

# 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 SPAN OF PRECAST PRESTRESSED CONCRETE CHANNEL GIRDERS WITH ASPHALT OVERLAY

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

**ROADWAY WIDTH** 10 800 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. STEEL PILE CAP DETAILS
8. STEEL PILE CAP DETAILS
9. BEARING AND ERECTION DETAILS
10. RAILING LAYOUT AND DETAILS
11. RAILING DETAILS
12. 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  $\phi$  low relaxation strands,  $f_{pu} = 1860$  MPa

#### PILE LOADING

	END PILE BENTS	INTERMEDIATE PILE BENTS
MAXIMUM FACTORED LOAD	$628$ kN	$810$ kN
FACTORED BEARING RESISTANCE	<span style="border: 1px solid black; display: inline-block; width: 40px; height: 15px;"></span>	<span style="border: 1px solid black; display: inline-block; width: 40px; height: 15px;"></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 # : _____  |
| <input type="checkbox"/> | FISHERIES AND OCEANS CANADA - AUTHORIZATION OR REVIEW |
|                          | DATE : _____  |
|                          | FILE # : _____  |
| <input type="checkbox"/> | TRANSPORT CANADA - NAVIGATION ACT                     |
|                          | DATE : _____  |
|                          | FILE # : _____  |
| <input type="checkbox"/> | MANITOBA INFRASTRUCTURE ENVIRONMENTAL APPROVAL        |
|                          | DATE : _____  |
|                          | FILE # : _____  |
| <input type="checkbox"/> | ENVIRONMENTAL REVIEW COMPLETED                        |
|                          | DATE : _____  |
|                          | COMPLETED BY : _____                                  |

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:

CHECKED BY:  DATE:

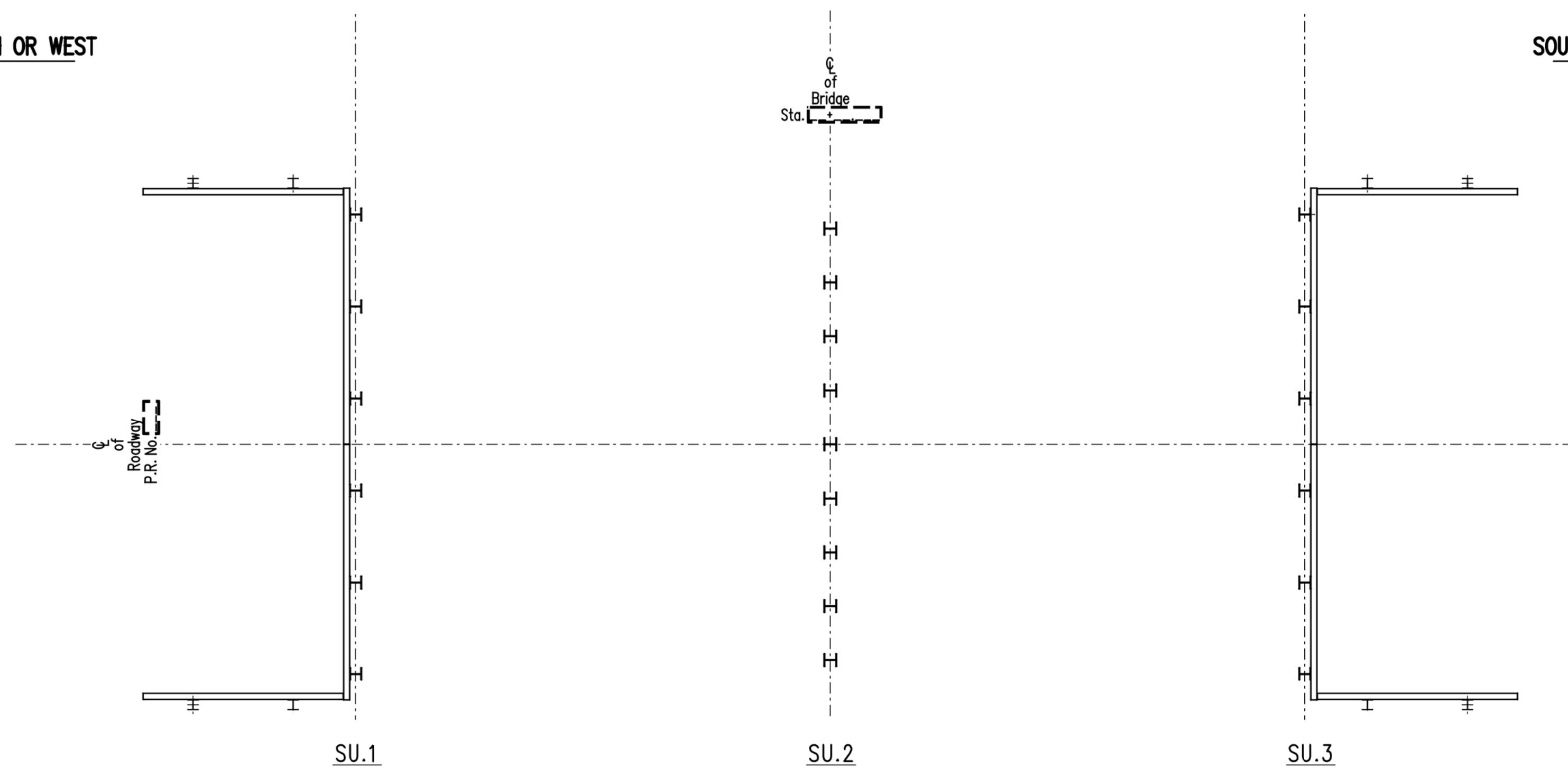
SHEET No. 1

SITE No.





← NORTH OR WEST



SU.1

SU.2

SU.3


→ SOUTH OR EAST

**PLAN**

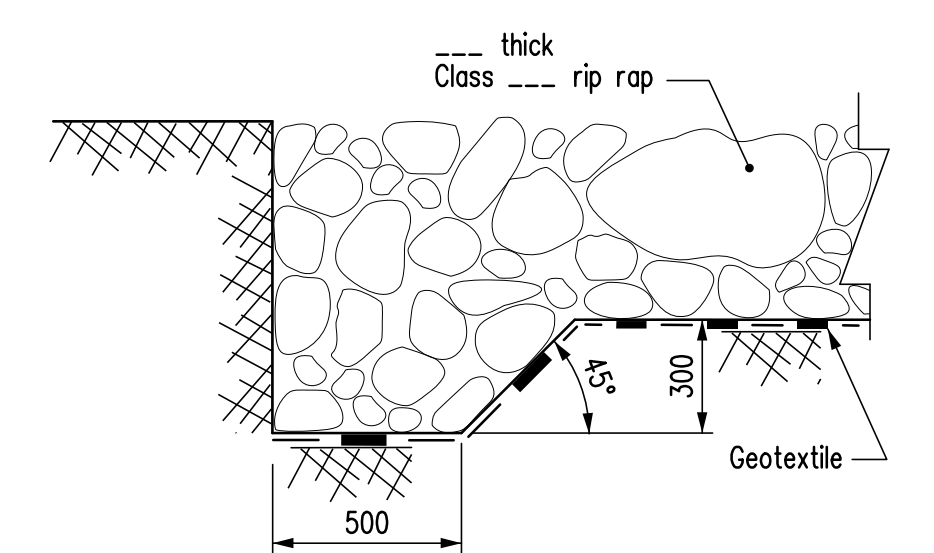
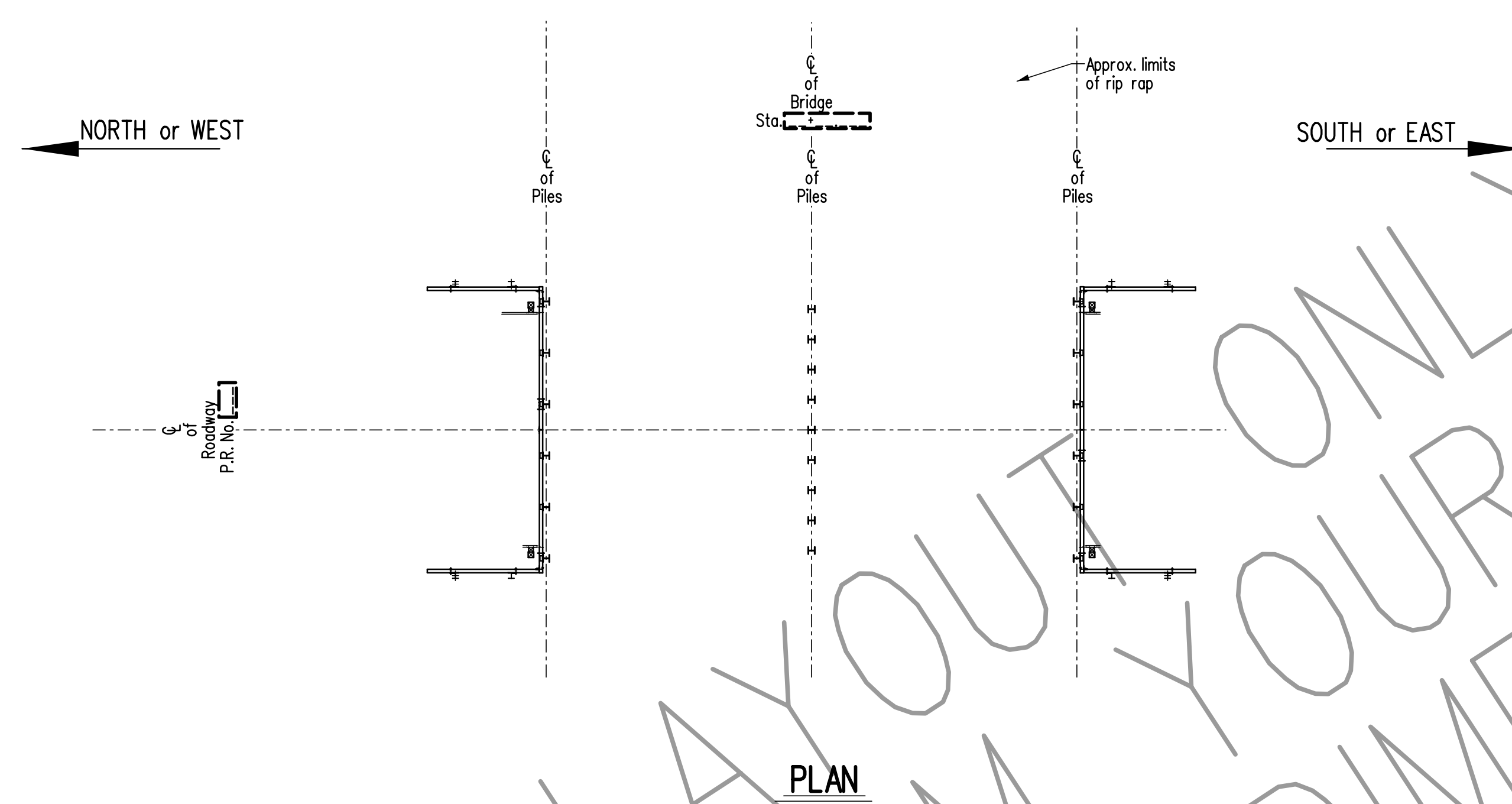
Showing Bore Hole locations

**NOTES - re: Boring Logs**

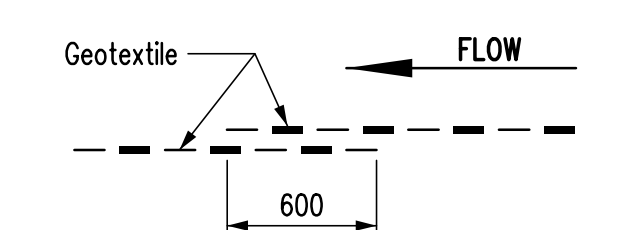
1. The Department provides log boring information shown on the Plans. This information may not be representative of the soil conditions throughout the site. Contractors may peruse all available soil information in the Water Management and Structures Branch located at 6th floor, 215 Garry Street, Winnipeg.
2. 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
3. All stations, elevations, offsets and depths as shown are in meters. All dimensions are in millimeters.
4. All bore hole locations shown in plan view are approximate.
5. Elevations on boring logs are at a vertical scale of 1:100.

REVISIONS		BORING LOGS	
DATE	BY	DESCRIPTION	
DESIGN SEAL	RECORD SEAL		
<p><b>PLACE ENGINEERS ELECTRONIC SEAL HERE</b></p>		 <p><b>Manitoba</b> Infrastructure Water Management and Structures</p>	<p>RELEASED FOR CONSTRUCTION BY: _____</p> <p>EXECUTIVE DIRECTOR OF STRUCTURES    DATE _____</p> <p>SCALE: 1:100</p> <p>SHEET No. <u>  3  </u></p> <p>or as shown    SITE No. <u>      </u></p>
DESIGN	BY: _____	B.A.N.	
CHECKED: _____	BY: _____	K.P.	
DETAILS	CHECKED: _____		

GENERATED ONLY SITE PLAN  
 EXAMPLE LAYOUT FROM YOUR SITE SPECIFIC SHEET DIMENSIONS



**EDGE TREATMENT**



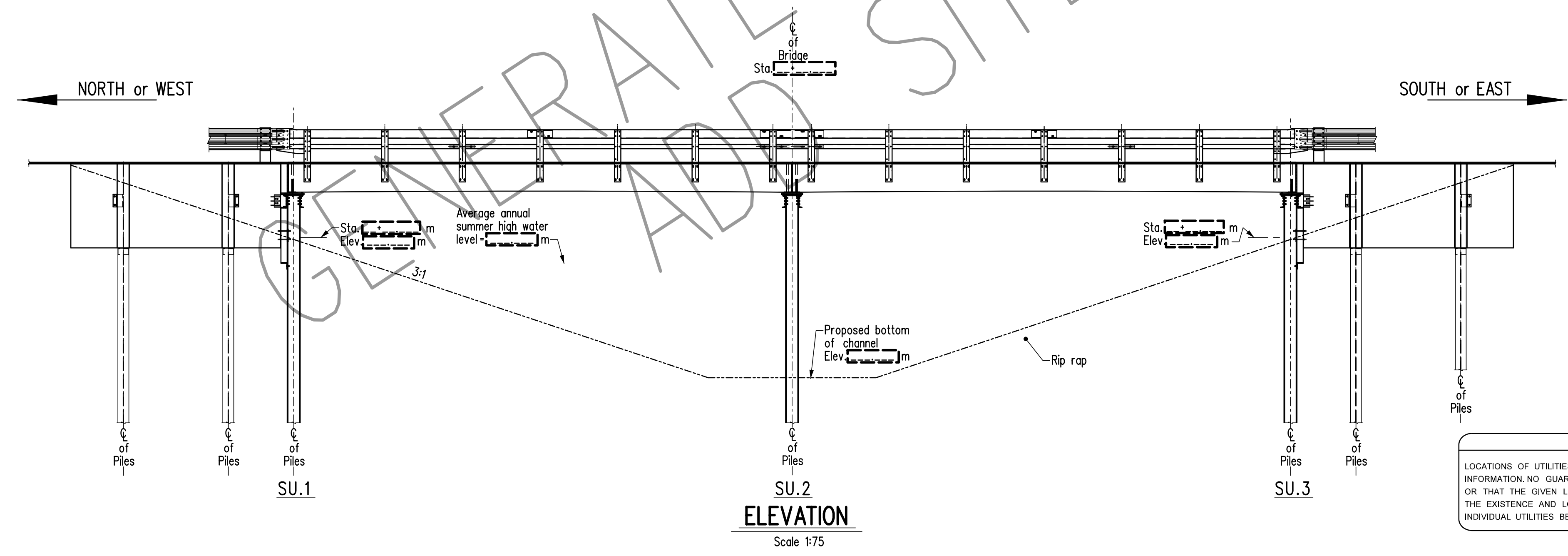
**OVERLAPPING DETAILS**

**RIP RAP DETAILS**

Not To Scale

- NOTES:
- All geotextile shall be Non-Woven Geotextile, Class 1 (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.



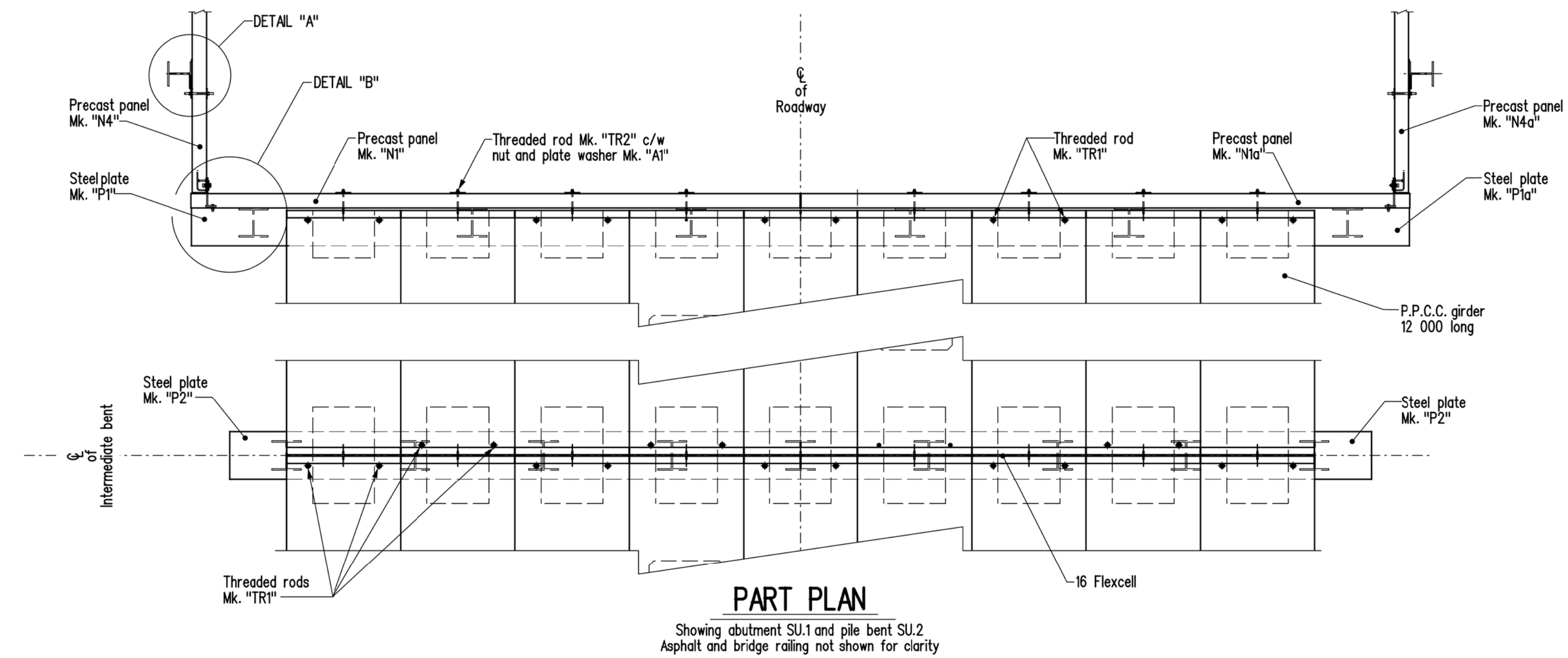
**UTILITY DISCLAIMER:**  
 LOCATIONS OF UTILITIES AS SHOWN ARE BASED ON READILY AVAILABLE INFORMATION. NO GUARANTEE IS GIVEN THAT ALL UTILITIES ARE SHOWN OR THAT THE GIVEN LOCATIONS ARE EXACT. CONTRACTOR SHALL CONFIRM THE EXISTENCE AND LOCATION OF UTILITIES BY OBTAINING FROM THE INDIVIDUAL UTILITIES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

REVISIONS		SITE AND EROSION CONTROL DETAILS	
DATE	DESCRIPTION		
		RELEASED FOR CONSTRUCTION BY: _____	
		EXECUTIVE DIRECTOR OF STRUCTURES DATE: _____	
		SCALE: 1:200	
		SHEET No. 4	
		or as shown SITE No. _____	

DATE	BY	DESIGN	RECORD SEAL

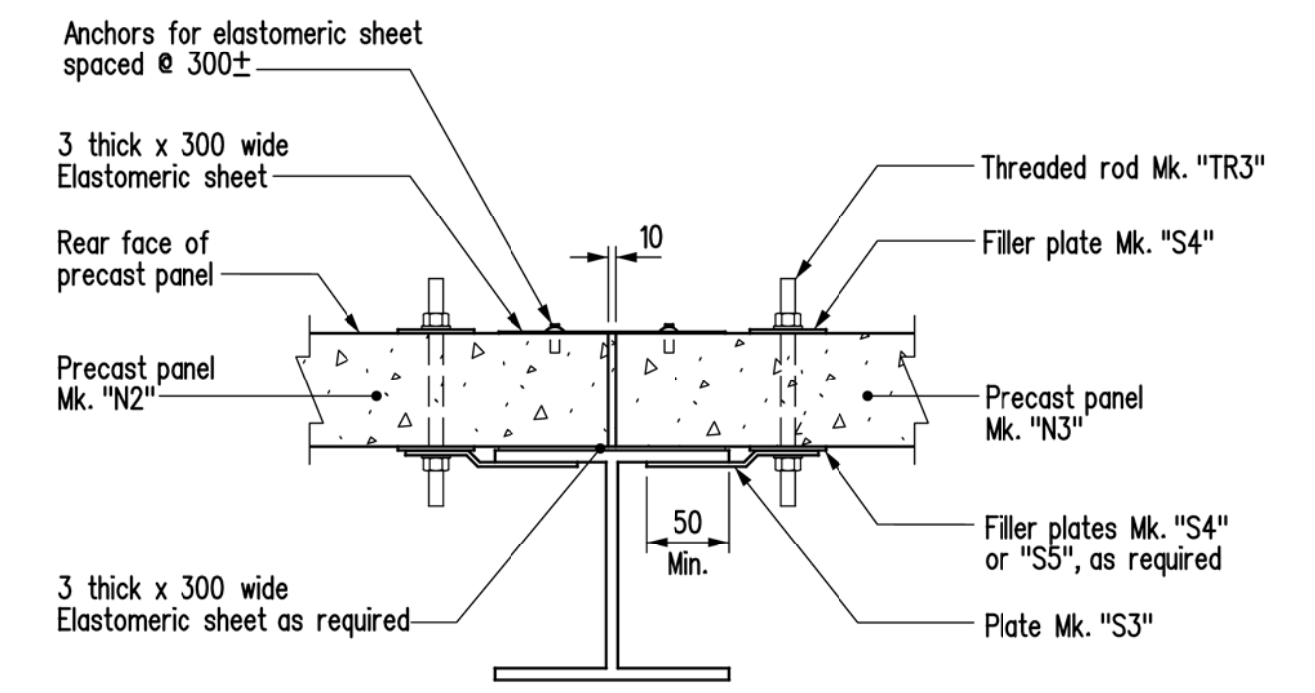
PLACE ENGINEERS ELECTRONIC SEAL HERE



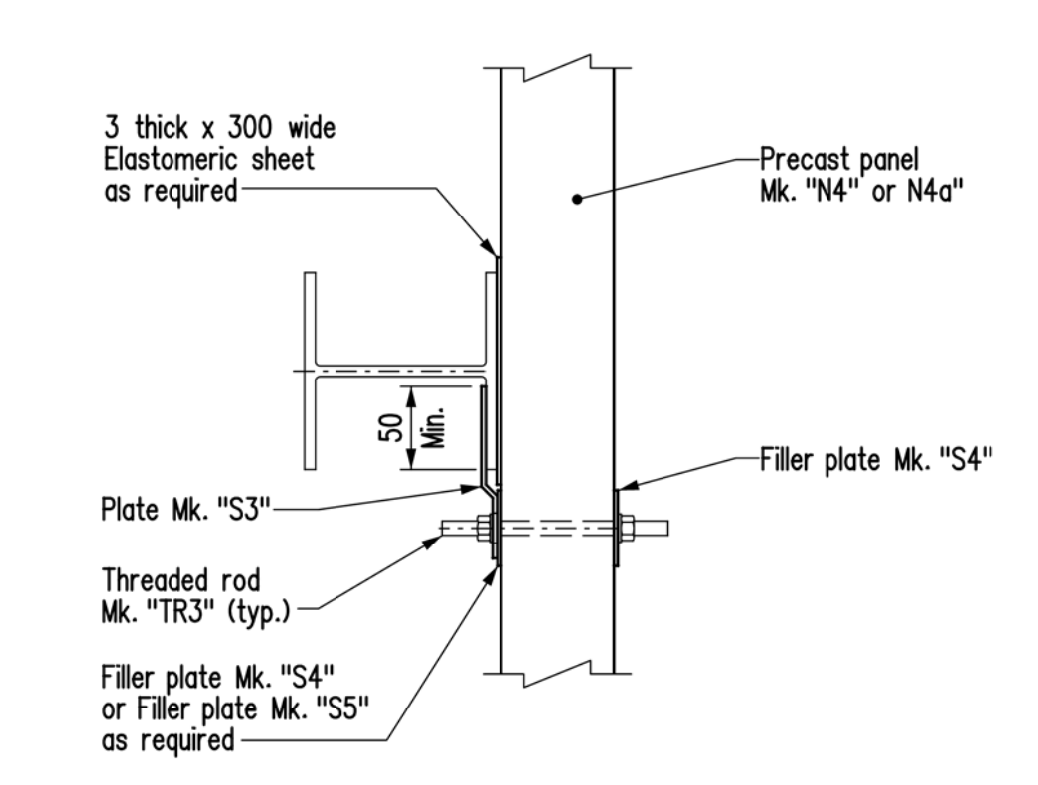


### PART PLAN

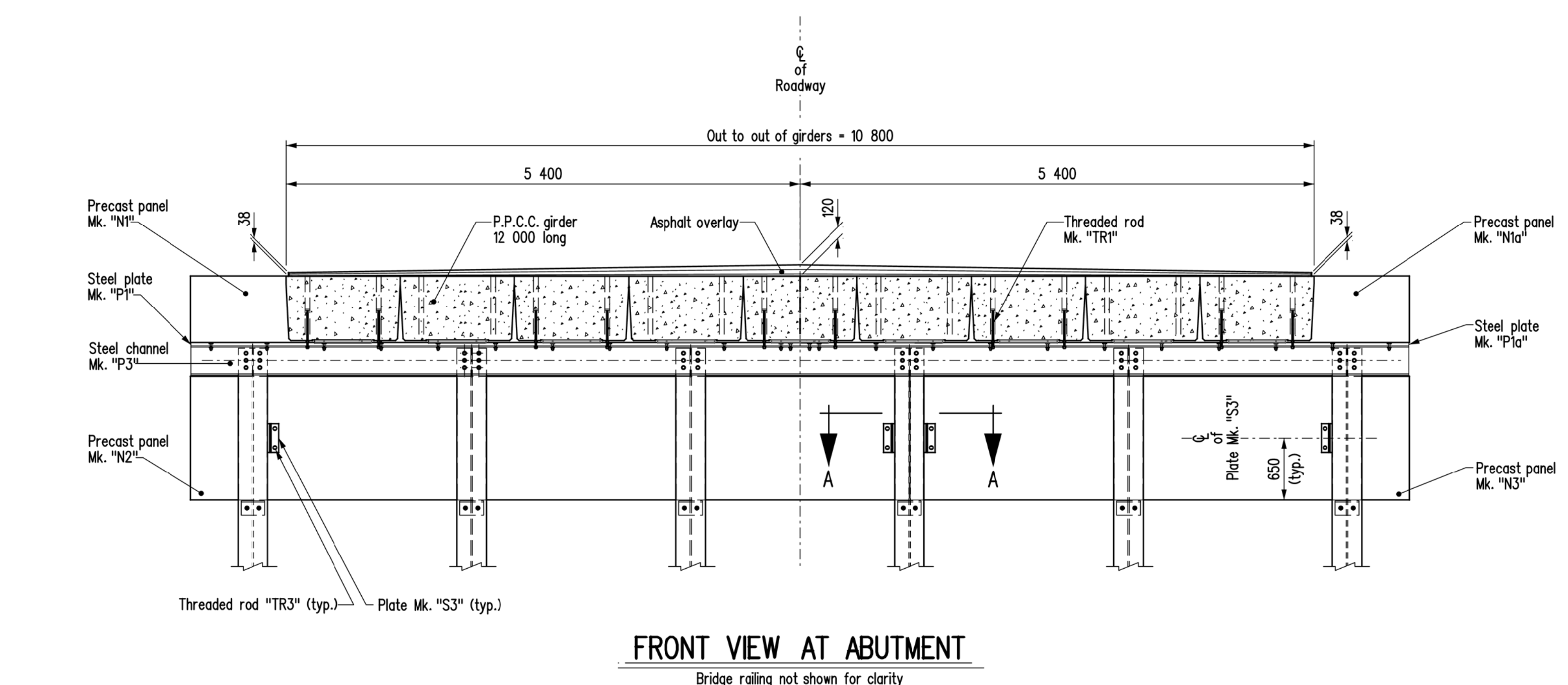
Showing abutment SU.1 and pile bent SU.2  
Asphalt and bridge railing not shown for clarity



