Section

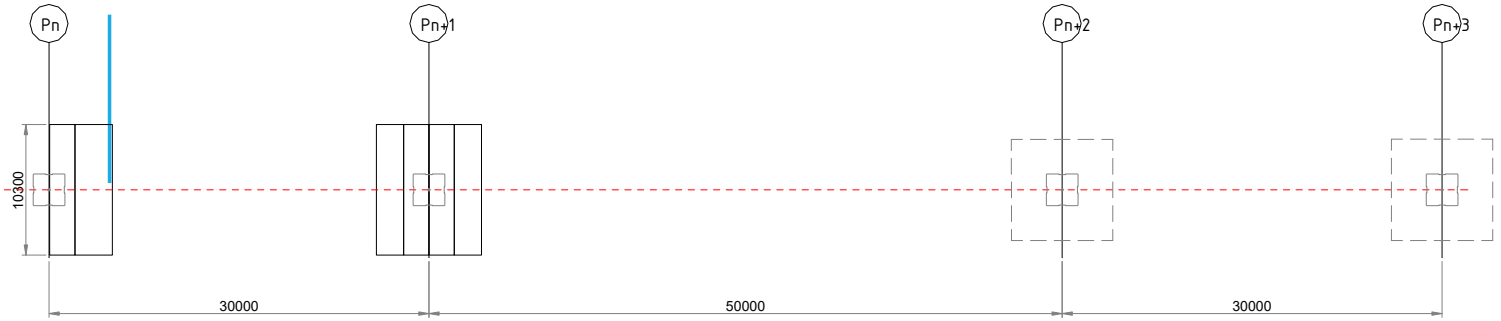
Momen Diagram

Cross Section

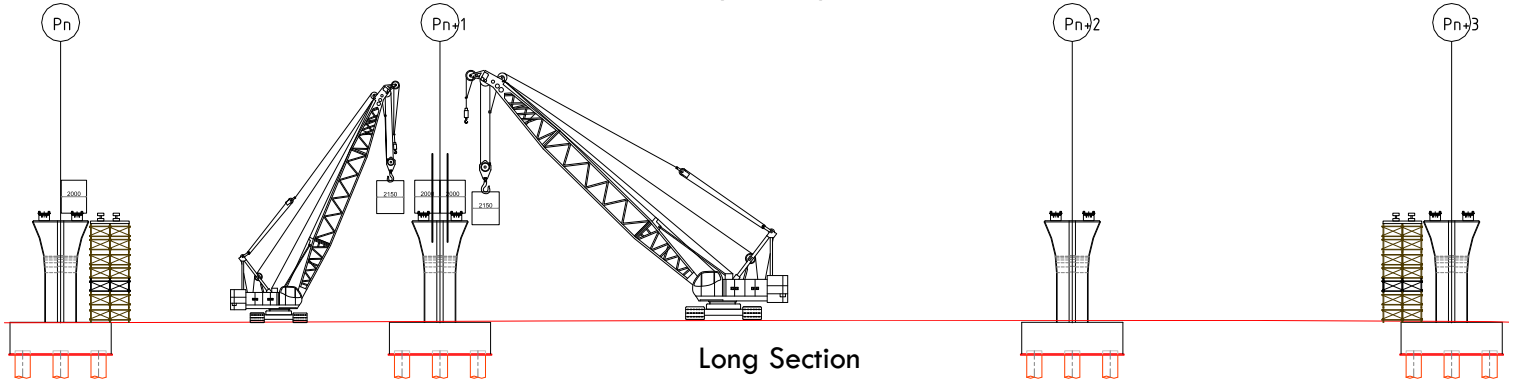


ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

STEP : INSTALL SEGMENT BOX



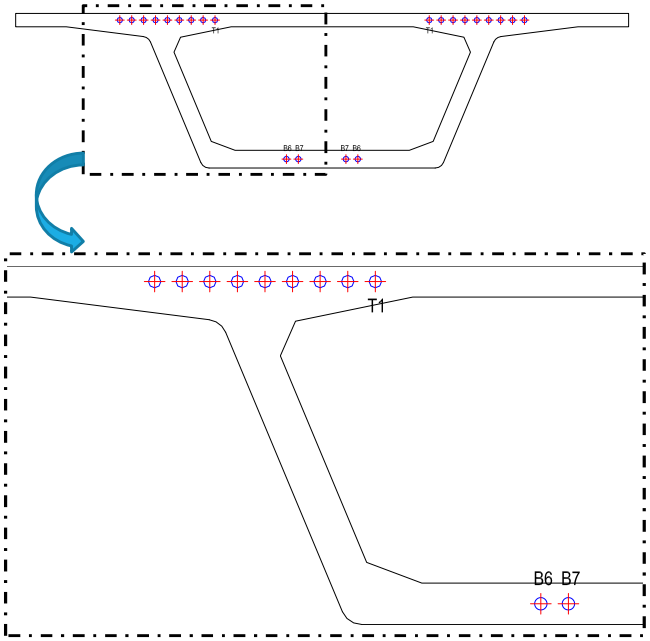
Lay Out Span



Long Section

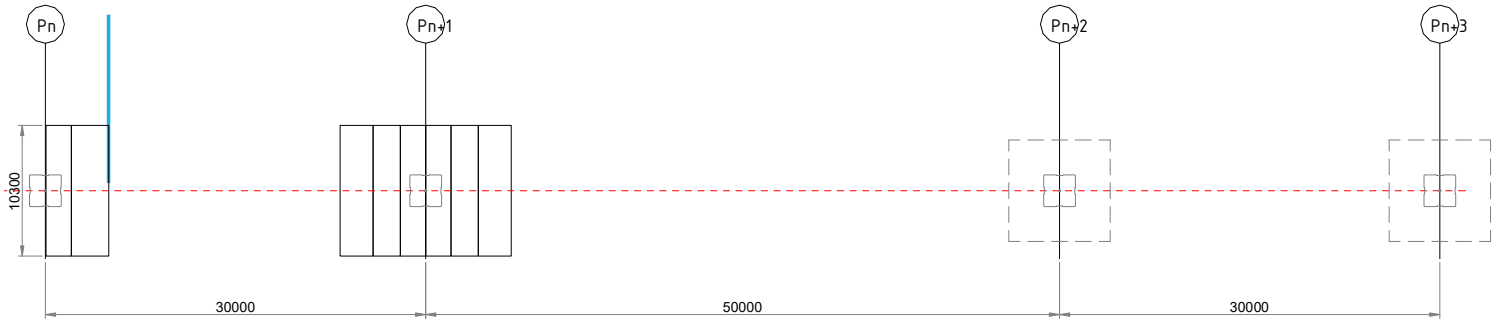
Momen Diagram

Cross Section

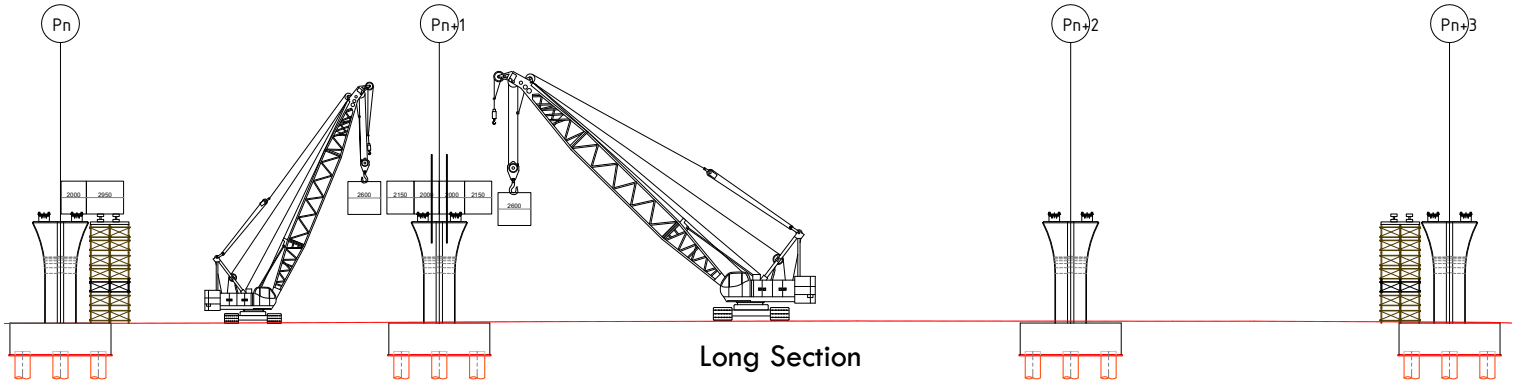


ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

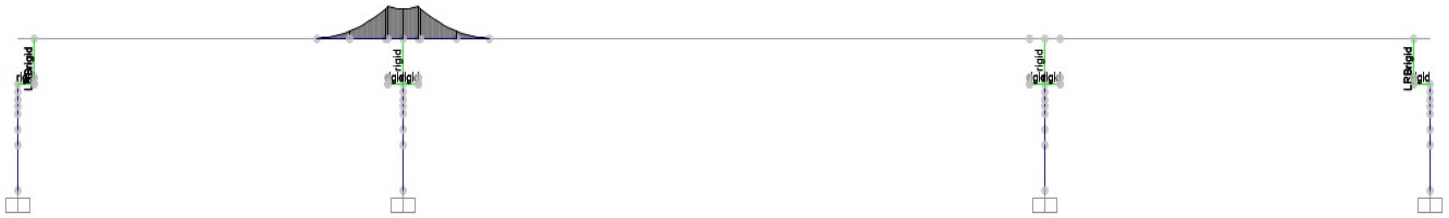
STEP : INSTALL SEGMENT BOX



Lay Out Span

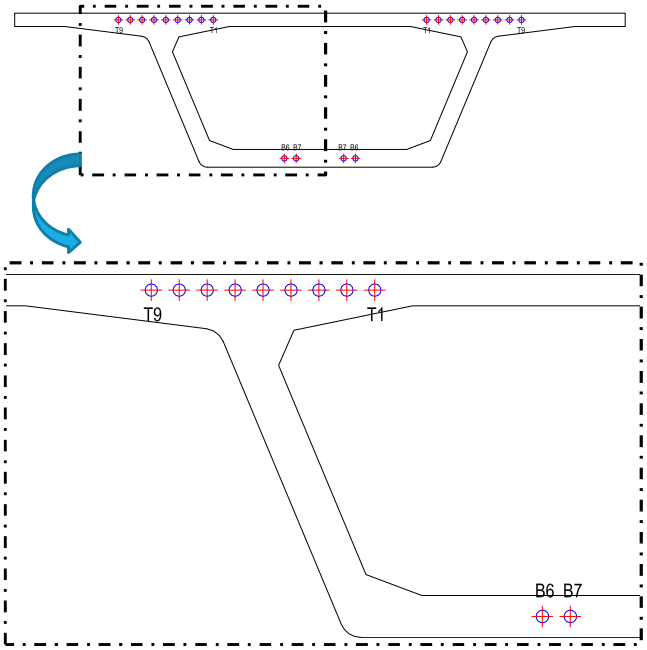


Long Section



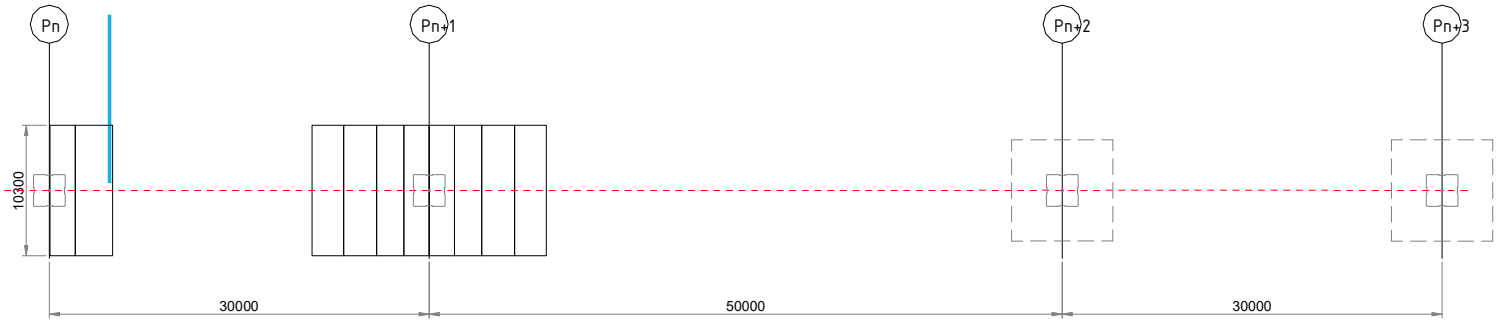
Momen Diagram

Cross Section

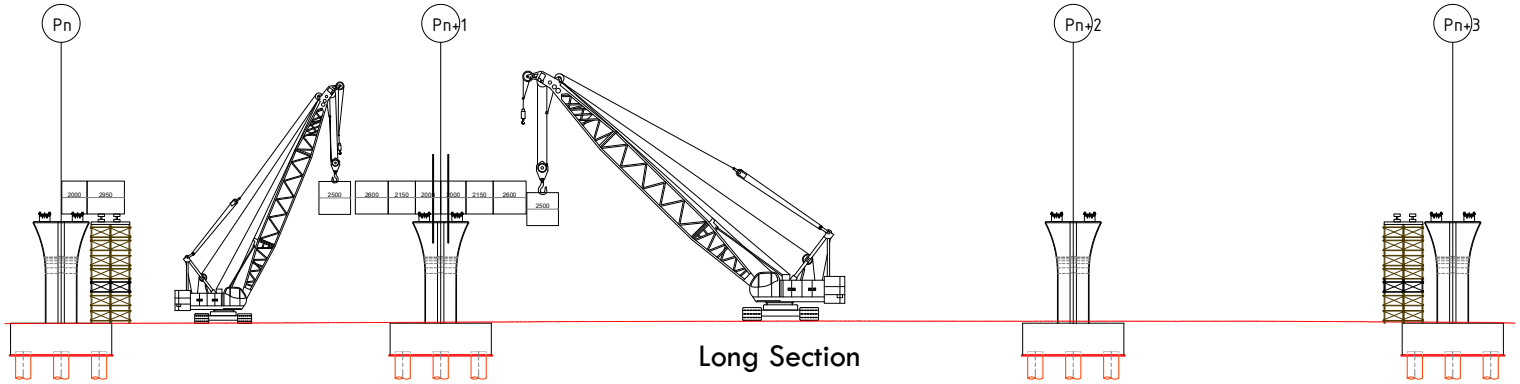


ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

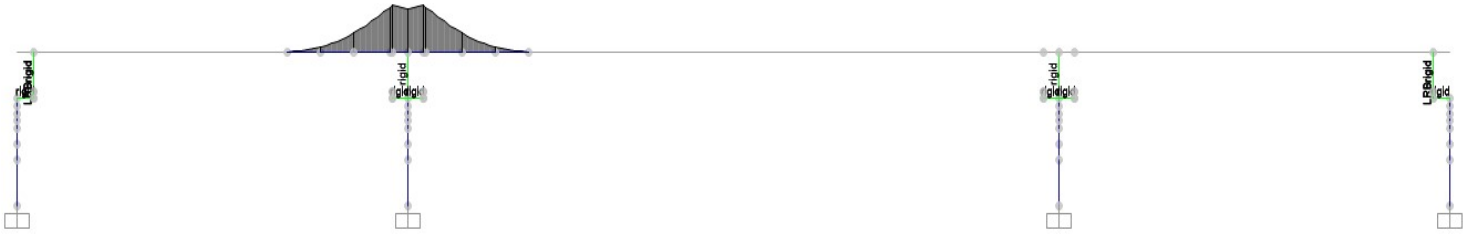
STEP : INSTALL SEGMENT BOX



Lay Out Span

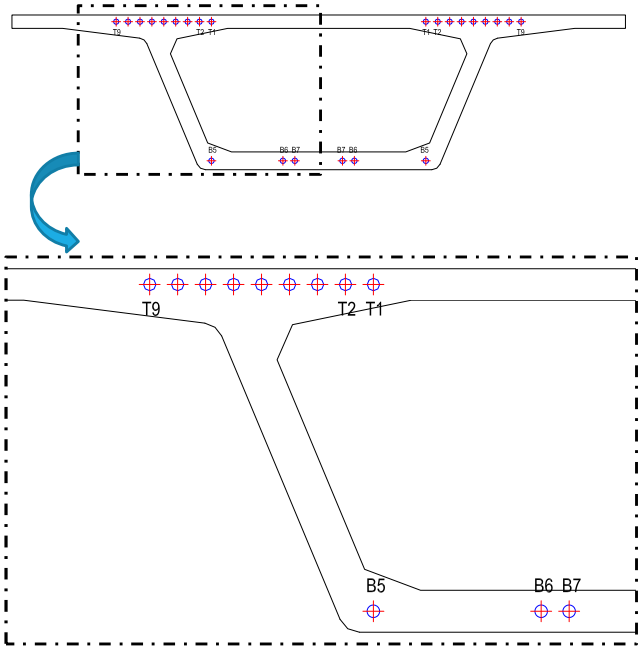


Long Section



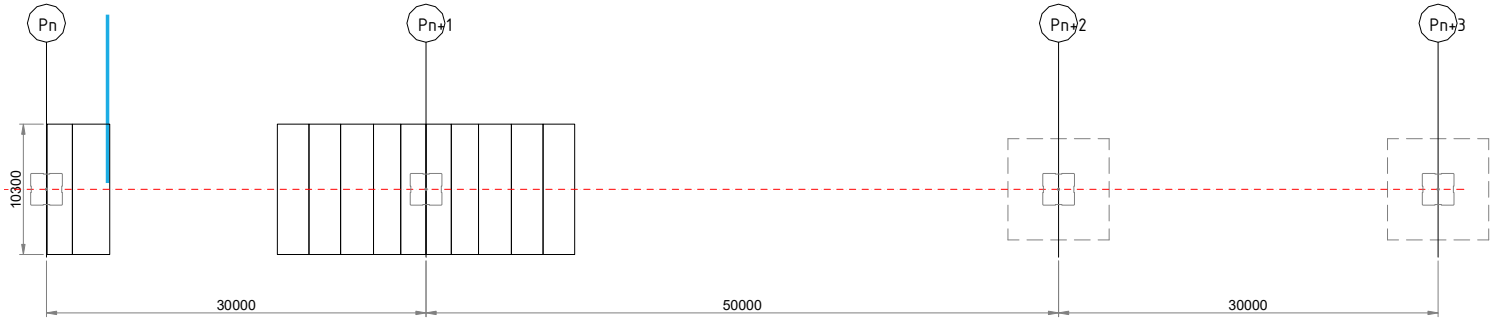
Momen Diagram

Cross Section

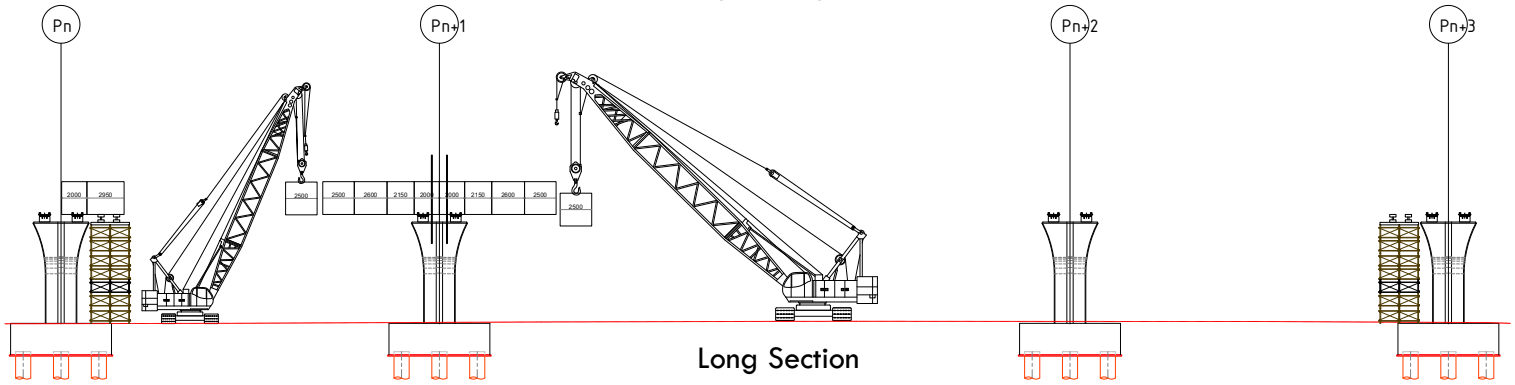


ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

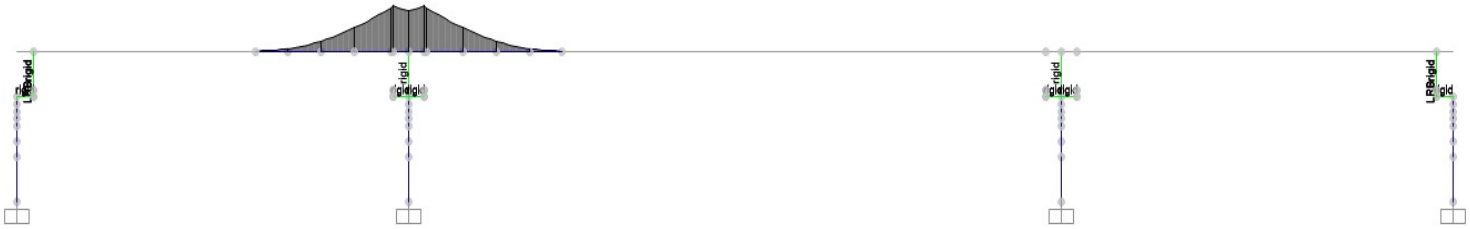
STEP : INSTALL SEGMENT BOX



Lay Out Span

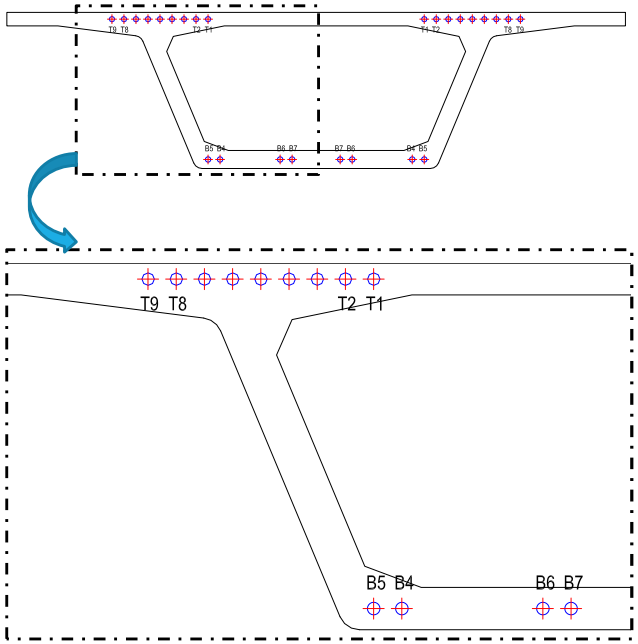


Long Section



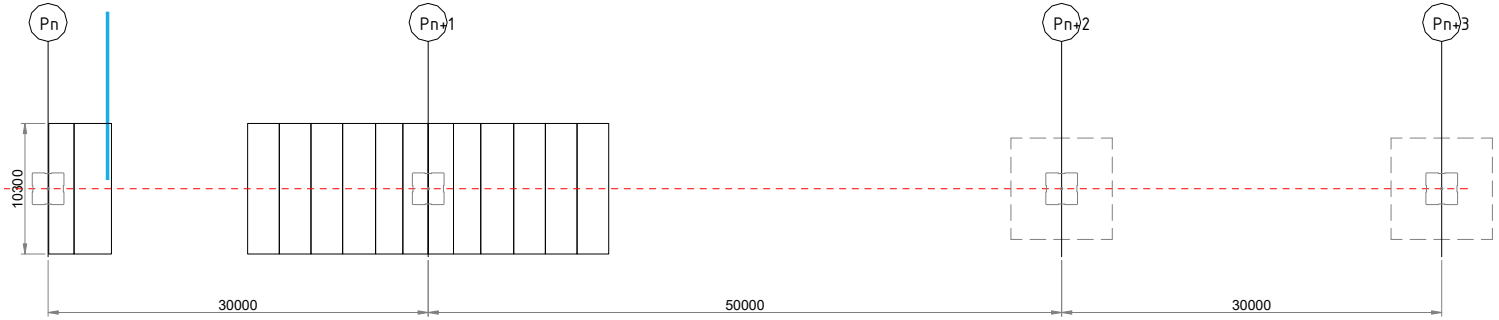
Momen Diagram

Cross Section



ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

STEP : INSTALL SEGMENT BOX



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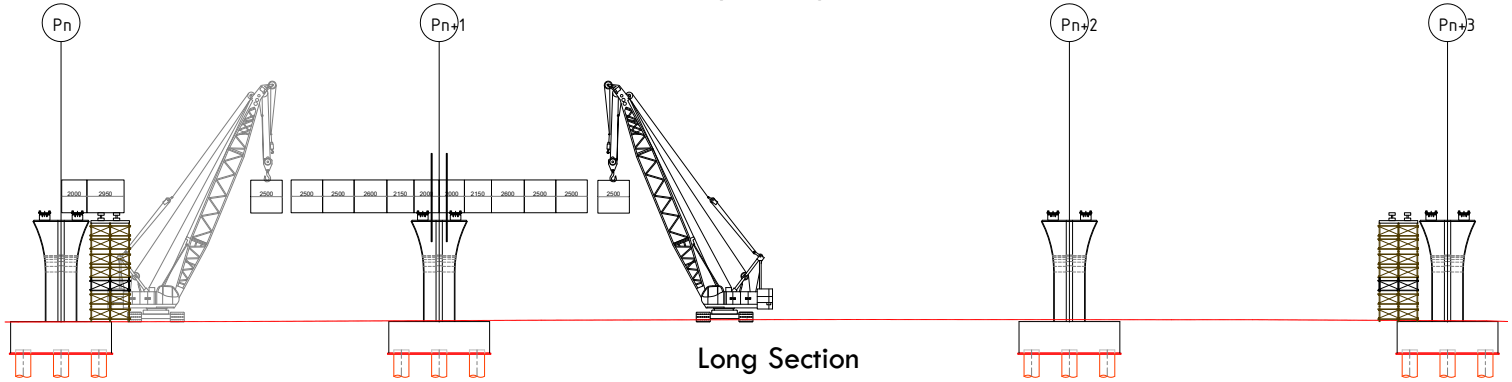
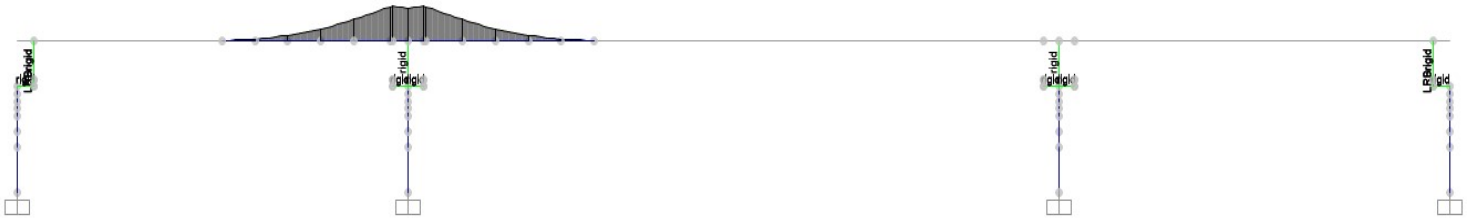


Long Section



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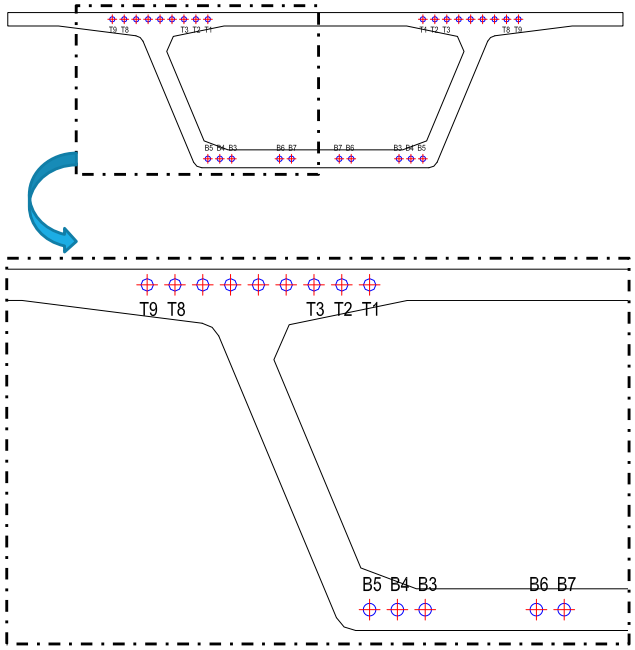
Cross Section



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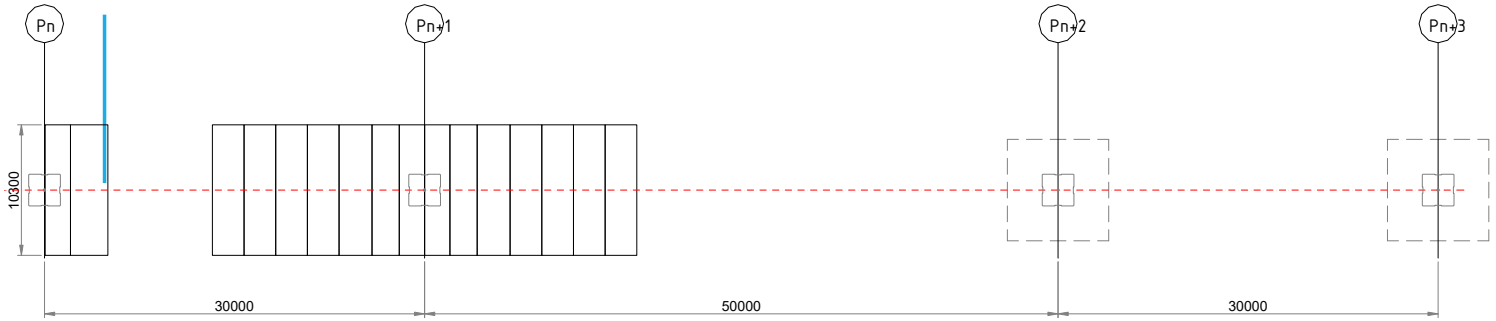
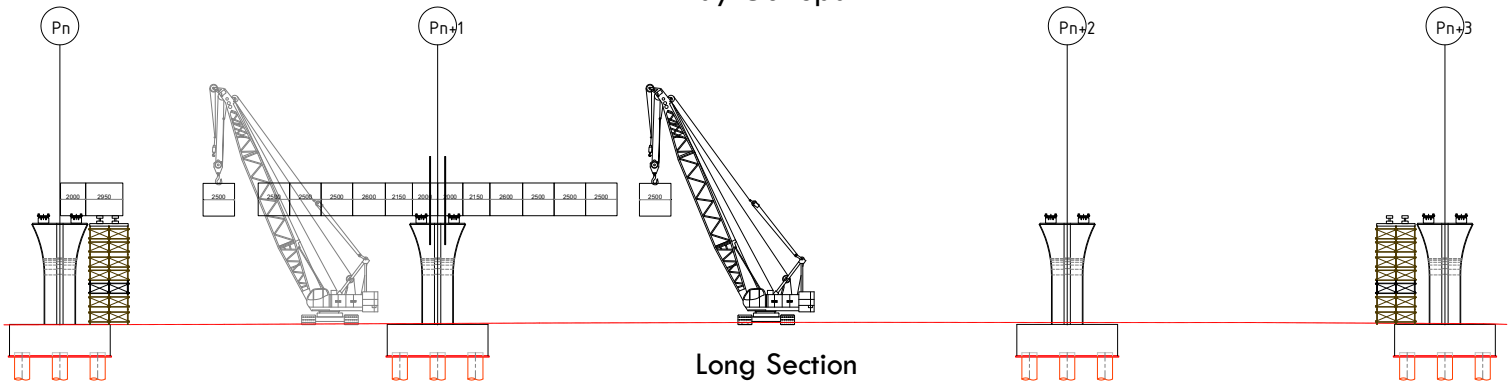
STEP : INSTALL SEGMENT BOX



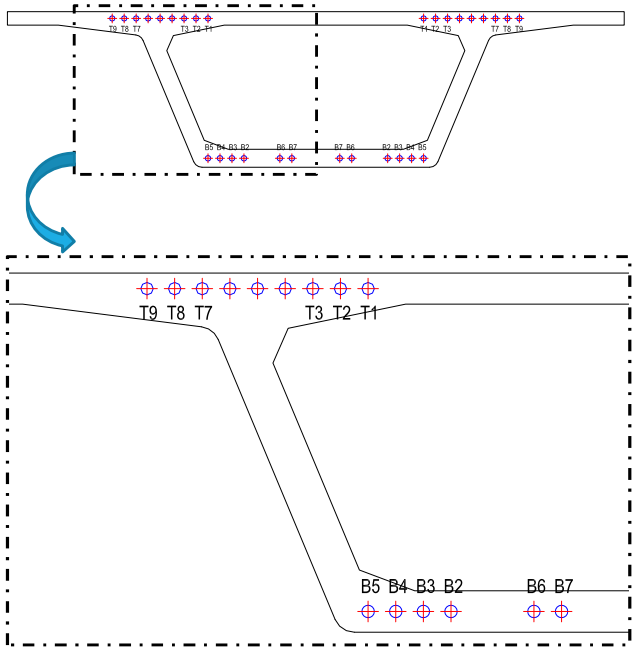
Lay Out Span



Long Section

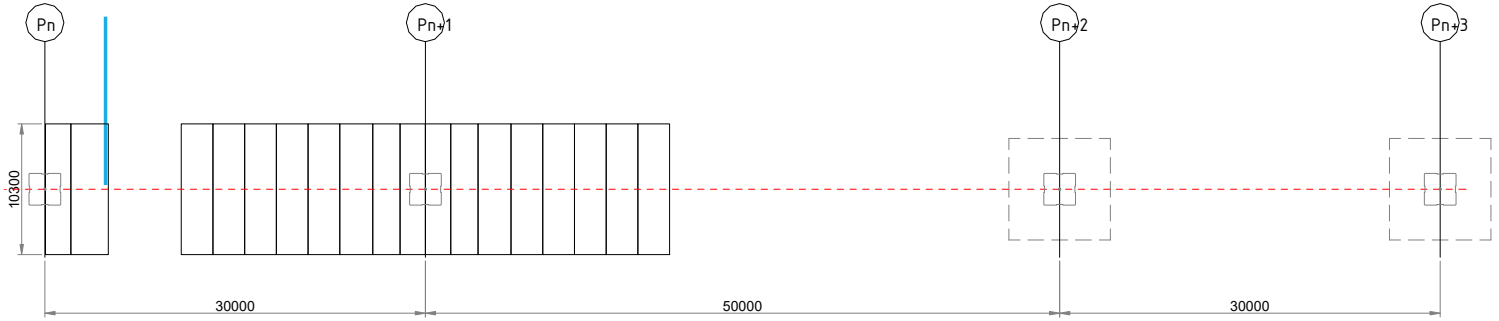
Momen Diagram

Cross Section



ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

STEP : INSTALL SEGMENT BOX



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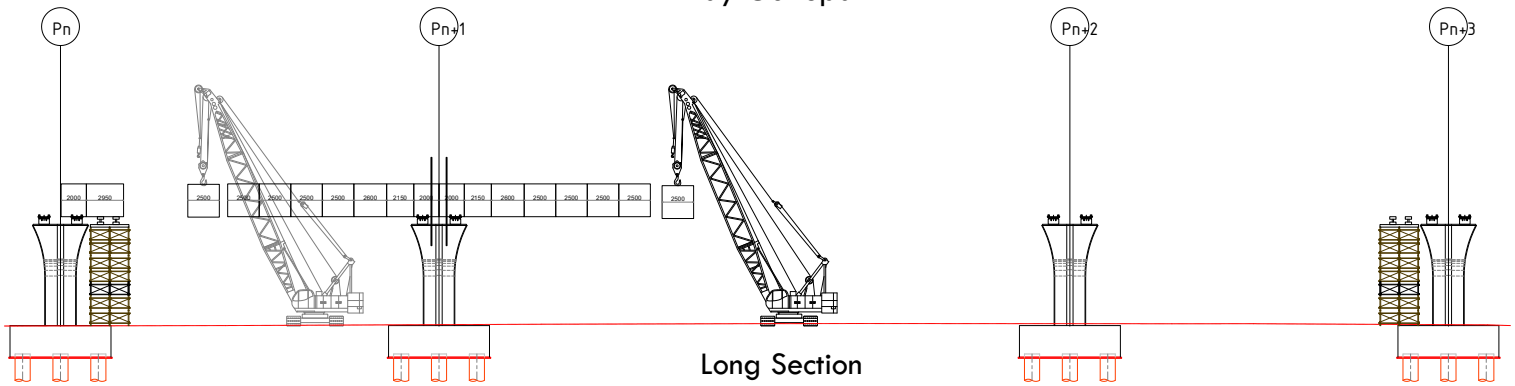

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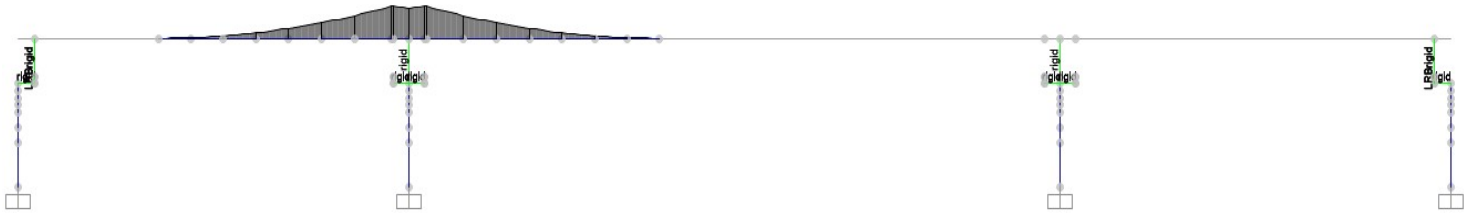
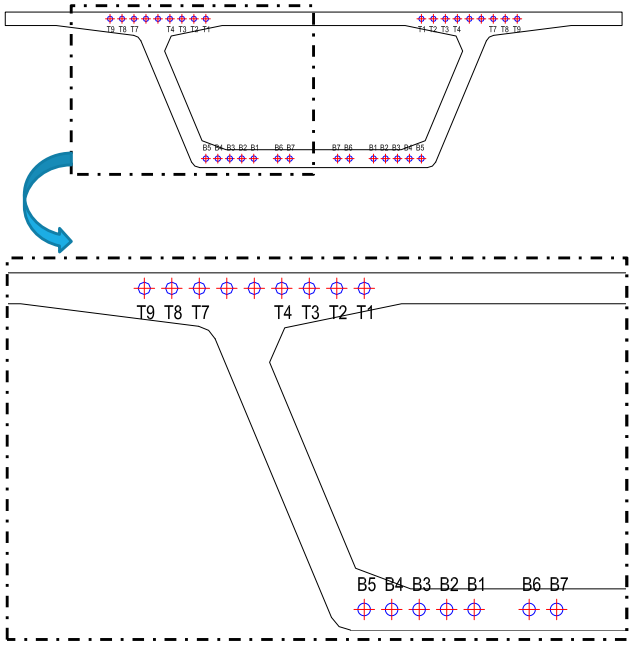


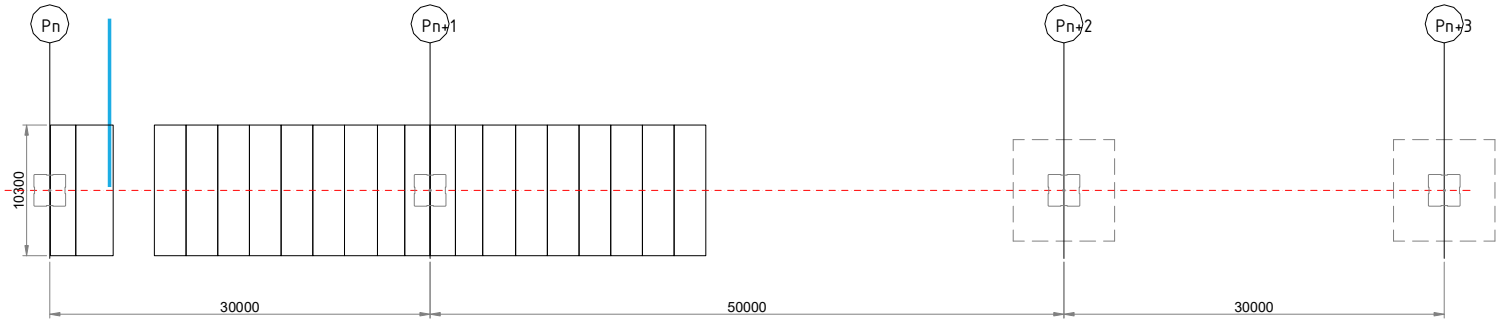
Momen Diagram

Cross Section



ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

STEP : INSTALL SEGMENT BOX



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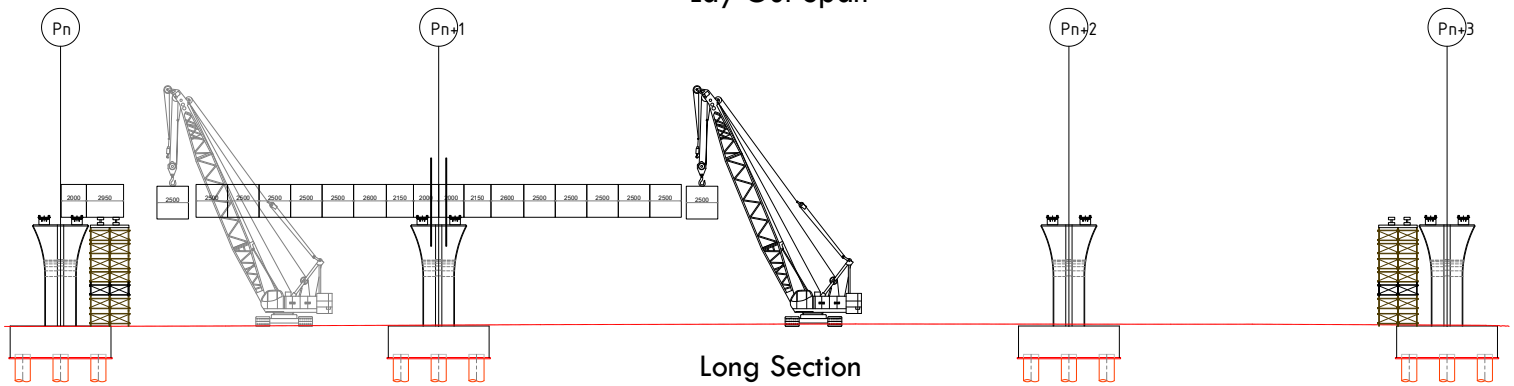
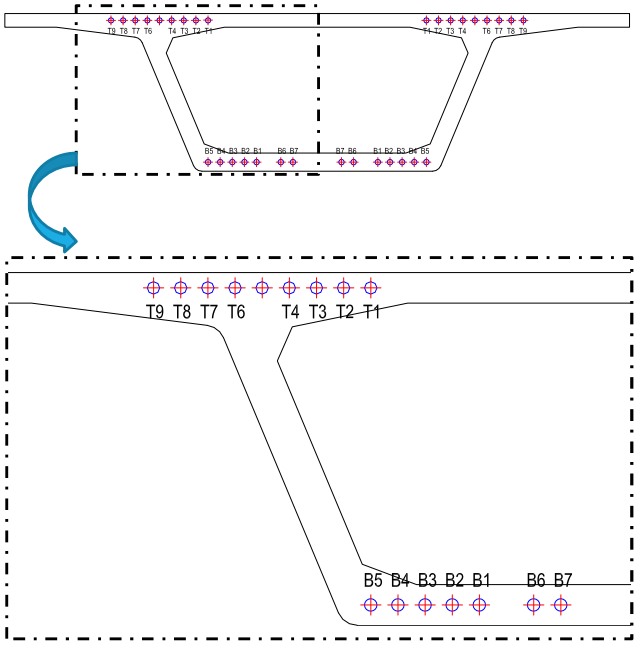


