

# PLANS OF PROPOSED P.P.C.C. BRIDGE OVER ON

**LENGTH** 24 368 OUT TO OUT OF ABUTMENT PRECAST BACKWALL PANELS

**SUPERSTRUCTURE** TWO SIMPLY SUPPORTED SPANS OF PRECAST PRESTRESSED CONCRETE CHANNEL GIRDERS WITH ASPHALT OVERLAY

**SUBSTRUCTURE** TWO PRECAST CONCRETE ABUTMENTS AND ONE INTERMEDIATE BENT WITH STEEL H-PILES

**ROADWAY WIDTH** 12 000 OUT TO OUT OF GIRDERS

**LOCATION** IN  R.M. OF

### SHEET LEGEND

1. COVER SHEET
2. GENERAL ELEVATION
3. BORING LOGS
4. SITE AND EROSION CONTROL DETAILS
5. ASSEMBLY DETAILS
6. ASSEMBLY DETAILS
7. ASSEMBLY DETAILS
8. STEEL PILE CAP DETAILS
9. STEEL PILE CAP DETAILS
10. BEARING AND ERECTION DETAILS
11. RAILING LAYOUT AND DETAILS
12. RAILING DETAILS
13. RAILPOST DETAILS
  
- P1. PRECAST PANEL DETAILS
- P2. PRECAST PANEL DETAILS
  
- G1. PRECAST PRESTRESSED CHANNEL GIRDER DETAILS
- G2. PRECAST PRESTRESSED CHANNEL GIRDER DETAILS
- G3. PRECAST PRESTRESSED CHANNEL GIRDER DETAILS
- G4. PRECAST PRESTRESSED CHANNEL GIRDER DETAILS
- G5. PRECAST PRESTRESSED CHANNEL GIRDER DETAILS

### DESIGN DATA

#### SPECIFICATIONS

AASHTO LRFD Bridge Design Specifications, First Edition, 1994 plus 1996/97 Interims

#### VEHICULAR LIVE LOADING

1. Modified AASHTO HSS-25 Truck
2. AASHTO LRFD "HL-93" Loading

#### STRUCTURAL CONCRETE

CSA A23.1, Exposure Class C-1 Air content category 1

1. PRECAST PRESTRESSED CONCRETE CHANNEL GIRDERS -  $f_c = 45$  MPa at 28 days  
 $f_{ci} = 35$  MPa at time of de-stressing
2. PRECAST PANELS -  $f_c = 35$  MPa

#### REINFORCING STEEL

1. PRECAST PRESTRESSED CONCRETE CHANNEL GIRDERS - CAN/CSA-G30.18-M92 Grade 400W black (i.e no epoxy coating)
2. PRECAST PANELS - CAN/CSA-G30.18-M92 Grade 400W black (i.e no epoxy coating)

#### STRUCTURAL STEEL

1. All Structural Steel shall conform to CAN/CSA G40.21-M92 Grade 300W
2. HSS Tubing for Bridge Rail shall conform to CAN/CSA G40.21-M92 Grade 350W

#### PRESTRESSING STRAND

20-13  $\emptyset$  low relaxation strands,  $f_{pu} = 1860$  MPa

#### PILE LOADING

	END PILE BENTS	INTERMEDIATE PILE BENTS
MAXIMUM FACTORED LOAD	$597$ kN	$668$ kN
FACTORED BEARING RESISTANCE	<span style="border: 1px dashed black; display: inline-block; width: 30px; height: 10px;"></span>	<span style="border: 1px dashed black; display: inline-block; width: 30px; height: 10px;"></span>

### HYDRAULIC DESIGN DATA

#### DESIGN DISCHARGE

$Q$   m<sup>3</sup>/sec

### SURVEY CONTROL

HORIZONTAL DATUM: NAD83CSRS  
 VERTICAL DATUM: CGVD28  
 ELLIPSOID: GRS 1980  
 GEOID (HT2.0): -----  
 UTM: ZONE ----  
 SCALE FACTOR: -----

#### SITE CONTROL POINT DATA

CONTROL POINT #-----	NORTHING: -----	EASTING: -----	ELEVATION: -----	DATE: -----
CONTROL POINT #-----	NORTHING: -----	EASTING: -----	ELEVATION: -----	DATE: -----
CONTROL POINT #-----	NORTHING: -----	EASTING: -----	ELEVATION: -----	DATE: -----



TP. - PLACE LOCATION  
MAP HERE

RGE. -  
LOCATION MAP  
Not to Scale

## MANITOBA INFRASTRUCTURE

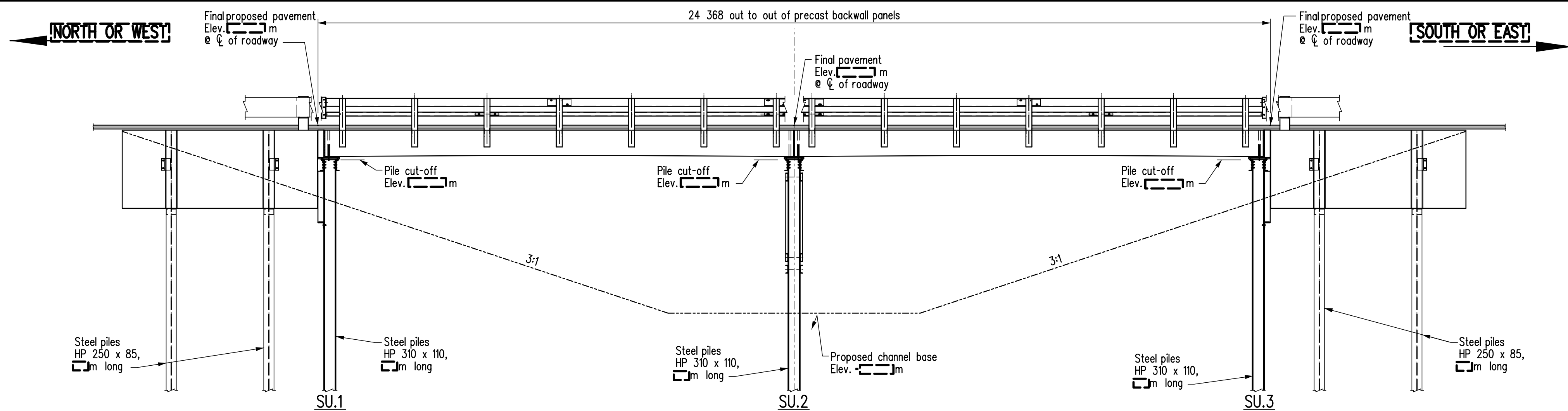
WATER MANAGEMENT AND STRUCTURES

ENVIRONMENTAL APPROVALS	
<input type="checkbox"/>	MANITOBA ENVIRONMENT ACT LICENCE DATE : _____ FILE # : _____
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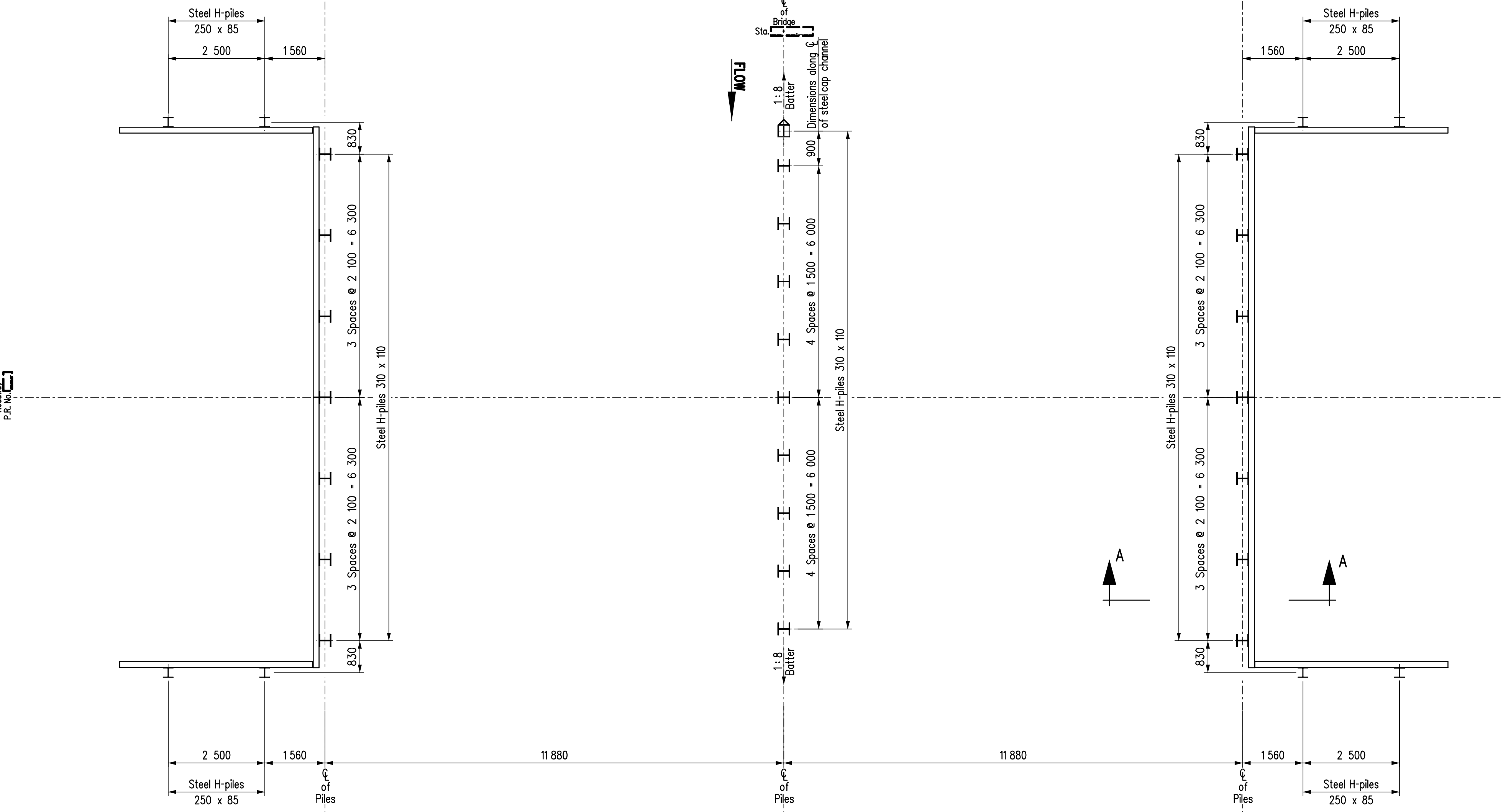
ALL DIMENSIONS ARE IN MILLIMETRES (mm) AND ALL ELEVATIONS AND STATIONS ARE IN METRES (m) UNLESS SHOWN OTHERWISE.

RELEASED FOR CONSTRUCTION BY : \_\_\_\_\_  
 EXECUTIVE DIRECTOR OF STRUCTURES  
 DATE \_\_\_\_\_

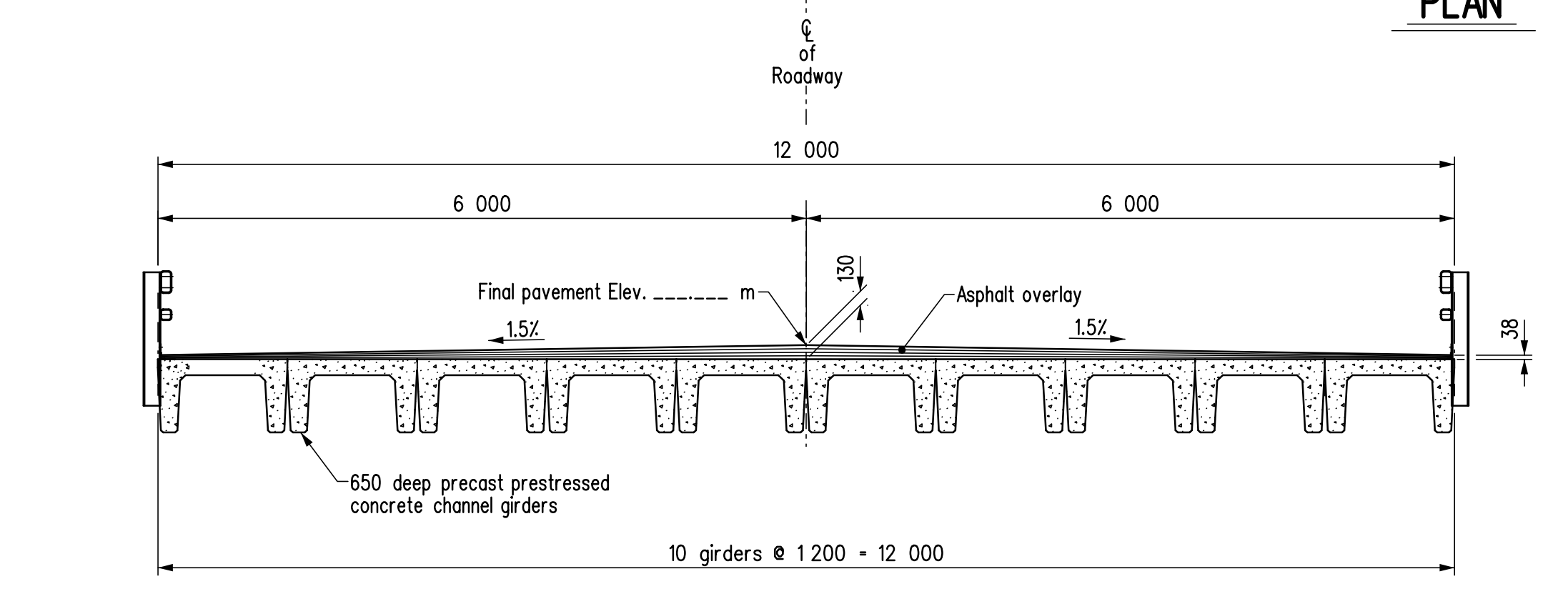
DRAWN BY: _____	DATE: _____	SHEET No. 1
CHECKED BY: _____	DATE: _____	SITE No. _____



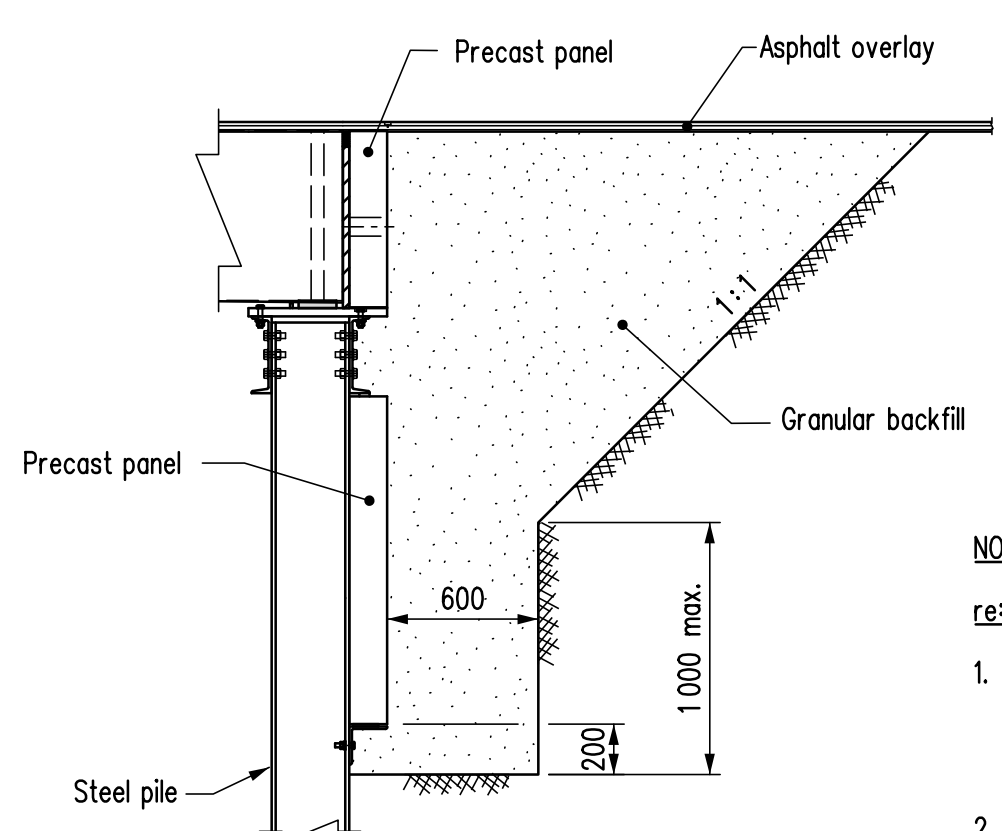
**ELEVATION**



**PLAN**



**CROSS SECTION**  
Scale 1:50



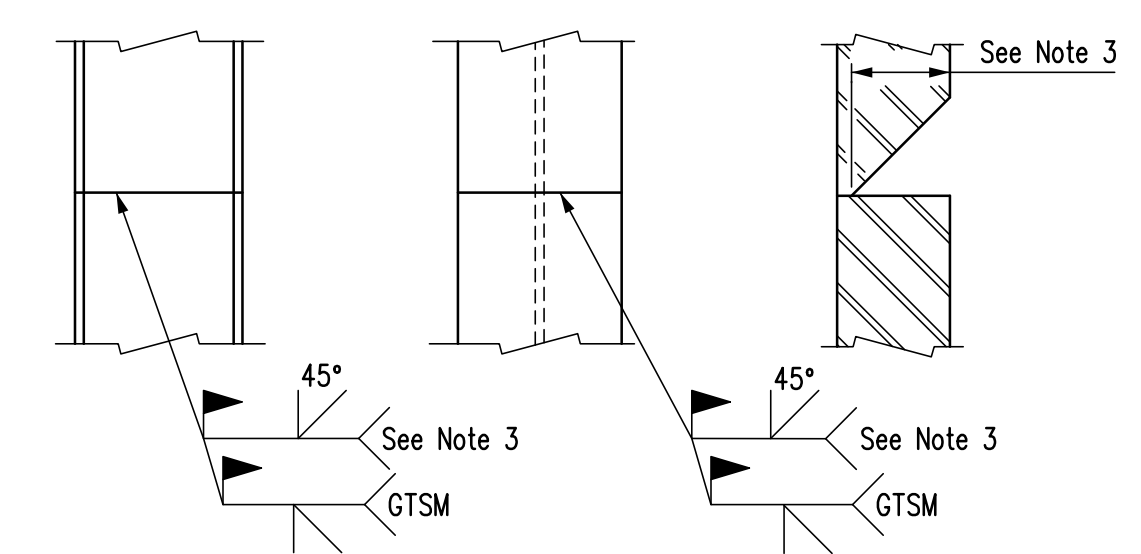
**SECTION A-A**  
Typical at Su.1  
Scale 1:30

**NOTES :**

- re: Backfill Behind Abutment Ballast Walls
- 1. Backfill behind ballast wall and wingwall panels shall be Type 1 - Granular backfill supplied and placed in accordance with Bridge Specification 1001 (1). The granular backfill shall be placed and compacted in lifts not exceeding 150 mm.
- 2. Compaction equipment used within 2 m of ballast walls and wingwalls shall be limited to light vibratory equipment with a mass not exceeding 120 kg unless otherwise approved.
- 3. Steel pile tip to be PRUYN "Hard-Bite" or equivalent.

BILL OF PILES				Site No.
LOCATION	DESCRIPTION	No. OF PILES	LENGTH	TOTAL LENGTH (m)
SU.1 & SU.3	Steel piles - HP310 x 110 (abutments)	14		0
SU.1 & SU.3	Steel piles - HP250 x 85 (wing walls)	8		0
				0
SU.2	Steel piles - HP310 x 110 (Intermediate bent)	9		0
SU.2	Steel piles - HP310 x 110 (Intermediate bent) - Ice Breaker Pile	1		0
				0
TOTAL LENGTH OF PILES (m) =				0

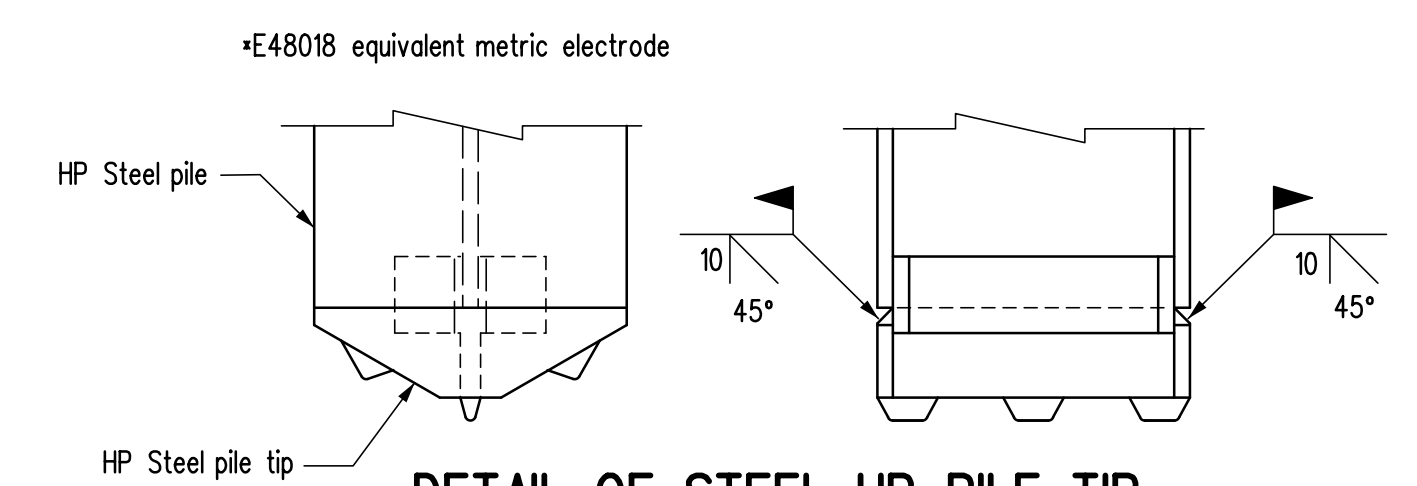
BILL OF PILE TIPS		
LOCATION	DESCRIPTION	No. OF PILES
SU.1 & SU.3	Hard-Bite Point HP-77750-B for HP310 x 110 (Abutments)	14
SU.2	Hard-Bite Point HP-77750-B for HP310 x 110 (Intermediate bent) - Excluding Ice Breaker Pile	9



**DETAIL OF STEEL HP PILE SPLICE**  
Not To Scale

**NOTES:**

- e: Welding
- 1. Low hydrogen +E70 series electrodes shall be used.
- 2. The minimum root pass shall be 6 mm.
- 3. Preparation for welding requires 13 mm bevel for HP 250 piles and 14 mm bevel for HP 310 piles.
- 4. Weld both flanges and web as shown. The inside bevelling and welds to be completed first.
- 5. Before undertaking the back welds, the weld preparation shall be carried out with a carbon Arc-Air gouger.



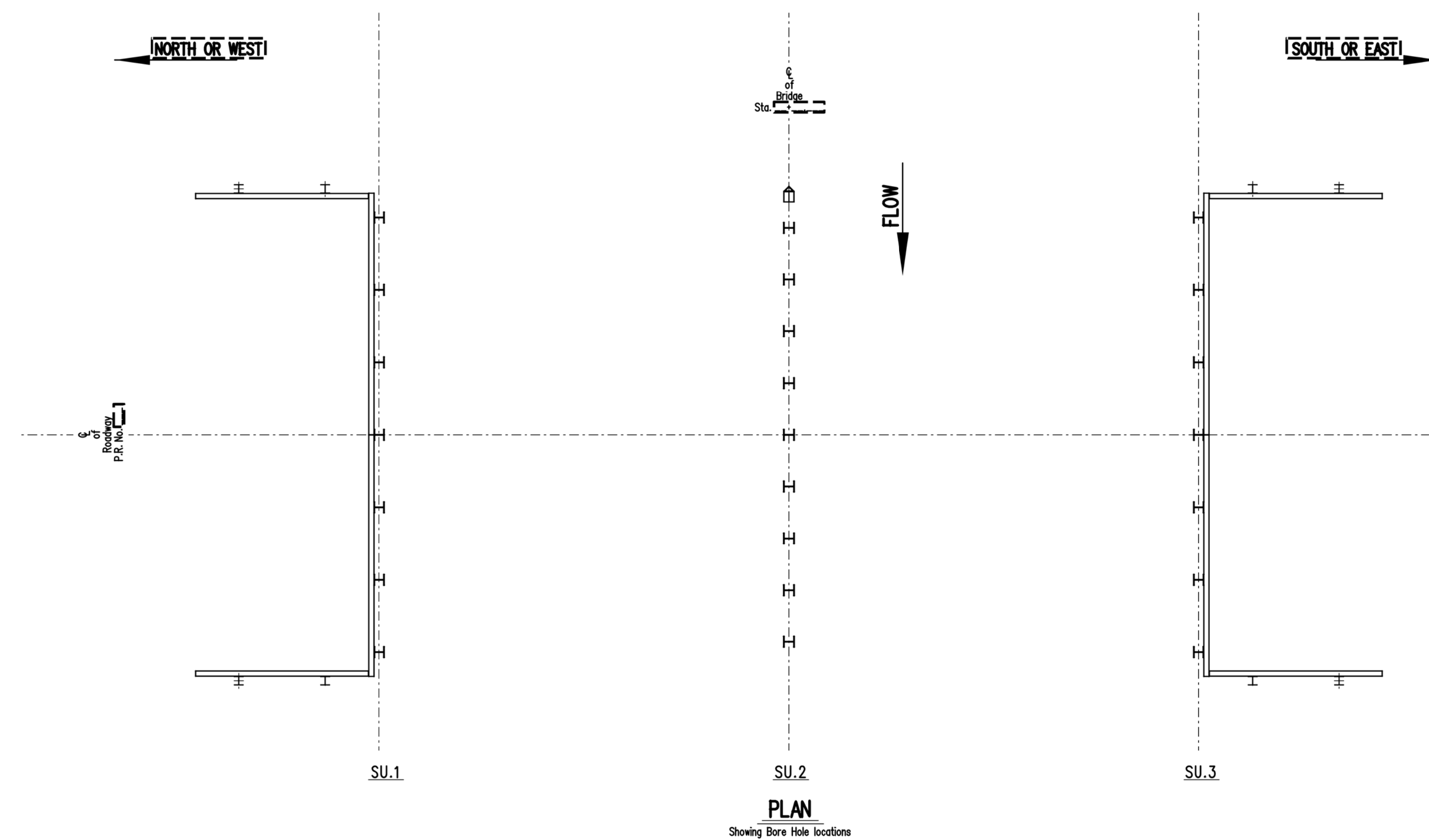
**DETAIL OF STEEL HP PILE TIP**  
Not to Scale

**NOTES :**

- 1. Edges of HP Steel pile tip to be ground on 45° bevel for 10 mm.
- 2. Low hydrogen +E70 series electrodes shall be used.
- 3. The minimum root pass shall be 6 mm.

+E48018 equivalent metric electrode

REVISIONS		GENERAL ELEVATION	
DATE	BY	DESIGN	RELEASED FOR CONSTRUCTION BY:
DESIGN SEAL	RECORD SEAL	<p>Infrastructure Water Management and Structures</p>	EXECUTIVE DIRECTOR OF STRUCTURES DATE
<p><b>PLACE ENGINEERS ELECTRONIC SEAL HERE</b></p>			SCALE: 1:75
		DETAILS	or as shown



PLAN  
Showing Bore Hole Locations

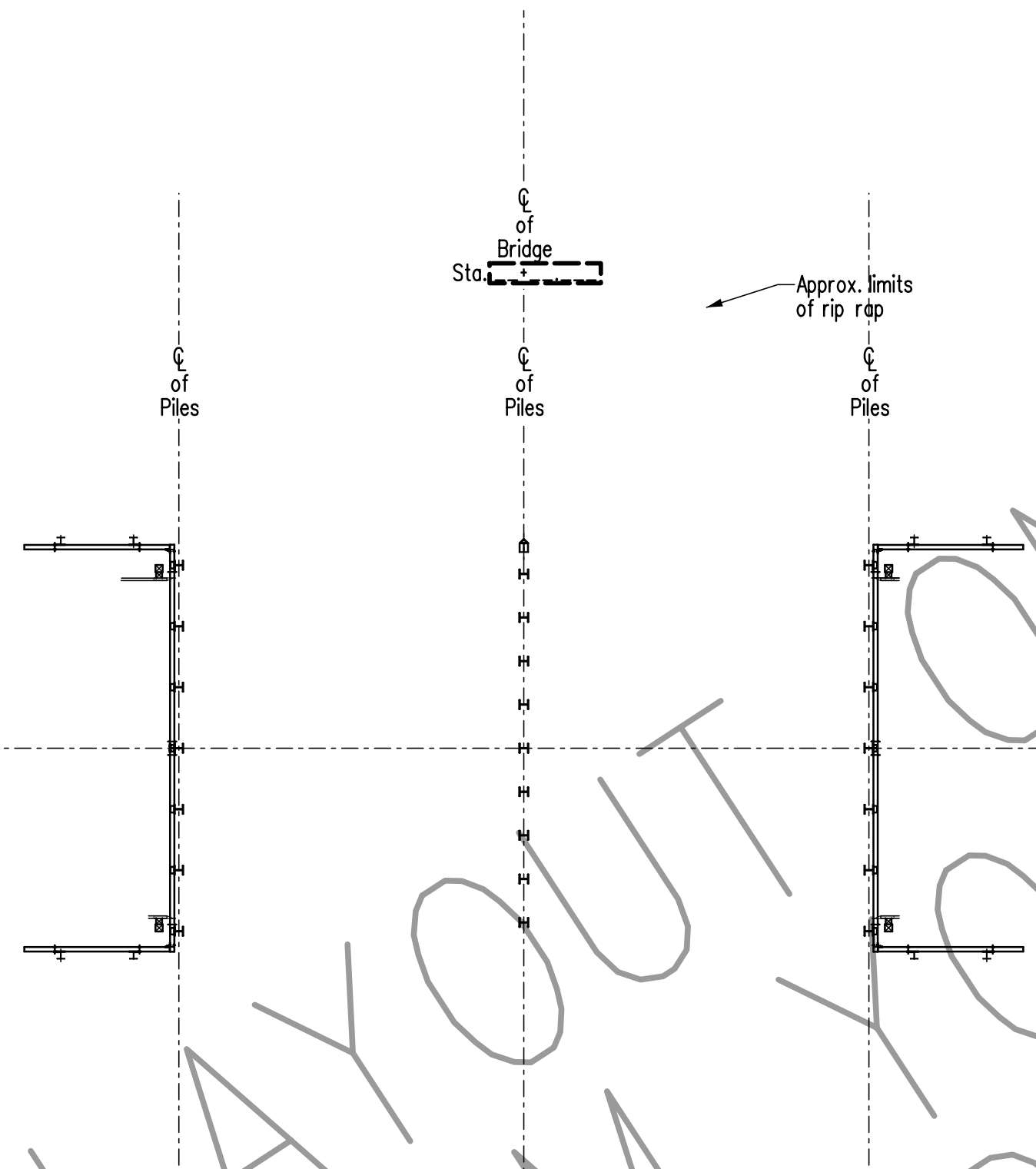
NOTES - re: Boring Logs

- The Department provides log boring information shown on the Plans. This information may not be representative of the soil conditions throughout the site. Contractors may peruse all available soil information in the Water Management and Structures Branch located at 6th floor, 215 Garry Street, Winnipeg.
- The following abbreviations apply to bore hole information:  
 Qu - Laboratory unconfined compressive strength in kPa  
 SPT (N) - Number of blows per 300 mm - Standard Penetration Test  
 USC - Unified Soil Classification  
 M.C. - Moisture Content
- All stations, elevations, offsets and depths as shown are in meters. All dimensions are in millimeters.
- All bore hole locations shown in plan view are approximate.
- Elevations on boring logs are at a vertical scale of 1:100.

REVISIONS		BORING LOGS	
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY:
DESIGN SEAL	RECORD SEAL		
PLACE ENGINEERS ELECTRONIC SEAL HERE			
		EXECUTIVE DIRECTOR OF STRUCTURES     DATE: _____ SCALE: 1:100     SHEET No. <u>3</u>	
		BY: _____ CHECKED: _____	
		BY: _____ CHECKED: _____ or as shown     SITE No. _____	

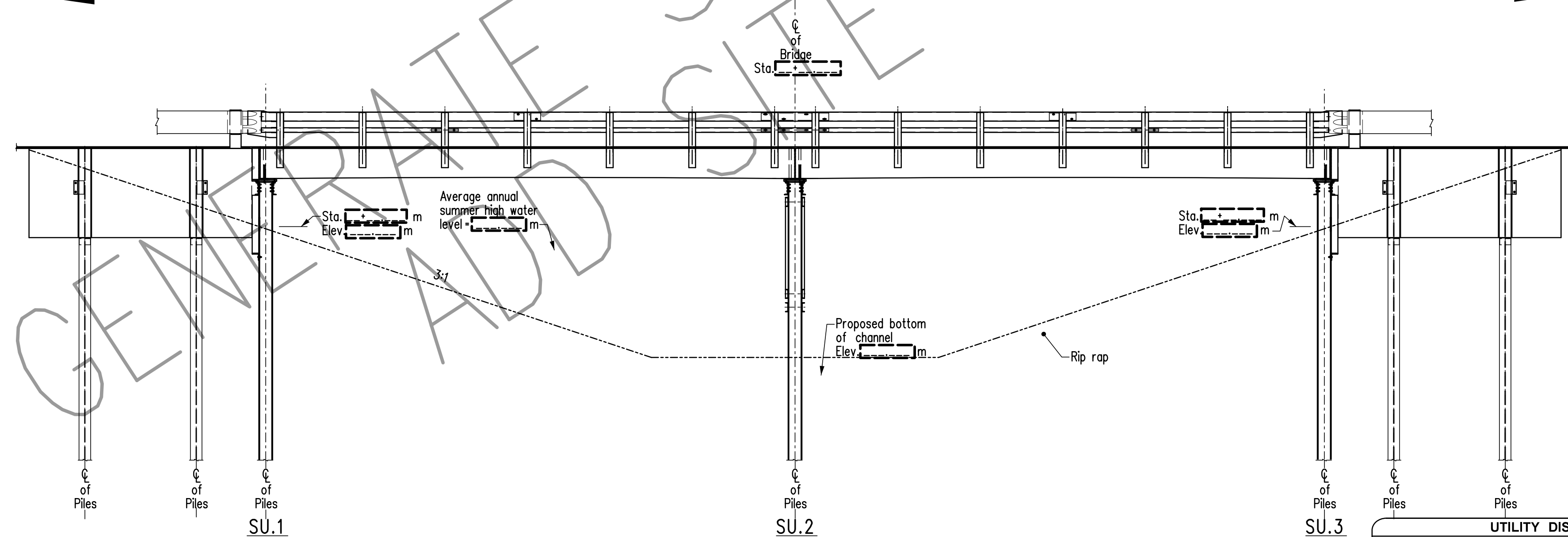
[NORTH OR WEST]

[SOUTH OR EAST]



[NORTH OR WEST]

[SOUTH OR EAST]

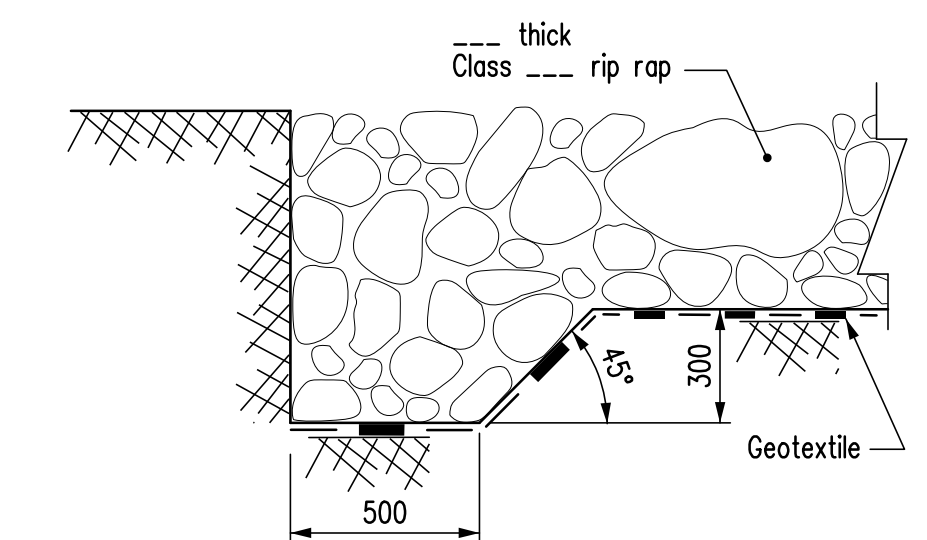


ELEVATION

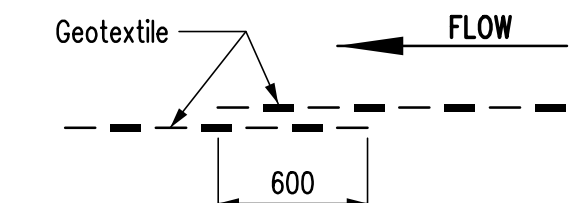
Scale 1:75

UTILITY DISCLAIMER:

LOCATIONS OF UTILITIES AS SHOWN ARE BASED ON READILY AVAILABLE INFORMATION. NO GUARANTEE IS GIVEN THAT ALL UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONTRACTOR SHALL CONFIRM THE EXISTENCE AND LOCATION OF UTILITIES BY OBTAINING FROM THE INDIVIDUAL UTILITIES BEFORE PROCEEDING WITH CONSTRUCTION.