SECTION A-A  
Scale 1:10

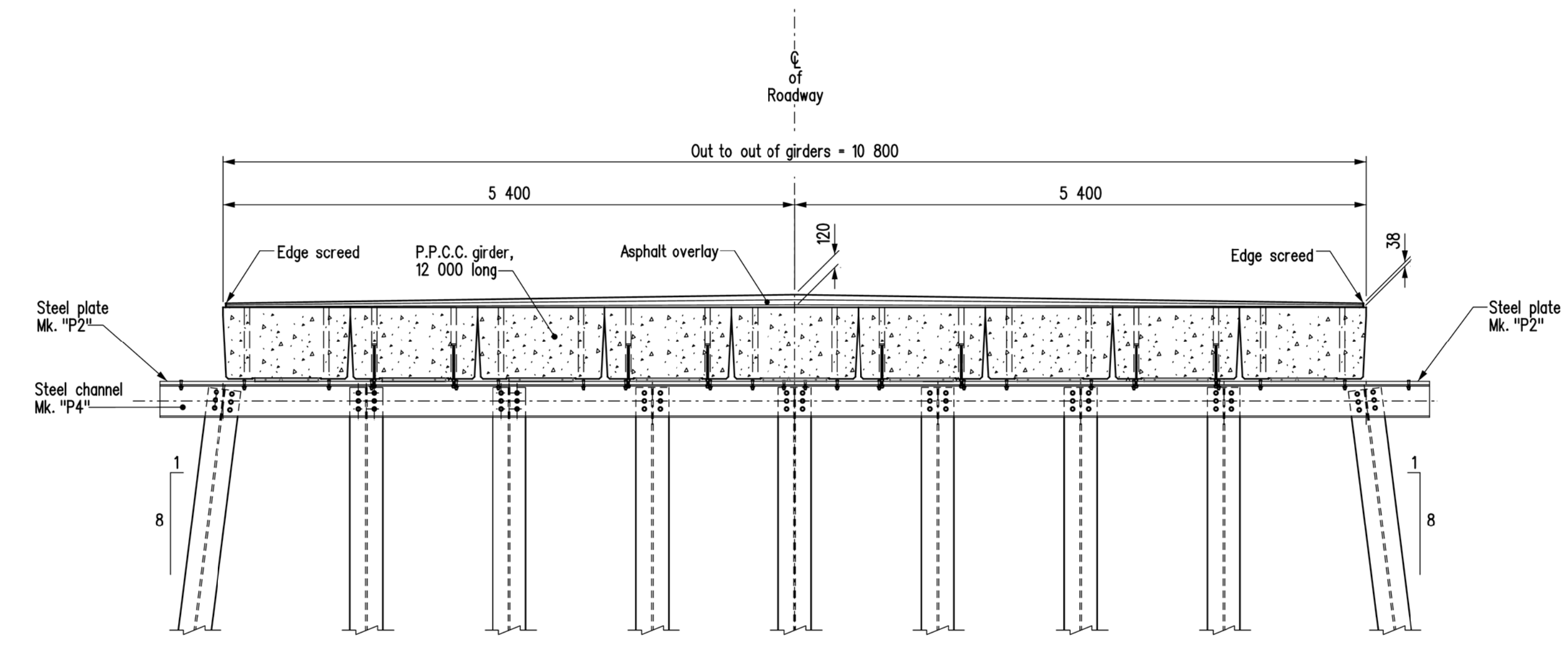


DETAIL "A"  
Scale 1:10



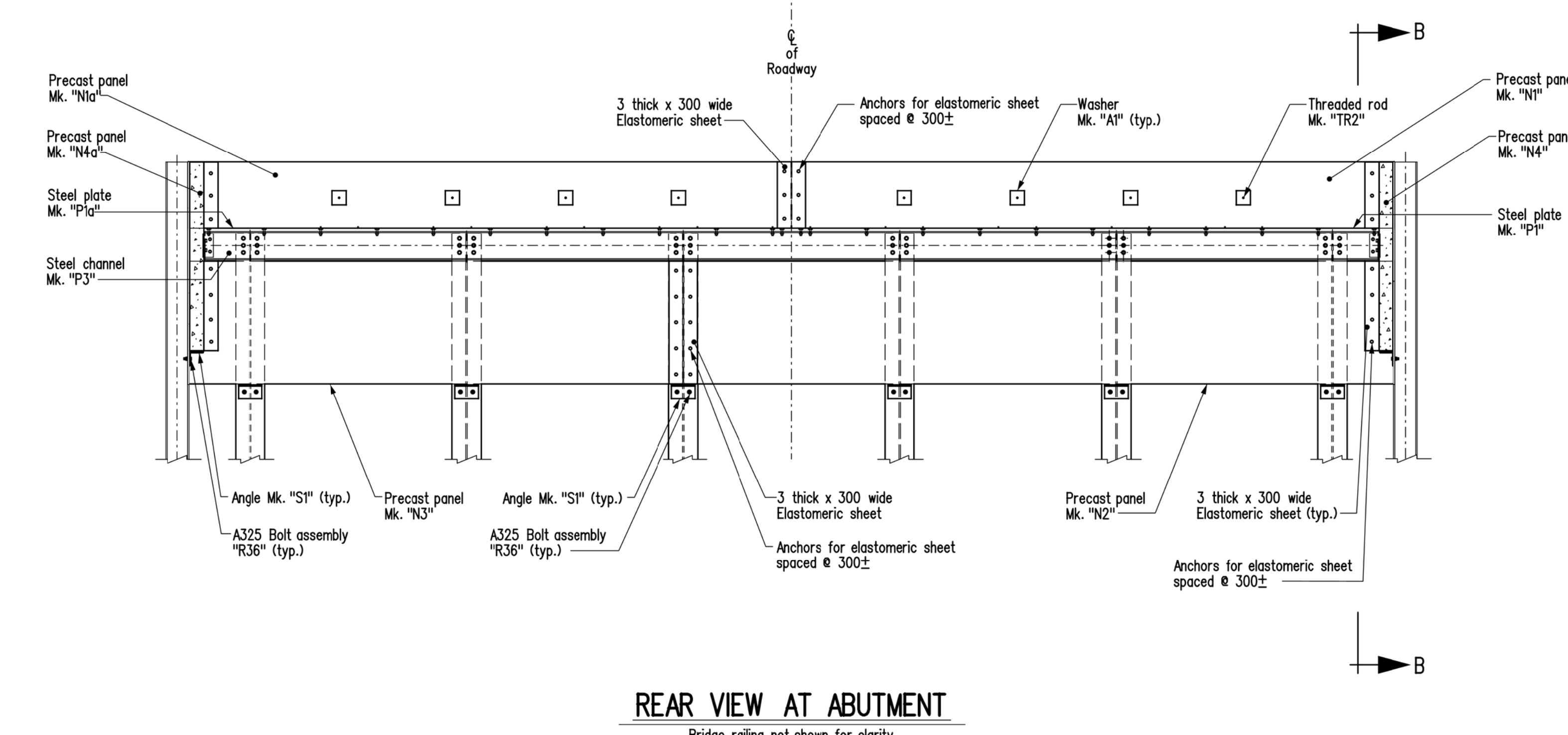
### FRONT VIEW AT ABUTMENT

Bridge railing not shown for clarity



### CROSS SECTION AT INTERMEDIATE PILE BENT

Bridge railing and intermediate pile bent cross bracing not shown for clarity



### REAR VIEW AT ABUTMENT

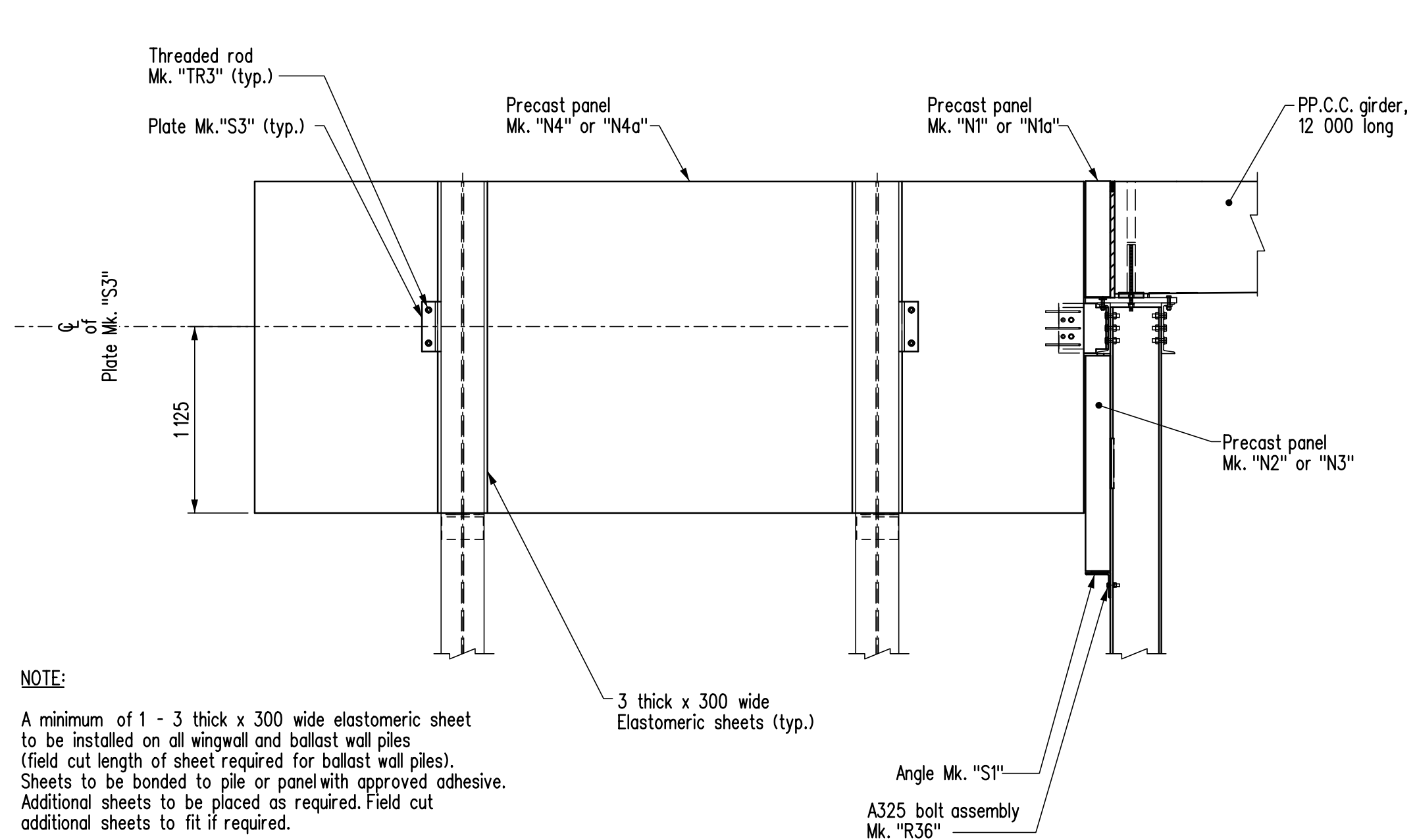
Bridge railing not shown for clarity

- 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 C of roadway.

REVISIONS		ASSEMBLY DETAILS	
DATE	BY	DESCRIPTION	

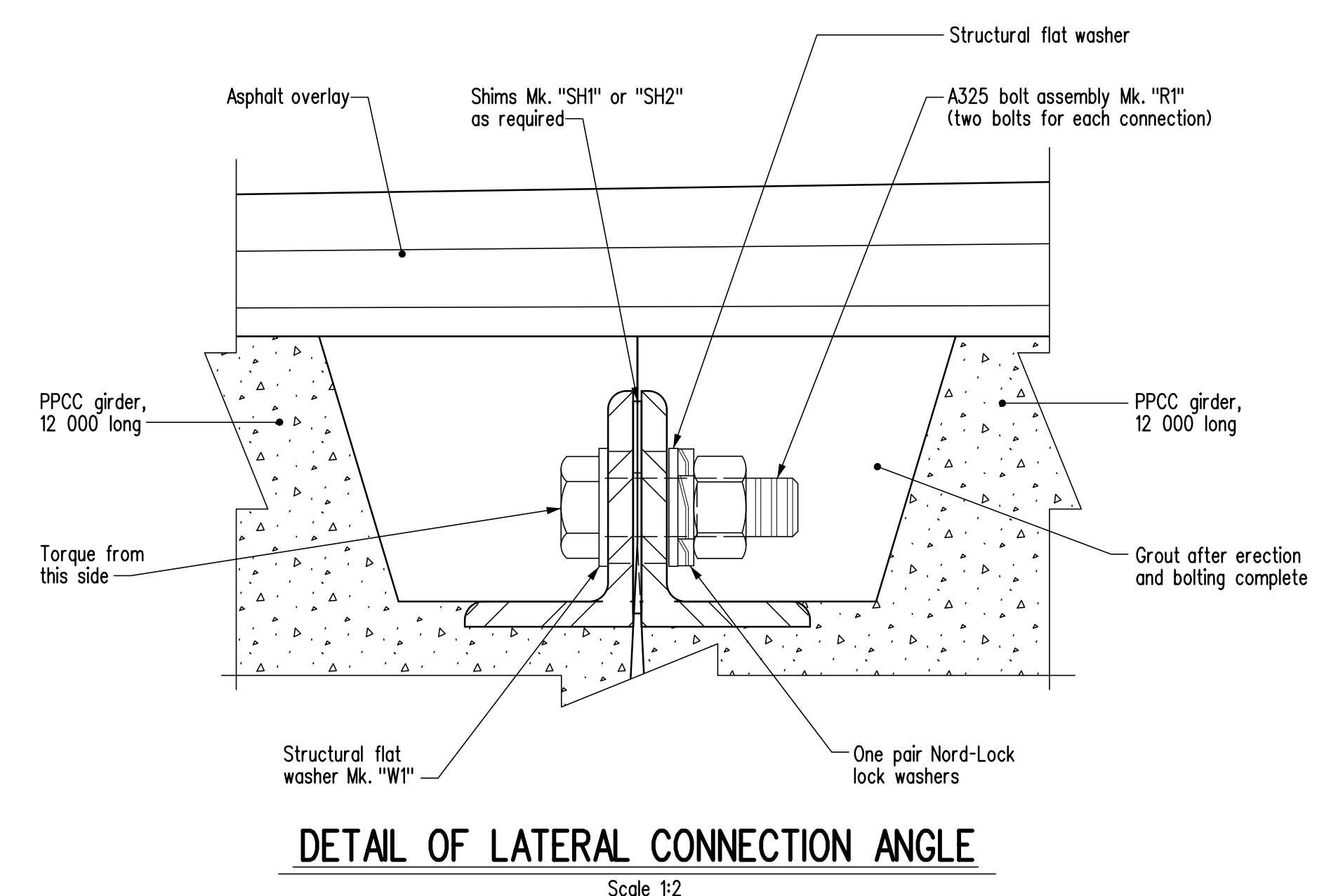
  

PLACE ENGINEERS ELECTRONIC SEAL HERE	DESIGN SEAL	RECORD SEAL	<p><b>Manitoba</b> Infrastructure Water Management and Structures</p> <p>BY: _____ B.A.N. CHECKED: _____ BY: _____ K.P. CHECKED: _____</p> <p>RELEASED FOR CONSTRUCTION BY: _____ DATE _____</p> <p>SCALE: 1:40 SHEET No. 6</p> <p>or as shown SITE No. _____</p>