Long Section

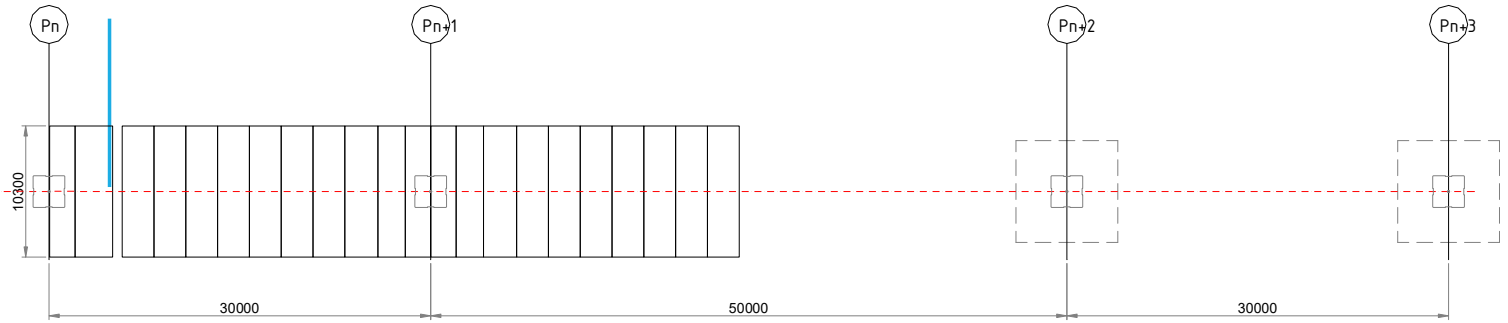
Momen Diagram

Cross Section



ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

STEP : INSTALL SEGMENT BOX



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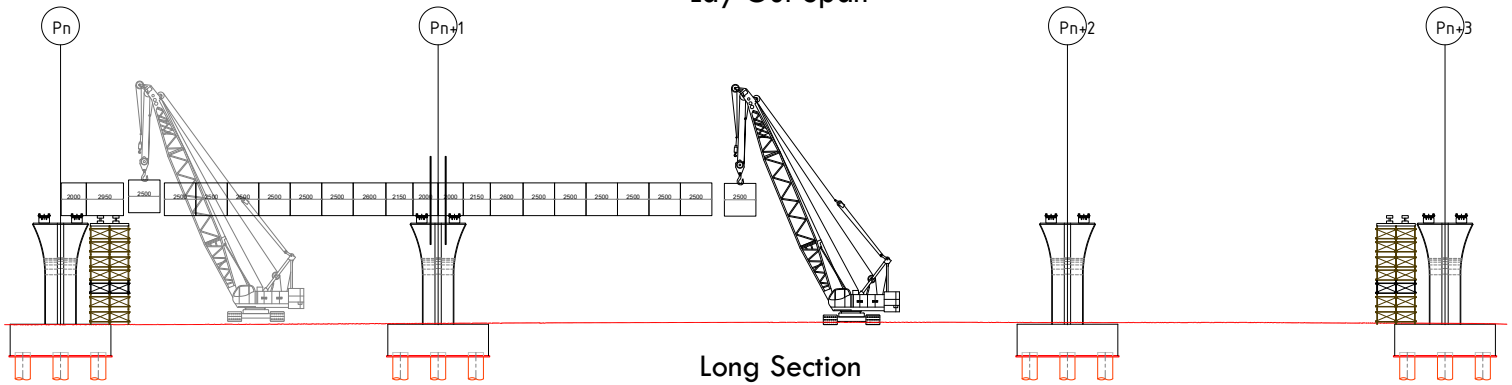
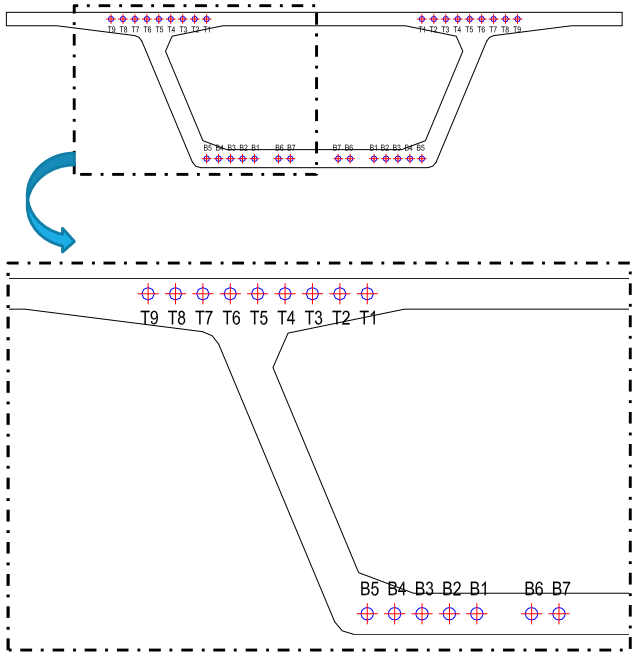


Long Section

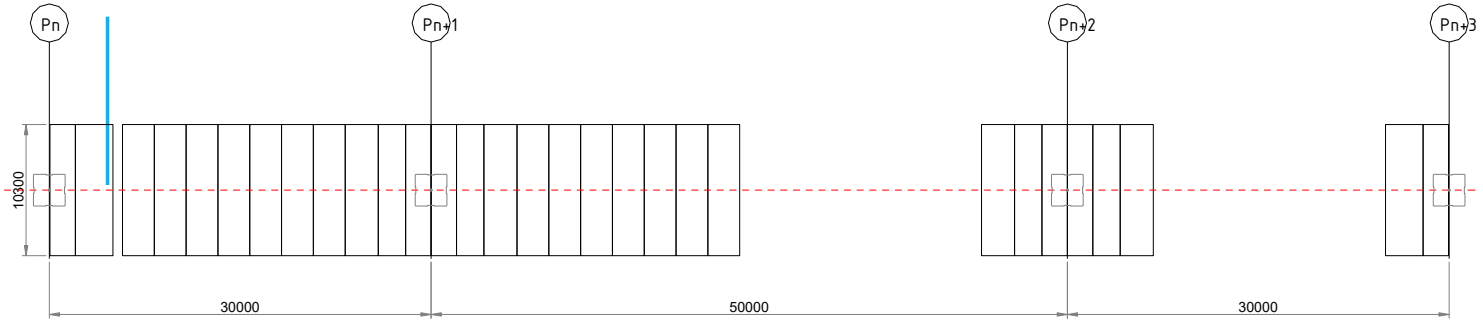
Momen Diagram

Cross Section

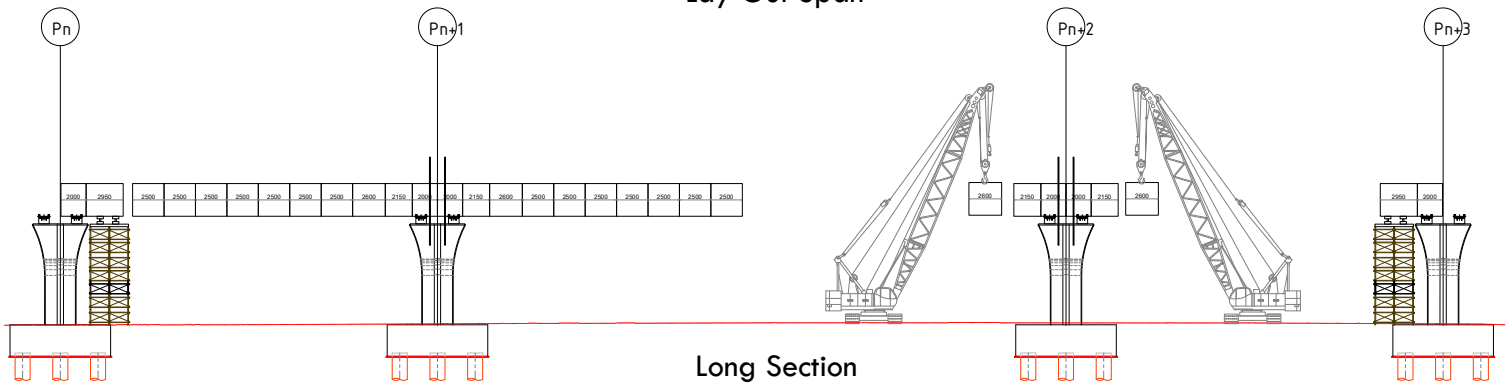


ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

STEP : INSTALL SEGMENT BOX



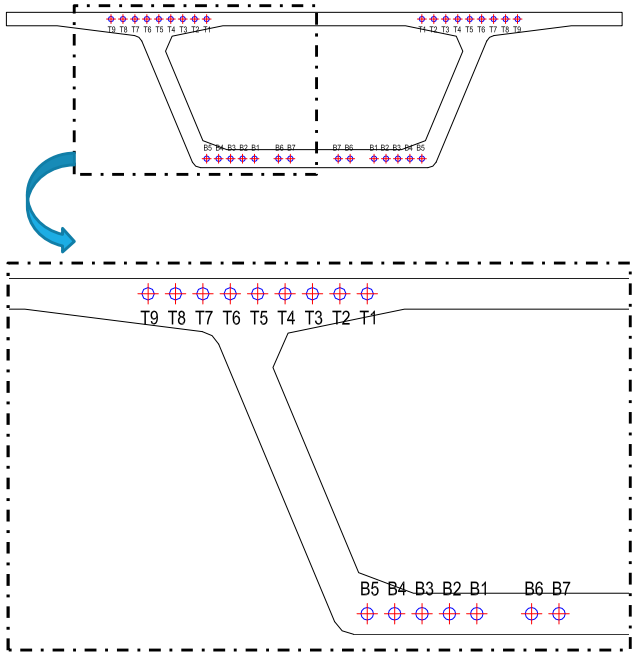
Lay Out Span



Long Section

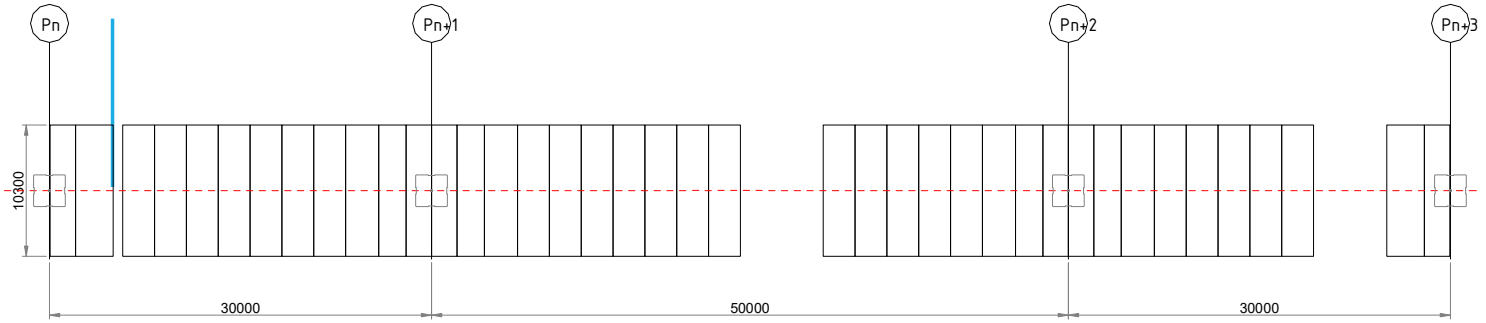
Momen Diagram

Cross Section



ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

STEP : INSTALL SEGMENT BOX



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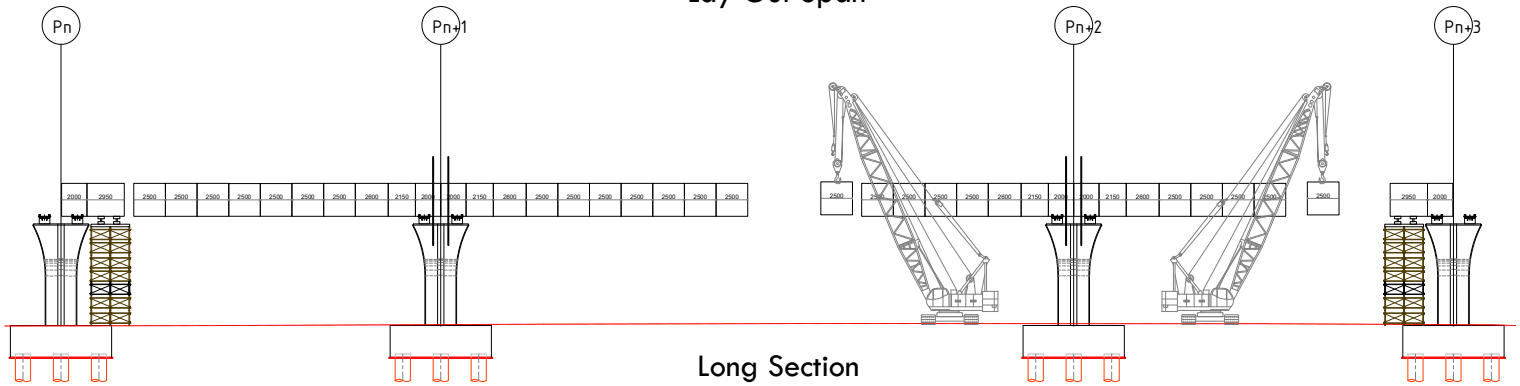
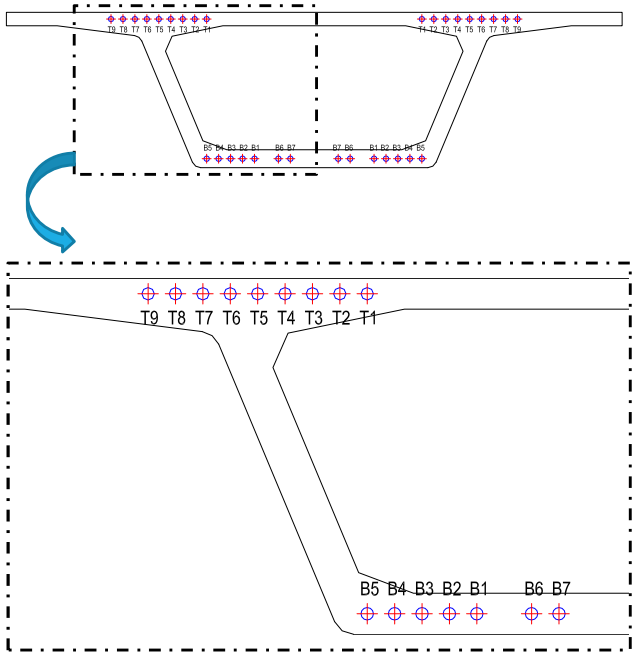


Long Section

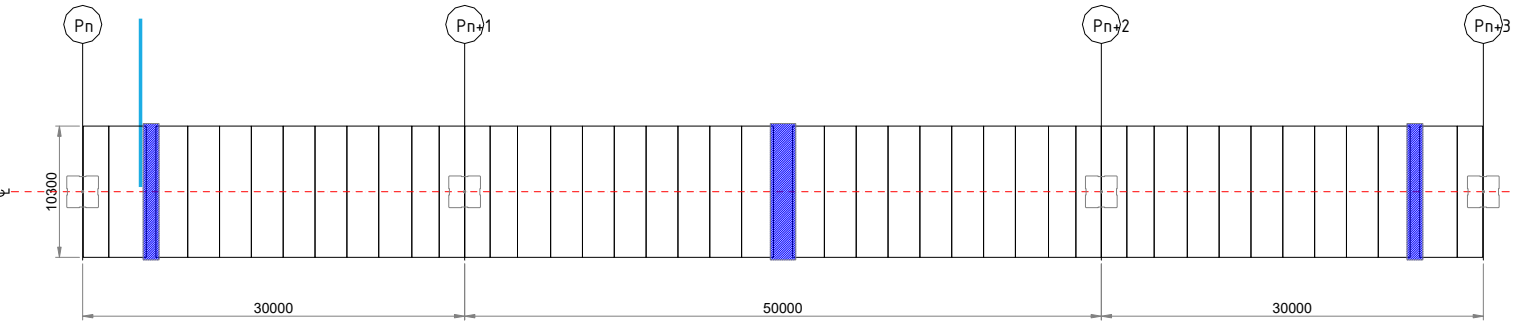
Momen Diagram

Cross Section

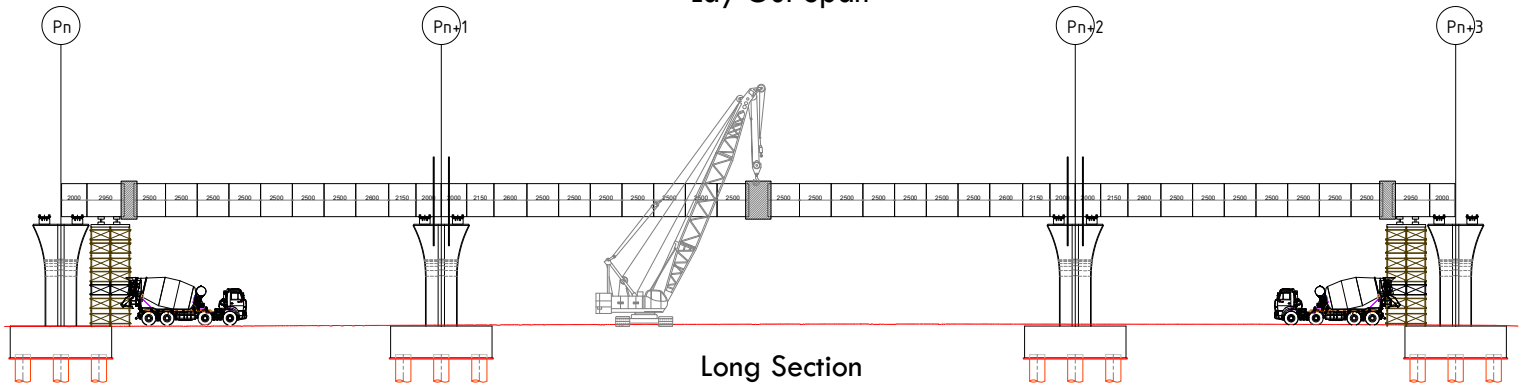


ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

STEP : COR CLOUSURE



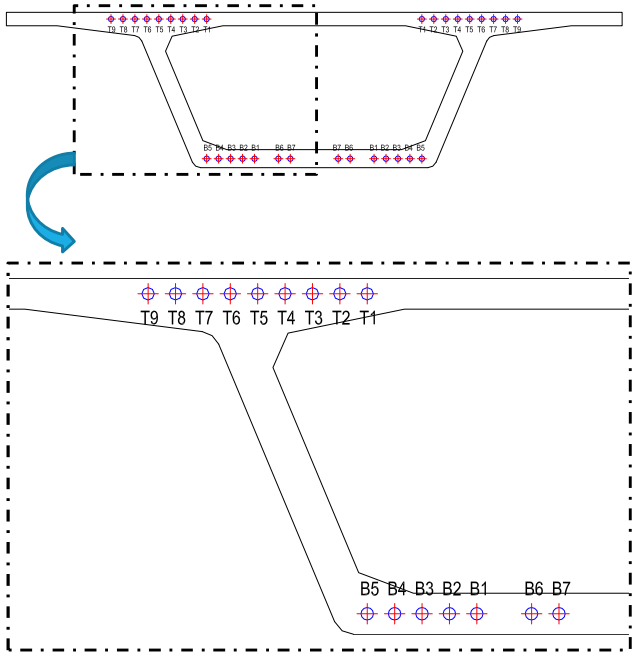
Lay Out Span



Long Section

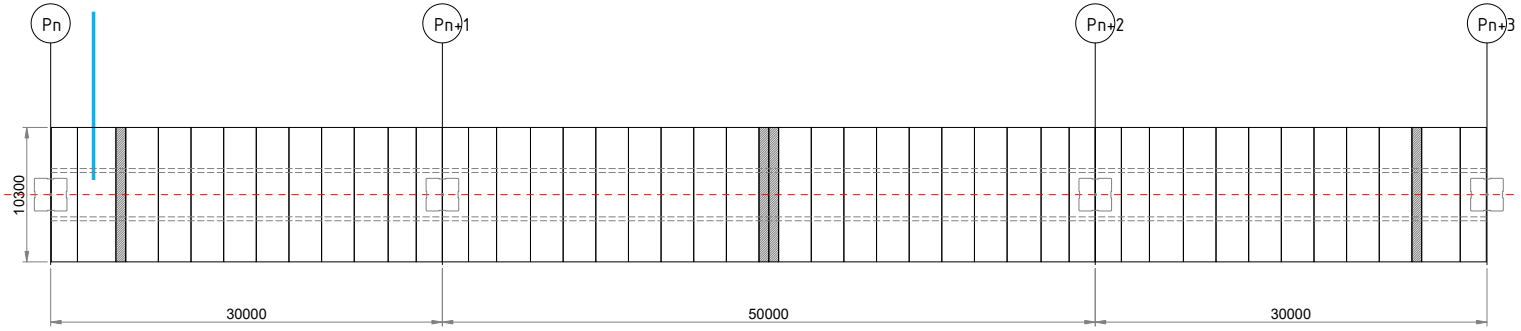
Momen Diagram

Cross Section



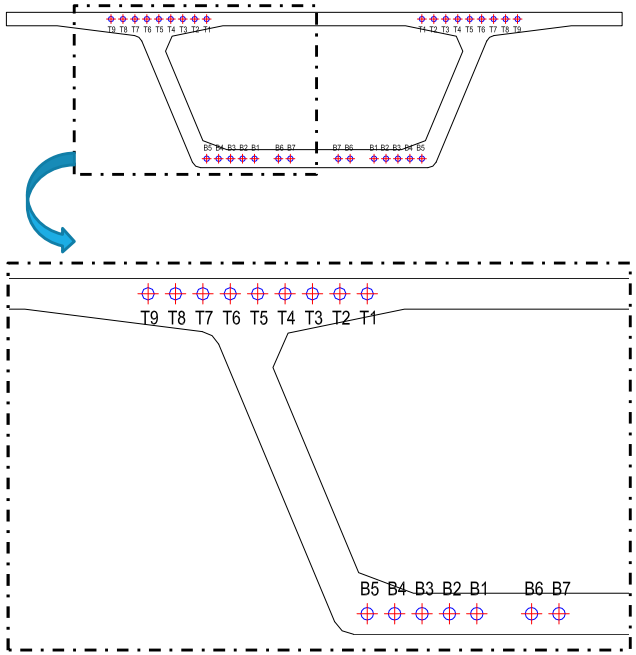
ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN CRANE

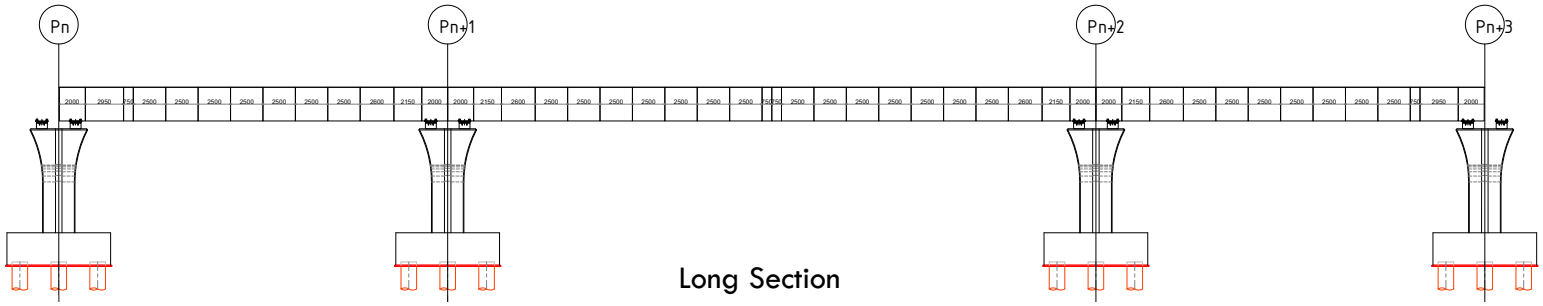
STEP : REALESE TEMPORARY FIXITY



Lay Out Span

Cross Section



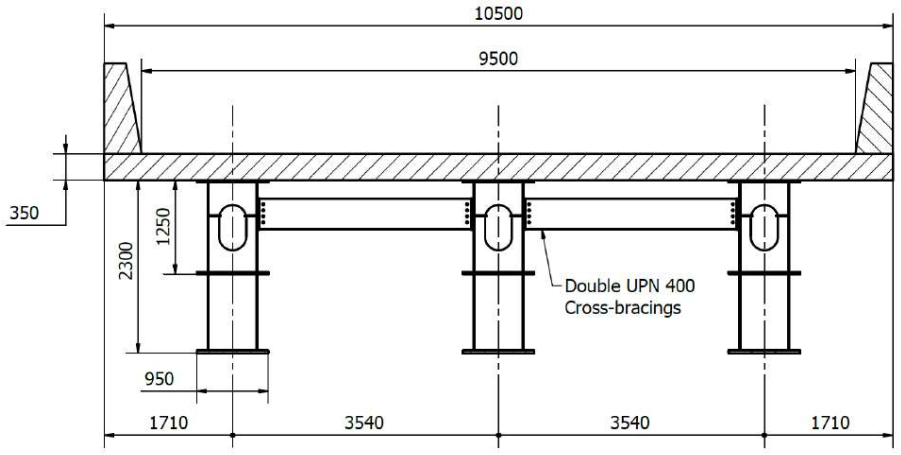


Long Section

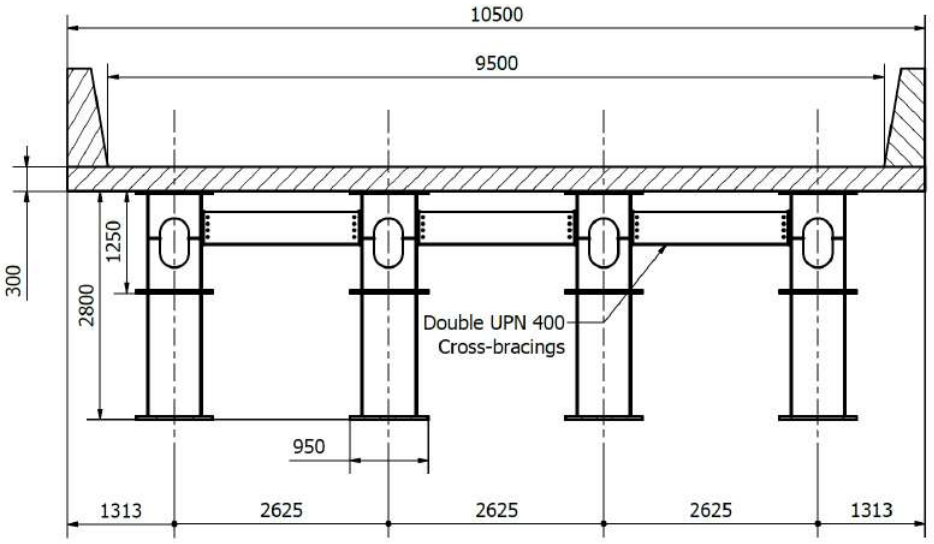
Momen Diagram

PENGANGKATAN SATU BENTANG GIRDER

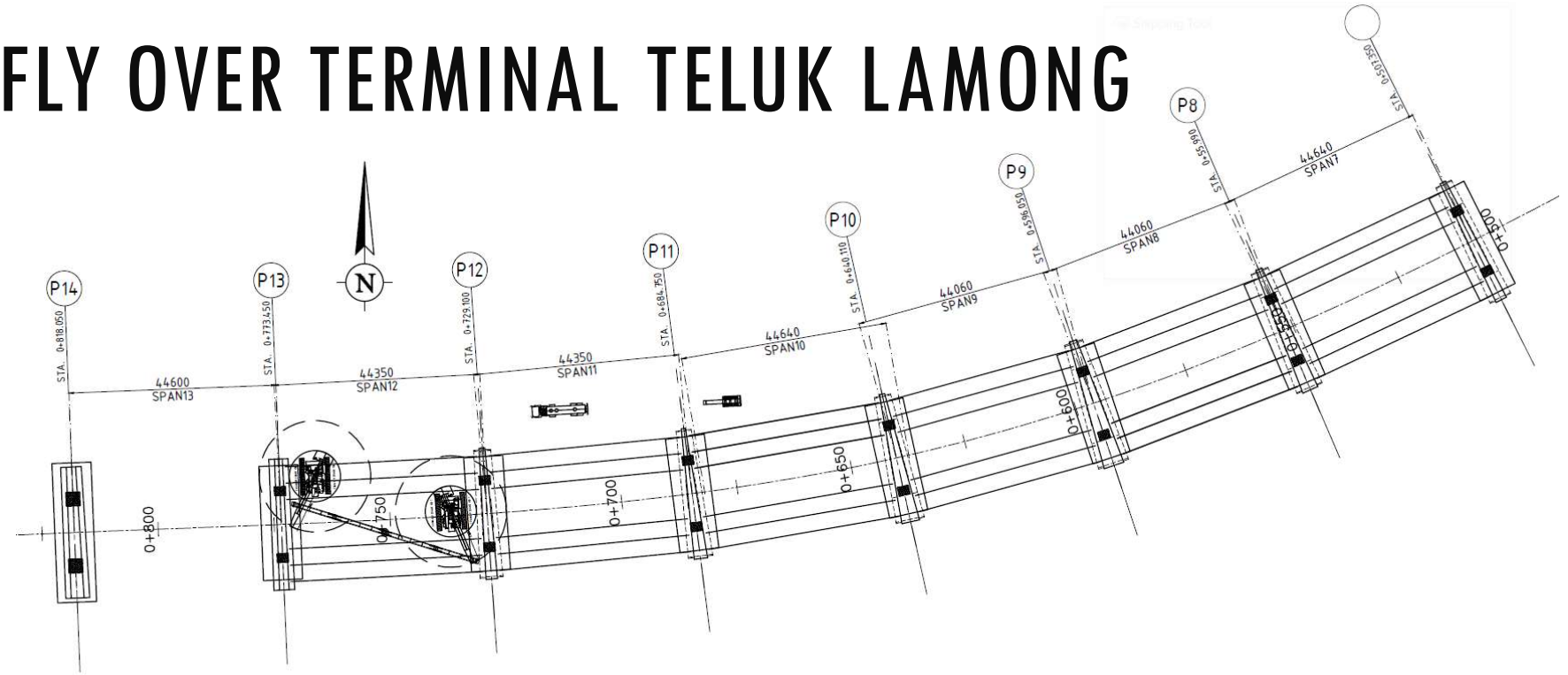
Unibridge 40 m (berat per girder : 50 ton)

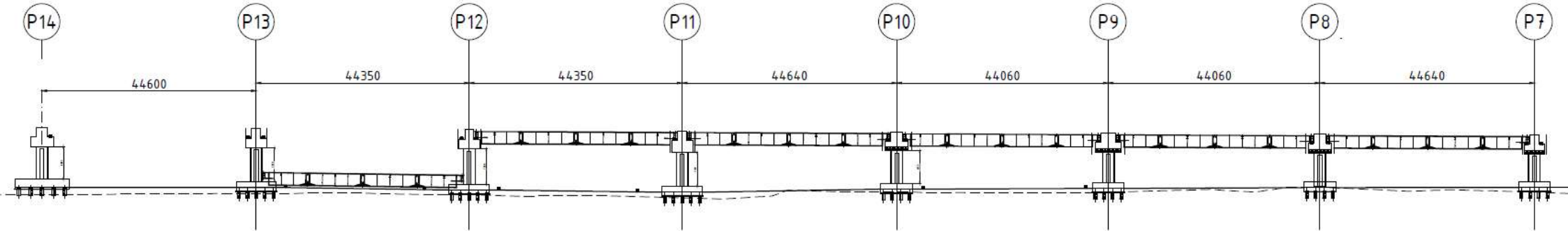


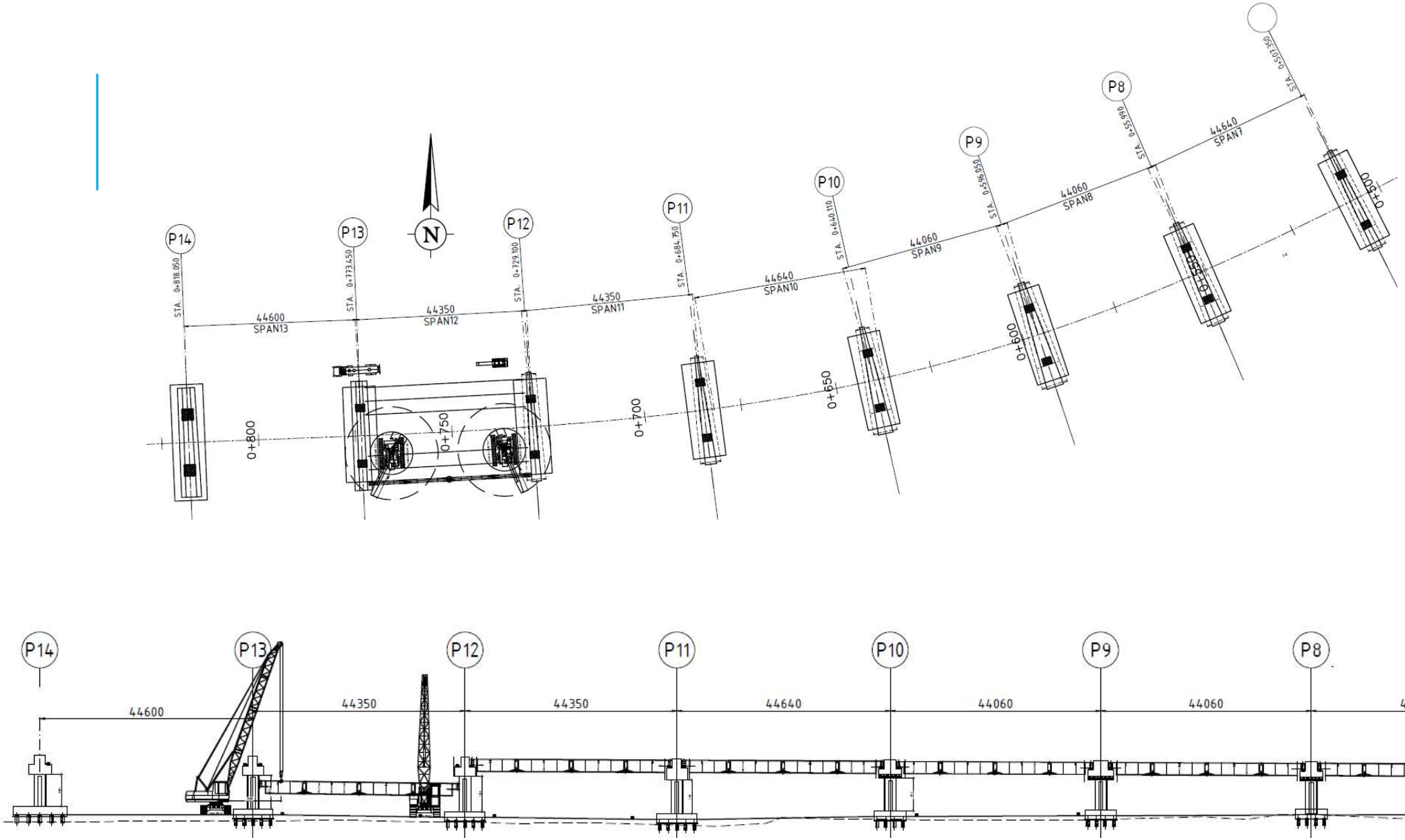
Unibridge 60 m (berat per girder : 85 ton



FLY OVER TERMINAL TELUK LAMONG






P14
P13
P12
P11
P10
P9
P8
N
STA. 0+818.050
STA. 0+773.450
STA. 0+729.100
STA. 0+684.750
STA. 0+640.110
STA. 0+596.050
STA. 0+551.690
STA. 0+507.350
44600
SPAN13
44350
SPAN12
44350
SPAN11
44640
SPAN10
44060
SPAN9
44060
SPAN8
44640
SPAN7
0+800
0+750
0+700
0+650
0+600
0+500

P14
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44640
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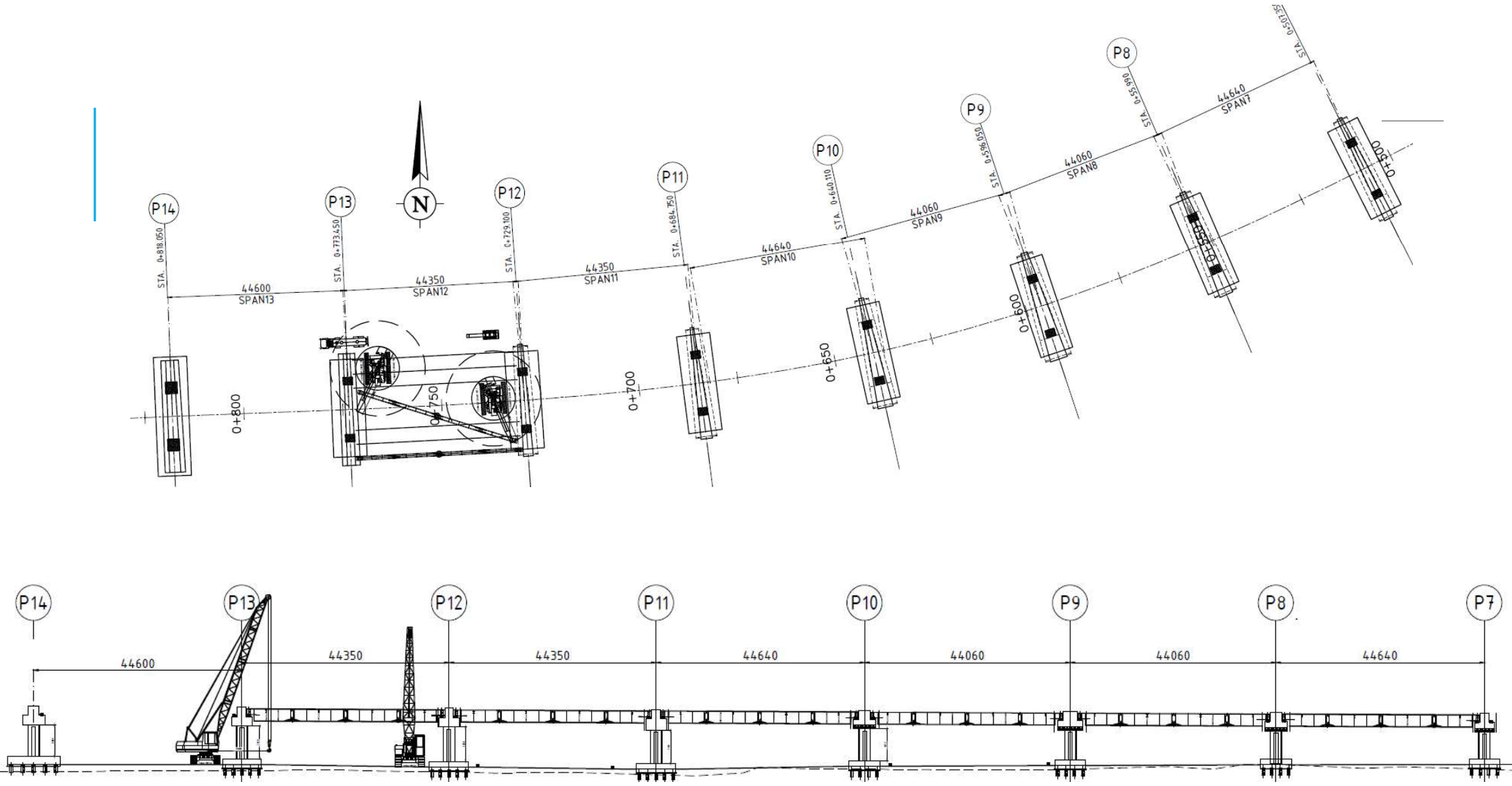
44640


P14
P13
P12
P11
P10
P9
P8
P7
N
STA. 0+818.050
STA. 0+773.450
STA. 0+729.100
STA. 0+684.750
STA. 0+640.110
STA. 0+596.050
STA. 0+551.990
STA. 0+507.930
44600
SPAN13
44350
SPAN12
44350
SPAN11
44640
SPAN10
44060
SPAN9
44060
SPAN8
44640
SPAN7
0+800
0+750
0+700
0+650
0+600
0+550
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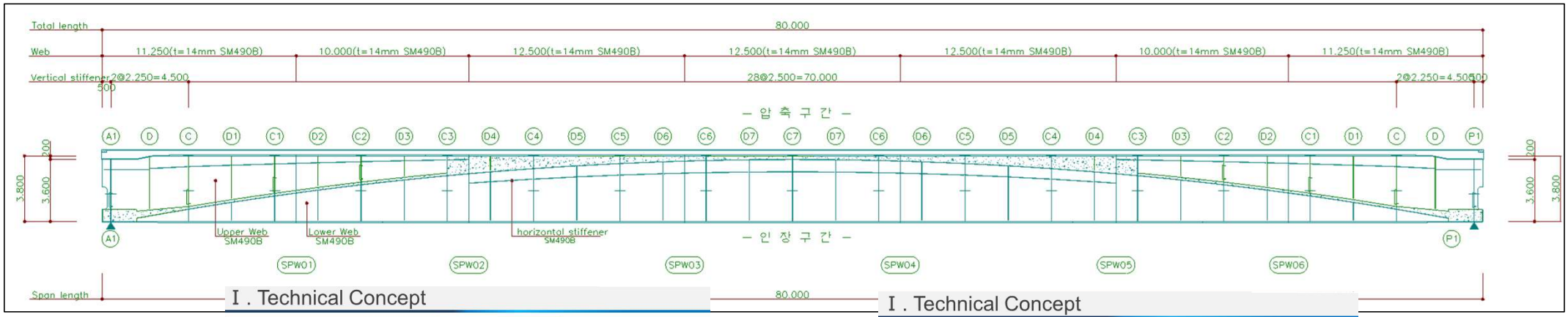
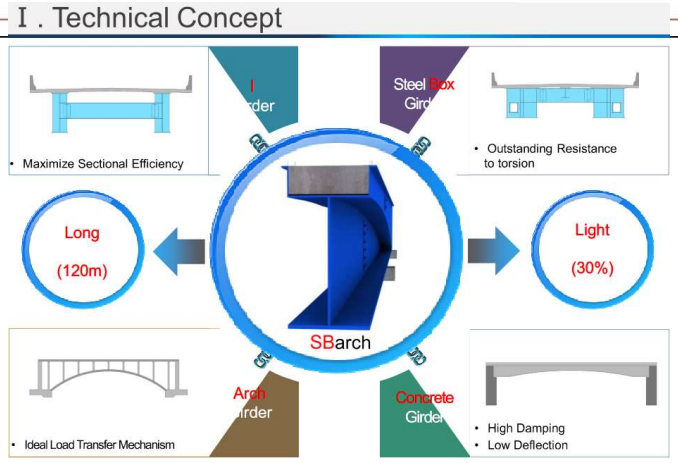
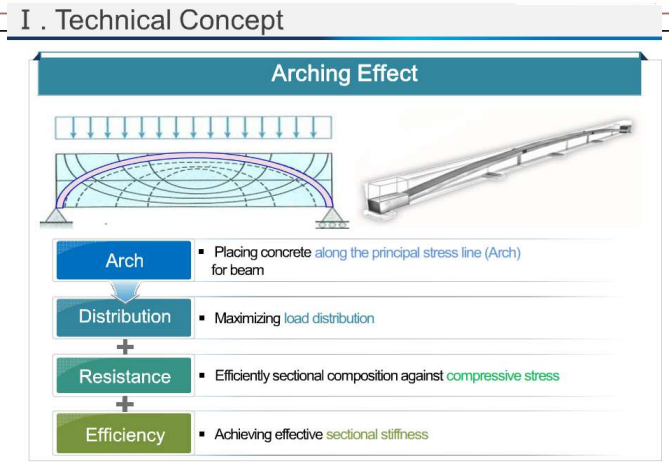
PENGANGKATAN SATU BENTANG GIRDER