EDGE TREATMENT



OVERLAPPING DETAILS

RIP RAP DETAILS

Not To Scale

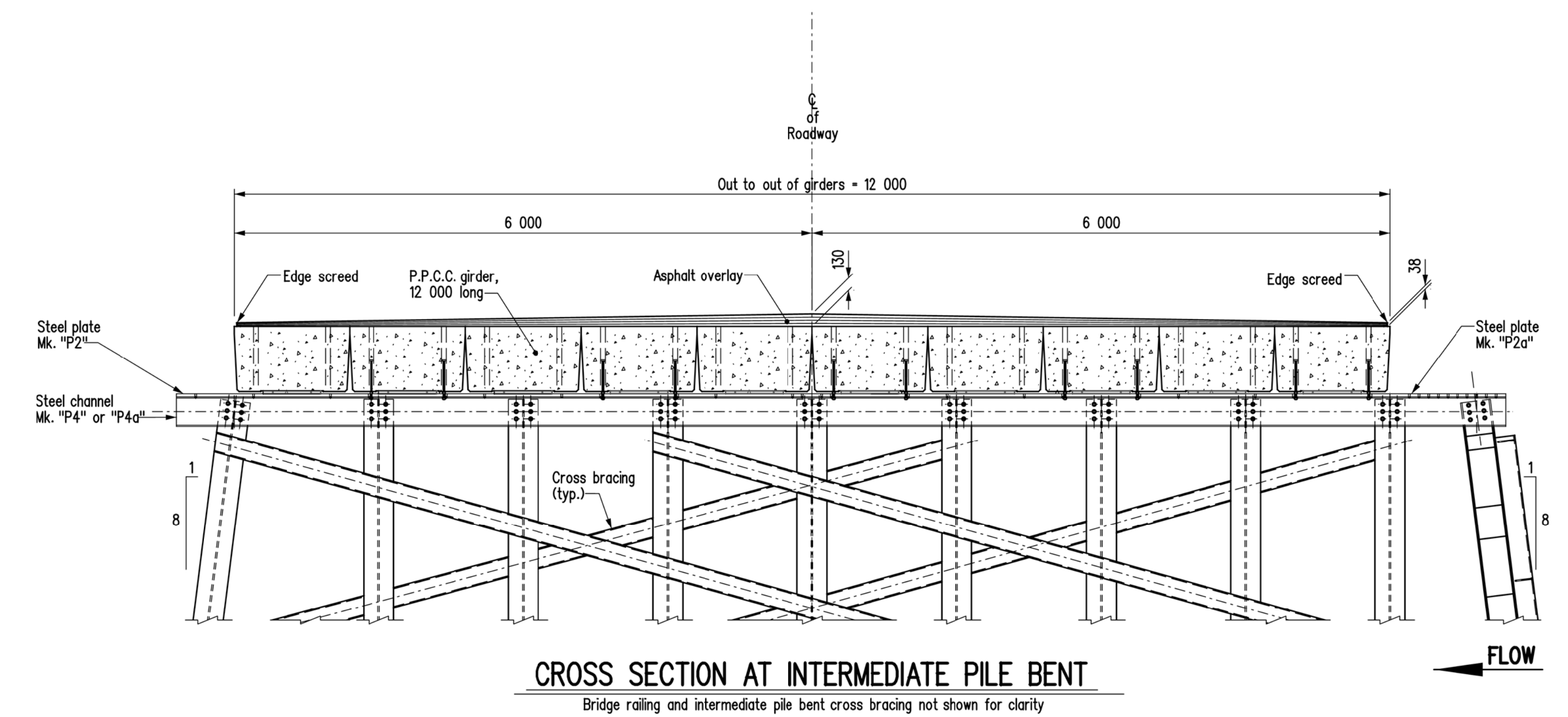
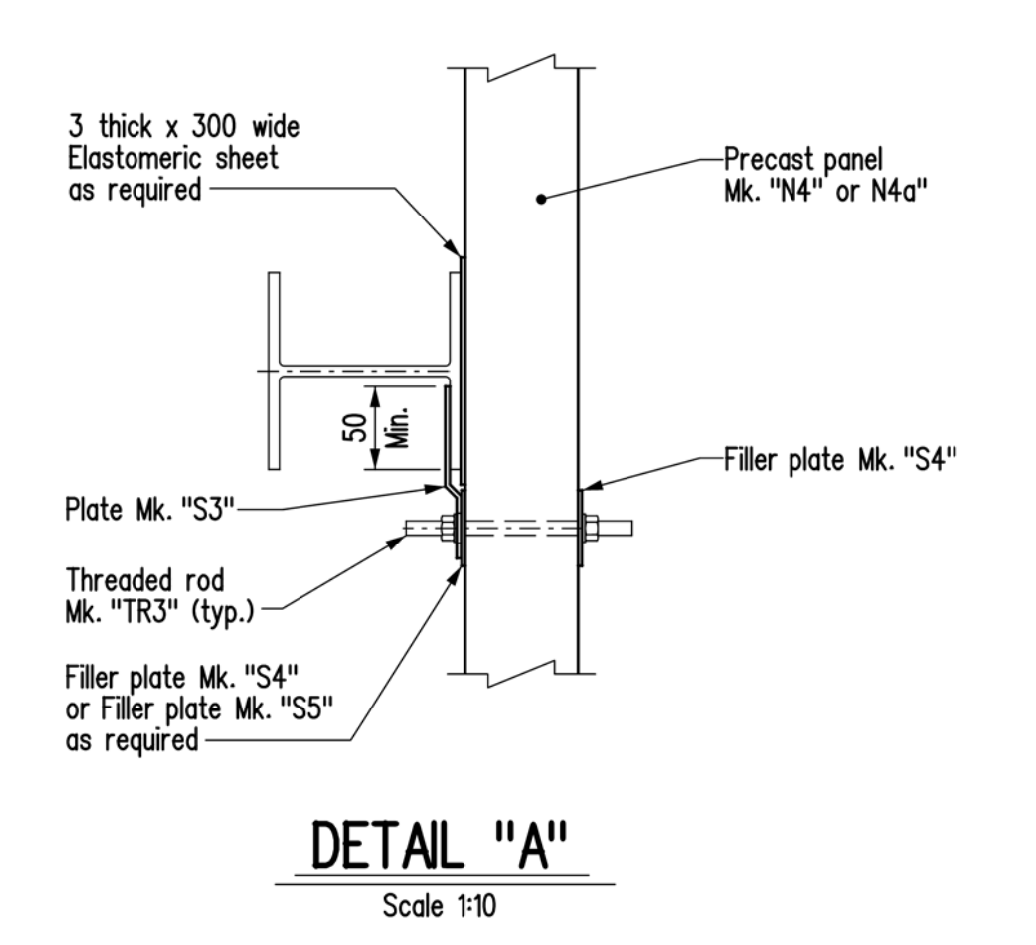
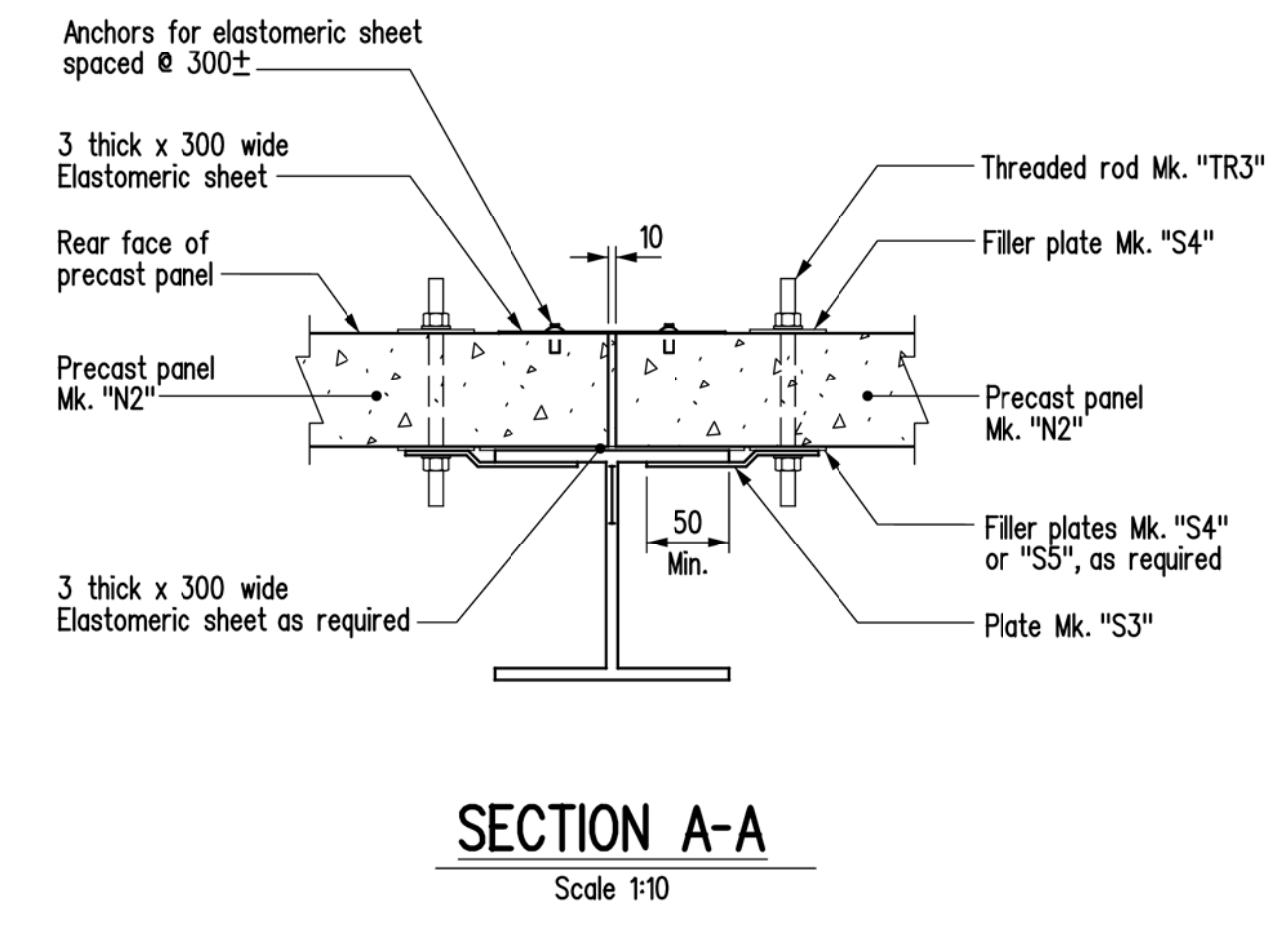
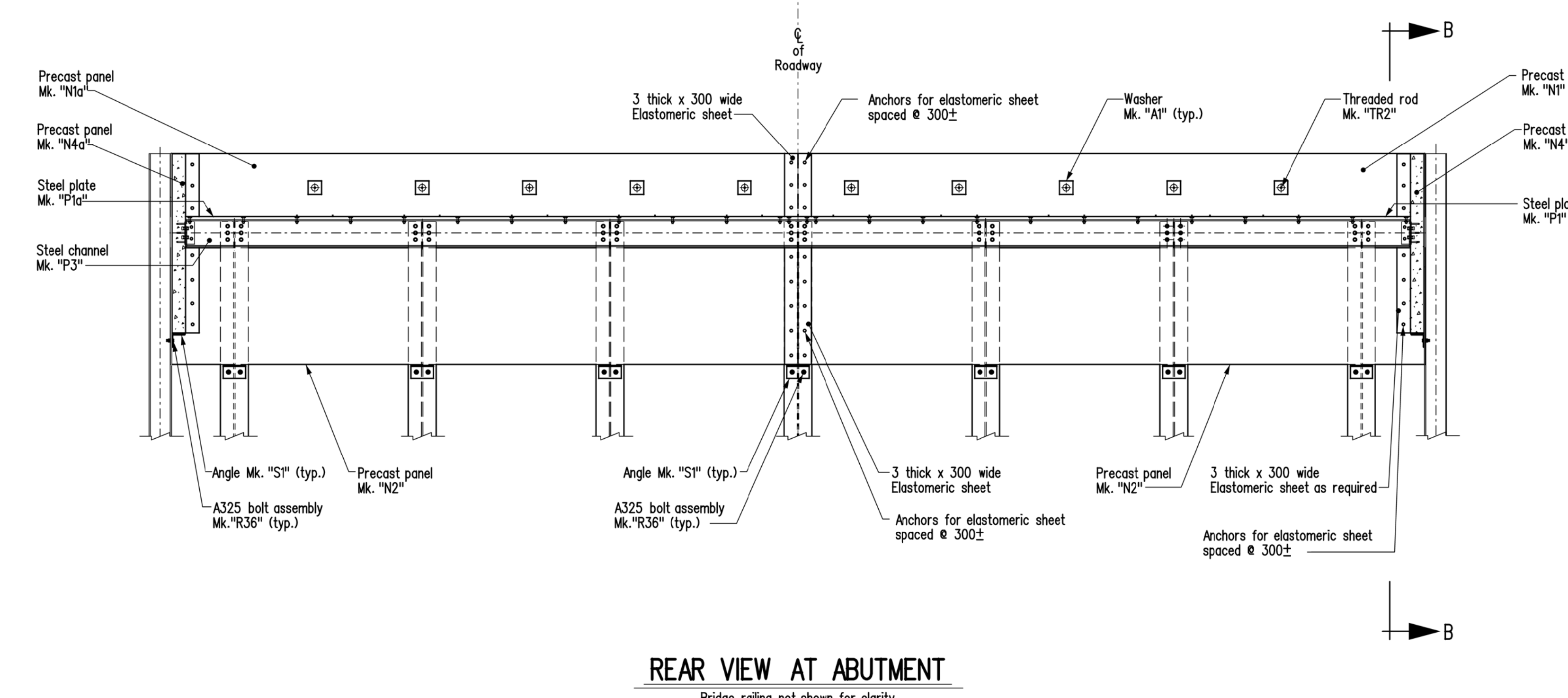
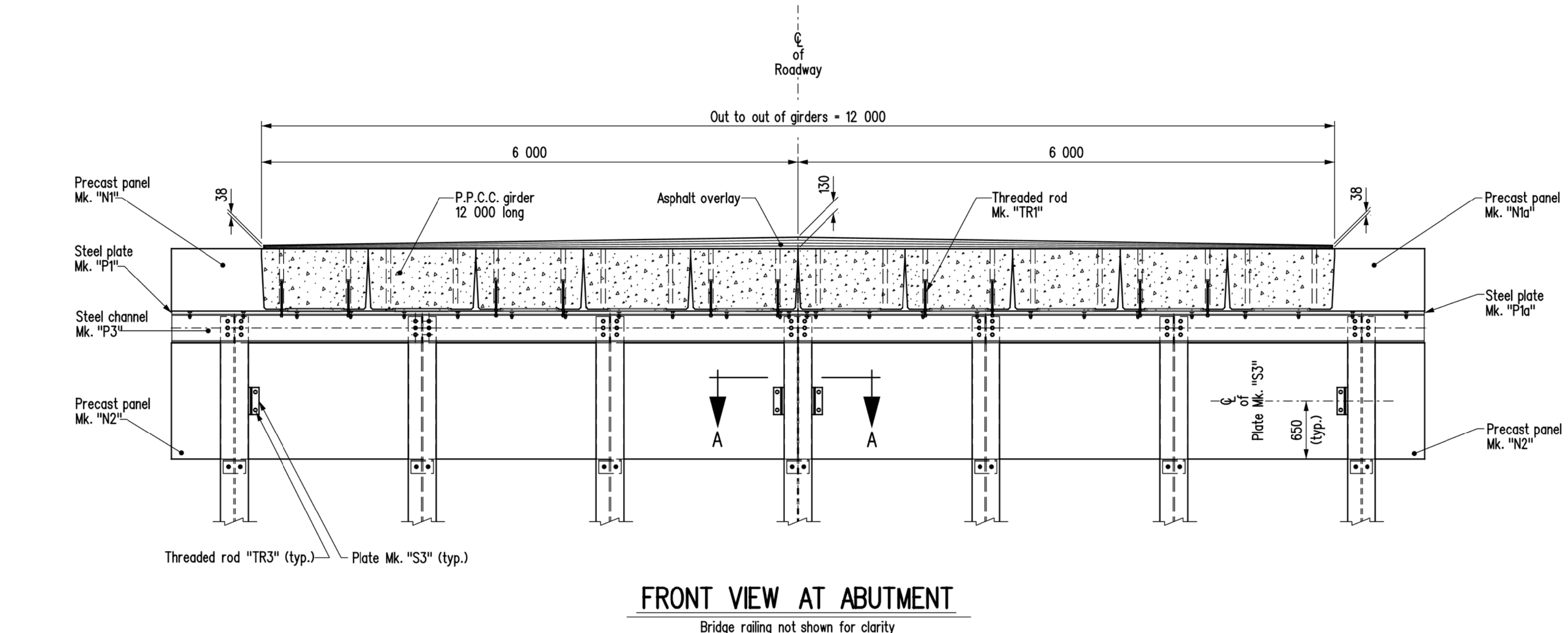
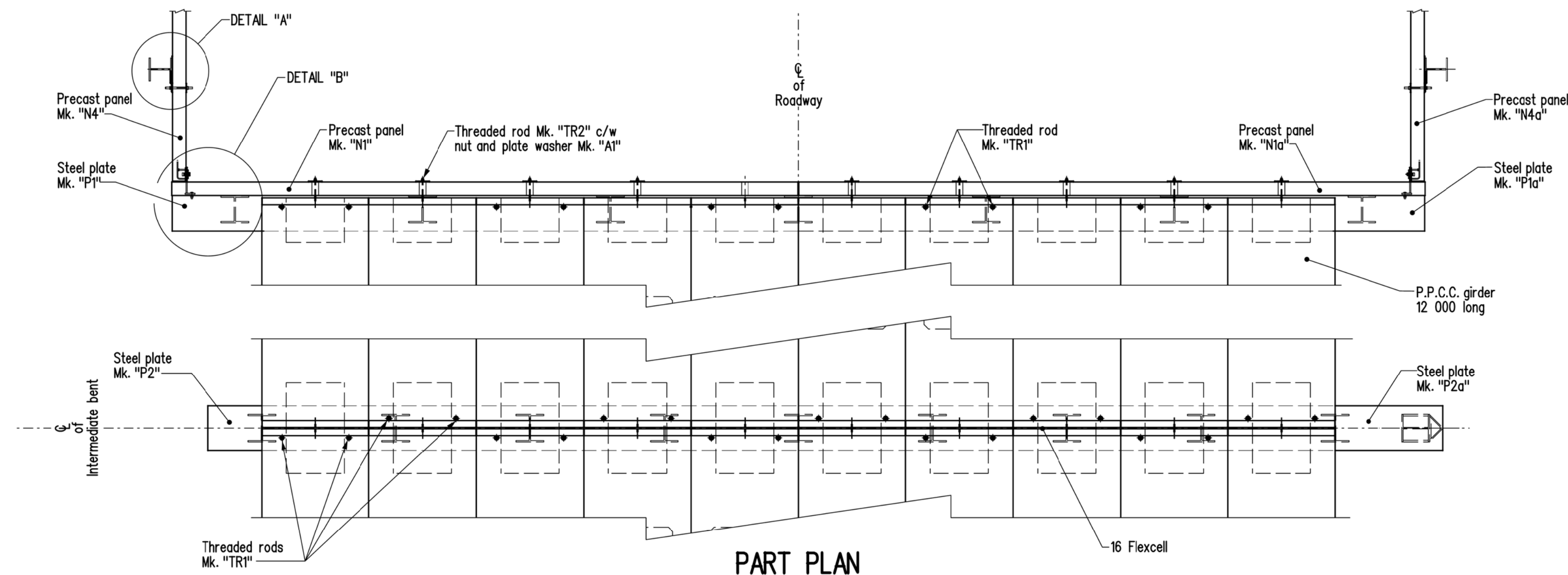
NOTES:

- All geotextile shall be Non-Woven Geotextile, Class I (Heavy Duty) from the Manitoba Infrastructure's Approved Product List.
- Geotextile shall be placed under all rip rap, overlapping 600mm in direction of flow.

NOTE:

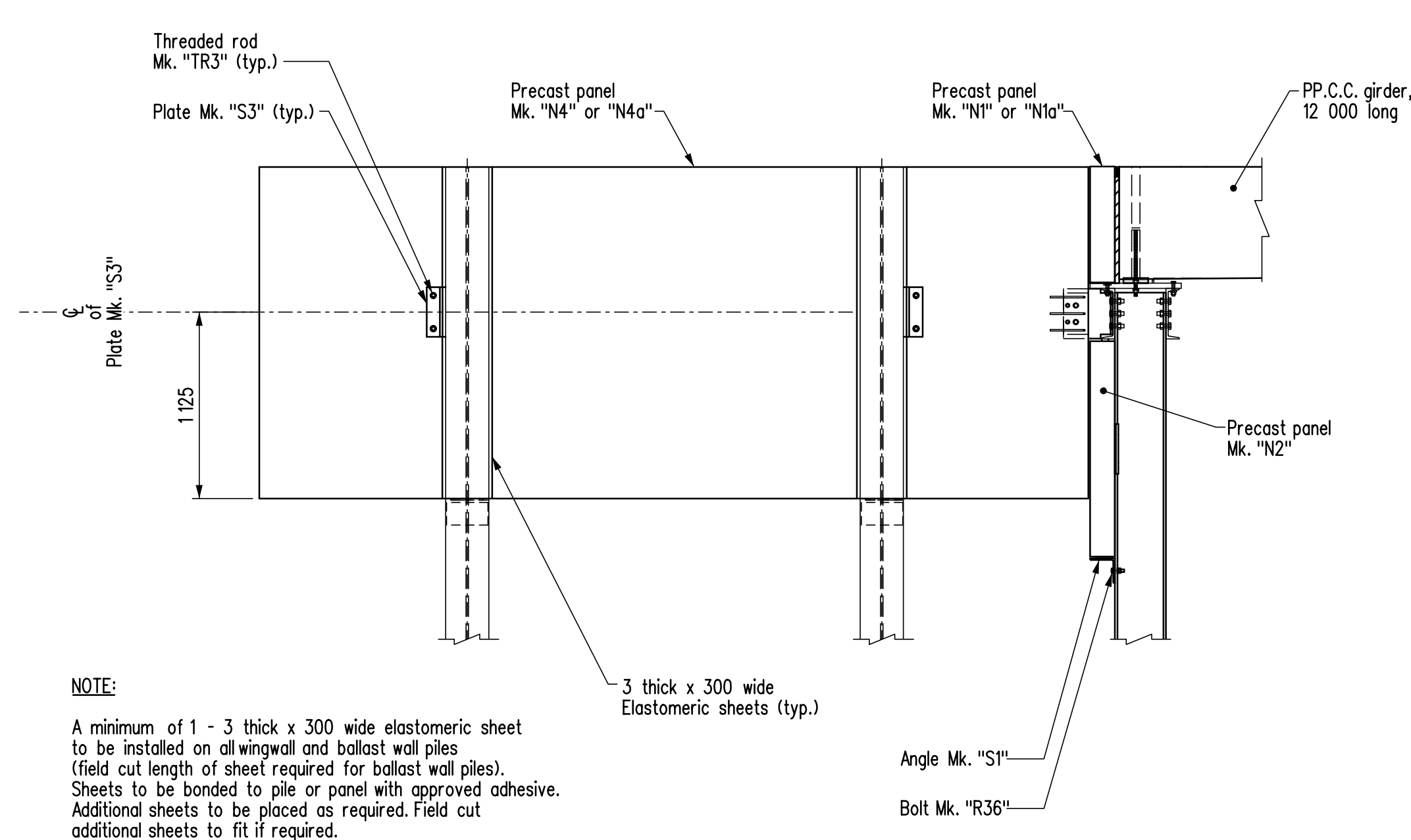
Existing pile bents to be removed by Bridge Contractor.

REVISIONS		SITE AND EROSION CONTROL DETAILS	
DATE	DESCRIPTION		
		<div style="text-align: center; border: 1px solid black; padding: 5px;"> <b>Manitoba</b> Infrastructure            Water Management and Structures         </div>	
		RELEASED FOR CONSTRUCTION BY: _____ DATE _____	
		EXECUTIVE DIRECTOR OF STRUCTURES DATE _____	
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<p>PLACE ENGINEERS ELECTRONIC SEAL HERE</p>		or as shown SITE No. _____	

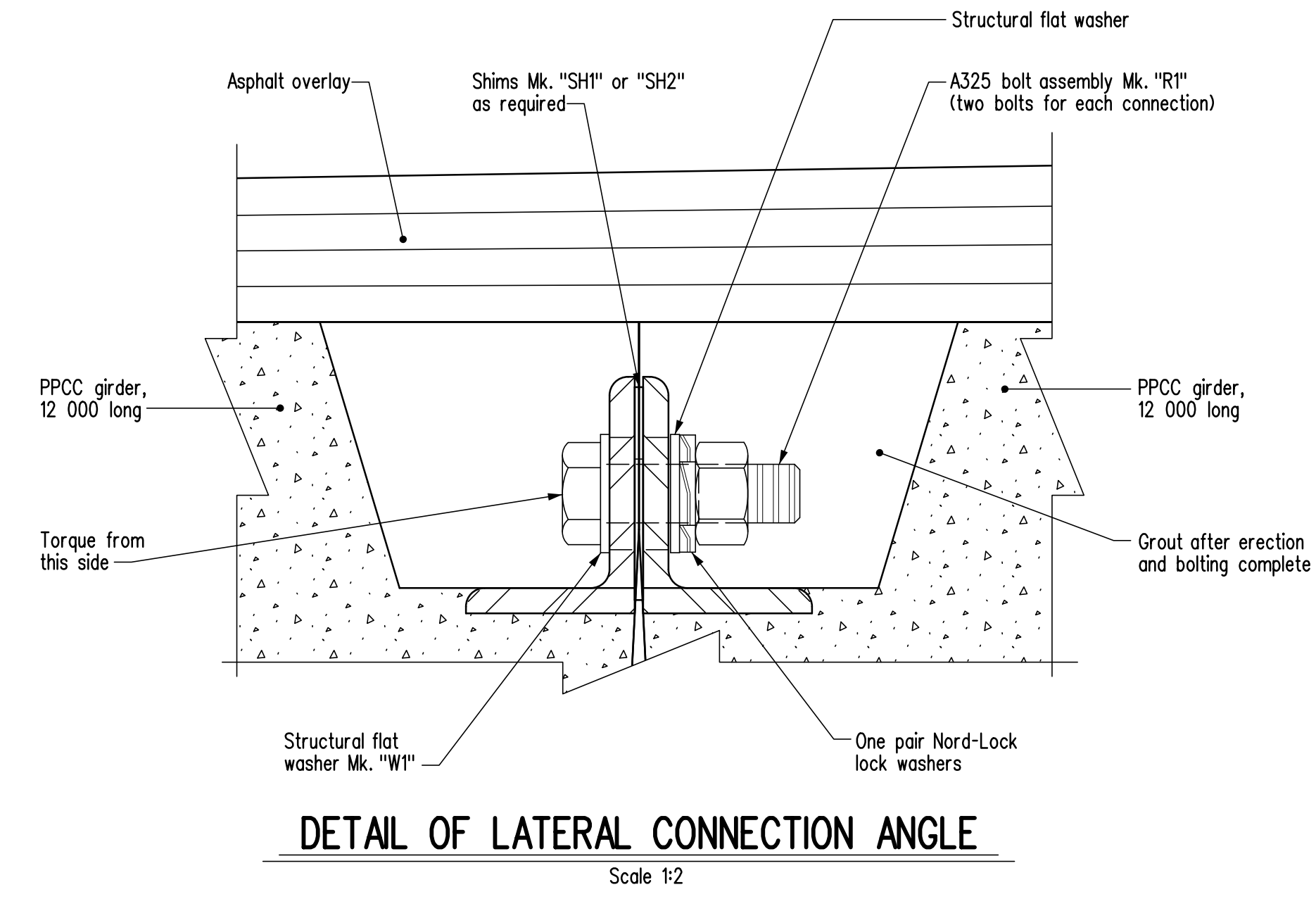


- NOTES:**
1. For Section "B-B" and DETAIL "B" see Sheet No. [ ]
  2. For "BILL OF MISCELLANEOUS METAL" see Sheet No. [ ]
  3. The Contractor shall field drill 22 # holes in the precast panels for threaded rods Mk. "TR3". Should rebar be encountered, abandon hole, patch and drill in new location. Rebar locations are marked on the panels by the Panel Fabricator.
  4. Back faces of the upper and lower ballast walls shall be aligned in the same vertical plane.
  5. The Contractor shall ensure that the upper ballast walls are placed with the edge 5mm from  $\phi$  of roadway.