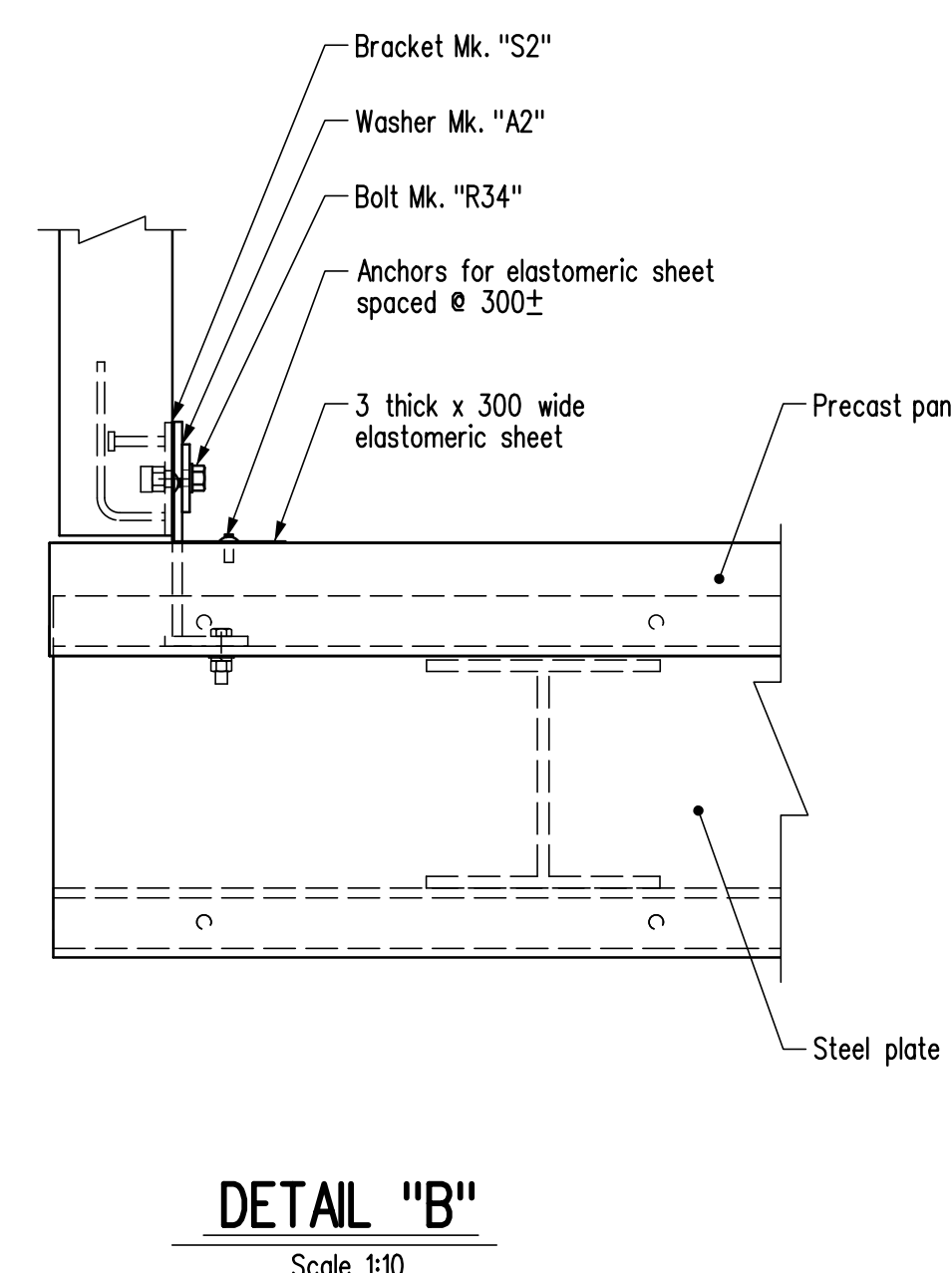
### PART SIDE ELEVATION

Bridge railing not shown for clarity



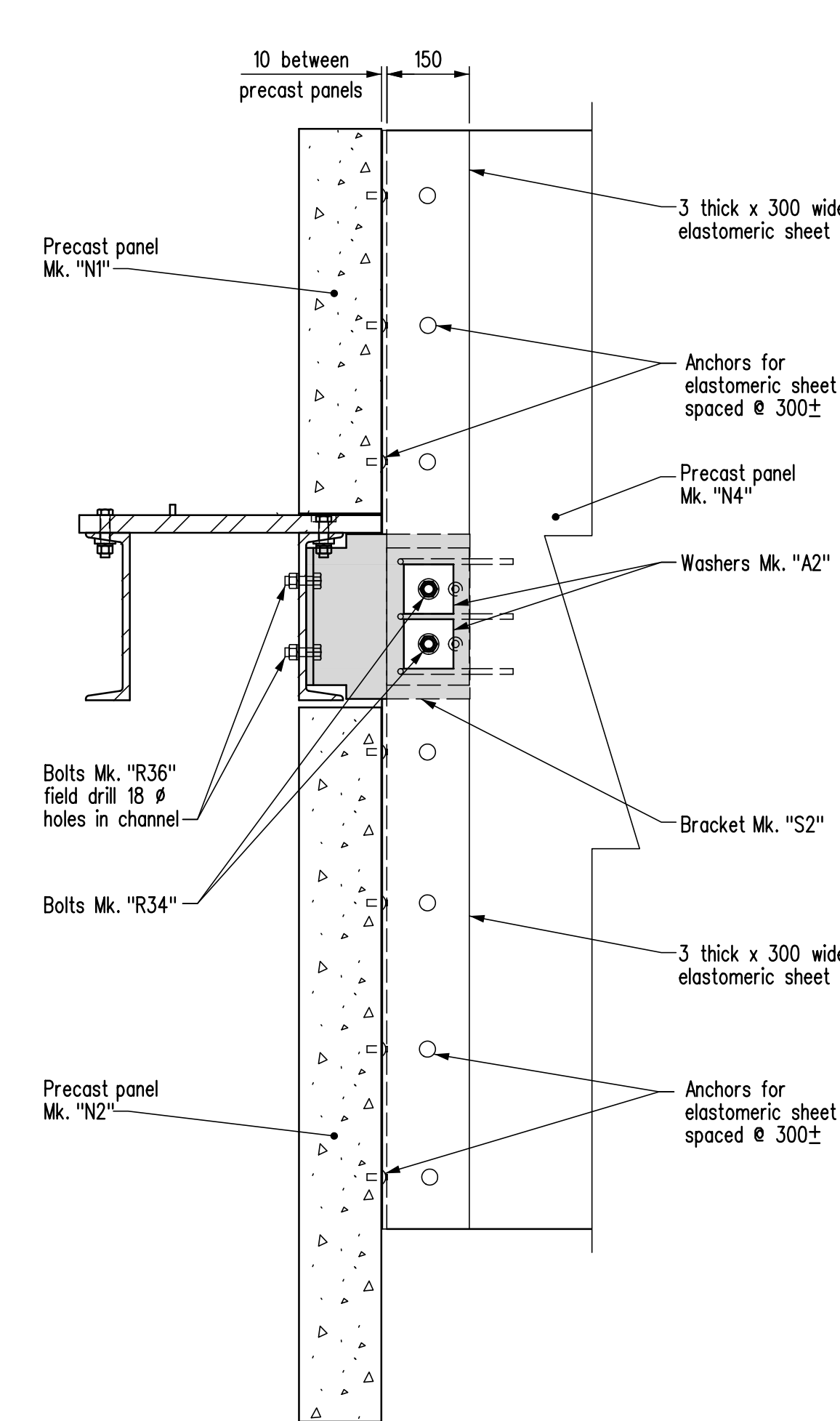
### DETAIL OF LATERAL CONNECTION ANGLE

Scale 1:2



### DETAIL "B"

Scale 1:10



### SECTION B-B

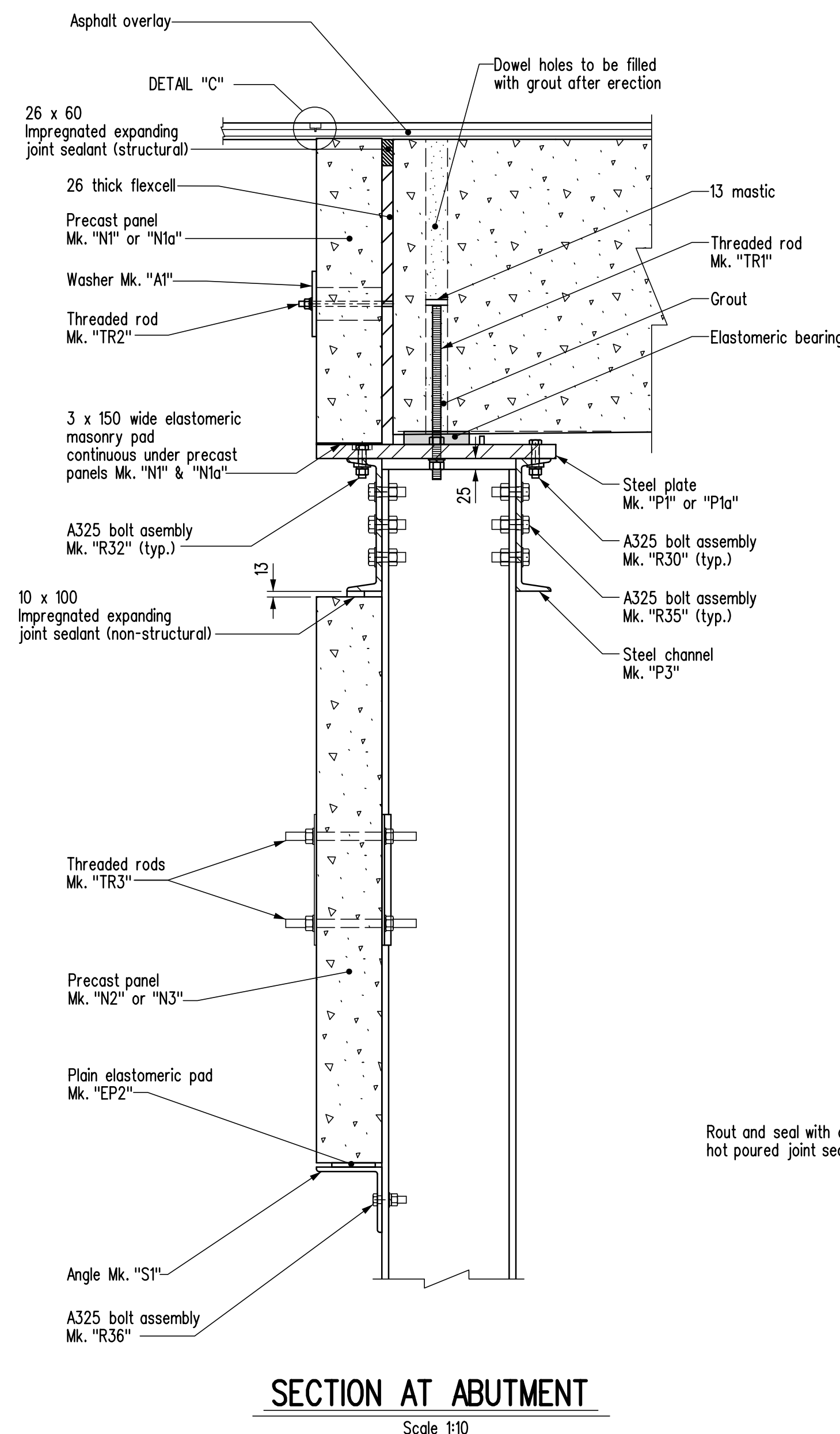
Scale 1:10

**NOTE:**

A minimum of 1 - 3 thick x 300 wide elastomeric sheet to be installed on all wingwall and ballast wall piles (field cut length of sheet required for ballast wall piles). Sheets to be bonded to pile or panel with approved adhesive. Additional sheets to be placed as required. Field cut additional sheets to fit if required.

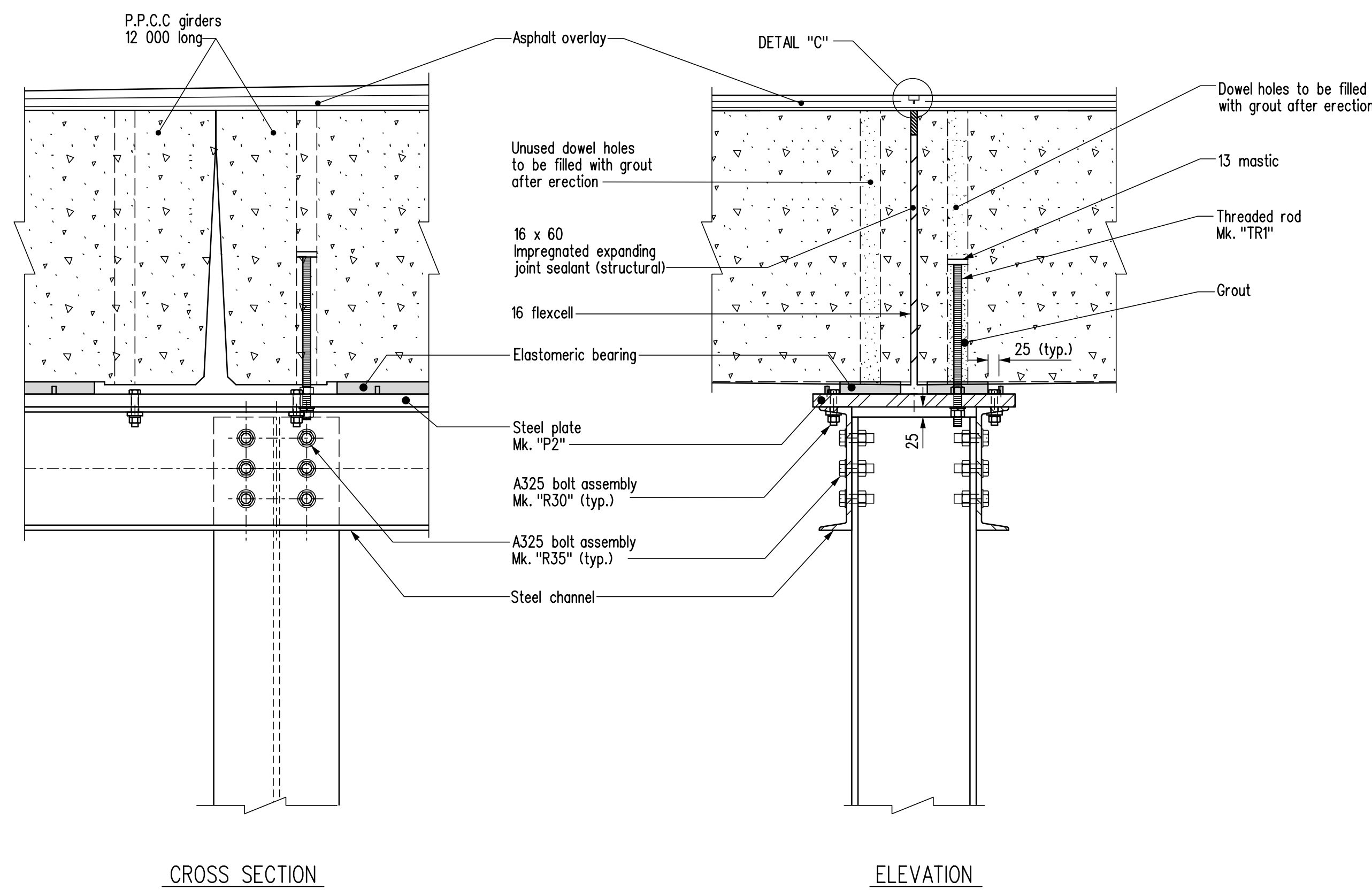
**NOTES:**

- RE: BOLTING
  - 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.
  - 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.
  - 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.
  - GIRDER TO STEEL CAP**
    - Threaded rod Mk. "TR1" - one standard flat washer and structural lock washer and two hex. nuts.
- High strength bolts shall be tightened by the turn-of-nut method as per Bridge Specifications. Ensure nuts are lubricated prior to bolting.
- Fill counter bored holes with mastic filler after tightening bolts.
- When grouting dowel holes in girders, ensure that there is no grout between bottom of girder and bearing plate.
- Apply galvalloy to all field welds & areas where galvanizing has been damaged.
- Impregnated expanding joint sealant shall be installed as per manufacturer's recommendations.



### SECTION AT ABUTMENT

Scale 1:10

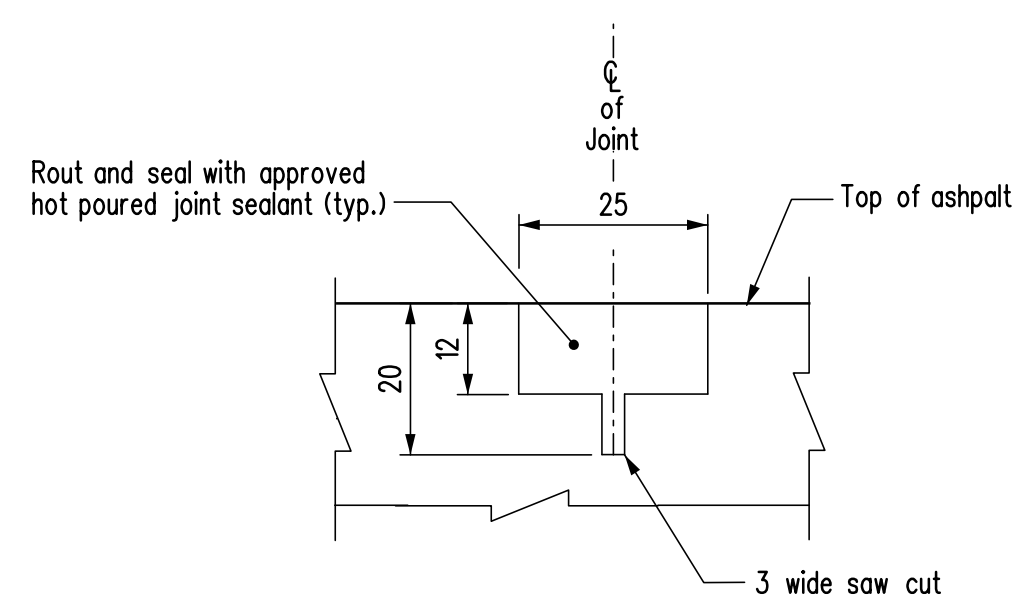


### CROSS SECTION

### ELEVATION

### DETAILS AT INTERMEDIATE BENT

Scale 1:10



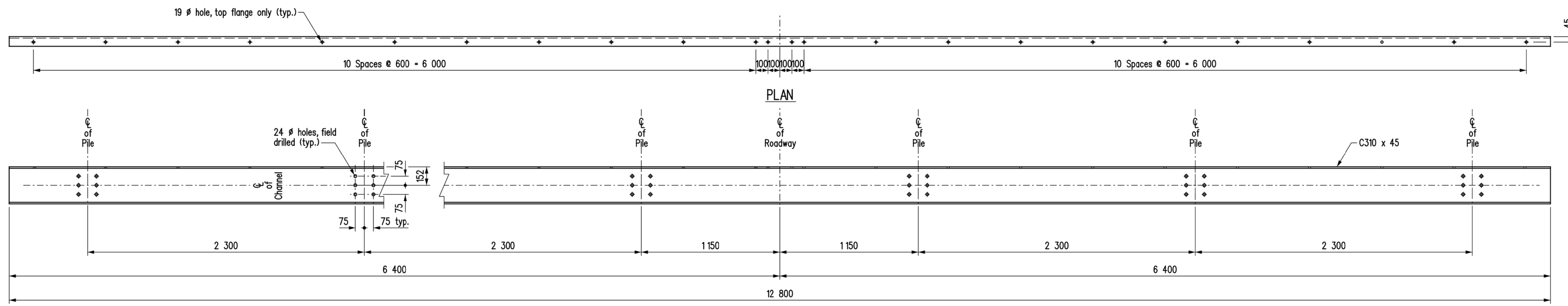
### DETAIL "C"

Scale 1:1

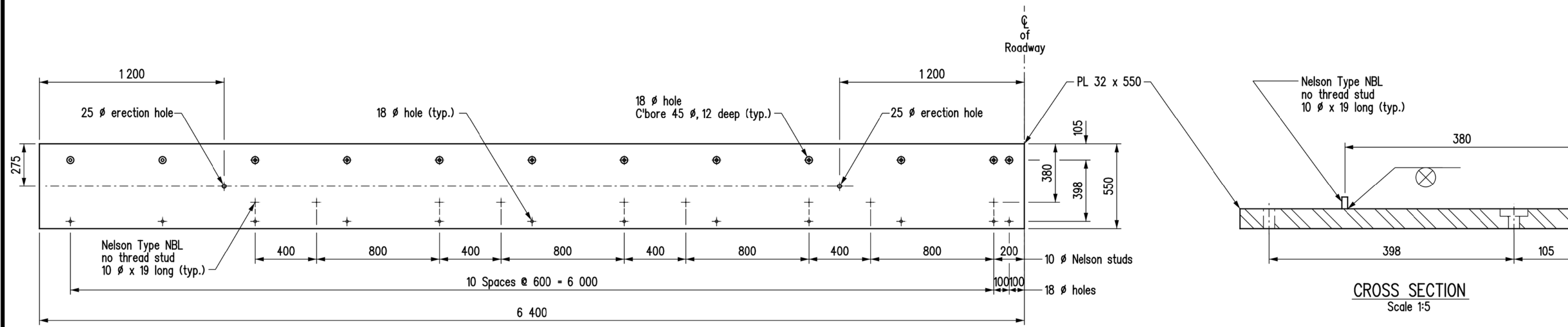
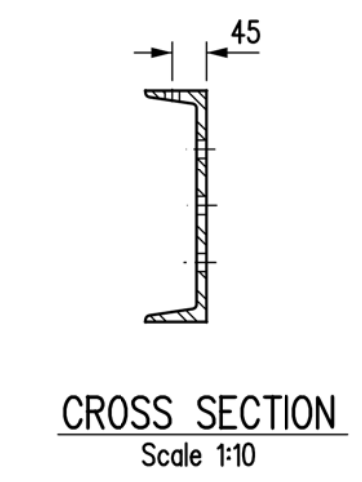
**NOTE:**

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

REVISIONS		ASSEMBLY DETAILS			
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY:		
DESIGN SEAL		RECORD SEAL			
PLACE ENGINEERS ELECTRONIC SEAL HERE					
				EXECUTIVE DIRECTOR OF STRUCTURES DATE	
				SCALE: 1:30 SHEET No. 7	
DETAILS		or as shown SITE No. <input type="text"/>			



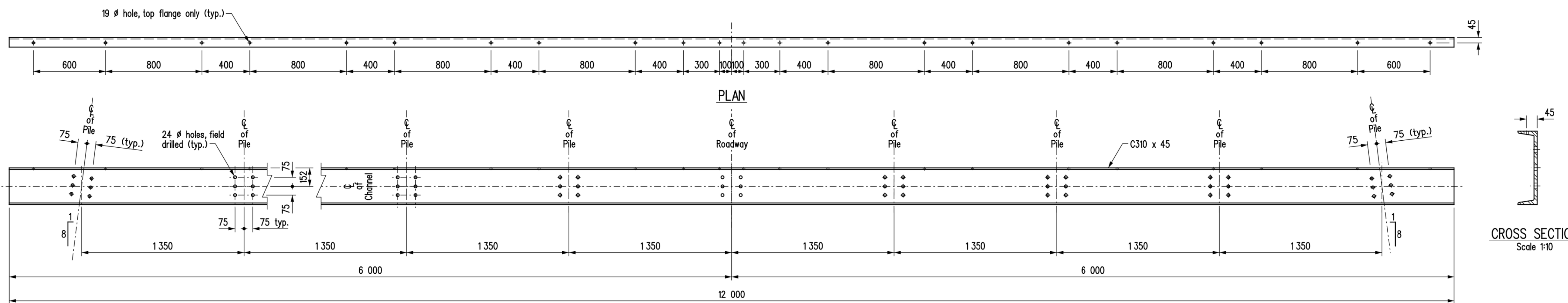
ELEVATION  
**STEEL CHANNEL MK "P3"**



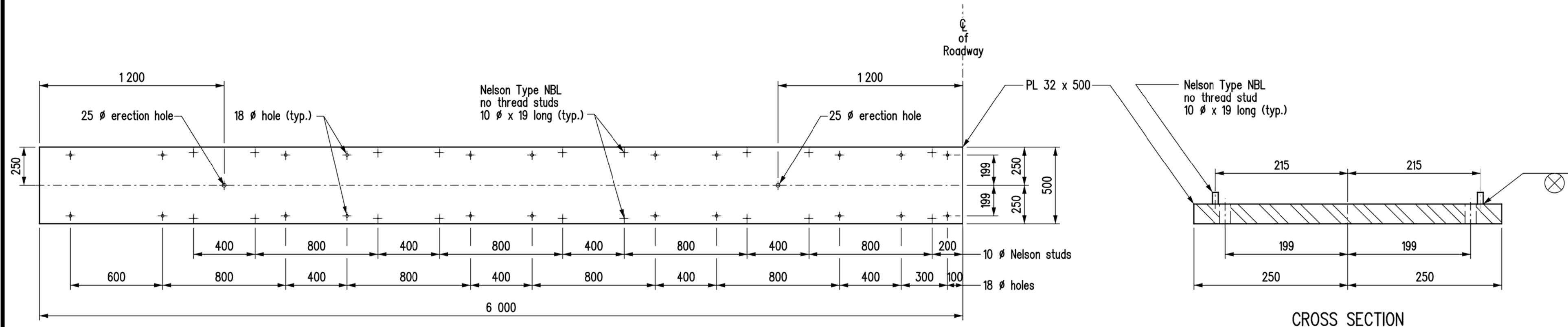
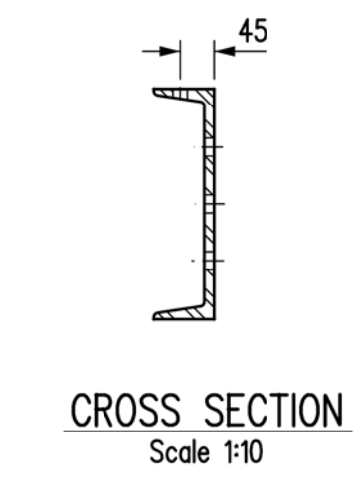
PLAN  
**STEEL PLATE MK "P1" & "P1a"**  
Plate Mk. "P1" as shown, Plate "P1a" opposite hand

CROSS SECTION  
Scale 1:5

FOR ABUTMENTS



ELEVATION  
**STEEL CHANNEL MK "P4"**



PLAN  
**STEEL PLATE MK "P2"**

CROSS SECTION  
Scale 1:5

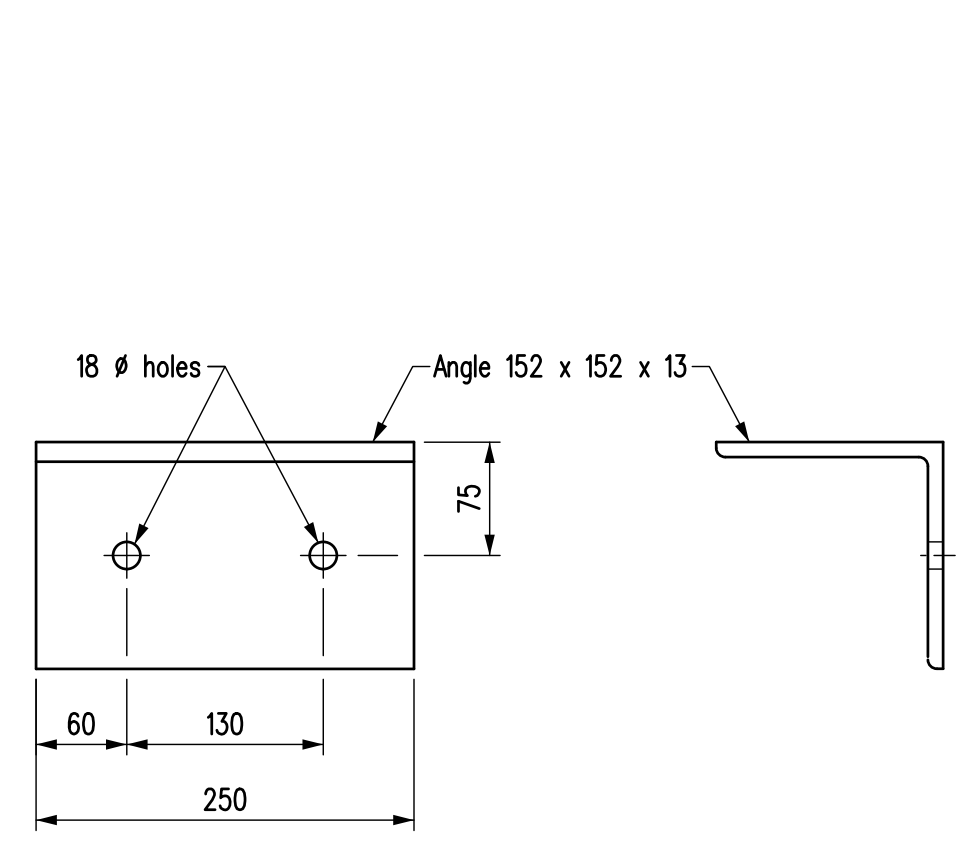
FOR INTERMEDIATE PILE BENTS

REVISIONS		STEEL PILE CAP DETAILS	
DATE	BY	DESIGN SEAL	RECORD SEAL
<p>PLACE ENGINEERS ELECTRONIC SEAL HERE</p>		<p>Manitoba Infrastructure Water Management and Structures</p>	
<p>DESIGN BY: <u>B.A.N.</u></p>		<p>RELEASED FOR CONSTRUCTION BY: _____</p>	
<p>CHECKED: _____</p>		<p>EXECUTIVE DIRECTOR OF STRUCTURES DATE</p>	
<p>DETAILS BY: <u>K.P.</u></p>		<p>SCALE: <u>Scale 1:20</u> SHEET No. <u>8</u></p>	
<p>CHECKED: _____</p>		<p>or as shown SITE No. <u>5555</u></p>	

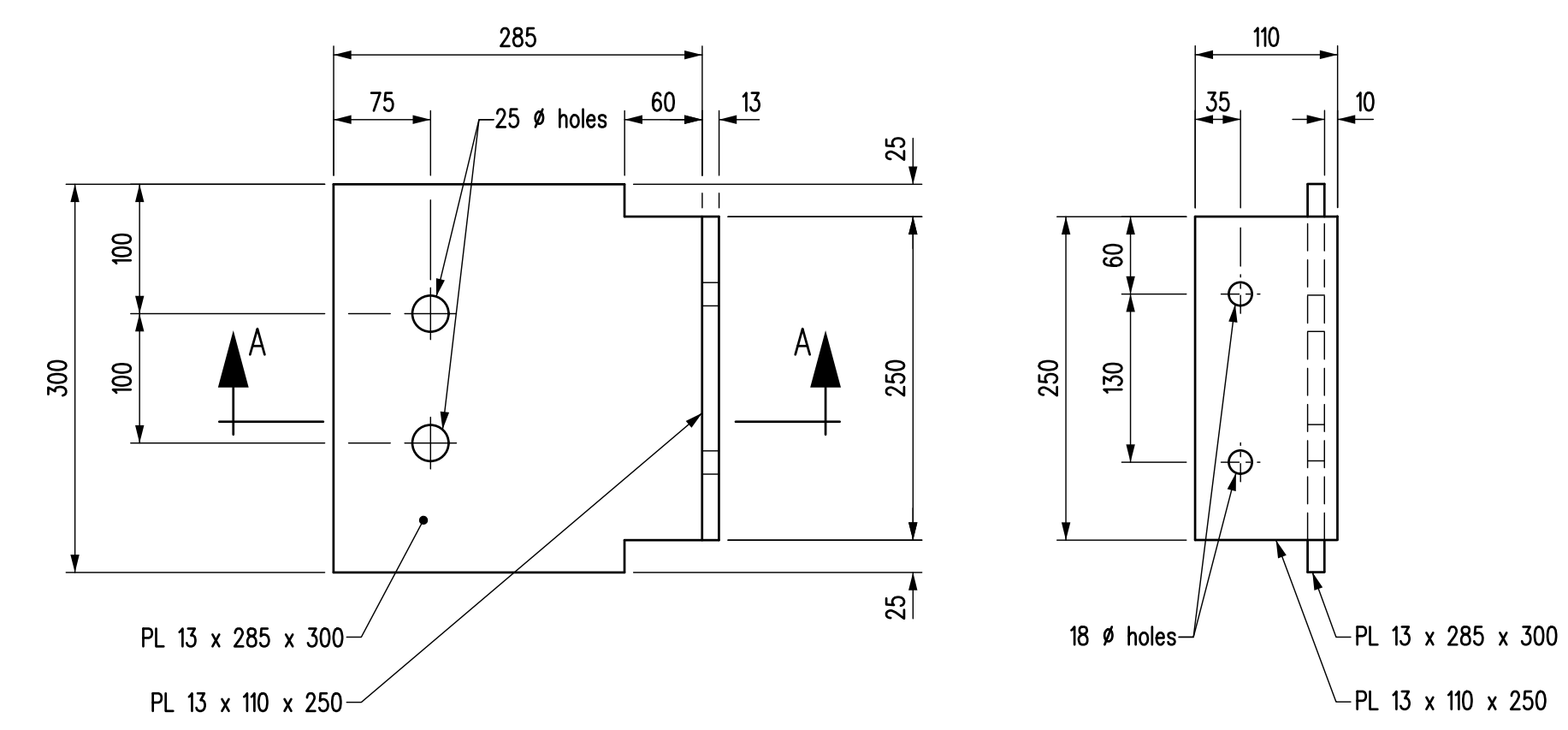
**BILL OF MISCELLANEOUS METAL 10 800 ROADWAY WIDTH - 2 SPAN** Site No. \_\_\_\_\_