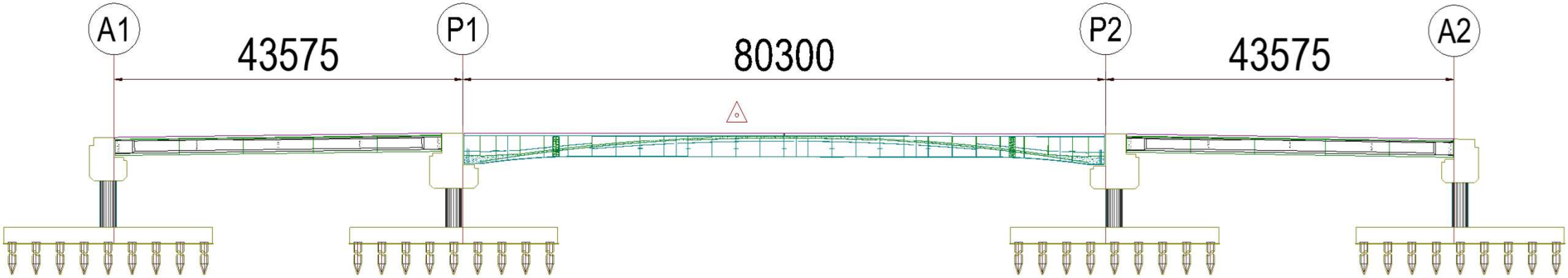
SB – Arch

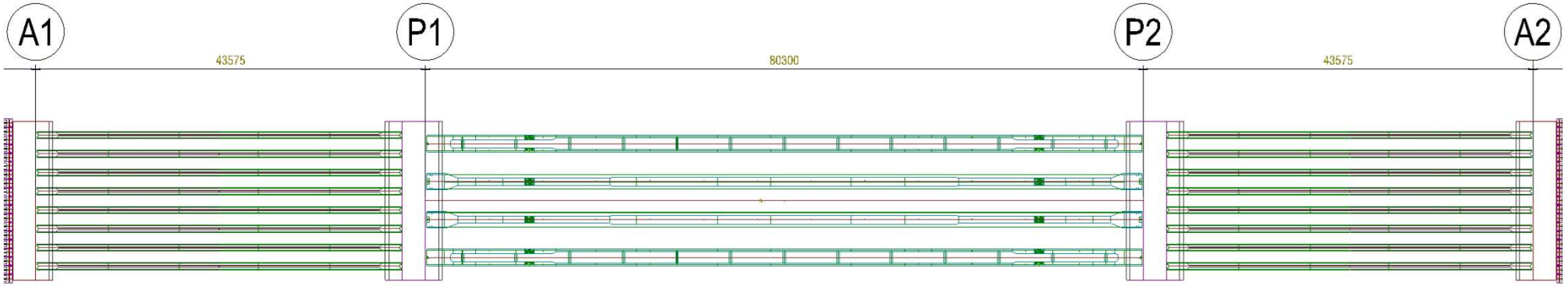




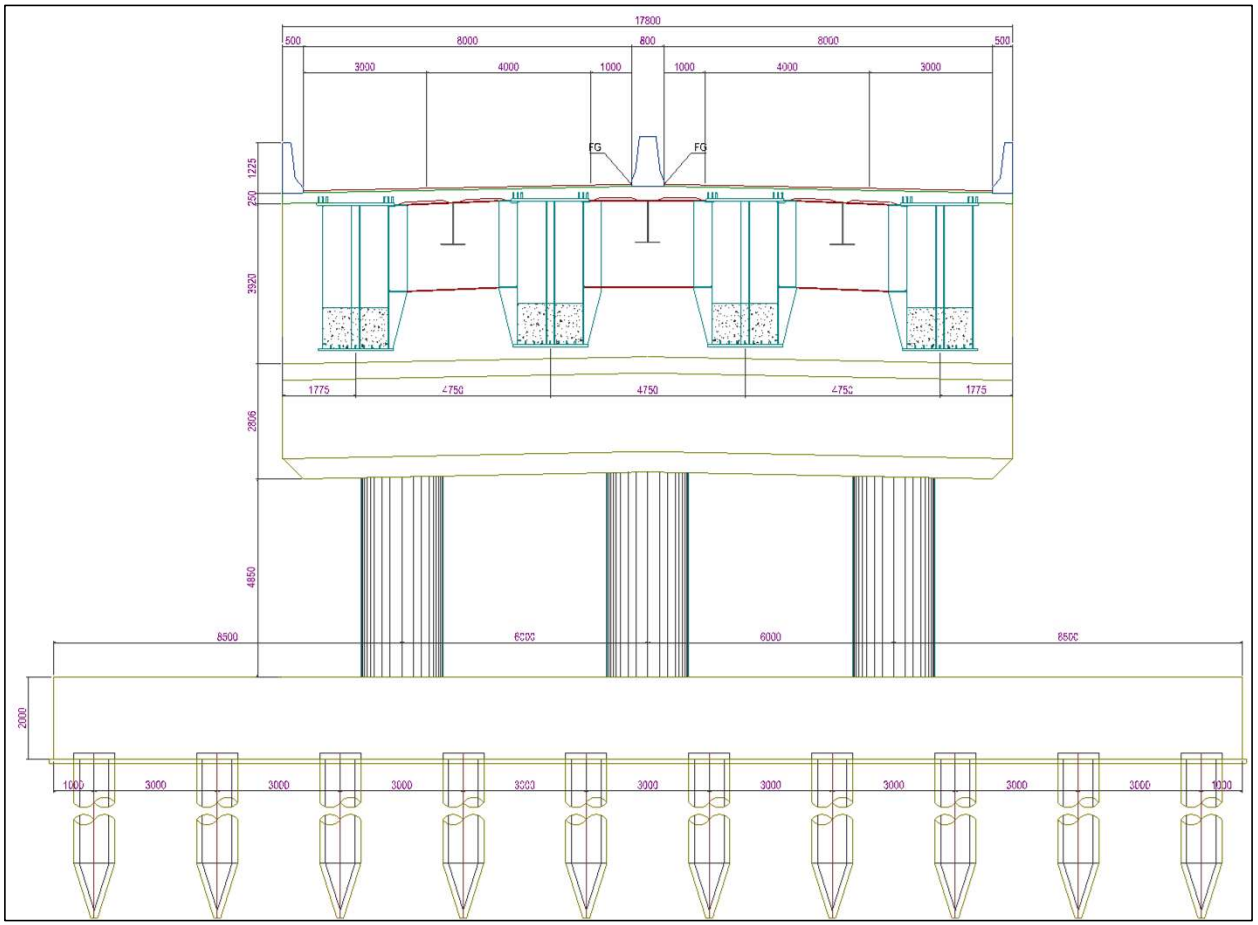


Long section





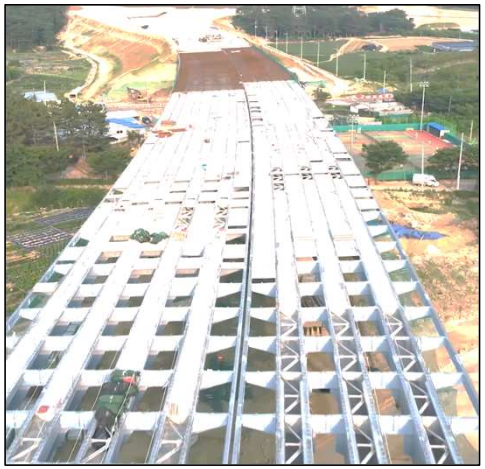
Cross section



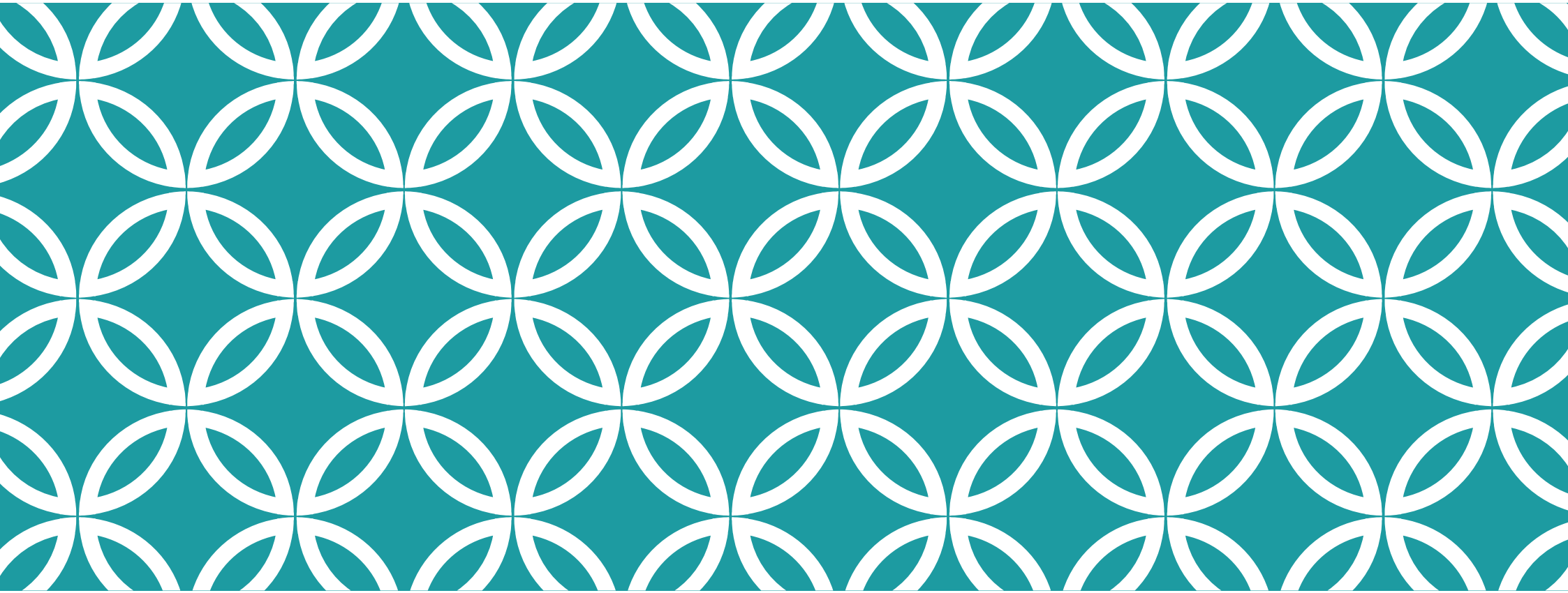
Metode & Dokumentasi

Metode & Dokumentasi

Metode & Dokumentasi



Metode & Dokumentasi



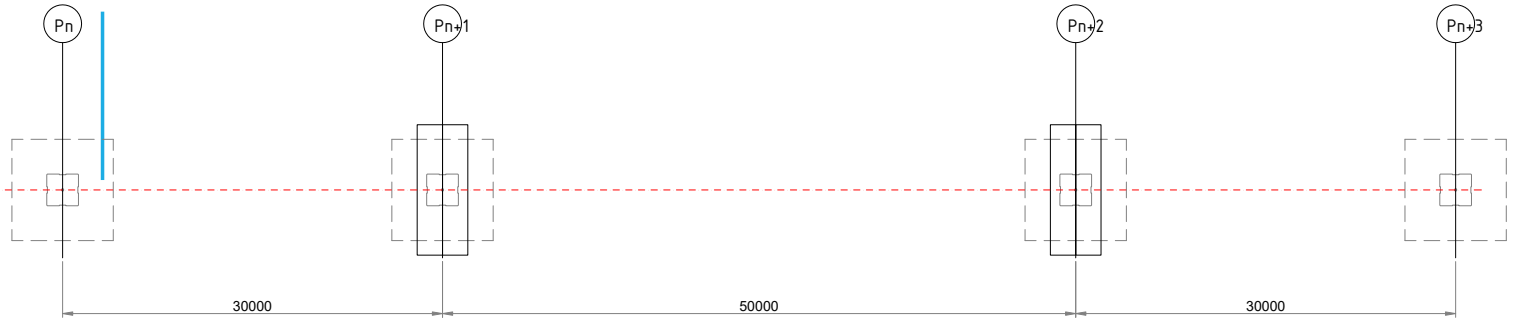
LIFTER

DESKRIPSI UMUM

- Alat bantu untuk metoda konstruksi kantilever untuk segmen precast yang tidak membolehkan adanya gangguan di bawah jembatan yang akan dibangun.
- Supportnya berada di segmen terakhir yang sudah diangkat
- Panjang bentang yang bisa diakomodir cukup fleksibel, selama segmentasi disesuaikan dengan kapasitas lifter
- Kinematik dan load introductionnya tidak dipengaruhi span arrangemen karena sifanya konstan
- Perlu diperhatikan adanya penambahan beban di ujung kantilever selama masa pelaksanaan.

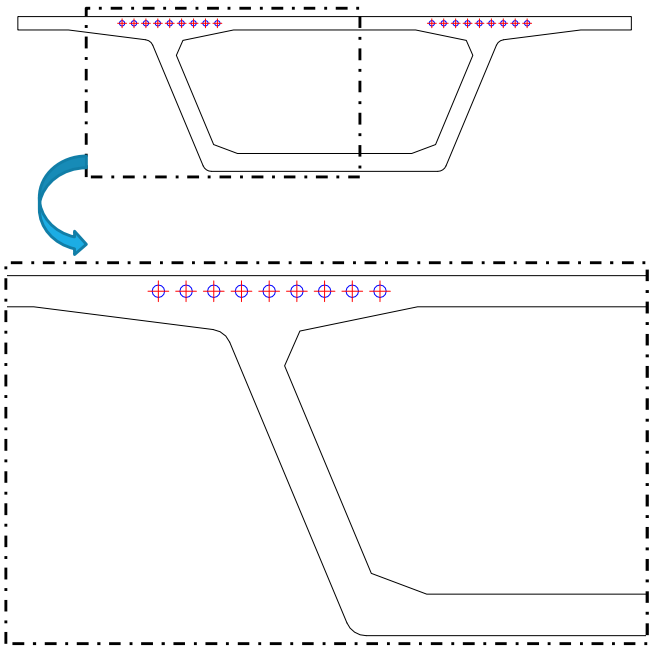
ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

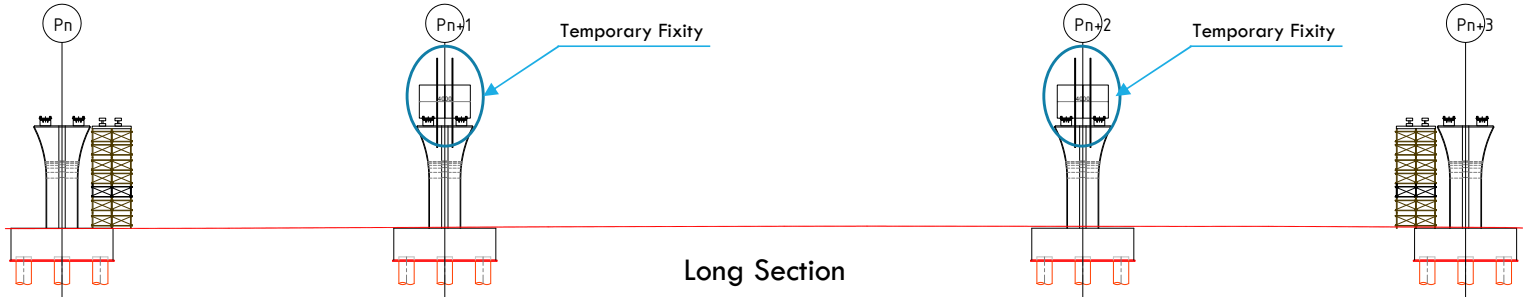
STEP : INSTALL TEMPORARY FIXITY



Lay Out Span

Cross Section



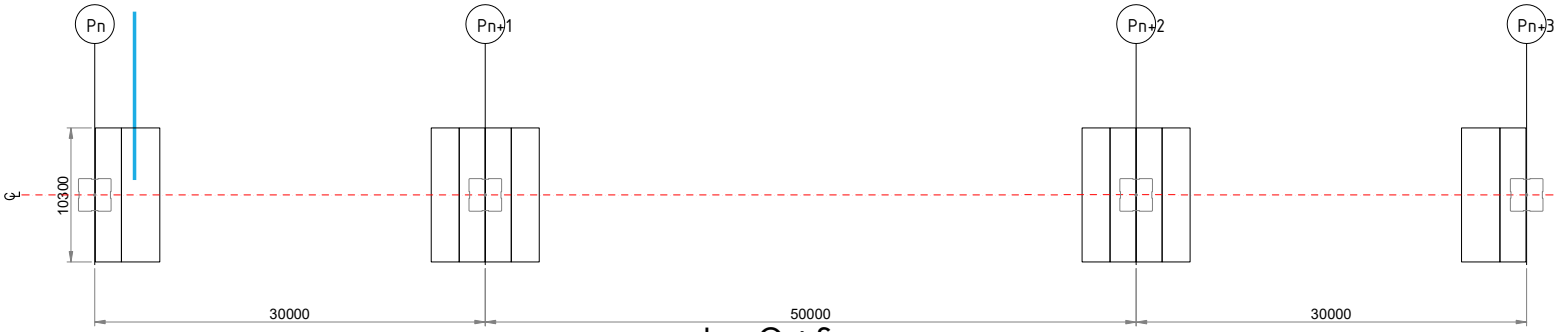


Long Section

Momen Diagram

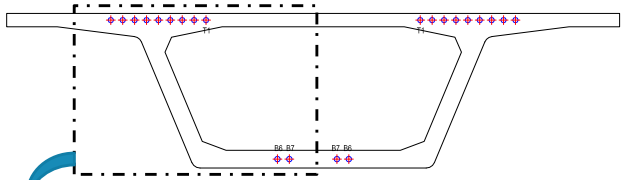
ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

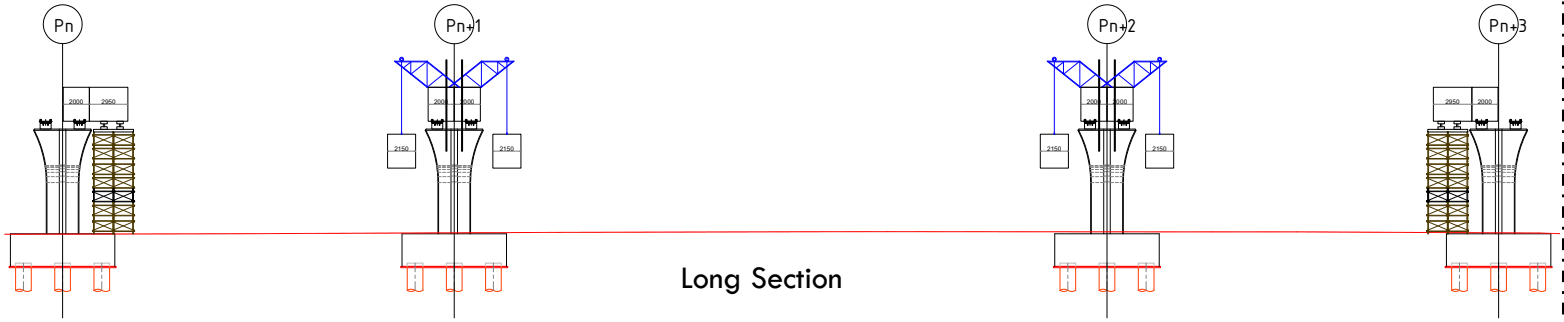
STEP : INSTALL LIFTER & LIFTING SEGMENT BOX GIRDER



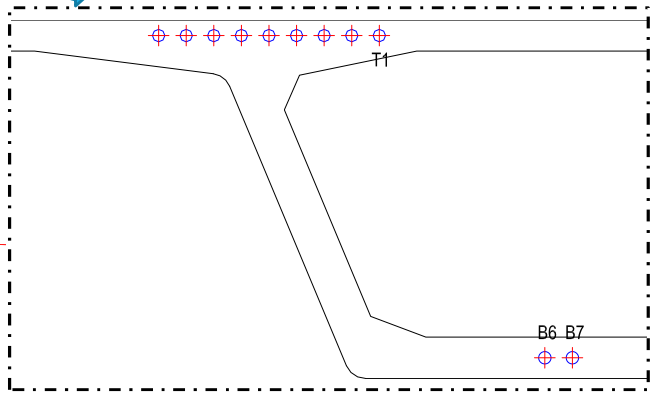
Lay Out Span

Cross Section





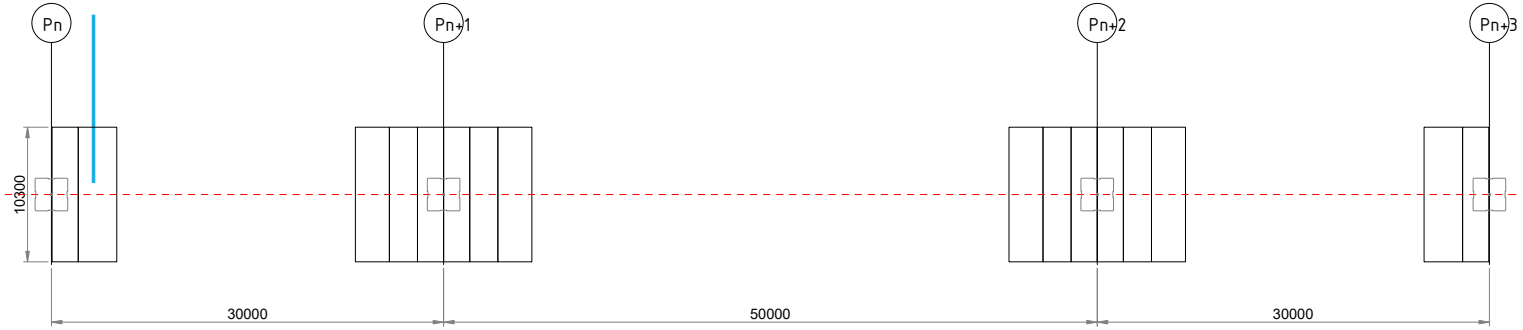
Long Section



Momen Diagram

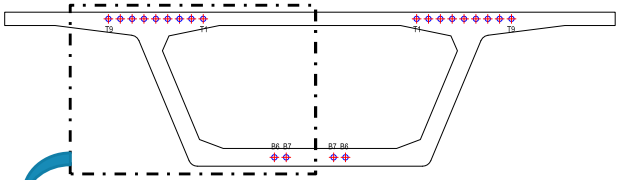
ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

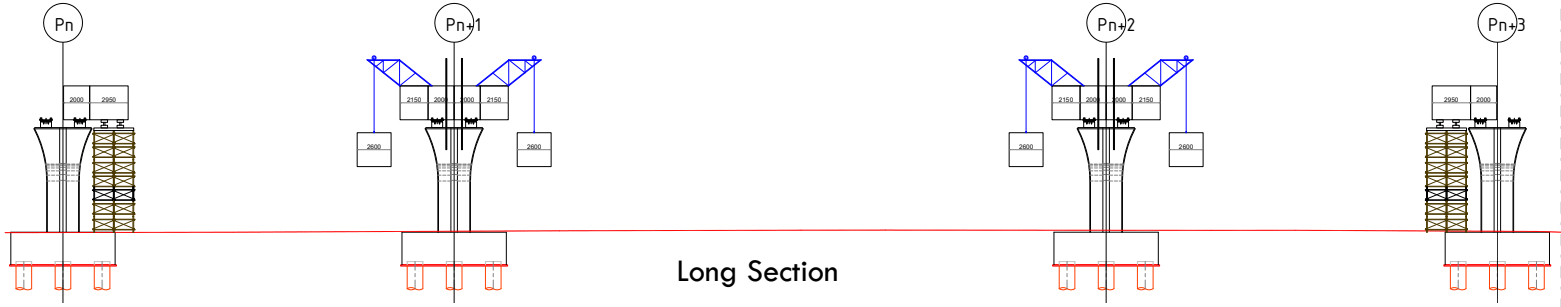
STEP : LIFTING SEGMENT BOX GIRDER



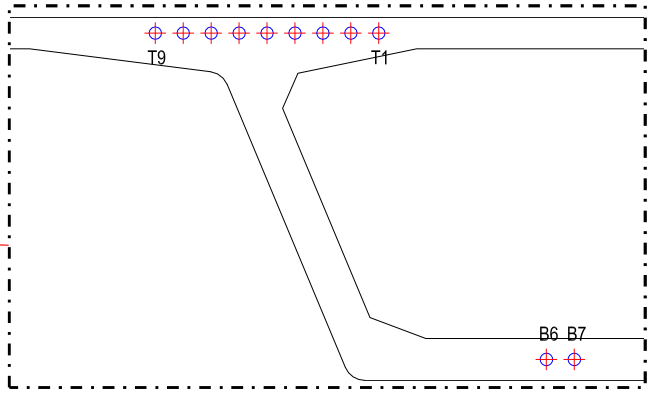
Lay Out Span

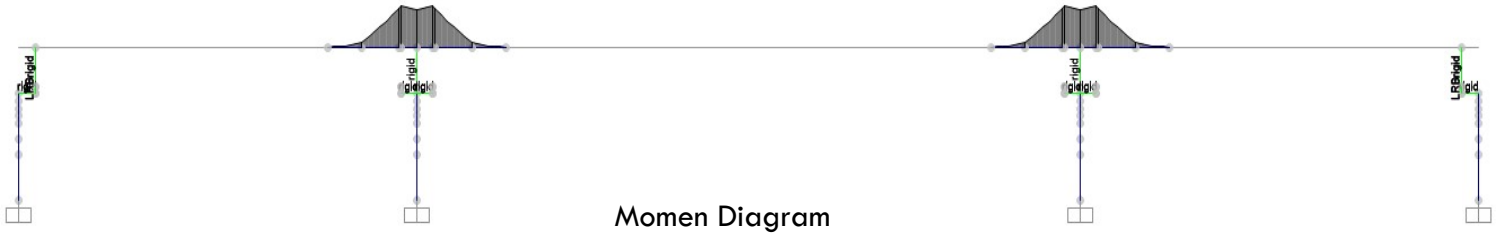
Cross Section





Long Section

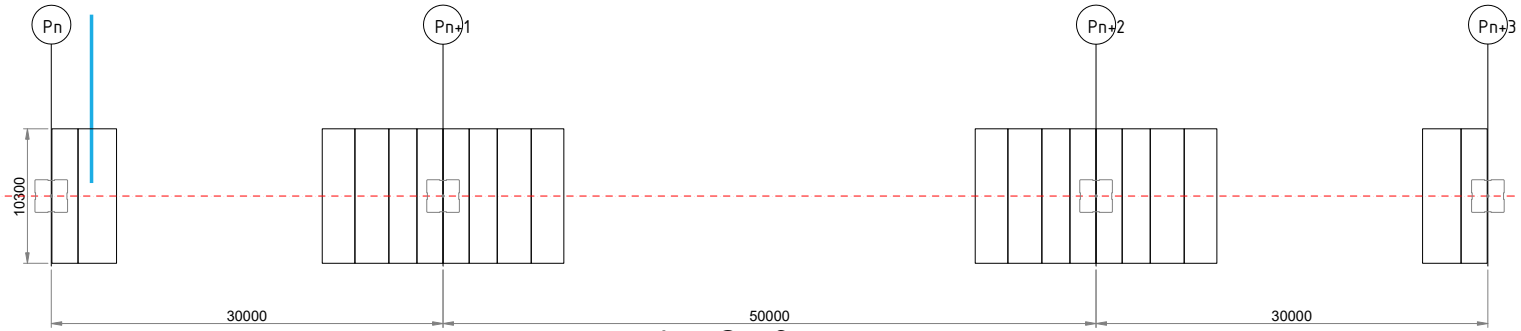




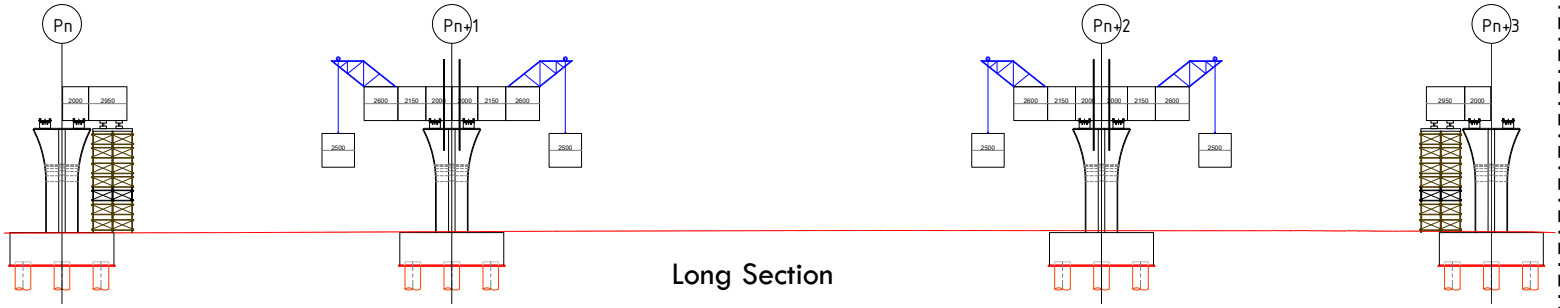
Momen Diagram

ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

STEP : LIFTING SEGMENT BOX GIRDER



Lay Out Span



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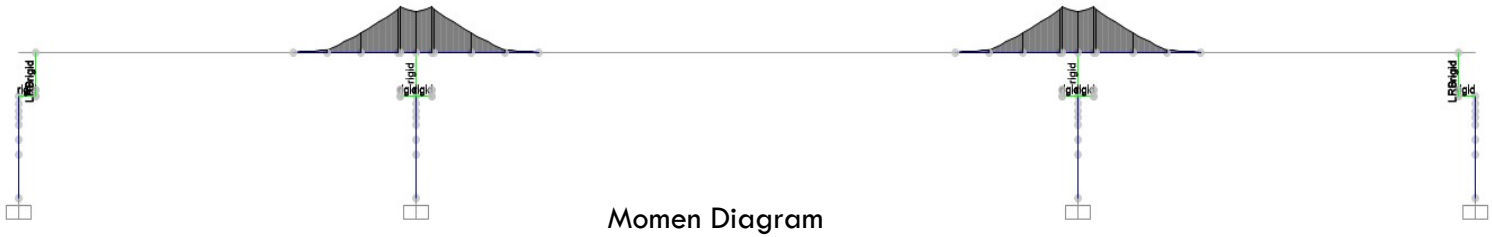
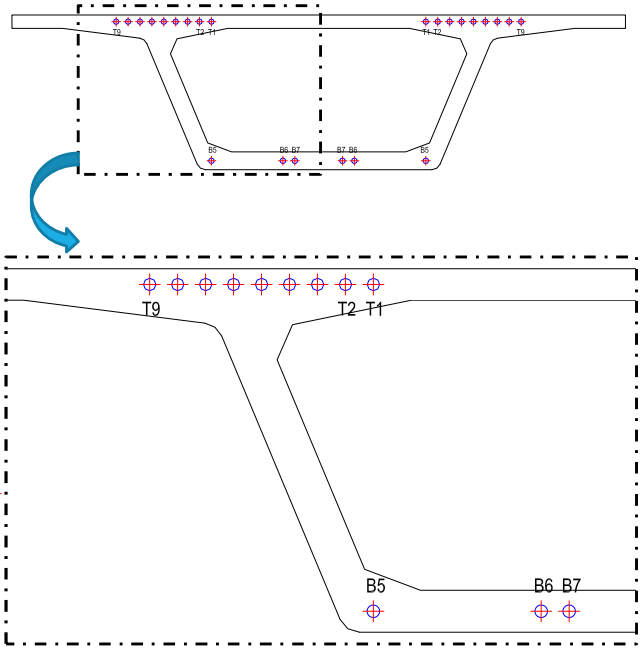


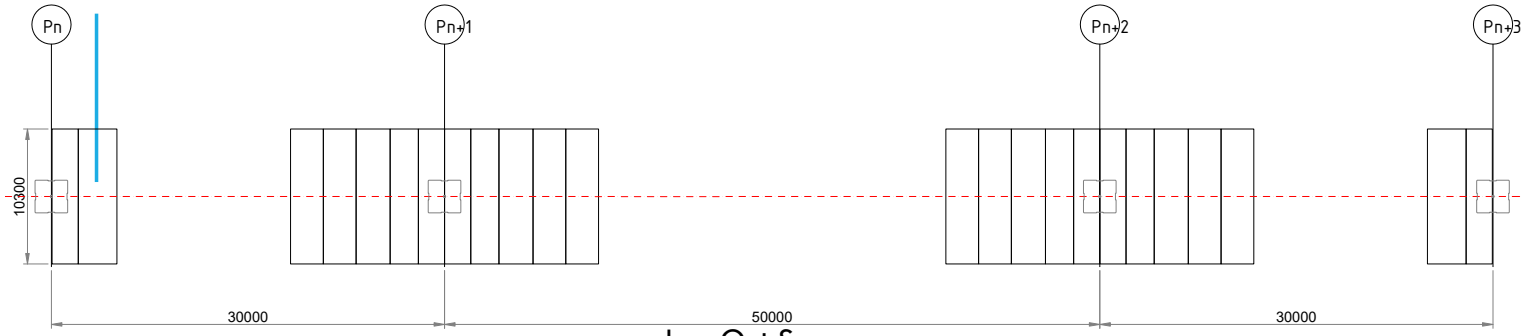
Momen Diagram

Cross Section



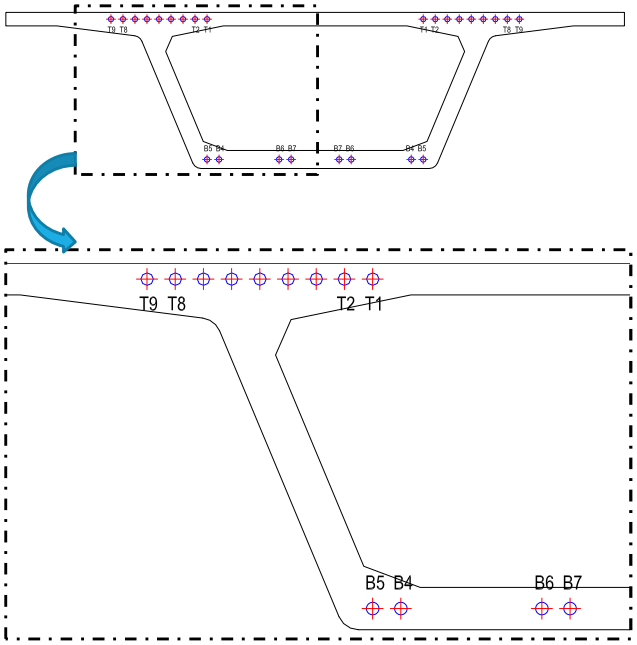
ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

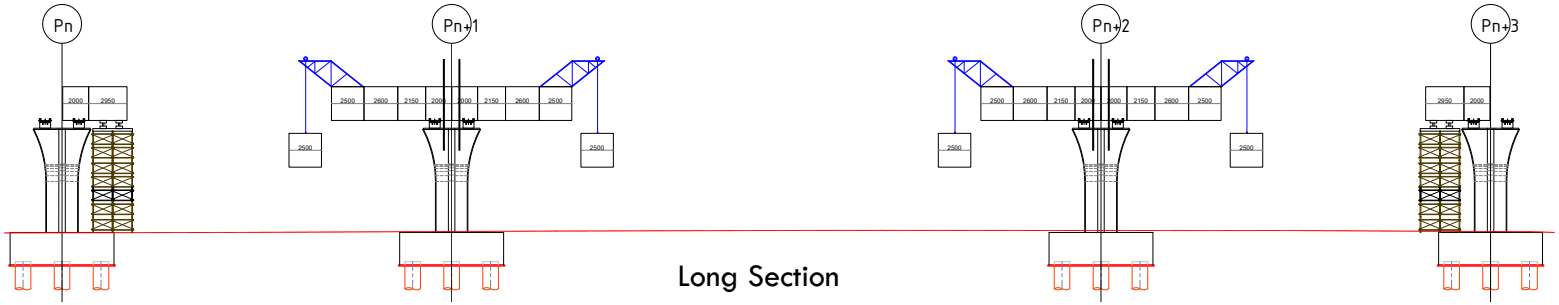
STEP : LIFTING SEGMENT BOX GIRDER



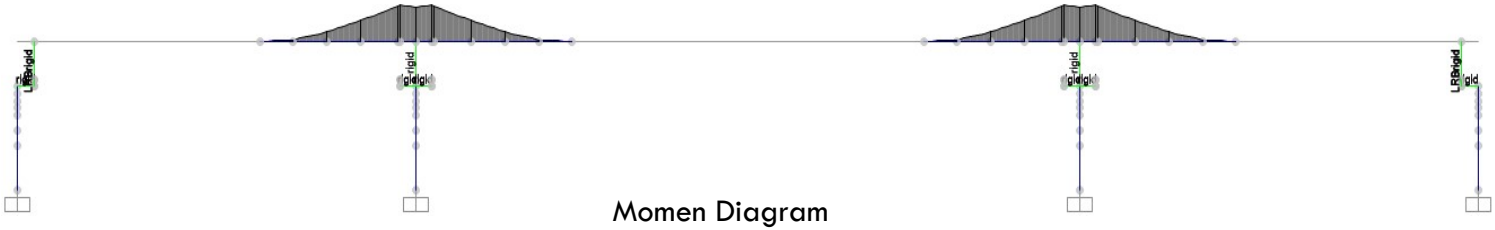
Lay Out Span

Cross Section





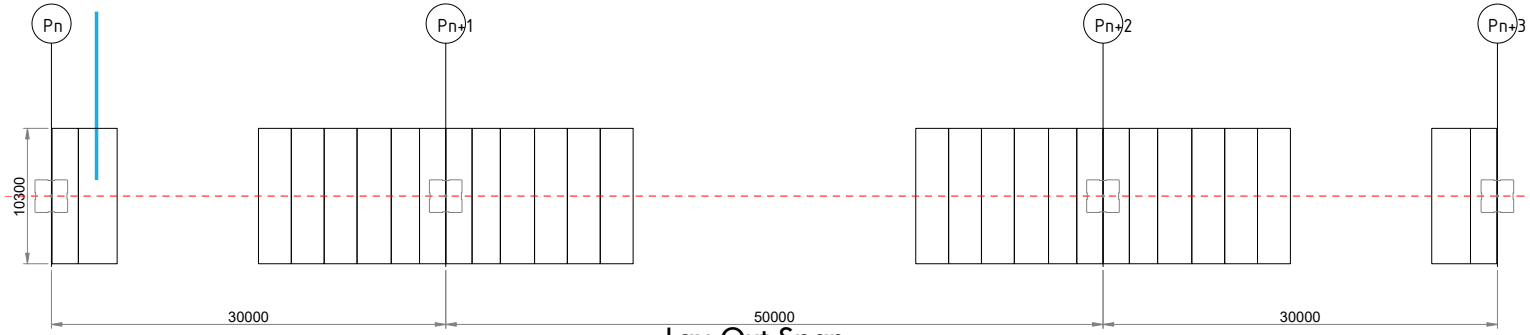
Long Section



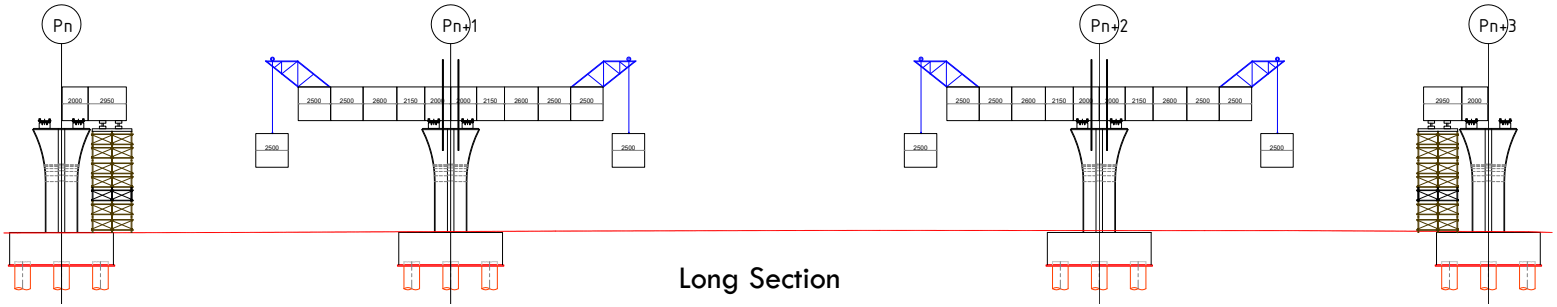
Momen Diagram

ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

STEP : LIFTING SEGMENT BOX GIRDER



Lay Out Span



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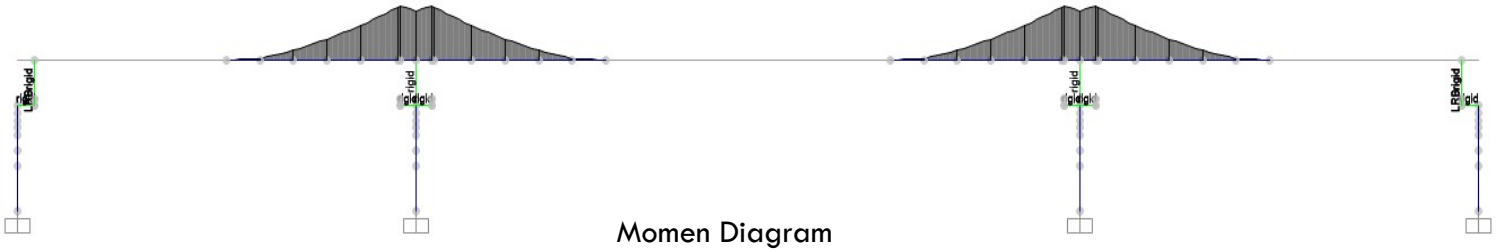
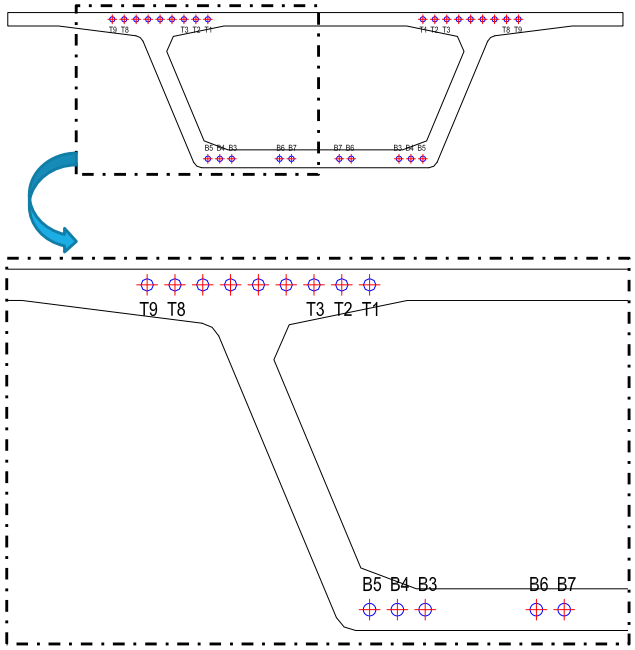


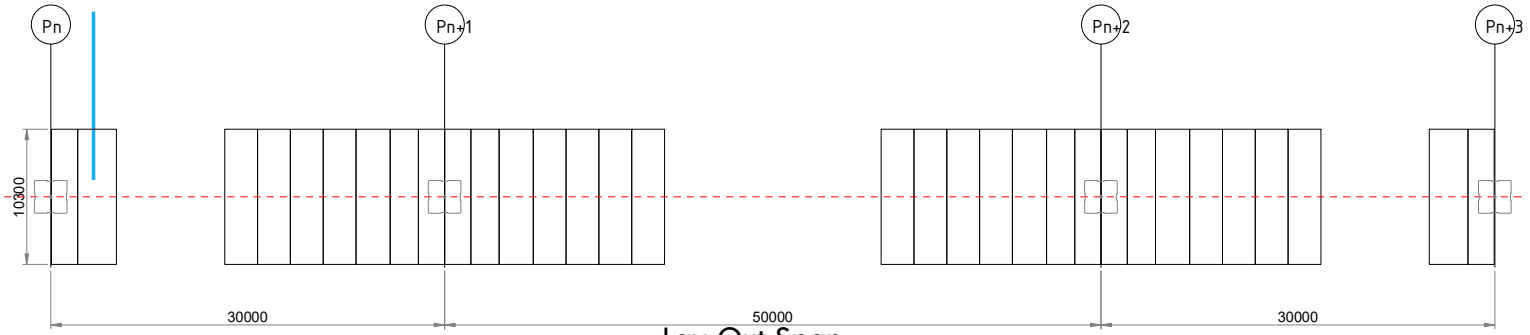
Momen Diagram

Cross Section



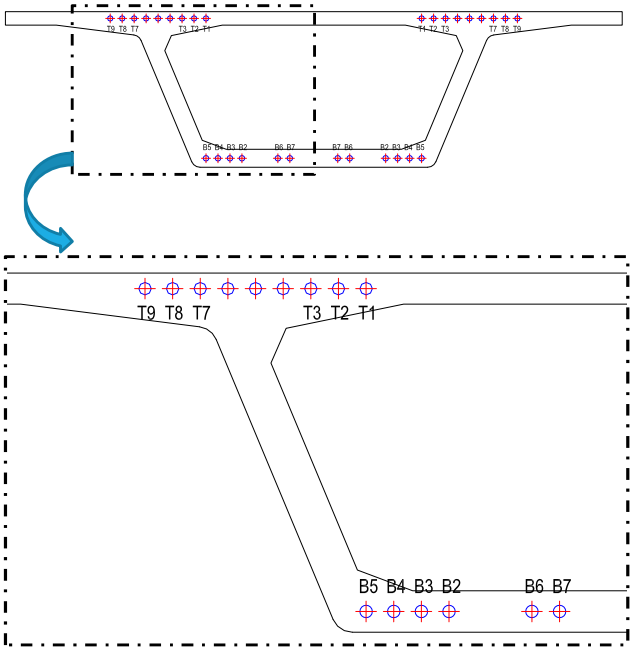
ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