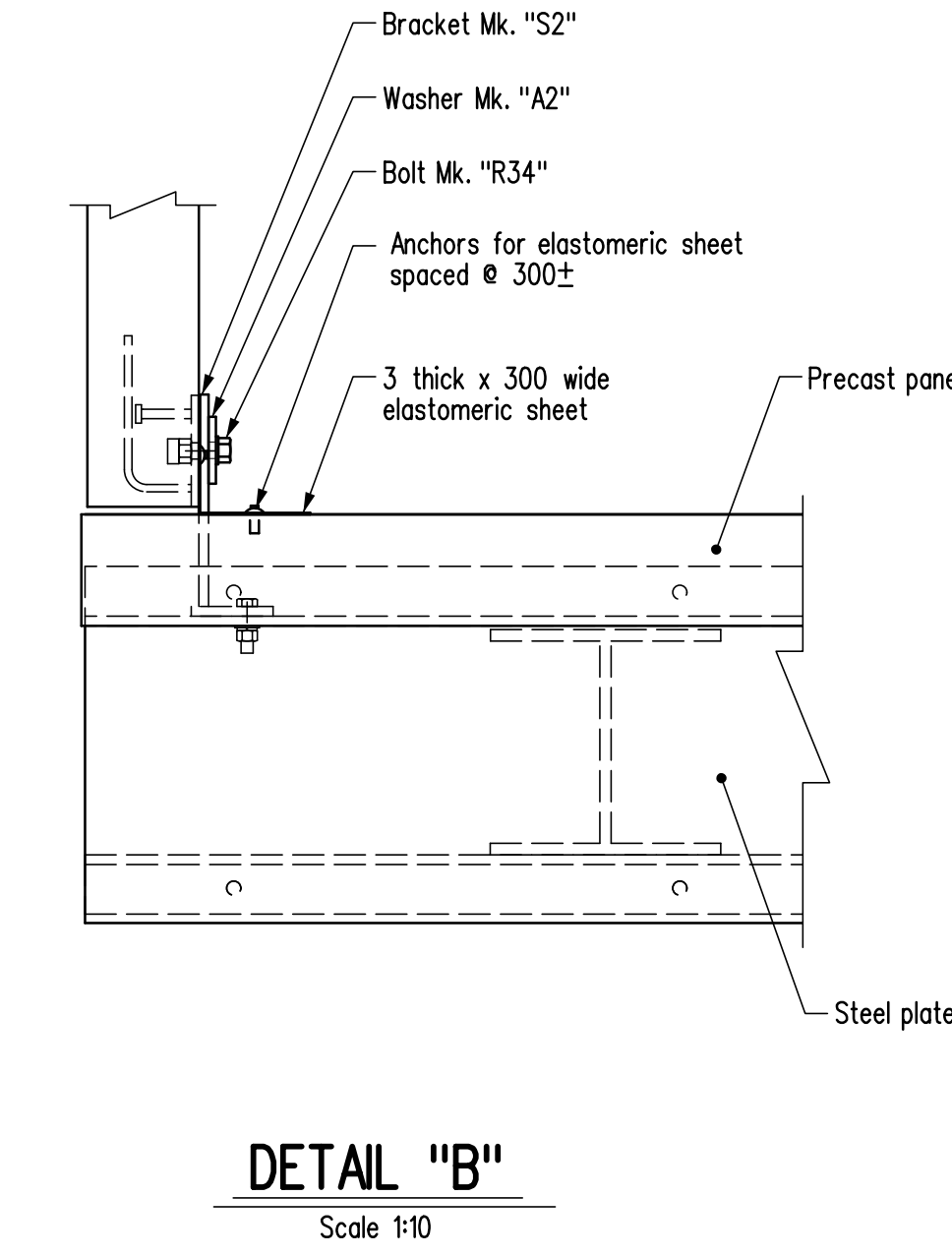
REVISIONS		ASSEMBLY DETAILS	
DATE	BY	DESIGN SEAL	RECORD SEAL
PLACE ENGINEERS ELECTRONIC SEAL HERE		<b>Manitoba</b> Infrastructure Water Management and Structures	RELEASED FOR CONSTRUCTION BY: _____ DATE: _____
		DESIGN BY: _____	EXECUTIVE DIRECTOR OF STRUCTURES _____ DATE: _____
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DETAILS BY: _____		CHECKED: _____	or as shown SITE No. [ ]
		CHECKED: _____	_____



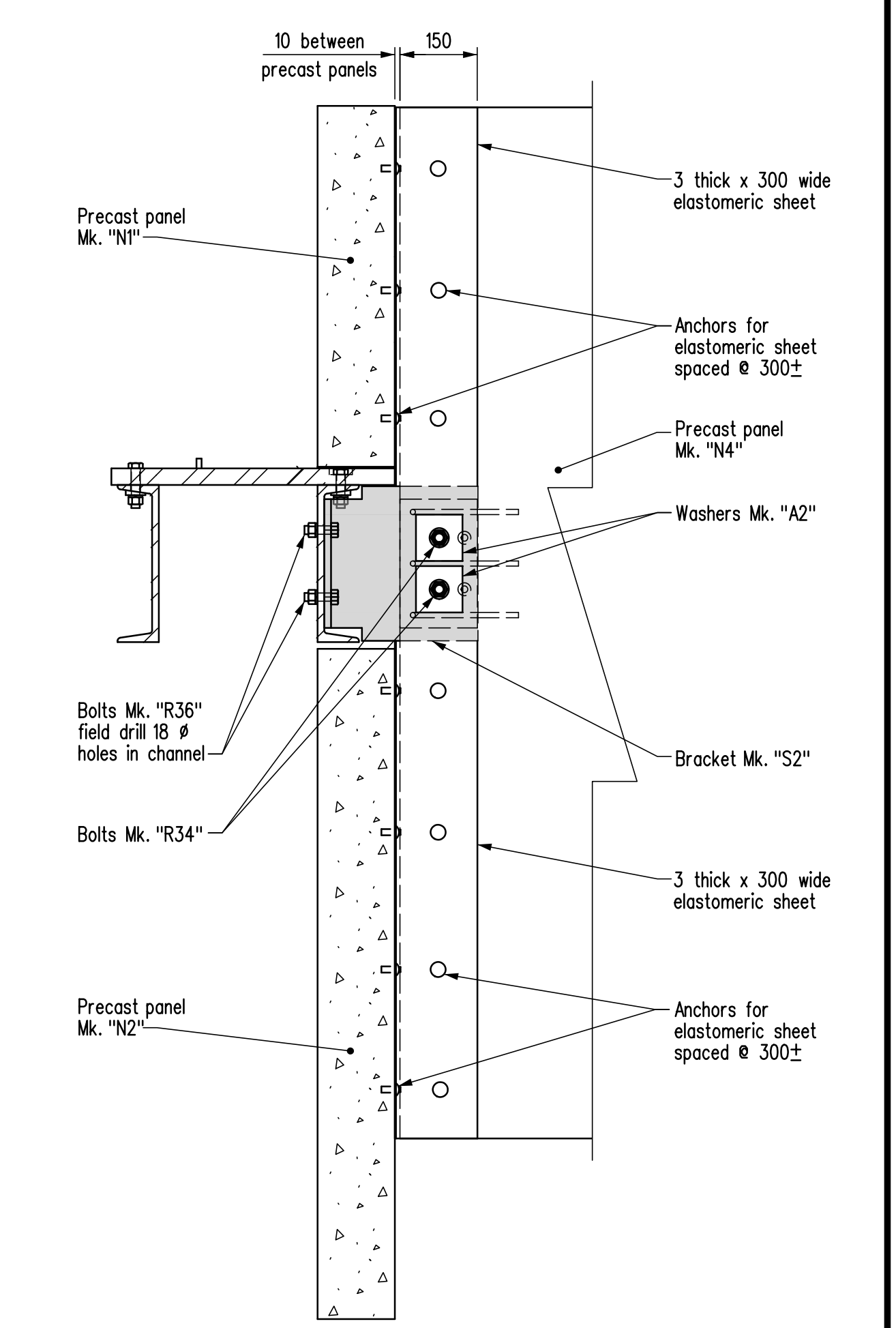
**PART SIDE ELEVATION**  
Bridge railing not shown for clarity



**DETAIL OF LATERAL CONNECTION ANGLE**  
Scale 1:2



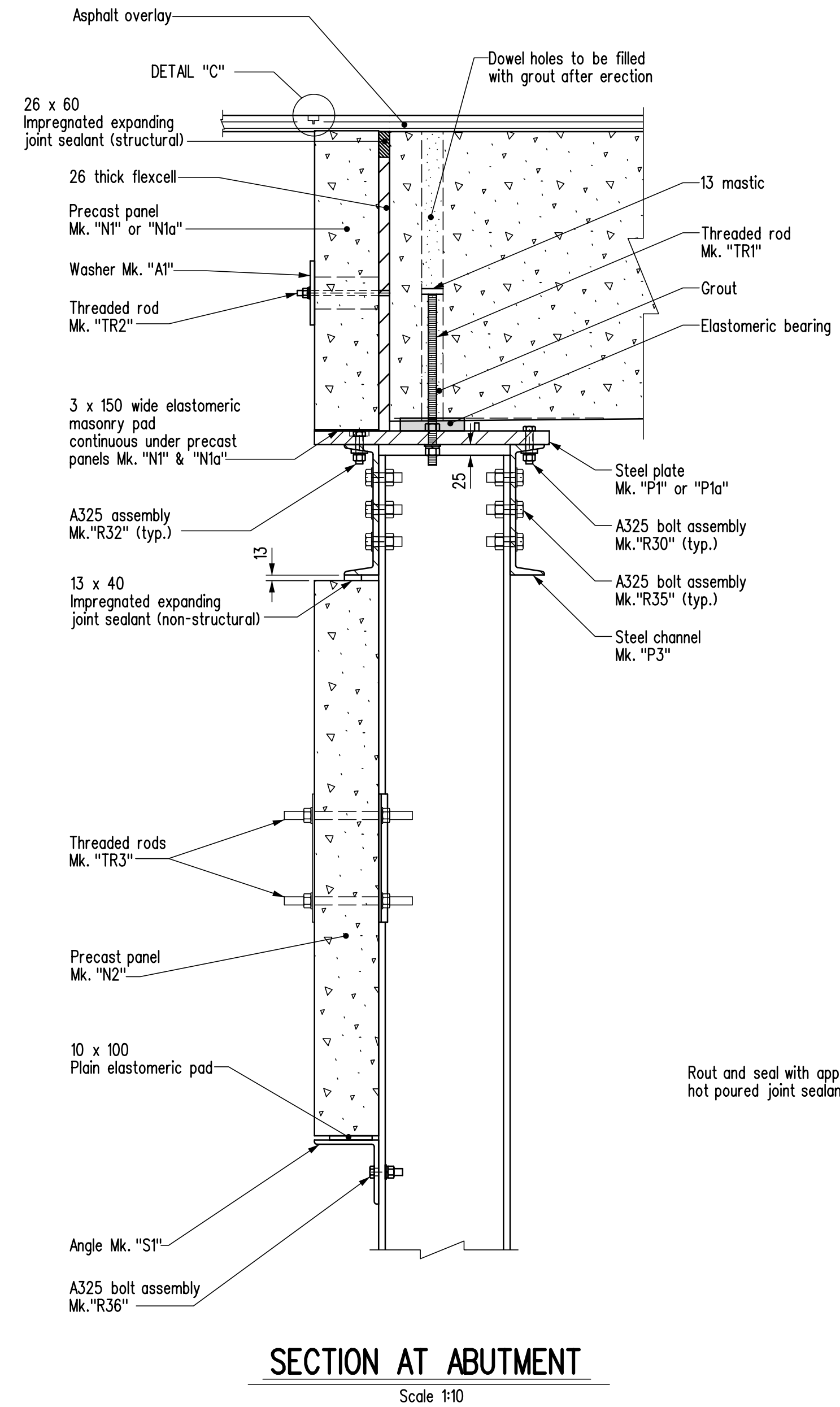
**DETAIL "B"**  
Scale 1:10



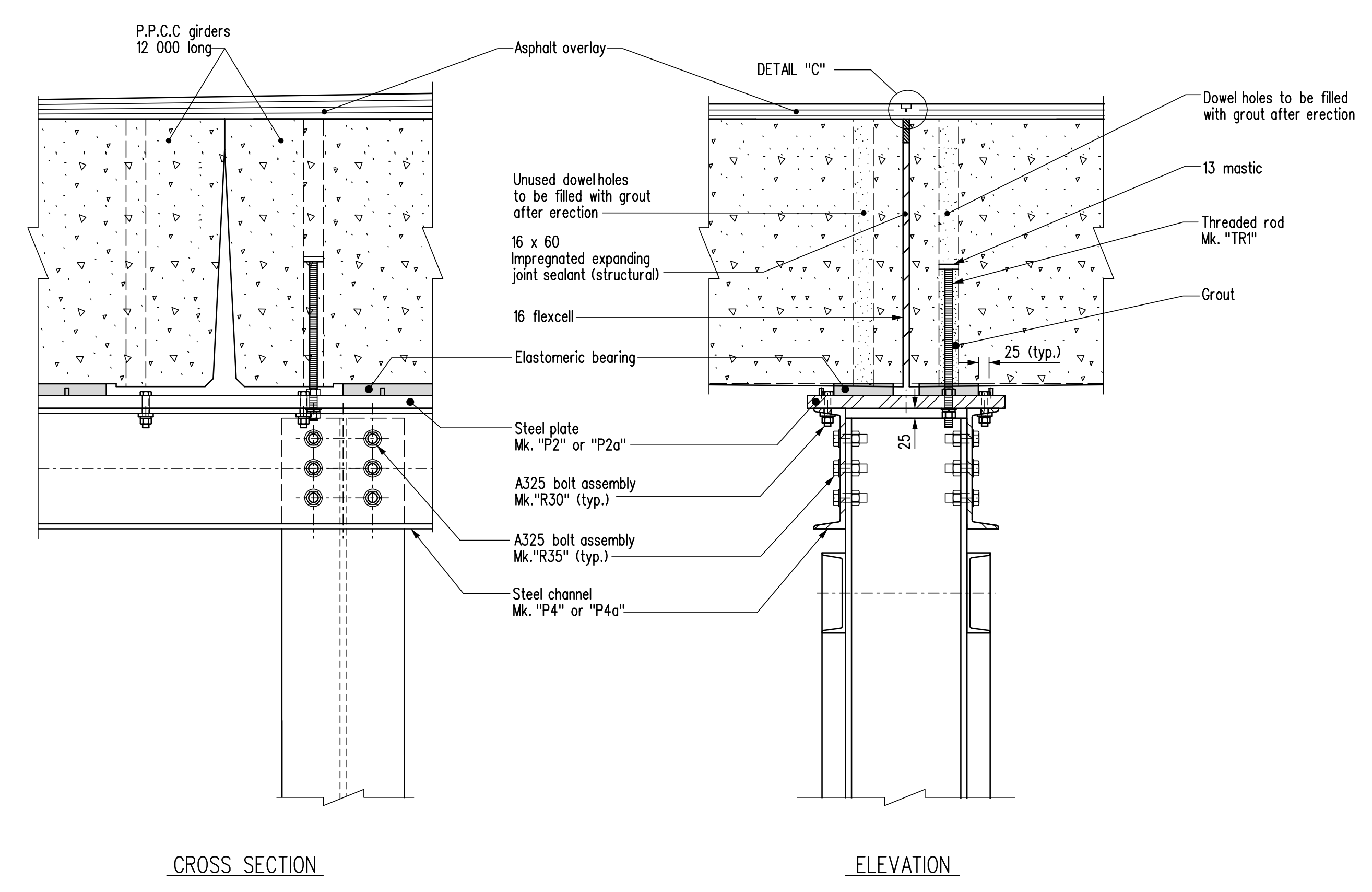
**SECTION B-B**  
Scale 1:10

**NOTES:**

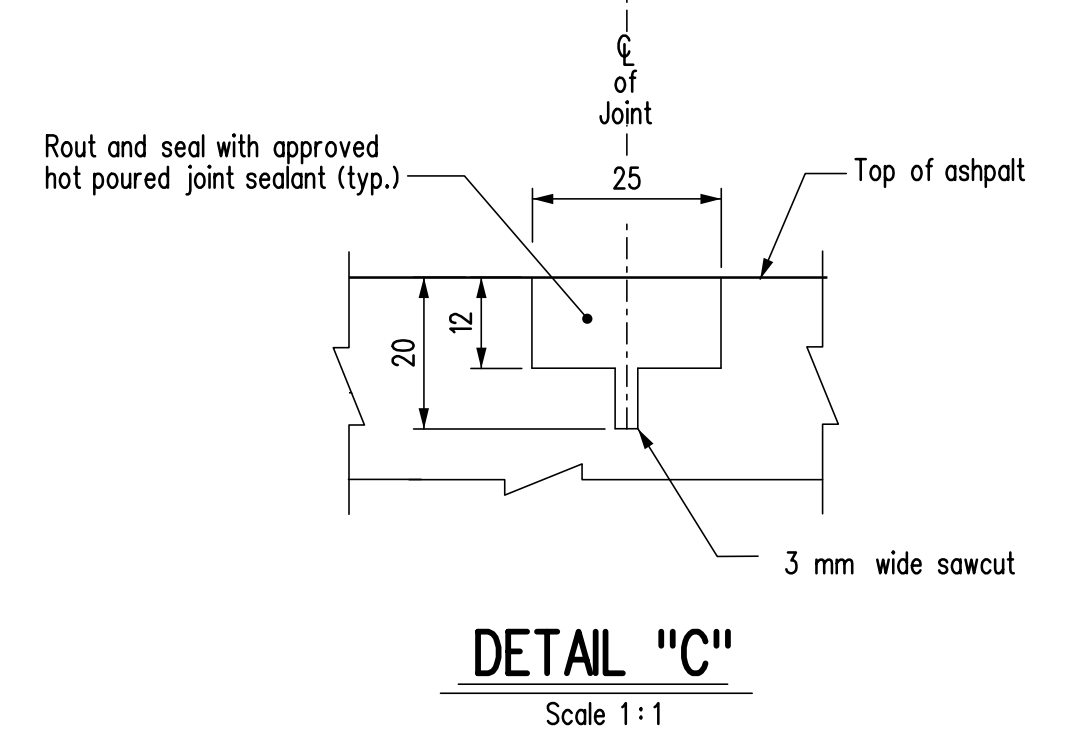
1. RE: BOLTING
  - a) GIRDER LATERAL CONNECTION
    - Bolts Mk. "R1" - c/w one F436 hardened washer, one structural plate washer Mk. "W1", one pair Nord-Lock washers and one Grade DH heavy hex. nut.
  - b) STEEL CAP
    - Bolts Mk. "R30" - One F436 hardened washer, one hardened bevel washer and one Grade DH heavy hex. nut.
    - Bolts Mk. "R32" - One hardened bevel washer and one Grade DH heavy hex. nut.
    - Bolts Mk. "R35" - Two F436 hardened washers and one Grade DH heavy hex. nut.
  - c) PRECAST PANELS
    - Bolts Mk. "R36" - Two F436 hardened washers and one Grade DH heavy hex. nut.
    - Bolts Mk. "R34" - One F436 hardened washer and one structural plate washer Mk. "A2", no nuts.
    - Threaded rod Mk. "TR2" - One standard flat washer, one structural lock washer, structural plate washer Mk. "A1" and one stainless steel hex. nut.
    - Threaded rod Mk. "TR3" - two Filler plates Mk. "S4", one structural lock washer, two standard flat washers and two hex. nuts, Filler plate Mk. "S5" if required.
  - d) GIRDER TO STEEL CAP
    - Threaded rod Mk. "TR1" - one standard flat washer and structural lock washer and two hex. nuts.
  - e) High strength bolts shall be tightened by the turn-of-nut method as per Bridge Specifications. Ensure nuts are lubricated prior to bolting.
  - f) Fill counter bored holes with mastic filler after tightening bolts.
2. When grouting dowel holes in girders, ensure that there is no grout between bottom of girder and bearing plate.
3. Apply galvalloy to all field welds & areas where galvanizing has been damaged.
4. Impregnated expanding joint sealant shall be installed as per manufacturer's recommendations.



**SECTION AT ABUTMENT**  
Scale 1:10



**DETAILS AT INTERMEDIATE BENT**  
Scale 1:10



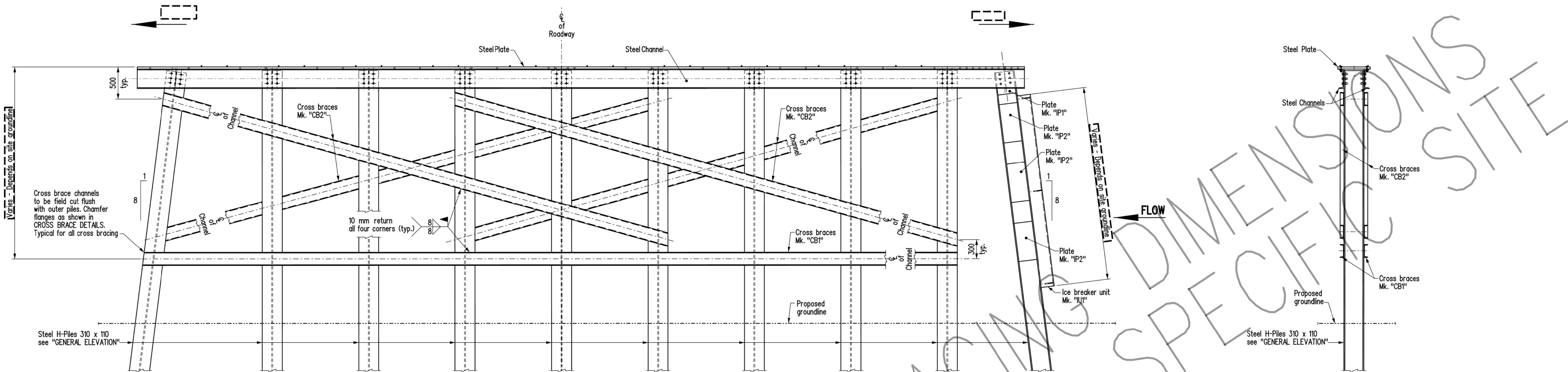
**DETAIL "C"**  
Scale 1:1

**NOTE:**  
For location of SECTIONS "B-B" & "DETAIL B" see Sheet No. 6.

REVISIONS		ASSEMBLY DETAILS	
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY:

<b>PLACE ENGINEERS ELECTRONIC SEAL HERE</b>	DESIGN SEAL	RECORD SEAL	 Infrastructure Water Management and Structures	EXECUTIVE DIRECTOR OF STRUCTURES	DATE	
	DESIGN	CHECKED: _____		SCALE: 1:30	SHEET No.	7
	DETAILS	CHECKED: _____		or as shown	SITE No.	_____
	BY: _____	CHECKED: _____				

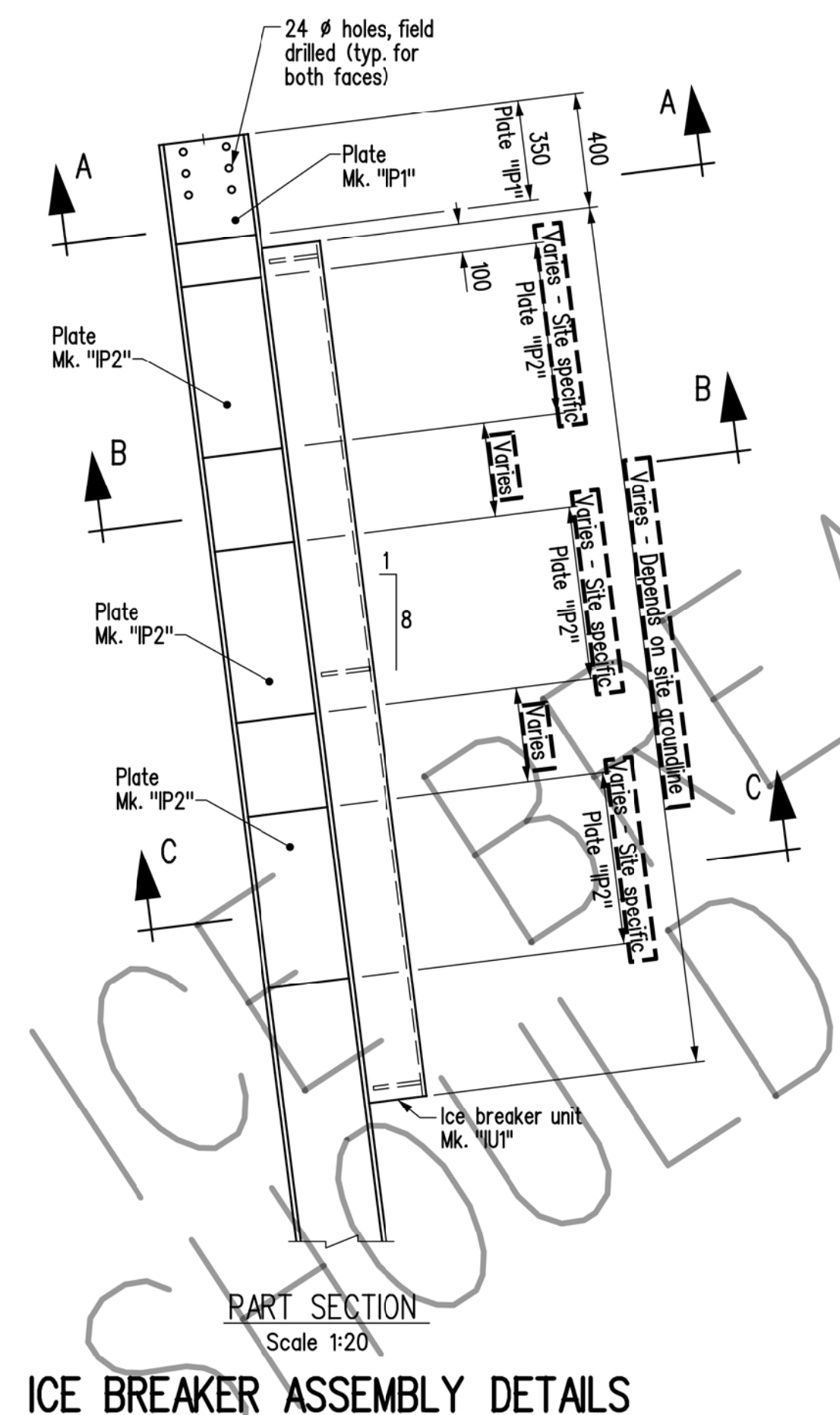


NOTE: Re: CROSS BRACING AND ICE BREAKER COMPONENTS

All cross bracing and ice breaker components shown shall be installed as per details, however if the river water level/ice level at the time of installation of bracing is such as to interfere with these components, the Contractor shall adjust as directed by Engineer.

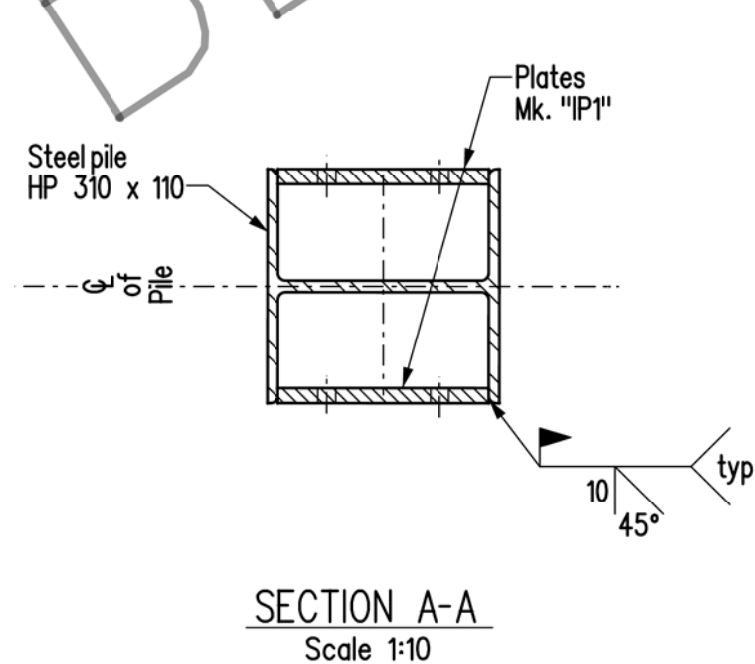
CROSS SECTION  
INTERMEDIATE PILE BENT SU.2

Showing cross bracing and ice breaker at intermediate pile bent SU.2  
Bridge superstructure not shown for clarity

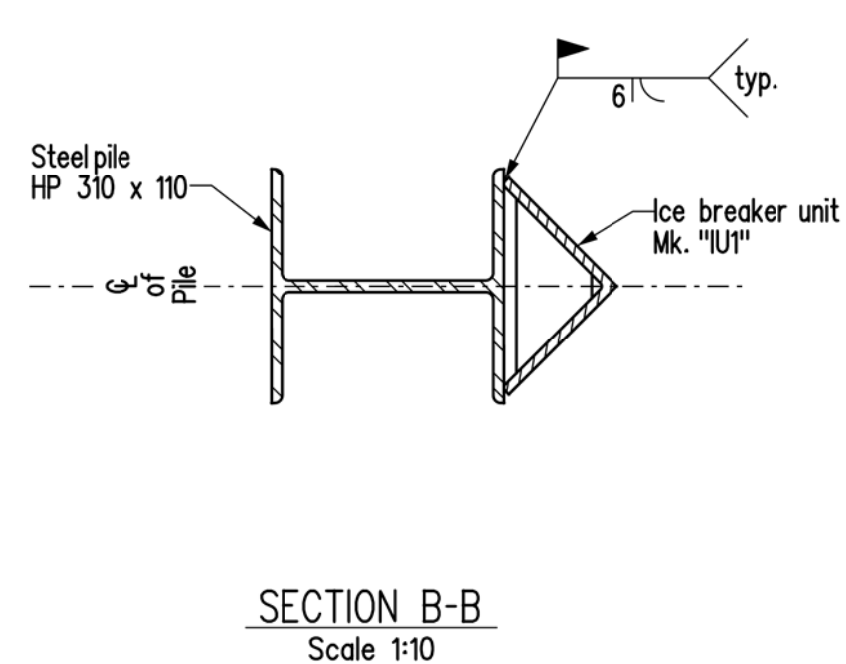


ICE BREAKER ASSEMBLY DETAILS

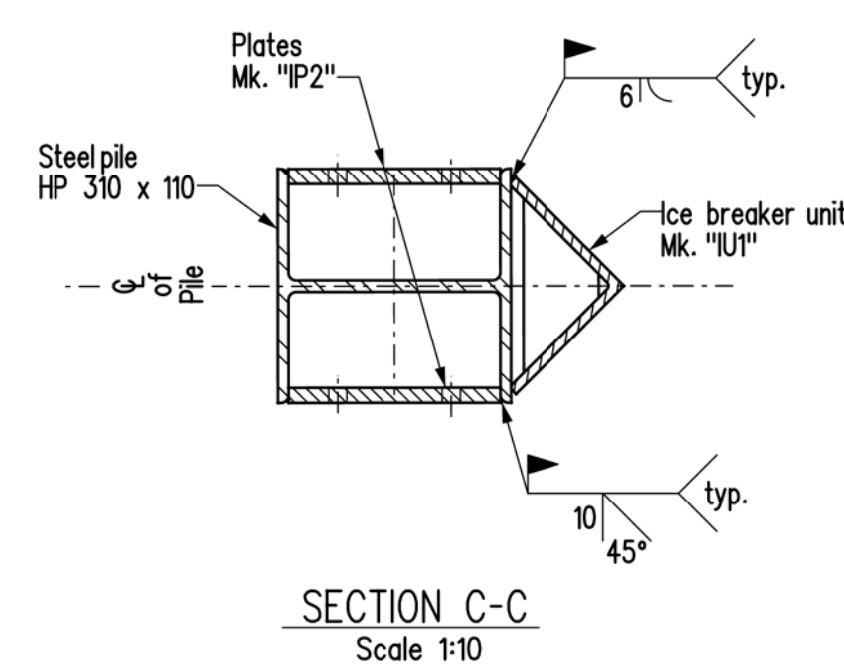
Showing SU.2 ice breaker  
Steel plate and channel not shown for clarity



SECTION A-A  
Scale 1:10

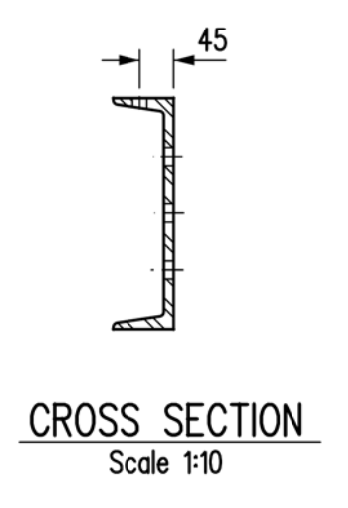
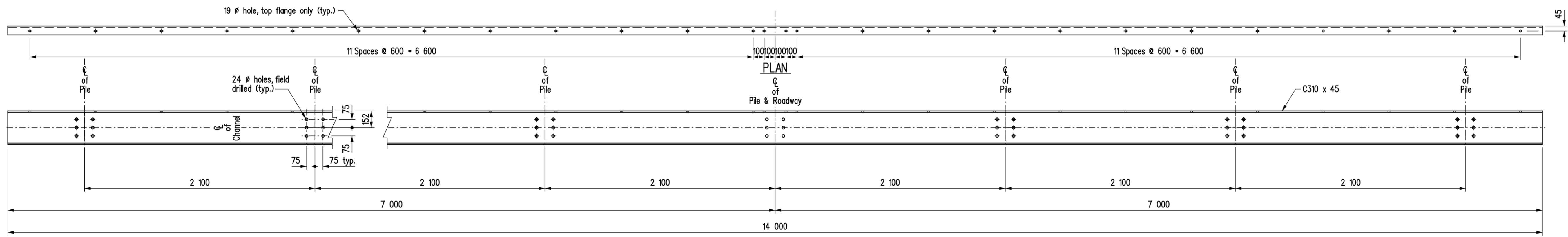


SECTION B-B  
Scale 1:10

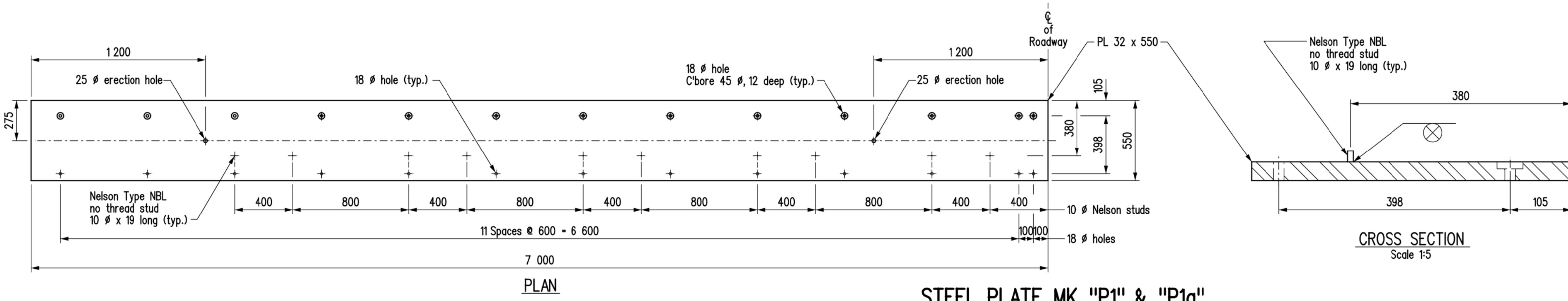


SECTION C-C  
Scale 1:10

REVISIONS		ASSEMBLY DETAILS	
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY: _____
DESIGN SEAL	RECORD SEAL	 Water Management and Structures	EXECUTIVE DIRECTOR OF STRUCTURES DATE
PLACE ENGINEERS ELECTRONIC SEAL HERE			DESIGN BY: _____
		CHECKED: _____	SHEET No. 8
		DETAILS BY: _____	or as shown
		CHECKED: _____	SITE No. _____



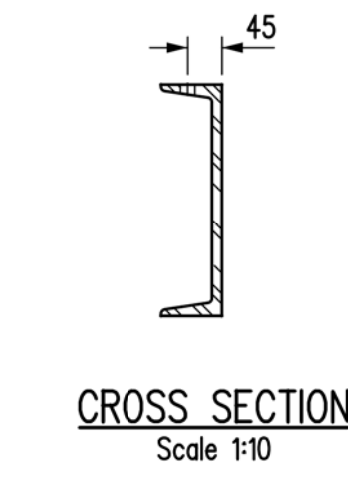
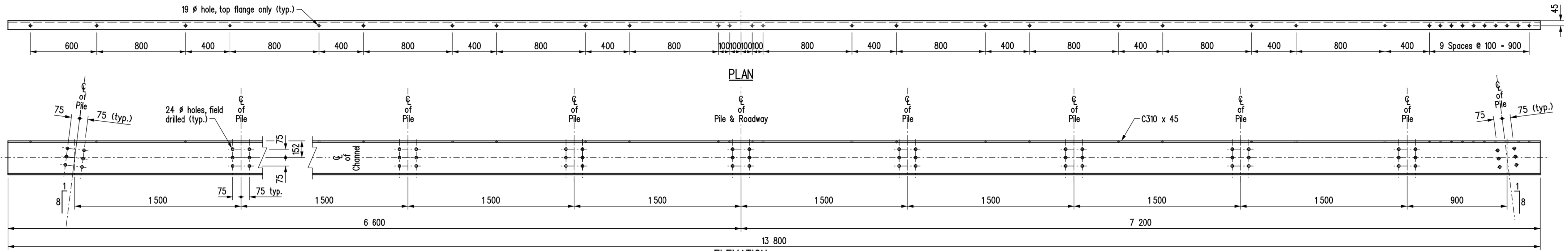
ELEVATION  
**STEEL CHANNEL MK "P3"**



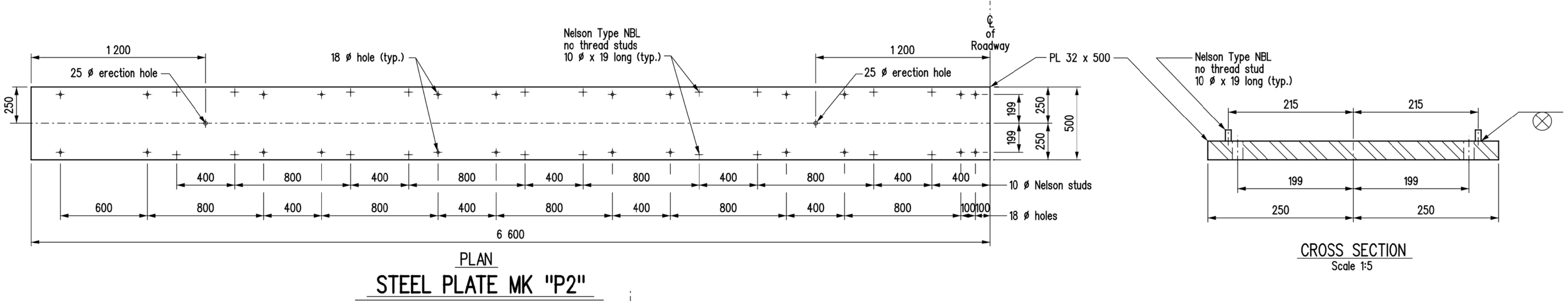
CROSS SECTION  
Scale 1:5

PLAN  
**STEEL PLATE MK "P1" & "P1a"**  
Plate Mk. "P1" as shown, Plate Mk. "P1a" opposite hand