MARK No.	No.	DESCRIPTION	CORROSION PROTECTION	SIZE	LENGTH	REMARKS	COMPONENT MASS	MASS PER UNIT	TOTAL MASS
P1	2	Steel plate	Hot dip galvanized						1768.66
		Each unit to be fabricated from:							
		1 - Steel plate		PL 32x550	6 400	See detail for Abutment	884.224	884.224	
		9 - Nelson Type NBL, no thread studs		10 dia.	19	Part No. 101-063-167	0.012	0.108	
								884.332	
P1a	2	Steel plate	Hot dip galvanized						1768.66
		Each unit to be fabricated from:							
		1 - Steel plate		PL 32x550	6 400	See detail for Abutment	884.224	884.224	
		9 - Nelson Type NBL, no thread studs		10 dia.	19	Part No. 101-063-167	0.012	0.108	
								884.332	
P2	2	Steel plate	Hot dip galvanized						1507.63
		Each unit to be fabricated from:							
		1 - Steel plate		PL 32x500	6 000	See detail for Intermediate Bent	753.600	753.600	
		18 - Nelson Type NBL, no thread studs		10 dia.	19	Part No. 101-063-167	0.012	0.216	
								753.816	
P3	4	Steel channel	Hot dip galvanized	C310x45	12 800	See detail for Abutment	572.160	2288.64	
P4	2	Steel channel	Hot dip galvanized	C310x45	12 000	See detail for Intermediate Bent	536.400	1072.80	
R30	92	A325 bolt assembly	Hot dip galvanized	16 dia.	89	Steel plate to channels		0.245	22.54
R32	48	A325 bolt assembly	Hot dip galvanized	16 dia.	76	Steel plate to channels Cbore holes		0.225	10.80
R35	252	A325 bolt assembly	Hot dip galvanized	22 dia.	64	Channels to piles		0.461	116.17
R36	48	A325 bolt assembly	Hot dip galvanized	16 dia.	64	Angles Mk. "S1" to piles & bracket Mk. "S2" to cap		0.205	9.84
S1	20	Angle	Hot dip galvanized	L 152x152x13	250	As detailed		7.250	145.00
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	Filler plate	Hot dip galvanized	PL 6x100	300	As detailed		1.413	45.22
S5	16	Filler plate	Hot dip galvanized	PL 3x100	300	As detailed		0.707	11.31
A1	16	Structural plate w/asher	Hot dip galvanized	PL 10x150	150	As detailed - One to threaded rod Mk. "TR2"		1.766	28.26
A2	8	Structural plate w/asher	Hot dip galvanized	PL 10x90	90	As detailed - One to bolt Mk. "R34"		0.636	5.09
TR1	36	Threaded rods c/w tw o hex. nuts	Hot dip galvanized	19 dia.	400	Girder to steel cap plate		0.940	33.84
TR3	32	Threaded rods c/w tw o hex. nuts	Hot dip galvanized	19 dia.	300	Steel plates Mk. "S3" to precast panels		0.660	21.12
	140	Hardened bevel w/asher	Hot dip galvanized	for 16 dia. bolts		One to bolts Mk. "R30" & "R32"		0.110	15.40
	16	Standard flat w/asher	Hot dip galvanized	for 13 dia. rod		One to threaded rod Mk. "TR2"		0.010	0.16
	100	Standard flat w/asher	Hot dip galvanized	for 19 dia. rod		One to "TR1", tw o to "TR3"		0.020	2.00
	16	Structural lock w/asher	Hot dip galvanized	for 12 dia. rod		One to threaded rod Mk. "TR2"		0.010	0.16
	68	Structural lock w/asher	Hot dip galvanized	for 19 dia. rod		One to "TR1" & "TR3"		0.020	1.36
	252	F436 Hardened w/asher	Hot dip galvanized	for 22 dia. bolts		One to bolt Mk. "R35"		0.032	8.06
	48	F436 Hardened w/asher	Hot dip galvanized	for 16 dia. bolts		One to bolt Mk. "R36"		0.014	0.67
R1	128	A325 bolt assembly	Hot dip galvanized	22 dia.	76	R.C. girder connection		0.499	63.87
W1	128	Structural flat w/asher	Hot dip galvanized	for 22 dia. bolts		One to bolt Mk. "R1"		0.050	6.40
	128	Pair Nord-Lock lock w/ashers		for 22 dia. bolts		One pair to bolt Mk. "R1"		0.020	2.56
SH1	64	Shim plate	Hot dip galvanized	PL 2.5x80	180	As detailed - use as required		0.231	14.78
SH2	64	Shim plate	Hot dip galvanized	PL 5x80	180	As detailed - use as required		0.463	29.63
<b>TOTAL MASS (kg) =</b>							<b>9097.12</b>		

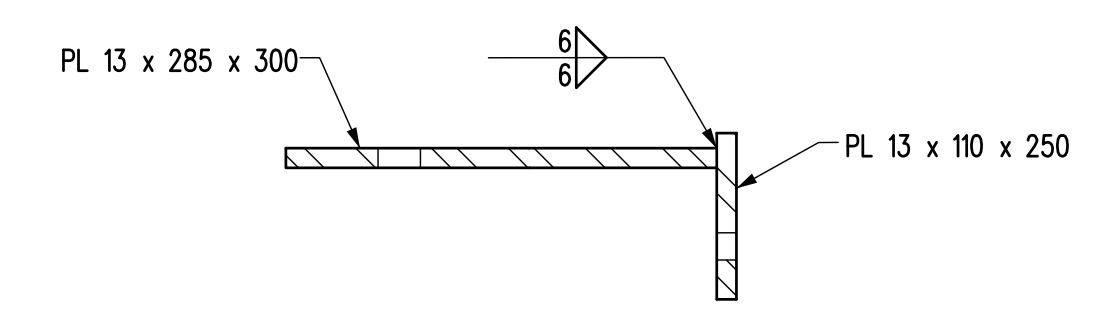
**NOTES:**  
 1. All material noted in the above Bill shall be hot dip galvanized after fabrication in accordance with CSA G164 for a minimum net retention of 610 g/m<sup>2</sup> unless otherwise stated in the specified material ASTM standards. The fabricator and galvanizer shall safeguard against embrittlement 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.



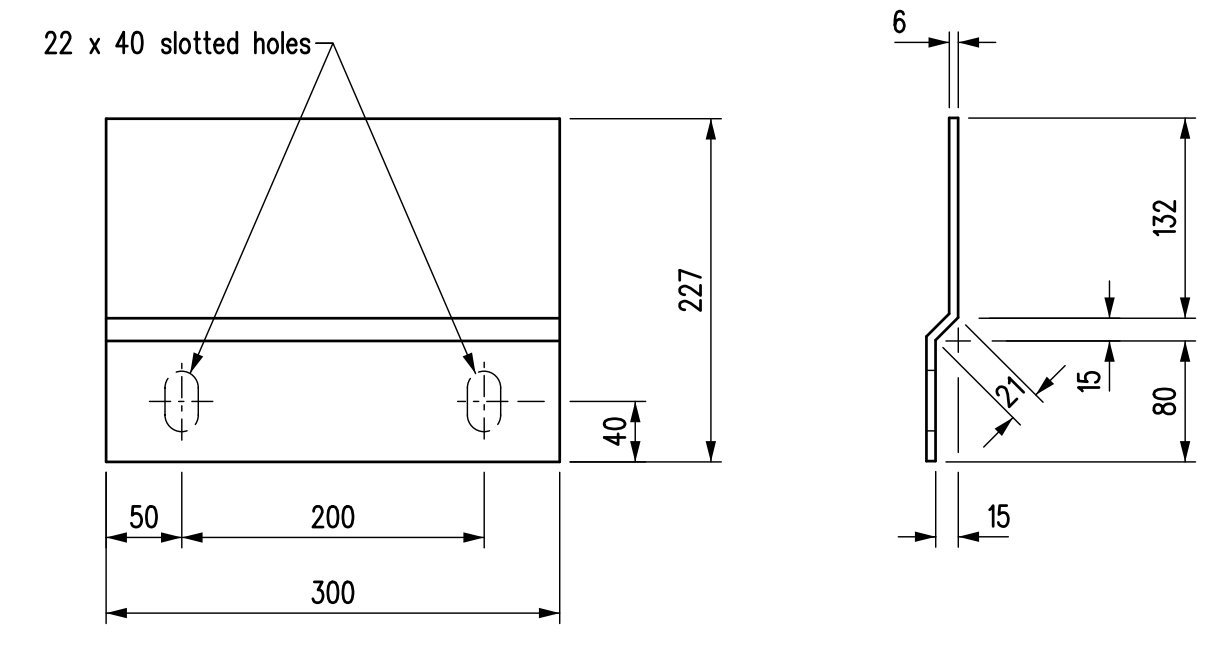
**ANGLE MK. "S1"**



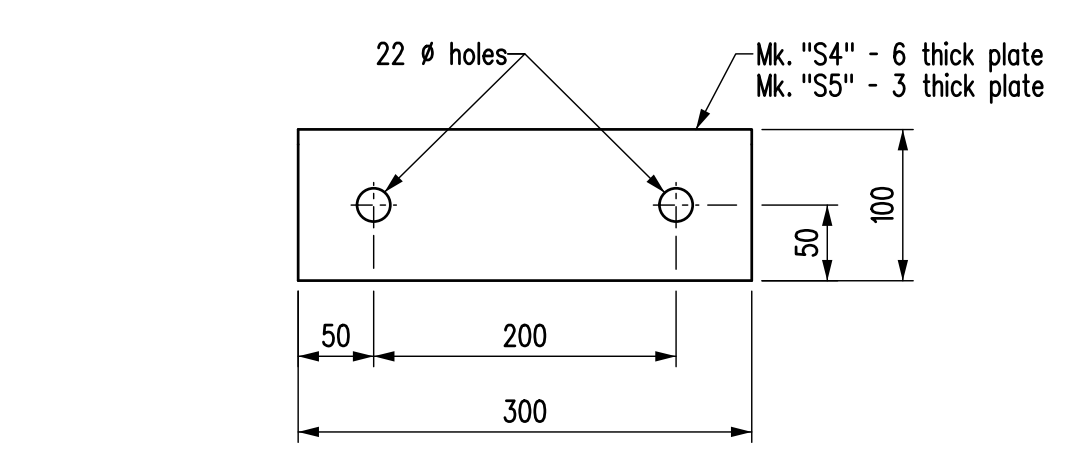
**BRACKET MK. "S2"**



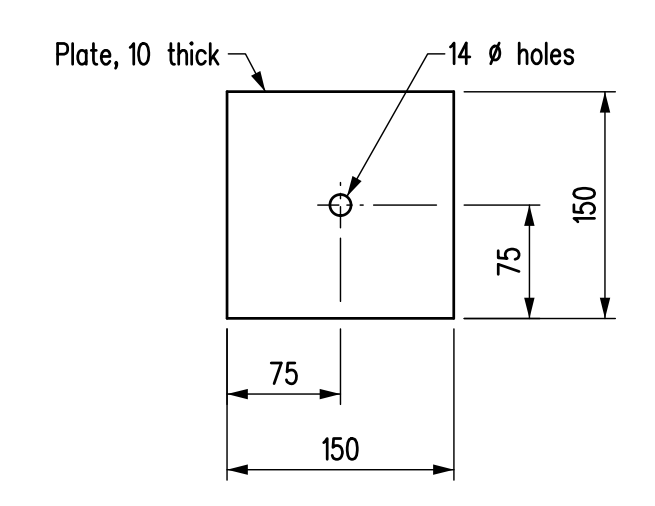
SECTION A-A



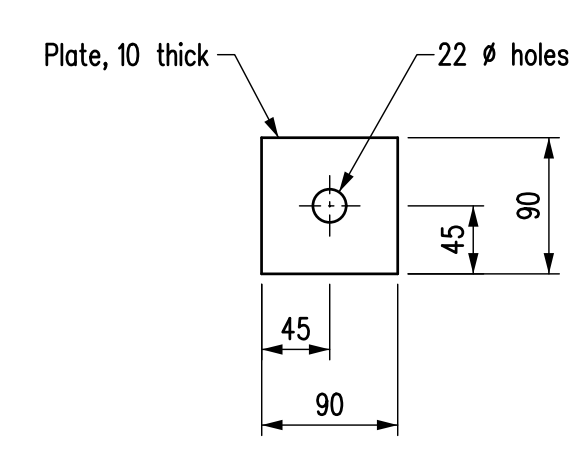
**PLATE MK. "S3"**



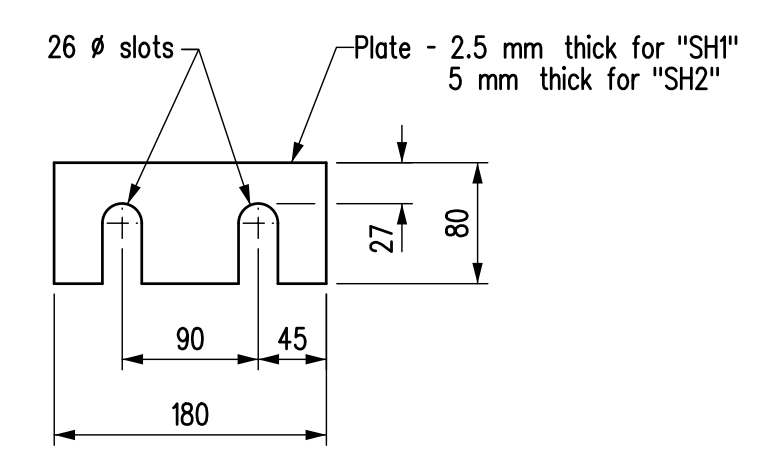
**FILLER PLATES MK. "S4" & "S5"**



**WASHER MK. "A1"**



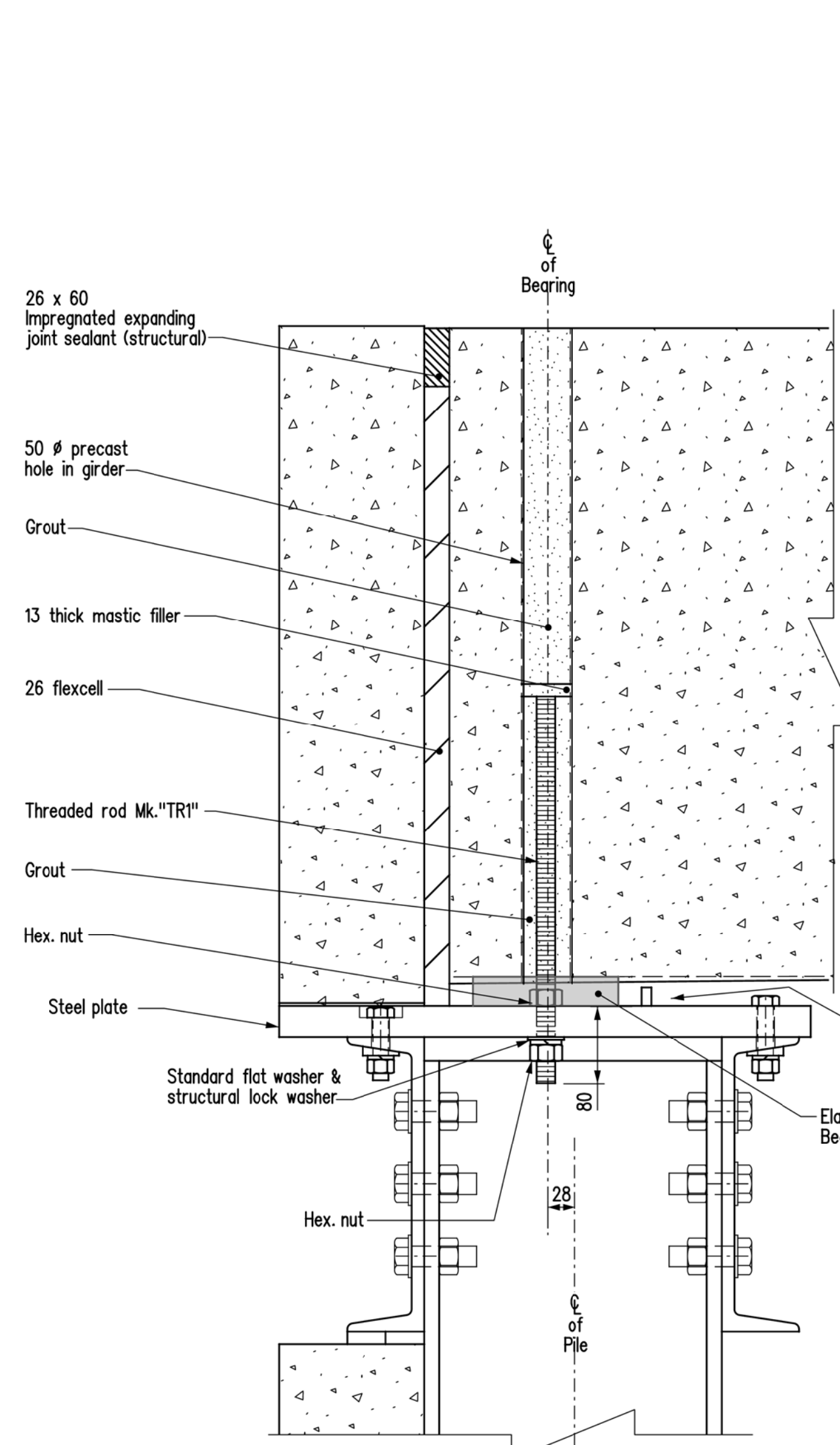
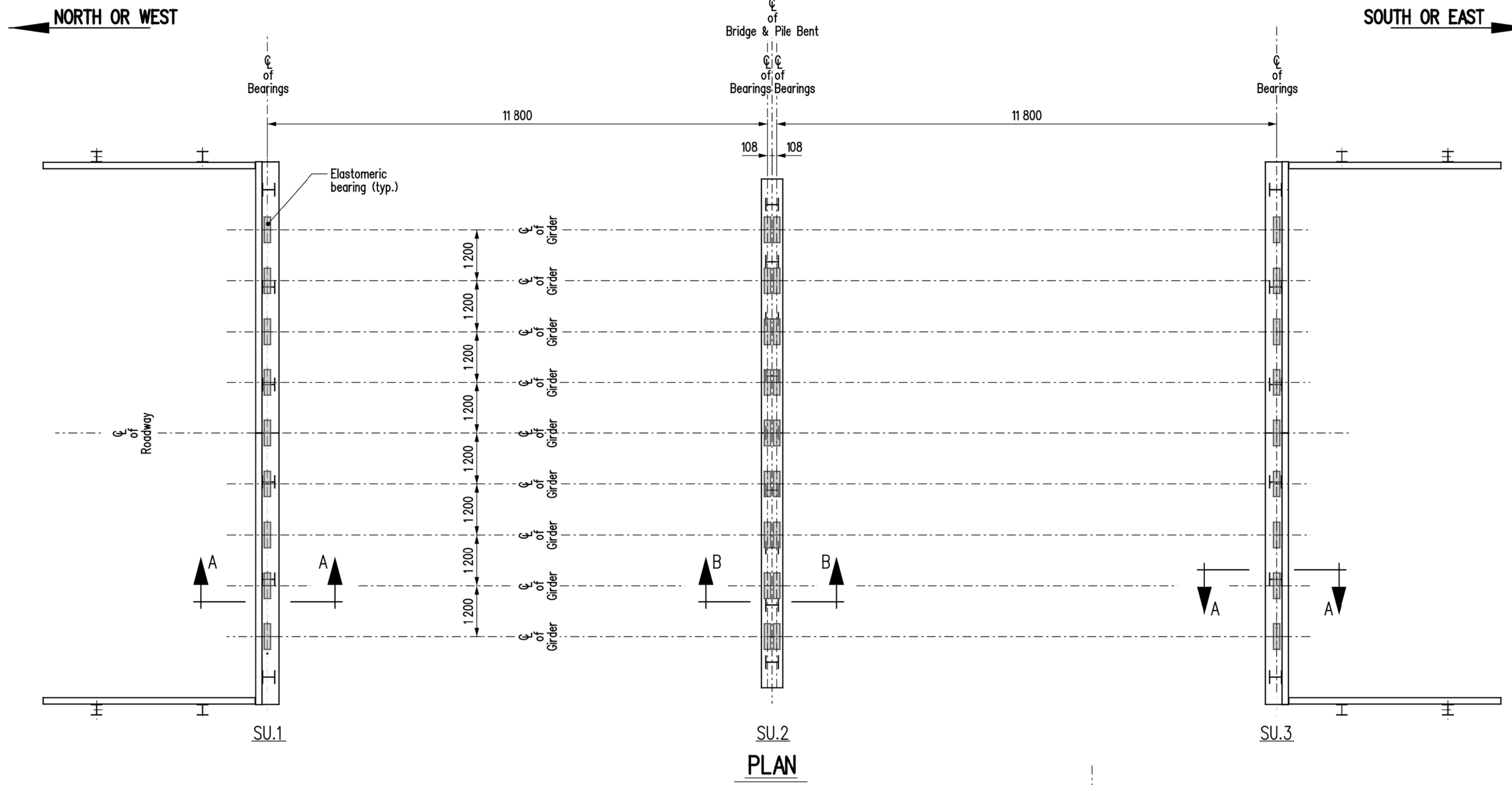
**WASHER MK. "A2"**



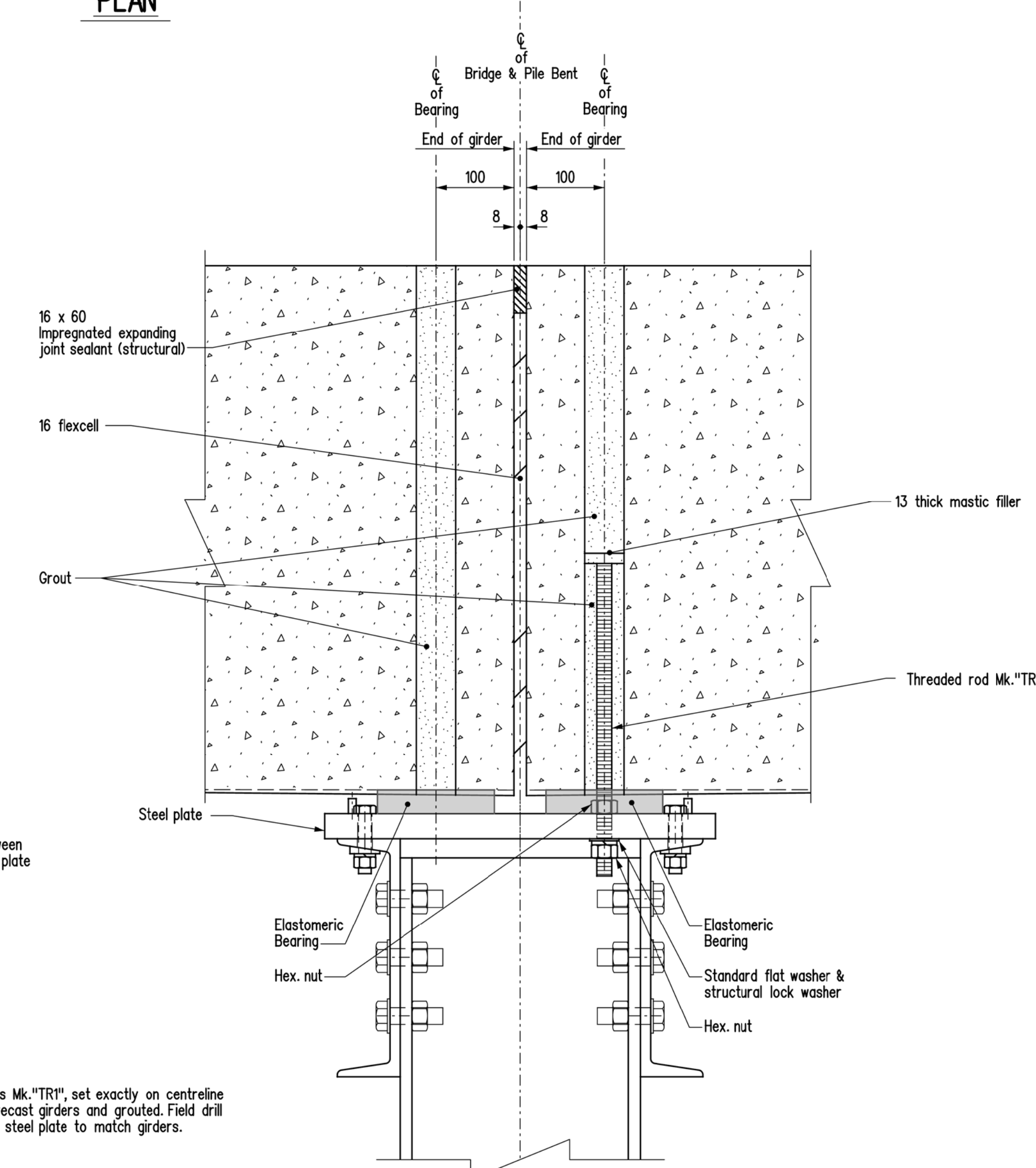
**SHIM PLATES MK. "SH1" & "SH2"**

REVISIONS		STEEL PILE CAP DETAILS	
DATE	DESCRIPTION		
		RELEASED FOR CONSTRUCTION BY: _____ EXECUTIVE DIRECTOR OF STRUCTURES DATE: _____	
		SCALE: 1:5 SHEET No. 9 of 9 SITE No. _____	
		DESIGN BY: B.A.N. CHECKED: _____ DETAILS BY: K.P. CHECKED: _____	
PLACE ENGINEERS ELECTRONIC SEAL HERE		EXECUTIVE DIRECTOR OF STRUCTURES DATE: _____	