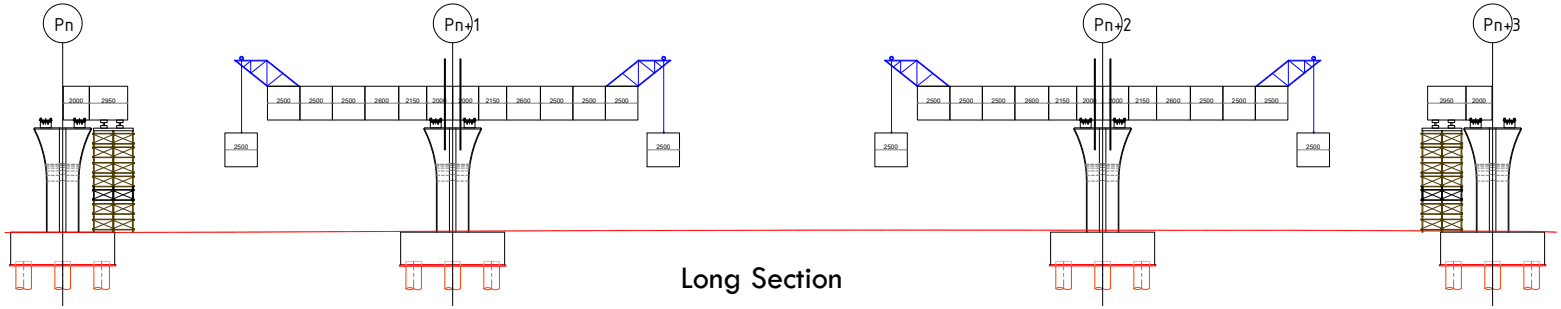
STEP : LIFTING SEGMENT BOX GIRDER



Lay Out Span

Cross Section





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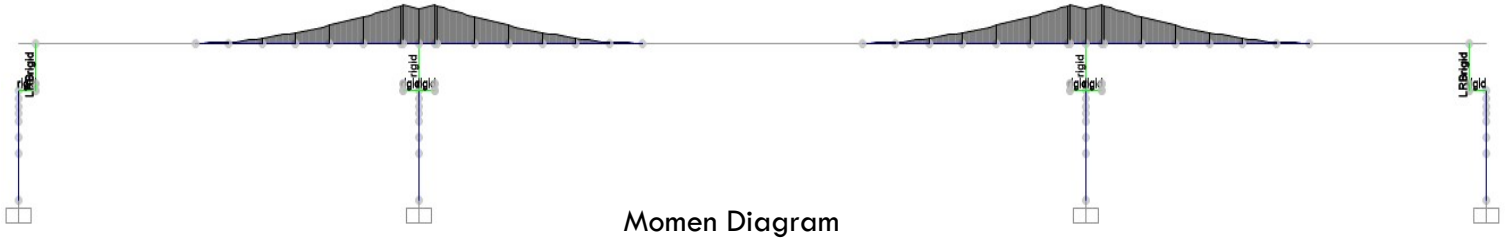
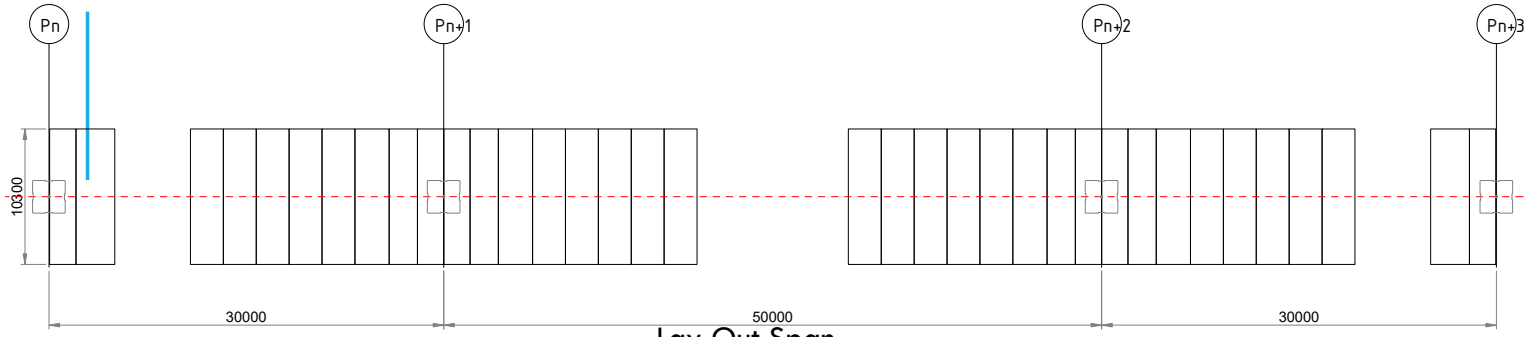


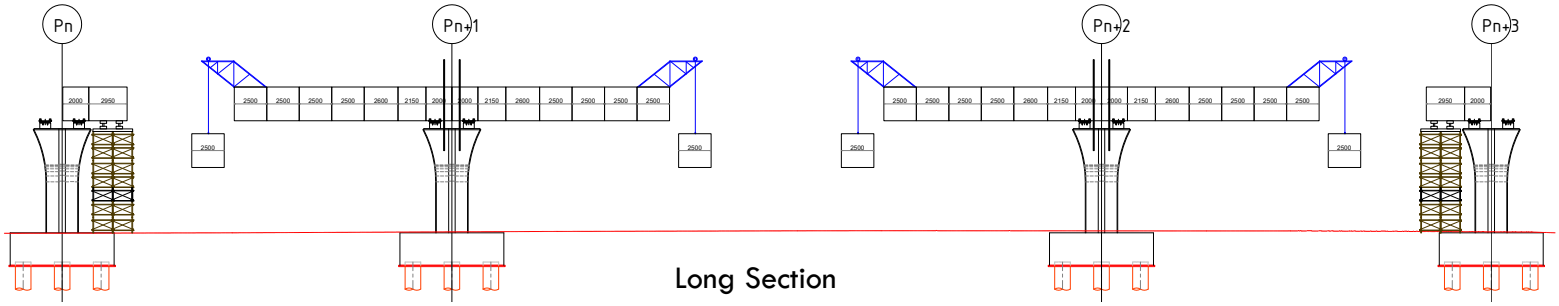
Momen Diagram

ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

STEP : LIFTING SEGMENT BOX GIRDER



Lay Out Span



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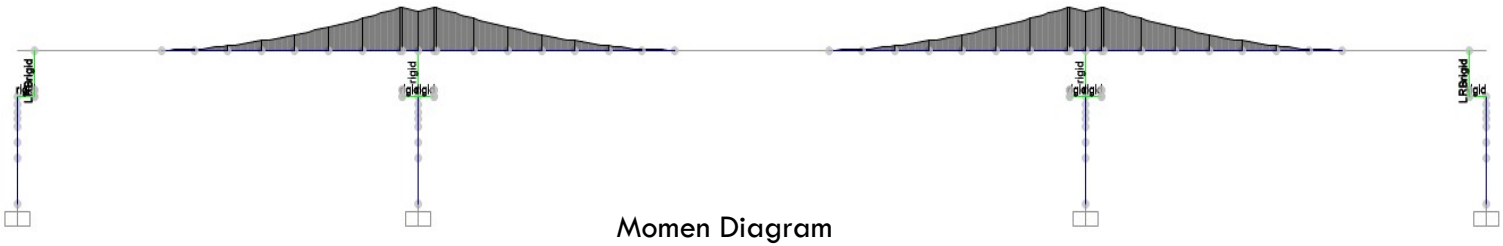
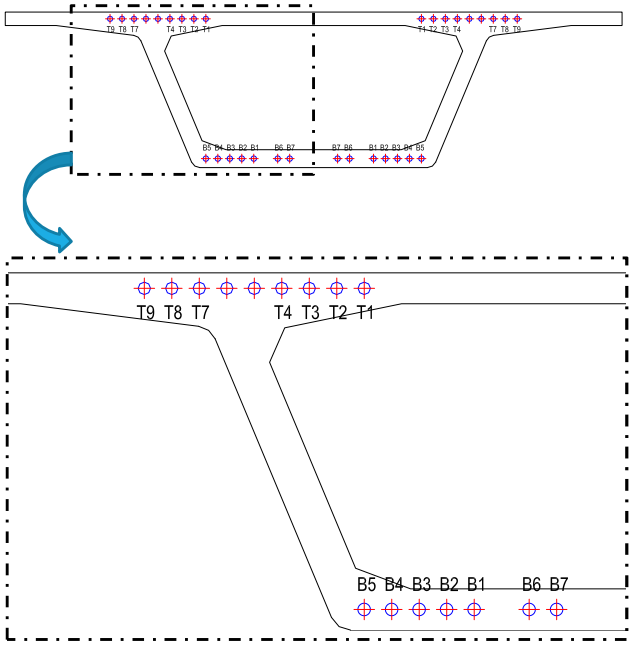


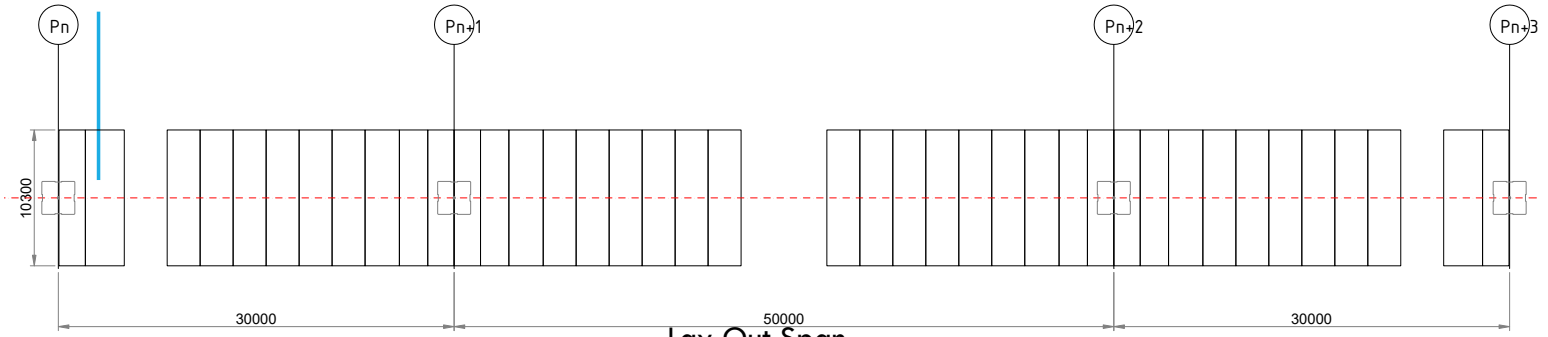
Momen Diagram

Cross Section



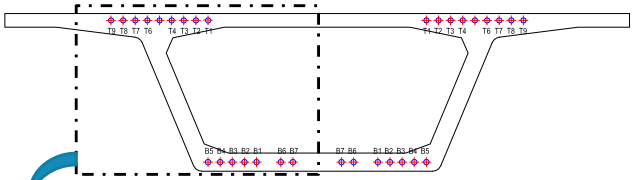
ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

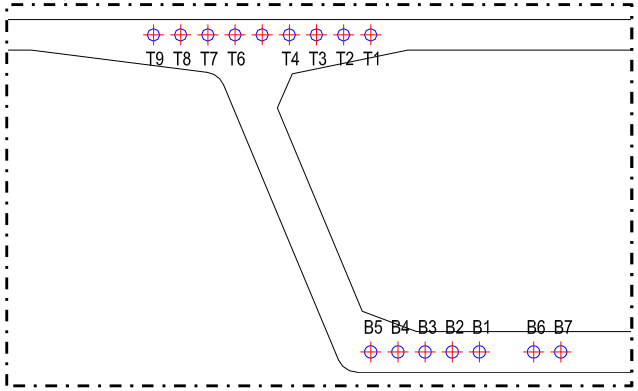
STEP : LIFTING SEGMENT BOX GIRDER

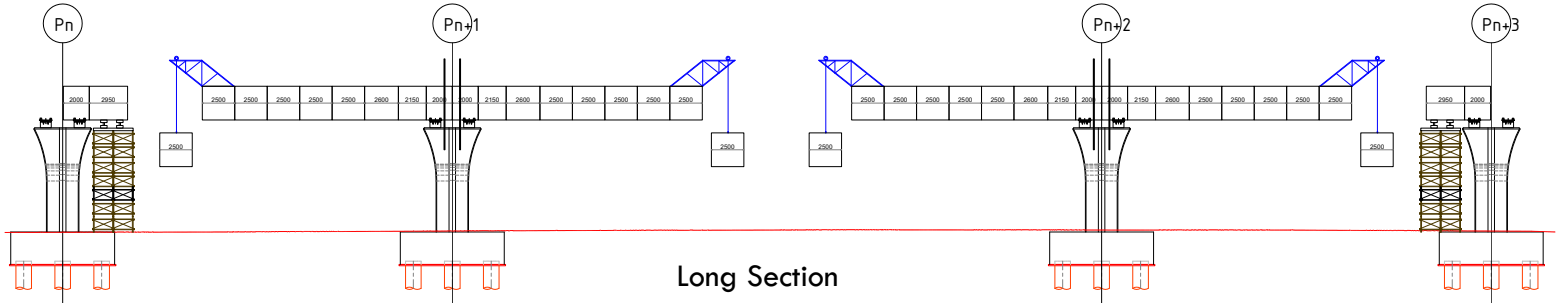


Lay Out Span

Cross Section







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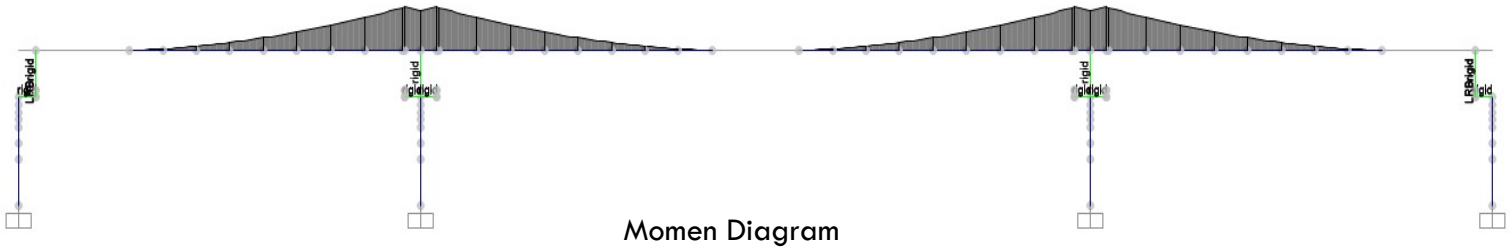
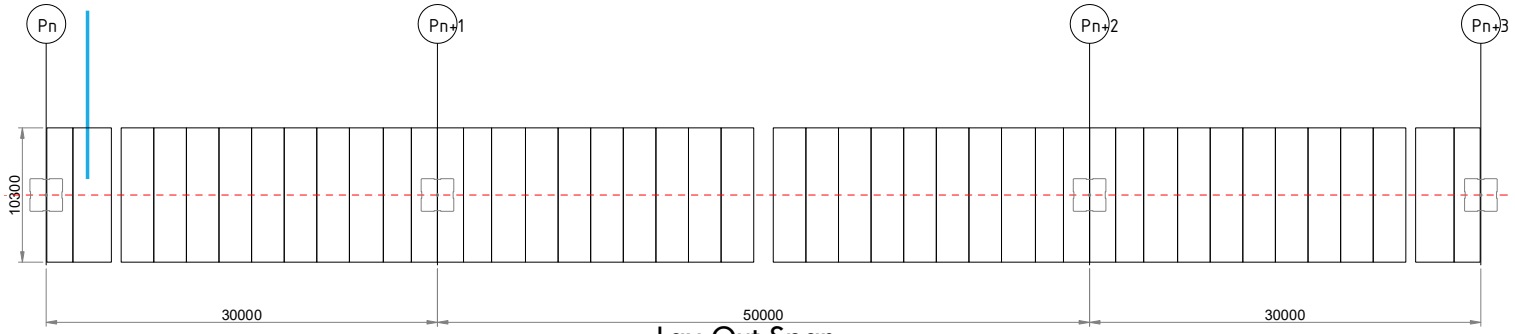


Momen Diagram

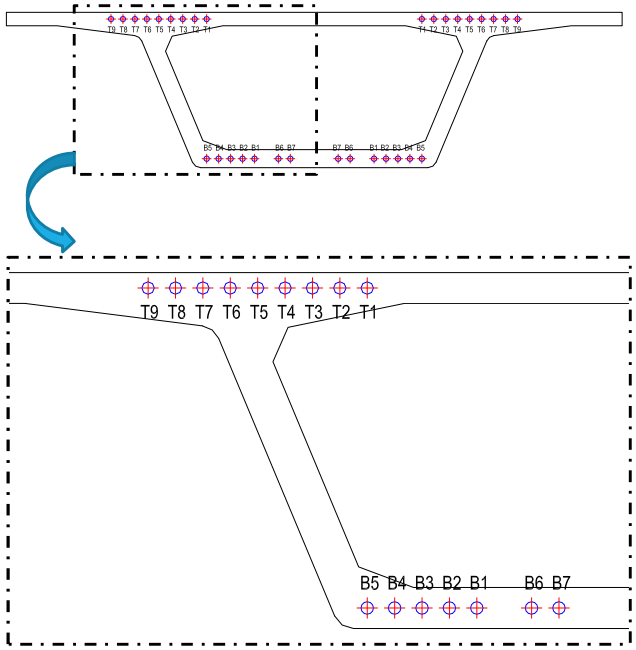
ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

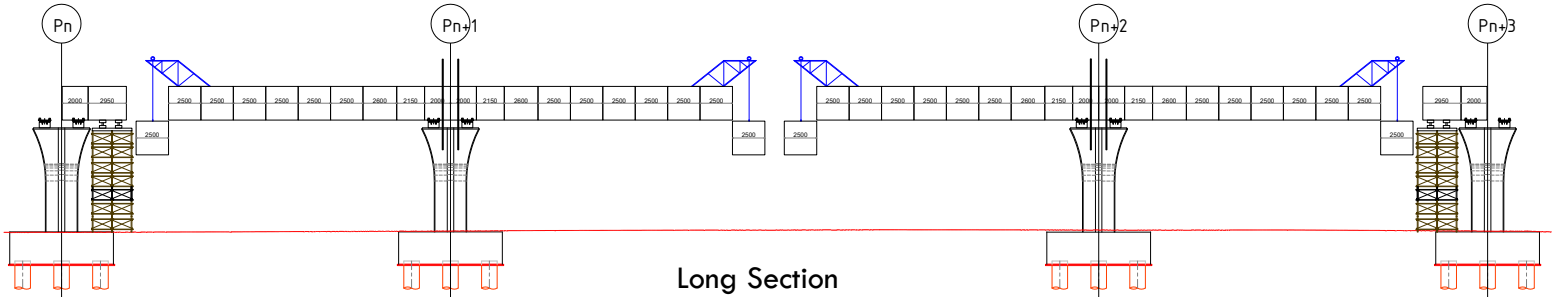
STEP : LIFTING SEGMENT BOX GIRDER



Lay Out Span

Cross Section





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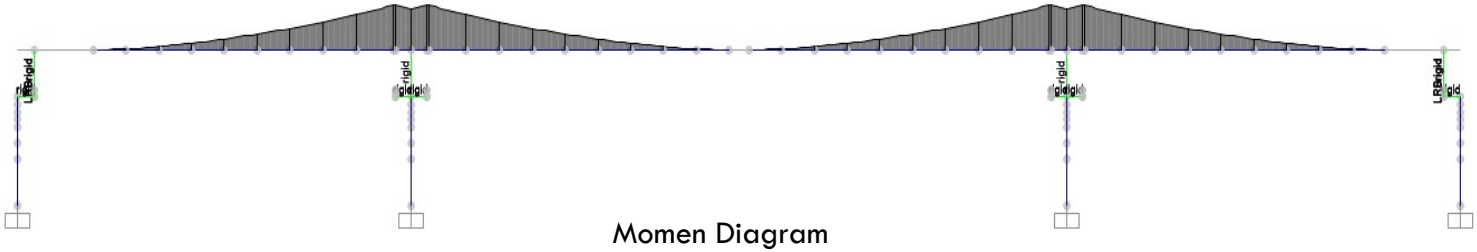
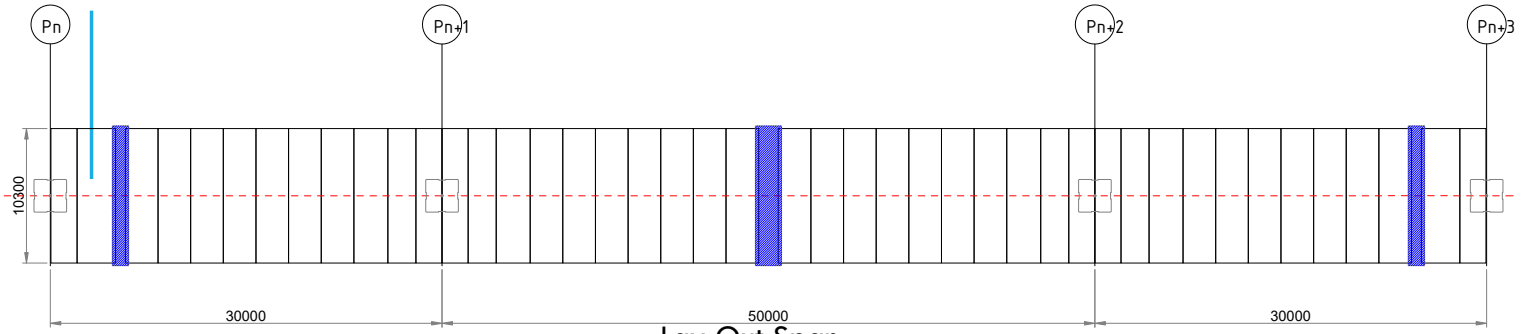


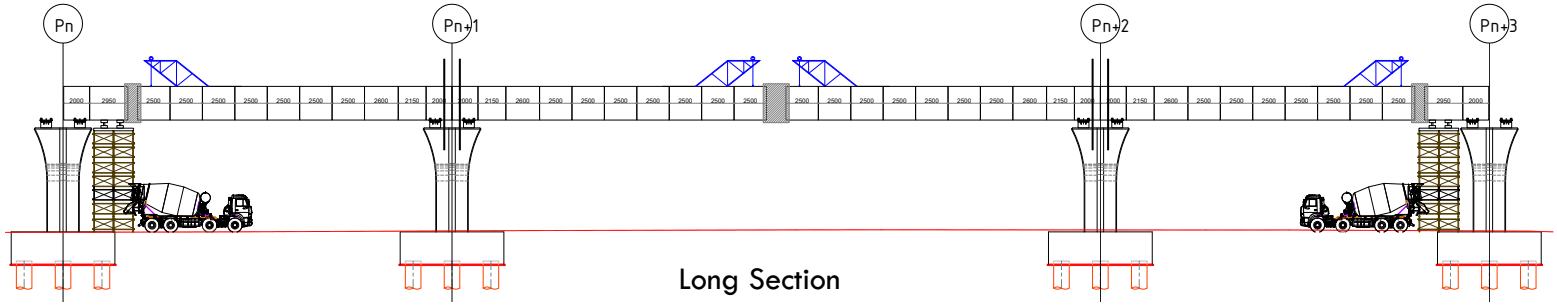
Momen Diagram

ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

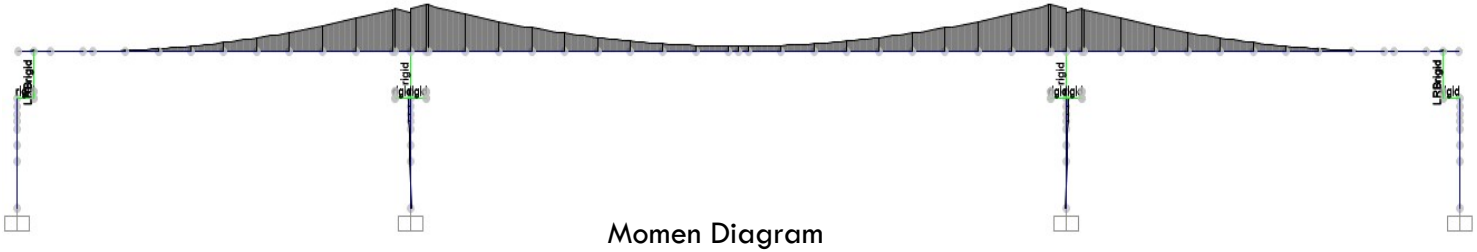
STEP : COR CLOUSURE



Lay Out Span

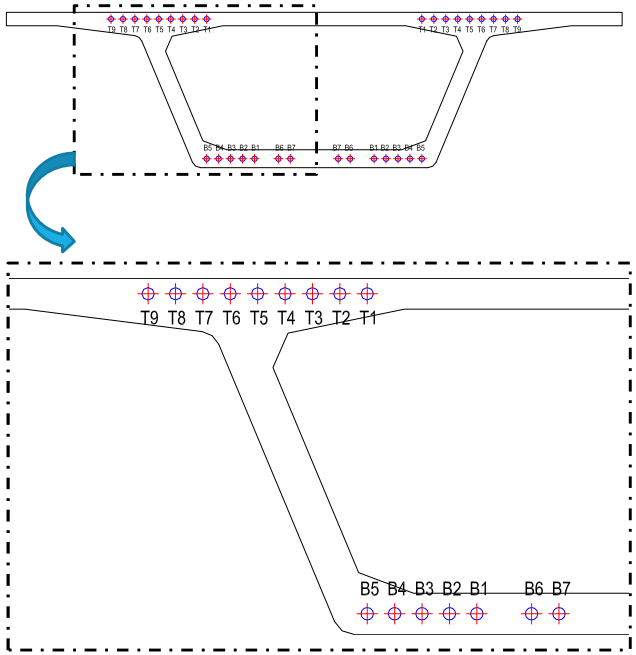


Long Section



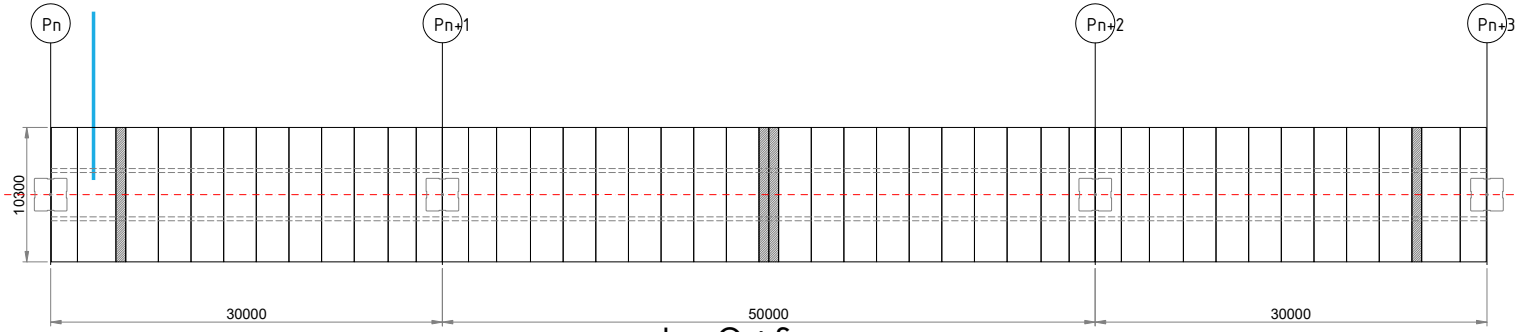
Momen Diagram

Cross Section



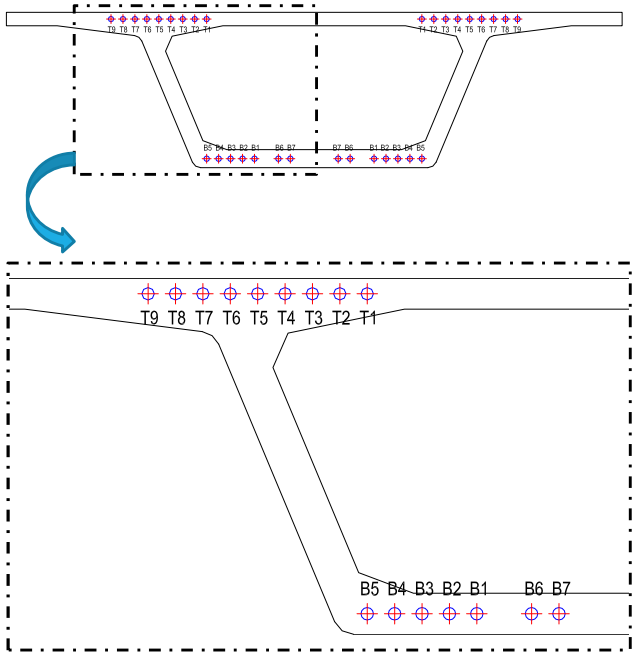
ILUSTRASI METODE KONSTRUKSI MENGGUNAKAN LIFTER

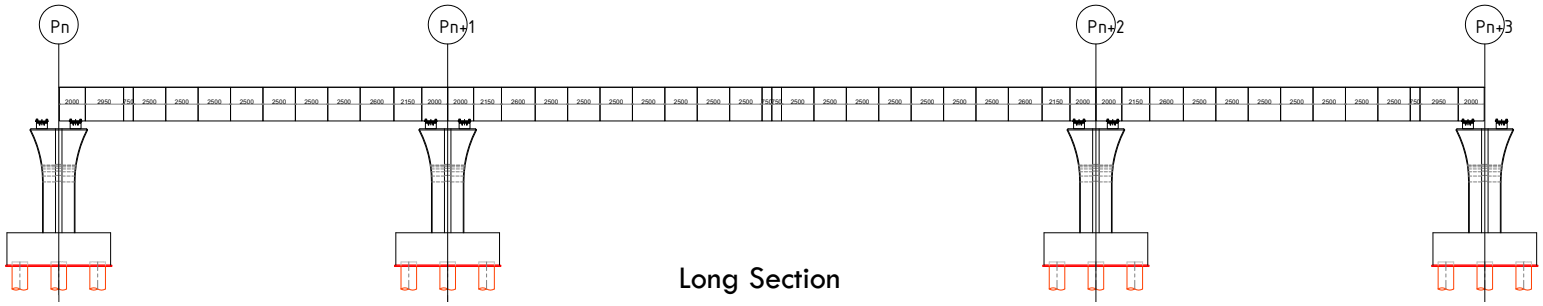
STEP : REALESE TEMPORARY FIXITY



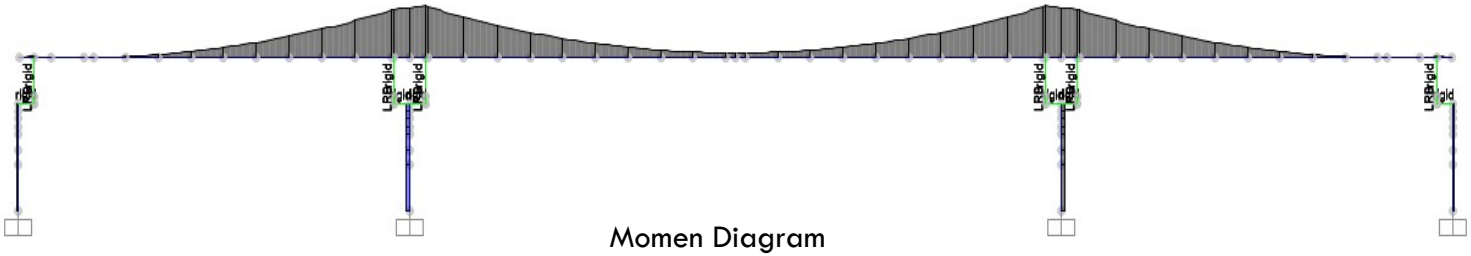
Lay Out Span

Cross Section





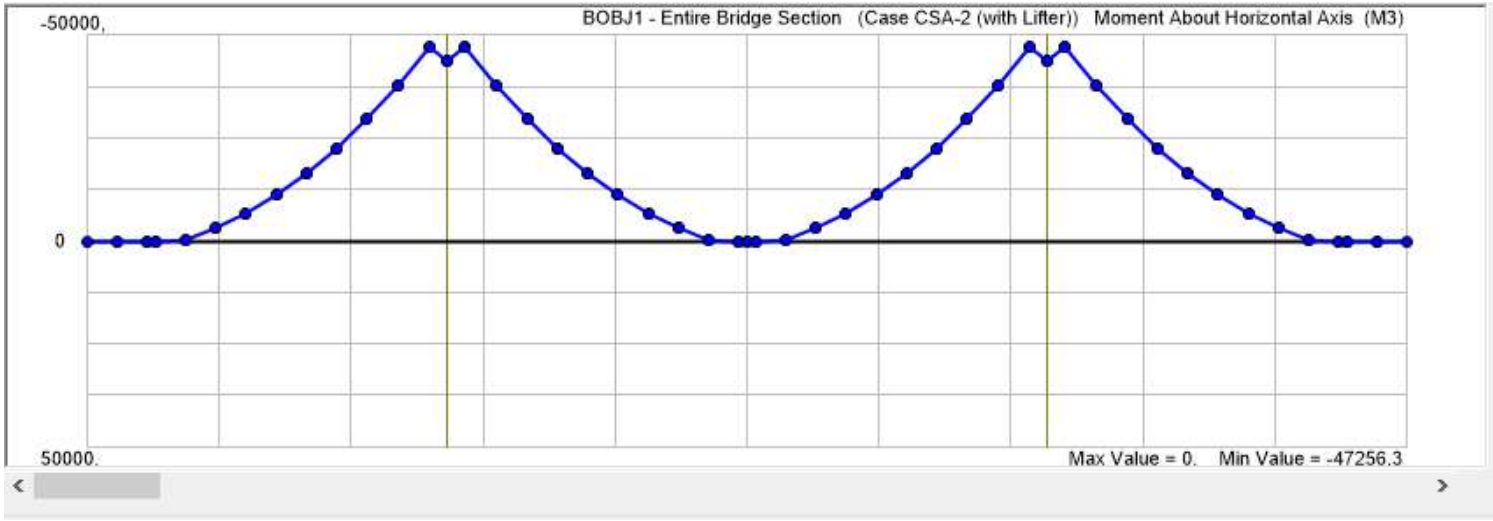
Long Section

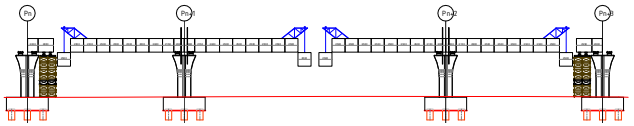


Momen Diagram

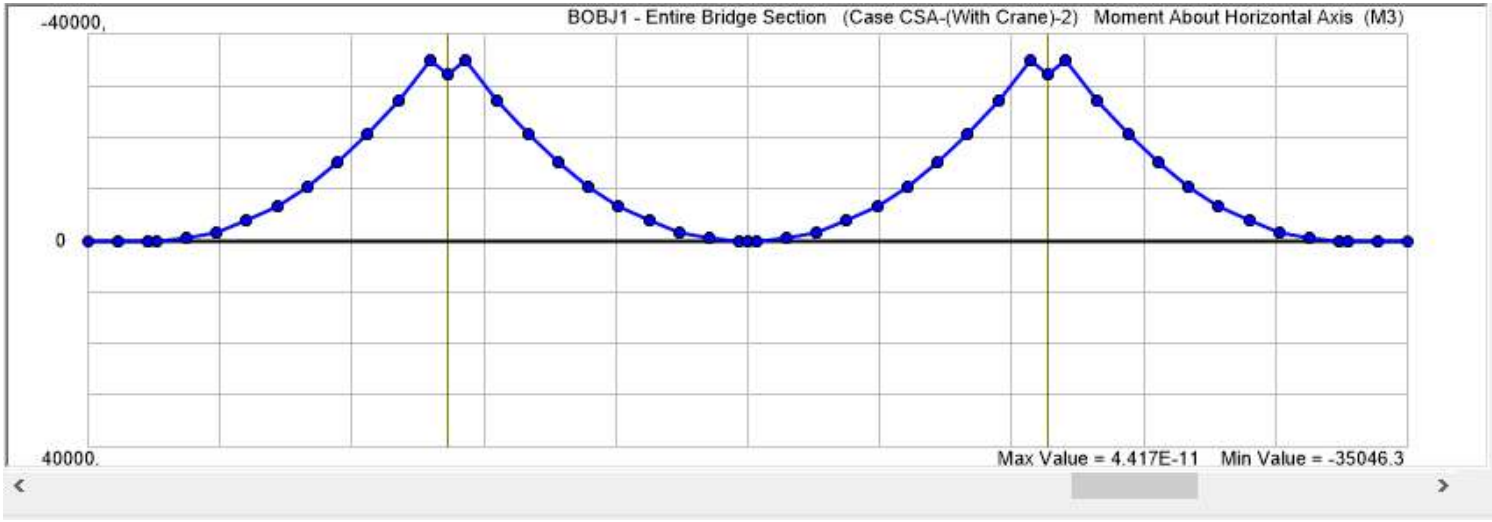
DIAGRAM MOMEN SAAT KANTILEVER TERPANJANG
METODE LIFTER VS METODE CRANE

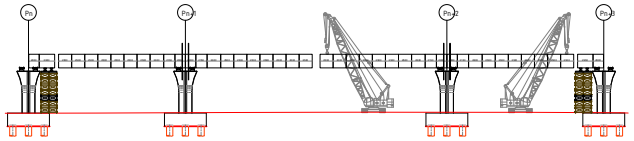
DIAGRAM MOMEN SAAT KANTILEVER TERPANJANG





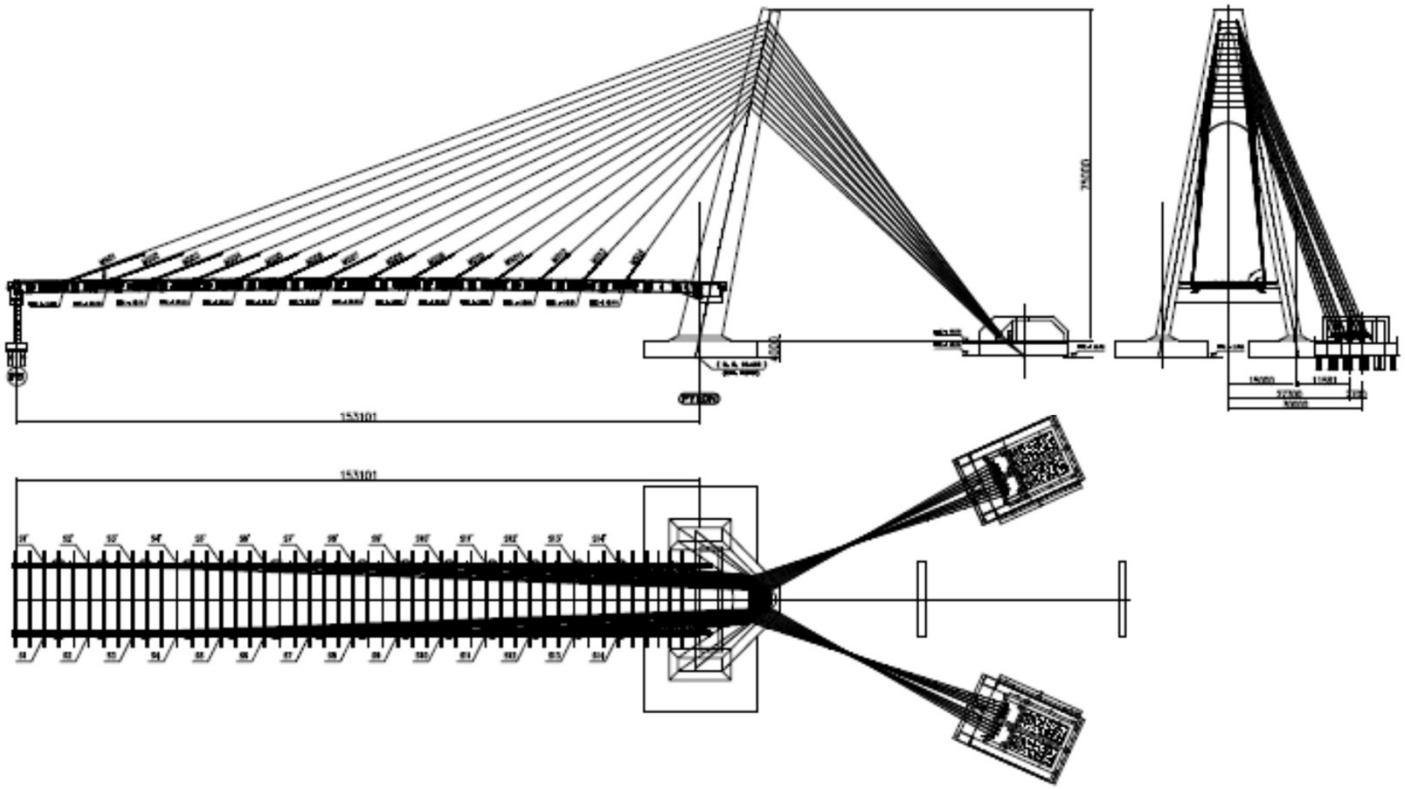
Metode Lifter
Nilai momen tumpuan :
M_{max} = -47256.3 kN m





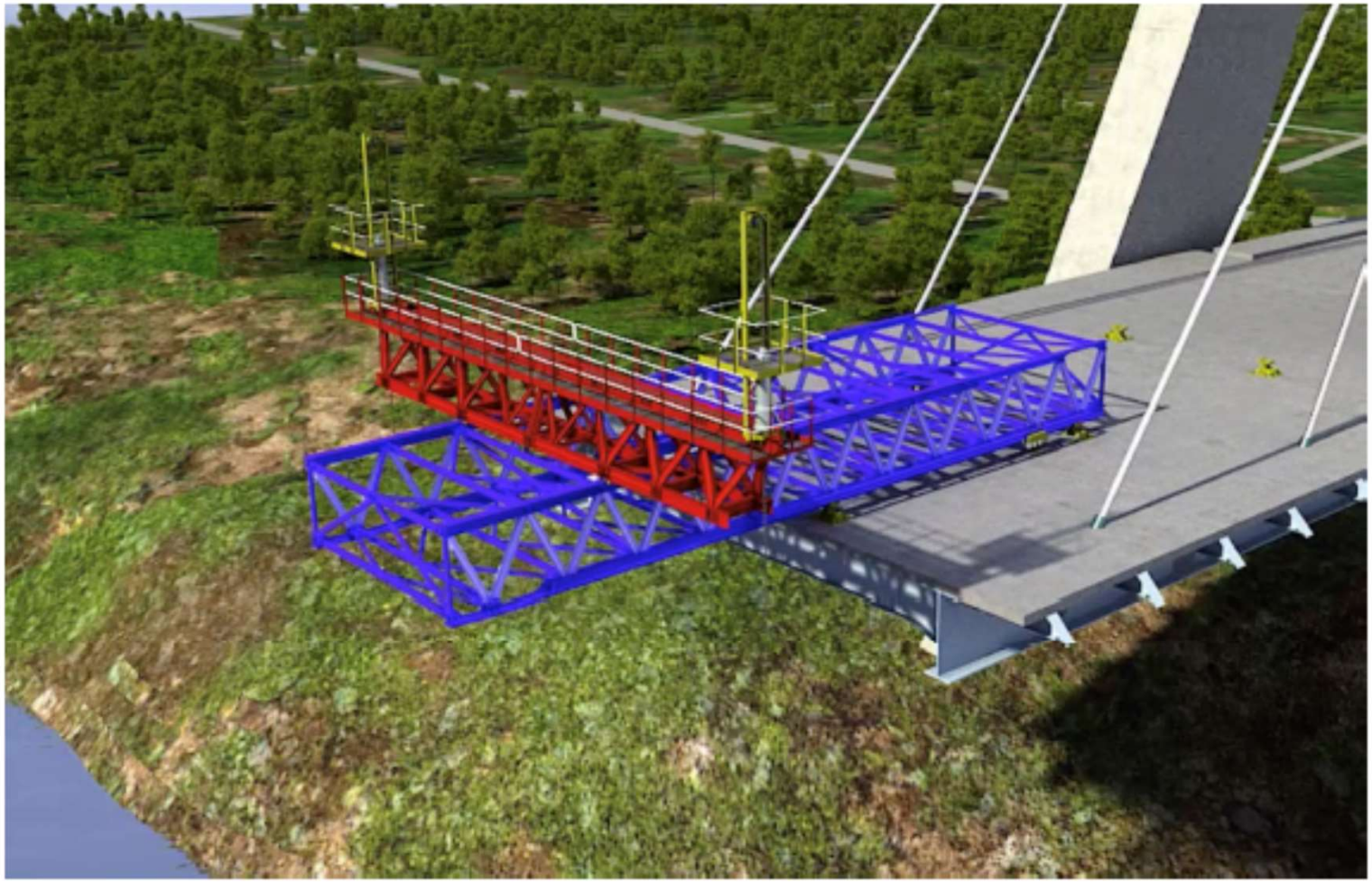
Metode Crane
Nilai momen tumpuan :
M_{max} = -35046.3 kN m

LIFTER SEGMEN BAJA



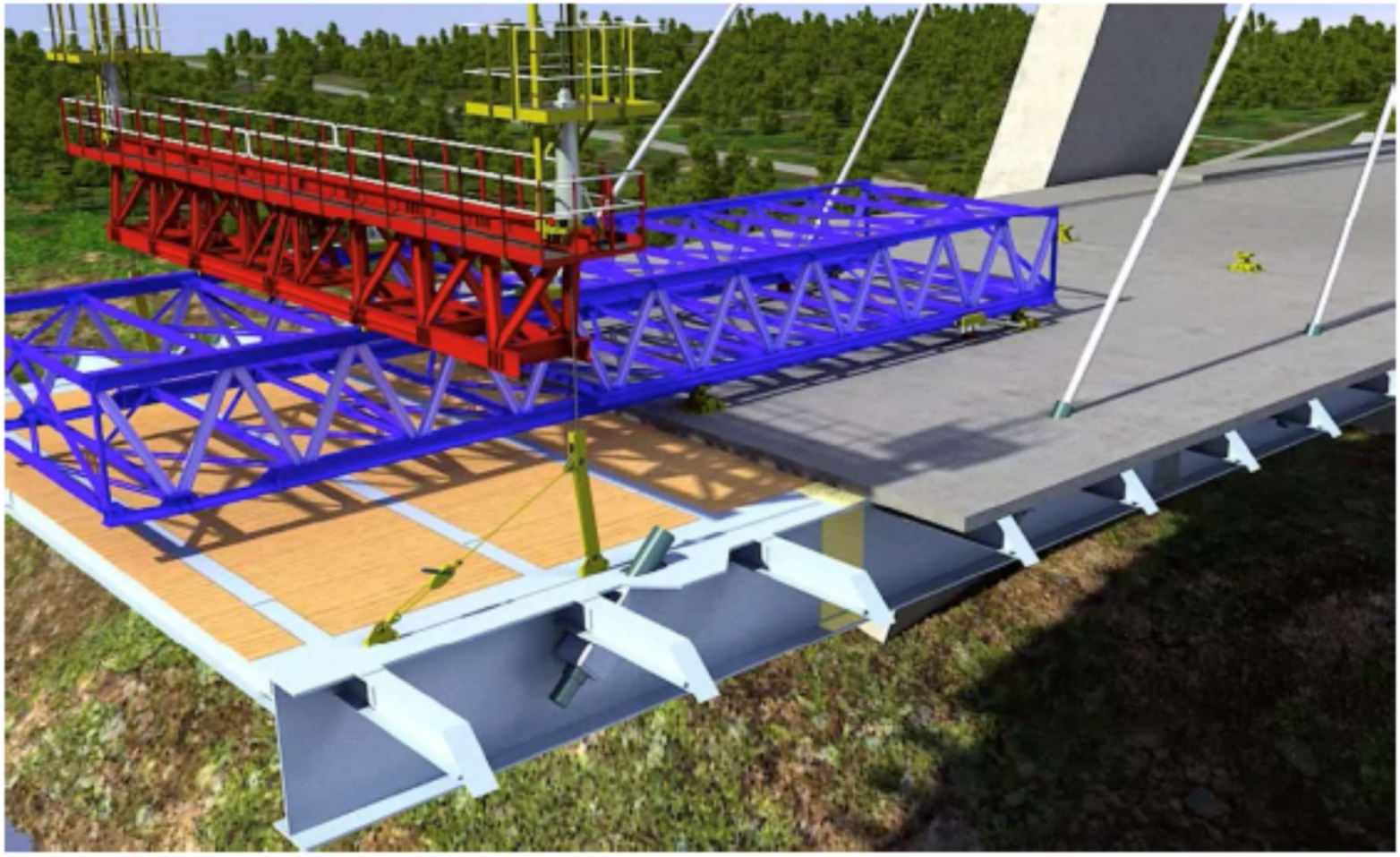
Preparing of segment on barge at the lifting position.