FOR ABUTMENTS

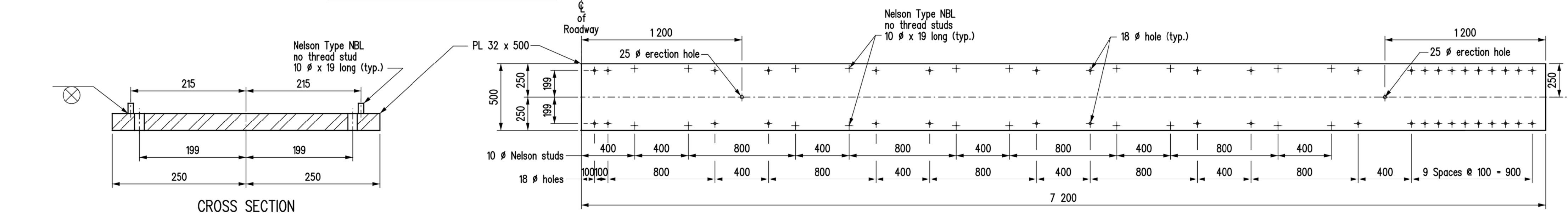


ELEVATION  
**STEEL CHANNEL MK "P4" & "P4a"**  
Channel Mk. "P4" as shown, Channel Mk. "P4a" opposite hand



CROSS SECTION  
Scale 1:5

PLAN  
**STEEL PLATE MK "P2"**



CROSS SECTION  
Scale 1:5

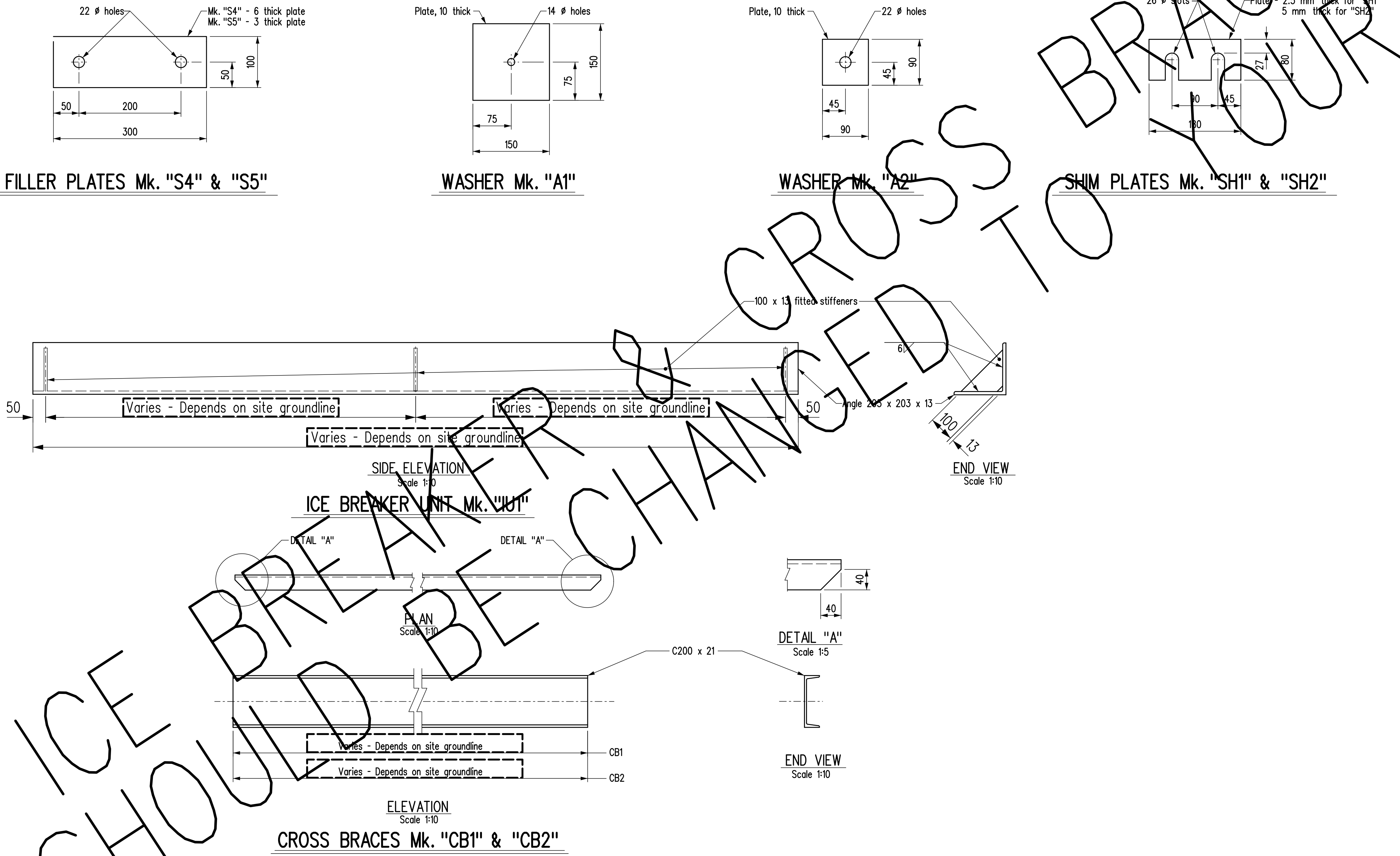
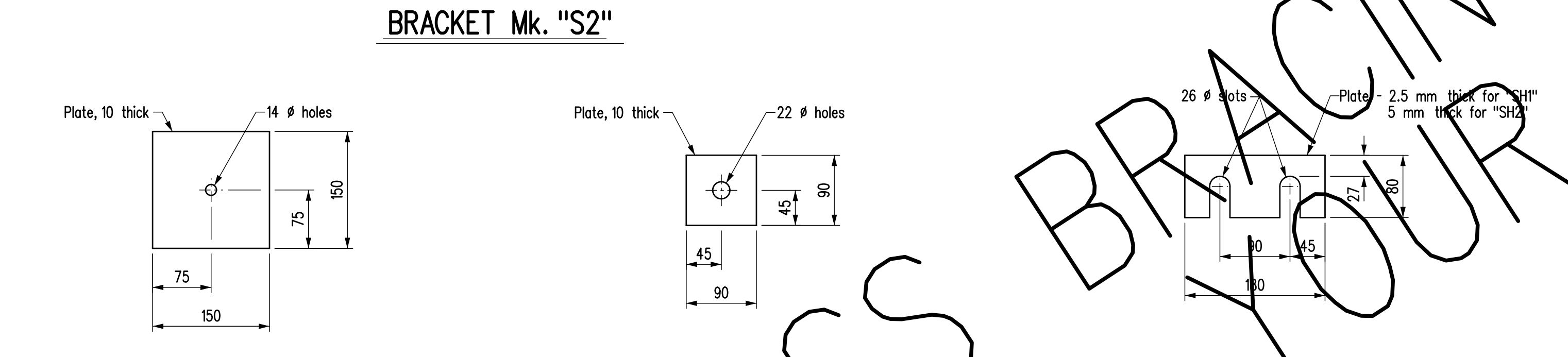
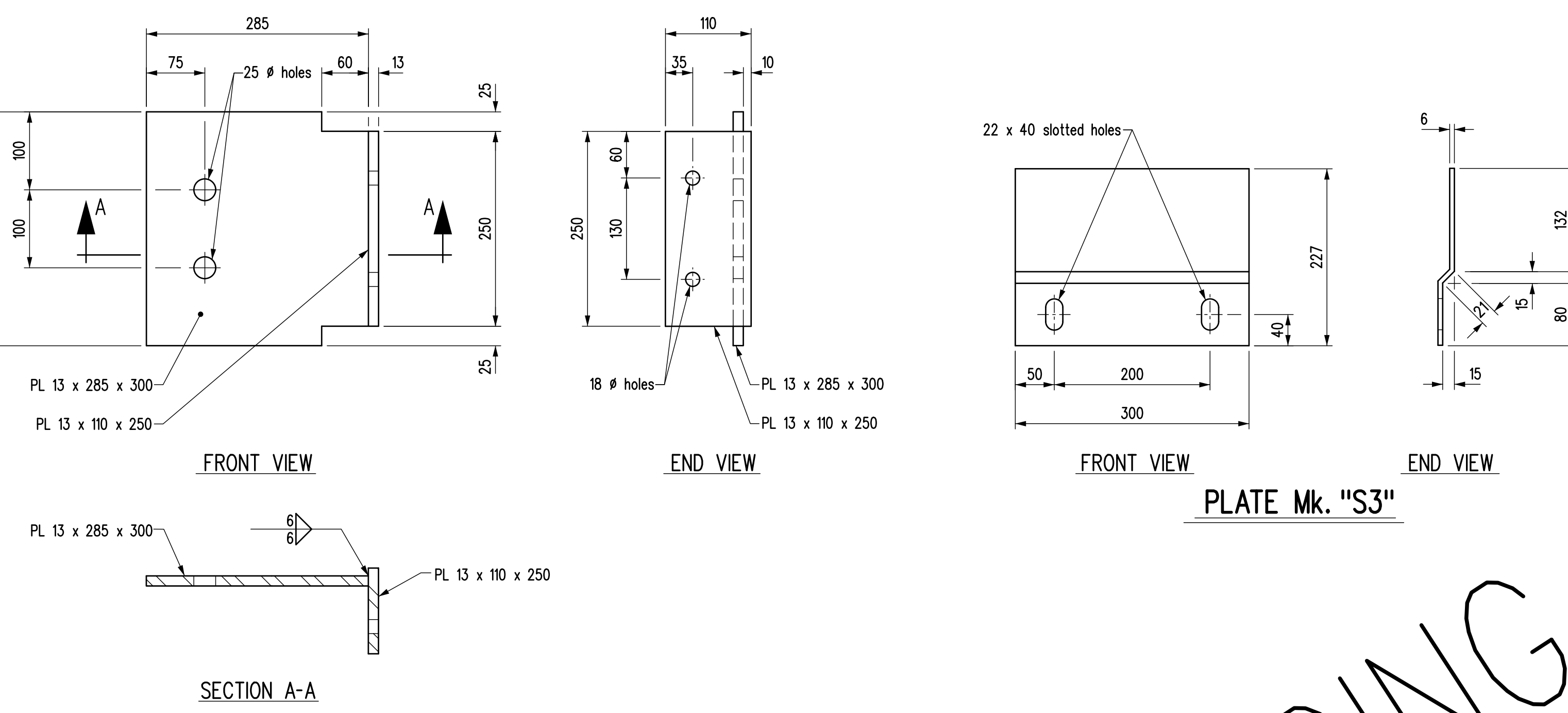
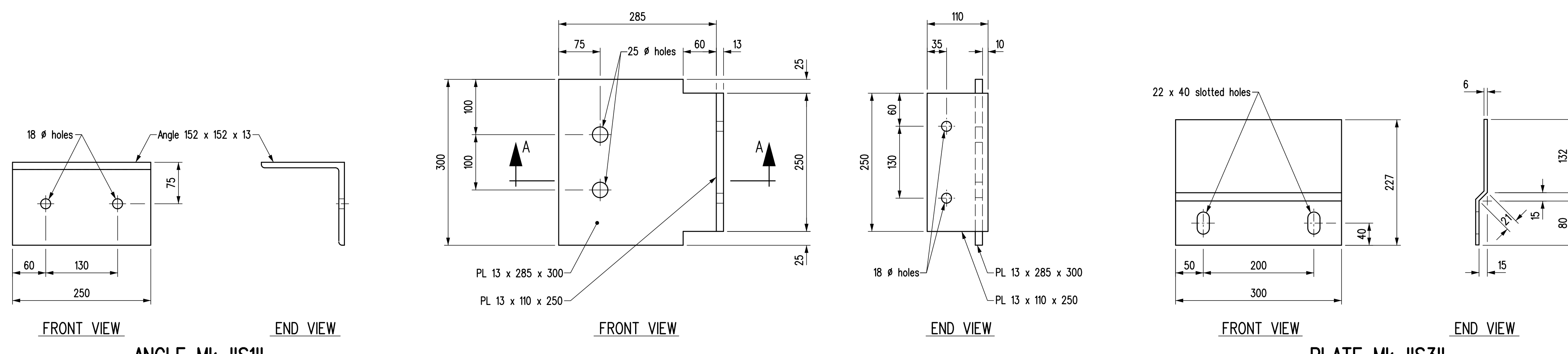
PLAN  
**STEEL PLATE MK "P2a"**

FOR INTERMEDIATE PILE BENTS

REVISIONS		STEEL PILE CAP DETAILS	
DATE	BY		
		RELEASED FOR CONSTRUCTION BY: _____ DATE: _____	
		EXECUTIVE DIRECTOR OF STRUCTURES	
		DESIGN BY: _____	SCALE: _____
		CHECKED: _____	SHEET No. 9
		DETAILS BY: _____	or as shown
		CHECKED: _____	SITE No. _____

PLACE ENGINEERS  
ELECTRONIC SEAL  
HERE





MARK No.	No.	DESCRIPTION	CORROSION PROTECTION	SIZE	LENGTH	REMARKS	COMPONENT MASS	MASS PER UNIT	TOTAL MASS	Site No.
P1	2	Steel plate	Hot dip galvanized						1934.48	
Each unit to be fabricated from:										
		1 - Steel plate		PL 32x550	7 000	See detail for Abutment	967.120	967.120		
		10 - Nelson Type NBL, no thread studs		10 dia.	19	Part No. 101-063-167	0.012	0.120		
							967.240			
P1a	2	Steel plate	Hot dip galvanized						1934.48	
Each unit to be fabricated from:										
		1 - Steel plate		PL 32x550	7 000	See detail for Abutment	967.120	967.120		
		10 - Nelson Type NBL, no thread studs		10 dia.	19	Part No. 101-063-167	0.012	0.120		
							967.240			
P2	1	Steel plate	Hot dip galvanized						829.20	
Each unit to be fabricated from:										
		1 - Steel plate		PL 32x600	6 600	See detail for Intermediate Bent	828.960	828.960		
		20 - Nelson Type NBL, no thread studs		10 dia.	19	Part No. 101-063-167	0.012	0.240		
							829.200			
P2a	1	Steel plate	Hot dip galvanized						904.49	
Each unit to be fabricated from:										
		1 - Steel plate		PL 32x600	7 200	See detail for Intermediate Bent	904.320	904.320		
		14 - Nelson Type NBL, no thread studs		10 dia.	19	Part No. 101-063-167	0.012	0.168		
							904.488			
R3	4	Steel channel	Hot dip galvanized	C310x45	14 000	See detail for Abutment	625.800	2503.20		
R4	1	Steel channel	Hot dip galvanized	C310x45	13 800	See detail for Intermediate Bent	590.040	590.04		
R4a	1	Steel channel	Hot dip galvanized	C310x45	13 800	See detail for Intermediate Bent	616.860	616.86		
R30	18	A325 bolt assembly	Hot dip galvanized	16 dia.	89	Steel plate to channels	0.245	28.91		
R32	52	A325 bolt assembly	Hot dip galvanized	16 dia.	76	Steel plate to channels C bore holes	0.225	11.70		
R35	288	A325 bolt assembly	Hot dip galvanized	22 dia.	64	Channels to piles	0.461	132.77		
R36	52	A325 bolt assembly	Hot dip galvanized	16 dia.	64	Angles Mk. "S1" to piles & bracket Mk. "S2" to cap	0.205	10.66		
S1	22	Angle	Hot dip galvanized	L 152x152x13	250	As detailed	7.250	159.50		
S2	4	Bracket	Hot dip galvanized			As detailed	11.226	44.90		
S3	16	Plate	Hot dip galvanized	PL 6x300		As detailed	3.223	51.57		
S4	32	Steel plate	Hot dip galvanized	PL 6x100		As detailed	1.413	45.22		
S5	16	Filler plate	Hot dip galvanized	PL 3x100		As detailed	0.707	11.31		
A1	20	Structural plate w/ washer	Hot dip galvanized	PL 10x150	150	As detailed - One to threaded rod Mk. "TR2"	1.766	35.32		
A2	4	Structural plate w/ washer	Hot dip galvanized	PL 10x90	90	As detailed - One to bolt Mk. "R34"	0.636	5.09		
TR1	40	Threaded rods c/w w/ hex. nuts	Hot dip galvanized	19 dia.	0	Girder to steel cap plate	0.940	37.60		
TR3	32	Threaded rods c/w w/ hex. nuts	Hot dip galvanized	19 dia.	0	Steel plates Mk. "S3" to precast panels	0.660	21.12		
	170	Hardened bevel w/ washer	Hot dip galvanized	for 16 dia. bolts		One to bolts Mk. "R30" & "R32"	0.110	18.70		
	20	Standard flat w/ washer	Hot dip galvanized	for 12 dia. rod		One to threaded rod Mk. "TR2"	0.010	0.20		
	104	Standard flat w/ washer	Hot dip galvanized	for 19 dia. rod		One to "TR1", two to "TR3"	0.020	2.08		
	20	Structural lock washer	Hot dip galvanized	for 12 dia. rod		One to threaded rod Mk. "TR2"	0.010	0.20		
	72	Structural lock washer	Hot dip galvanized	for 19 dia. rod		One to "TR1" & "TR2"	0.020	1.44		
	288	F436 Hardened washer	Hot dip galvanized	for 22 dia. bolts		One to bolt Mk. "R35"	0.032	9.22		
	52	F436 Hardened washer	Hot dip galvanized	for 16 dia. bolts		One to bolt Mk. "R36"	0.014	0.73		
R1	144	A325 bolt assembly	Hot dip galvanized	22 dia.	76	R.C. girder connection	0.499	71.86		
W1	144	Structural flat w/ washer	Hot dip galvanized	for 22 dia. bolts		One to bolt Mk. "R1"	0.050	7.20		
	144	Pair Nord-Lock lock w/ washers		for 22 dia. bolts		One pair to bolt Mk. "R1"	0.020	2.88		
SH1	72	Shim plate	Hot dip galvanized	PL 2.5x80	180	As detailed - use as required	0.231	16.63		
SH2	72	Shim plate	Hot dip galvanized	PL 5x80	180	As detailed - use as required	0.463	33.34		
IP1	2	Plate	Shop Primed	PL277x20	350	See Ice Breaker Details	15.221	30.44		
IP2	2	Plate	Shop Primed	PL277x20	350	See Ice Breaker Details	0.000	0.00		
IJ1	1	Ice Breaker Unit	Shop Primed				7.041	7.04		
Each unit fabricated from:										
		1 - Angle		L203x203x13		As detailed	0	0.000		
		3 - Stiffener Steel Plate		100x13	230	Fitted stiffeners as detailed	2.347	7.041		
							7.041			
CB1	2	Channel	Shop Primed	C200x21			0.000	0.00		
CB2	4	Channel	Shop Primed	C200x21			0.000	0.00		
							0.000			
<b>TOTAL MASS (kg) = 10110.37</b>										

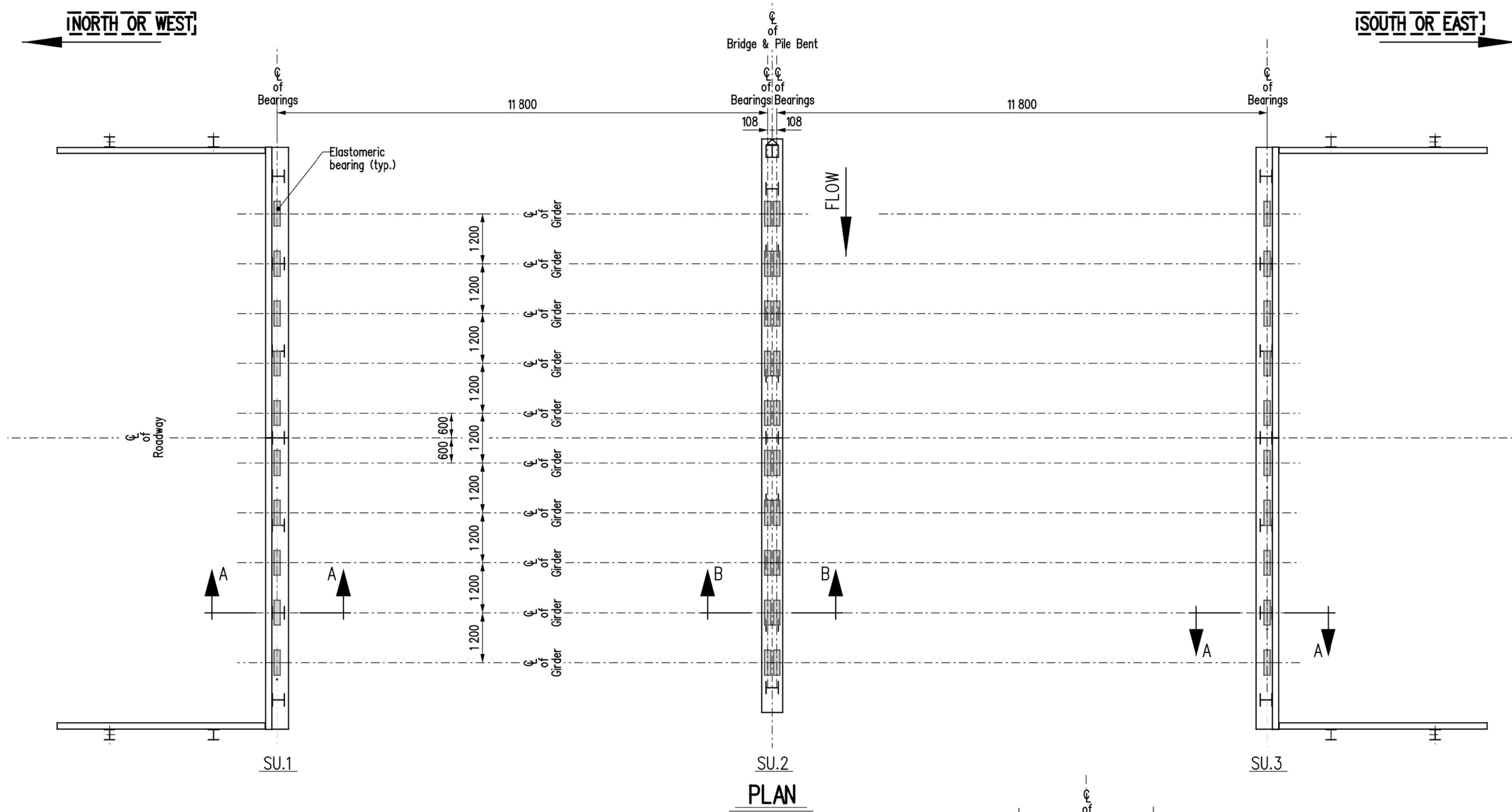
NOTES:  
 1. All material noted in the above Bill shall be hot dip galvanized after fabrication in accordance with CSA G164 for a minimum net retention of 610 g/m<sup>2</sup> unless otherwise stated in the specified material ASTM standards. The fabricator and galvanizer shall safeguard against embrittlement using recommended practices from applicable standards.  
 2. Seal all welds prior to galvanizing.  
 3. Apply Galvaloy to all field welds and areas where galvanizing has been damaged.  
 4. All bolts and threaded rod in the above Bill shall be Imperial thread.

ICE BREAKER & CROSS BRACING SHOULD BE CHANGED TO PRECAST

REVISIONS		STEEL PILE CAP DETAILS	
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY:

PLACE ENGINEERS ELECTRONIC SEAL HERE	DESIGN CHECKED: _____ BY: _____	<b>Manitoba</b> Infrastructure Water Management and Structures	EXECUTIVE DIRECTOR OF STRUCTURES DATE SCALE: 1:5 SHEET No. 10 or as shown SITE No. _____
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BILL OF BEARINGS			12 000 ROADWAY WIDTH - 2 SPAN	Site No.
No.	LOCATION	DESCRIPTION	REMARKS	
40	SU.1 - SU.3	Elastomeric bearings	As detailed	

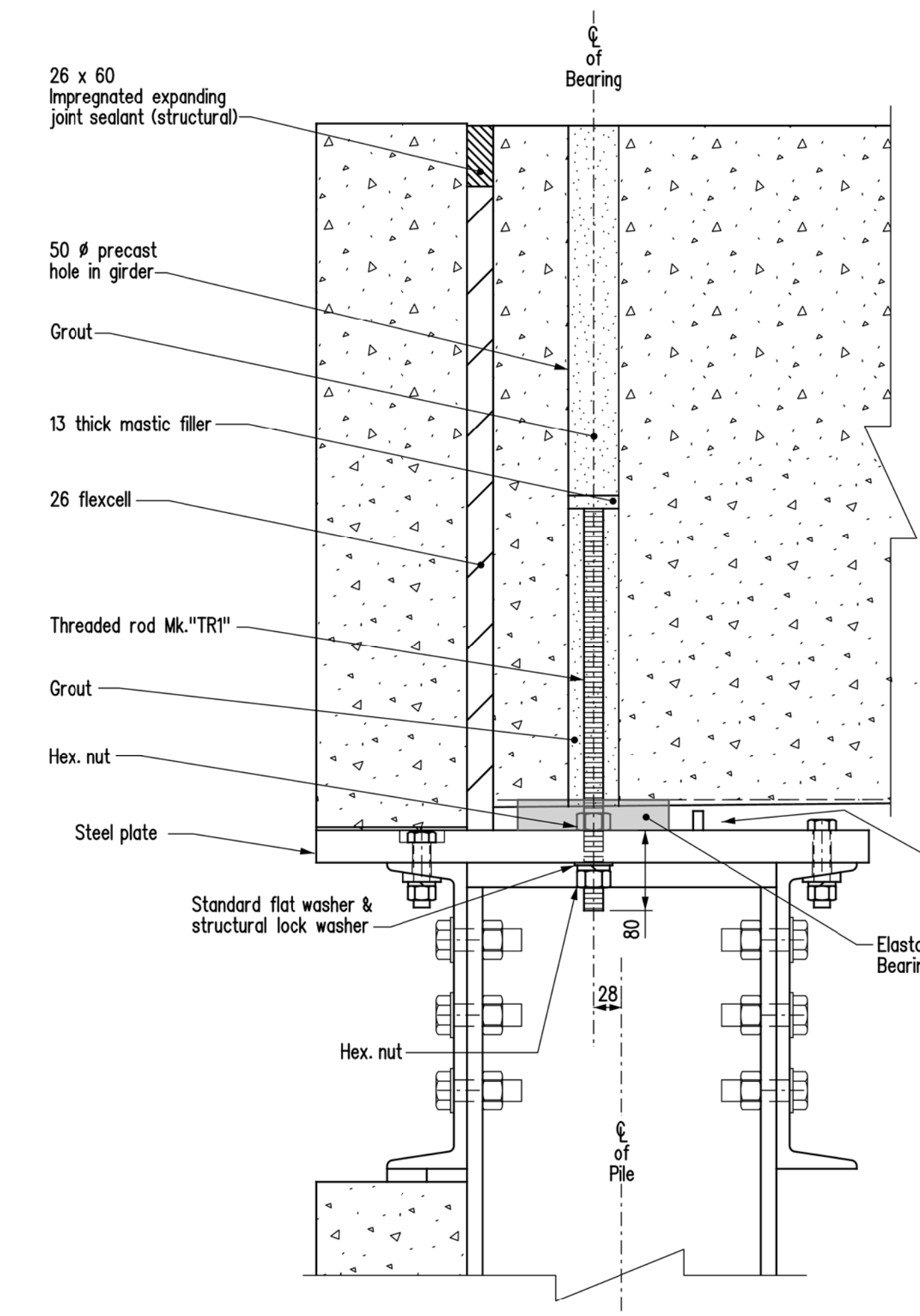
**NOTE:**

- Elastomer shall be natural rubber. Elastomer shall be AASHTO low temperature Grade 5 with a minimum shear modulus  $G \geq 0.9$  MPa and a 60 durometer Shore A hardness.
- Internal steel reinforcing plates for laminate bearings shall be rolled mild steel with a minimum yield strength of 300 Mpa.

PLAN  
Scale 1:10

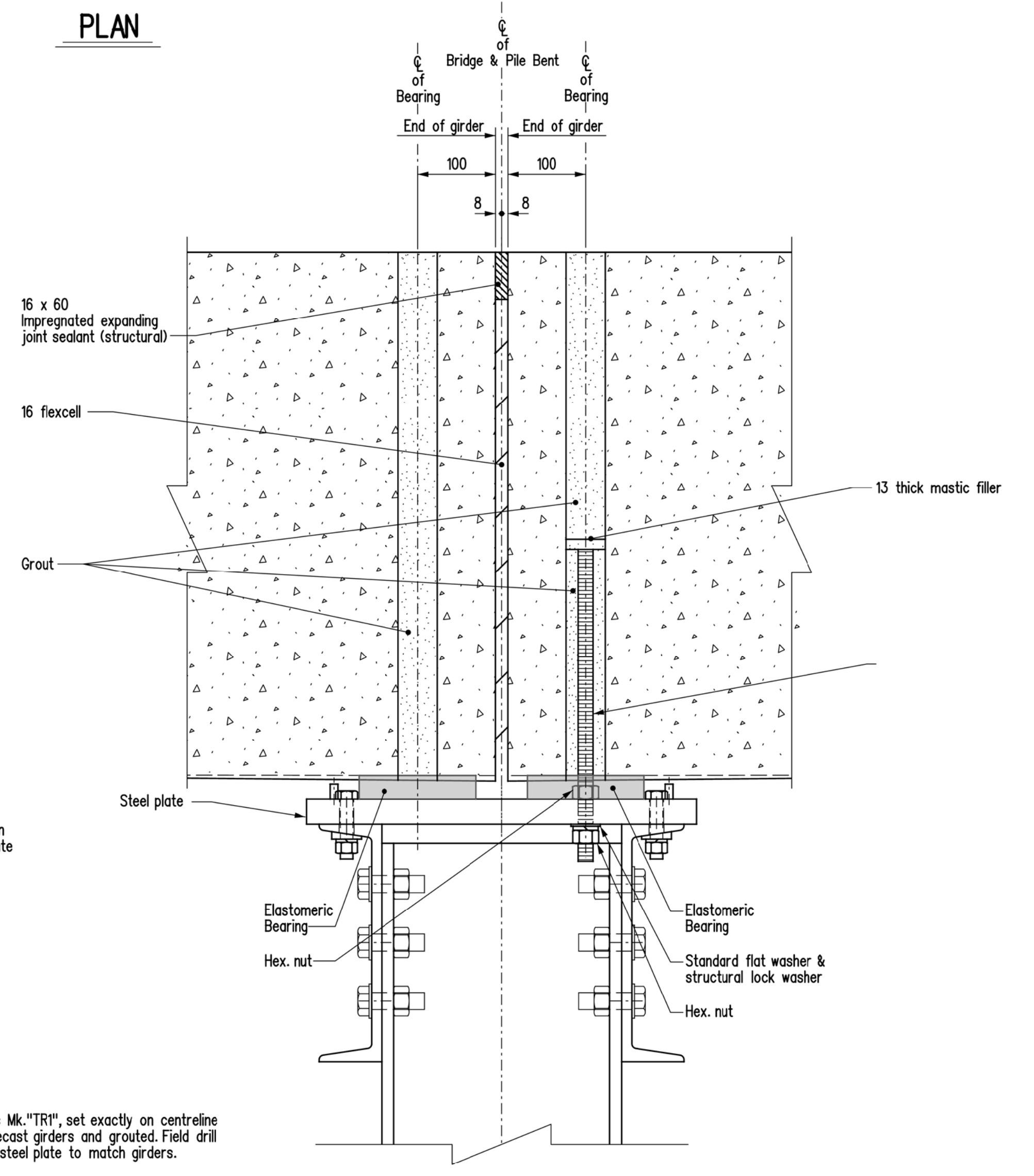
PART CROSS SECTION  
Scale 1:2

**ELASTOMERIC BEARINGS**



**SECTION "A-A"**  
Threaded rods at SU.1 & SU.3. See sheet No. 6 for layout.  
Scale 1:5

**NOTE:**  
Threaded rods Mk. "TR", set exactly on centreline of holes in precast girders and grouted. Field drill 21 dia. hole in steel plate to match girders.



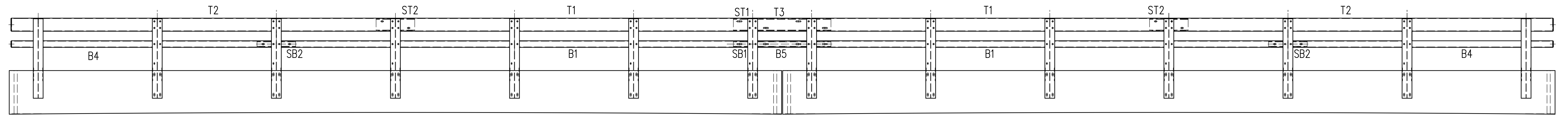
**SECTION "B-B"**  
Threaded rods at SU.2. See Sheet No. 6 for layout.  
Scale 1:5

**NOTES:**

- Re: Girder Erection Operations Behind Abutment Ballast Walls**
- Surcharge loading on the backfill resulting from girder erection operations shall be minimized near the precast concrete ballast walls and wingwalls.
  - Where possible, girder erection equipment shall be positioned such that there are no surcharge loads behind the back face of the precast panels within a distance equal to the depth of backfill to the bottom of the panels at the time of girder erection.
  - Should the Contractor propose to encroach on this zone, the following requirements must be satisfied:
    - Submit a girder erection procedure for approval outlining type, configuration, weights and locations of equipment including expected tipping forces on crane outriggers, etc.
    - Perform all precautionary measures outlined by the Department as a result of that submission.
    - All surcharge loads encroaching in this zone must be distributed over an area not less than 2.0 m<sup>2</sup>.