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



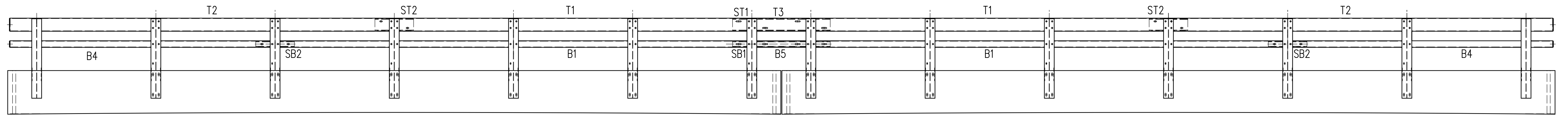
**SECTION "B-B"**  
Threaded rods at SU.2. See sheet No. 6 for layout.  
Scale 1:5

<b>BILL OF BEARINGS</b>			10 800 ROADWAY WIDTH - 2 SPAN	Site No.
No.	LOCATION	DESCRIPTION	REMARKS	
36	SU.1 - SU.3	Elastomeric bearings	As detailed	
<b>NOTE:</b> 1. 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. 2. Internal steel reinforcing plates for laminate bearings shall be rolled mild steel with a minimum yield strength of 300 Mpa.				
<p style="text-align: center;">PLAN Scale 1:10</p>		<p style="text-align: center;">PART CROSS SECTION Scale 1:2</p>		
<b>ELASTOMERIC BEARINGS</b>				

- NOTES:**  
 Re: Girder Erection Operations Behind Abutment Ballast Walls
1. Surcharge loading on the backfill resulting from girder erection operations shall be minimized near the precast concrete ballast walls and wingwalls.
  2. 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.
  3. 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		<b>BEARING AND ERECTION DETAILS</b>			
DATE	BY	DESCRIPTION		RELEASED FOR CONSTRUCTION BY:	
		DESIGN SEAL	RECORD SEAL		
<b>PLACE ENGINEERS ELECTRONIC SEAL HERE</b>		<p style="text-align: center;">Infrastructure Water Management and Structures</p>		EXECUTIVE DIRECTOR OF STRUCTURES DATE	
				BY: <u>      B.A.N.      </u>	
				SCALE: <u>      1:75      </u>	
				SHEET No. <u>      10      </u>	
DESIGN CHECKED: <u>      K.P.      </u>		DETAILS CHECKED: <u>            </u>		or as shown <u>      1      </u> SITE No. <u>      1      </u>	





SU.1

SU.2

SU.3

END SPAN

END SPAN

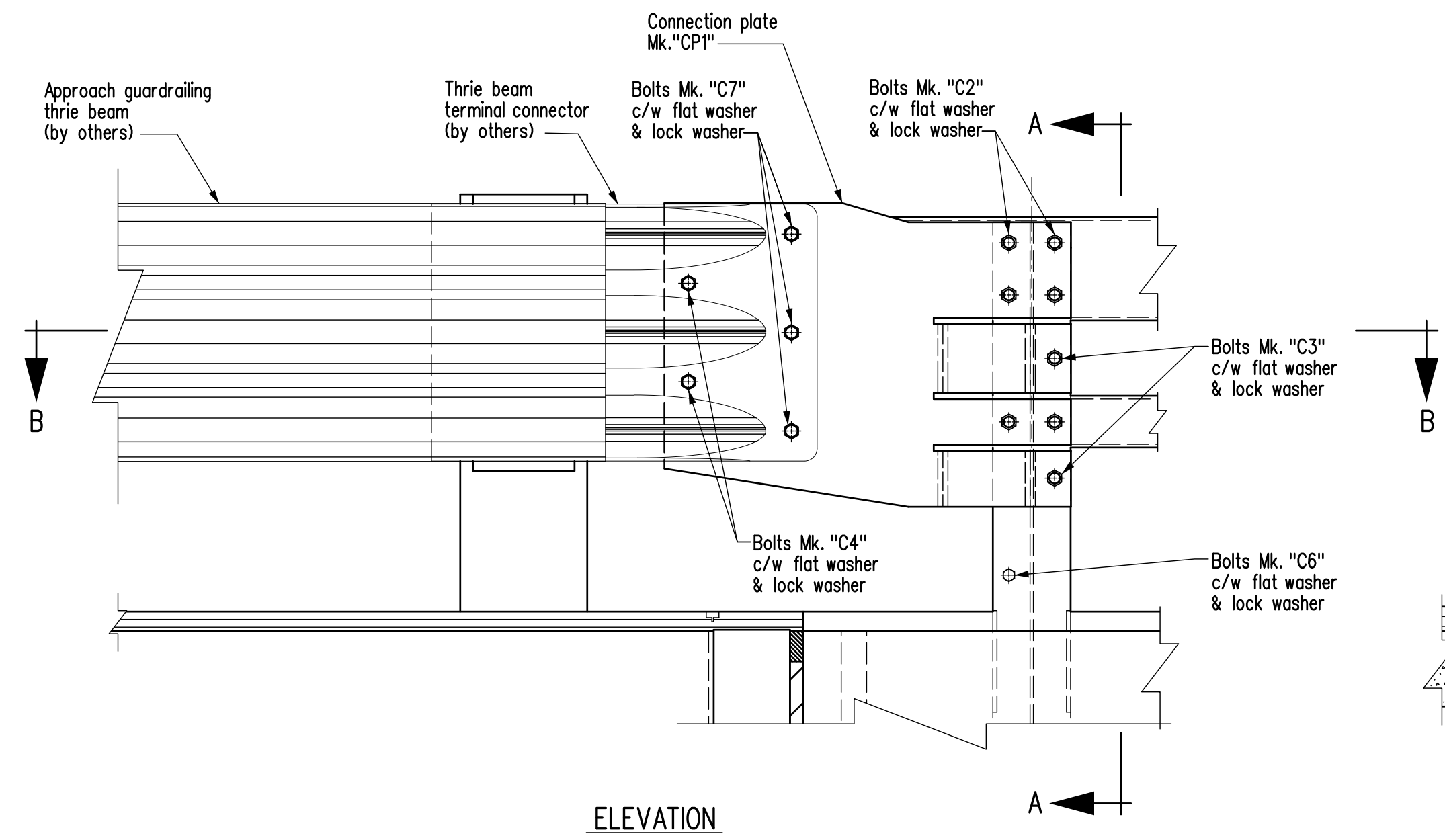
RAILS				SLEEVES		RAILPOSTS	
T1	T2	B1	B4	ST2	SB2	GP1	GP2
2	2	2	2	2	2	12	2

RAILS		SLEEVES	
T3	B5	ST1	SB1
2	2	2	2

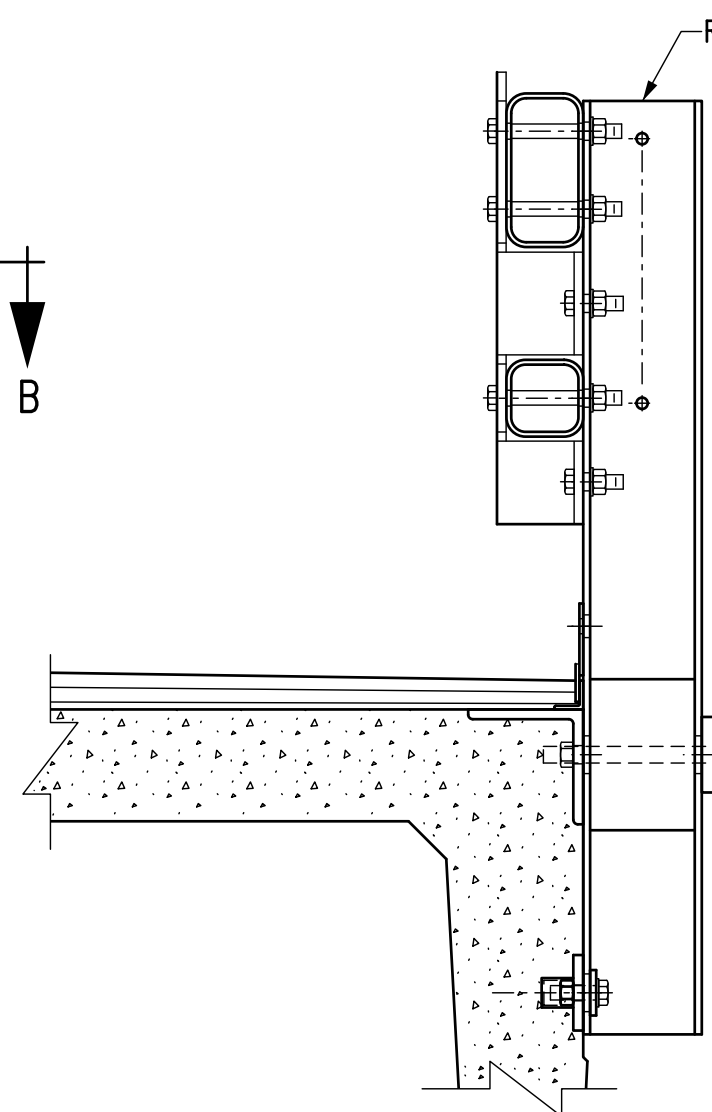
RAILS				SLEEVES		RAILPOSTS	
T1	T2	B1	B4	ST2	SB2	GP1	GP2
2	2	2	2	2	2	12	2

**RAILING LAYOUT**

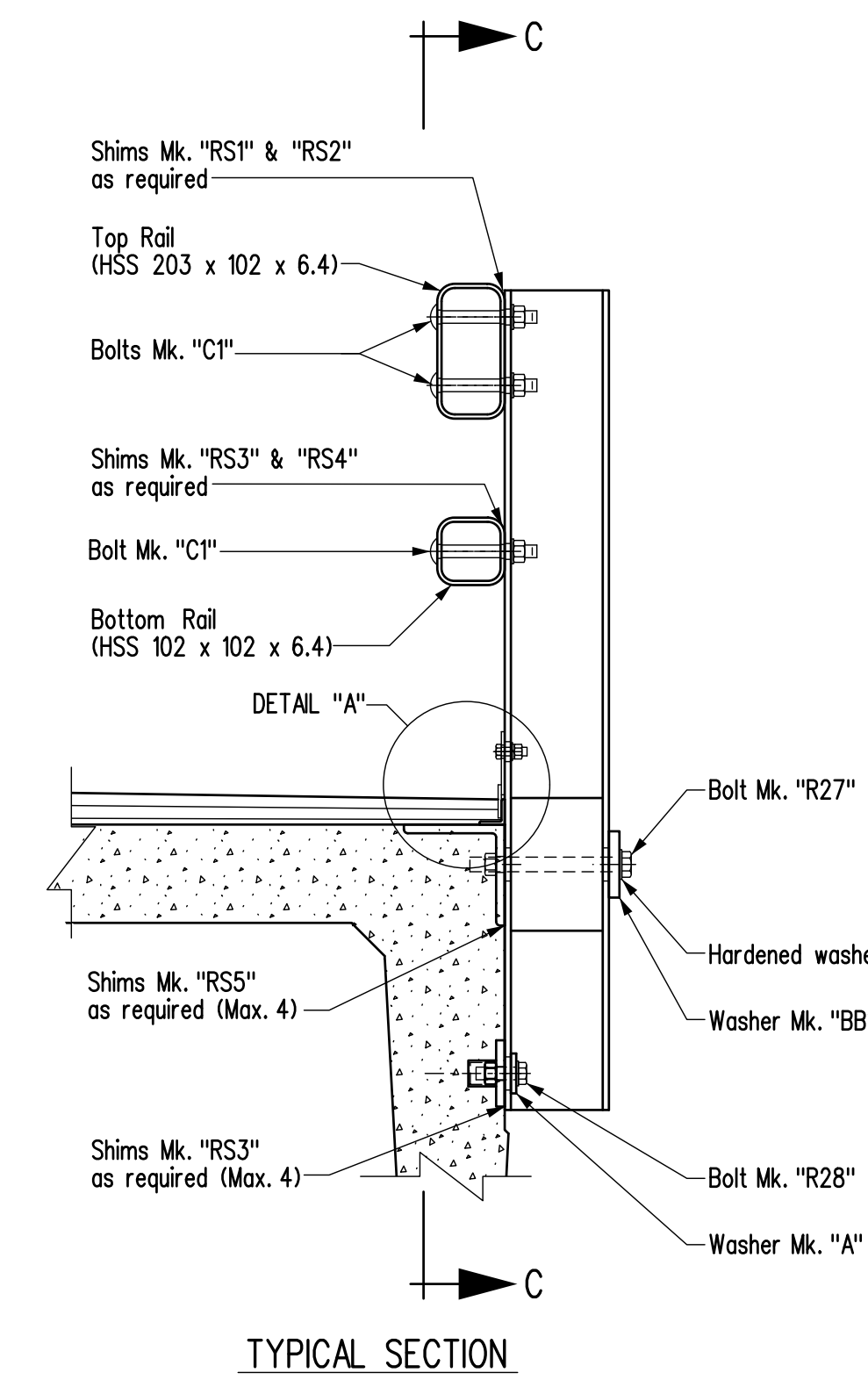
Not to Scale



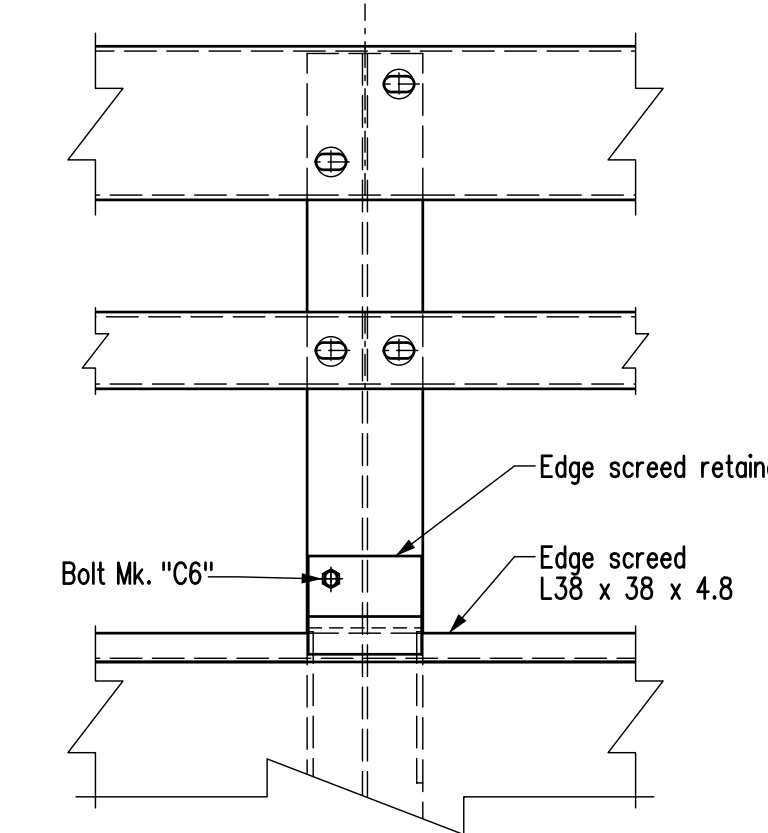
ELEVATION



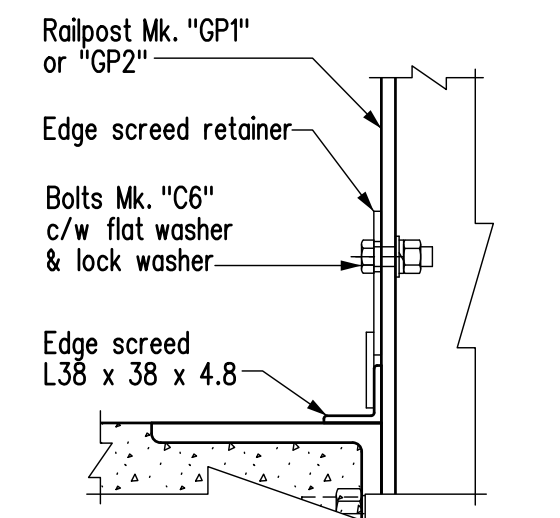
SECTION A-A



TYPICAL SECTION



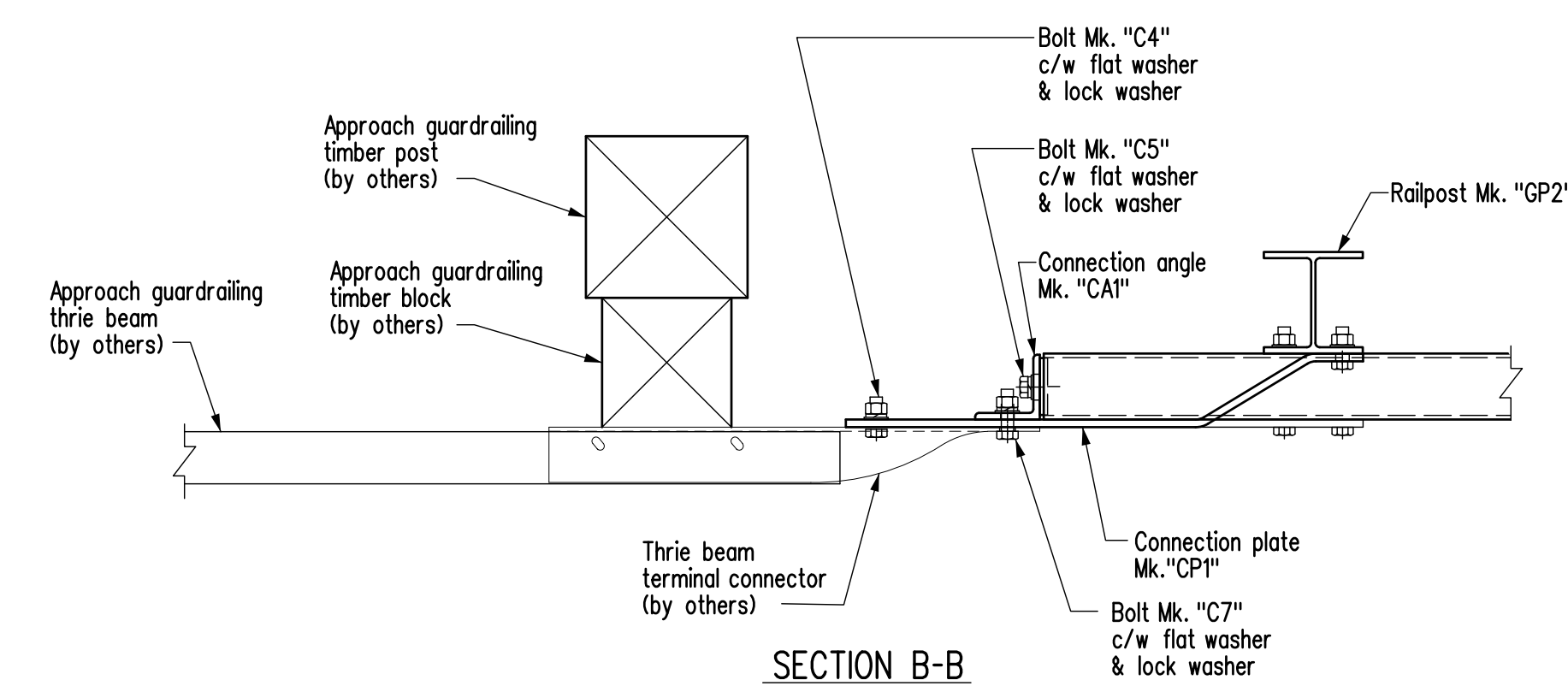
ELEVATION C-C  
Showing edge screed installation detail



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

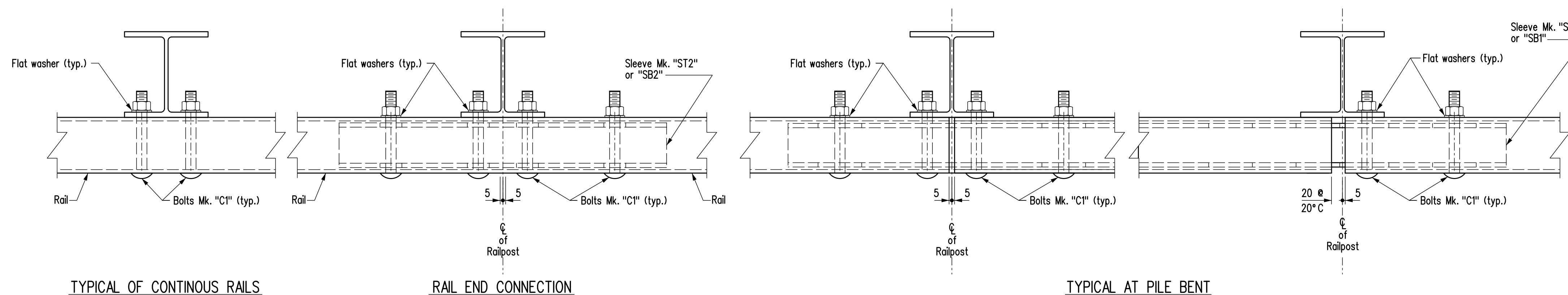
**NOTES:**

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



SECTION B-B

**APPROACH RAIL CONNECTION DETAILS**



TYPICAL OF CONTINUOUS RAILS

RAIL END CONNECTION

TYPICAL AT PILE BENT

**RAILING ERECTION DETAILS**

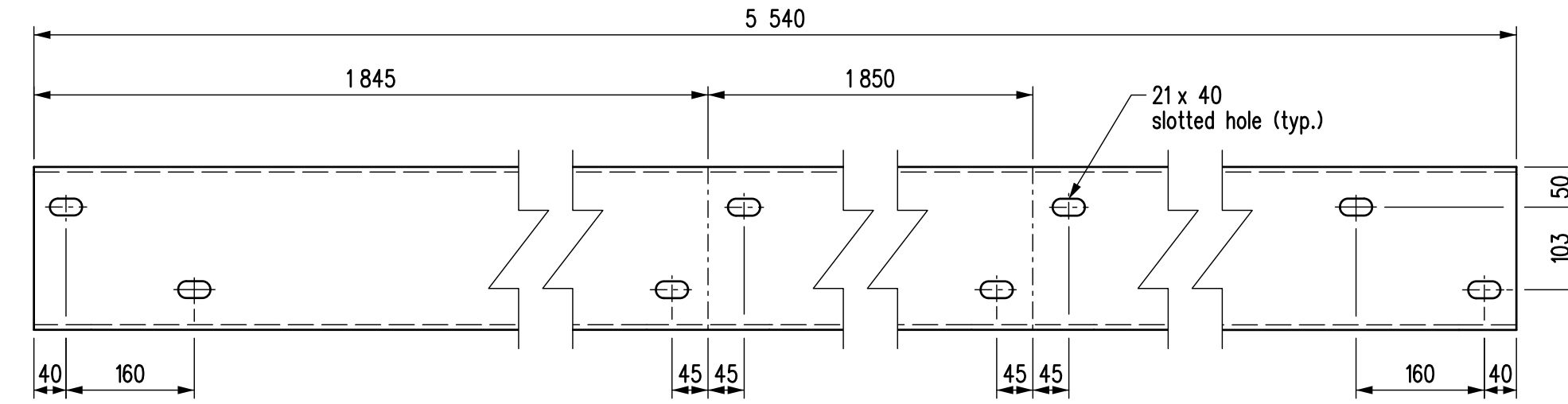
Scale 1:5

**RAILPOST ERECTION DETAILS**

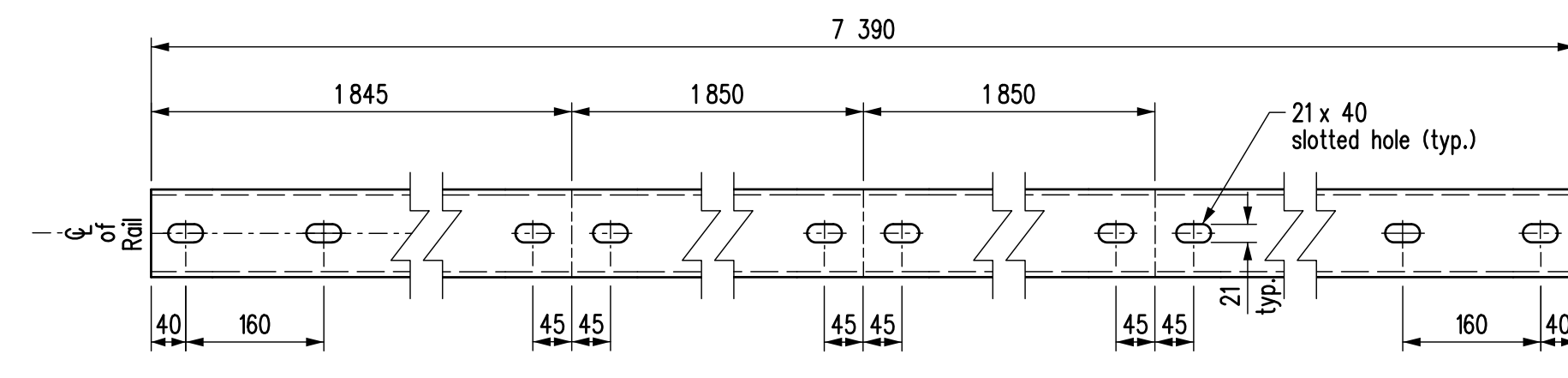
**NOTES:**

- 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".