Moving of main transverse truss (MTB) forward to lifting position.



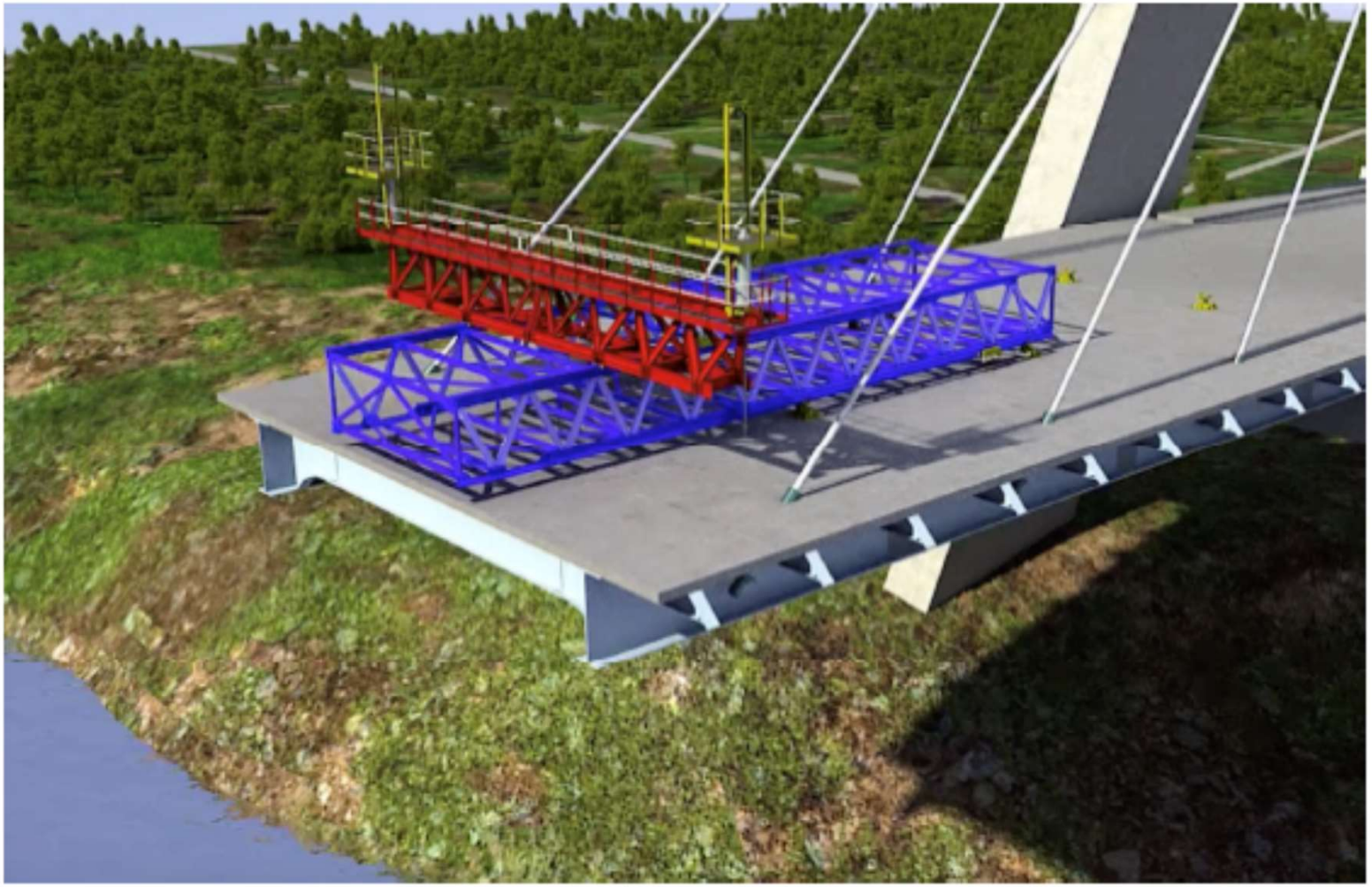
Lifting of Segment

Bolting of Segment

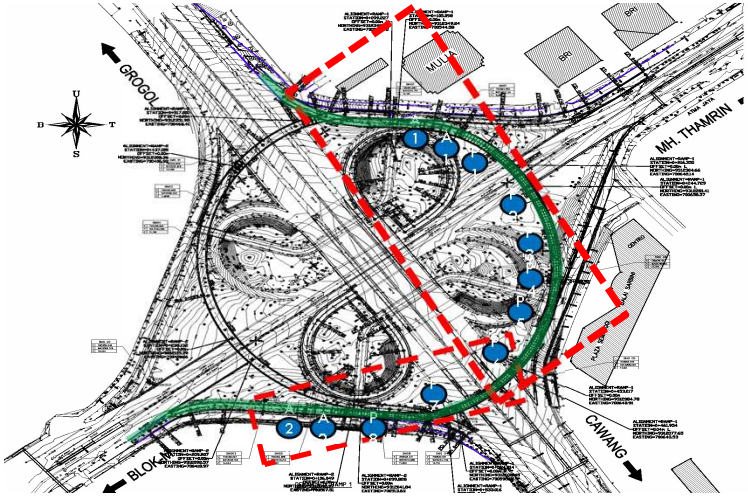


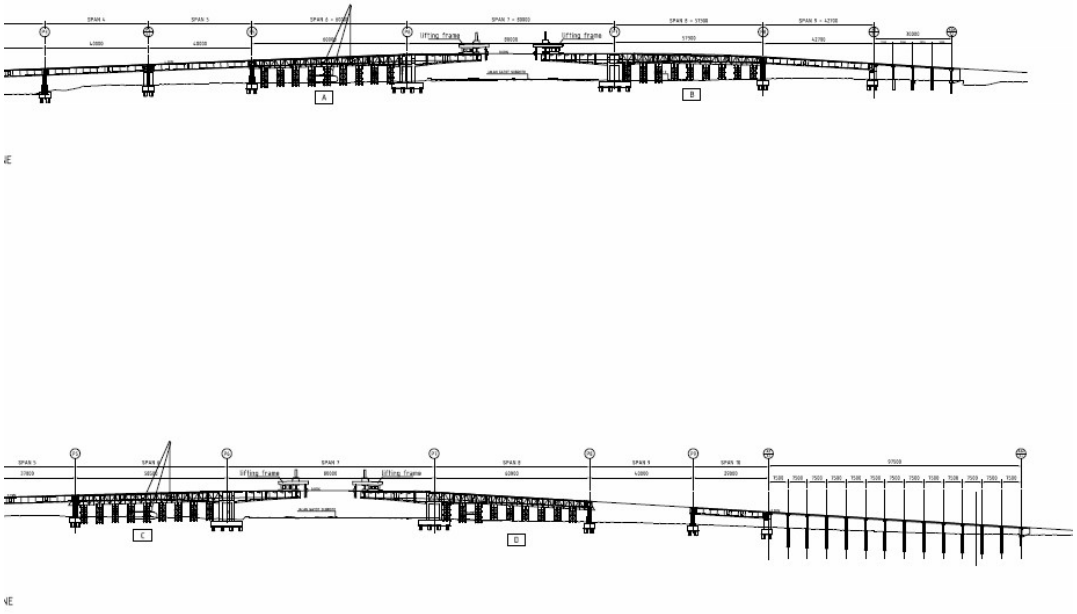
Installation of Stay Cable

Casting of Concrete Slab



LIFTER SEGMEN BOX PRECAST BETON

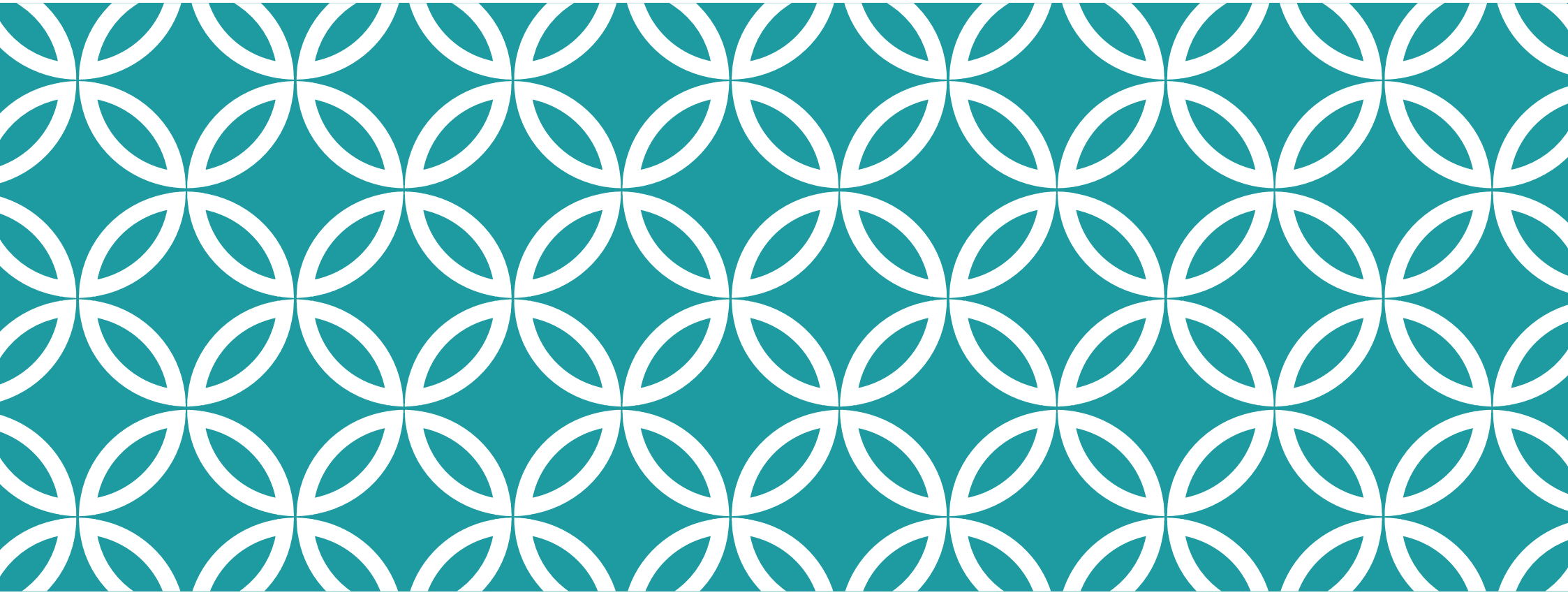





YWL
KM
8
600


SAFETY FIRST
PT WIJAYA KARYA (Persero) Tbk
YWL
AIA


YWL



LAUNCHING GANTRY

DESKRIPSI UMUM

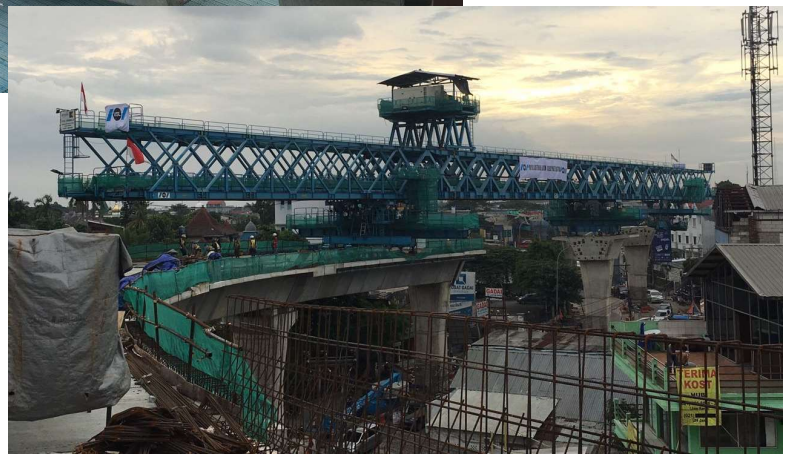
- Alat bantu untuk metoda konstruksi yang tidak membolehkan adanya gangguan di bawah jembatan yang akan dibangun.
- Supportnya berupa tumpuan yang pada umumnya dari pier ke pier
- Dibatasi bentang yang tidak dapat terlalu panjang, karena tumpuannya yang berada di pier. Pada umumnya adalah 40 m sampai 50 m.
- Kinematik dan load introductionnya sangat dipengaruhi span arrangemen.

LAUNCHING GANTRY TIPE TRUSS

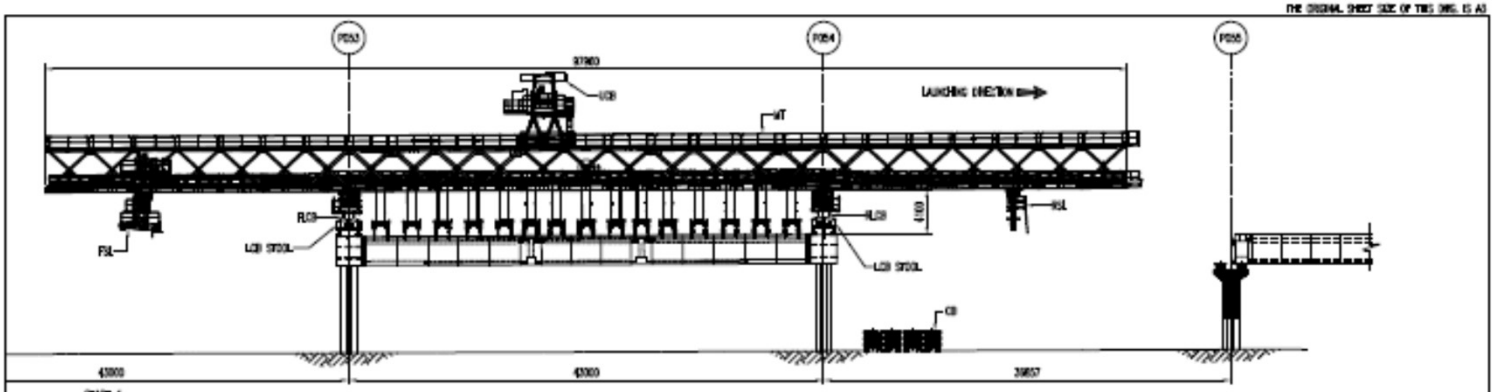
- Span by span, precast concrete box girder
- Balance cantilever, precast concrete box girder

SPAN BY SPAN PRECAST BOX GIRDER

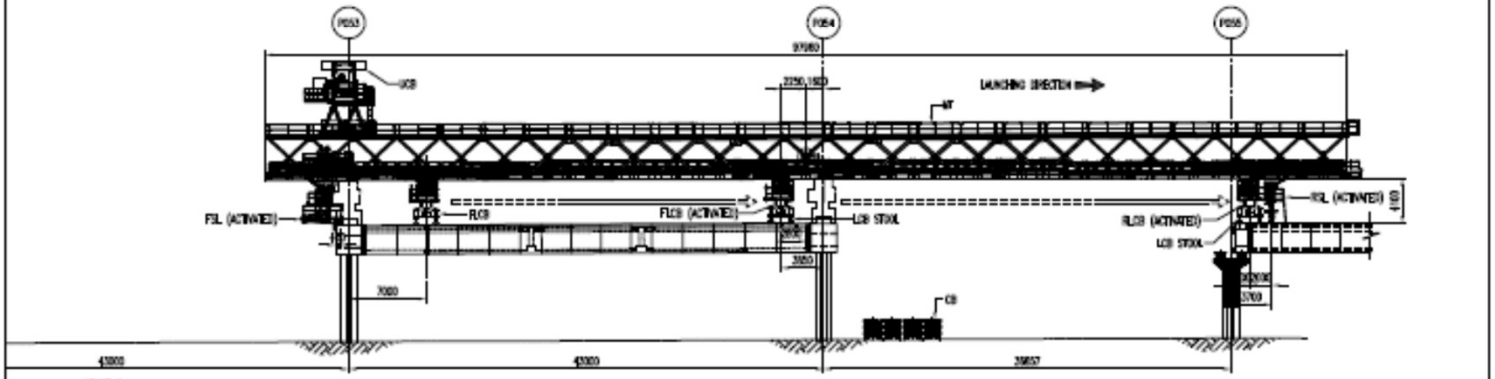
JLKB Paket Kostrad, Jakarta



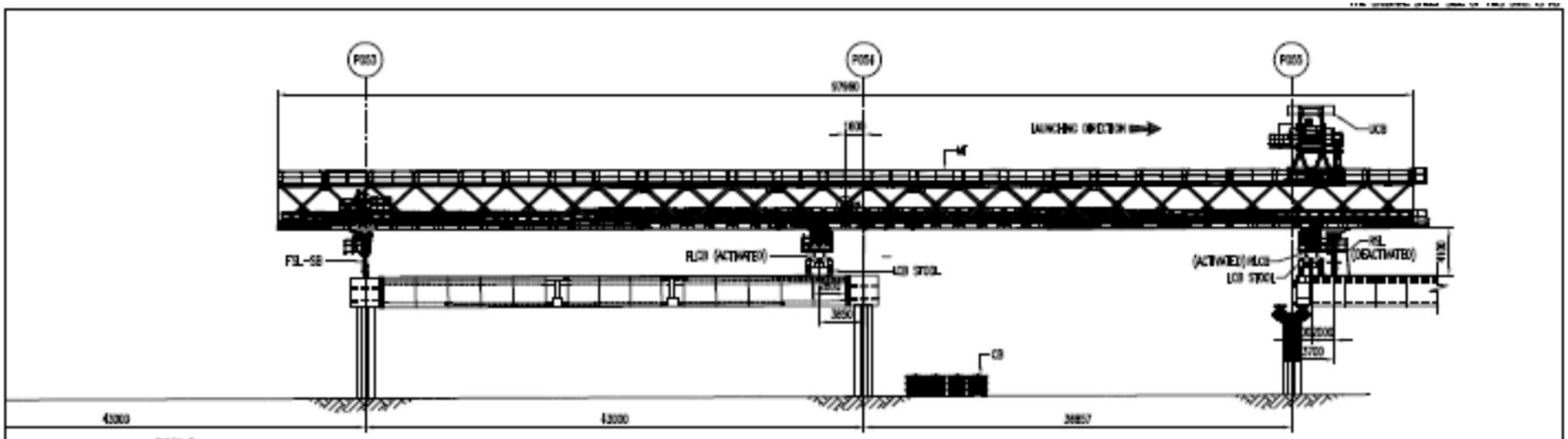
THE ORIGINAL SHEET SIZE OF THIS DWG. IS A3



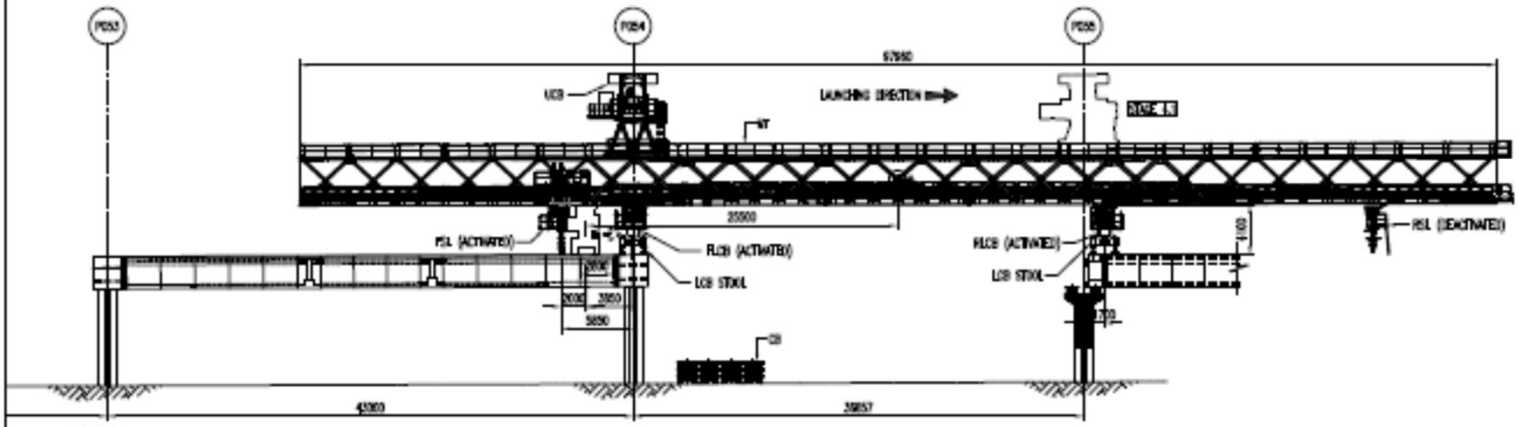
STAGE 1
1. ERECTION OF SPAN P053–P054 HAS BEEN COMPLETED.
2. DISCONNECT SEGMENT SUSPENSION BARS, AND STORE CB TEMPORARILY ON GROUND.
3. MOVE LAUNCHING JACK TO FLCB.



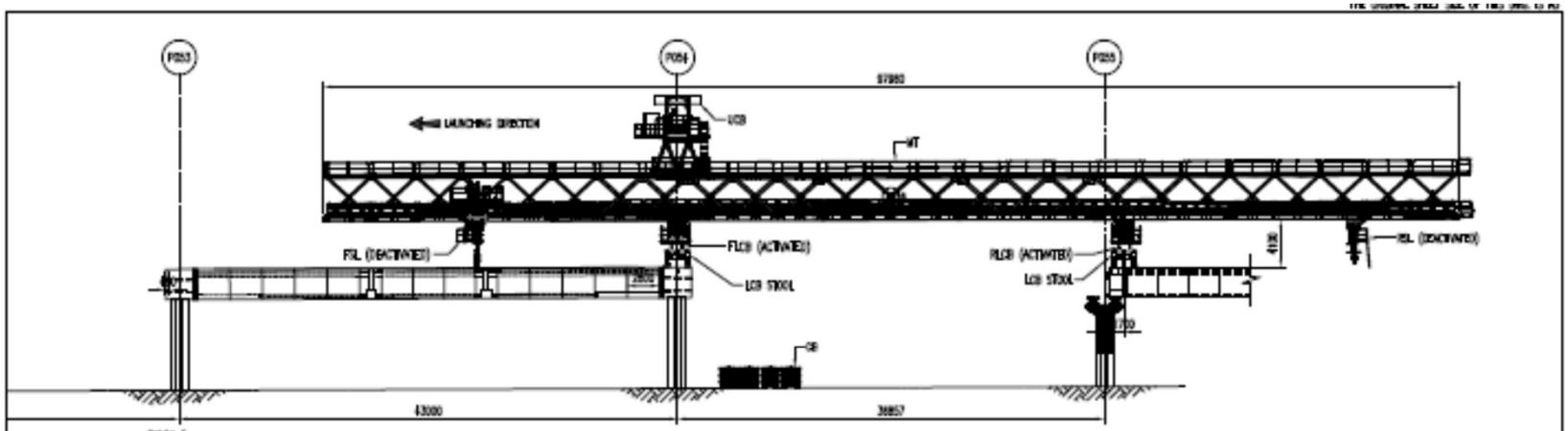
STAGE 2
1. LAUNCH GANTRY BACKWARD KEEPING UCB ABOVE FLCB, C.G. AT 1.0m BEHIND P054.
2. ACTIVATE FSL AND RSL AT A GIVEN POSITION.
3. DEACTIVATE FLCB AND RELOCATE (USING UCB) 7m IN FRONT OF P053 AND ACTIVATE.
4. DEACTIVATE FSL, LOWER DOWN BY UCB AND INSTALL BOTTOM SPREADER BEAM.
5. ACTIVATE FSL (DECK CONTROL) [NOTE: DURING ACTIVATION OF FSL, NEVER TRY TO INCREASE THE LEVEL OF MT AT FLCB BY JACKING UP].
6. DEACTIVATE FLCB AND RELOCATE (USING UCB) 3.05m BEHIND P054 AND ACTIVATE.
7. DEACTIVATE RLCB AND RELOCATE (USING UCB) 1.7m AFTER P055 AND ACTIVATE.



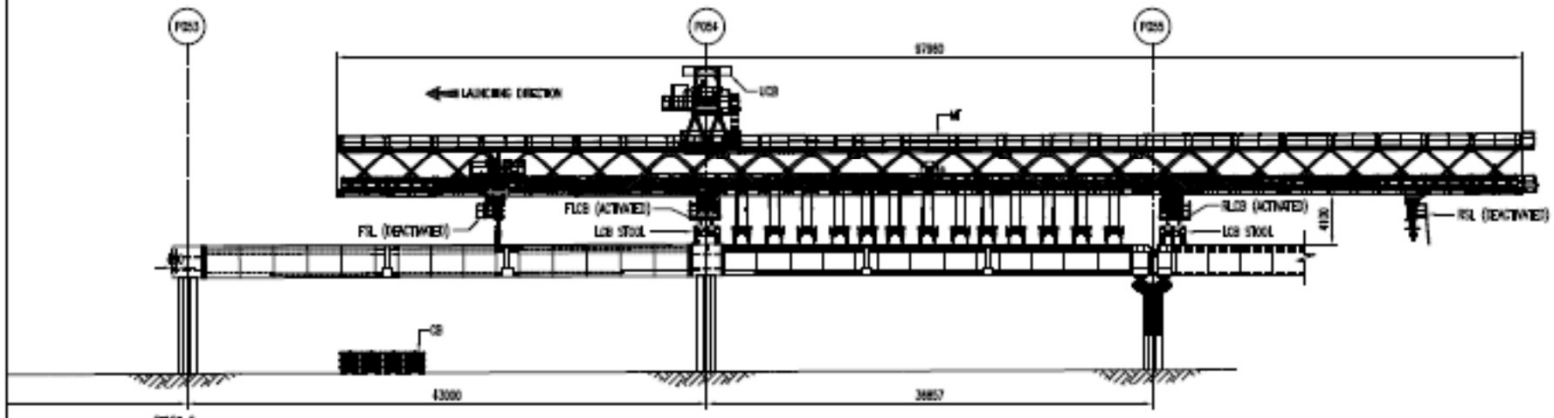
STAGE 3
1. DEACTIVATE FSL AND RSL



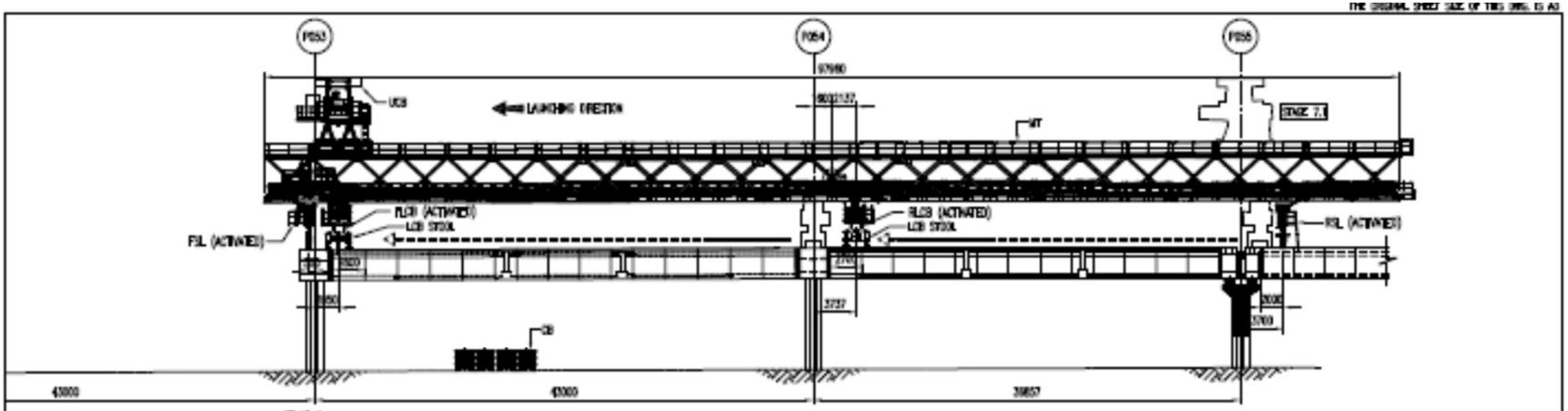
STAGE 4
1. LAUNCH MT BACKWARD UNTIL C.G. 25.0m FROM FLCB (NOTE: LAUNCHING JACK AT FLCB, LCB ABOVE FLCB).
2. ACTIVATE FSL AT A GIVEN POSITION.
3. DEACTIVATE FLCB AND RELOCATE IT TO NEW P054 THEN ACTIVATE.



STAGE 5
1. DEACTIVATE FSL.
2. ADJUST MT TO ORIGINAL ERECTION POSITION.
3. SPAN P254~P255 READY FOR ERECTION.

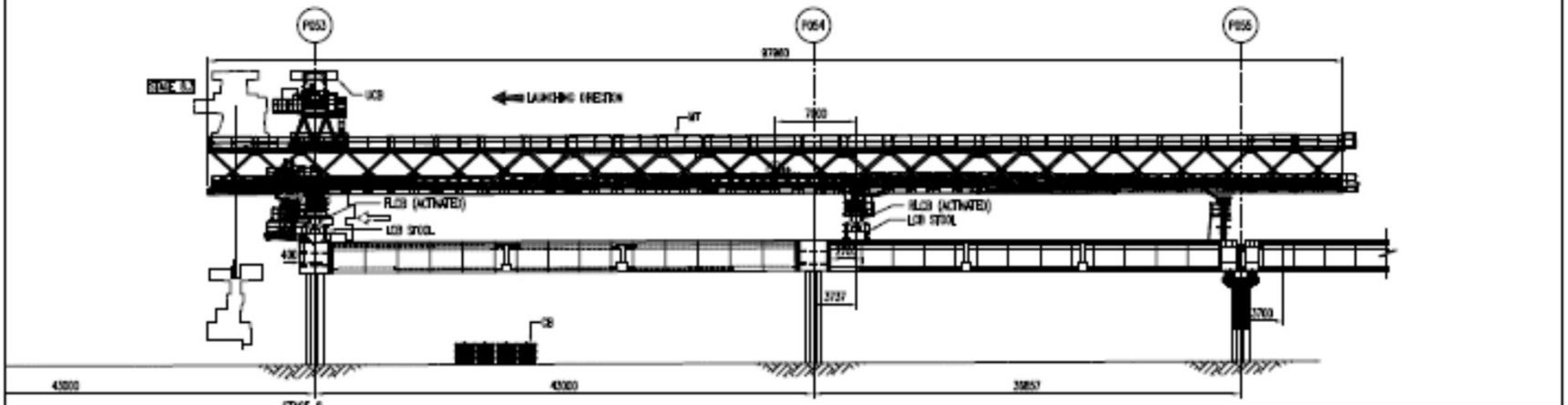


STAGE 6
1. ERECTION OF SPAN P254~P255 HAS BEEN COMPLETED.
2. DISCONNECT SEDIMENT SUSPENSION BARS, AND STORE OR TEMPORARILY ON GROUND.



STAGE 7

1. LAUNCH MT FORWARD UNTIL C.G. AT 1.6m BEHIND P054 (NOTE: LAUNCHING JACK AT FLCB, UCB ABOVE RLCB).
2. ACTIVATE FSL AND RSL AT A GIVEN POSITION.
3. DEACTIVATE RLCB AND RELOCATE (USING UCB) 3.737m BEHIND P054 AND THEN ACTIVATE.
4. DEACTIVATE FLCB AND RELOCATE (USING UCB) 2.05m BEHIND P053 AND THEN ACTIVATE.

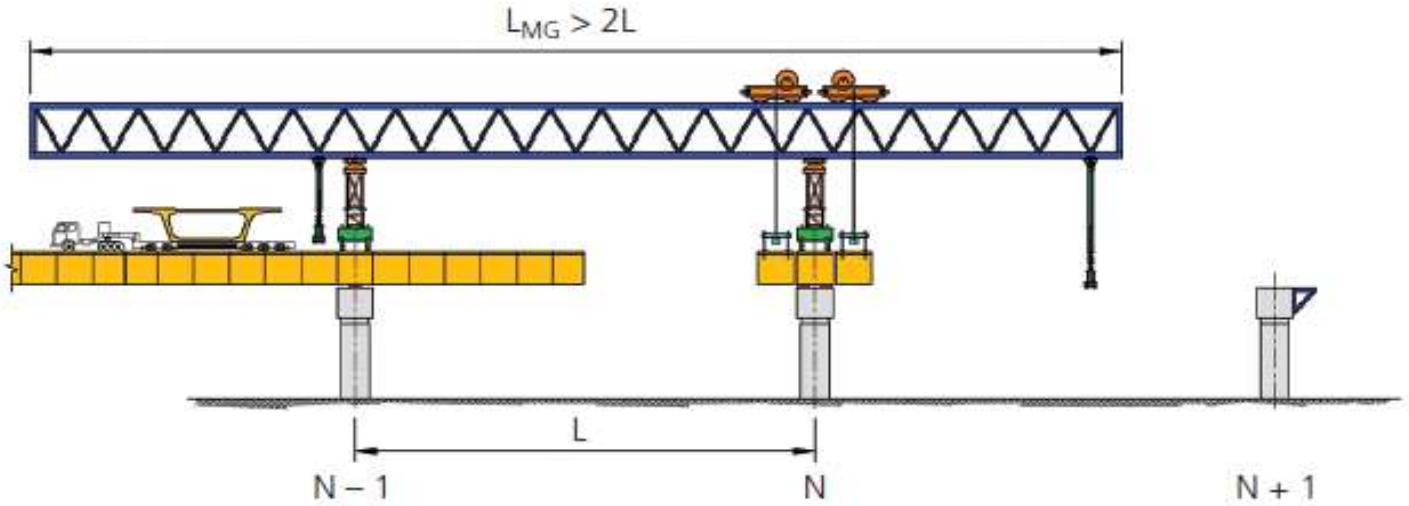


STAGE 8

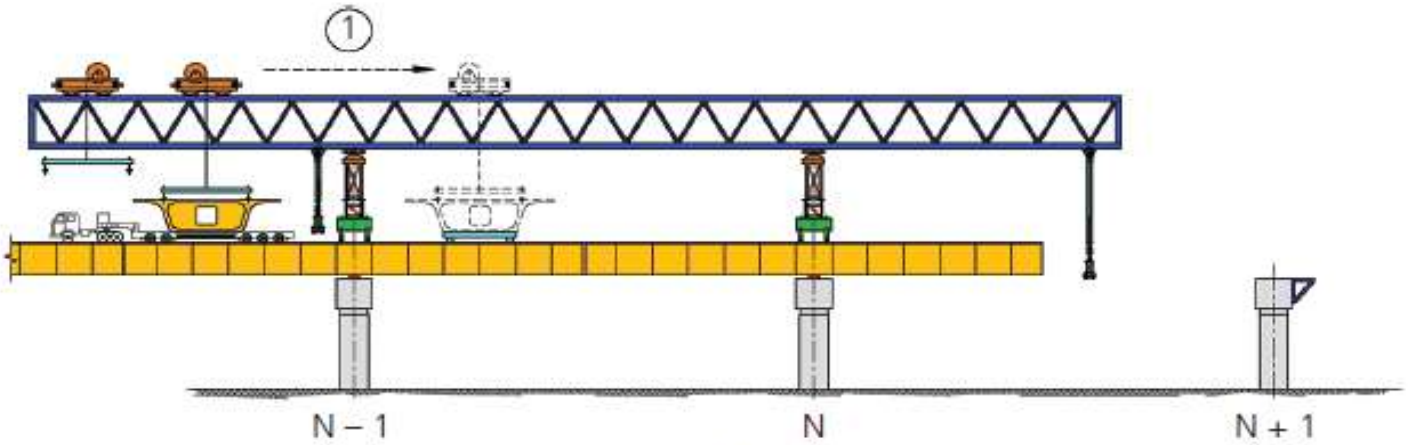
1. DEACTIVATE FSL AND RSL.
2. LAUNCH MT FORWARD UNTIL CG AT 7.0m IN FRONT OF RLCB (NOTE: LAUNCHING JACK AT RLCB, UCB ABOVE RLCB).
3. LOWER FSL WITH UCB. REPLACE THE BOTTOM FRAME. INSTALL TO MT.
4. ACTIVATE AT PIER P053.
5. DEACTIVATE FLCB AND RELOCATE TO P053, THEN ACTIVATE.

BALANCE CANTILEVER PRECAST BOX GIRDER

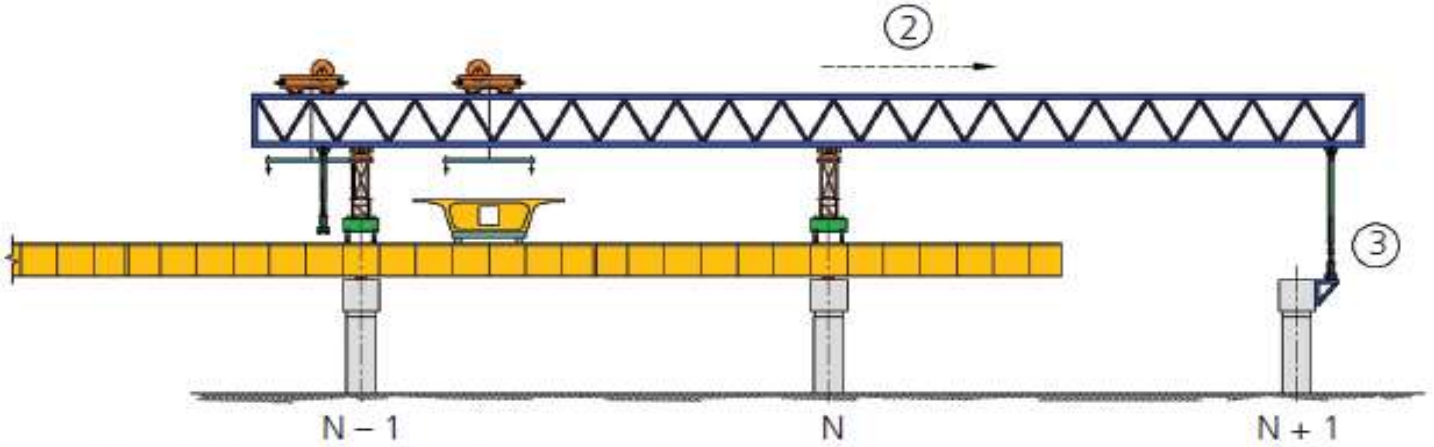
TYP



LG over span N – 1/N for placing of field segments about pier N

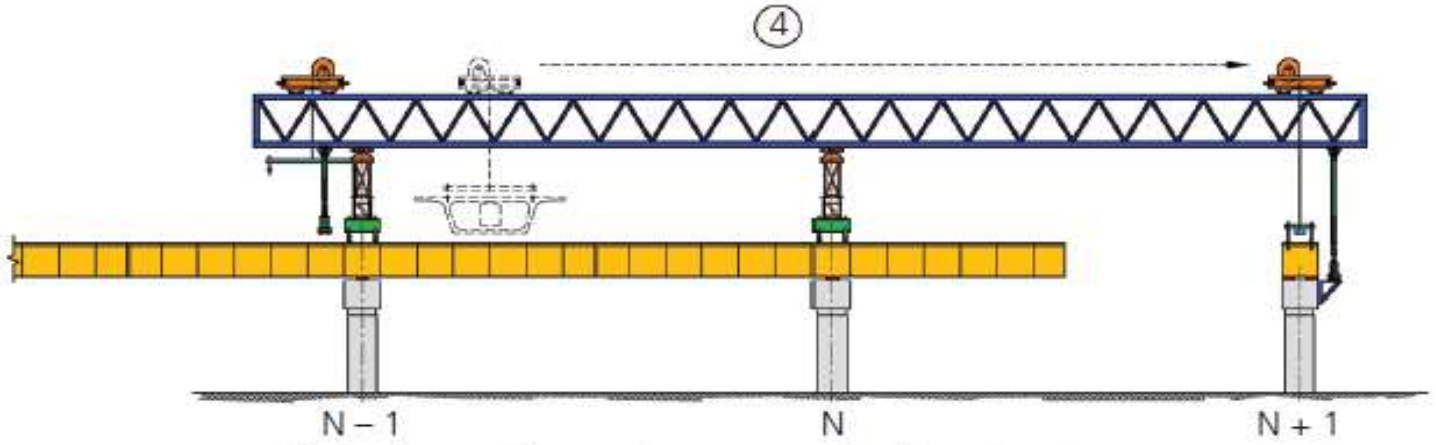


1. Pick up the pier segment N + 1 with the front trolley and park it on the deck in front of the rear main support.

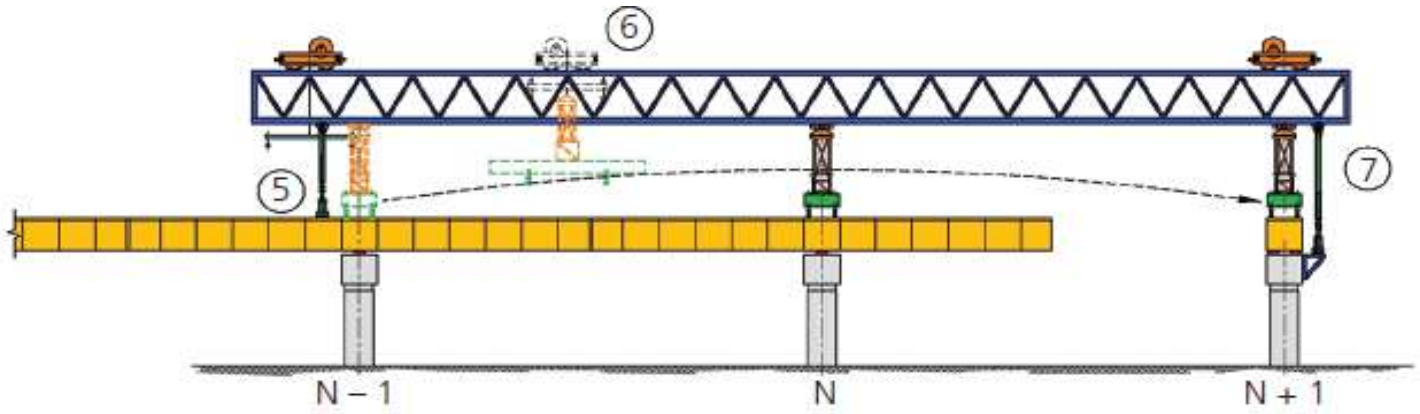


2. Launch the Main Girder (MG) forward until its tip is over the bracket at pier N + 1.
3. Activate the Front Support Leg (FSL) on the bracket.