REVISIONS		BEARING AND ERECTION DETAILS	
DATE	BY		
		<p>Infrastructure Water Management and Structures</p>	
		<p>RELEASED FOR CONSTRUCTION BY:</p> <p>EXECUTIVE DIRECTOR OF STRUCTURES DATE</p>	
		<p>SCALE: 1:75</p> <p>SHEET No. 11</p>	
		<p>or as shown</p> <p>SITE No. 11</p>	

PLACE ENGINEERS ELECTRONIC SEAL HERE



SU.1 SU.2 SU.3

**END SPAN**

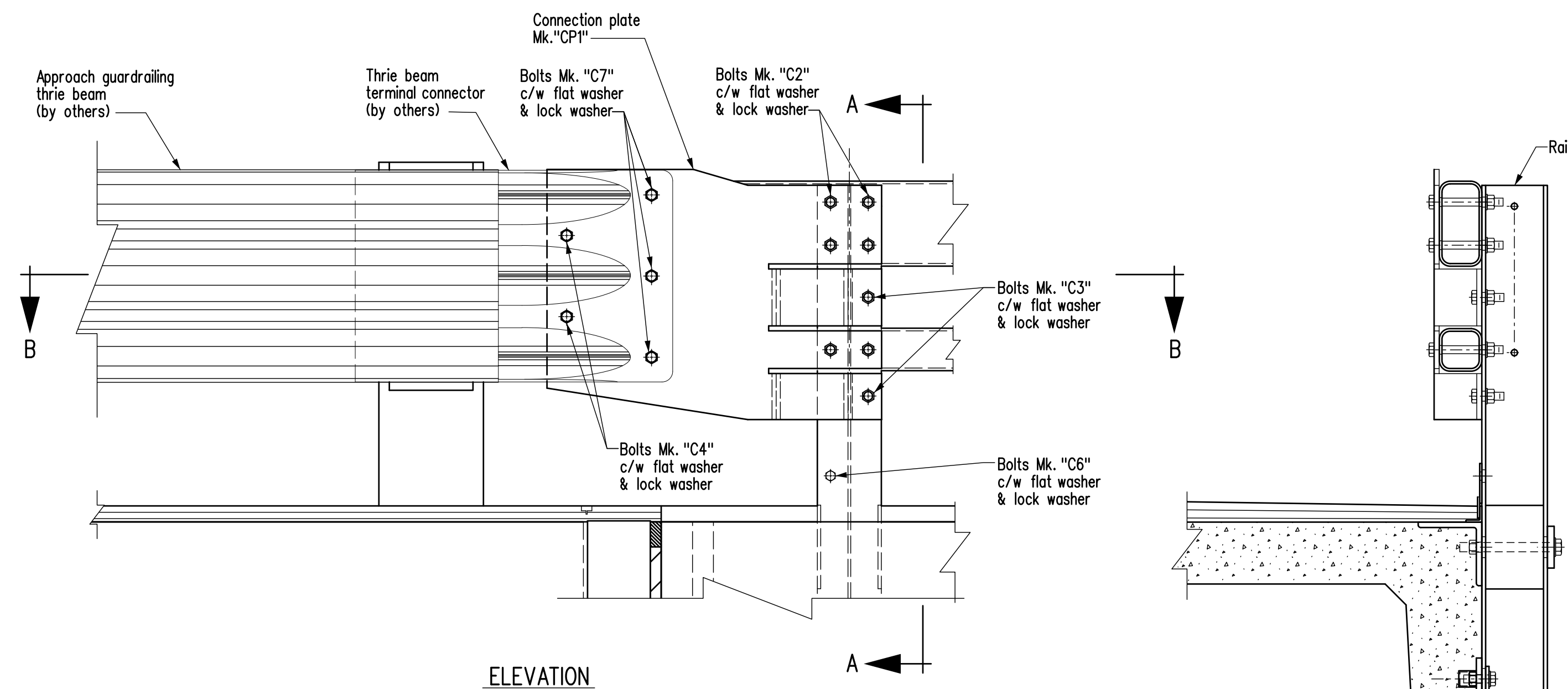
RAILS				SLEEVES		RAILPOSTS	
T1	T2	B1	B4	ST2	SB2	GP1	GP2
2	2	2	2	2	2	12	2

RAILS		SLEEVES	
T3	B5	ST1	SB1
2	2	2	2

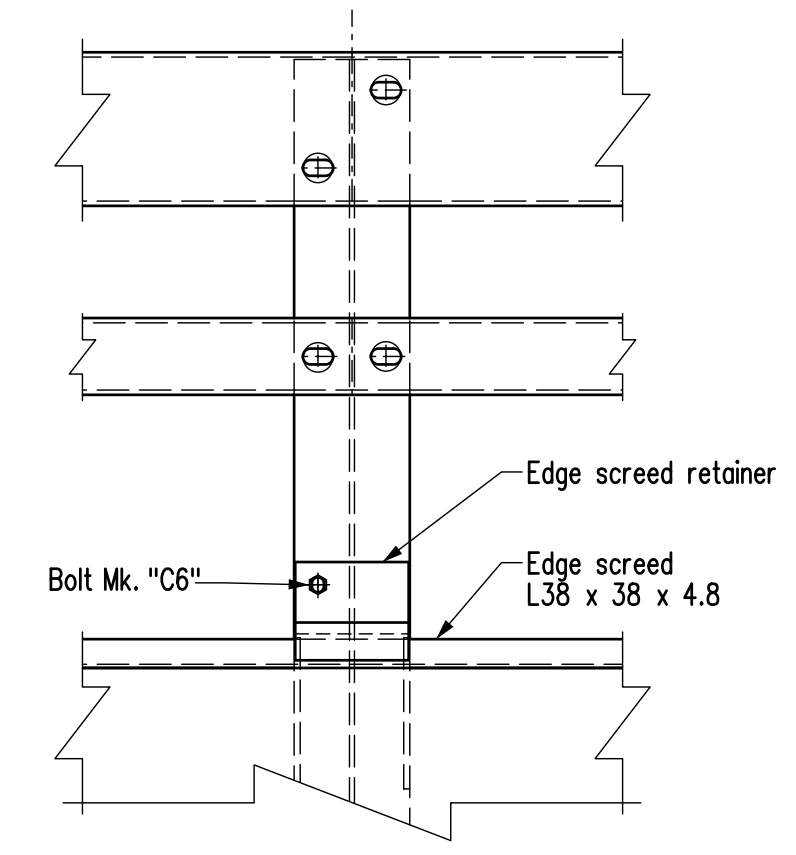
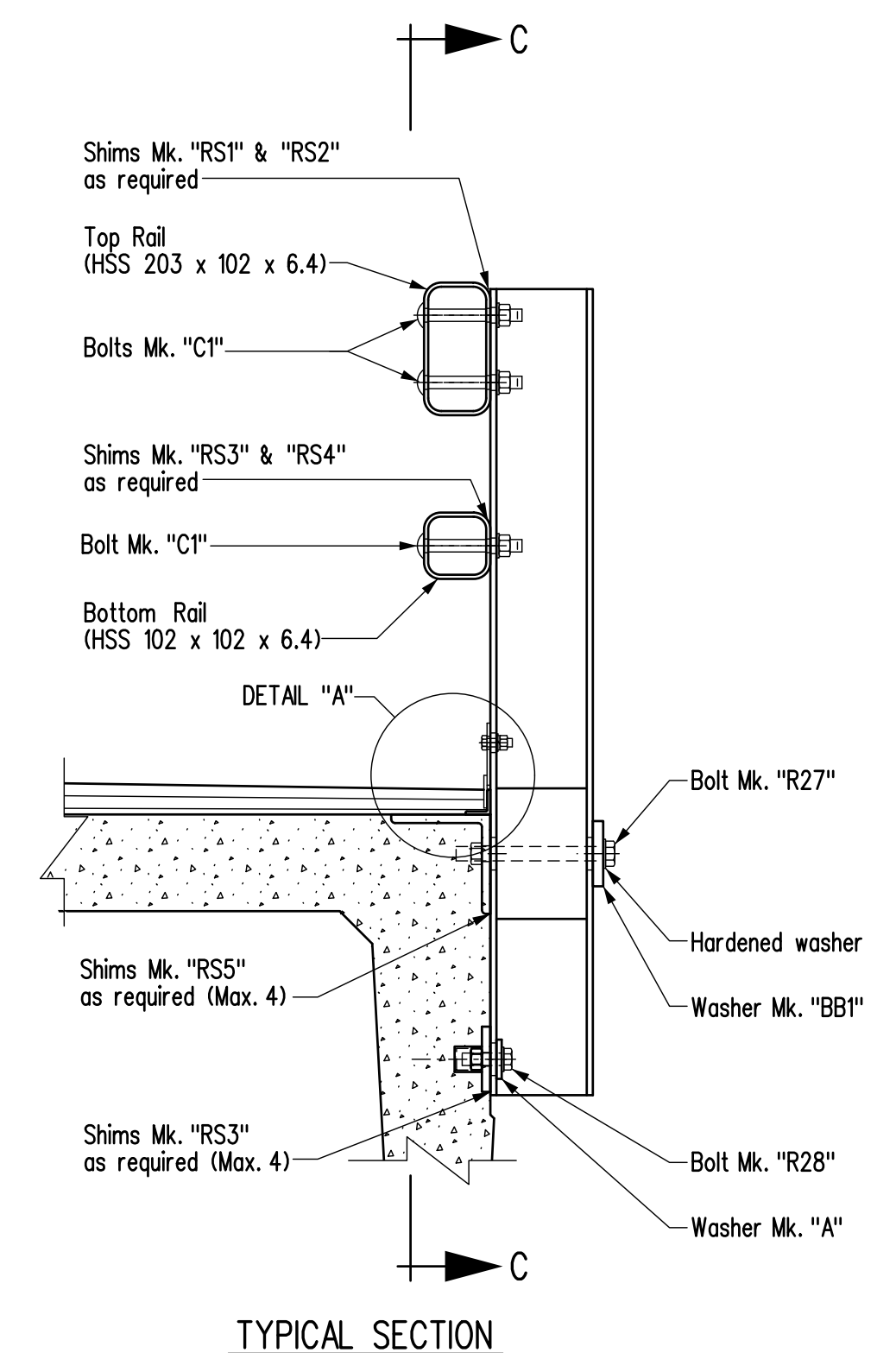
**END SPAN**

RAILS				SLEEVES		RAILPOSTS	
T1	T2	B1	B4	ST2	SB2	GP1	GP2
2	2	2	2	2	2	12	2

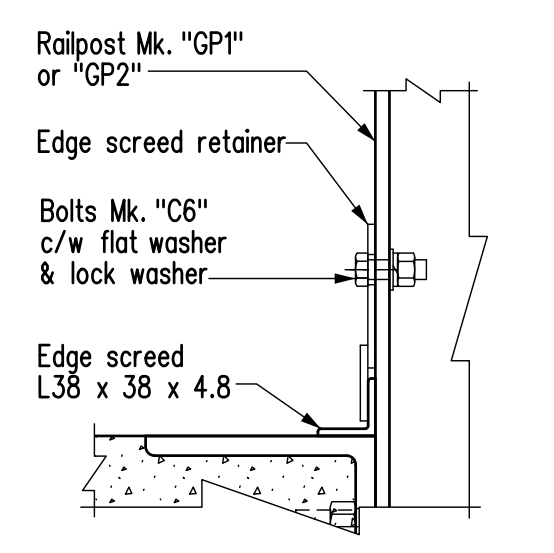
**RAILING LAYOUT**  
Not to Scale



**SECTION A-A**

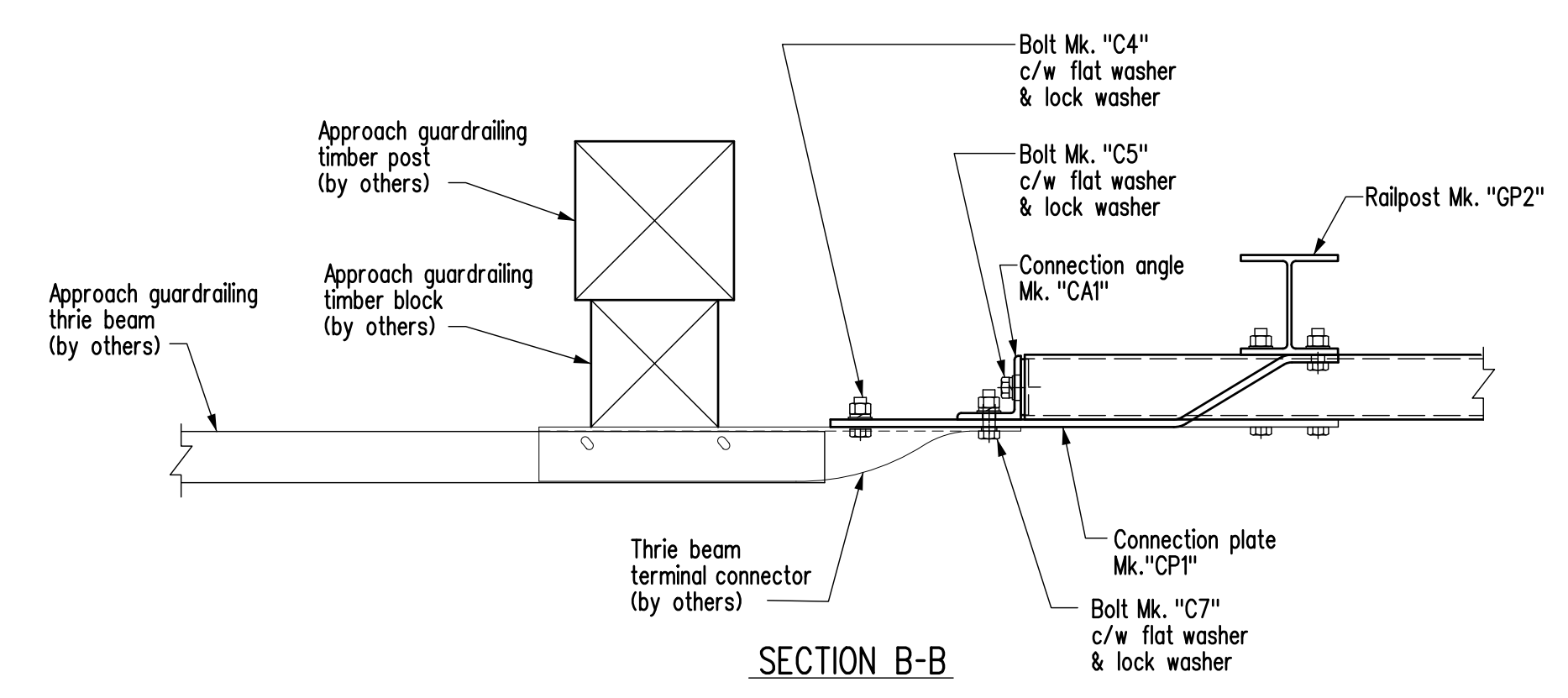


**ELEVATION C-C**  
Showing edge screed installation detail

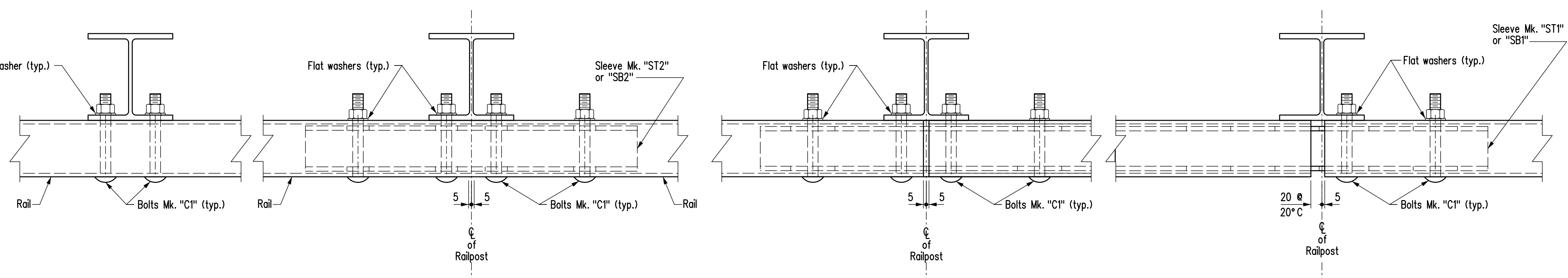


**DETAIL "A"**  
Showing edge screed installation detail  
Scale 1:5

- NOTES:**
- All railposts shall be Mk. "GP1" unless noted otherwise.
  - This sheet to be read in conjunction with Sheets & .



**APPROACH RAIL CONNECTION DETAILS**



TYPICAL OF CONTINUOUS RAILS

RAIL END CONNECTION

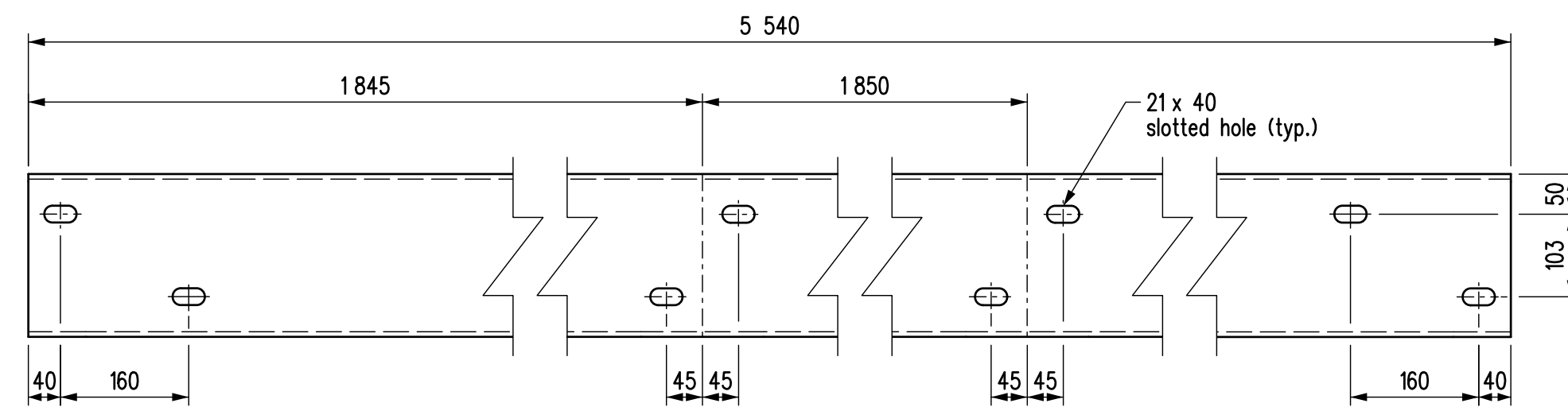
TYPICAL AT PILE BENT

**RAILING ERECTION DETAILS**  
Scale 1:5

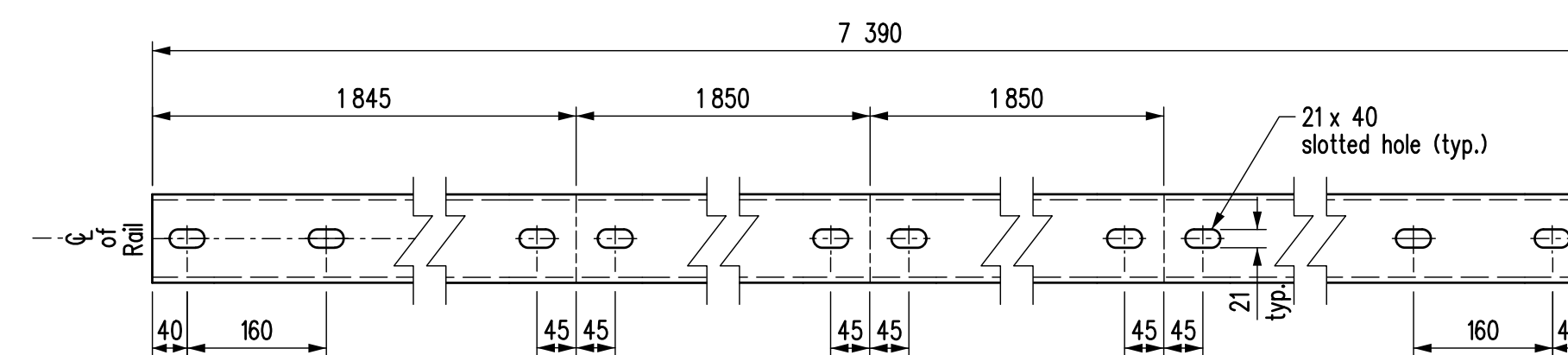
**RAILPOST ERECTION DETAILS**

- NOTES:**
- High strength bolts Mk. "R27" & "R28" shall be tightened by turn-of-nut method as per Specification 1061. These bolts to be supplied by the Girder Fabricator. For quantities see Bill of Miscellaneous Metal on Girder sheet.
  - High strength bolted connection may be shimmed to a maximum of 12 mm with shims Mk. "RS3" & "RS4".

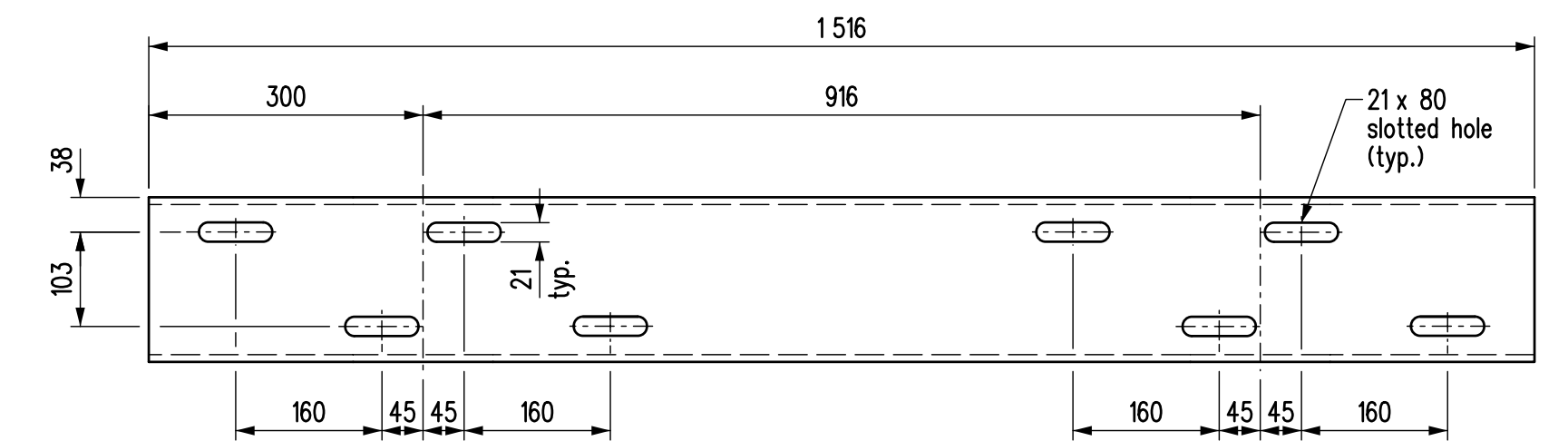
REVISIONS		RAILING LAYOUT AND DETAILS	
DATE	BY		
		<p>Infrastructure Water Management and Structures</p>	RELEASED FOR CONSTRUCTION BY:
			EXECUTIVE DIRECTOR OF STRUCTURES
		DESIGN	SCALE: 1:10
		DETAILS	SHEET No. _____
			or as shown
			SITE No. _____



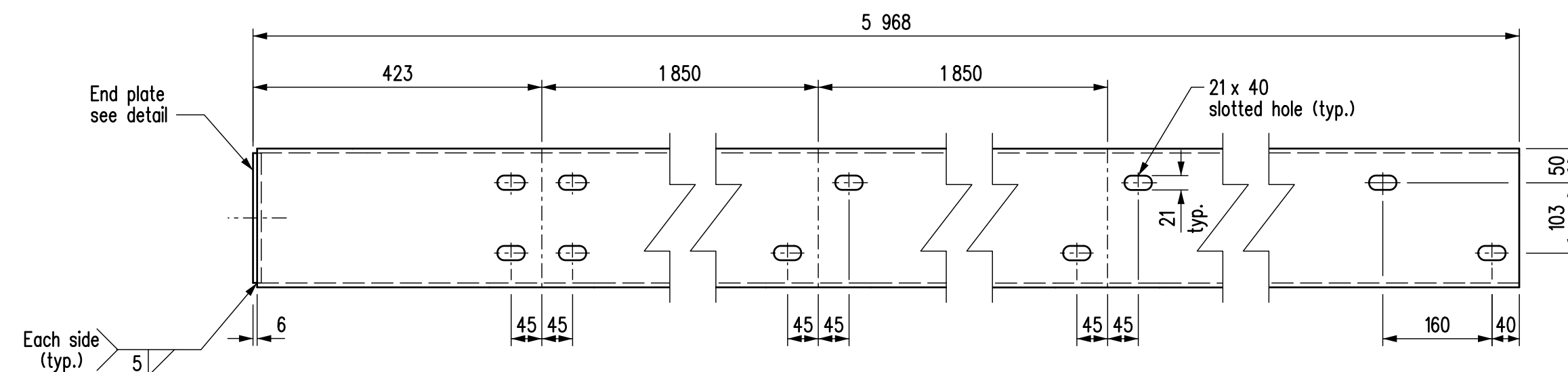
Mk. "T1"



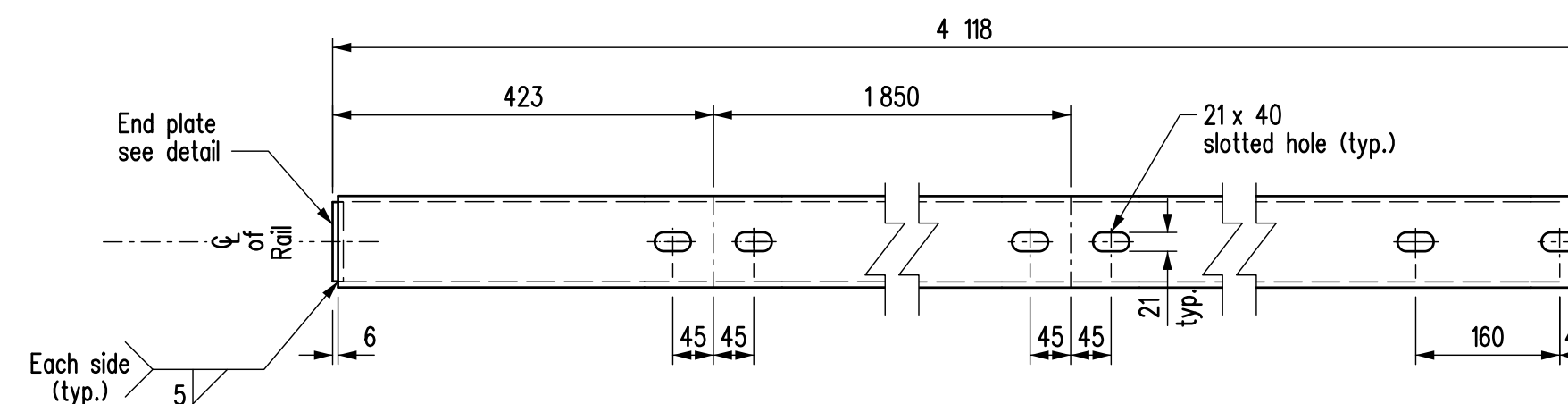
Mk. "B1"



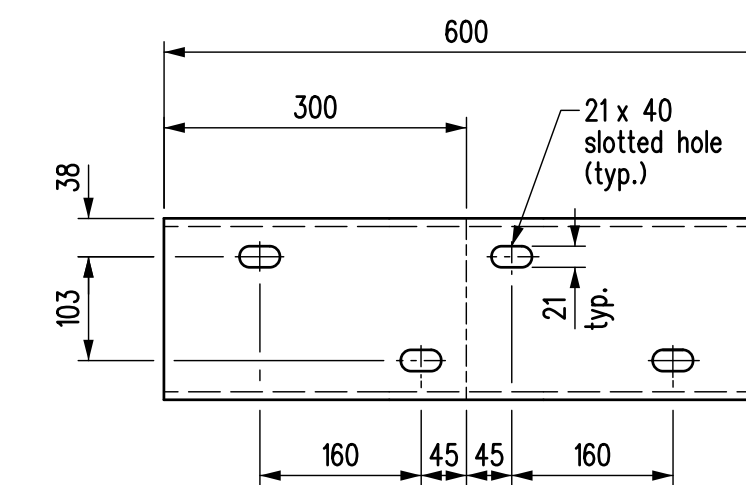
Mk. "ST1"



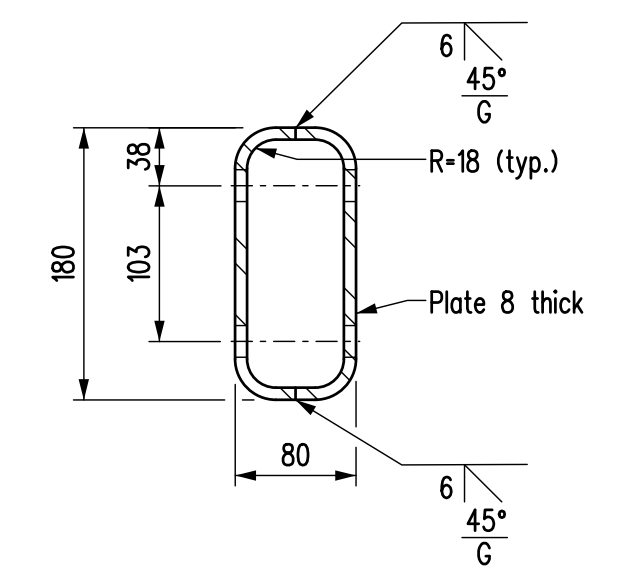
Mk. "T2"



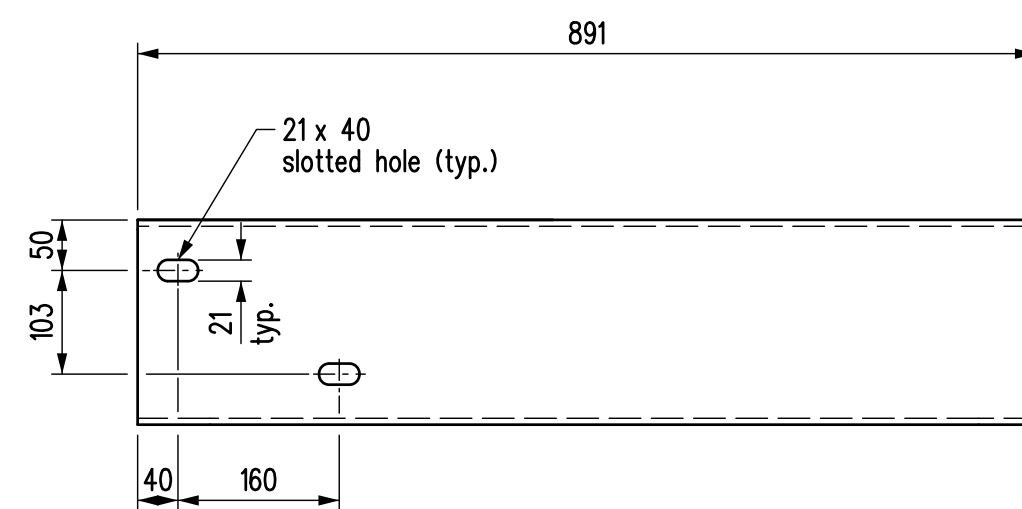
Mk. "B4"



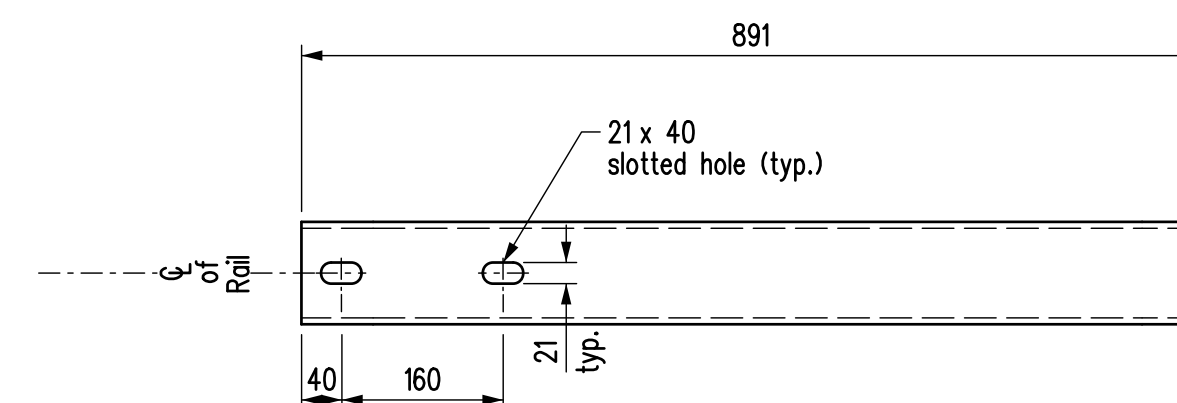
Mk. "ST2"



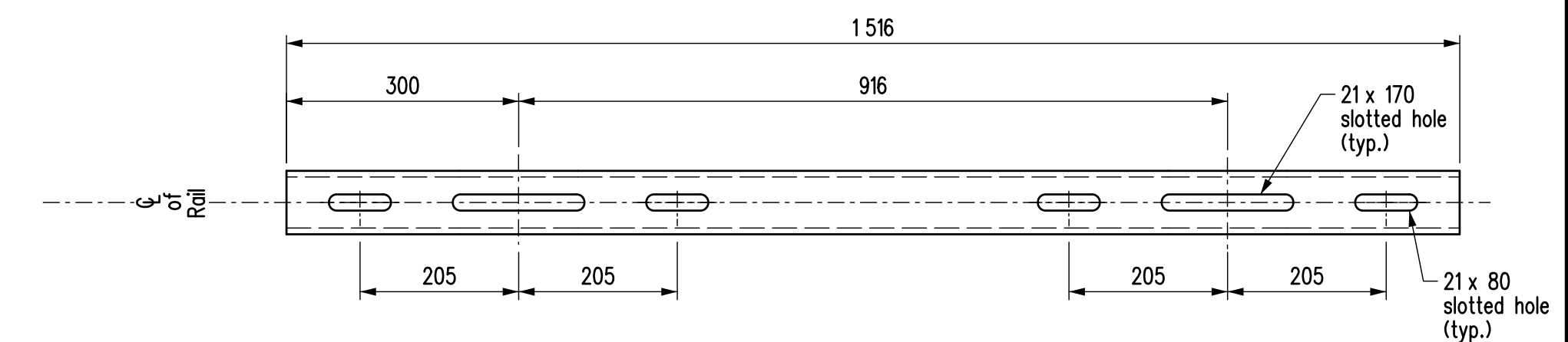
TYPICAL CROSS SECTION  
Scale 1:5



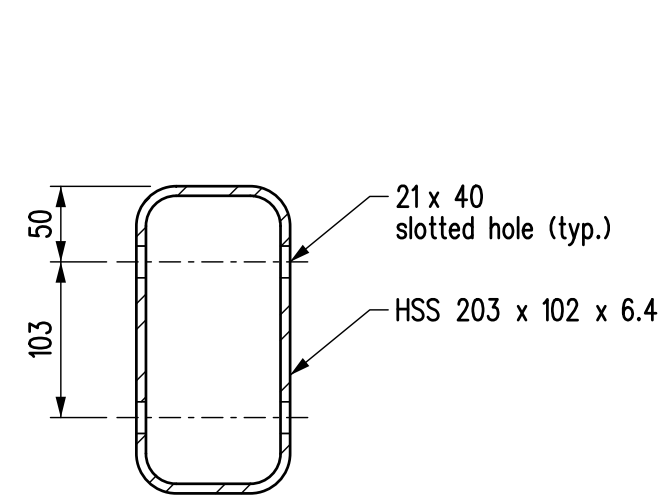
Mk. "T3"



Mk. "B5"

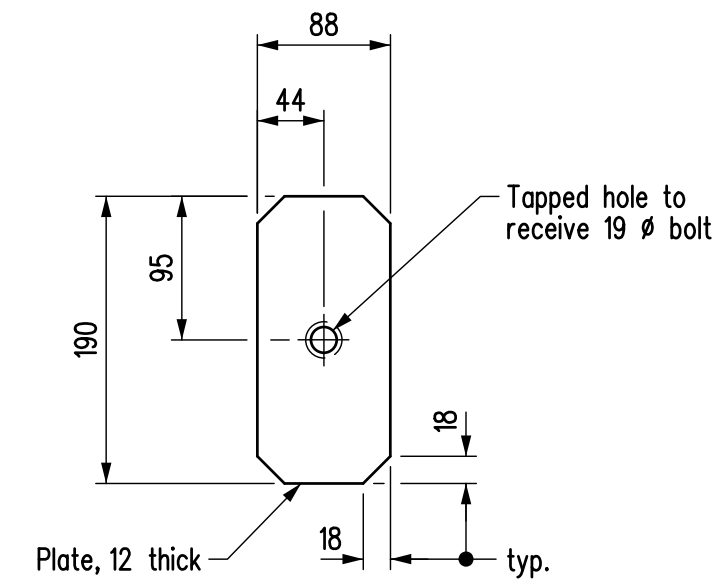


Mk. "SB1"