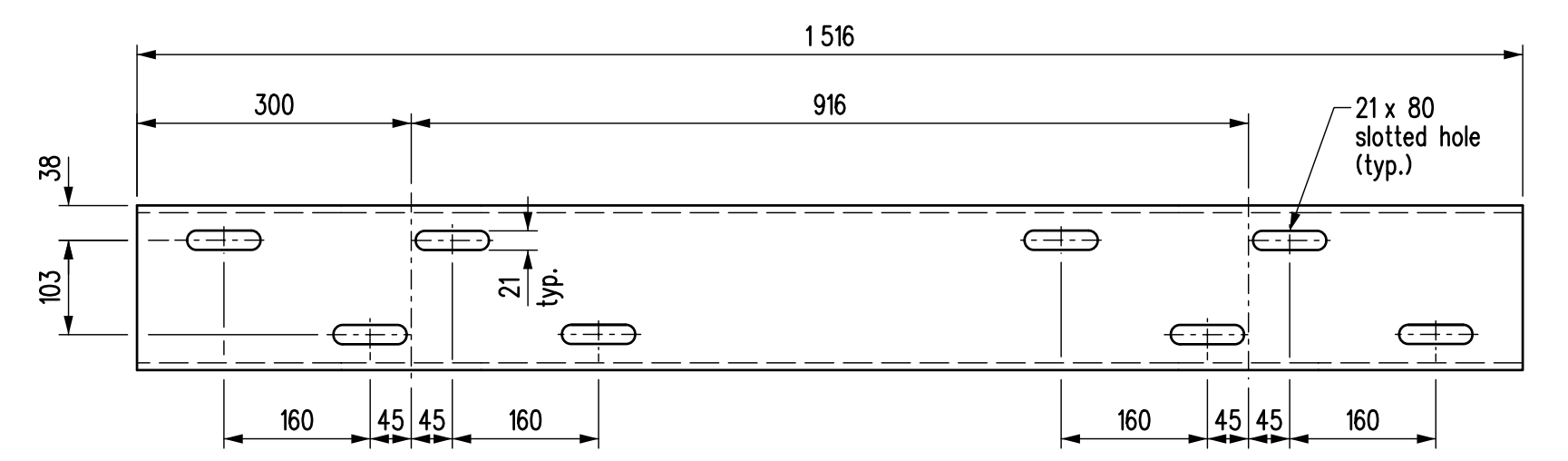
REVISIONS		RAILING LAYOUT AND DETAILS	
DATE	BY	DESIGN SEAL	RECORD SEAL
		RELEASED FOR CONSTRUCTION BY: _____ DATE: _____	
		EXECUTIVE DIRECTOR OF STRUCTURES	
		SCALE: 1:10	
		SHEET No. _____	
		or as shown	
		SITE No. _____	



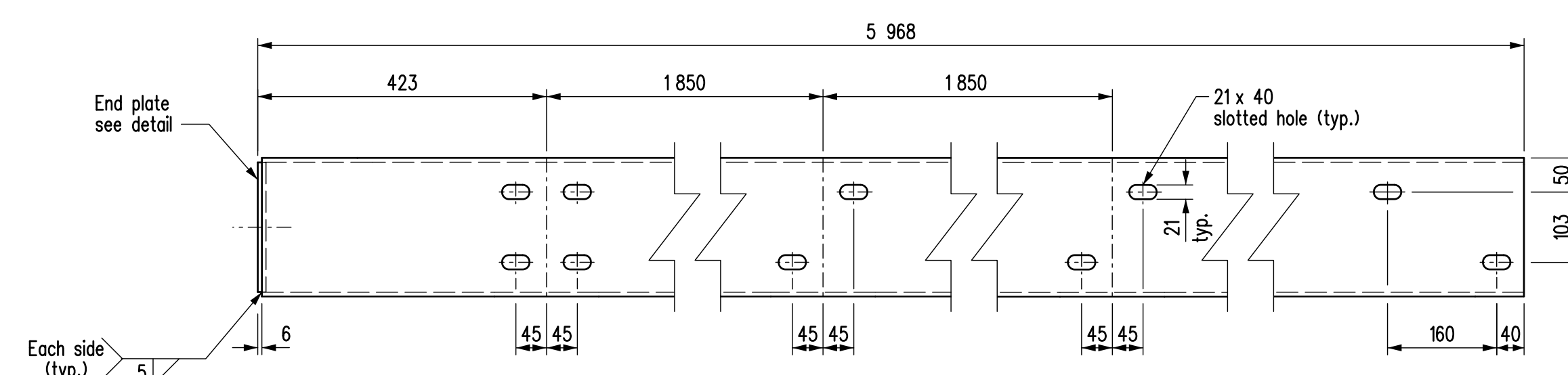
Mk. "T1"



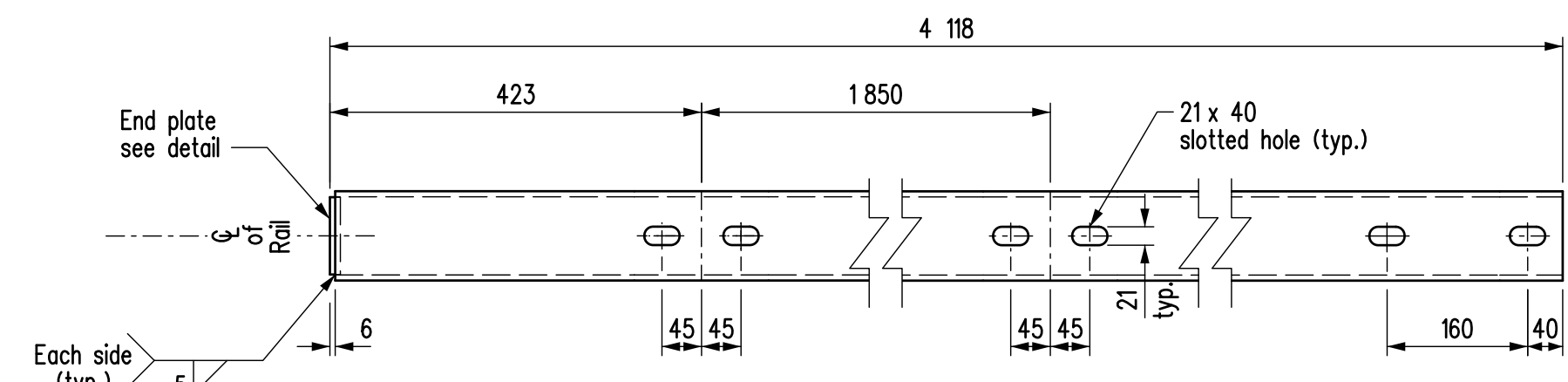
Mk. "B1"



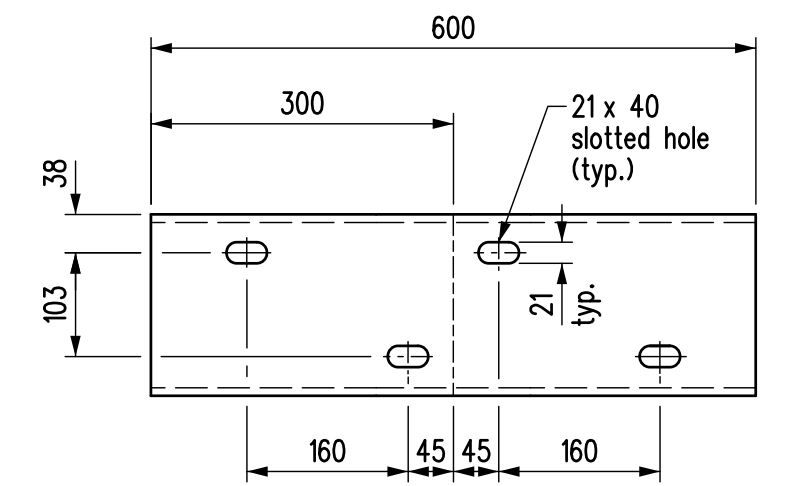
Mk. "ST1"



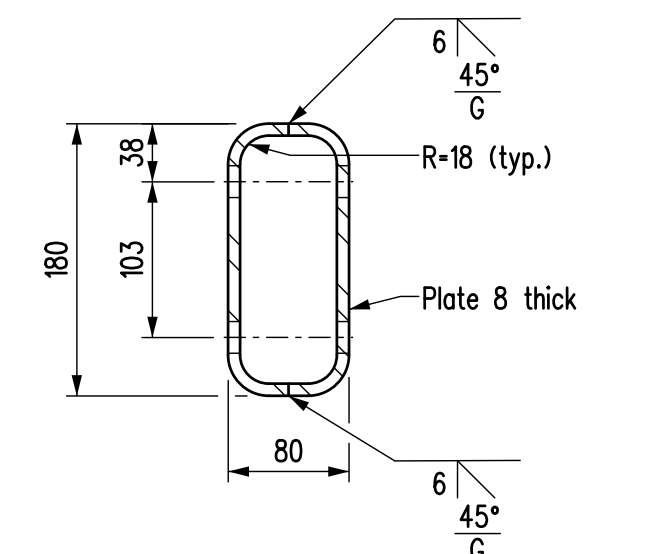
Mk. "T2"



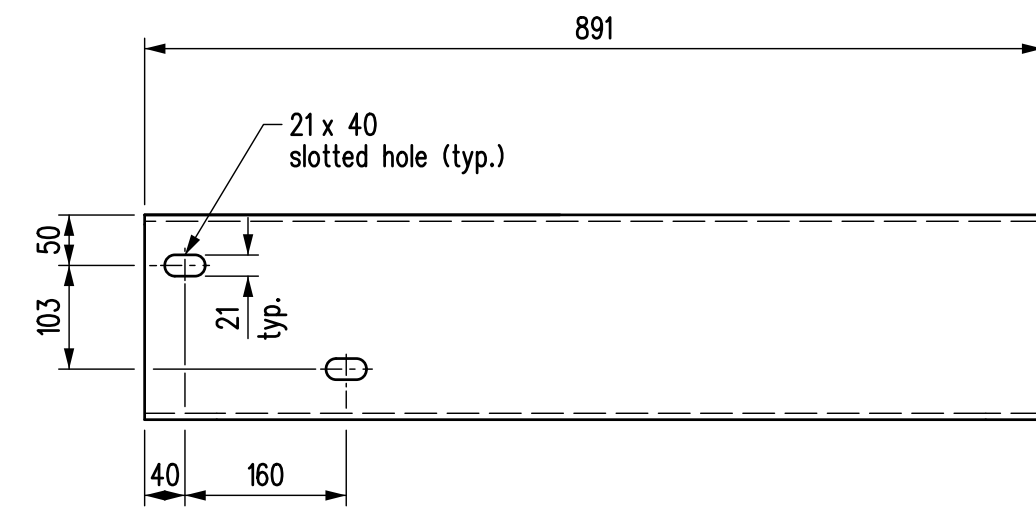
Mk. "B4"



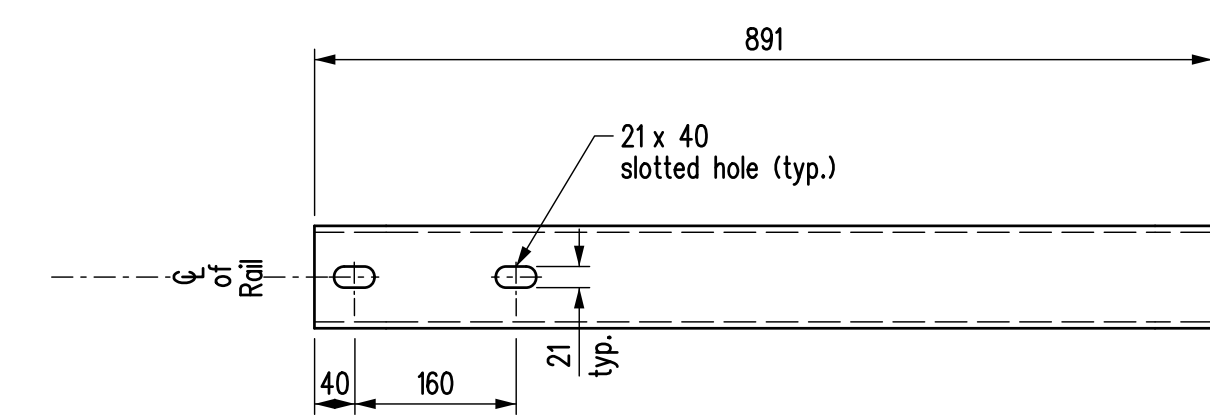
Mk. "ST2"



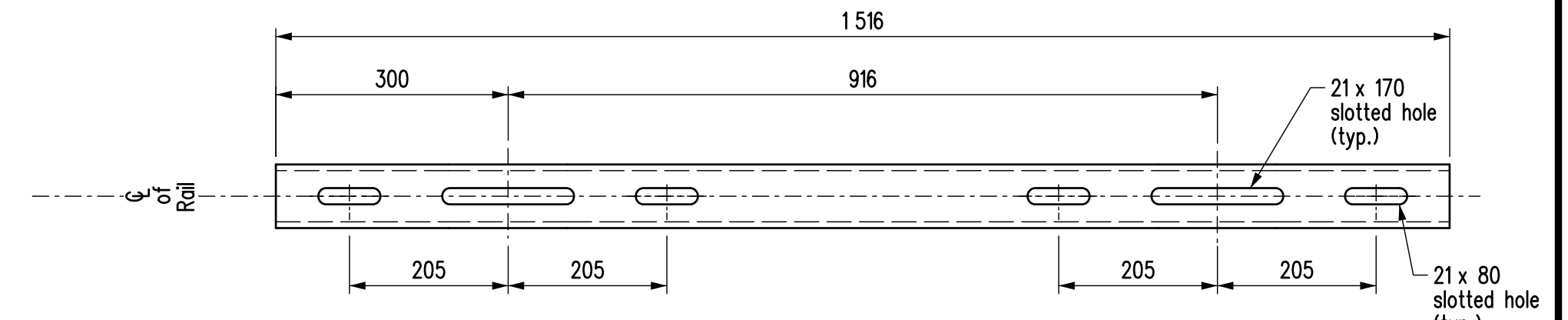
TYPICAL CROSS SECTION Scale 1:5



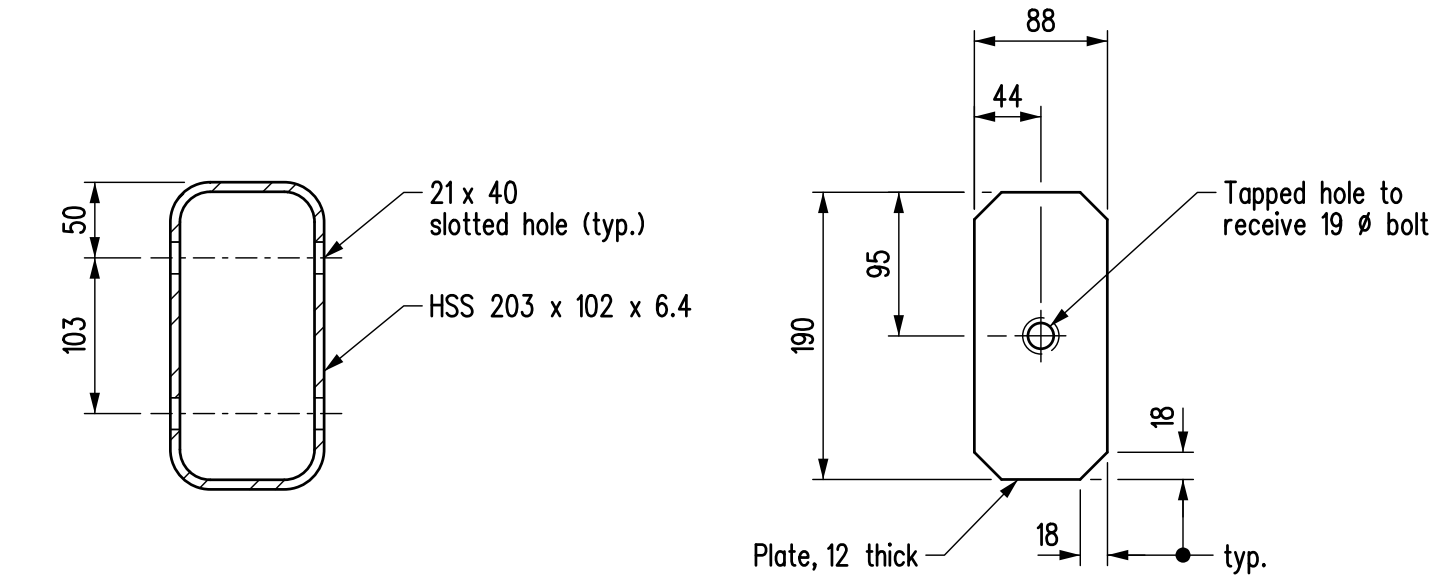
Mk. "T3"



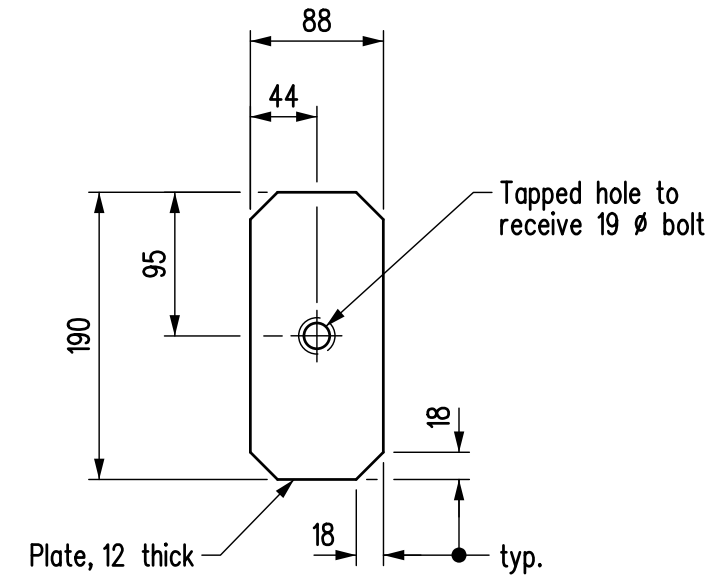
Mk. "B5"



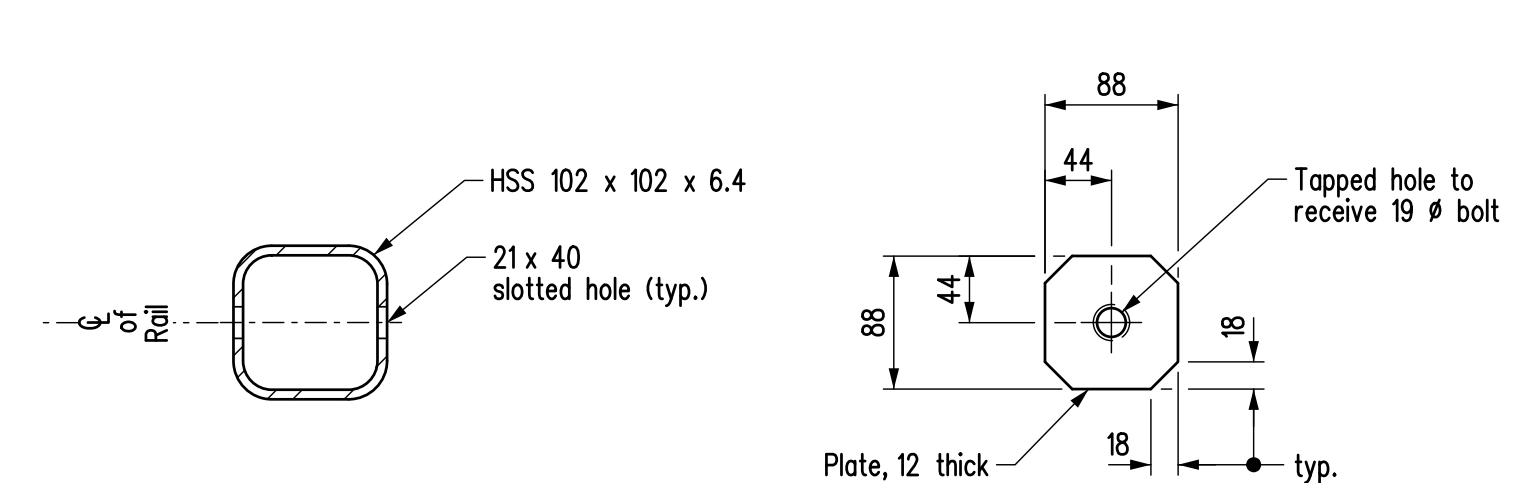
Mk. "SB1"



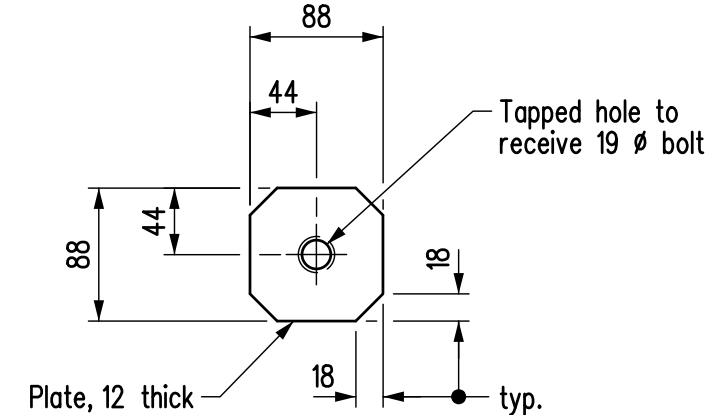
TYPICAL CROSS SECTION Typical for rail Mk. "T1", "T2" & "T3" Scale 1:5



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

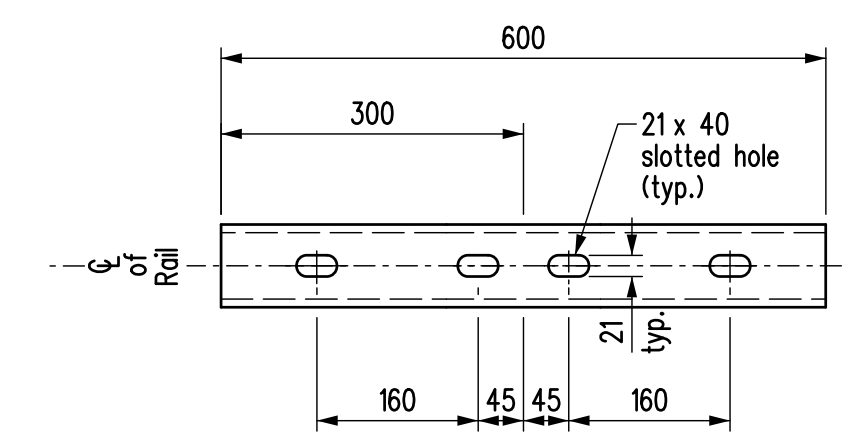


TYPICAL CROSS SECTION Typical for rails Mk. "B1", "B4" & "B5" Scale 1:5

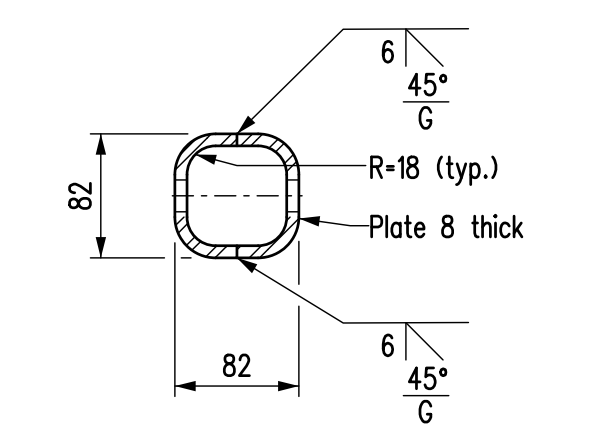


END PLATE For rail Mk. "B4" Scale 1:5

DETAILS OF BOTTOM RAILS



Mk. "SB2"



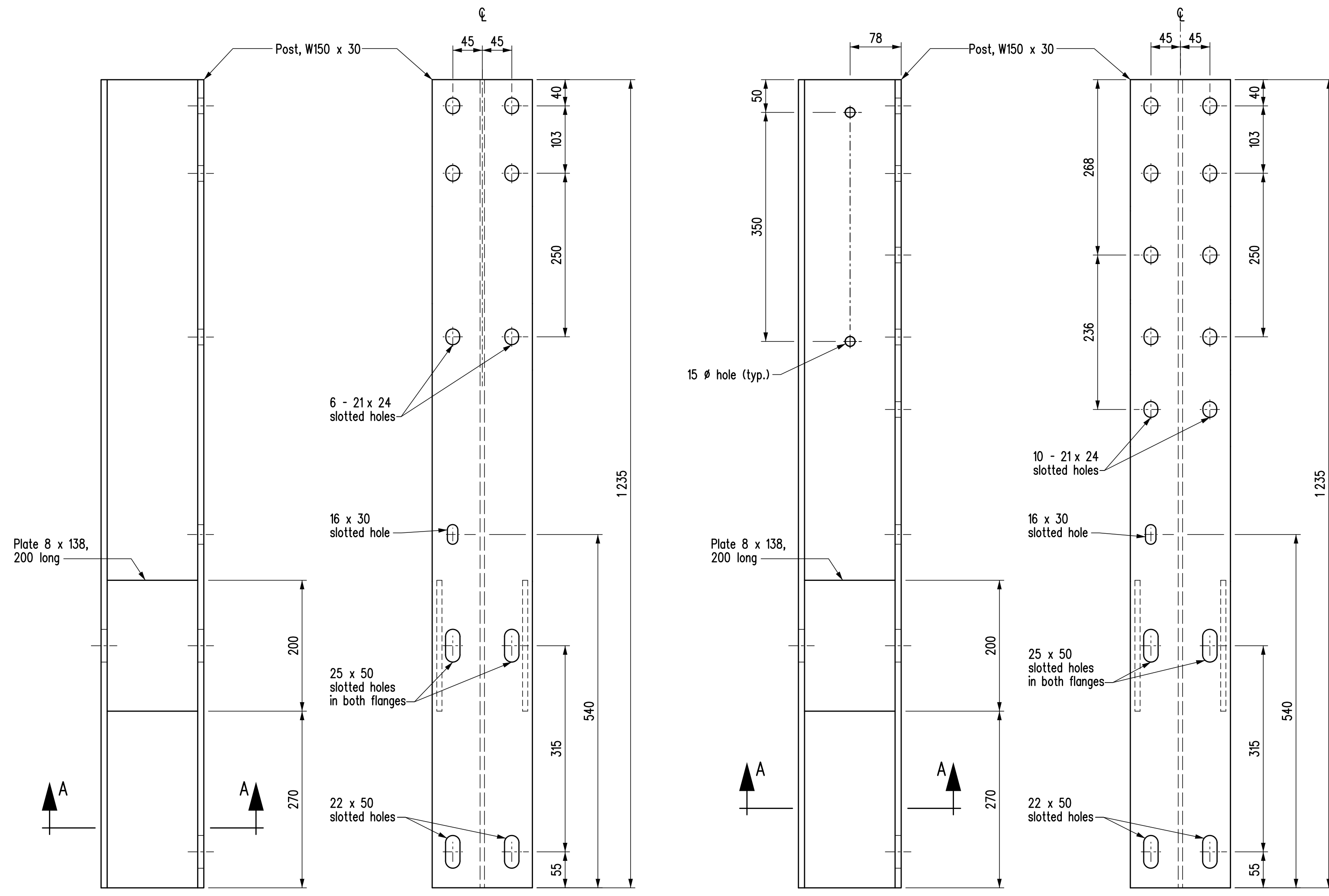
TYPICAL CROSS SECTION Scale 1:5

DETAILS OF SLEEVES

NOTES:

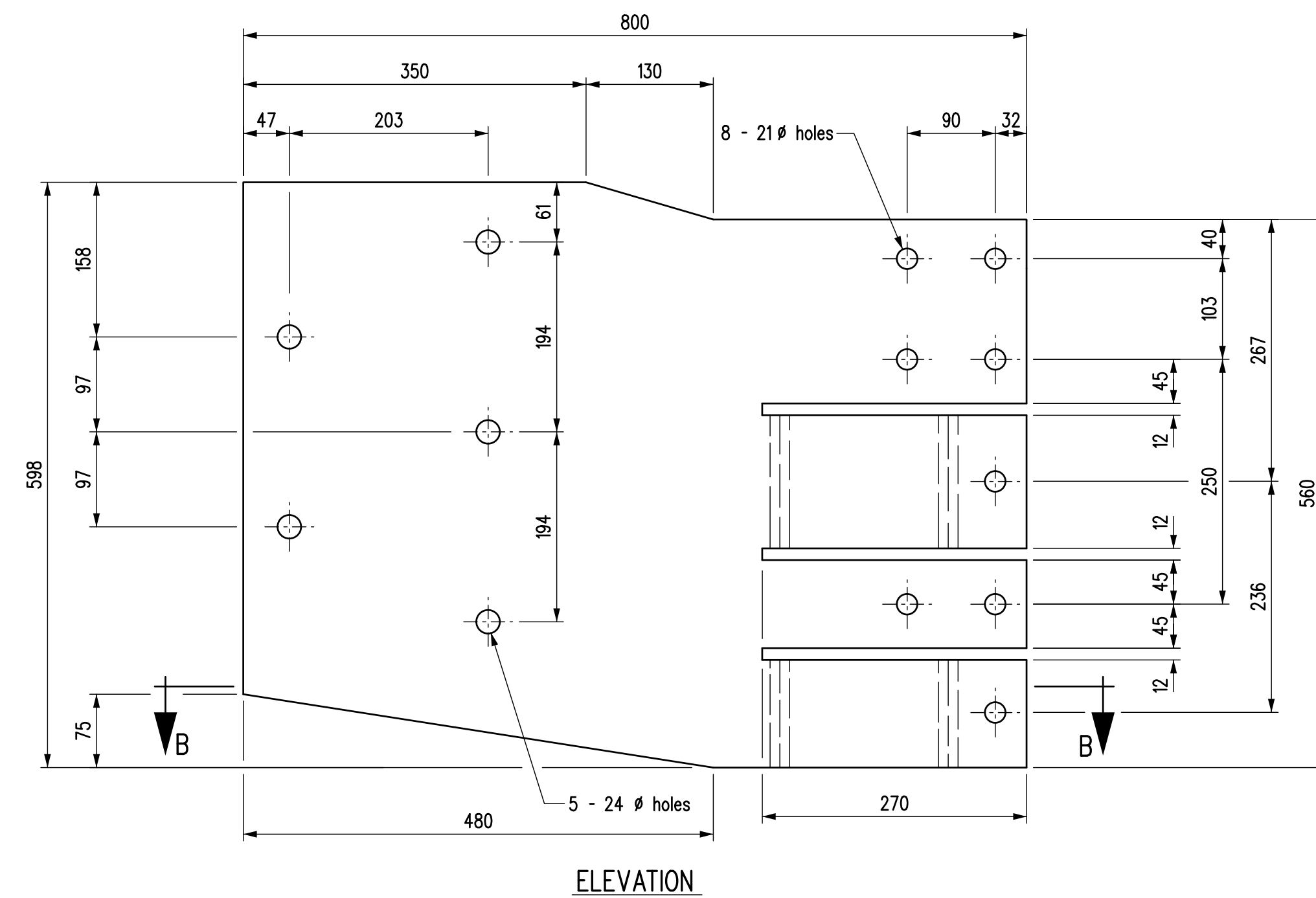
- 1. It is imperative that all rail and sleeve holes in each pair of holes be opposite to each other.
- 2. The length of slotted holes shall not be less than shown.
- 3. The width and height of the sleeves shall not exceed the dimensions shown.
- 4. All dimensions are in millimeters (mm).

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.:



**RAILPOST MK. "GP1"**

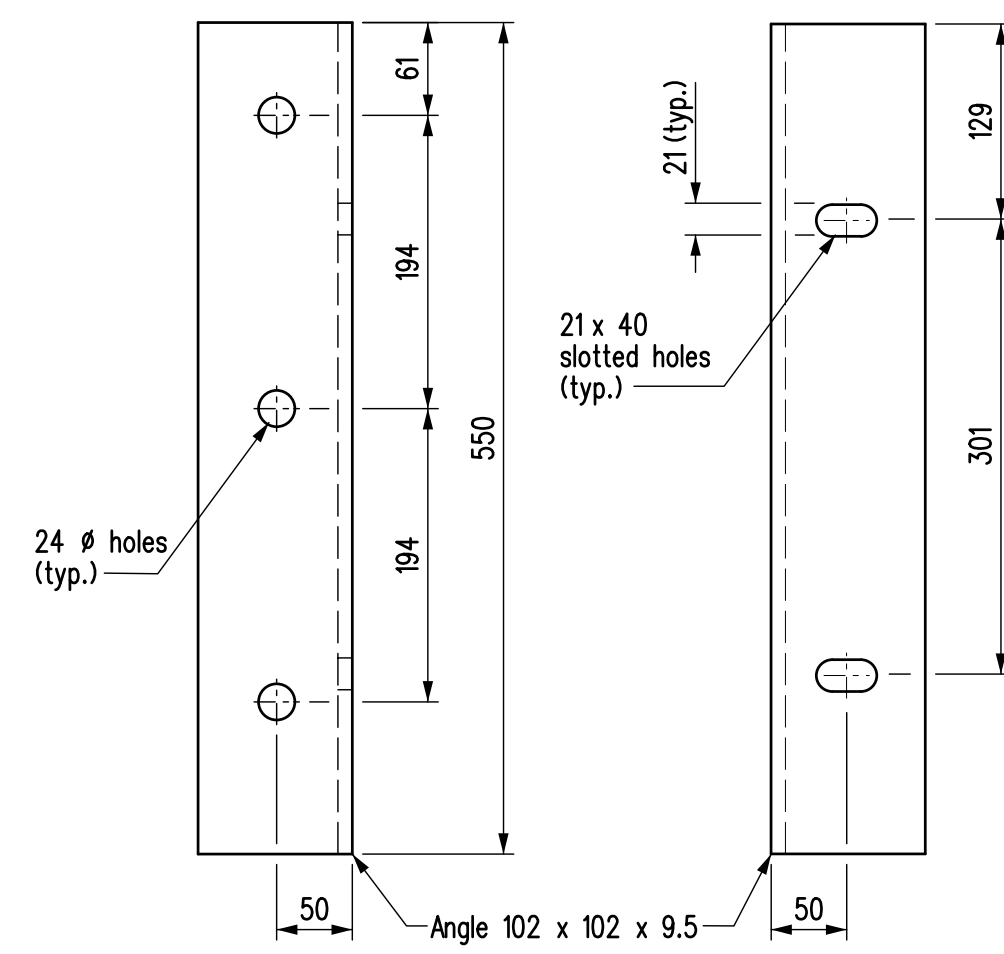
**RAILPOST MK. "GP2"**



**SECTION B-B**

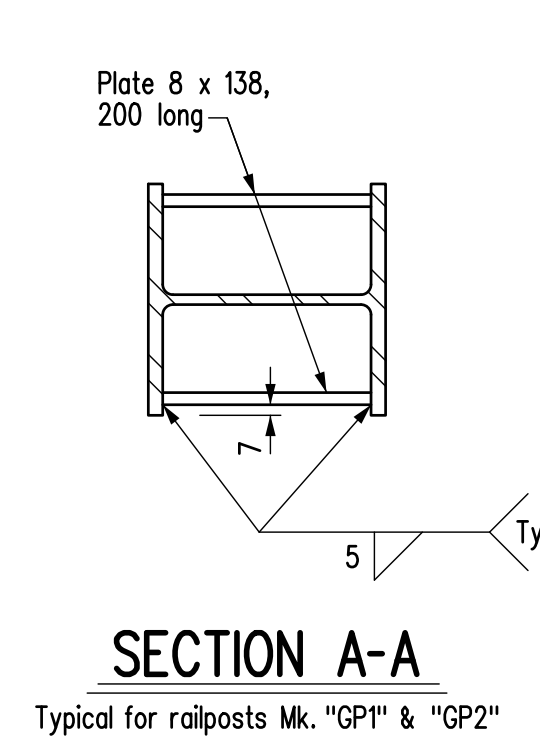
**CONNECTION PLATES MK. "CP1" & "CP2"**

*NOTE: Mk. "CP1" shown, Mk. "CP2" opposite hand.*

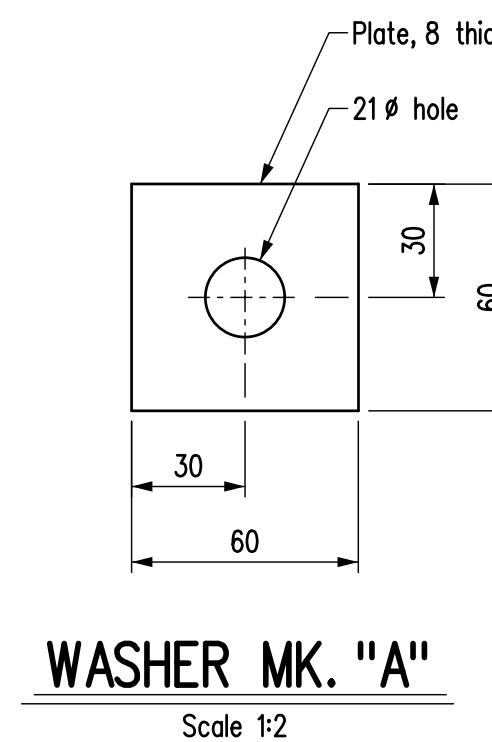


**CONNECTION ANGLES MK. "CA1" & "CA2"**

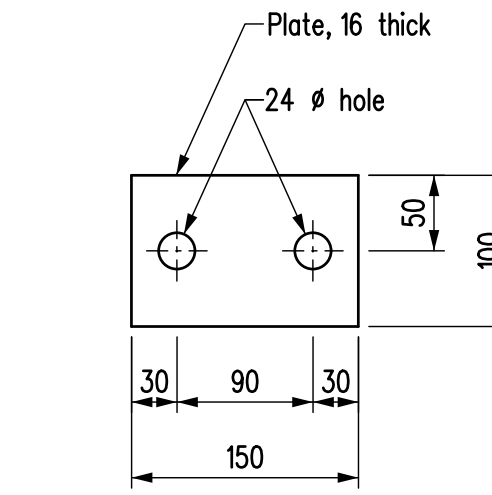
*NOTE: Mk. "CA1" shown, Mk. "CA2" opposite hand.*



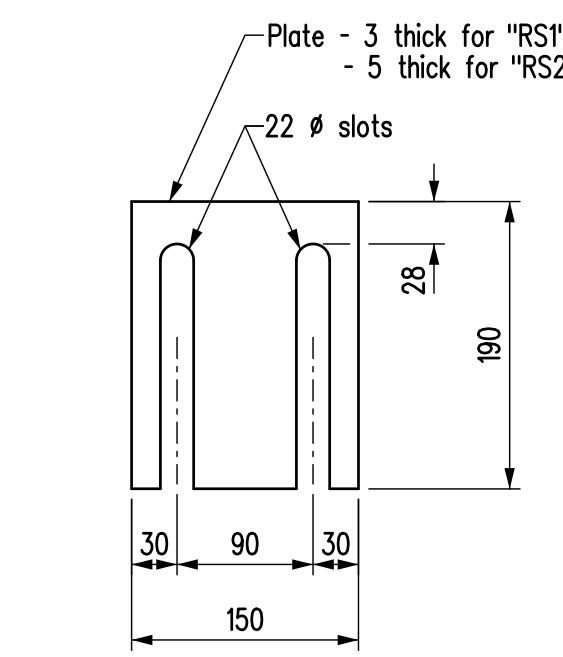
**SECTION A-A**  
Typical for railposts Mk. "GP1" & "GP2"



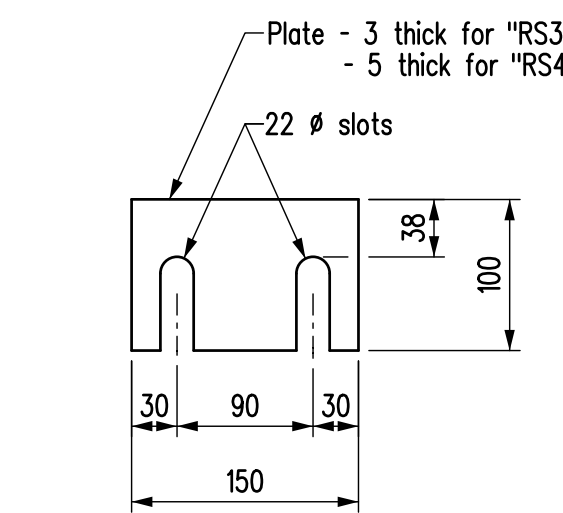
**WASHER MK. "A"**  
Scale: 1:2



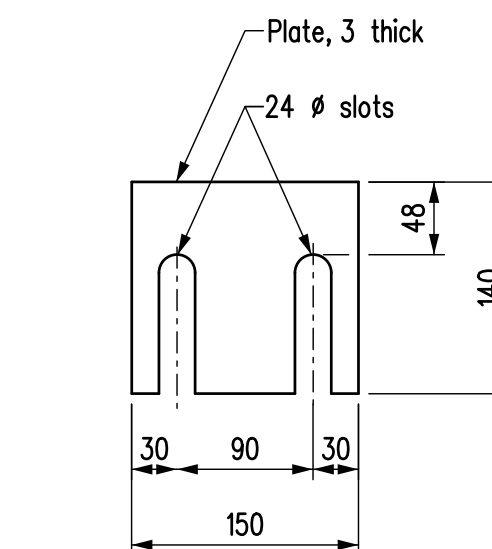
**WASHER MK. "BB1"**



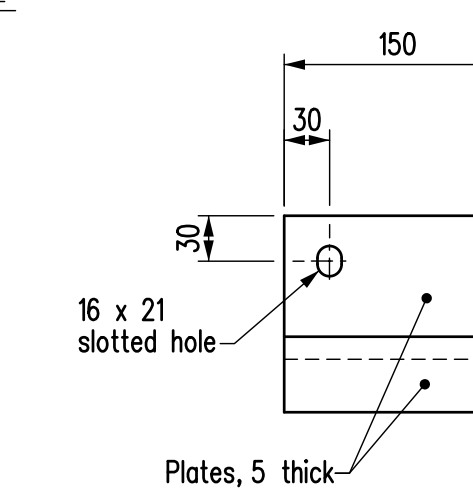
**SHIMS MK. "RS1" & "RS2"**



**SHIMS MK. "RS3" & "RS4"**



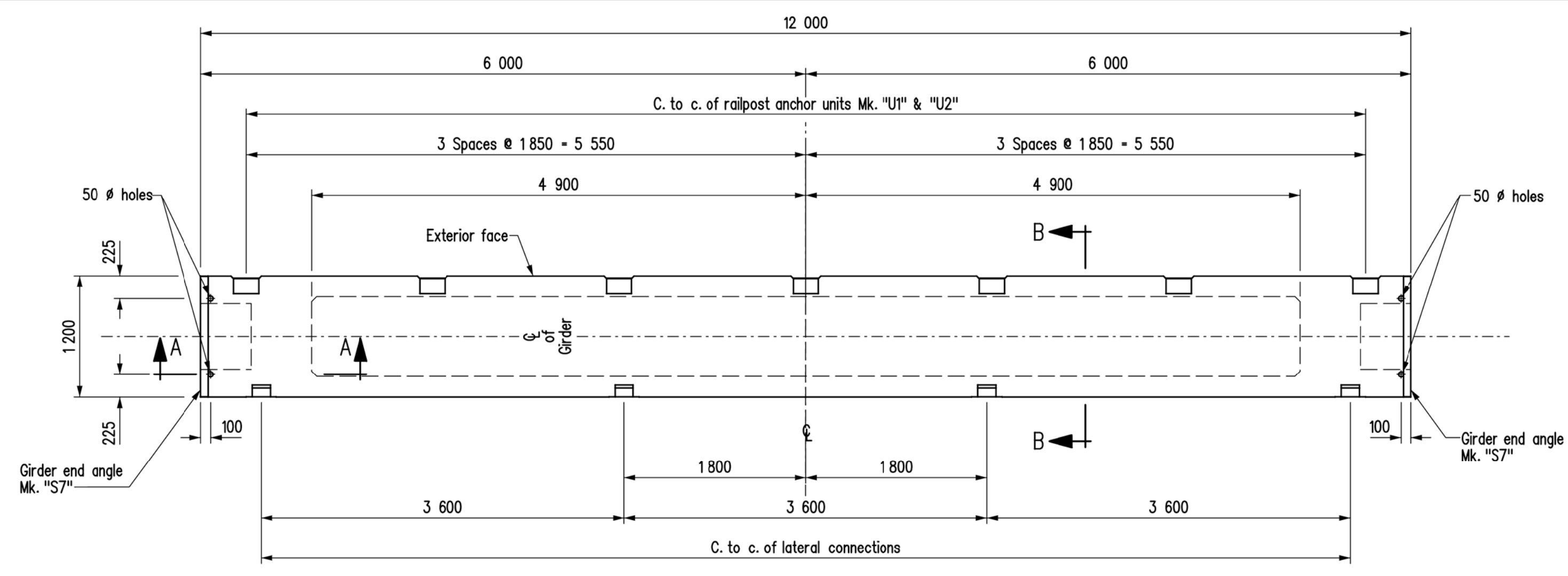
**SHIM MK. "RS5"**



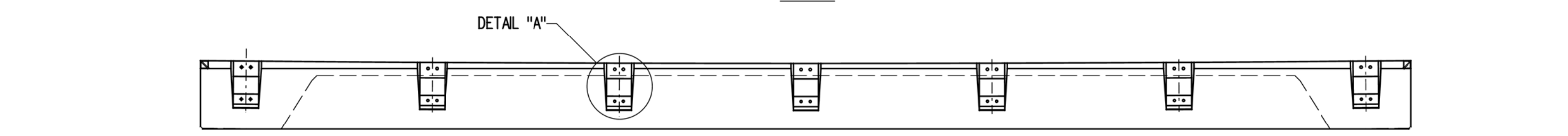
**EDGE SCREED RETAINER**

BILL OF MISCELLANEOUS METAL						for BRIDGE RAIL - 2 SPAN		Site No.	
MARK No.	No.	DESCRIPTION	CORROSION PROTECTION	SIZE	LENGTH	REMARKS	COMPONENT MASS	MASS PER UNIT	TOTAL MASS
GP1	24	Railpost	Hot dip galvanized						953.93
		Each unit to be fabricated from:							
		1 - Post		W150 x 30	1 235	As detailed	36.281	36.281	
		2 - Plates		PL 8 x 138	200	As detailed	1.733	3.466	
									39.747
GP2	4	Railpost	Hot dip galvanized						158.51
		Each unit to be fabricated from:							
		1 - Post		W150 x 30	1 235	As detailed	36.161	36.161	
		2 - Plates		PL 8 x 138	200	As detailed	1.733	3.466	
									39.627
T1	4	Top rail	Hot dip galvanized						624.75
		Each unit to be fabricated from:							
		1 - Hollow structural section		HSS203x102x6.4	5 540	As detailed			156.188
									677.98
T2	4	Top rail	Hot dip galvanized						677.98
		Each unit to be fabricated from:							
		1 - Hollow structural section		HSS203x102x6.4	5 962	As detailed	167.982	167.982	
		1 - Plate		PL 12 x 88	190	As detailed	1.514	1.514	
									169.496
T3	2	Top rail	Hot dip galvanized						50.13
		Each unit to be fabricated from:							
		1 - Hollow structural section		HSS203x102x6.4	891	As detailed			25.066
									535.02
B1	4	Bottom rail	Hot dip galvanized						535.02
		Each unit to be fabricated from:							
		1 - Hollow structural section		HSS102x102x6.4	7 390	As detailed			133.755
									300.24
B4	4	Bottom rail	Hot dip galvanized						300.24
		Each unit to be fabricated from:							
		1 - Hollow structural section		HSS102x102x6.4	4 112	As detailed	74.392	74.392	
		1 - Plate		PL 12 x 88	88	As detailed	0.668	0.668	
									75.060
B5	2	Bottom rail	Hot dip galvanized						32.13
		Each unit to be fabricated from:							
		1 - Hollow structural section		HSS102x102x6.4	891	As detailed			16.067
									83.00
ST1	2	Sleeve	Hot dip galvanized						83.00
		Each unit to be fabricated from:							
		2 - Plates			1 516	As detailed	20.749	41.498	
									66.10
ST2	4	Sleeve	Hot dip galvanized						66.10
		Each unit to be fabricated from:							
		2 - Plates			600	As detailed	8.263	16.526	
									45.49
SB1	2	Sleeve	Hot dip galvanized						45.49
		Each unit to be fabricated from:							
		2 - Plates			1 516	As detailed	11.372	22.744	
									37.17
SB2	4	Sleeve	Hot dip galvanized						37.17
		Each unit to be fabricated from:							
		2 - Plates			600	As detailed	4.646	9.292	
									83.21
CP1	2	Connection plate	Hot dip galvanized						41.605
CP2	2	Connection plate	Hot dip galvanized						41.605
CA1	2	Connection angle	Hot dip galvanized	L102x102x9.5	550	As detailed	7.864	15.73	
CA2	2	Connection angle	Hot dip galvanized	L102x102x9.5	550	As detailed	7.864	15.73	
A	56	Washer	Hot dip galvanized	PL 8x60	60	As detailed	0.226	12.66	
BB1	28	Washer	Hot dip galvanized	PL 16x100	150	As detailed	1.884	52.75	
C1	120	Bolts c/w hex nuts	Hot dip galvanized	19 dia.	150	Round head, square neck bolt c/w 1 hex nut	0.424	50.88	
C2	24	Bolts c/w hex nuts	Hot dip galvanized	19 dia.	165	Hex bolt c/w 1 hex nut	0.466	11.18	
C3	8	Bolts c/w hex nuts	Hot dip galvanized	19 dia.	65	Hex bolt c/w 1 hex nut	0.249	1.99	
C4	8	Bolts c/w hex nuts	Hot dip galvanized	22 dia.	50	Hex bolt c/w 1 hex nut	0.327	2.62	
C5	8	Bolts - no nuts	Hot dip galvanized	19 dia.	38	Hex bolt - no nuts	0.145	1.16	
C6	24	Bolts c/w hex nuts	Hot dip galvanized	13 dia.	38	Hex bolt c/w 1 hex nut	0.070	1.68	
C7	12	Bolts c/w hex nuts	Hot dip galvanized	22 dia.	65	Hex bolt c/w 1 hex nut	0.215	2.58	
8	8	Edge screed angle	Hot dip galvanized	L38x38x4.8	6 000	As detailed	16.020	128.16	
24	24	Edge screed retainers	Hot dip galvanized						20.23
		Each unit to be fabricated from:							
		1 - Plate		PL 5x95	150	As detailed	0.549	0.549	
		1 - Plate		PL 5x50	150	As detailed	0.294	0.294	
									0.843
20	20	Standard flat washer	Hot dip galvanized	for 22 dia. bolts		1 per bolt Mk. "C4" & "C7"	0.032	0.64	
160	160	Standard flat washer	Hot dip galvanized	for 19 dia. bolts		1 per bolt Mk. "C1", "C2", "C3" & "C5"	0.022	3.52	
24	24	Standard flat washer	Hot dip galvanized	for 13 dia. bolts		1 per bolt Mk. "C6"	0.010	0.24	
160	160	Standard lock washer	Hot dip galvanized	for 19 dia. bolts		1 per bolt Mk. "C1", "C2", "C3" & "C5"	0.019	3.04	
24	24	Standard lock washer	Hot dip galvanized	for 13 dia. bolts		1 per bolt Mk. "C6"	0.007	0.17	
20	20	Standard lock washer	Hot dip galvanized	for 22 dia. bolts		1 per bolt Mk. "C4" & "C7"	0.027	0.54	
RS1	48	Shims	Hot dip galvanized	PL 3x150	190	As detailed	0.506	24.29	
RS2	48	Shims	Hot dip galvanized	PL 5x150	190	As detailed	0.843	40.46	
RS3	144	Shims	Hot dip galvanized	PL 3x150	100	As detailed	0.291	41.90	
RS4	48	Shims	Hot dip galvanized	PL 5x150	100	As detailed	0.486	23.33	
RS5	96	Shims	Hot dip galvanized	PL 3x140	150	As detailed	0.394	37.82	
									<b>TOTAL MASS (kg) = 4224.18</b>