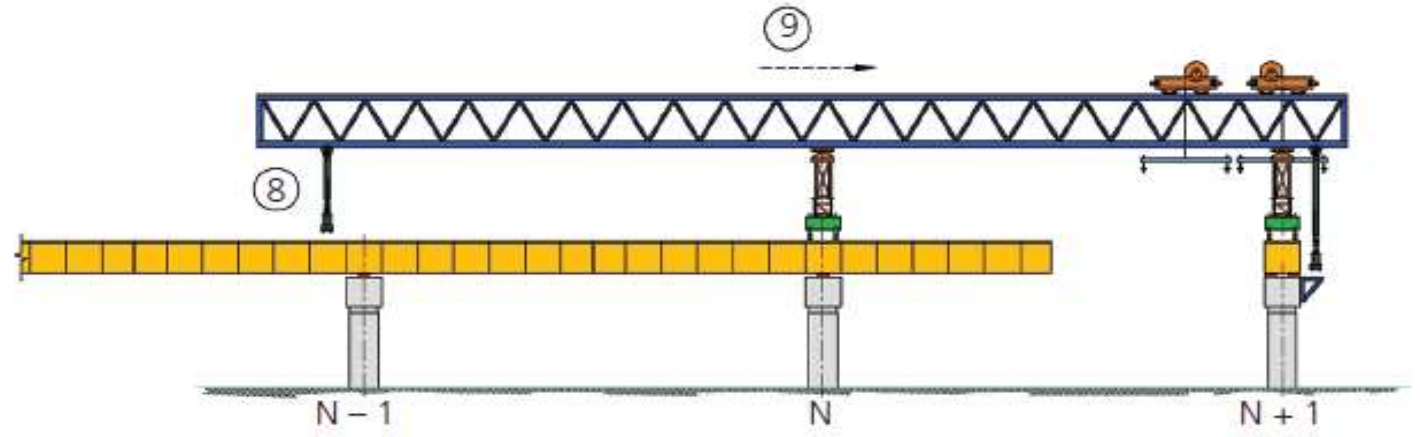
TYP



4. Place the pier segment N + 1 with the front trolley on pier N + 1 and nail it to the pier.

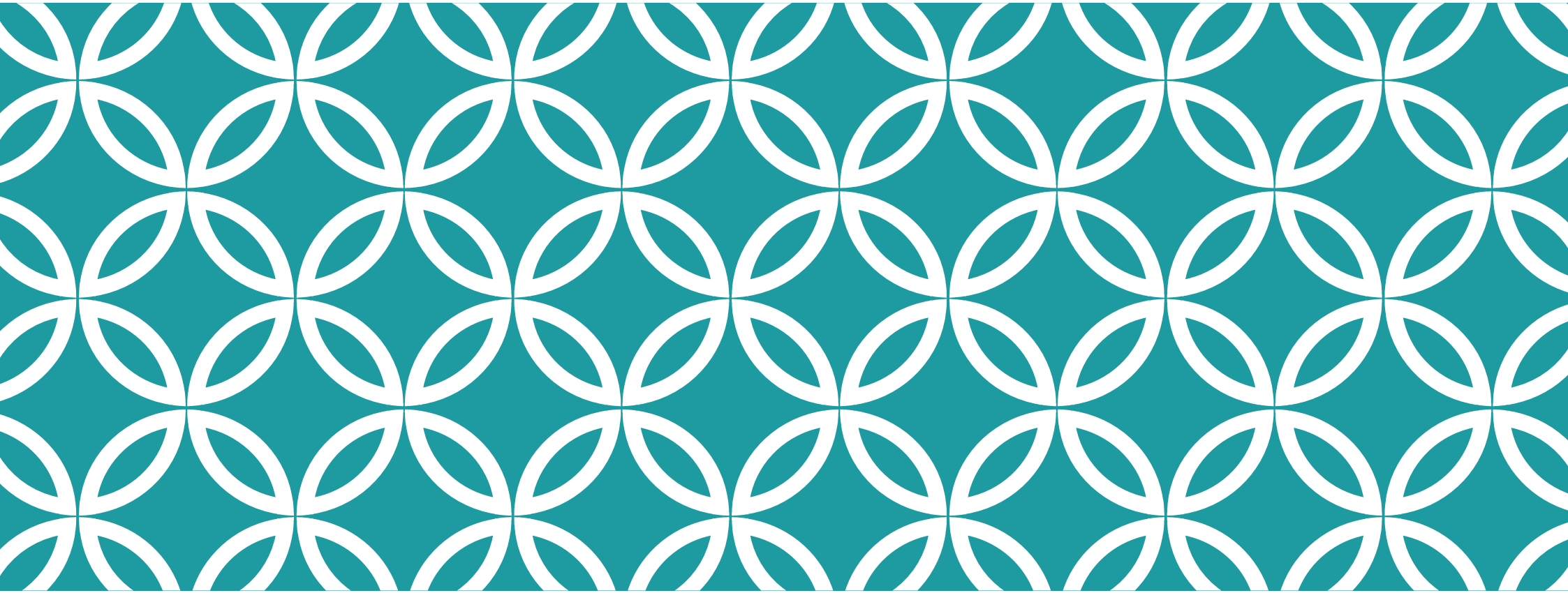


5. Activate the Rear Support Leg (RSL).
6. Move the main support from pier N – 1 to pier N + 1.
7. Transfer load from the FSL to the main support.



8. Deactivate the RSL.
9. Launch the MG forward until it is centred over span N/N + 1.

TYP

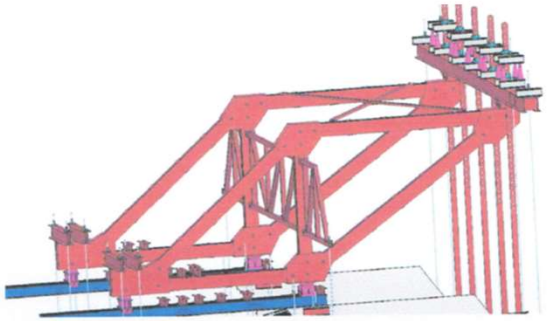


TRAVELER

DESKRIPSI UMUM

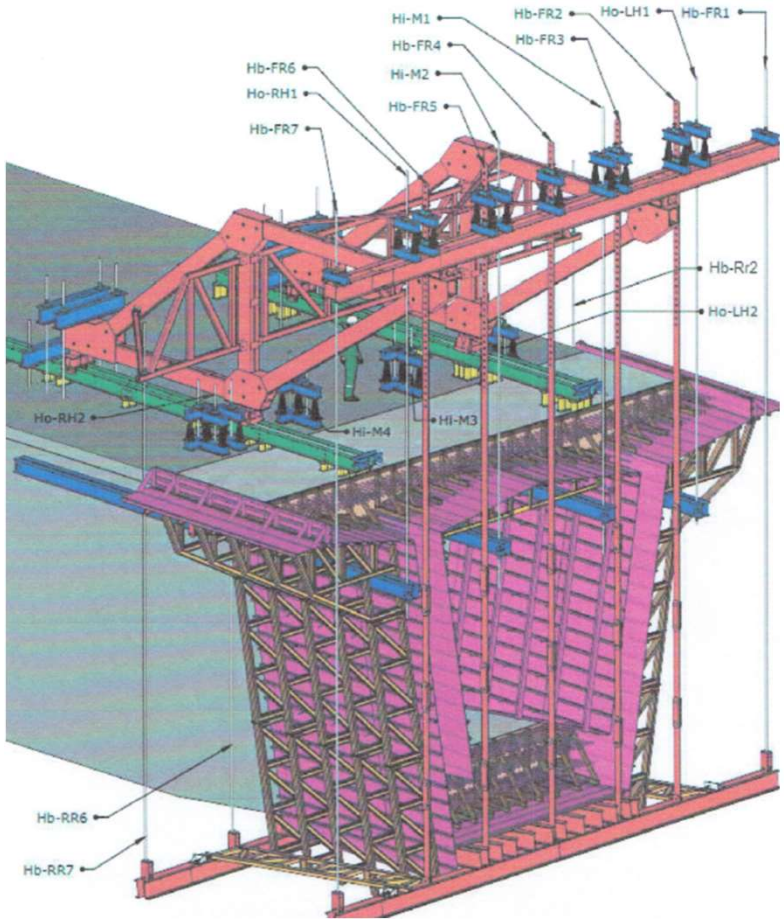
- Alat bantu untuk metoda konstruksi kantilever untuk segmen cor di tempat yang tidak membolehkan adanya gangguan di bawah jembatan yang akan dibangun.
- Supportnya berada di segmen terakhir yang sudah diangkat
- Panjang bentang yang bisa diakomodir cukup fleksibel, selama segmentasi disesuaikan dengan kapasitas traveler
- Kinematik dan load introductionnya tidak dipengaruhi span arrangemen karena sifanya konstan
- Perlu diperhatikan adanya penambahan beban di ujung kantilever selama masa pelaksanaan.

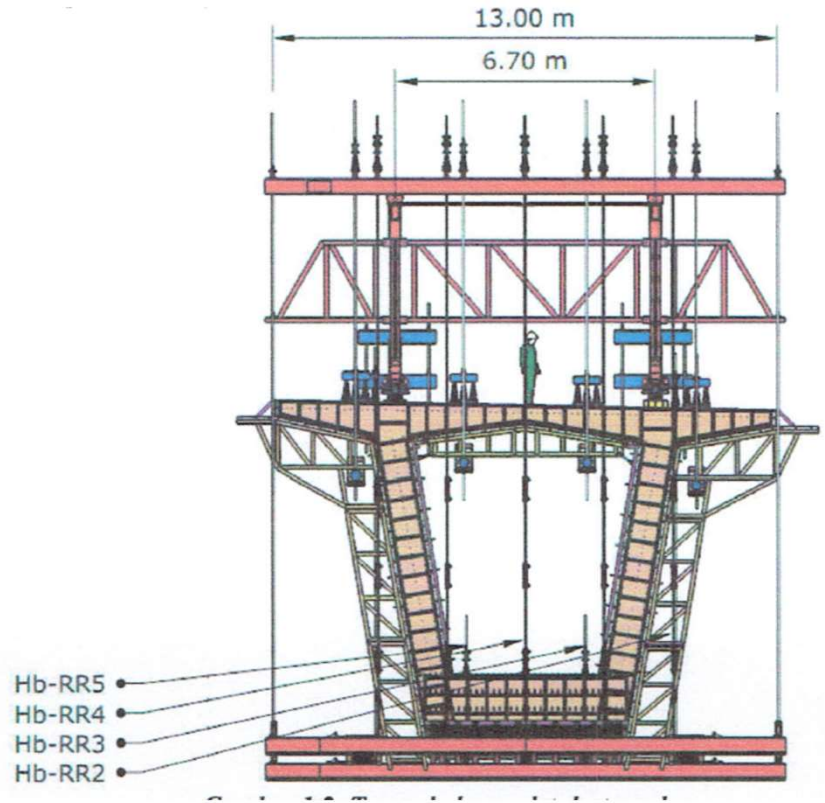
OVERHEAD TRAVELER (BOX BALANCE CANTILEVER)



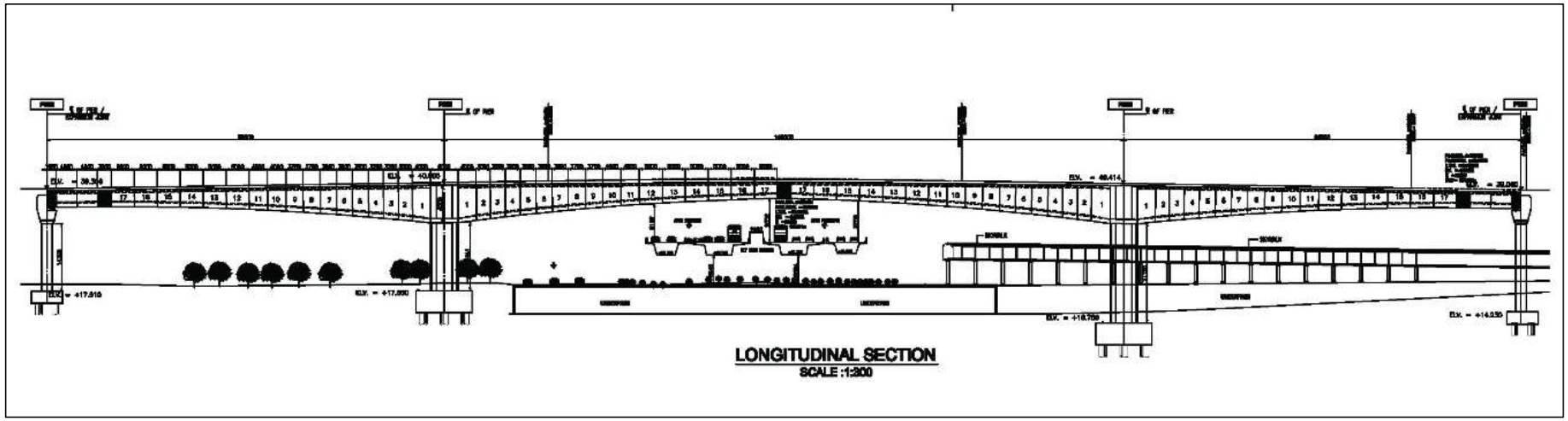
Longspan LRT Kuningan

BAGIAN – BAGIAN TRAVELER

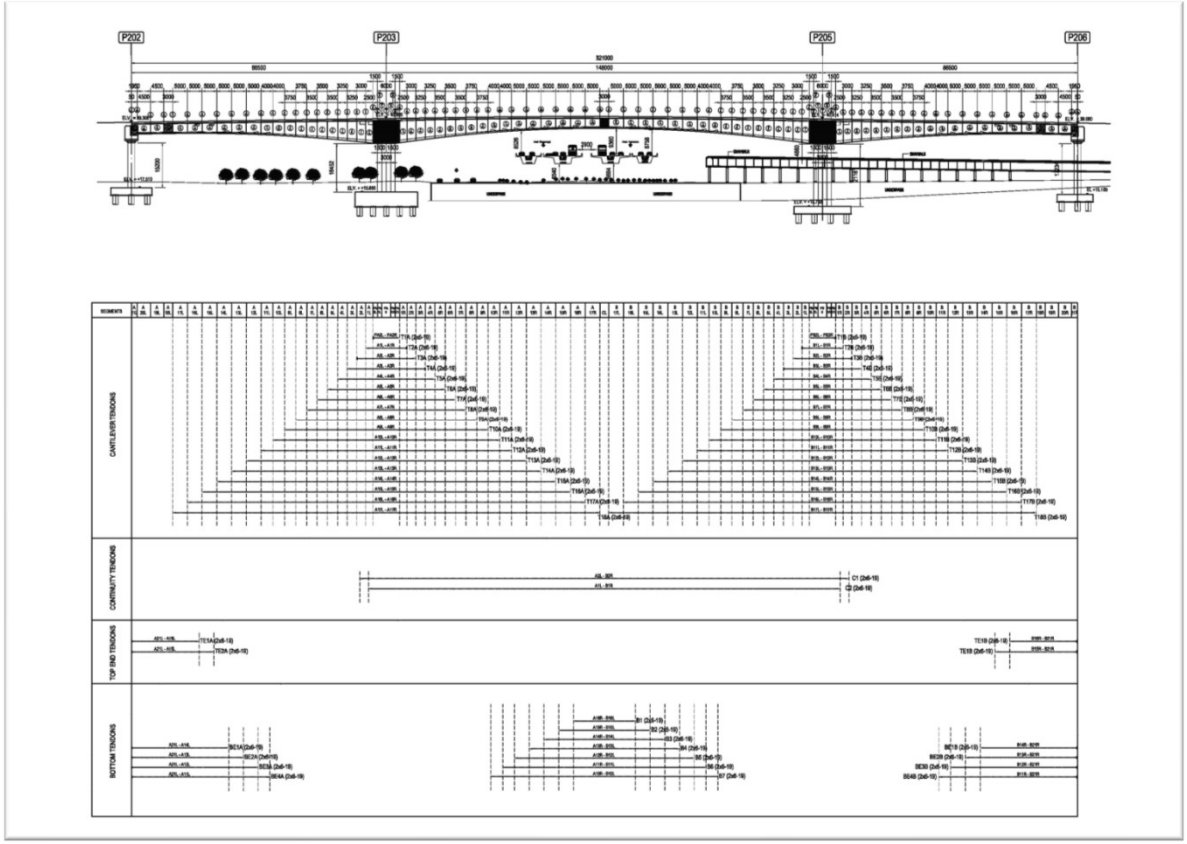




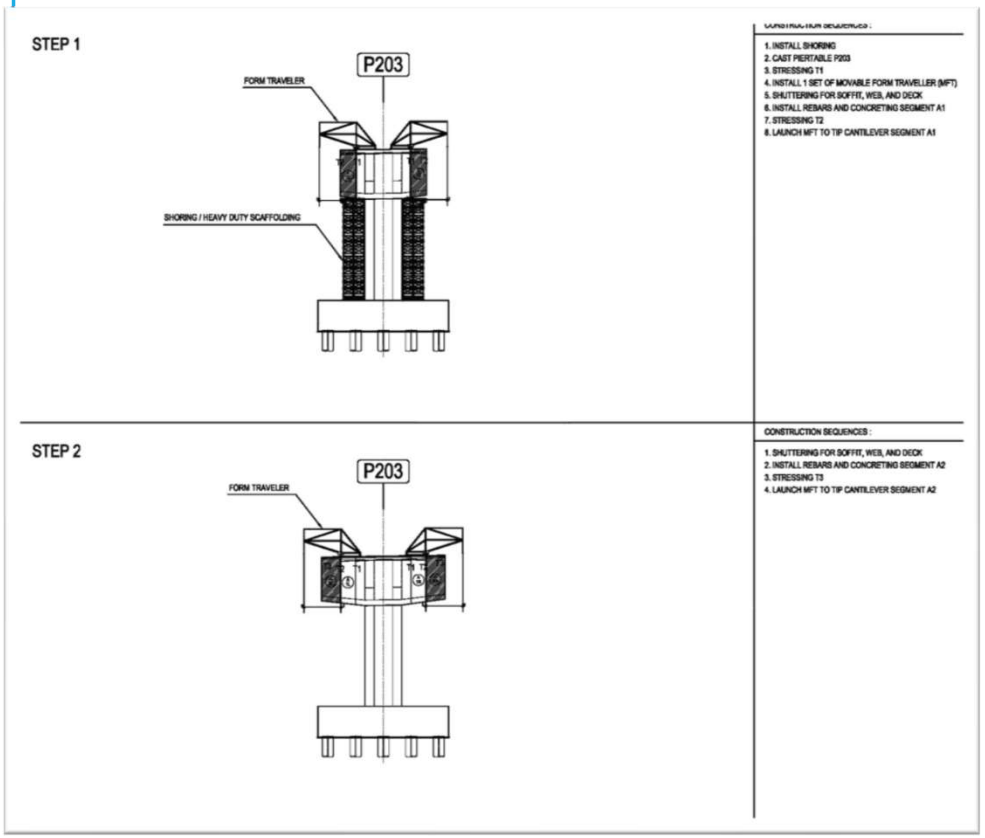
LONG SECTION

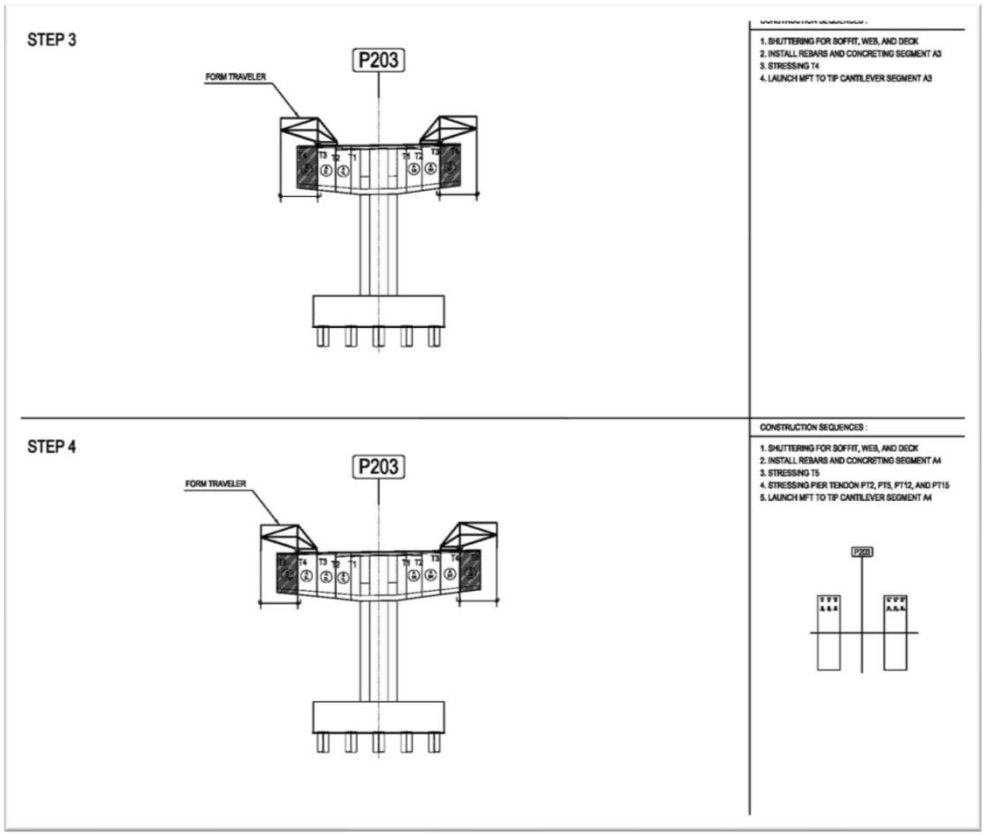


LAYOUT TENDON



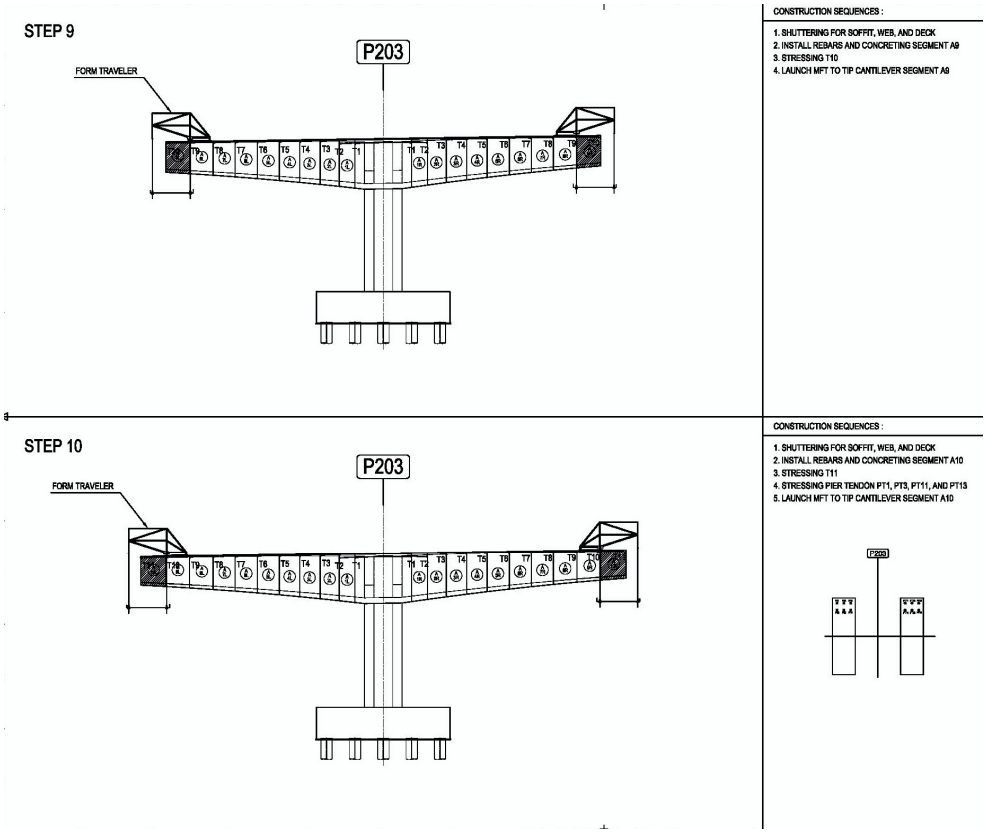
METODE KONSTRUKSI

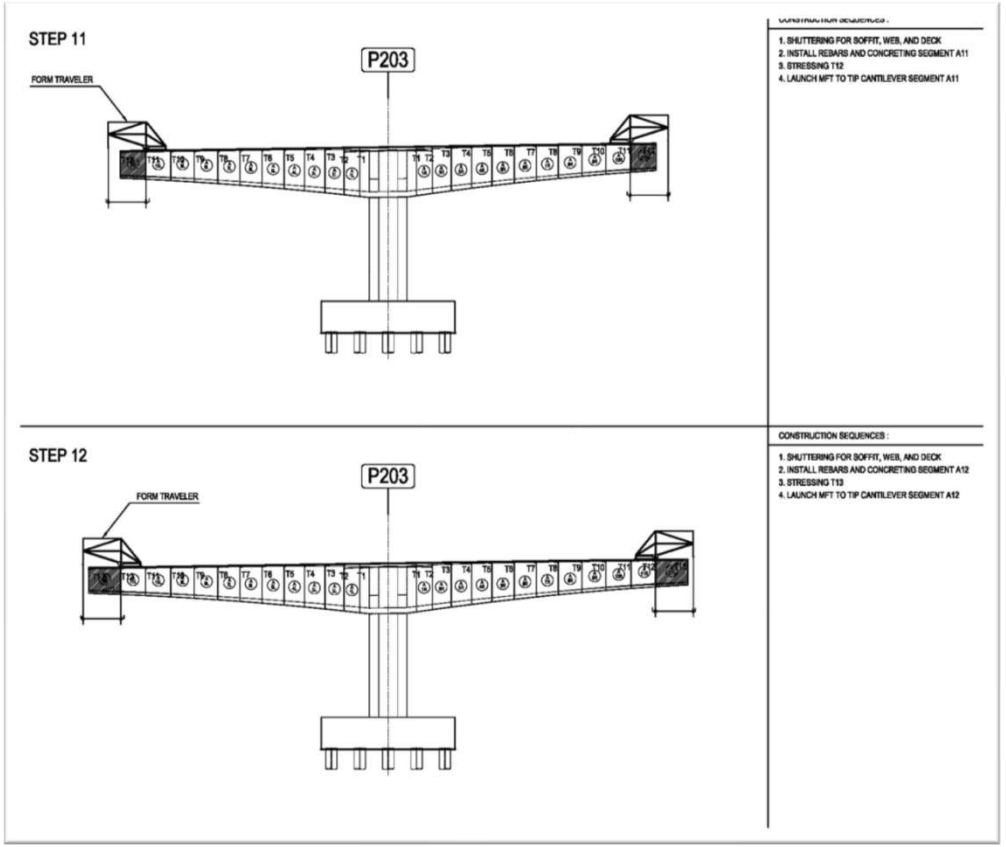




Cantilever
P203

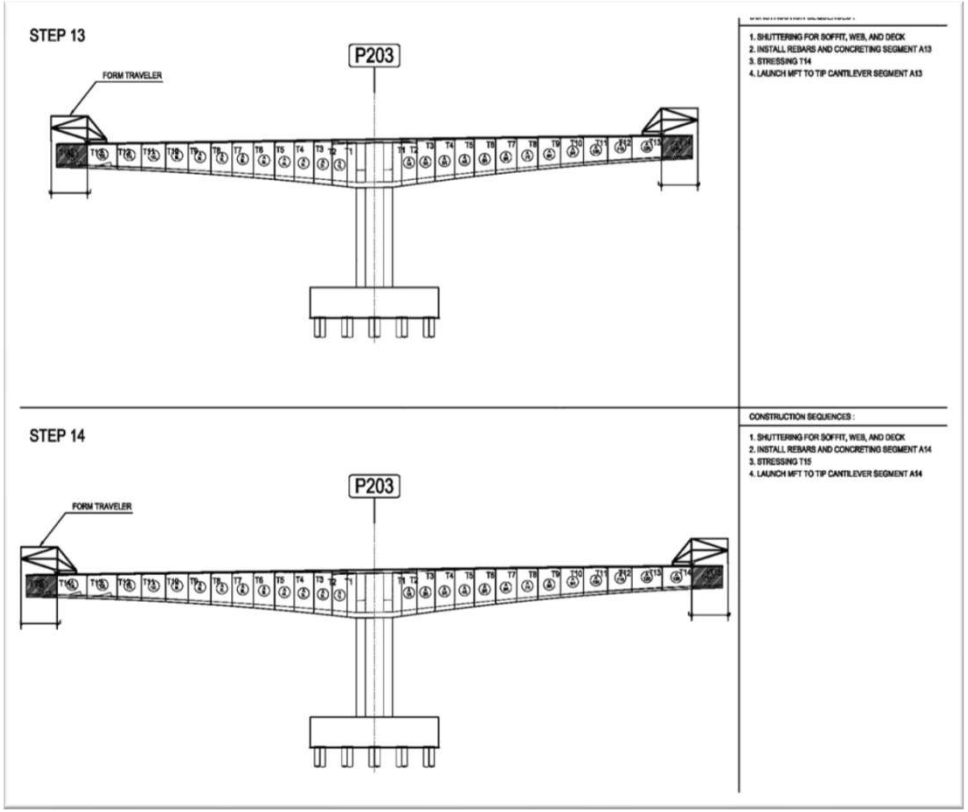
METODE KONSTRUKSI

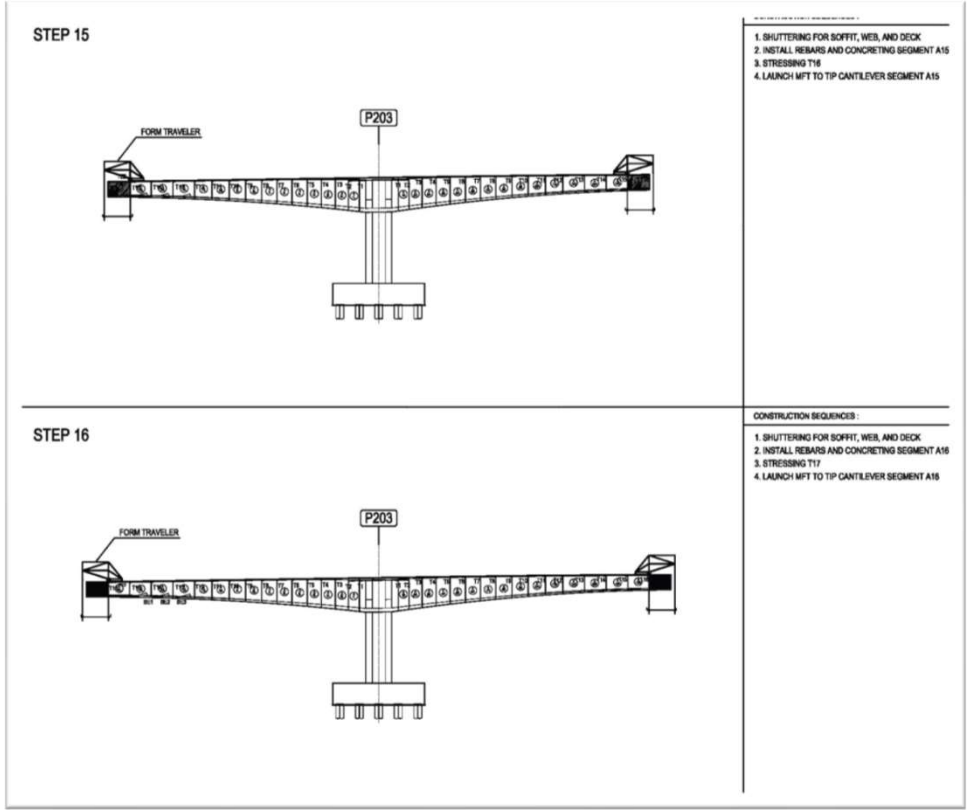




Cantilever
P203

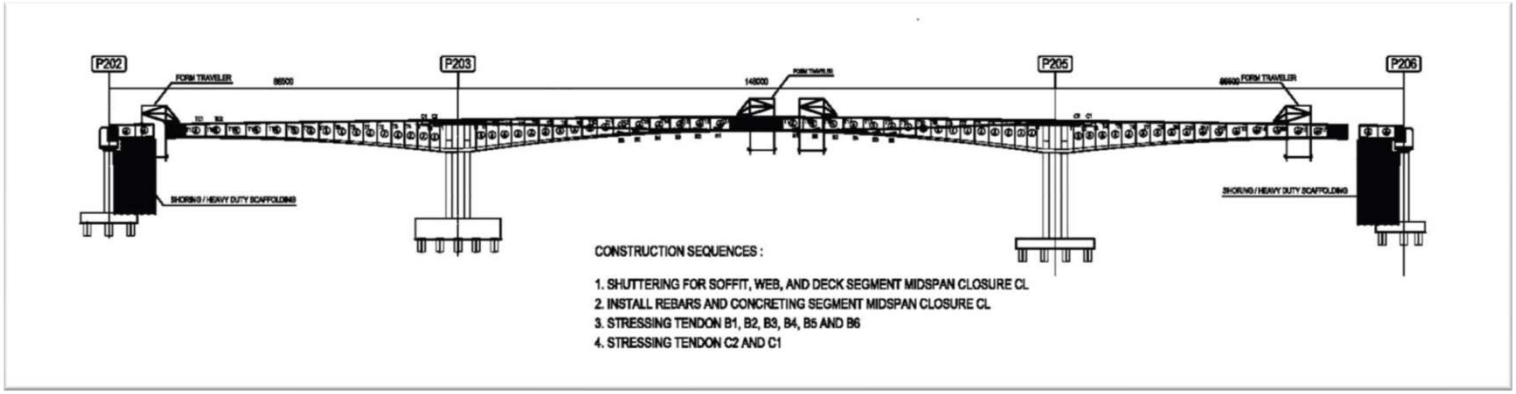
METODE KONSTRUKSI

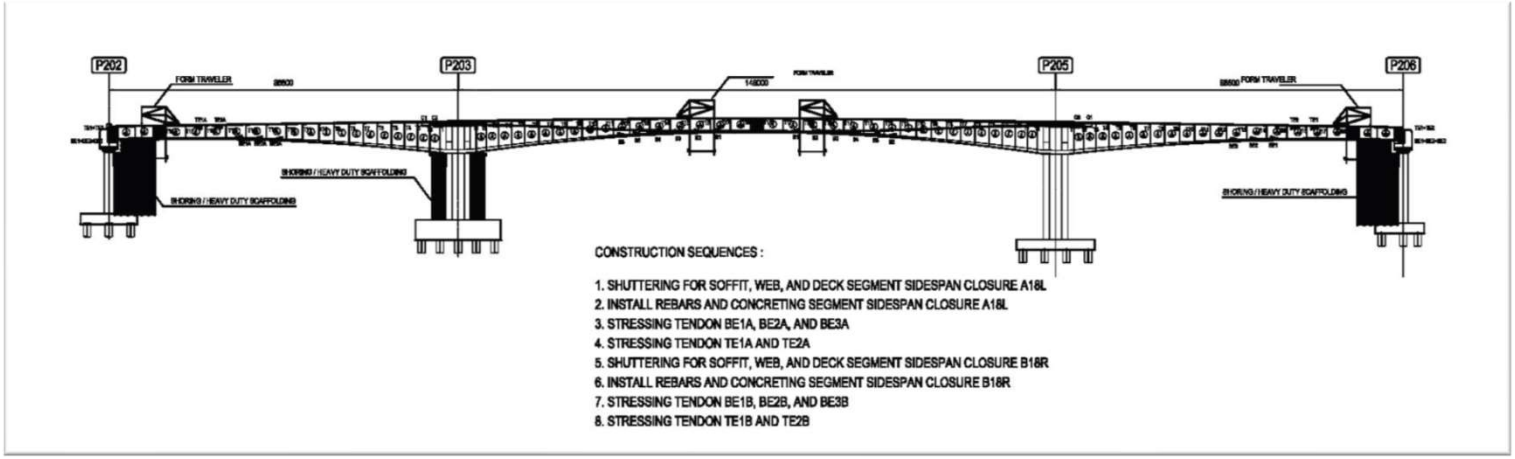




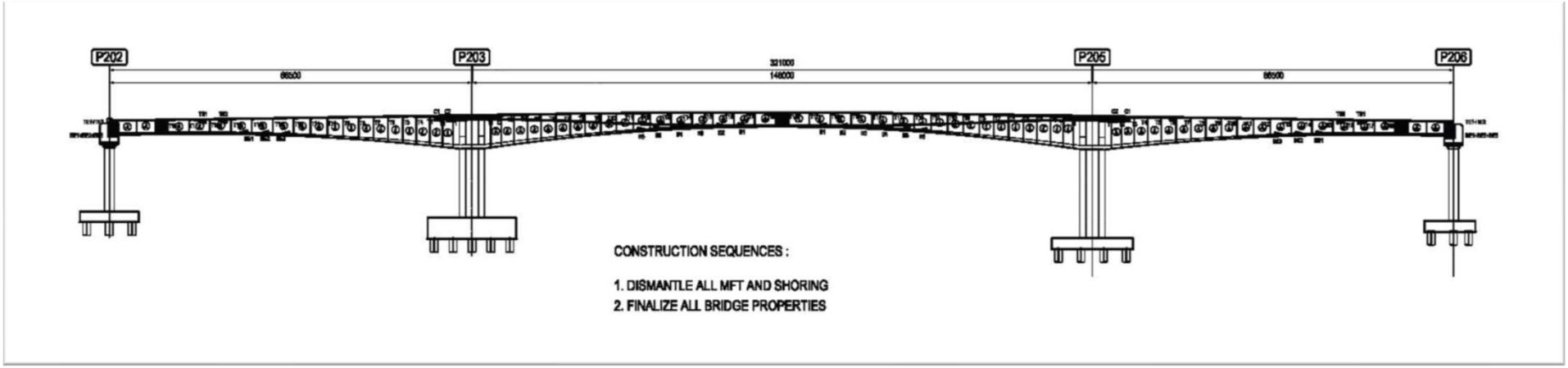
Cantilever
P203

METODE KONSTRUKSI

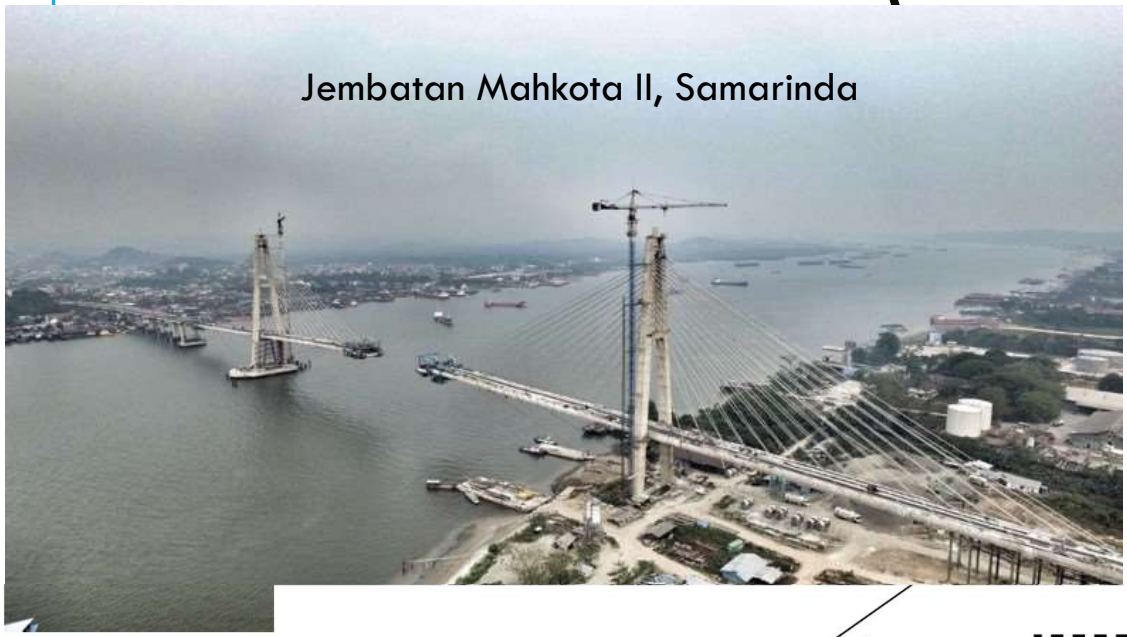


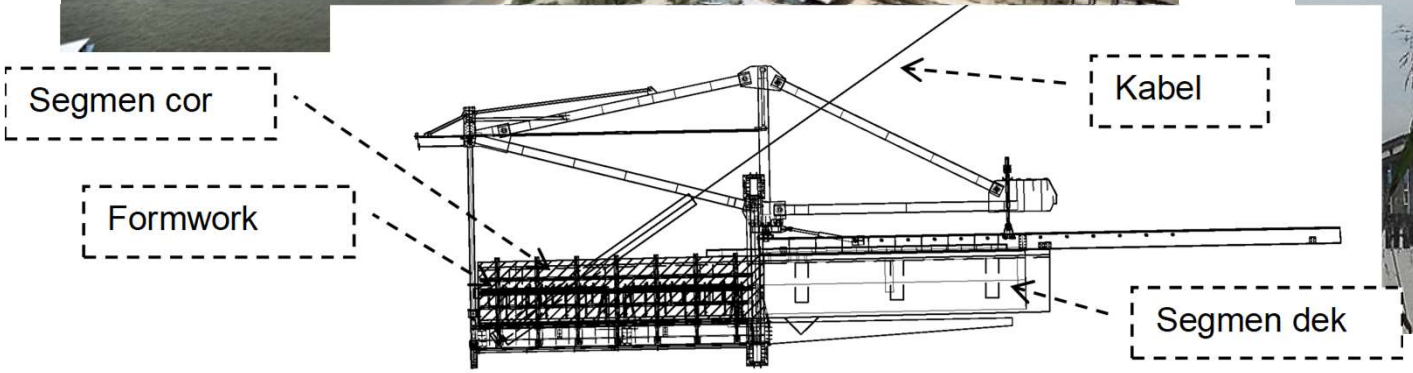


METODE KONSTRUKSI

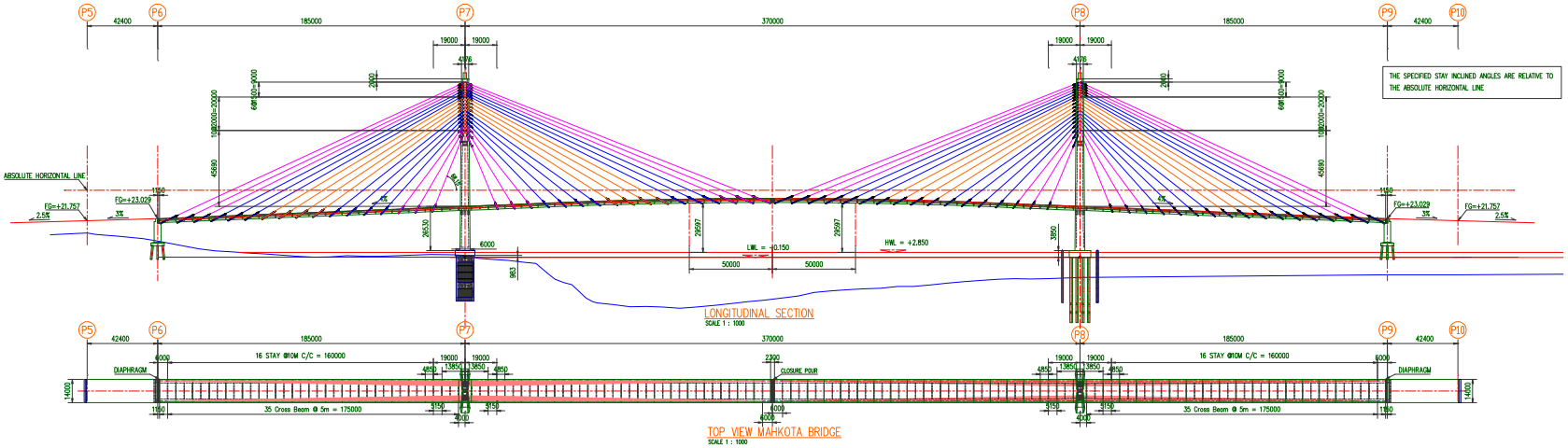


OVERHEAD TRAVELER (CABLE STAYED)