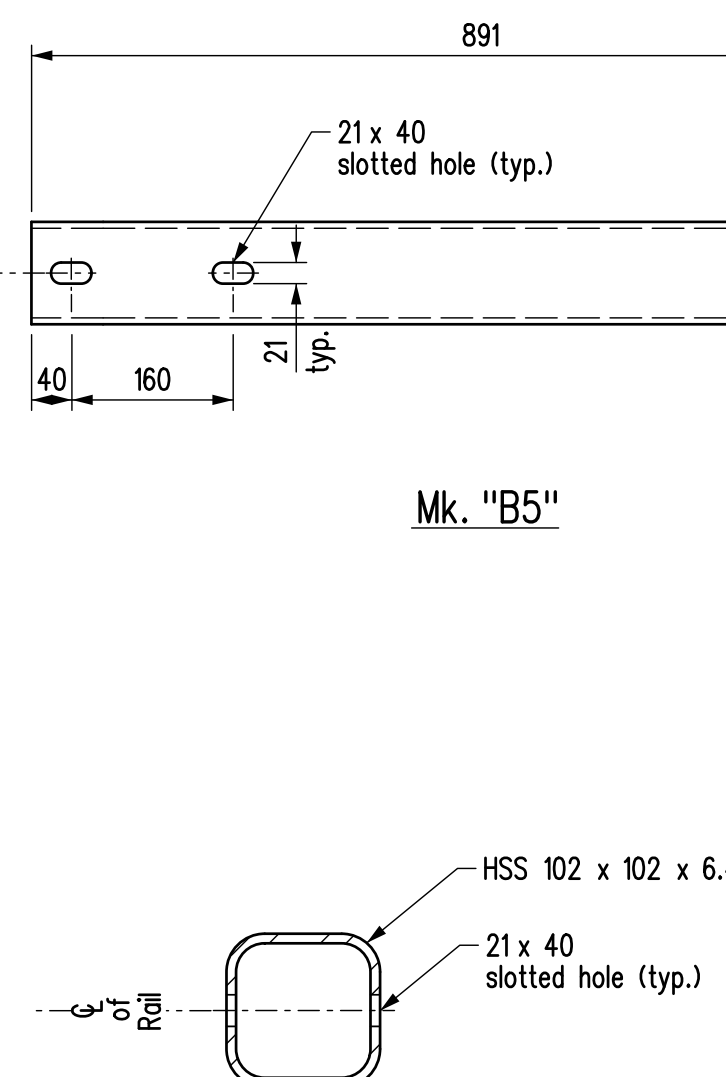


TYPICAL CROSS SECTION  
Typical for rail Mk. "T1", "T2" & "T3"  
Scale 1:5

DETAILS OF TOP RAILS

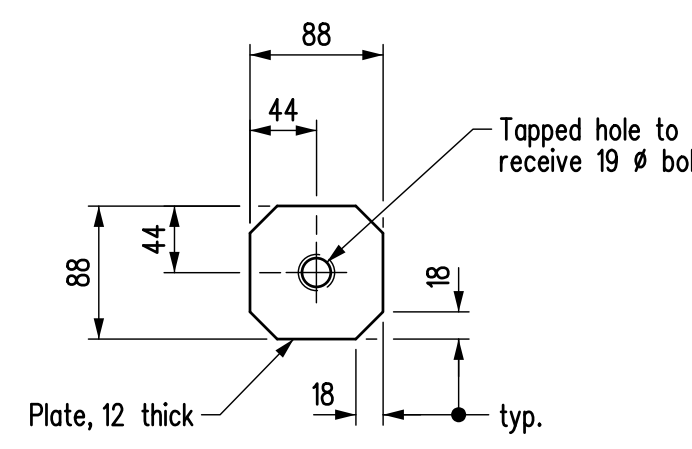


END PLATE  
For rail Mk. "T2"  
Scale 1:5

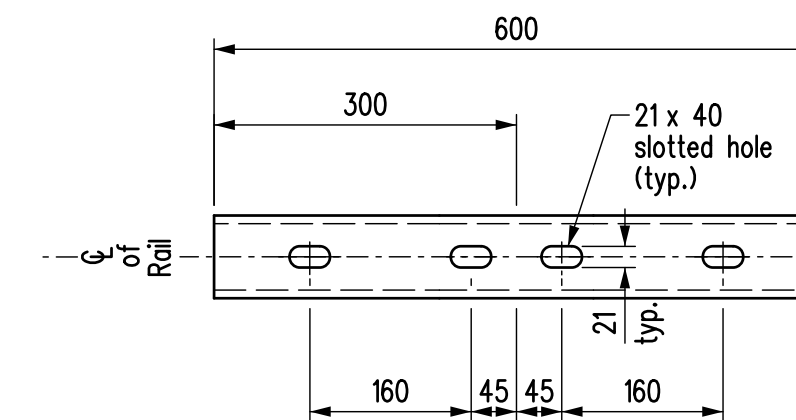


TYPICAL CROSS SECTION  
Typical for rails Mk. "B1", "B4" & "B5"  
Scale 1:5

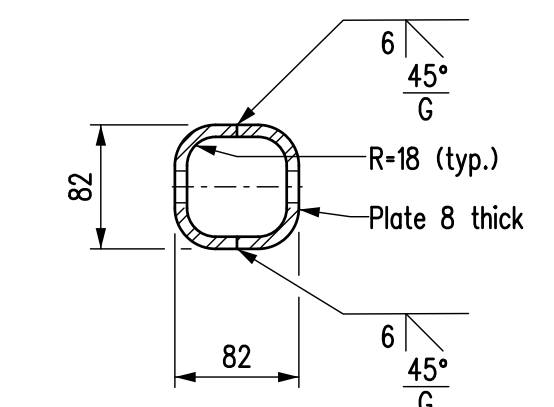
DETAILS OF BOTTOM RAILS



END PLATE  
For rail Mk. "B4"  
Scale 1:5



Mk. "SB2"



TYPICAL CROSS SECTION  
Scale 1:5

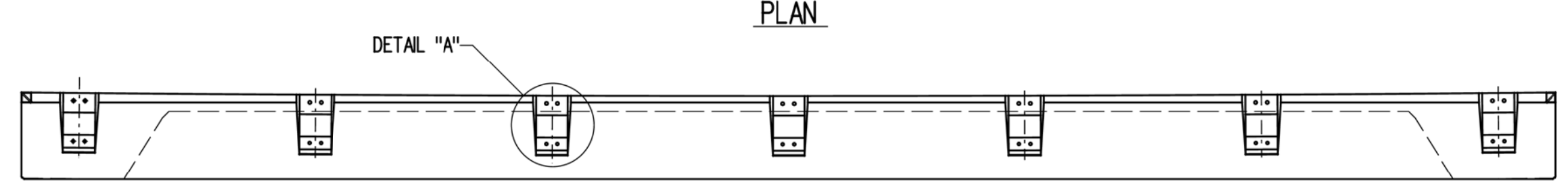
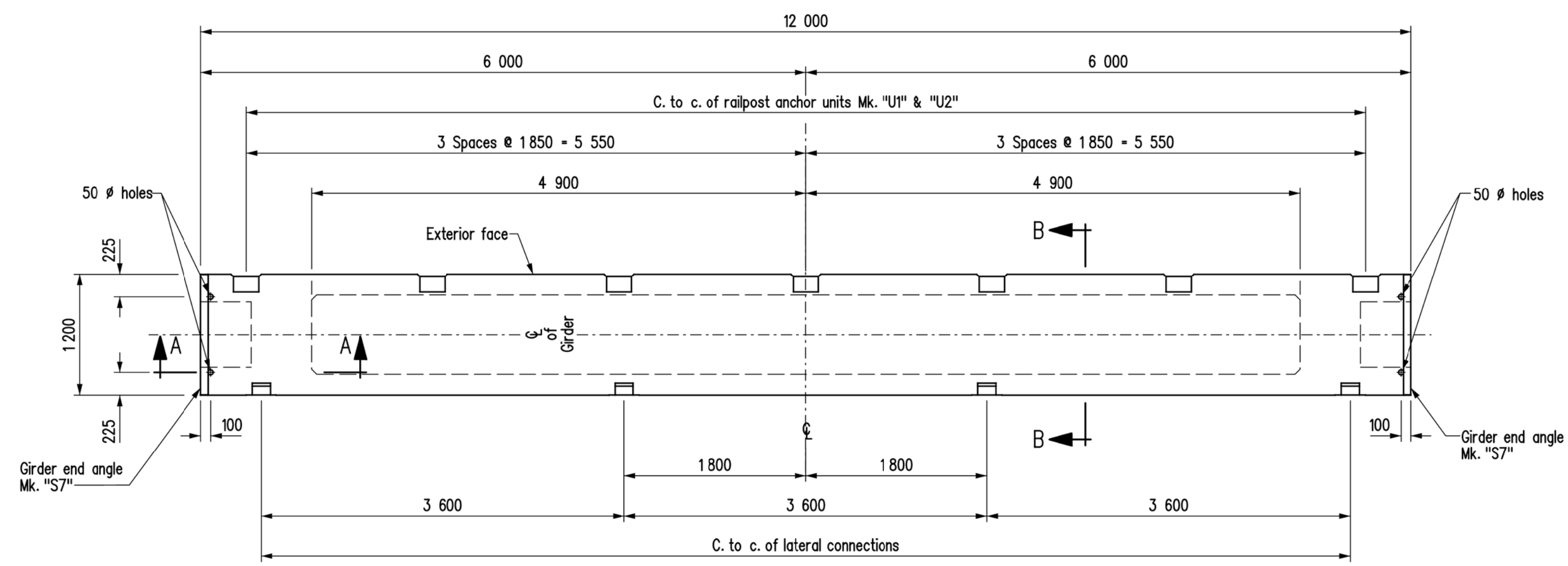
DETAILS OF SLEEVES

NOTES:

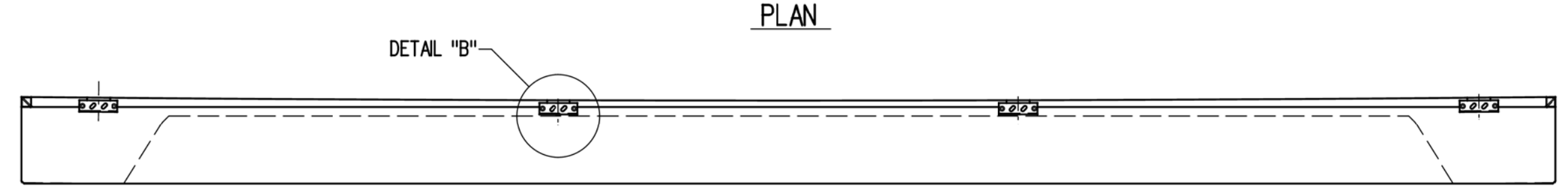
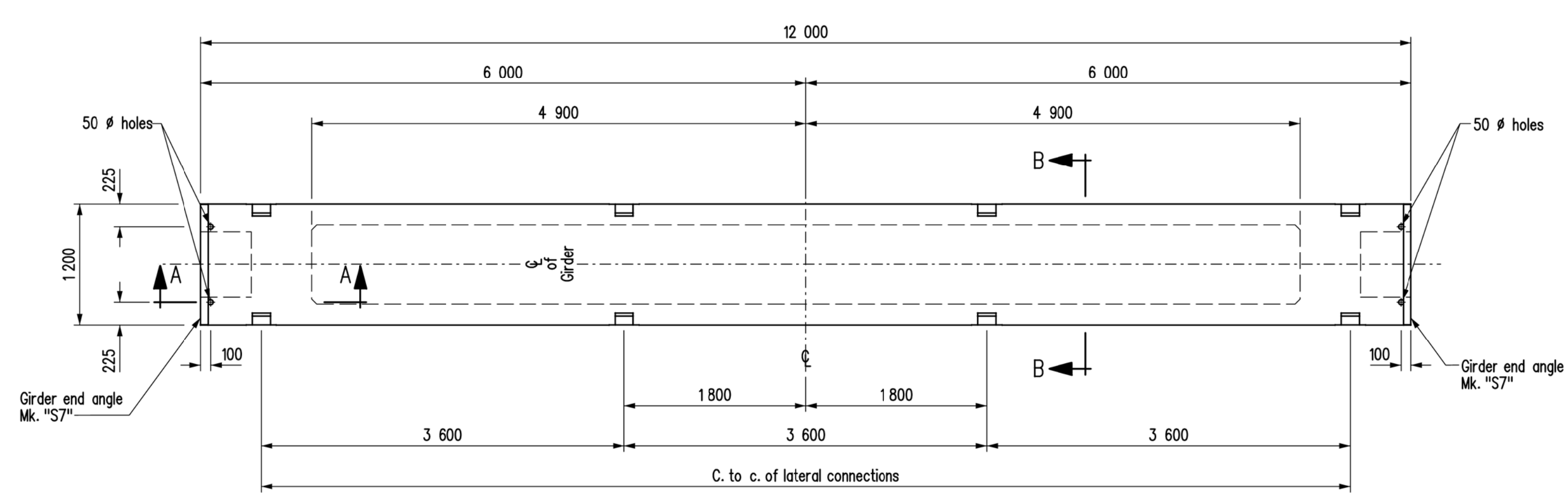
1. It is imperative that all rail and sleeve holes in each pair of holes be opposite to each other.
2. The length of slotted holes shall not be less than shown.
3. The width and height of the sleeves shall not exceed the dimensions shown.
4. All dimensions are in millimeters (mm).

REVISIONS		RAILING DETAILS	
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY:
DESIGN SEAL	RECORD SEAL		EXECUTIVE DIRECTOR OF STRUCTURES DATE
			SCALE:
			1:7.5
			SHEET No.
			or as shown SITE No.

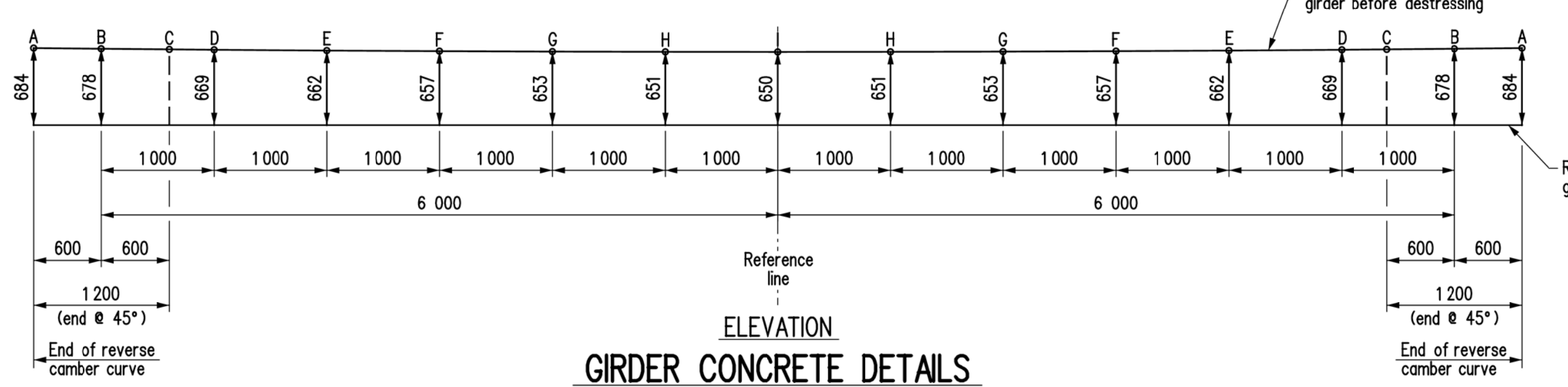
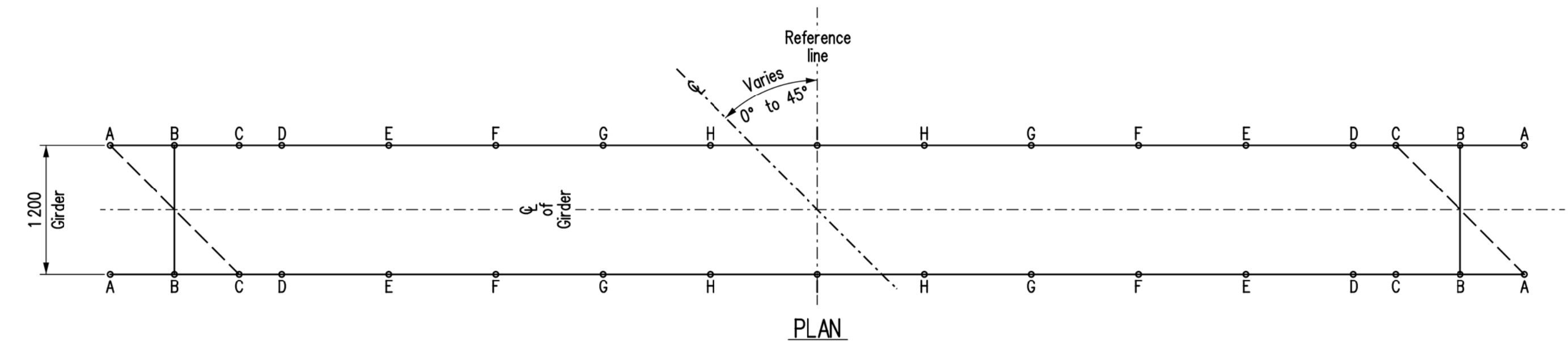




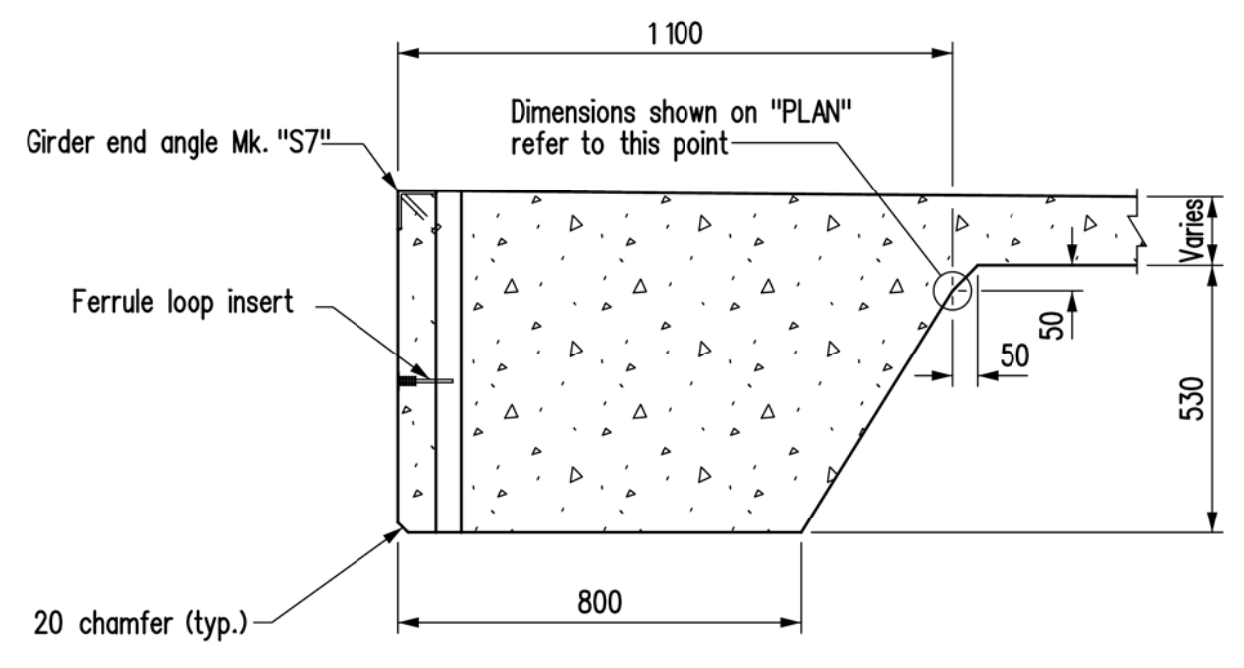
EXTERIOR GIRDER MK. "G1"



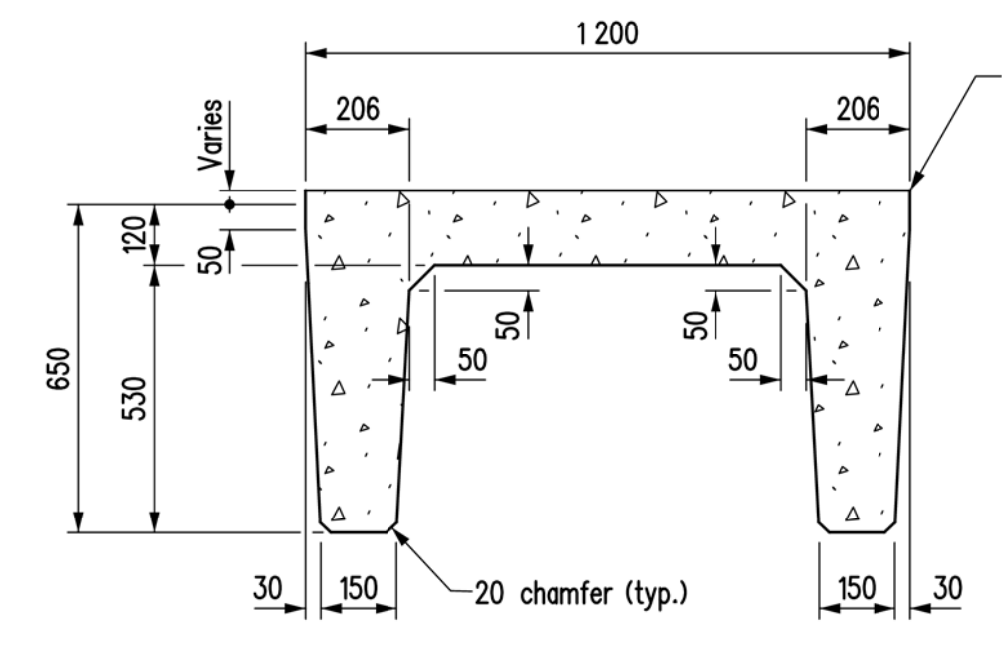
INTERIOR GIRDER MK. "G2"



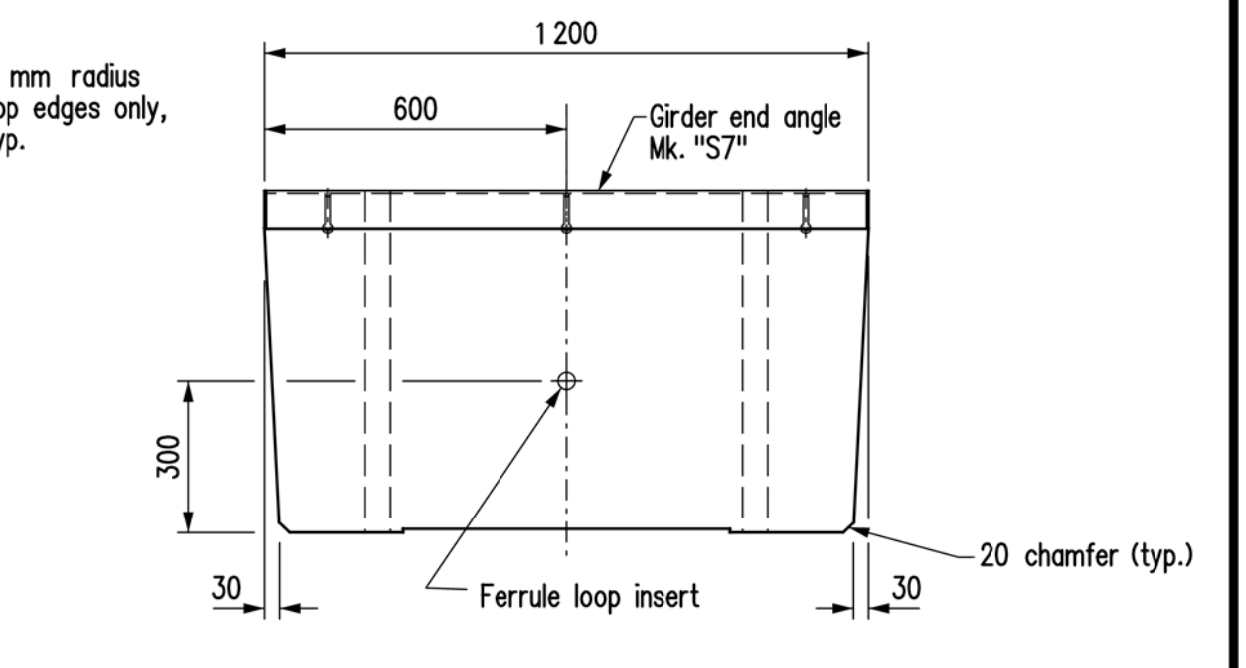
GIRDER CONCRETE DETAILS



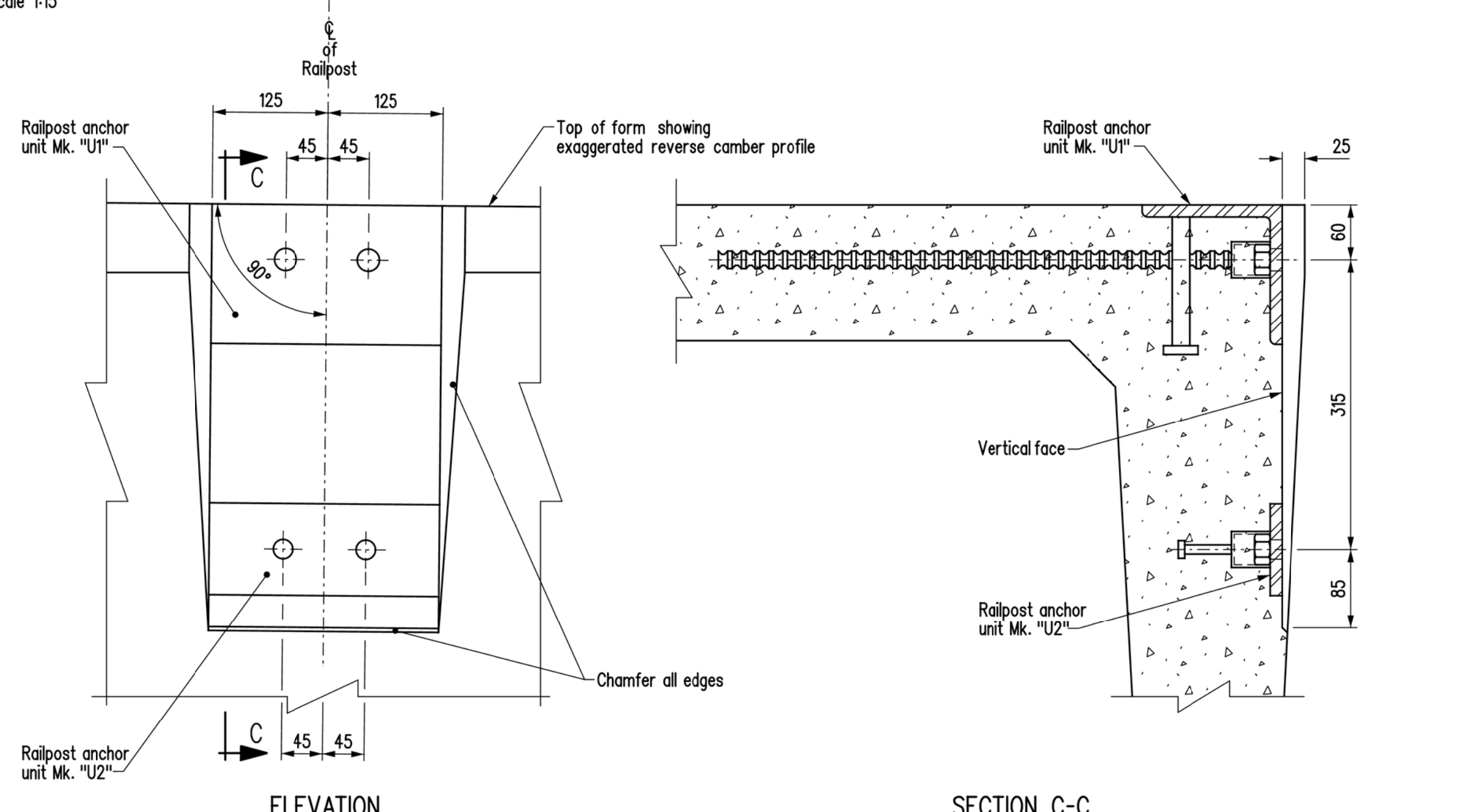
SECTION A-A  
Typical at both ends of girders  
Scale 1:15



SECTION B-B  
Scale 1:15



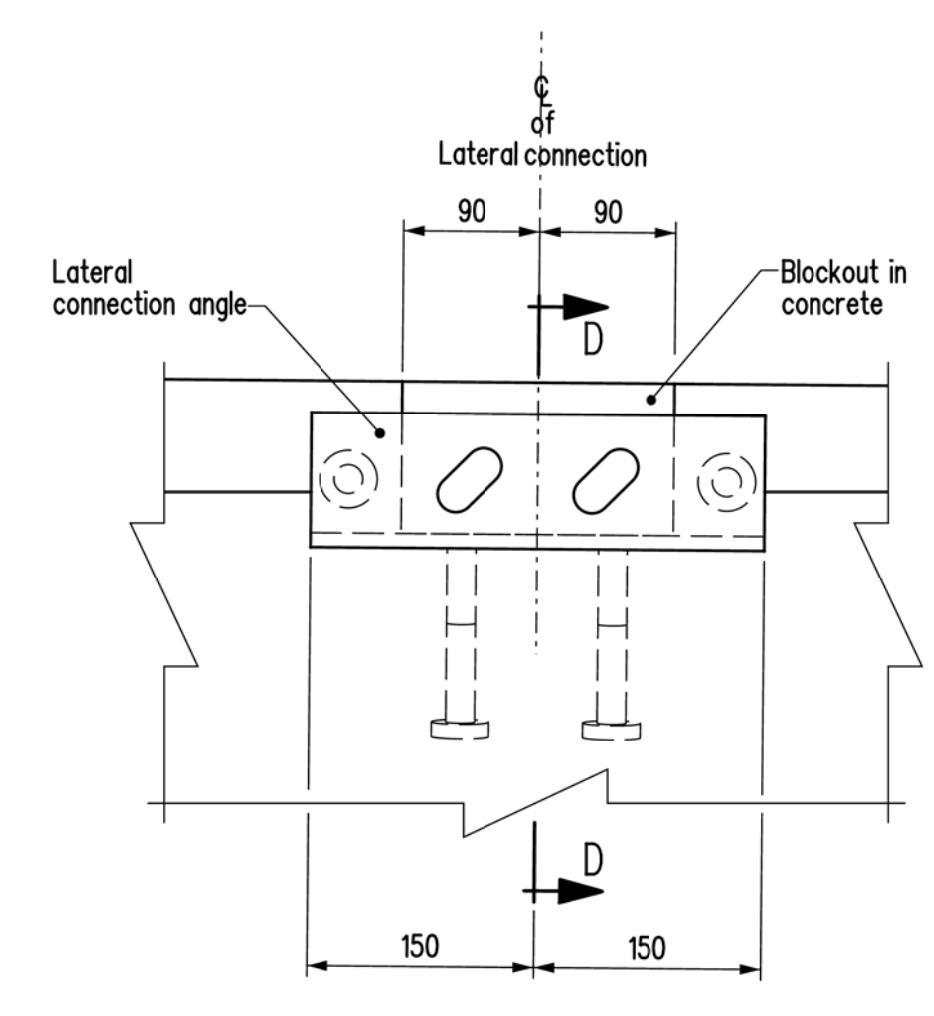
END VIEW  
Scale 1:15



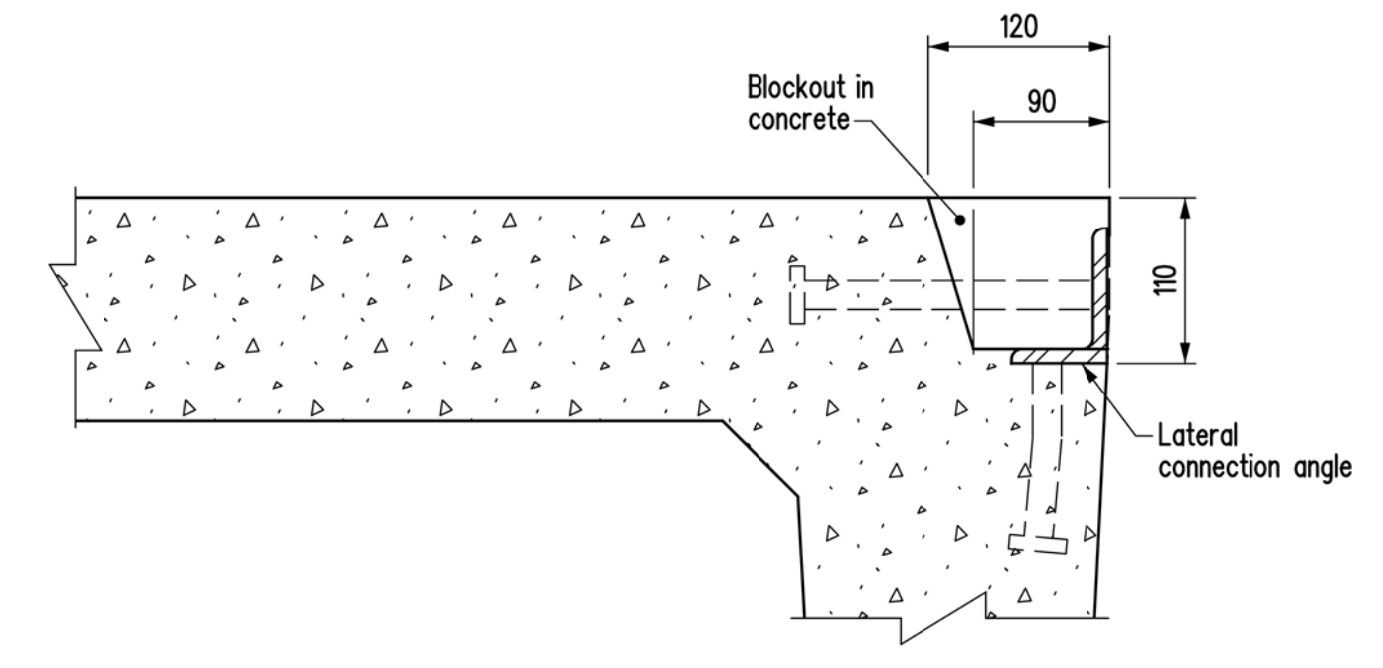
ELEVATION

SECTION C-C

DETAIL "A"  
Scale 1:5



ELEVATION



SECTION D-D

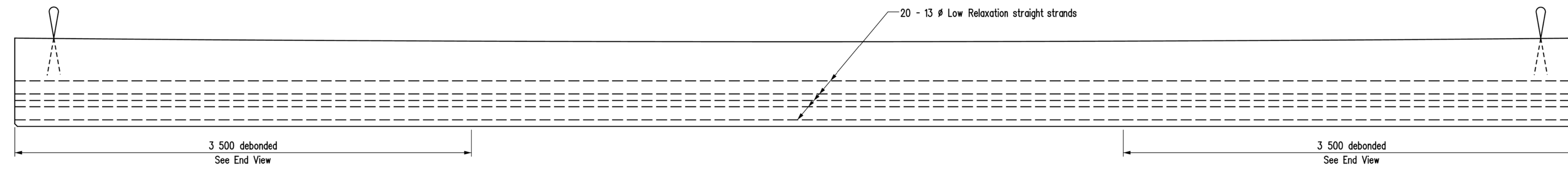
DETAIL "B"  
Scale 1:5

- NOTES:
- Design in accordance with AASHTO LRFD Bridge Design Specifications, First Edition, 1994 plus 1996/1997 interim's.
  - Design Vehicular Live Load: Modified AASHTO HSS-25 AASHTO LRFD "HL-93"
  - Design distribution factor = 0.5 lanes/girder.
  - Concrete strength:  $f_c$  transfer,  $f_{ci}$  = 35 MPa  $f_c$  @ 28 days,  $f_c$  = 45 MPa
  - Prestressing steel: 13 mm  $\phi$  low relaxation strands  
Minimum ultimate strength,  $f_{pu}$  = 1860 MPa  
Jacking force/strand,  $f_{pj}$  = 128.5 kN/strand
  - Girder dimensioning tolerances: Length 3 mm  $\pm$   
Cross section 2 mm  $\pm$
  - Approximate mass per girder = 12 000 kg

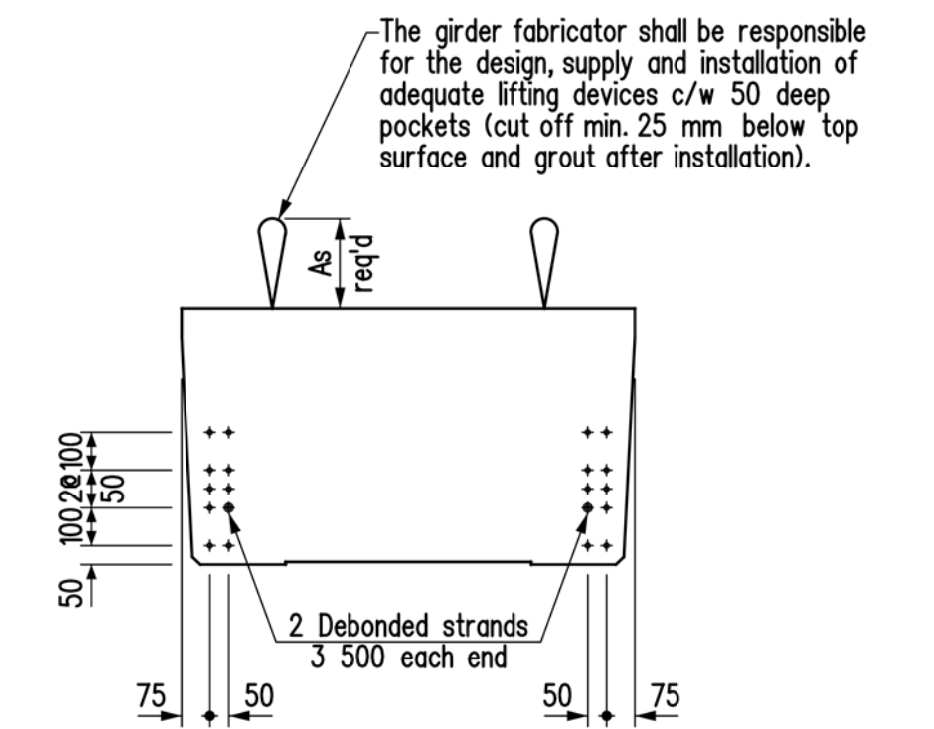
REVISIONS		PRECAST PRESTRESSED CHANNEL GIRDER DETAILS	
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY:

DESIGN	BY: _____	EXECUTIVE DIRECTOR OF STRUCTURES	DATE
	CHECKED: _____		
DETAILS	BY: _____	SCALE:	SHEET No. <b>G1</b>
	CHECKED: _____		
		or as shown	SITE No. _____

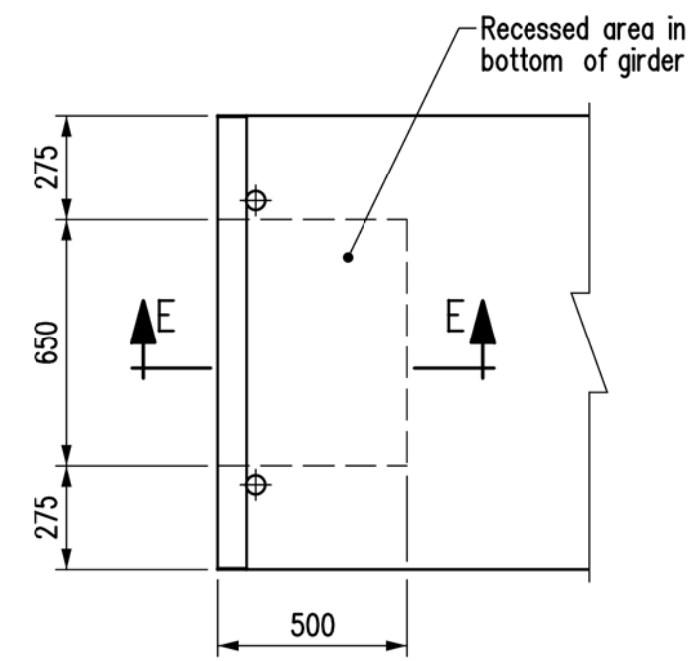
PLACE ENGINEERS  
ELECTRONIC SEAL  
HERE



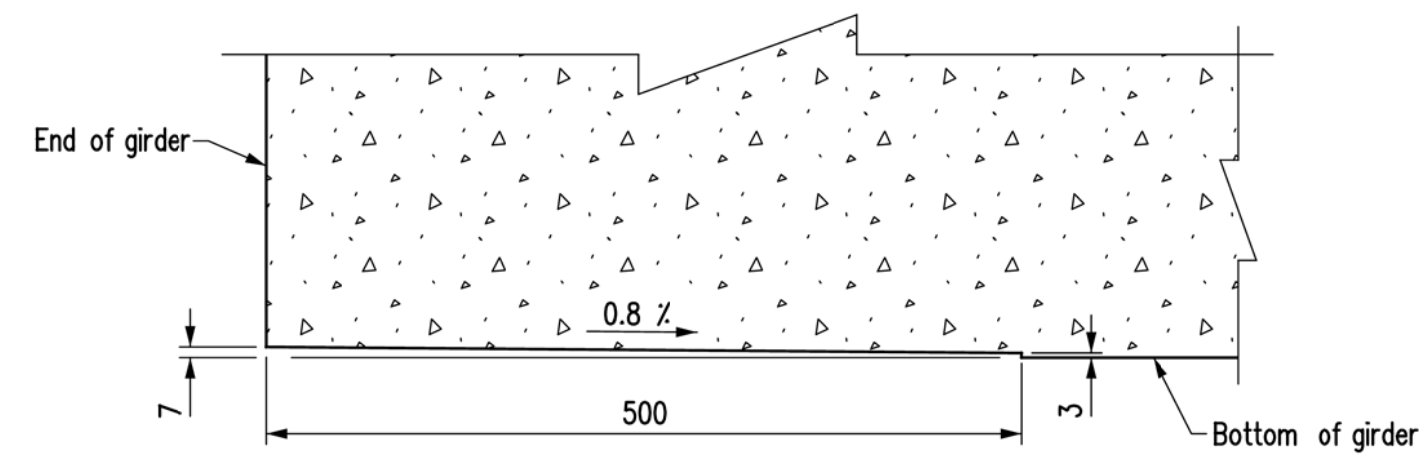
ELEVATION  
GIRDER STRAND LAYOUT



END VIEW  
Typical layout of 20 - 13 #  
Low Relaxation straight strands



PART PLAN  
Typical at both ends of girders




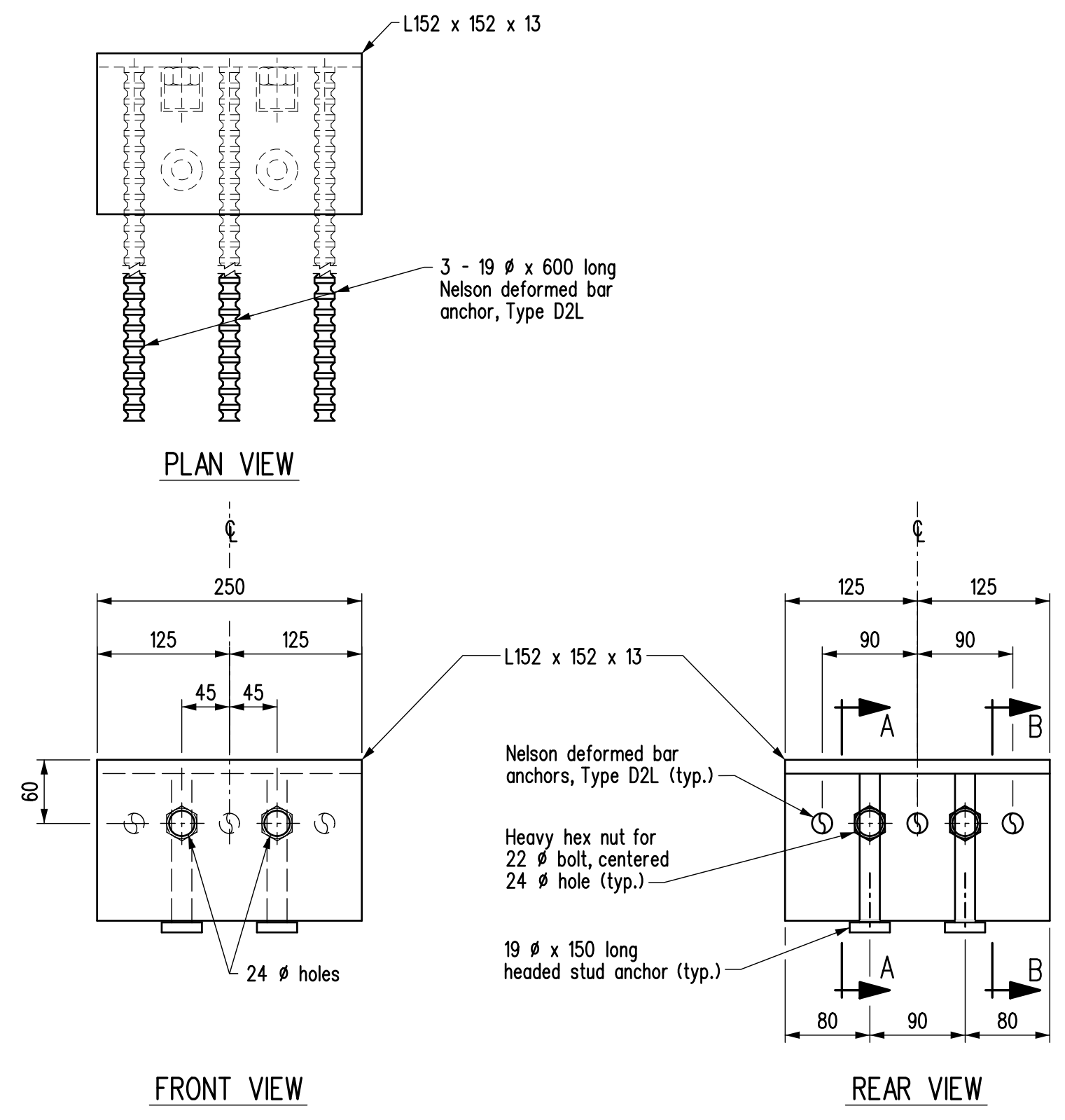
SECTION E-E  
Scale 1:5

BEARING RECESS DETAILS

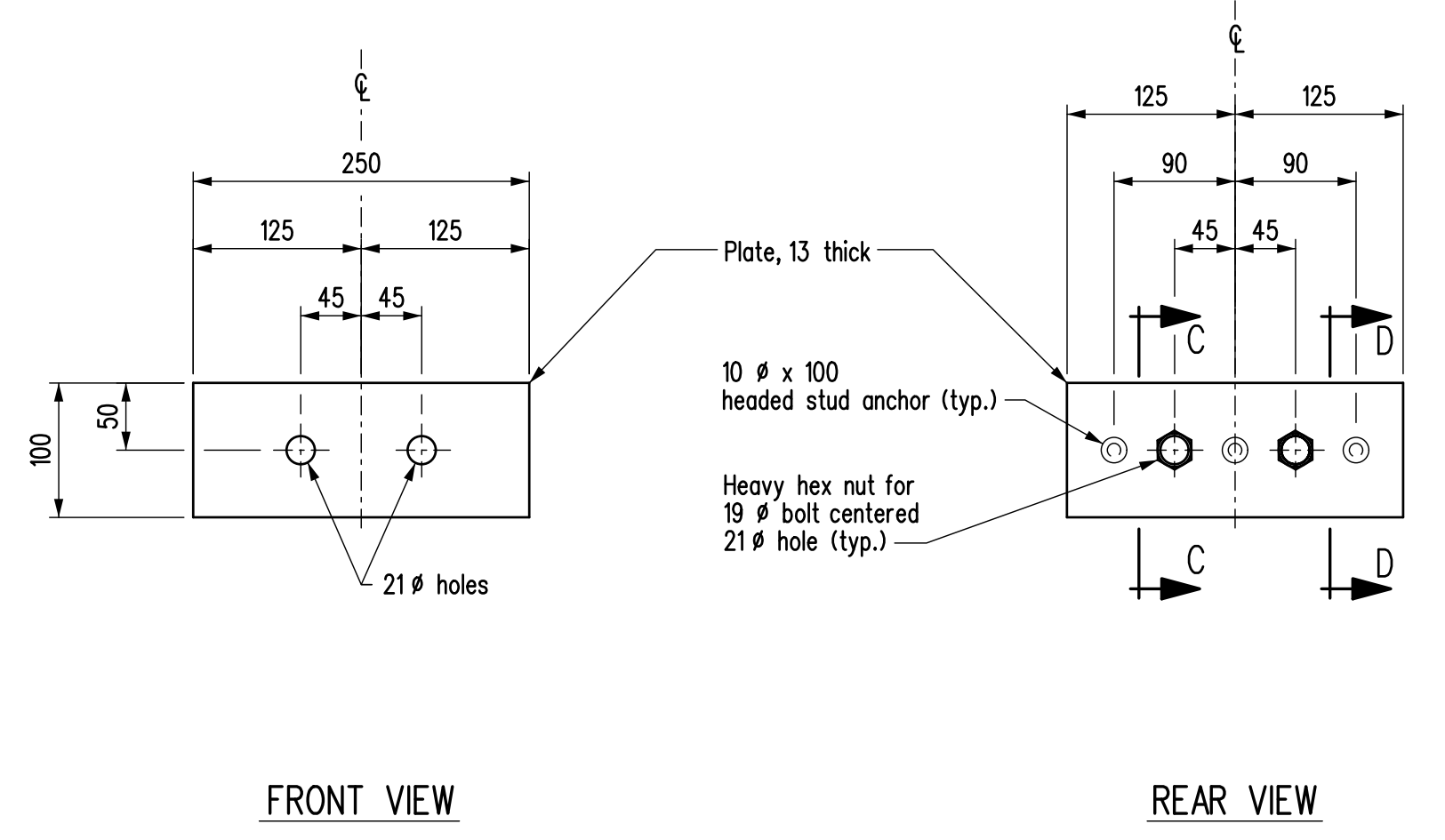
REVISIONS		PRECAST PRESTRESSED CHANNEL GIRDER DETAILS	
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY:
			EXECUTIVE DIRECTOR OF STRUCTURES DATE
			SCALE: Scale 1:20 SHEET No. G2
			or as shown SITE No.

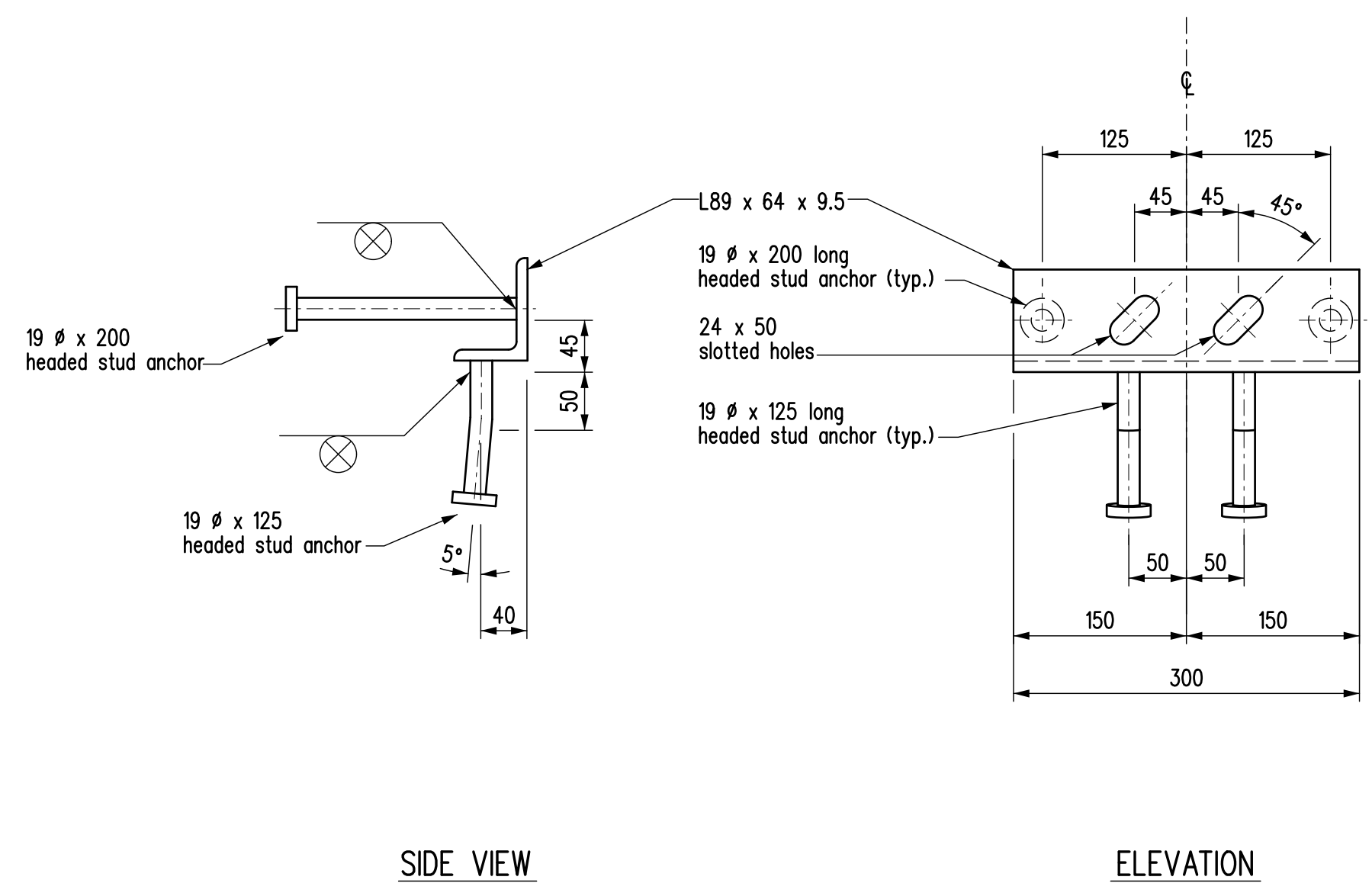
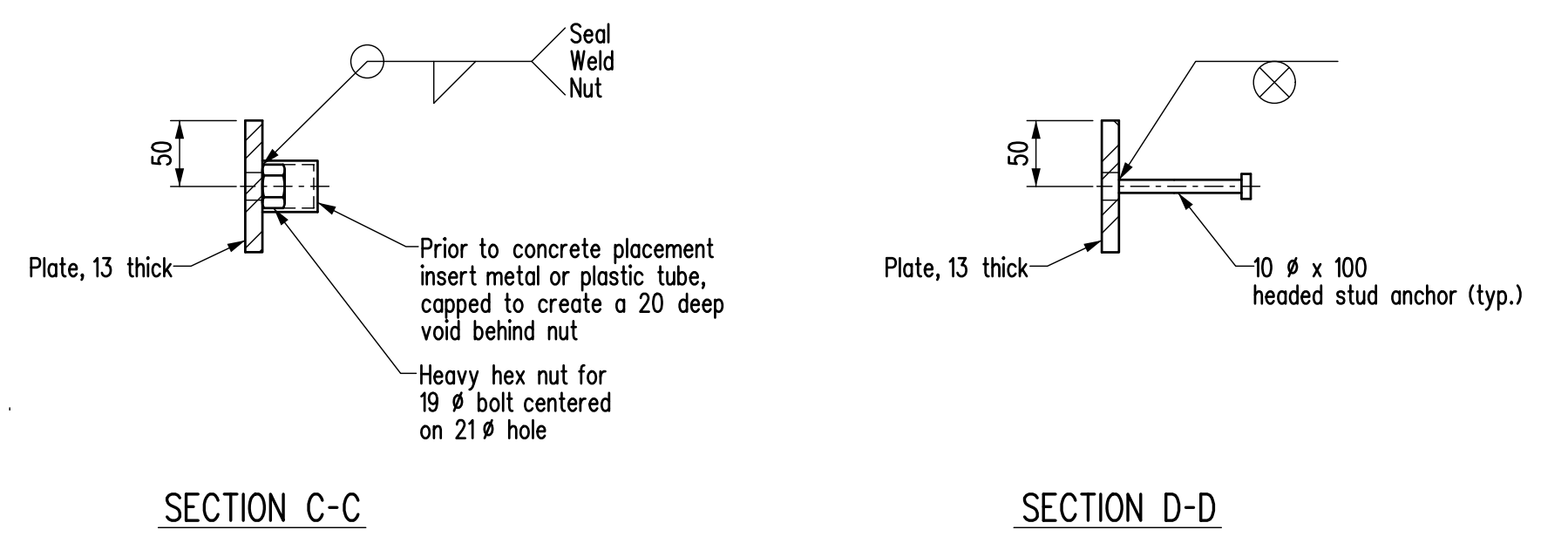
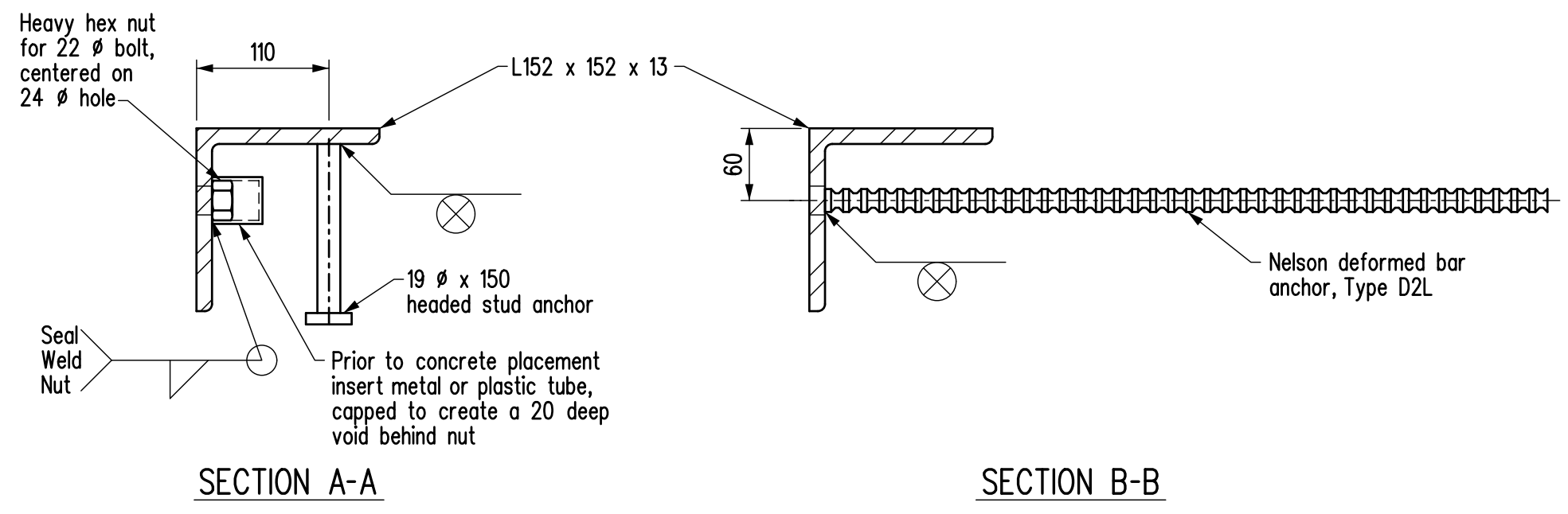
PLACE ENGINEERS ELECTRONIC SEAL HERE	DESIGN SEAL      RECORD SEAL		 <b>Manitoba</b> Infrastructure Water Management and Structures	
	BY: _____	_____		BY: _____
	CHECKED: _____	_____		CHECKED: _____
	BY: _____	_____		CHECKED: _____



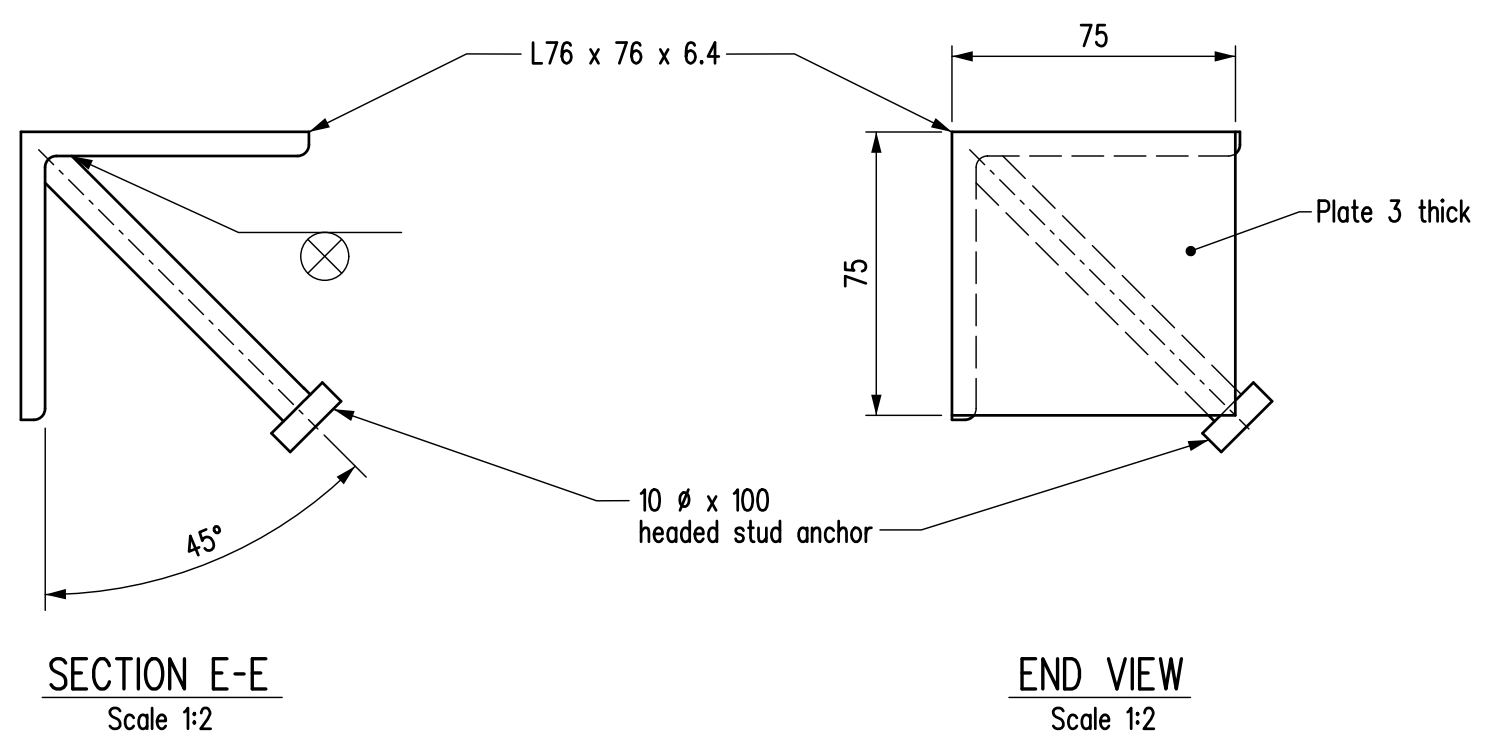
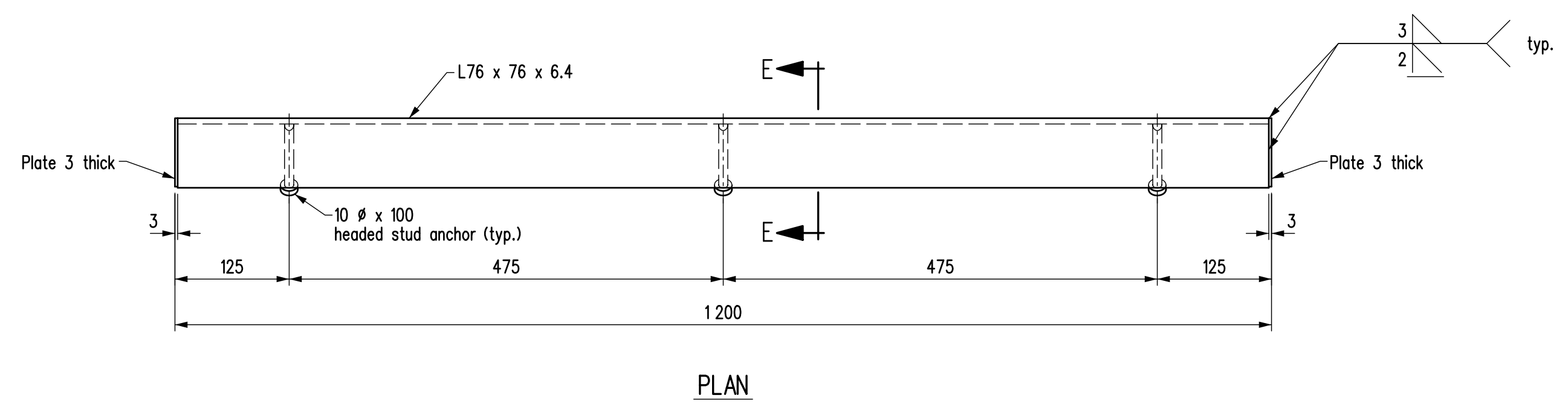
**RAILPOST ANCHOR UNIT MK. "U1"**



**RAILPOST ANCHOR UNIT MK. "U2"**



**LATERAL CONNECTION ANGLE MK. "LC1"**



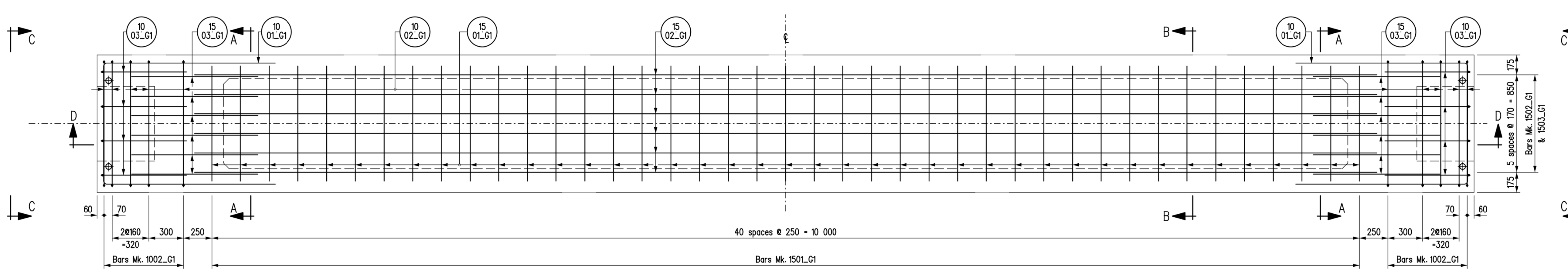
**GIRDER END ANGLE MK. "S7"**

BILL OF MISCELLANEOUS METAL		for 12 m LONG GIRDERS 12 000 ROADWAY WIDTH - 2 SPAN			Site No.	
MARK No.	No.	DESCRIPTION	CORROSION PROTECTION	SIZE	LENGTH	REMARKS
U1	28	Railpost anchor unit	Hot dip galvanized			
		Each unit is fabricated from:				
		1 - Angle		L152x152x13	250	As detailed
		2 - Heavy hex. nuts		for 22 dia. bolt		Grade DH or 2H
		2 - Studs		19 dia.	150	Headed stud anchors, ASTM A108
		3 - Bars		for 19 dia. Bolt	600	Nelson deformed bar anchors, Type D2L
		2 - Tubes				Metal or plastic capped - As detailed
U2	28	Railpost anchor unit	Hot dip galvanized			
		Each unit is fabricated from:				
		1 - Plate		PL 13x100	250	As detailed
		2 - Heavy hex. nuts		for 19 dia. bolt		Grade DH or 2H
		3 - Studs		10 dia.	100	Headed stud anchors, ASTM A108
		2 - Tubes				Metal or plastic capped - As detailed
LC1	144	Lateral connection angle	Hot dip galvanized			
		Each unit is fabricated from:				
		1 - Angle		L89x64x9.5	300	As detailed
		2 - Studs		19 dia.	200	Headed stud anchors, ASTM A108
		2 - Studs		19 dia.	125	Headed stud anchors, ASTM A108
S7	40	Girder end angle	Hot dip galvanized			
		Each unit is fabricated from:				
		1 - Angle		L76x76x6.4	1 194	As detailed
		2 - Plates		PL 3x75	75	As detailed
		3 - Studs		10 dia.	100	Headed stud anchors, ASTM A108
	40	Ferrule loop insert	Stainless steel	for 13 dia. bolt		Richmond anchor, Type LF-W with mounting washer
TR2	20	Threaded rod	Stainless steel	13 dia.	250	c/w hex. nut
R27	56	A325 bolt c/w F436 hardened washer	Hot dip galvanized	22 dia.	229	Heavy hex. no nut, ASTM F3125
R28	56	A325 bolt c/w F436 hardened washer	Hot dip galvanized	19 dia.	64	Heavy hex. no nut, ASTM F3125

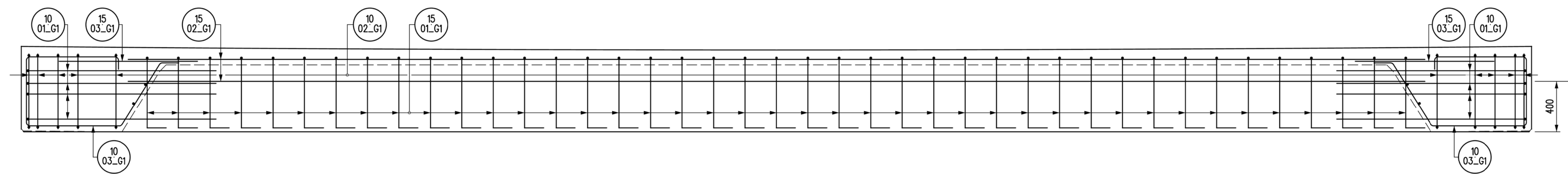
- NOTES:**
- All material in the above Bill shall be supplied by the GIRDER CONTRACTOR.
  - All structural steel shall conform to CAN/CSA G40.21-M92 Grade 300W.
  - All material noted in the above Bill shall be hot dip galvanized after fabrication in accordance with CSA G164 for a minimum net retention of 610 g/m<sup>2</sup> unless otherwise stated in the specified material ASTM standards. The fabricator and galvanizer shall safeguard against embrittlement using recommended practices from applicable standards.
  - Seal all welds prior to galvanizing.
  - Grade DH or 2H galvanized nuts for A325 bolts shall be overlapped to a minimum amount required for the fastener assembly in accordance with ASTM F3125. The nuts shall be lubricated with a lubricant containing a visible dye. The lubricant shall be clean and dry to the touch.
  - All bolts and inserts in the above Bill shall be Imperial thread.
  - Stainless steel shall conform to the requirements of ASTM A320, Class B8.