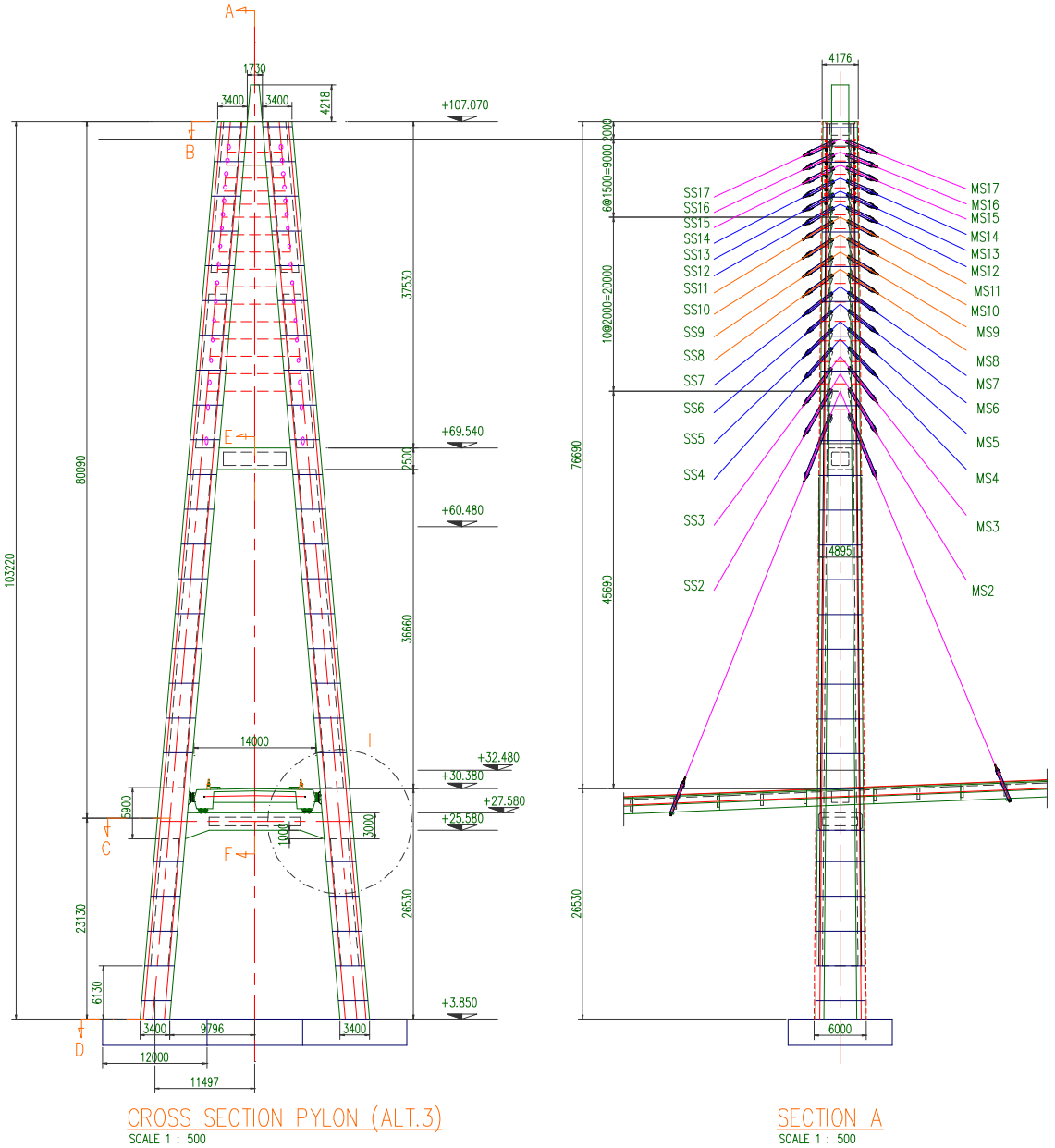




LONGITUDINAL SECTION & PLAN VIEW



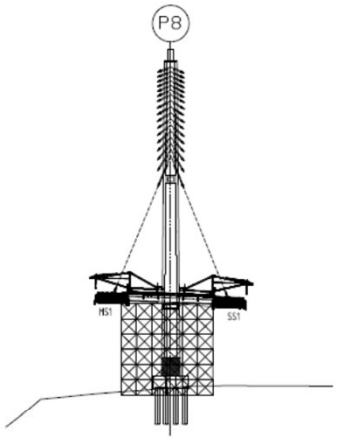
PYLON



CROSS SECTION PYLON (ALT.3)
SCALE 1 : 500

SECTION A
SCALE 1 : 500

STAGE 1 DAN STAGE 2



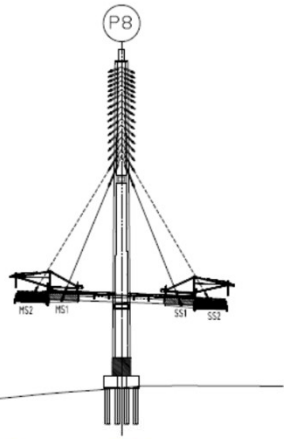
stage 1

1 construct pier table (shoring)
2 install traveler for stage MS1
3 pour EB MS1
4 install traveler for stage SS1
5 pour EB SS1
6 PT EB MS1
7 instal MS1 + 1st stressing

		1st tension (kN)
MS1		1662

8 PT EB SS1
9 instal SS1 + 1st stressing

		1st tension (kN)
SS1		1662



stage 2
1.remove shoring piertable
2.launching traveler to stage MS2
3.launching traveler to stage SS2
4.pour TB+slab MS1
5.PT TB MS1
6.pour TB+slab SS1
7.PT TB SS1

8.retension MS1

		retension (kN)
MS1		1005

9.pour EB MS2
10.retension SS1

		retension (kN)
SS1		1005

11.pour EB SS2
12.PT EB MS2
13.install MS2 + 1st stressing

		1st tension (kN)
MS2		1060

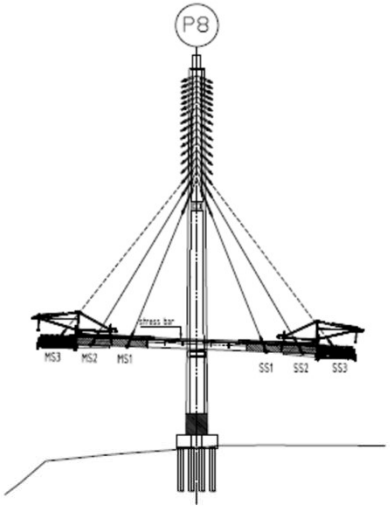
14.PT EB SS2
15.install SS2 + 1st stressing

		1st tension (kN)
SS2		1060

16.detension MS1 & SS1

		detension (kN)
SS1		1005
MS1		1005

STAGE 3 DAN STAGE 4



stage 3

1. launching traveler for stage MS3
2. launching traveler for stage SS3
3. retension MS2

		retension (kN)
MS2		600

4. retension SS2

		retension (kN)
SS2		600

5. pour TB-slab MS2
6. PT TB MS2
7. pour TB-slab SS2
8. PT TB SS2
9. install temporary stress bar MS2
10. pour EB MS3
11. install temporary stress bar SS2
12. pour EB SS3
13. PT EB MS3
14. install MS3 + 1st stressing

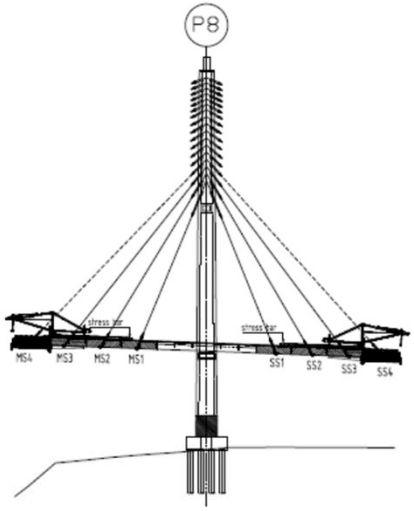
		1st tension (kN)
MS3		1150

15. PT EB SS3
16. install SS3 + 1st stressing

		1st tension (kN)
SS3		1150

17. detension MS2 & SS2

		detension (kN)
SS2		600
MS2		600



stage 4

1. release temporary stress bar MS2
2. release temporary stress bar SS2
3. launching traveler for stage MS4
4. launching traveler for stage SS4
5. retension MS3

		retension (kN)
MS3		307

6. retension SS3

		retension (kN)
SS3		307

7. pour TB-slab MS3
8. PT TB MS3
9. pour TB-slab SS3
10. PT TB SS3
11. install temporary stress bar MS3
12. pour EB MS4
13. install temporary stress bar SS3
14. pour EB SS4
15. PT EB MS4
16. install MS4 + 1st stressing

		1st tension (kN)
MS4		1270

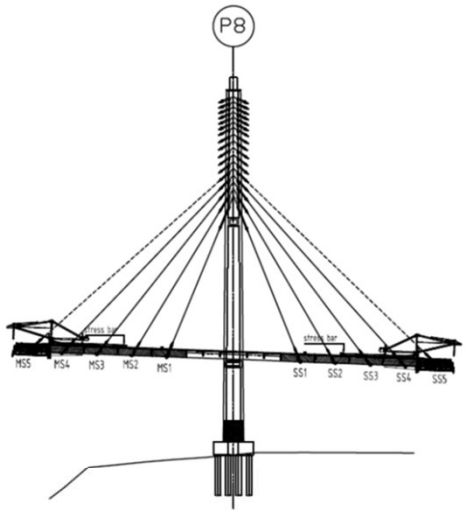
17. PT EB SS4
18. install SS4 + 1st stressing

		1st tension (kN)
SS4		1270

19. detension MS3 & SS3

		detension (kN)
SS3		307
MS3		307

STAGE 5 DAN STAGE 6



stage 5

1. release temporary stress bar MS3
2. release temporary stress bar SS3
3. launching traveler for stage MS5
4. launching traveler for stage SS5
5. retension MS4

		retension (kN)
MS4		231

6. retension SS4

		retension (kN)
SS4		231

7. pour TB+slab MS4
8. PT TB MS4
9. pour TB+slab SS4
10. PT TB SS4
11. install temporary stress bar MS4
12. pour EB MS5
13. install temporary stress bar SS4
14. pour EB SS5
15. PT EB MS5
16. install MS5 + 1st stressing

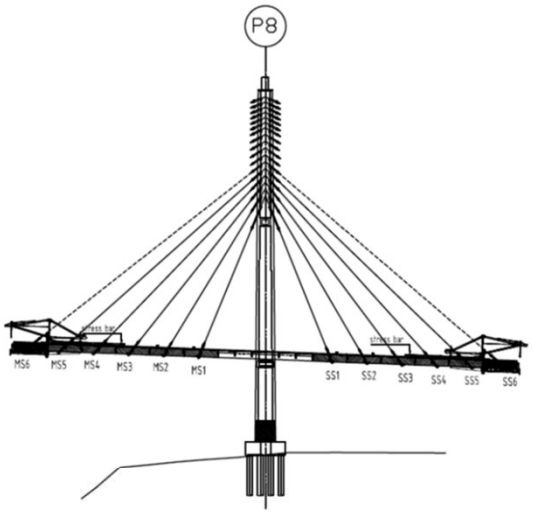
		1st tension (kN)
MS5		1100

17. PT EB SS5
18. install SS5 + 1st stressing

		1st tension (kN)
SS5		1100

19. detension MS4 & SS4

		detension (kN)
SS4		231
MS4		231



stage 6

1. release temporary stress bar MS4
2. release temporary stress bar SS4
3. launching traveler for stage MS6
4. launching traveler for stage SS6
5. retension MS5

		retension (kN)
MS5		600

6. retension SS5

		retension (kN)
SS5		600

7. pour TB+slab MS5
8. PT TB MS5
9. pour TB+slab SS5
10. PT TB SS5
11. install temporary stress bar MS5
12. pour EB MS6
13. install temporary stress bar SS5
14. pour EB SS6
15. PT EB MS6
16. install MS6 + 1st stressing

		1st tension (kN)
MS6		1315

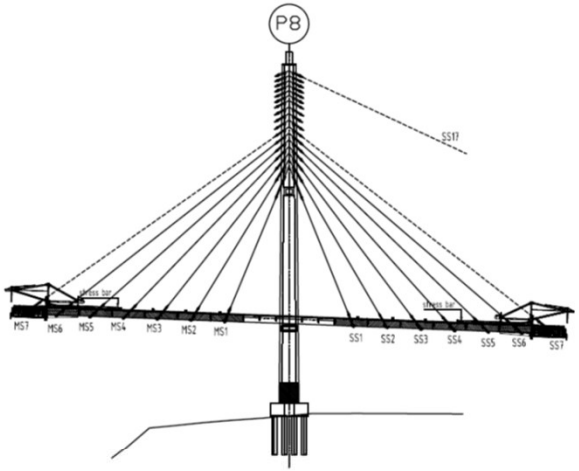
17. PT EB SS6
18. install SS6 + 1st stressing

		1st tension (kN)
SS6		1315

19. detension MS5 & SS5

		detension (kN)
SS5		600
MS5		600

STAGE 7 DAN STAGE 8



stage 7

1. release temporary stress bar MS5
2. release temporary stress bar SS5
3. launching traveler for stage MS7
4. launching traveler for stage SS7
5. retension MS6

		retension (kN)
MS6		562

6. retension SS6

		retension (kN)
SS6		600

7. pour TB+slab MS6
8. PT TB MS6
9. pour TB+slab SS6
10. PT TB SS6
11. install temporary stress bar MS6
12. pour EB MS7
13. install temporary stress bar SS6
14. pour EB SS7
15. PT EB MS7
16. install MS7 + 1st stressing

		1st tension (kN)
MS7		1469

17. PT EB SS7
18. install SS7 + 1st stressing

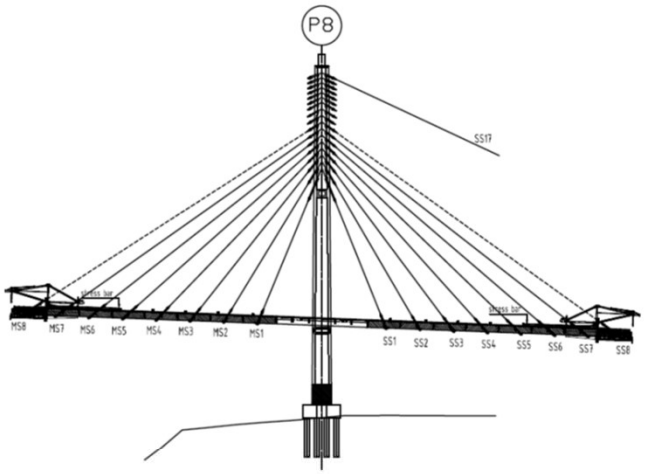
		1st tension (kN)
SS7		1469

19. detension MS6 & SS6

		detension (kN)
SS6		600
MS6		562

20. pour SS17
21. install SS17 + 1st stressing

		1st tension (kN)
SS17		1000



stage 8

1. release temporary stress bar MS6
2. release temporary stress bar SS6
3. launching traveler for stage MS8
4. launching traveler for stage SS8
5. retension MS7

		retension (kN)
MS7		624

6. retension SS7

		retension (kN)
SS7		662

7. pour TB+slab MS7
8. PT TB MS7
9. pour TB+slab SS7
10. PT TB SS7
11. install temporary stress bar MS7
12. pour EB MS8
13. install temporary stress bar SS7
14. pour EB SS8
15. PT EB MS8
16. install MS8 + 1st stressing

		1st tension (kN)
MS8		1615

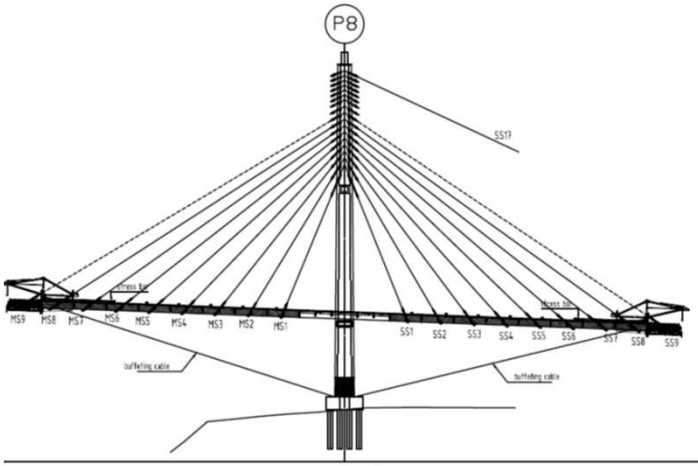
17. PT EB SS8
18. install SS8 + 1st stressing

		1st tension (kN)
SS8		1615

19. detension MS7 & SS7

		detension (kN)
SS7		662
MS7		624

STAGE 9 DAN STAGE 10



stage 9

1. release temporary stress bar MS7
2. release temporary stress bar SS7
3. launching traveler for stage MS9
4. launching traveler for stage SS9
5. retension MS8

		retension (kN)
MS8		655

6. retension SS8

		retension (kN)
SS8		731

7. pour TB+slab MS8
8. PT TB MS8
9. pour TB+slab SS8
10. PT TB SS8
11. install buffeting cable SS & MS
12. install temporary stress bar MS8
13. pour EB MS9
14. install temporary stress bar SS8
15. pour EB SS9
16. PT EB MS9
17. install MS9 + 1st stressing

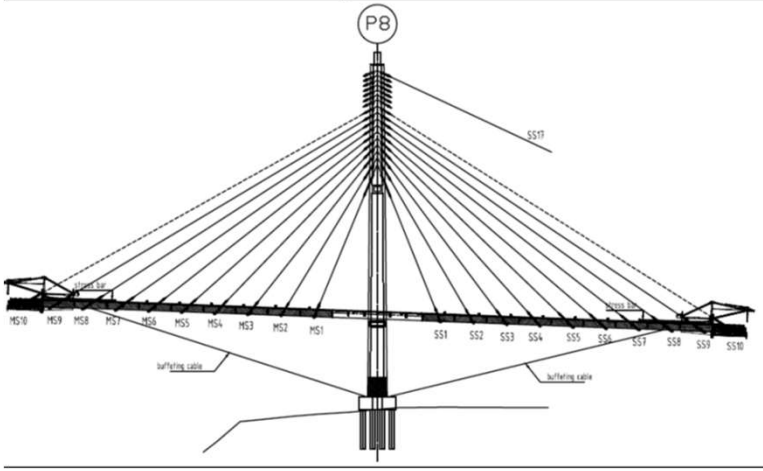
		1st tension (kN)
MS9		1649

18. PT EB SS9
19. install SS9 + 1st stressing

		1st tension (kN)
SS9		1649

19. detension MS8 & SS8

		detension (kN)
SS8		731
MS8		655



stage 10

1. release temporary stress bar MS8
2. release temporary stress bar SS8
3. launching traveler for stage MS10
4. launching traveler for stage SS10
5. retension MS9

		retension (kN)
MS9		869

6. retension SS9

		retension (kN)
SS9		924

7. pour TB+slab MS9
8. PT TB MS9
9. pour TB+slab SS9
10. PT TB SS9
11. install temporary stress bar MS9
12. pour EB MS10
13. install temporary stress bar SS9
14. pour EB SS10
15. PT EB MS10
16. install MS10 + 1st stressing

		1st tension (kN)
MS10		1762

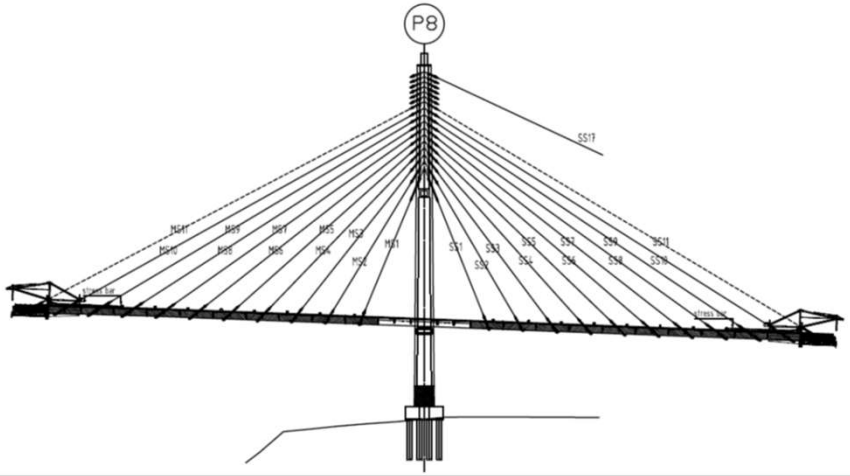
17. PT EB SS10
18. install SS10 + 1st stressing

		1st tension (kN)
SS10		1762

19. detension MS9 & SS9

		detension (kN)
SS9		924
MS9		869

STAGE 11 DAN STAGE 12



stage 11

1. release temporary stress bar MS9
2. release temporary stress bar SS9
3. launching traveler for stage MS11
4. launching traveler for stage SS11
5. retension MS10

		retension (kN)
MS10		1062

6. retension SS10

		retension (kN)
SS10		1155

7. pour TB+slab MS10
8. PT TB MS10
9. pour TB+slab SS10
10. PT TB SS10
11. install temporary stress bar MS10
12. pour EB MS11
13. install temporary stress bar SS10
14. pour EB SS11
15. PT EB MS11
16. install MS11 + 1st stressing

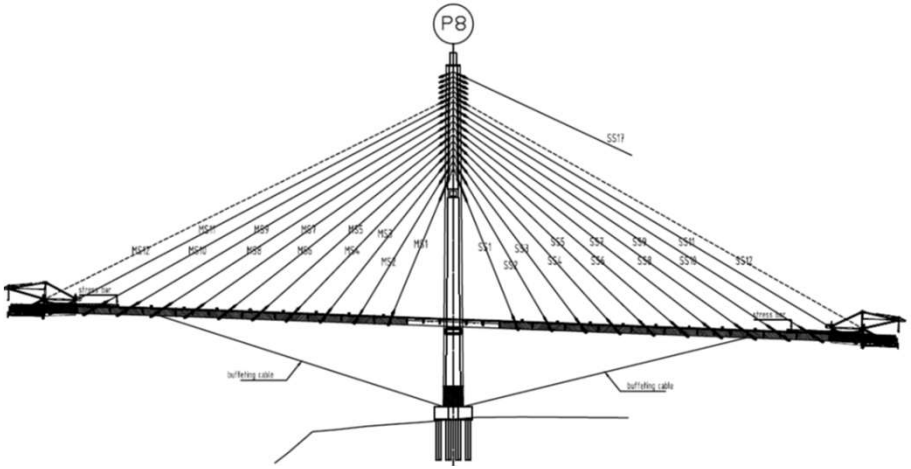
		1st tension (kN)
MS11		1741

17. PT EB SS11
18. install SS11 + 1st stressing

		1st tension (kN)
SS11		1741

19. detension MS10 & SS10

		detension (kN)
SS10		1155
MS10		1062



stage 12

1. release temporary stress bar MS10
2. release temporary stress bar SS10
3. launching traveler for stage MS12
4. launching traveler for stage SS12
5. retension MS11

		retension (kN)
MS11		1393

6. retension SS11

		retension (kN)
SS11		1424

7. pour TB+slab MS11
8. PT TB MS11
9. pour TB+slab SS11
10. PT TB SS11
11. install temporary stress bar MS11
12. pour EB MS12
13. install temporary stress bar SS11
14. pour EB SS12
15. PT EB MS12
16. install MS12 + 1st stressing

		1st tension (kN)
MS12		1883

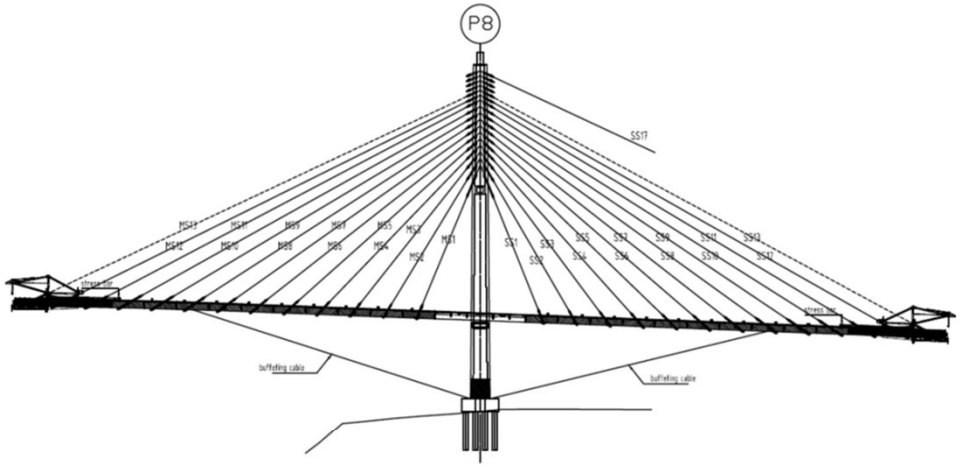
17. PT EB SS12
18. install SS12 + 1st stressing

		1st tension (kN)
SS12		1883

19. detension MS11 & SS11

		detension (kN)
SS11		1424
MS11		1393

STAGE 13



stage 13

1. release temporary stress bar MS11
2. release temporary stress bar SS11
3. launching traveler for stage MS13
4. launching traveler for stage SS13
5. retension MS12

		retension (kN)
MS12		1500

6. retension SS12

		retension (kN)
SS12		1531

7. pour TB+slab MS12
8. PT TB MS12
9. pour TB+slab SS12
10. PT TB SS12
11. install temporary stress bar MS12
12. pour EB MS13
13. install temporary stress bar SS12
14. pour EB SS13
15. PT EB MS13
16. install MS13 + 1st stressing

		1st tension (kN)
MS13		1983

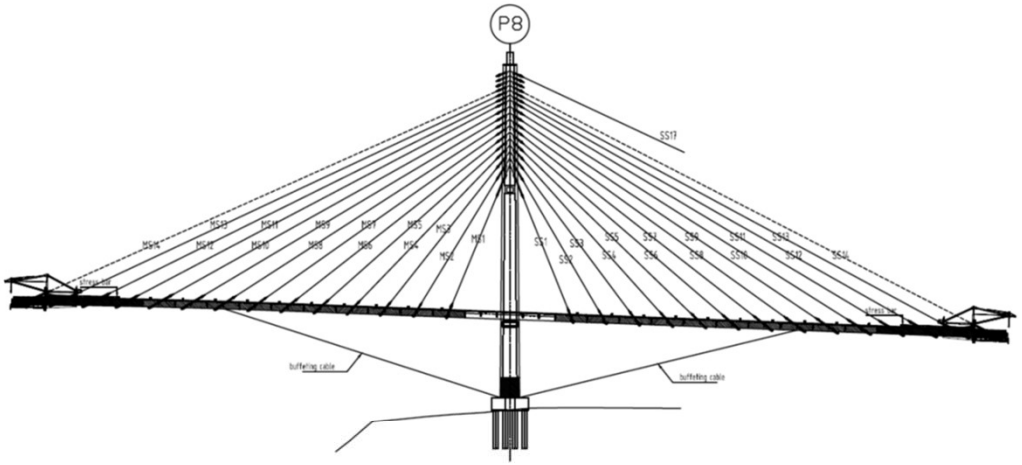
17. PT EB SS13
18. install SS13 + 1st stressing

		1st tension (kN)
SS13		1983

19. detension MS12 & SS12

		detension (kN)
SS12		1531
MS12		1500

STAGE 14



stage 14

1. release temporary stress bar MS12
2. release temporary stress bar SS12
3. launching traveler for stage MS14
4. launching traveler for stage SS14
5. retension MS13

		retension (kN)
MS13		1638

6. retension SS13

		retension (kN)
SS13		1676

7. pour TB+slab MS13
8. PT TB MS13
9. pour TB+slab SS13
10. PT TB SS13
11. install temporary stress bar MS13
12. pour EB MS14
13. install temporary stress bar SS13
14. pour EB SS14
15. PT EB MS14
16. install MS14 + 1st stressing

		1st tension (kN)
MS14		2104

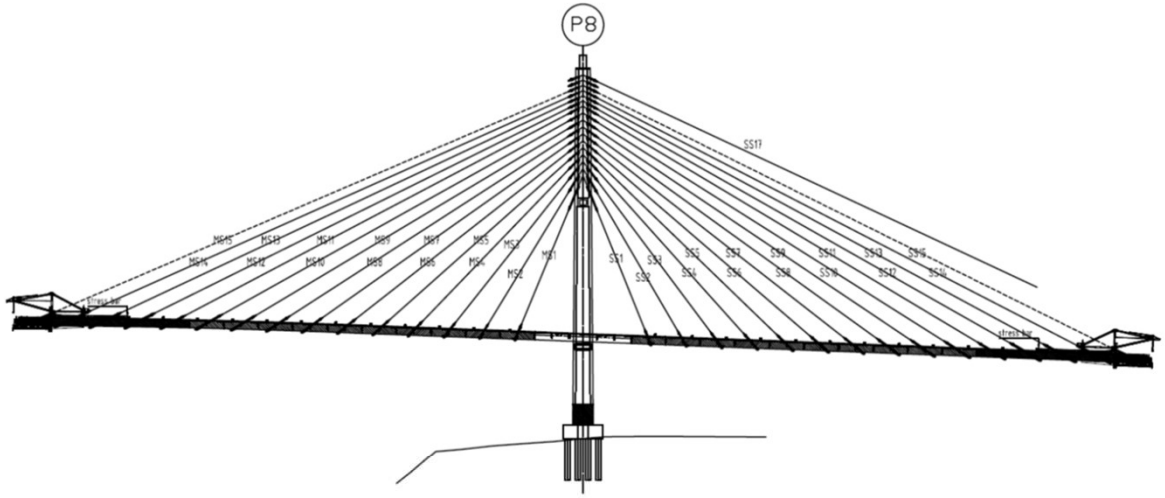
17. PT EB SS14
18. install SS14 + 1st stressing

		1st tension (kN)
SS14		2104

19. detension MS13 & SS13

	n-strand	detension (kN)
SS13		1676
MS13		1638

STAGE 15



stage 15

1. release temporary stress bar MS13
2. release temporary stress bar SS13
3. launching traveler for stage MS15
4. launching traveler for stage SS15
5. retension MS14

		retension (kN)
MS14		1762

6. retension SS14

		retension (kN)
SS14		1800

7. pour TB+slab MS14
8. PT TB MS14
9. pour TB+slab SS14
10. PT TB SS14
11. install temporary stress bar MS14
12. pour EB MS15
13. install temporary stress bar SS14
14. pour EB SS15
15. PT EB MS15
16. install MS15 + 1st stressing

		1st tension (kN)
MS15		2047

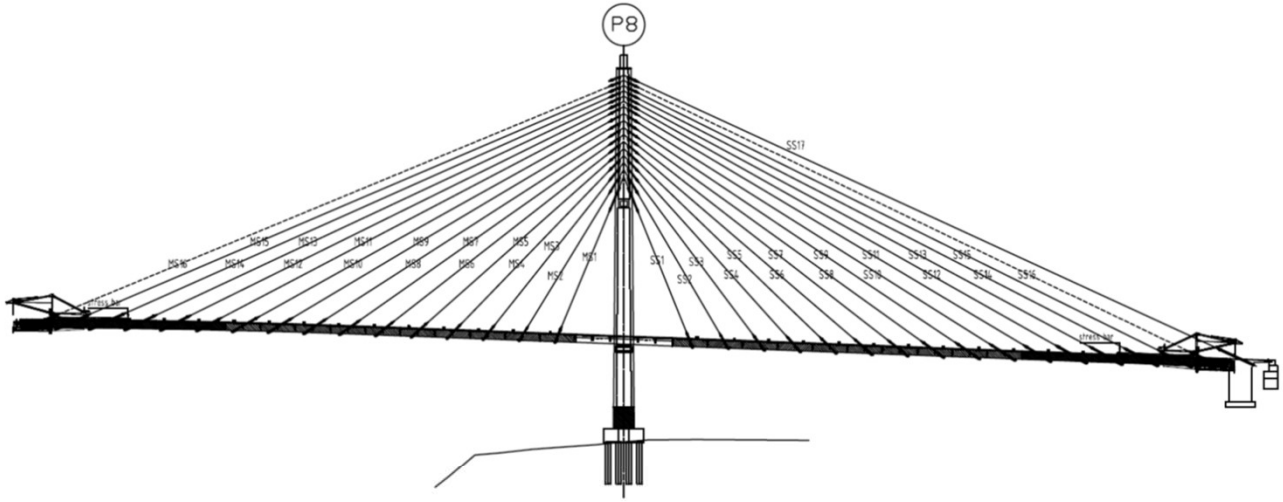
17. PT EB SS15
18. install SS15 + 1st stressing

		1st tension (kN)
SS15		2047

19. detension MS14 & SS14

		detension (kN)
SS14		1800
MS14		1762

STAGE 16



stage 16

1. release temporary stress bar MS14
2. release temporary stress bar SS14
3. launching traveler for stage MS16
4. launching traveler for stage SS16
5. retension MS15

		retension (kN)
MS15		2069

6. retension SS15

		retension (kN)
SS15		2031

7. pour TB+slab MS15
8. PT TB MS15
9. pour TB+slab SS15
10. PT TB SS15
11. install temporary stress bar MS15
12. pour EB MS16
13. install temporary stress bar SS15
14. pour EB SS16
15. PT EB MS16
16. install MS16 + 1st stressing

		1st tension (kN)
MS16		2593

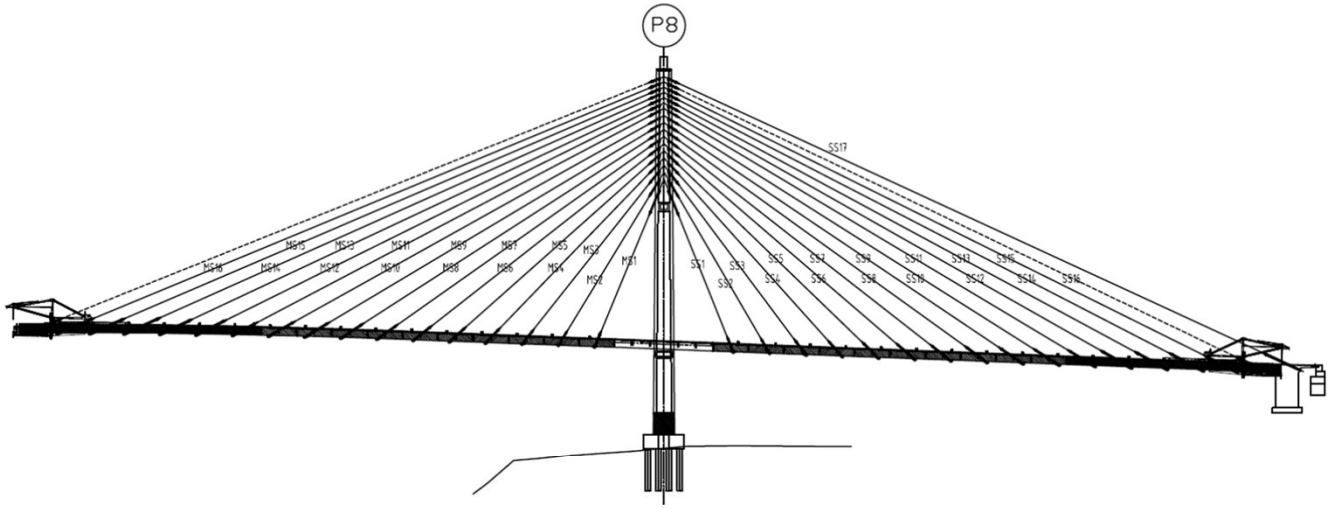
17. PT EB SS16
18. install SS16 + 1st stressing

		1st tension (kN)
SS16		2593

19. detension MS15 & SS15

		detension (kN)
SS15		2031
MS15		2069

STAGE 17



stage 17

1. install end diaphragm + bearing
2. closure SS16 to end diaphragm
3. release temporary stress bar MS15
4. release temporary stress bar SS15
5. launching traveler for stage MS17
6. dismantling traveler for stage SS16
7. retension MS16

		retension (kN)
MS16		1876

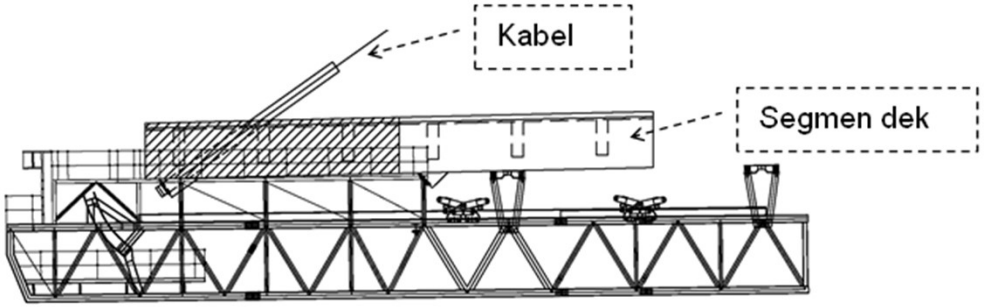
8. pour TB+slab MS16
9. PT TB MS16
10. pour TB+slab SS16
11. PT TB SS16
12. install temporary stress bar MS16
13. pour EB MS17
14. PT EB MS17
15. install MS17 + 1st stressing

		1st tension (kN)
MS17		3210

16. pour TB+slab MS17
17. PT TB MS17
18. release temporary stress bar MS16
19. detension MS16

		detension (kN)
MS16		1876

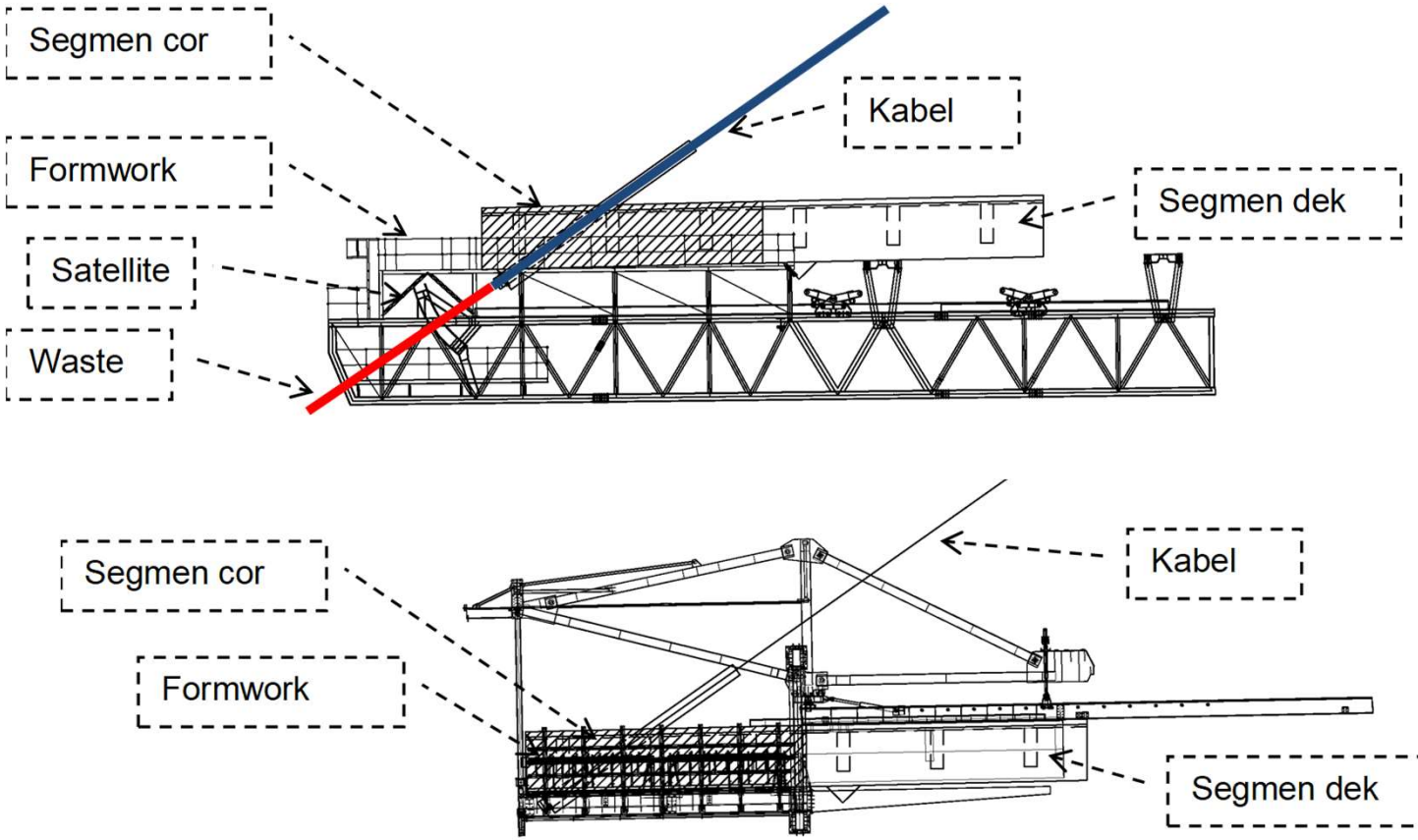
UNDERSLANG TRAVELER (CABLE STAYED)



Jembatan Pedamaran II,
Bagansiapiapi, Riau

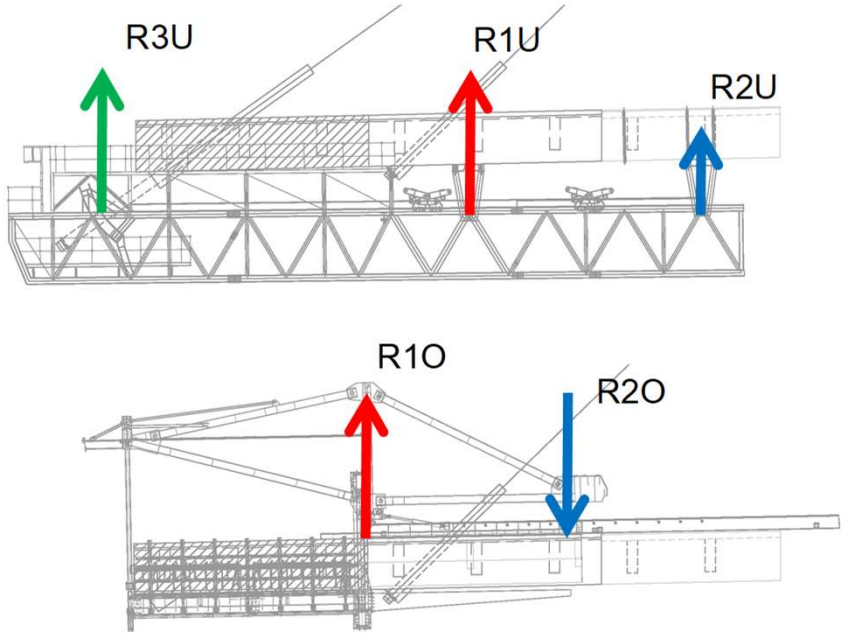
PERBANDINGAN TRAVELLER: UNDERSLUNG - OVERHEAD

- UNDERSLUNG
  - Di bawah
  - Temporer restraint cable
  - Panjang segmen ++
- OVERHEAD
  - Di atas
  - Tidak ada temporer cable
  - Panjang segmen terbatas



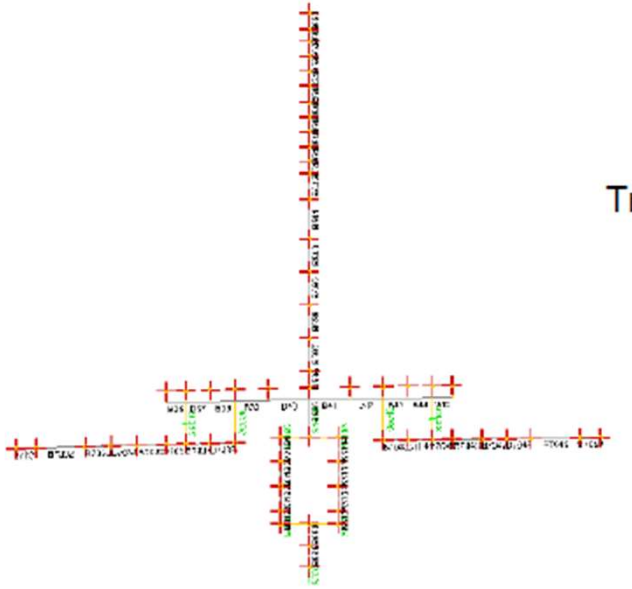
PERBANDINGAN TRAVELLER: UNDERSLUNG - OVERHEAD