REVISIONS		PRECAST PRESTRESSED CHANNEL GIRDER DETAILS	
DATE	BY	DESIGN SEAL	RECORD SEAL
PLACE ENGINEERS ELECTRONIC SEAL HERE			
		RELEASED FOR CONSTRUCTION BY:	
		EXECUTIVE DIRECTOR OF STRUCTURES DATE	
		SCALE: Scale 1:5 SHEET No. G3	
		or as shown SITE No.	

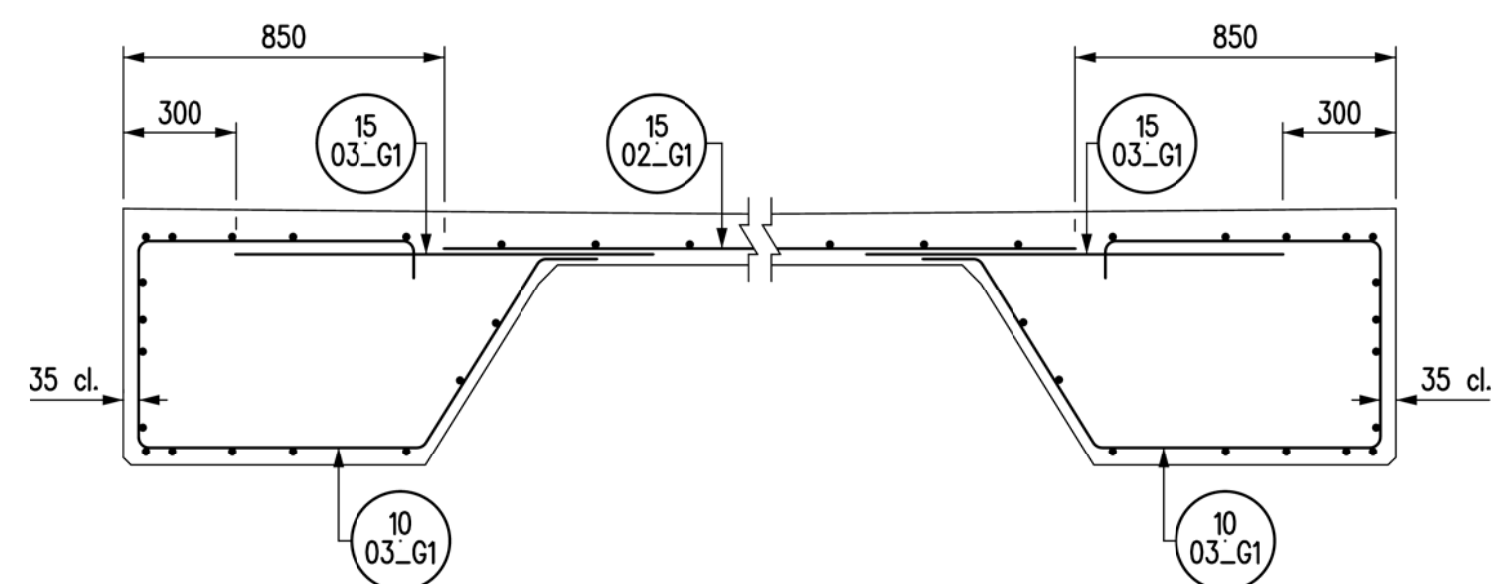




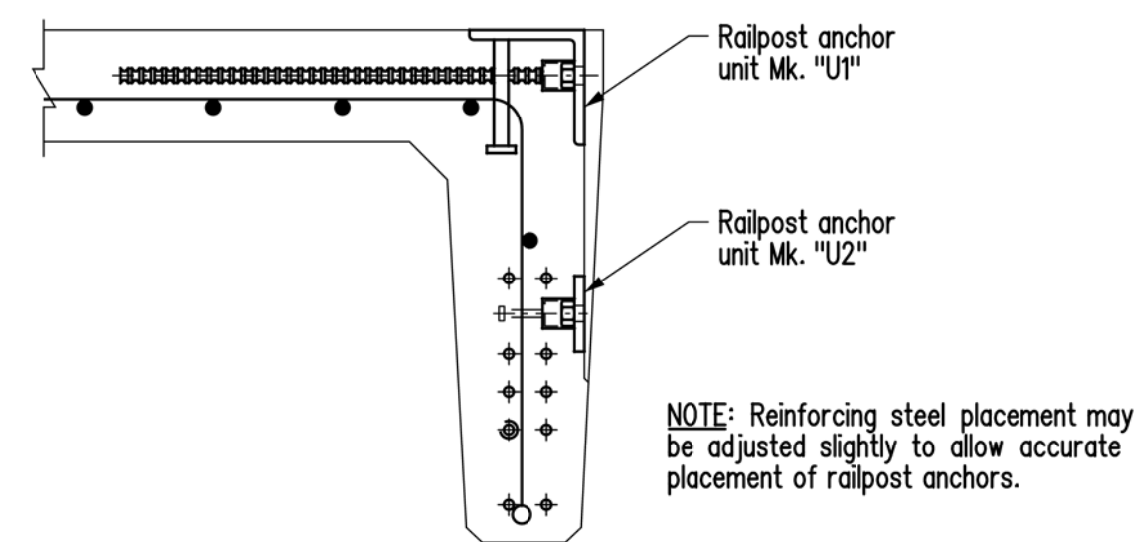
**PLAN OF GIRDER**



**ELEVATION OF GIRDER**

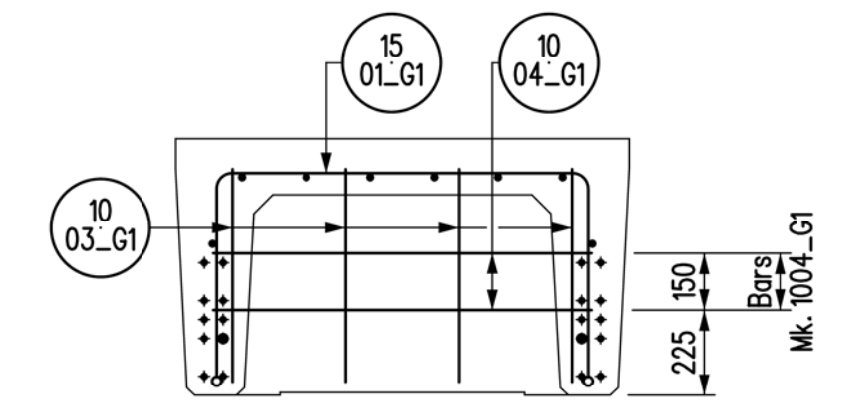


**PART SECTION D-D**

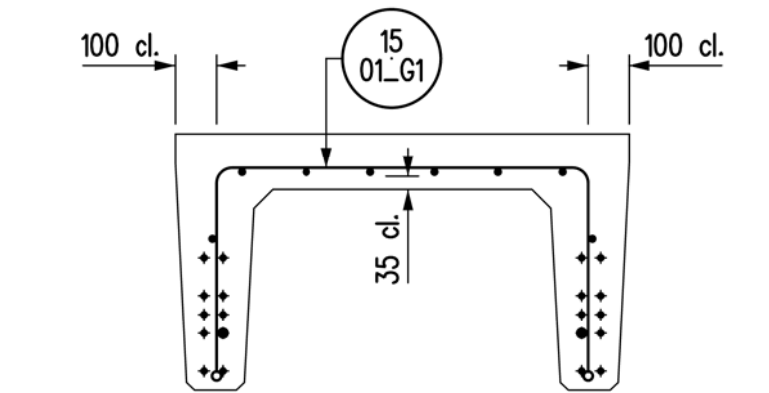


**DETAIL AT RAILPOST ANCHOR**

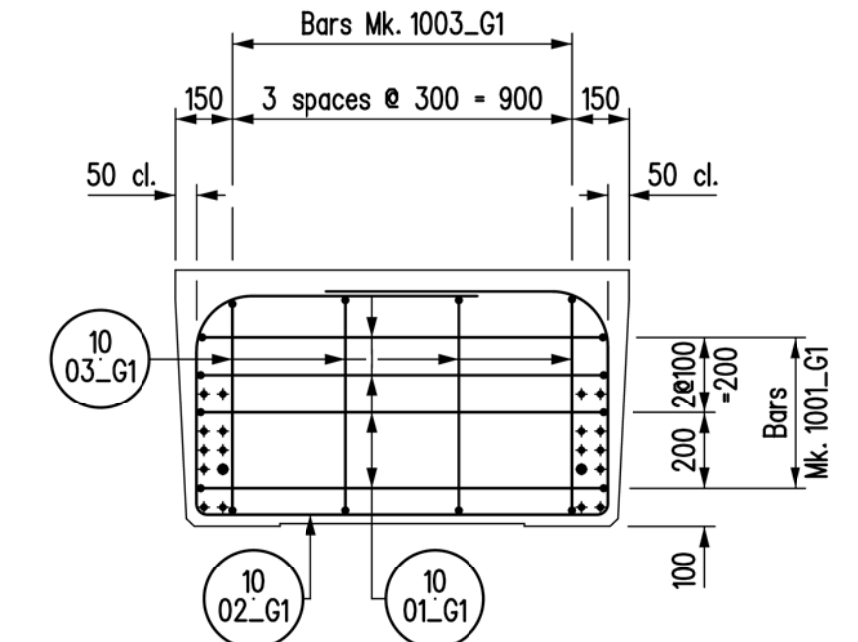
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**SECTION A-A**



**SECTION B-B**



**END VIEW C-C**

**NOTES:**

1. Concrete cover shall be 25 mm unless noted otherwise.
2. Reinforcing details are typical for all 12 m girders unless noted otherwise.
3. Bar Mark labels with suffix \_G1 are Exterior girders and suffix \_G2 are Interior girders. See Bill of Reinforcing Sheet No. G.

REVISIONS		PRECAST PRESTRESSED CHANNEL GIRDER DETAILS	
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY:

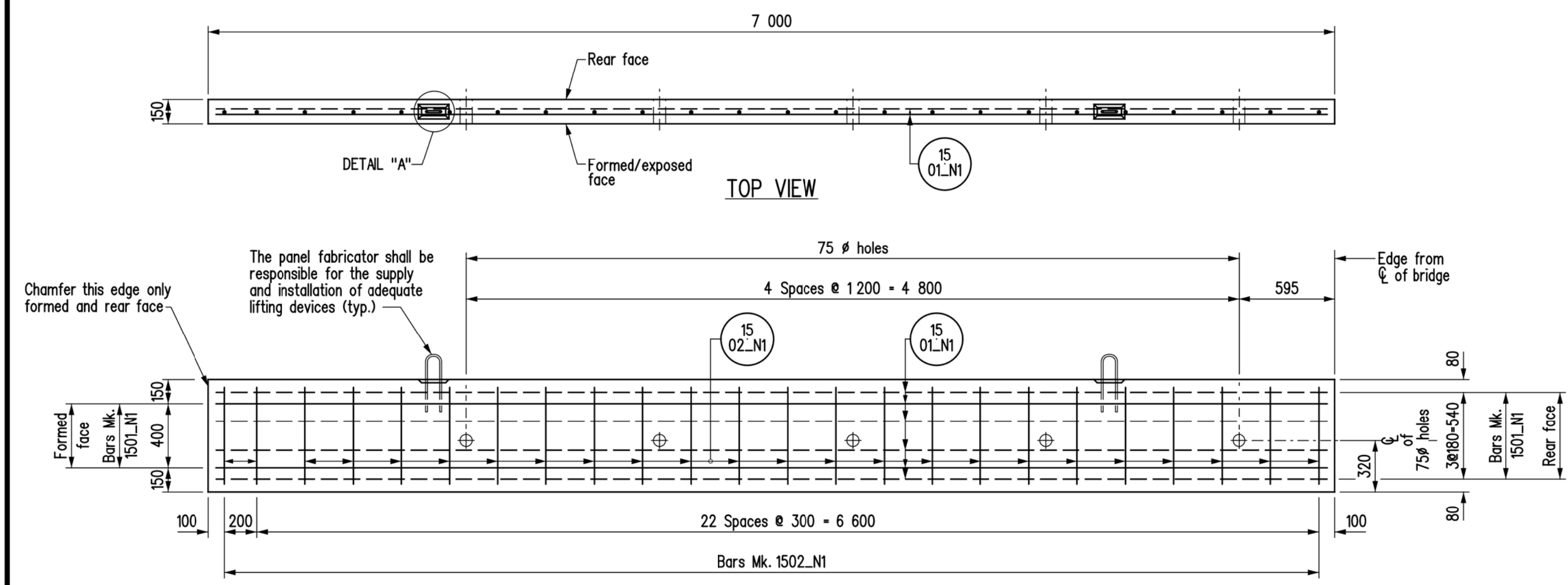


**PLACE ENGINEERS ELECTRONIC SEAL HERE**

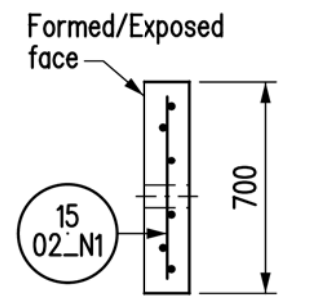
DESIGN BY: [Signature]  
 CHECKED: [Signature]  
 DETAILS BY: [Signature]  
 CHECKED: [Signature]

EXECUTIVE DIRECTOR OF STRUCTURES DATE  
 SCALE: Scale 1:20 SHEET No. G4  
 or as shown SITE No. [Signature]

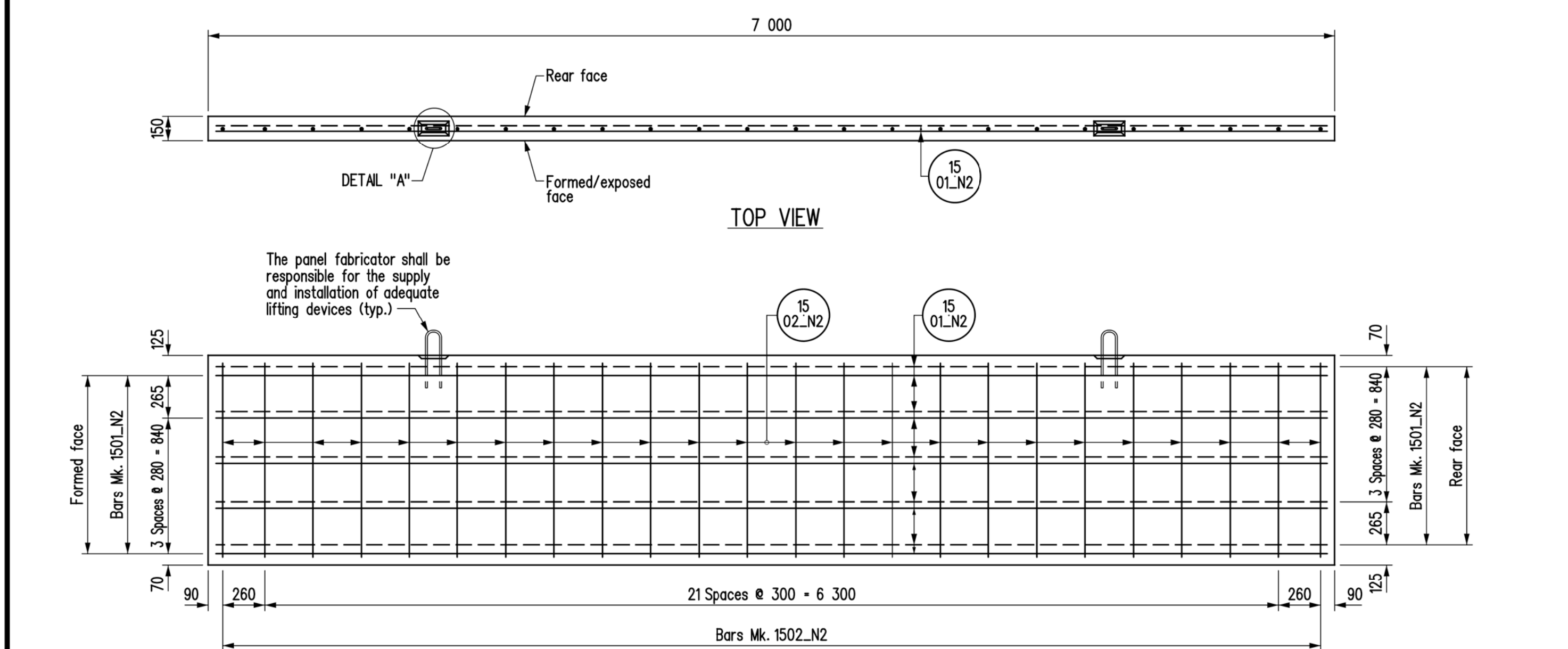




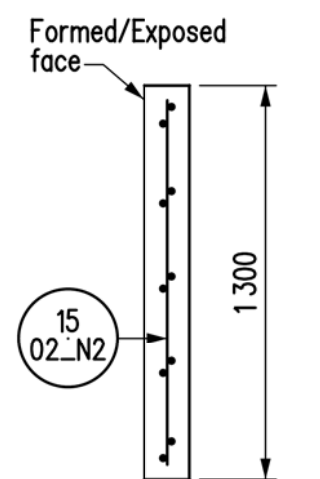
**ELEVATION**  
**PRECAST PANEL Mk. "N1" & "N1a"**  
 Panel Mk. "N1" shown, Panel Mk. "N1a" opposite hand.



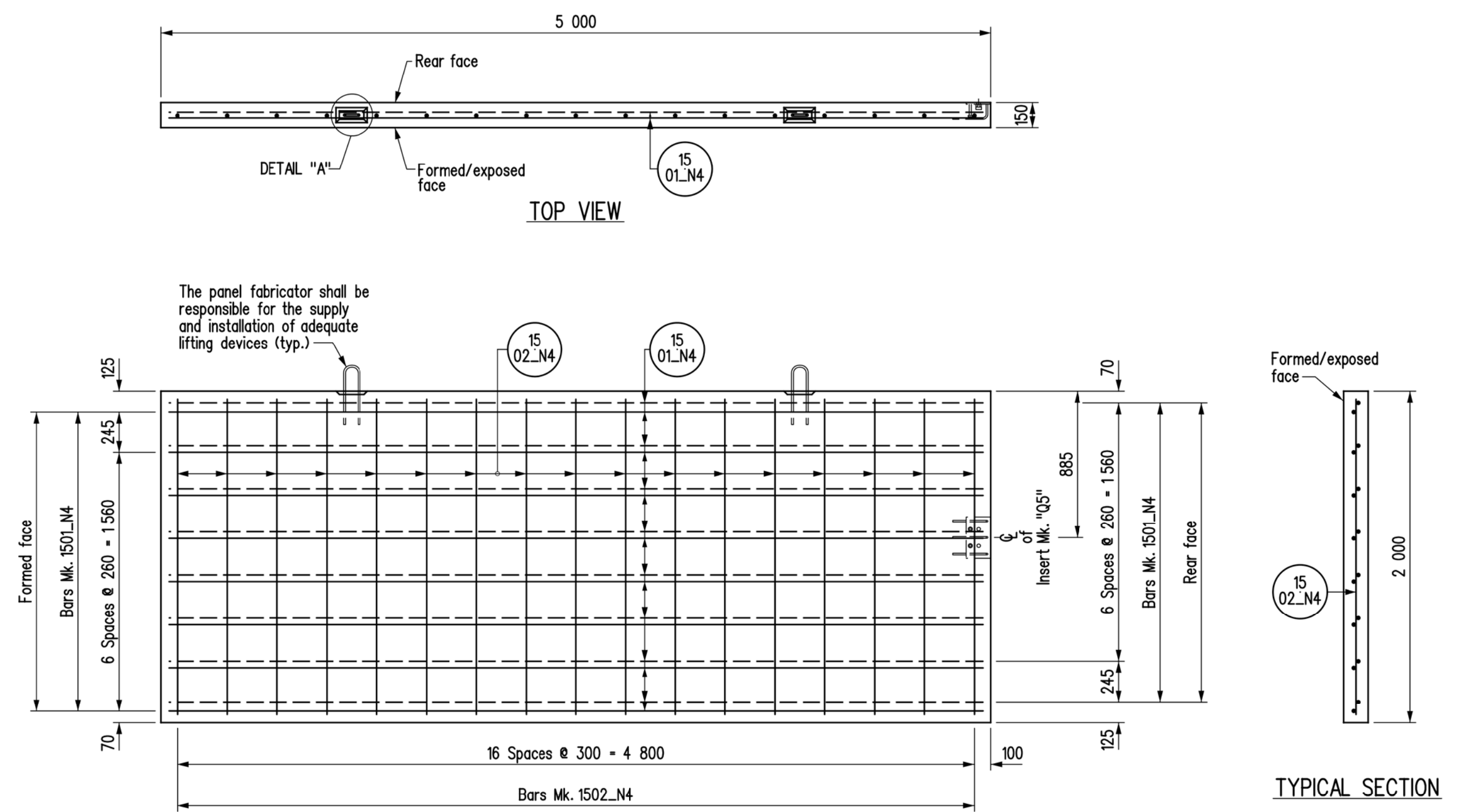
TYPICAL SECTION



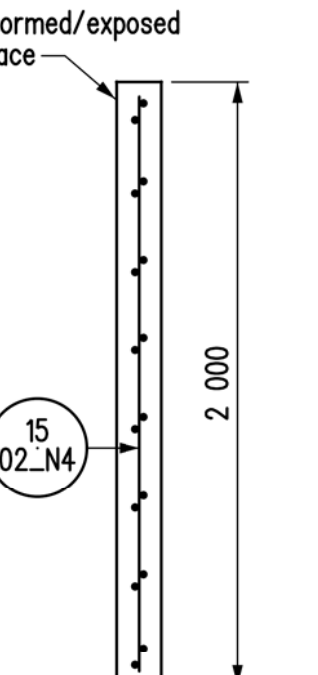
**ELEVATION**  
**PRECAST PANEL Mk. "N2"**



TYPICAL SECTION



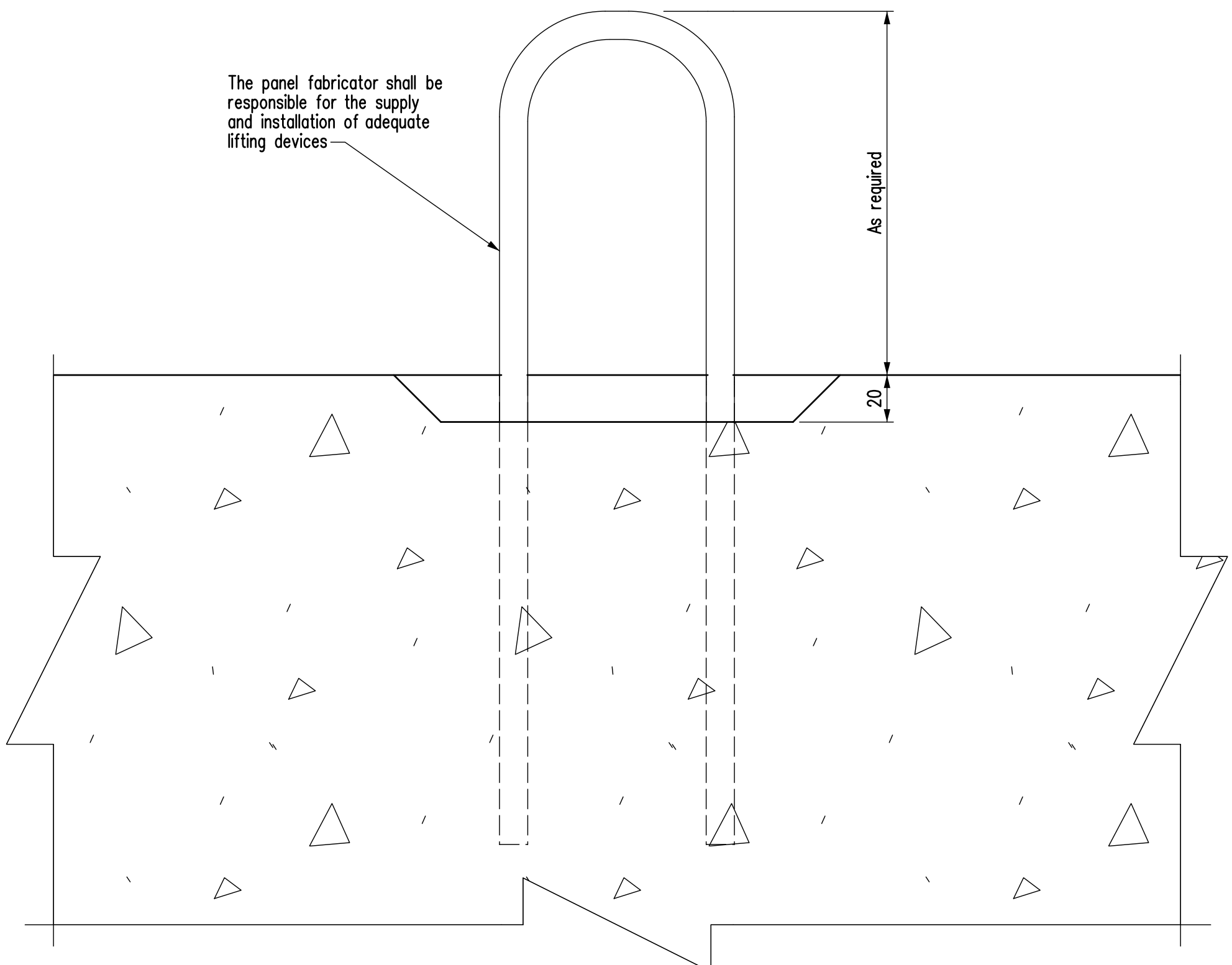
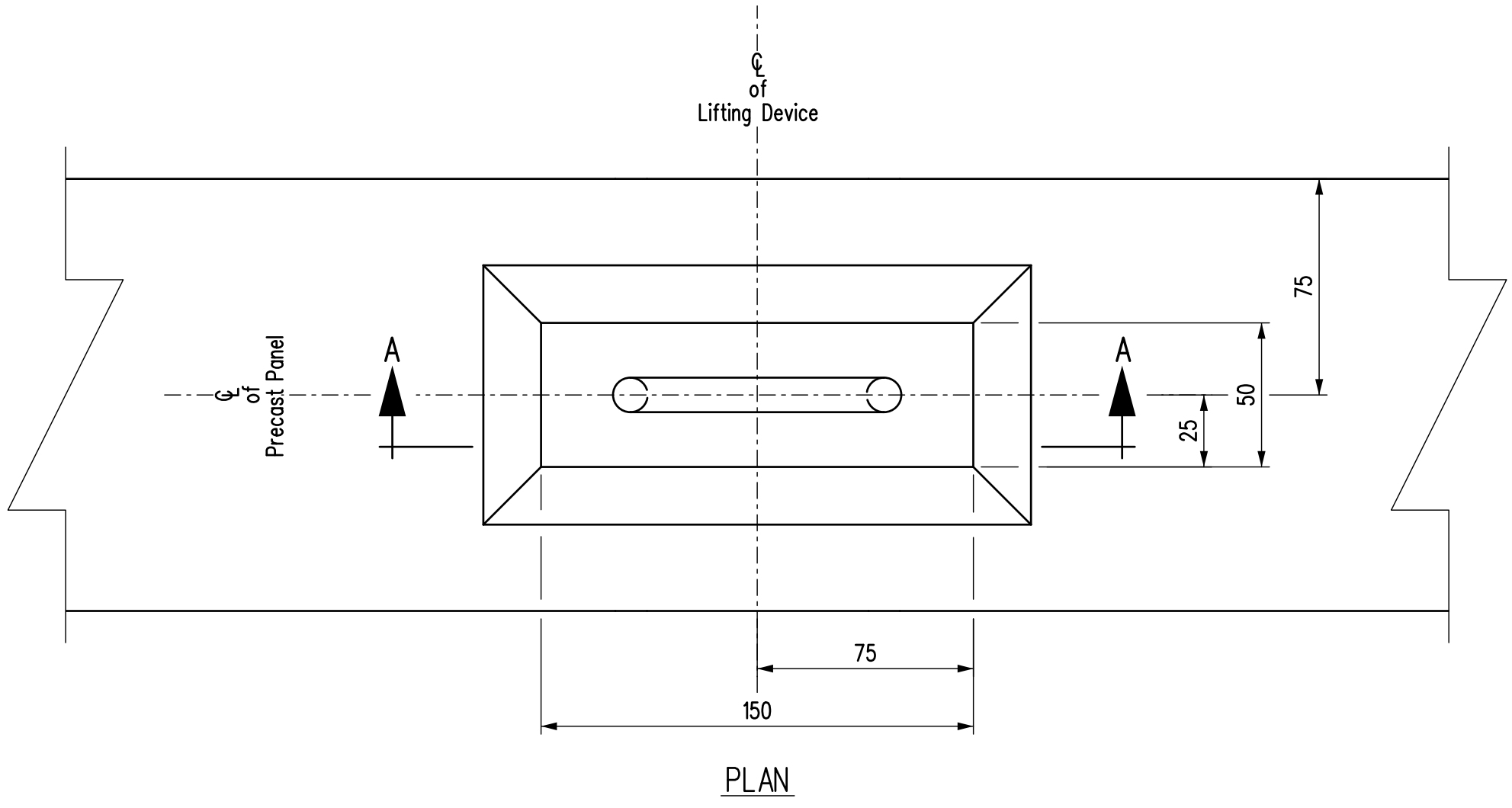
**ELEVATION**  
**PRECAST PANEL Mk. "N4" & "N4a"**  
 Panel Mk. "N4" shown, "N4a" similar except location of insert Mk. "Q5" at opposite end.



TYPICAL SECTION

- NOTES:**
1. All panel exposed edges to be chamfered 20 mm except no chamfer on panels Mk. "N1" & "N1a", or if shown.
  2. Mark reinforcing steel location on the edges of the back face of panels after casting.
  3. Concrete cover shall be 50 mm unless noted otherwise.
  4. Formed face to be placed as exposed face during construction.
  5. After precast panel installation, all lifting devices to be cut-off flush and grouted as directed by Engineer.
  6. For DETAIL "A" see sheet No. P2.
  7. For BILL OF REINFORCING STEEL see Sheet No. P2.

REVISIONS		PRECAST PANEL DETAILS	
20--	ISSUED FOR CONSTRUCTION		
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY:
DESIGN SEAL	RECORD SEAL		
PLACE ENGINEERS ELECTRONIC SEAL HERE		BY:	EXECUTIVE DIRECTOR OF STRUCTURES DATE
		CHECKED:	SCALE: 1:25 SHEET No. P1
		BY:	or as shown SITE No.
		CHECKED:	



SECTION A-A  
DETAIL "A"

SITE No. \_\_\_\_\_

### BILL OF REINFORCING FOR PRECAST PANELS

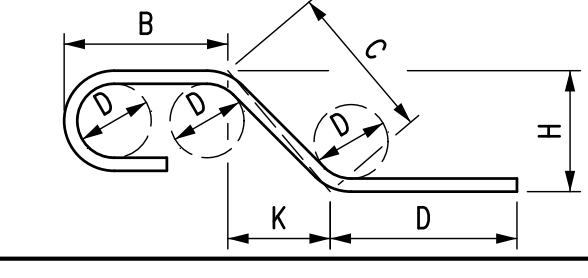
MARK	TYPE	PIN DIAMETER	LENGTH	PANEL TYPE	No. of PANELS	No. of BARS PER PANEL	TOTAL No. of BARS PER PANEL TYPE	BENDING DIAGRAM
1501_N1	STR		6 900	N1	2	6	12	
1502_N1	STR		600	N1	2	24	48	
1501_N1a	STR		6 900	N1a	2	6	12	
1502_N1a	STR		600	N1a	2	24	48	
1501_N2	STR		6 900	N2	4	10	40	
1502_N2	STR		1 200	N2	4	24	96	
1501_N4	STR		4 900	N4	2	16	32	
1502_N4	STR		1 900	N4	2	17	34	
1501_N4a	STR		4 900	N4a	2	16	32	
1502_N4a	STR		1 900	N4a	2	17	34	

Total mass of reinforcing steel							1659.80	kg
Panel Type	N1	N1a	N2	N3	N4	N4a		
Area m <sup>2</sup> /panel	4.90	4.90	9.10	-	10.00	10.00		
Total area of precast Panels							96.00	m <sup>2</sup>

**NOTES:**

- All dimensions given in bending diagram are out to out, except radii and extensions on 90°, 135° & 180° hooks. Extensions on 90°, 135° & 180° hooks are the "A" or "G" dimensions for standard 90°, 135° & 180° hooks referenced from the RSIC "Manual of Standard Practice". Radii are inside dimensions. All reinforcing steel bends and hooks shall conform to Clause 6.6.2 of C.S.A. A23.1-04, unless noted otherwise in the BILL OF REINFORCING STEEL.
- All reinforcing steel shall be deformed steel, unless noted otherwise in the BILL OF REINFORCING STEEL.
- All reinforcing steel shall conform to CSA G30.18-M92 "Billet Steel Bars for Concrete Reinforcement" Grade 400W, unless noted otherwise in the BILL OF REINFORCING STEEL.
- Like bars shall be bundled, securely tied and identified as to Mark and Site No. by appropriate means. All other items to be identified in a similar fashion.
- All bars shall be bent in accordance with the following detail:



### BILL OF MISCELLANEOUS METAL for PRECAST PANELS

Site No. \_\_\_\_\_

MARK No.	No.	DESCRIPTION	CORROSION PROTECTION	SIZE	LENGTH	REMARKS
Q5	4	Insert units	Hot dip galvanized			
		Each unit is fabricated from:				
		Steel plate		PL 10 x 150	250	As detailed
		2 - Studs Mk. "A1"		13 dia.	75	Nelson headed concrete anchors, Type H4L, Part No. 101-053-002 - As detailed
		3 - Bars Mk. "A2"		10 dia.	300	Nelson deformed bar anchors, Type D2L, Part No. 101-064-537 - As detailed
		2 - Heavy hex. nuts		for 19 dia. bolt		Grade DH or 2H heavy hex. nut, c/w metal or plastic sleeve
R34	8	A325 bolt c/w F436 hardened w washer		19 dia.	60	

**NOTES:**

- All material noted in the above Bill shall be hot dip galvanized after fabrication in accordance with CSA G164 for a minimum net retention of 610 g/m<sup>2</sup> unless otherwise stated in the specified material ASTM standards. The fabricator and galvanizer shall safeguard against embrittlement using recommended practices from applicable standards.
- Seal all welds prior to galvanizing.
- All structural steel to be CSA G40.21 Grade 300W.
- All bolts and inserts in the above Bill shall be Imperial thread.

TOP VIEW

FRONT VIEW  
INSERT Mk. "Q5"  
Scale 1:5

**NOTES:**

- For location of DETAIL "A" see sheet No. P1.
- Precast panel concrete strength: f'c = 35 MPa.

REVISIONS		PRECAST PANEL DETAILS			
<p>20__/__/____ ISSUED FOR CONSTRUCTION</p>		<p>DESIGN SEAL          RECORD SEAL</p>		<p>RELEASED FOR CONSTRUCTION BY:</p>	
<p><b>PLACE ENGINEERS ELECTRONIC SEAL HERE</b></p>		<p><b>Manitoba</b> Infrastructure</p> <p>Water Management and Structures</p>		<p>EXECUTIVE DIRECTOR OF STRUCTURES      DATE</p>	
		<p>DESIGN BY: <u>        </u></p> <p>CHECKED: <u>        </u></p>		<p>SCALE: 1:2</p> <p>SHEET No. P2</p>	
<p>DETAILS BY: <u>        </u></p> <p>CHECKED: <u>        </u></p>		<p>OR AS SHOWN</p>		<p>SITE No. <u>        </u></p>	