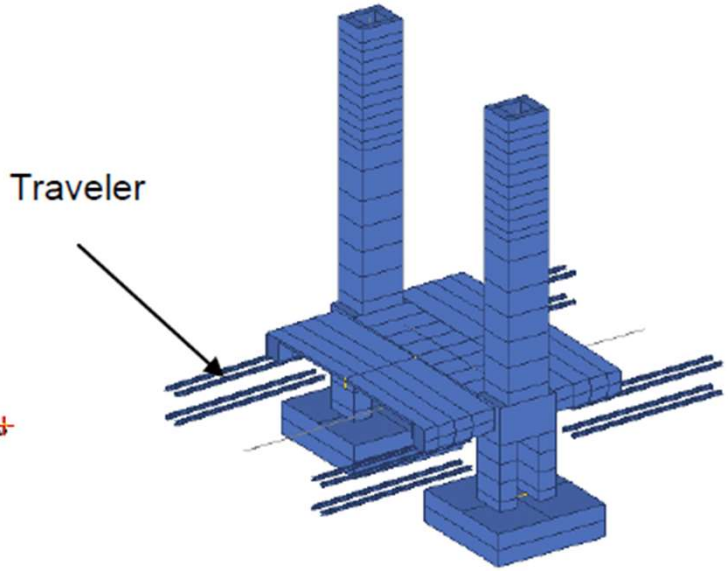
- Respon pada struktur saat kegiatan pengecoran
- Distribusi restraint



KONSTRUKSI

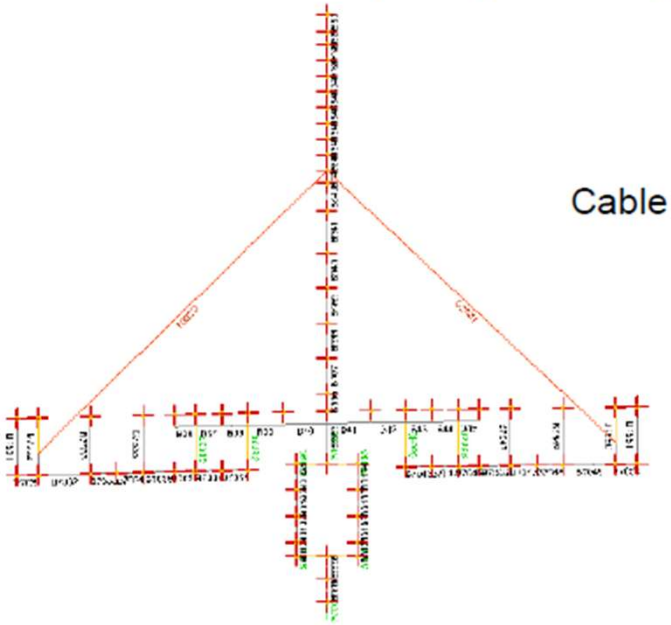
STEP 1: Traveler weight (active treveler)



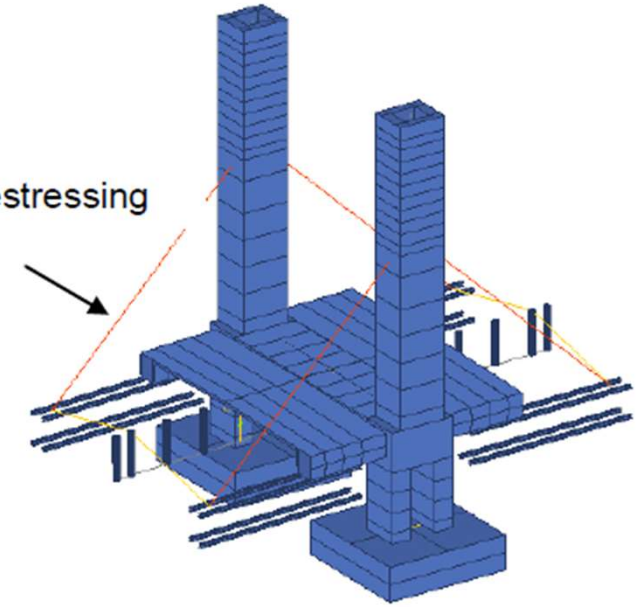


KONSTRUKSI

STEP 2: Stress cable (cable prestressing)

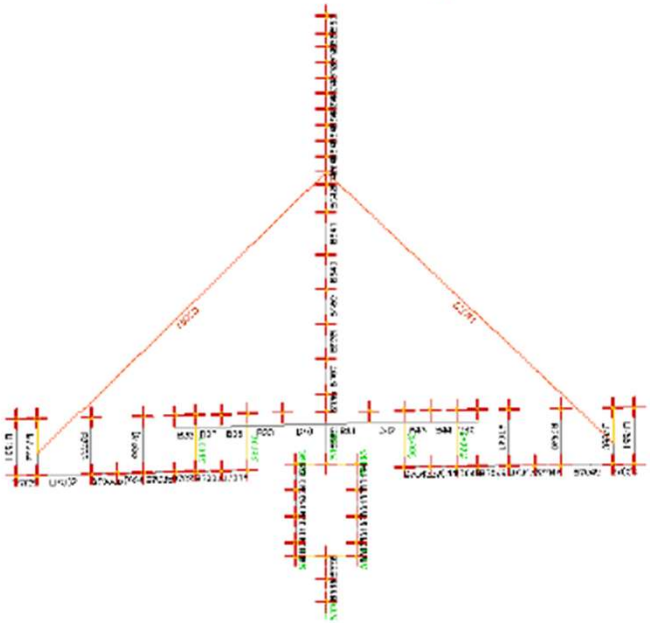


Cable prestressing

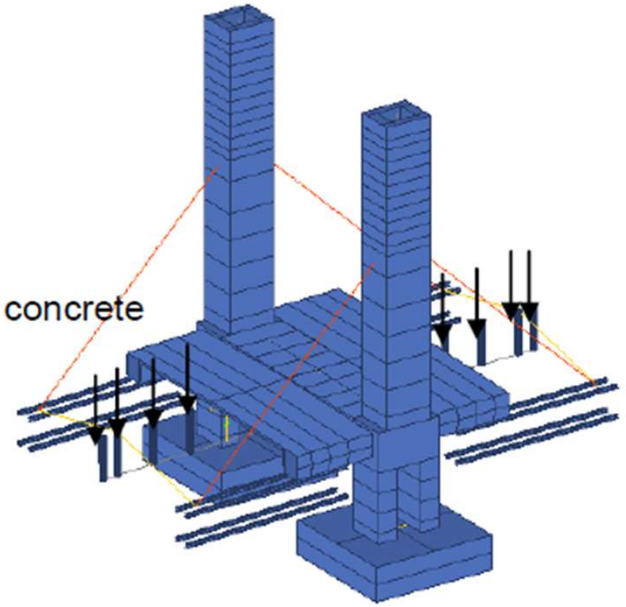


KONSTRUKSI

STEP 3: Wet concrete weight

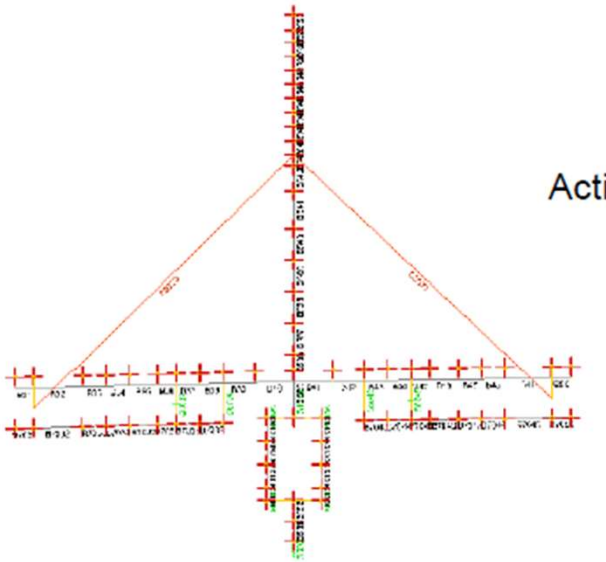


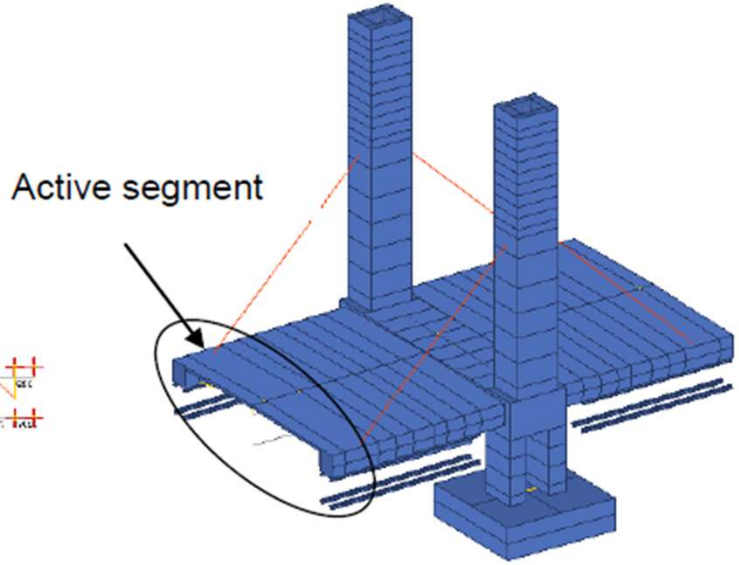
Wet concrete



KONSTRUKSI

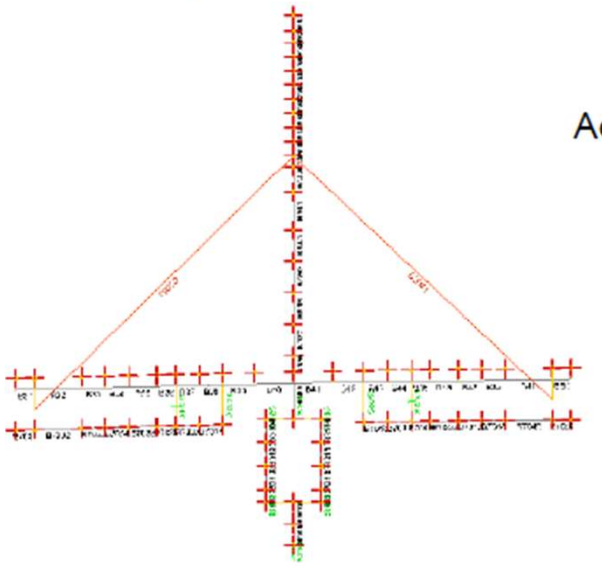
STEP 4: Active segment -> remove wet concrete (cut cable) -> Loading of traveler ->released

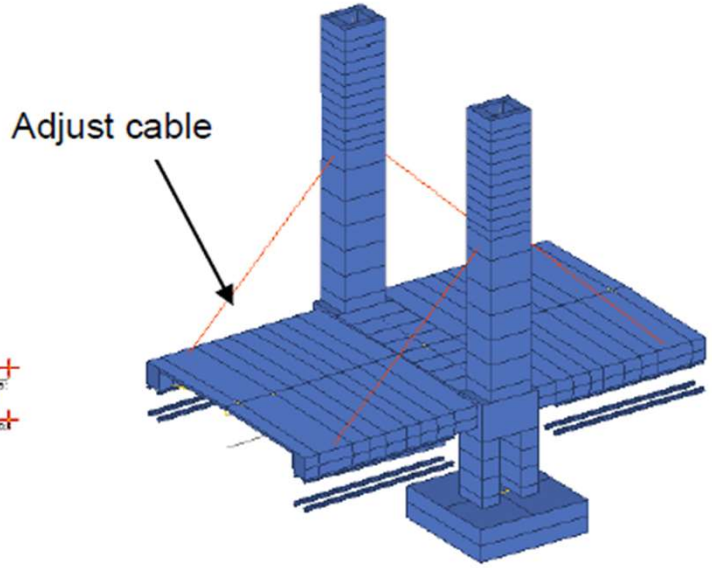




KONSTRUKSI

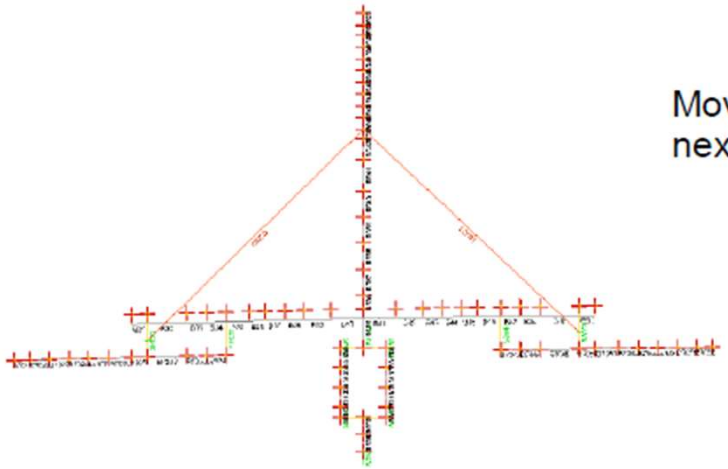
STEP 5: Adjust cable

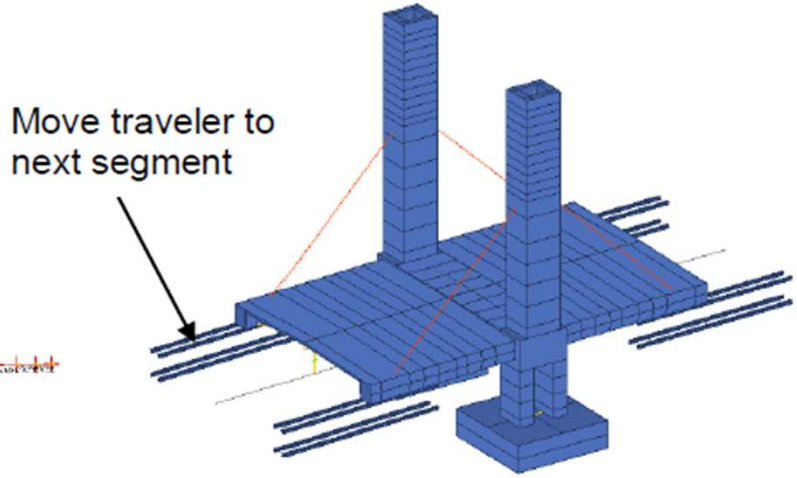


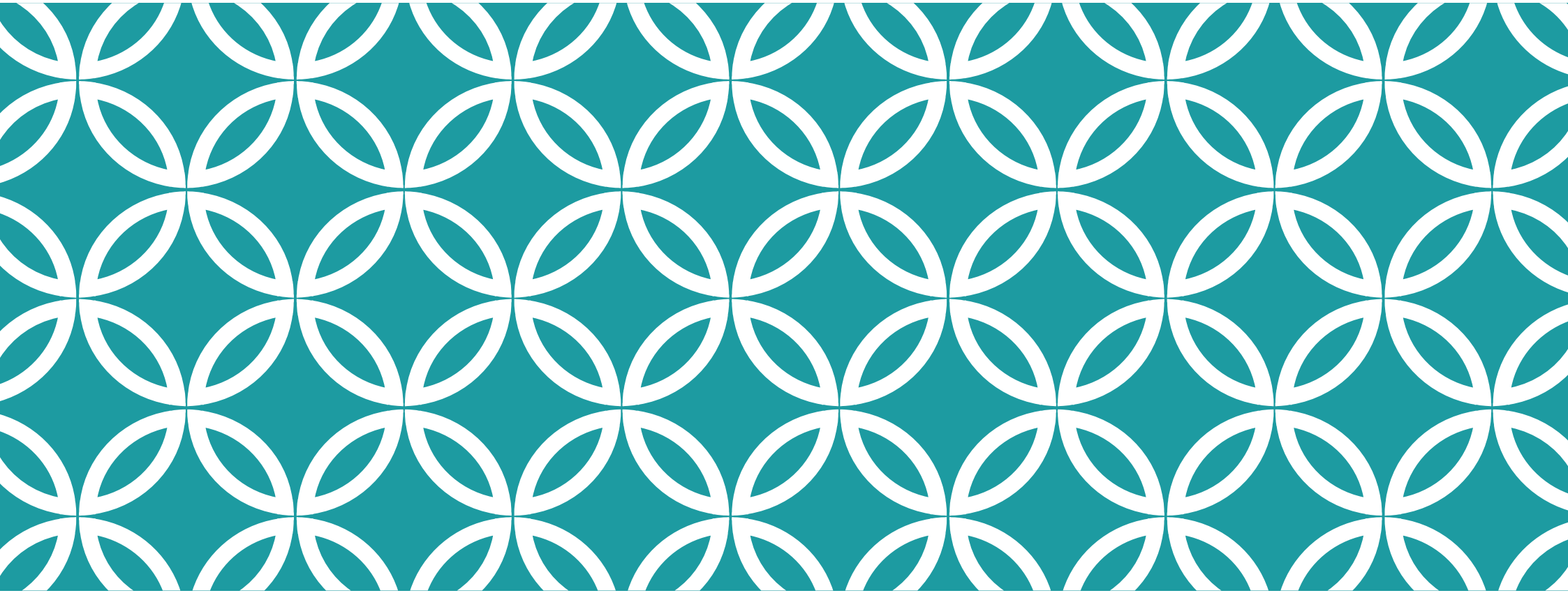


KONSTRUKSI

STEP 6: Move traveler



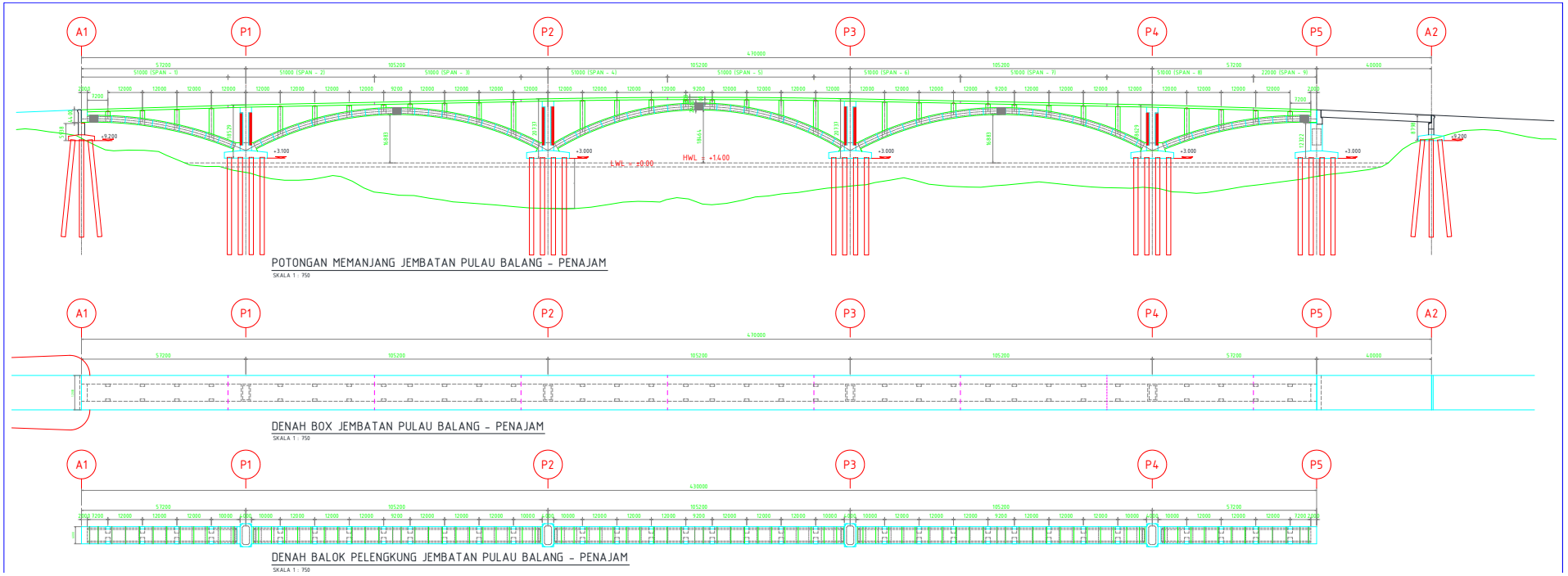




TEMPORARY STRAND

TEMPORARY STRAND WITH TEMPORARY TOWER

Jembatan Bentang
Pendek Pulau Balang



POTONGAN MEMANJANG JEMBATAN PULAU BALANG - PENAJAM

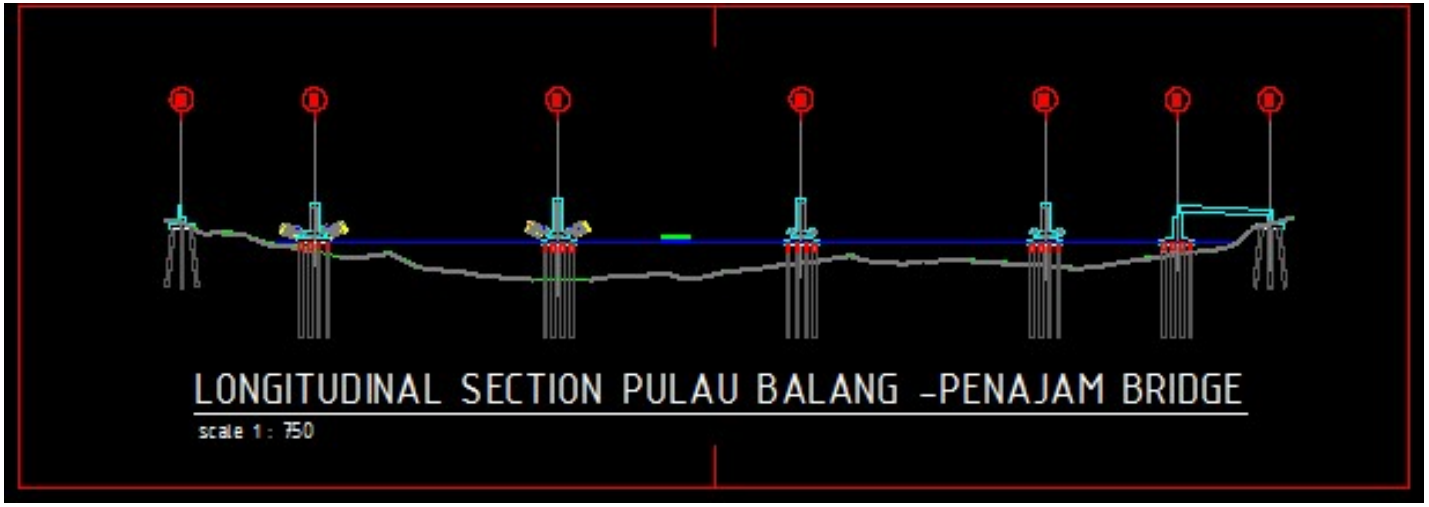
SKALA 1 : 750

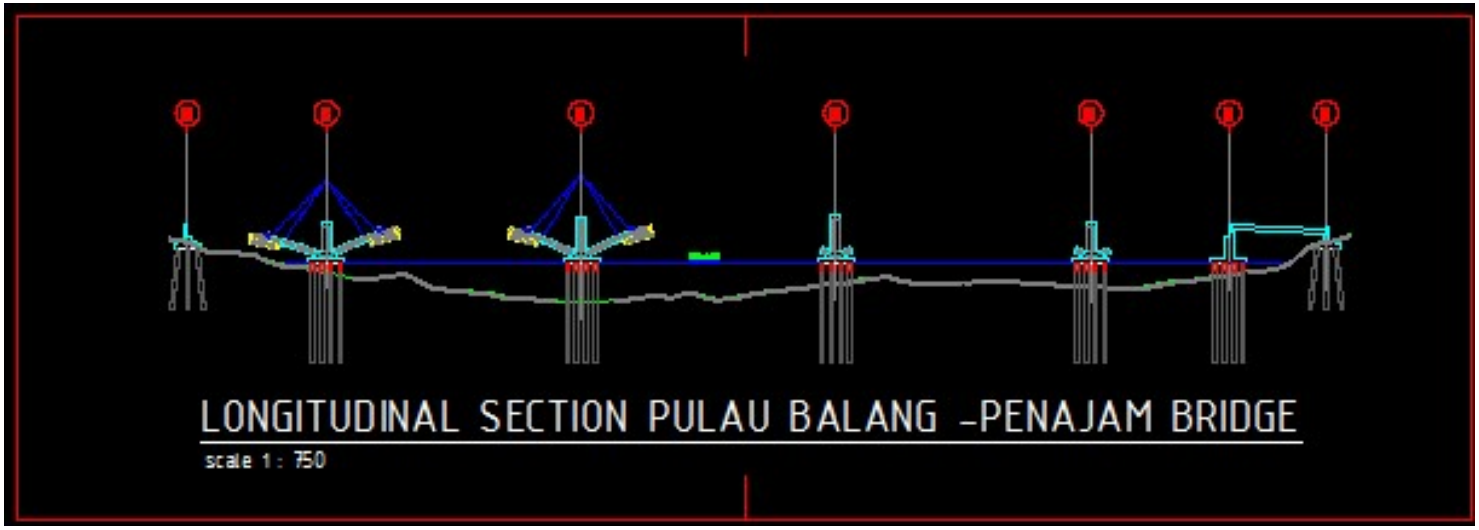
DENAH BOX JEMBATAN PULAU BALANG - PENAJAM

SKALA 1 : 750

DENAH BALOK PELENGKUNG JEMBATAN PULAU BALANG - PENAJAM

SKALA 1 : 750


LONGITUDINAL SECTION PULAU BALANG -PENAJAM BRIDGE
scale 1 : 750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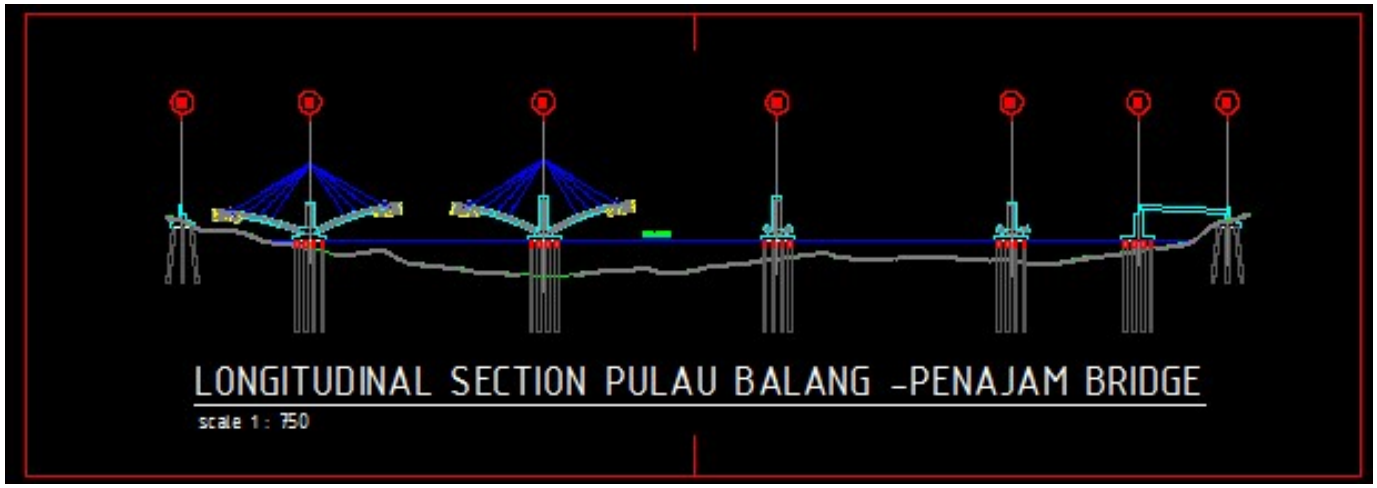
LONGITUDINAL SECTION PULAU BALANG -PENAJAM BRIDGE
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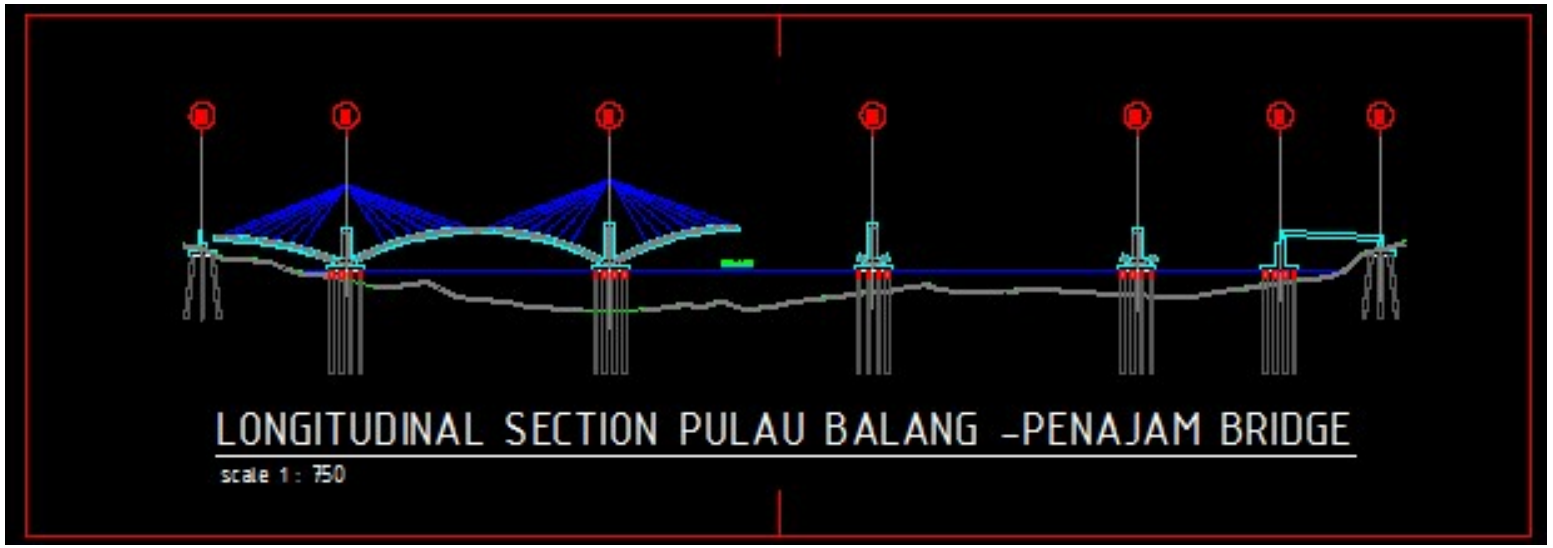
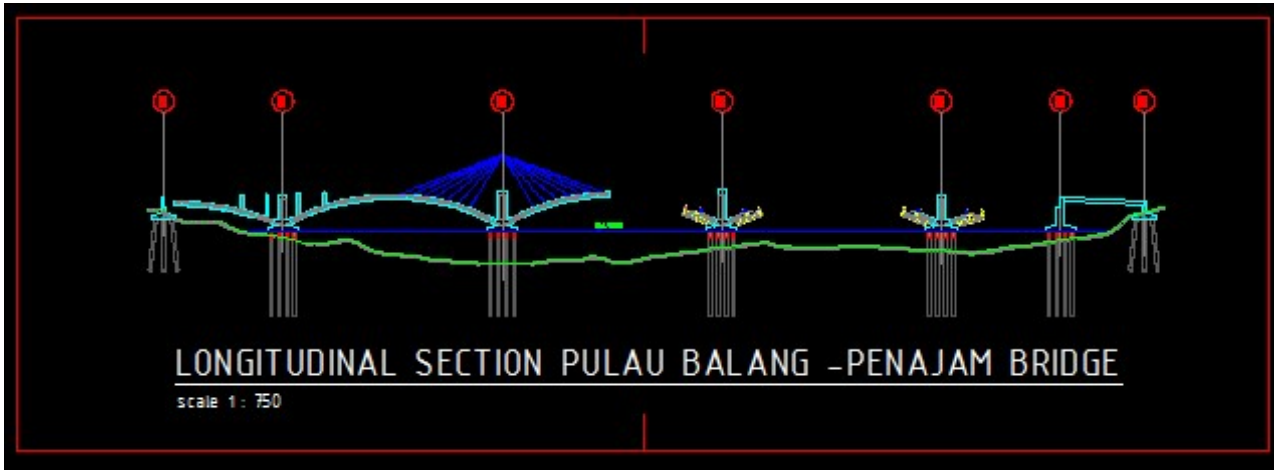
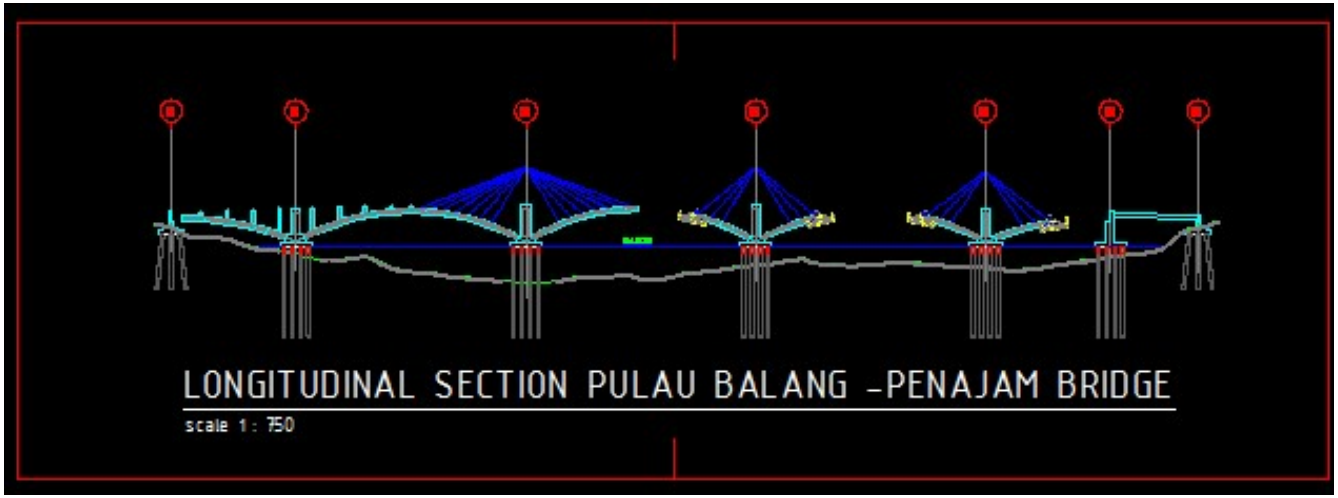
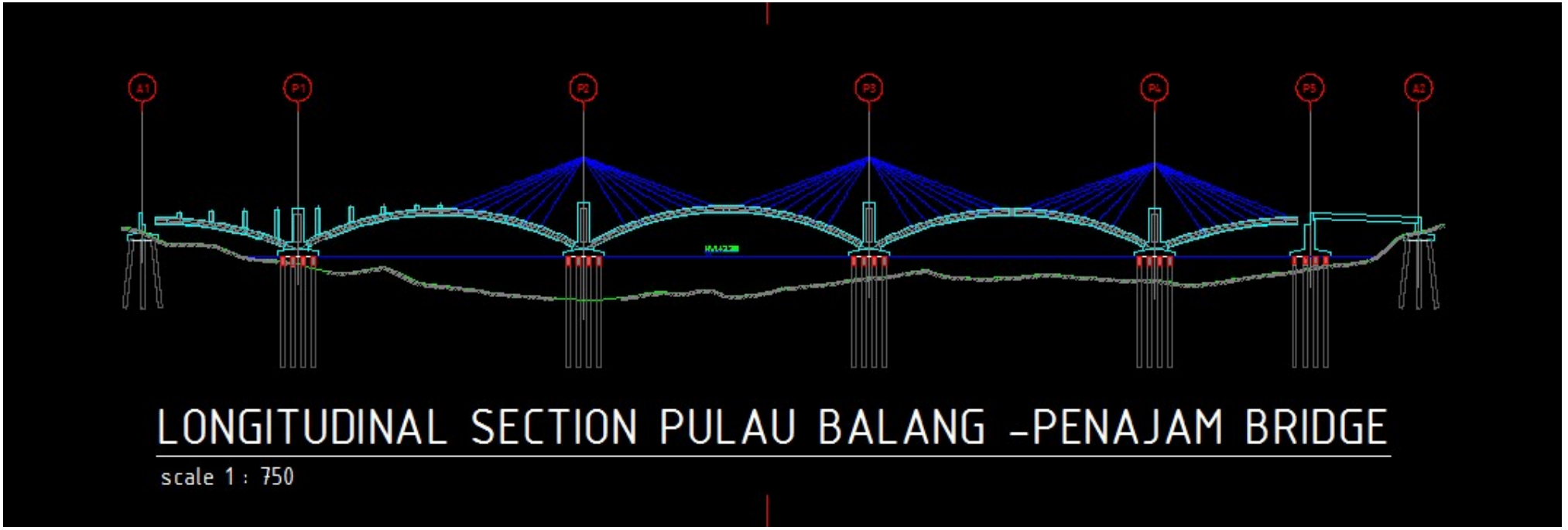
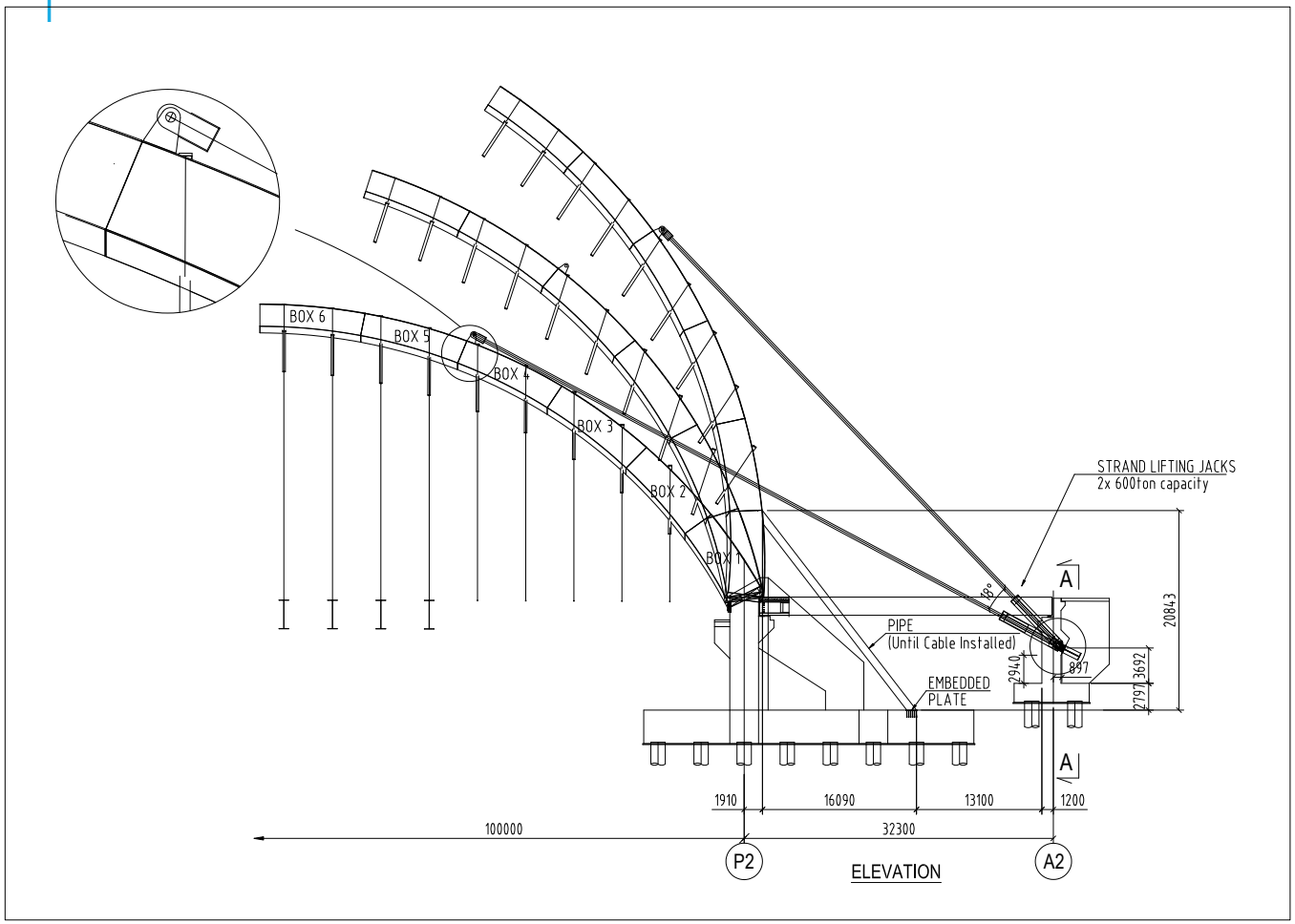

LONGITUDINAL SECTION PULAU BALANG -PENAJAM BRIDGE
scale 1 : 750


LONGITUDINAL SECTION PULAU BALANG -PENAJAM BRIDGE
scale 1 : 750

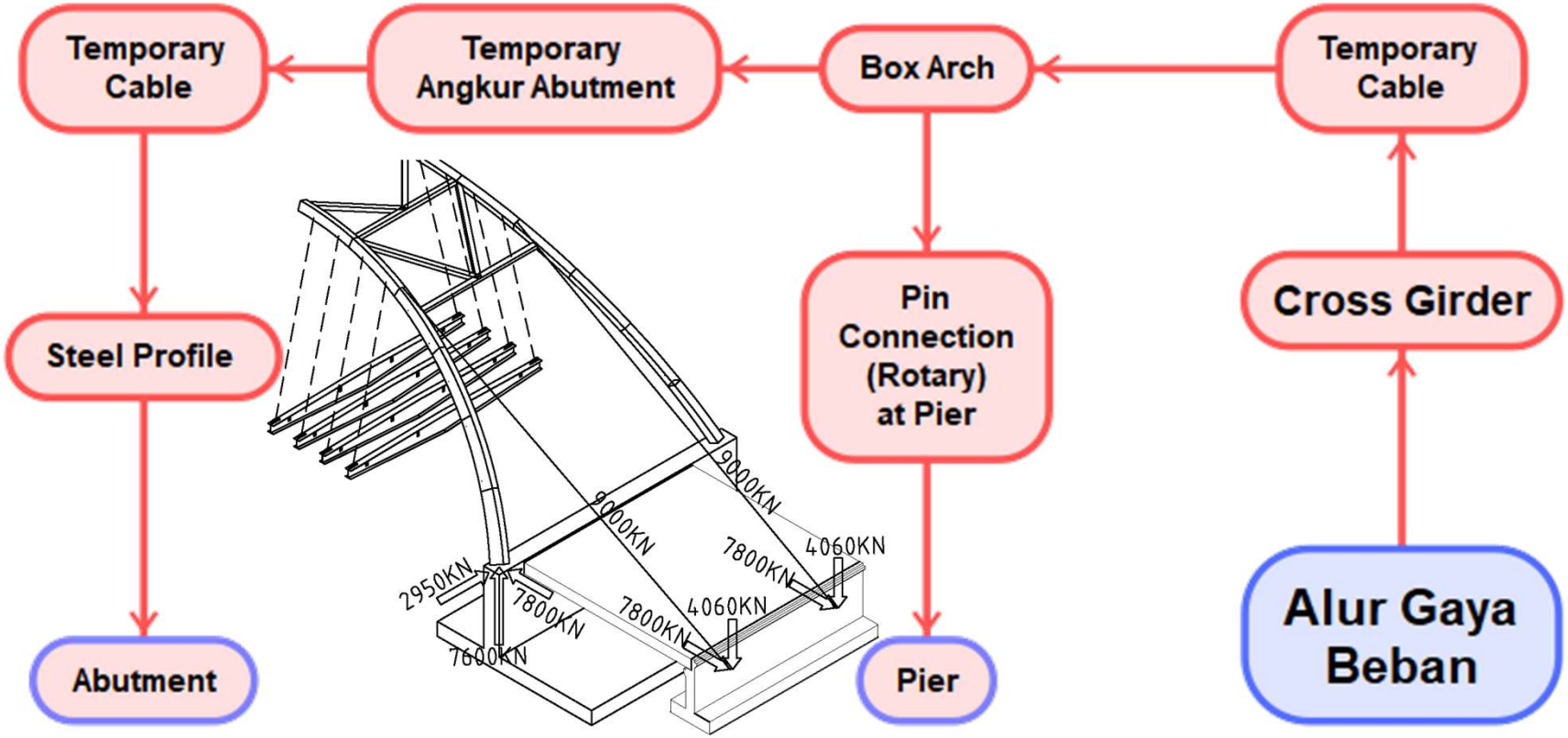

LONGITUDINAL SECTION PULAU BALANG -PENAJAM BRIDGE
scale 1 : 750


A1
P1
P2
P3
P4
P5
A2
LONGITUDINAL SECTION PULAU BALANG -PENAJAM BRIDGE
scale 1 : 750

TEMPORARY STRAND WITH JACK



Jembatan Kali Kuto


Temporary Cable
Temporary Angkur Abutment
Box Arch
Temporary Cable
Steel Profile
Pin Connection (Rotary) at Pier
Cross Girder
Abutment
Pier
Alur Gaya Beban
9000KN
9000KN
7800KN
4060KN
2950KN
7800KN
7800KN
4060KN
7600KN