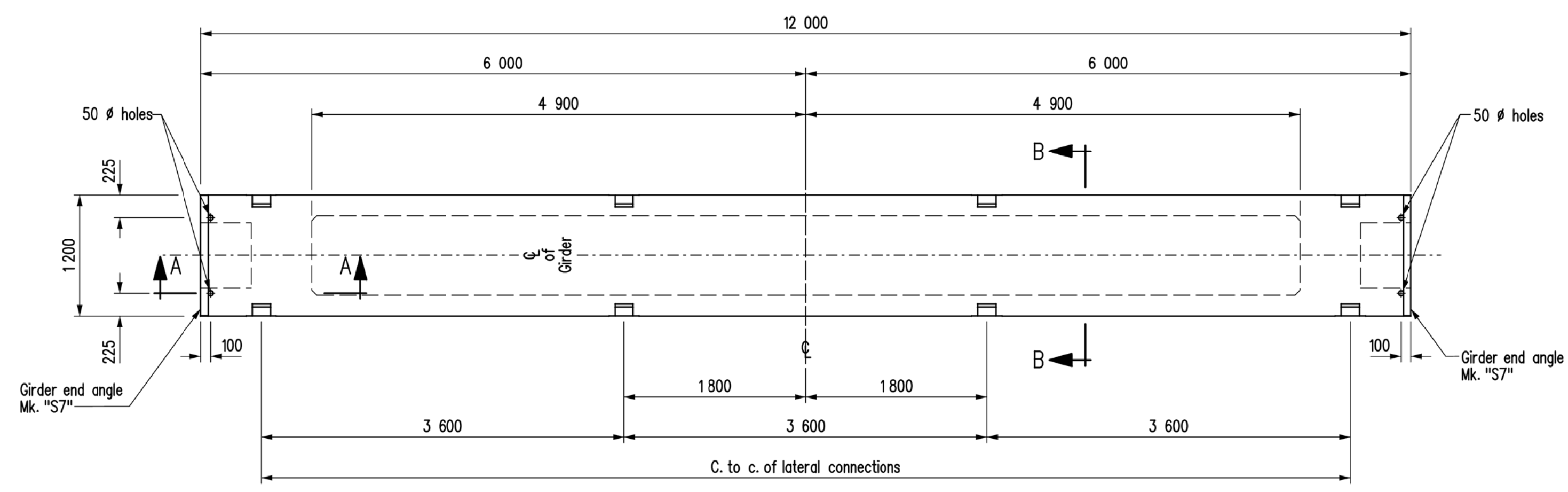
REVISIONS		RAILPOST DETAILS	
DATE	BY	DESIGN	RELEASED FOR CONSTRUCTION BY:
		DESIGN SEAL	RECORD SEAL
		 Water Management and Structures	
SCALE: 1:5		EXECUTIVE DIRECTOR OF STRUCTURES DATE	
SHEET No. _____		SITE No. _____	



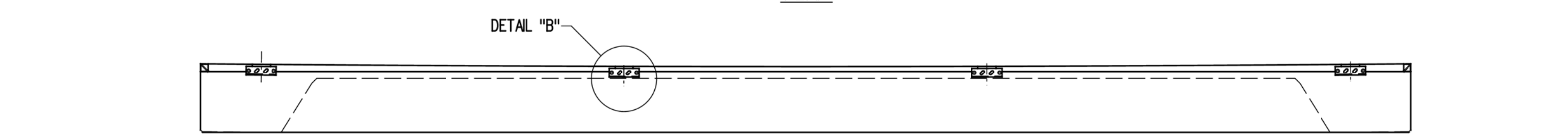
PLAN



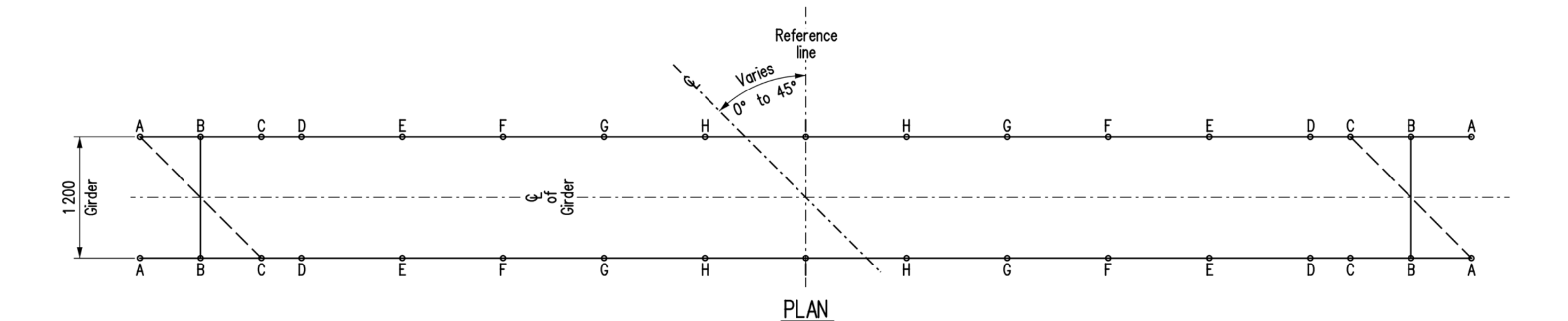
EXTERIOR ELEVATION  
EXTERIOR GIRDER MK. "G1"



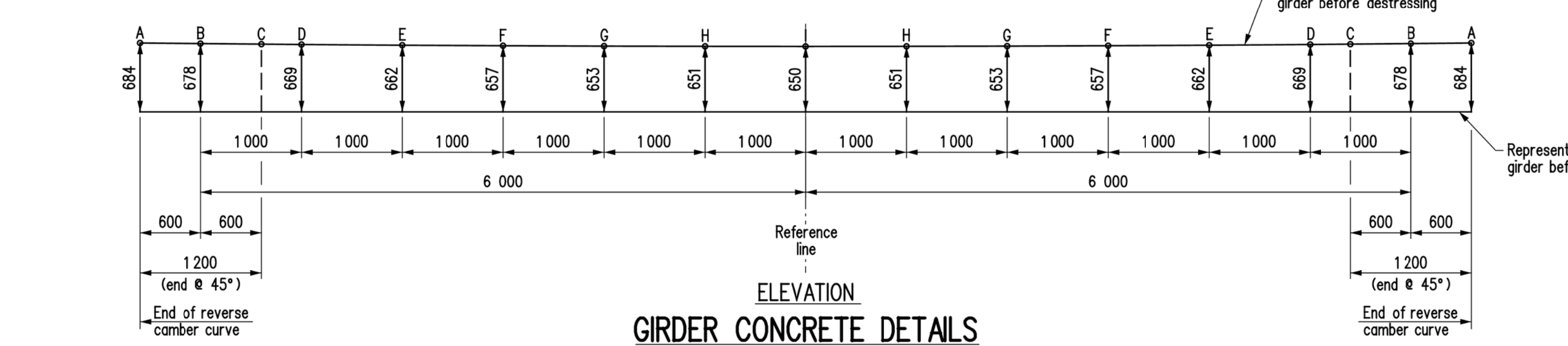
PLAN



ELEVATION  
INTERIOR GIRDER MK. "G2"

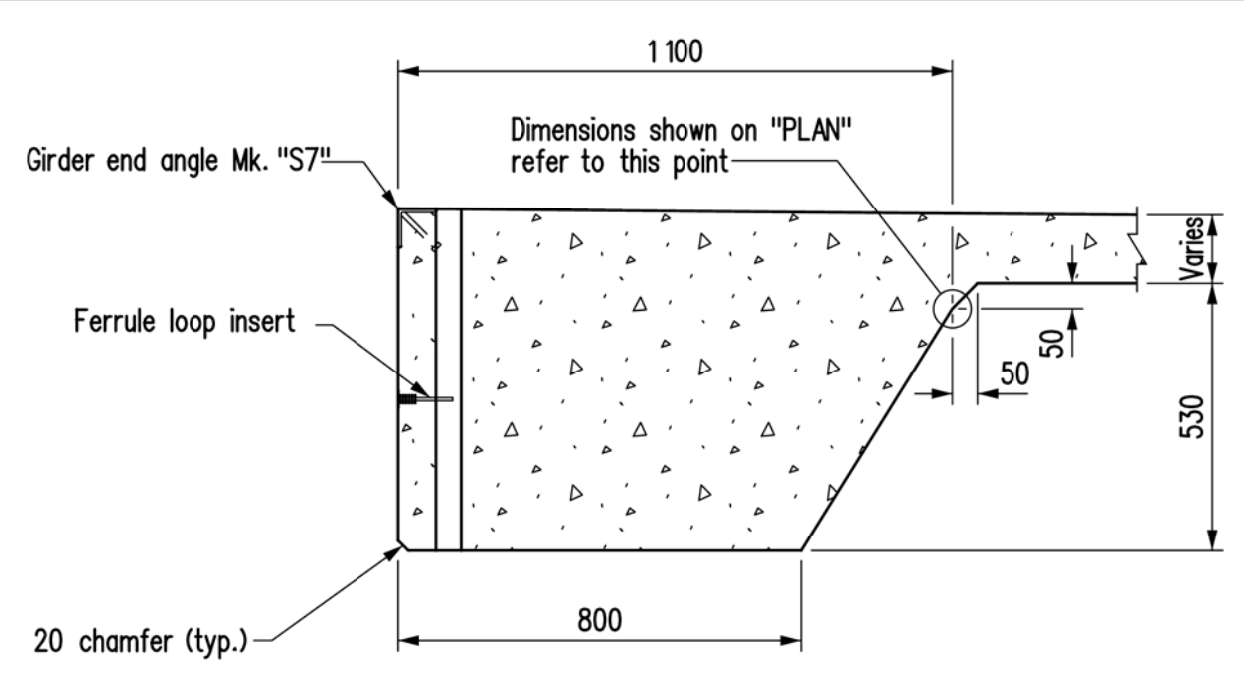


PLAN

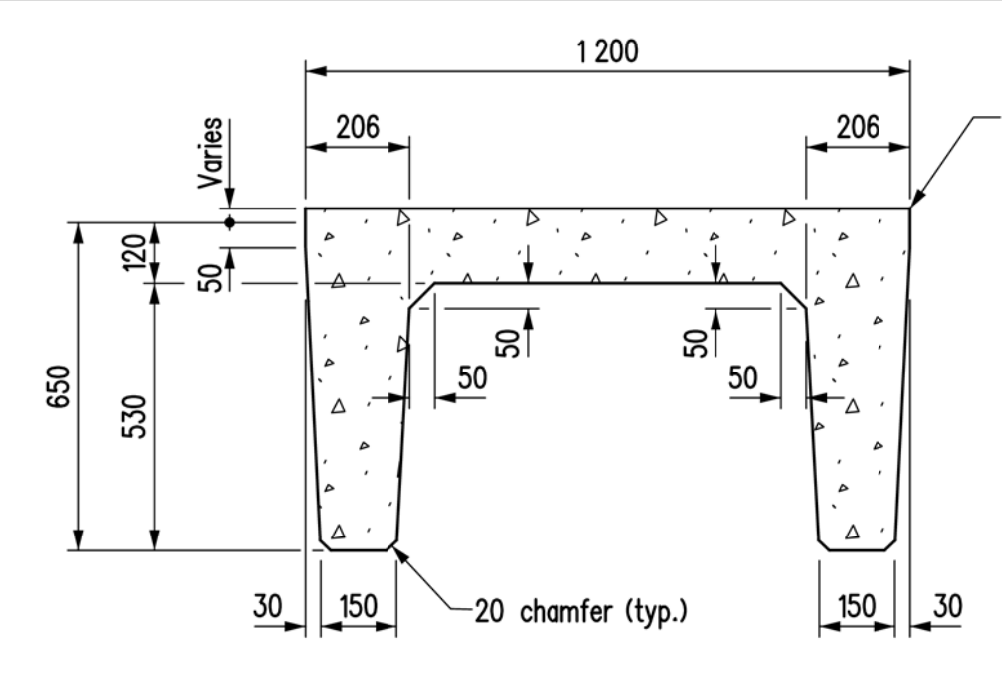


ELEVATION  
GIRDER CONCRETE DETAILS

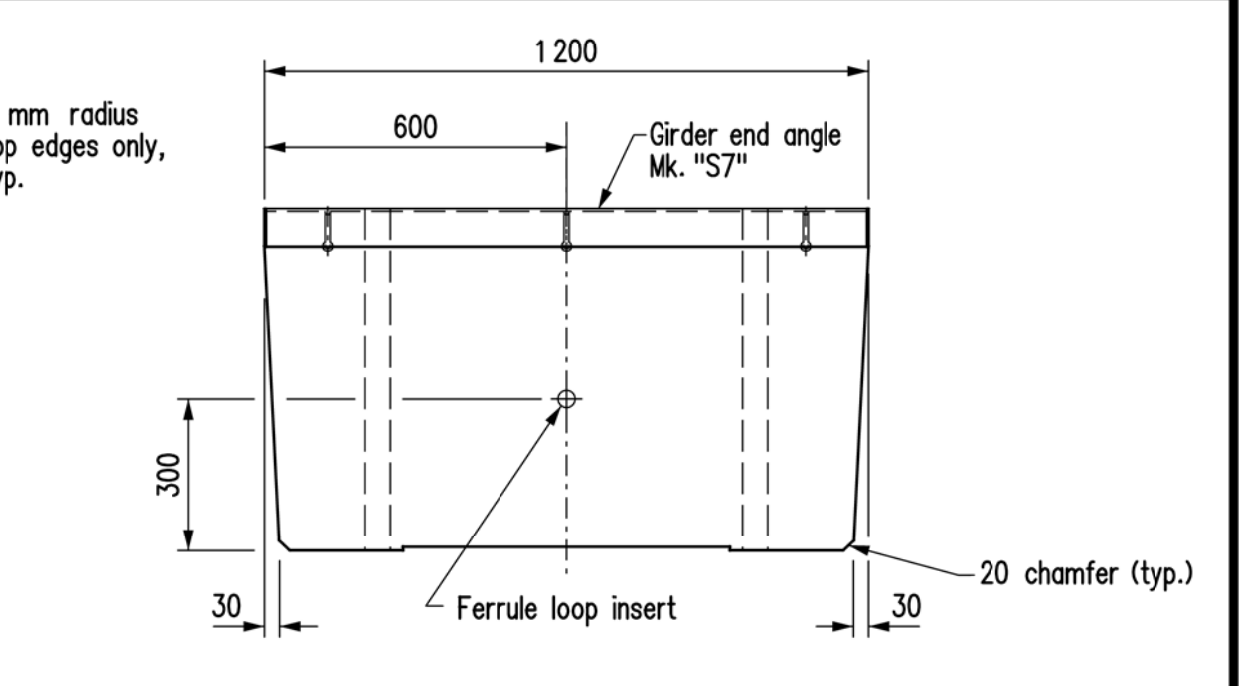
NOTE: The end of girder will fall between POINT "A" and POINT "C" on curve because of various skew angles.



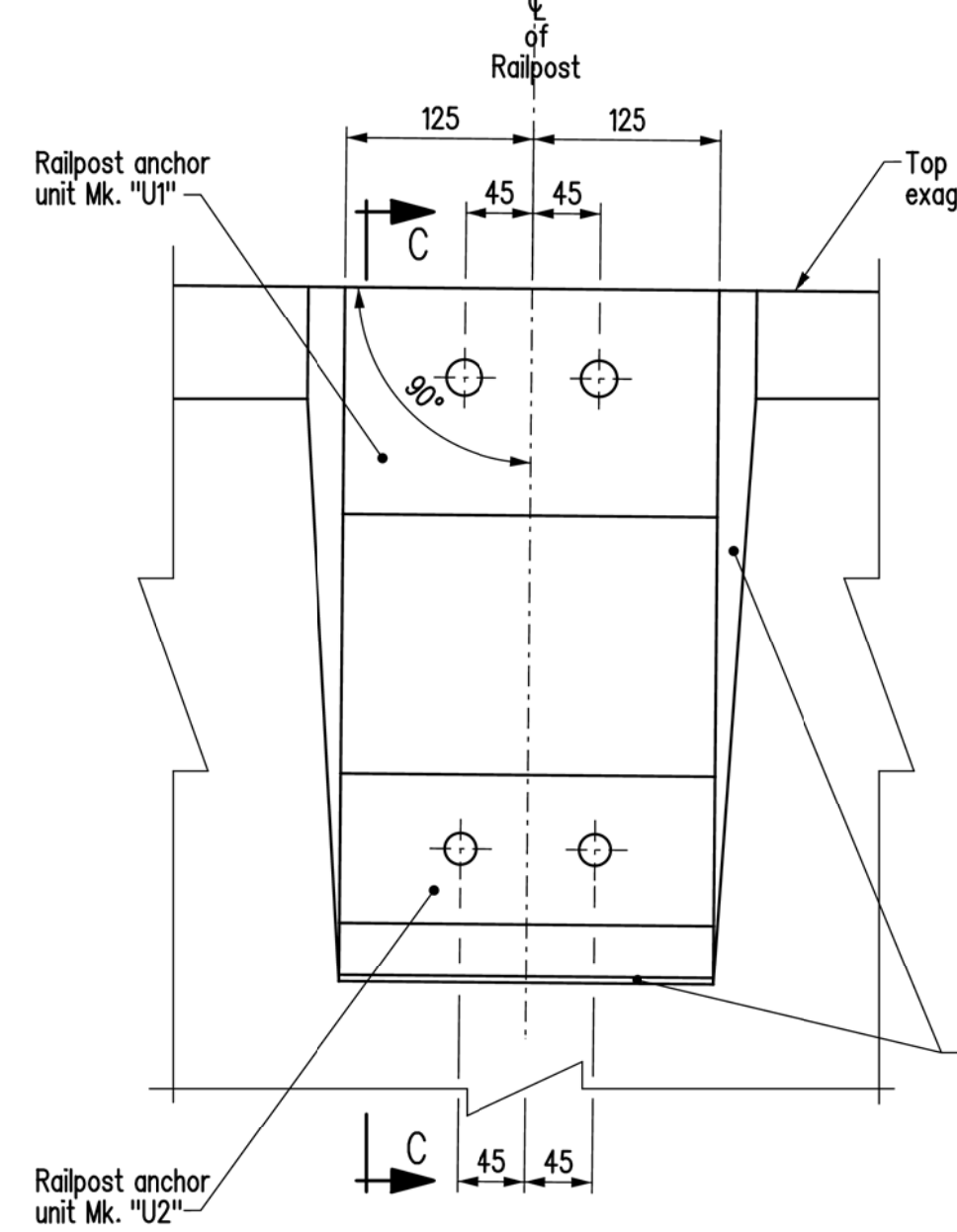
SECTION A-A  
Typical at both ends of girders  
Scale 1:15



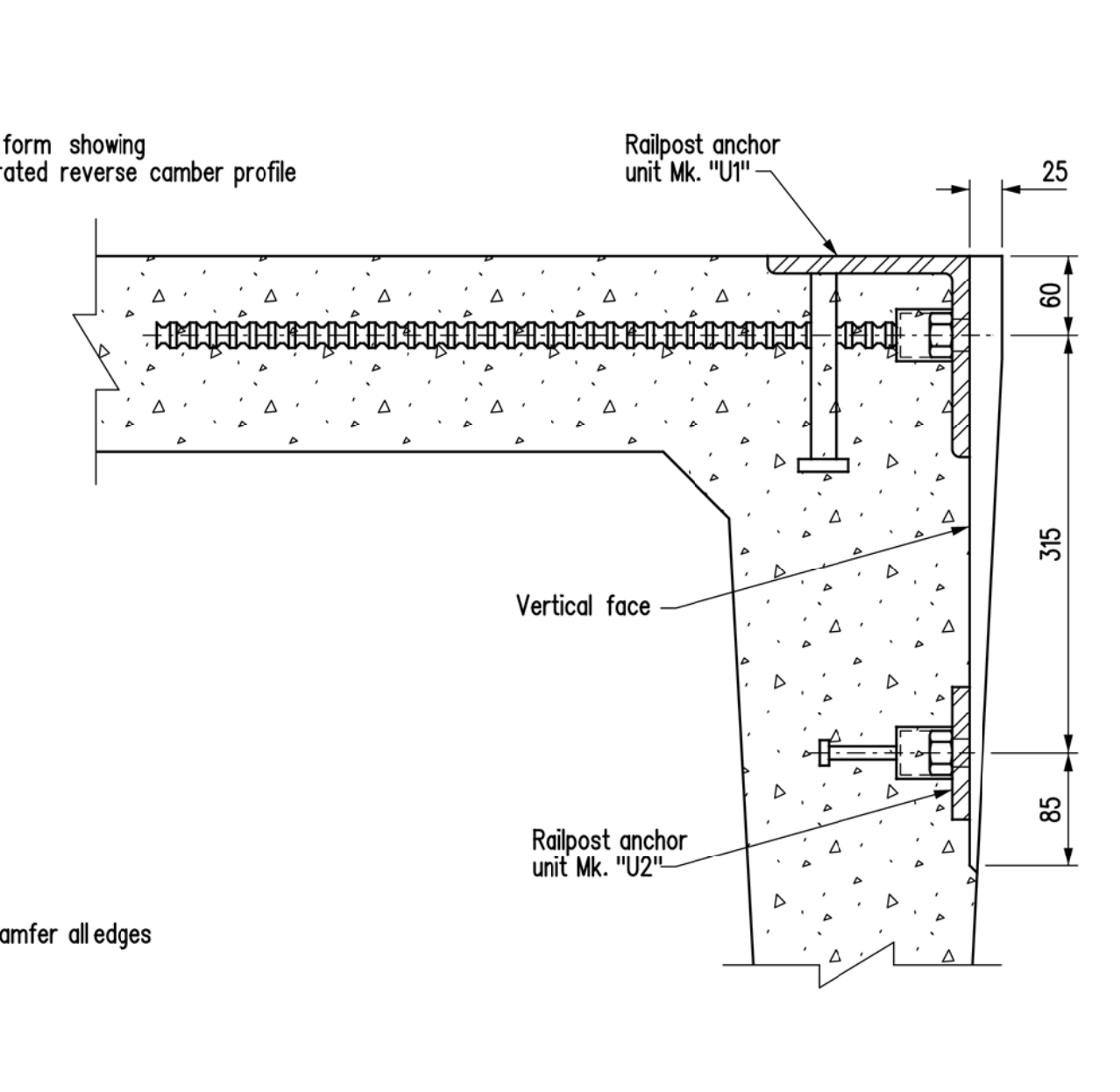
SECTION B-B  
Scale 1:15



END VIEW  
Scale 1:15

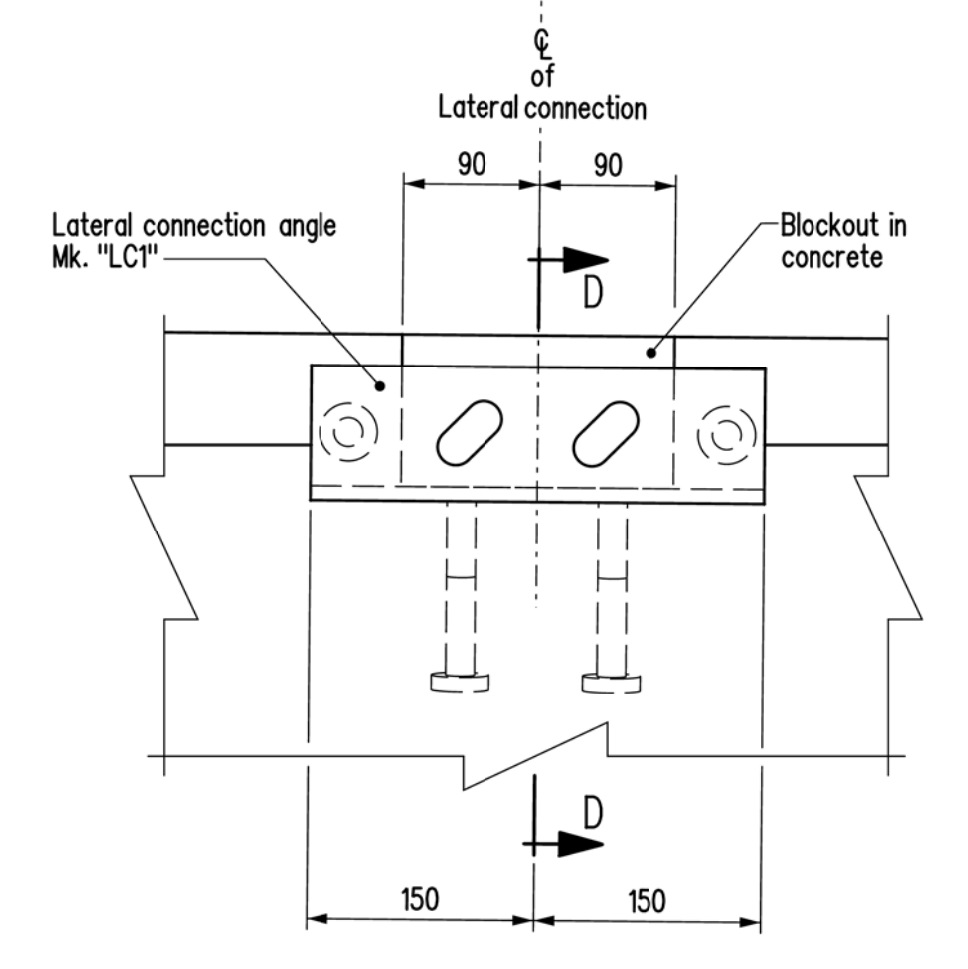


ELEVATION

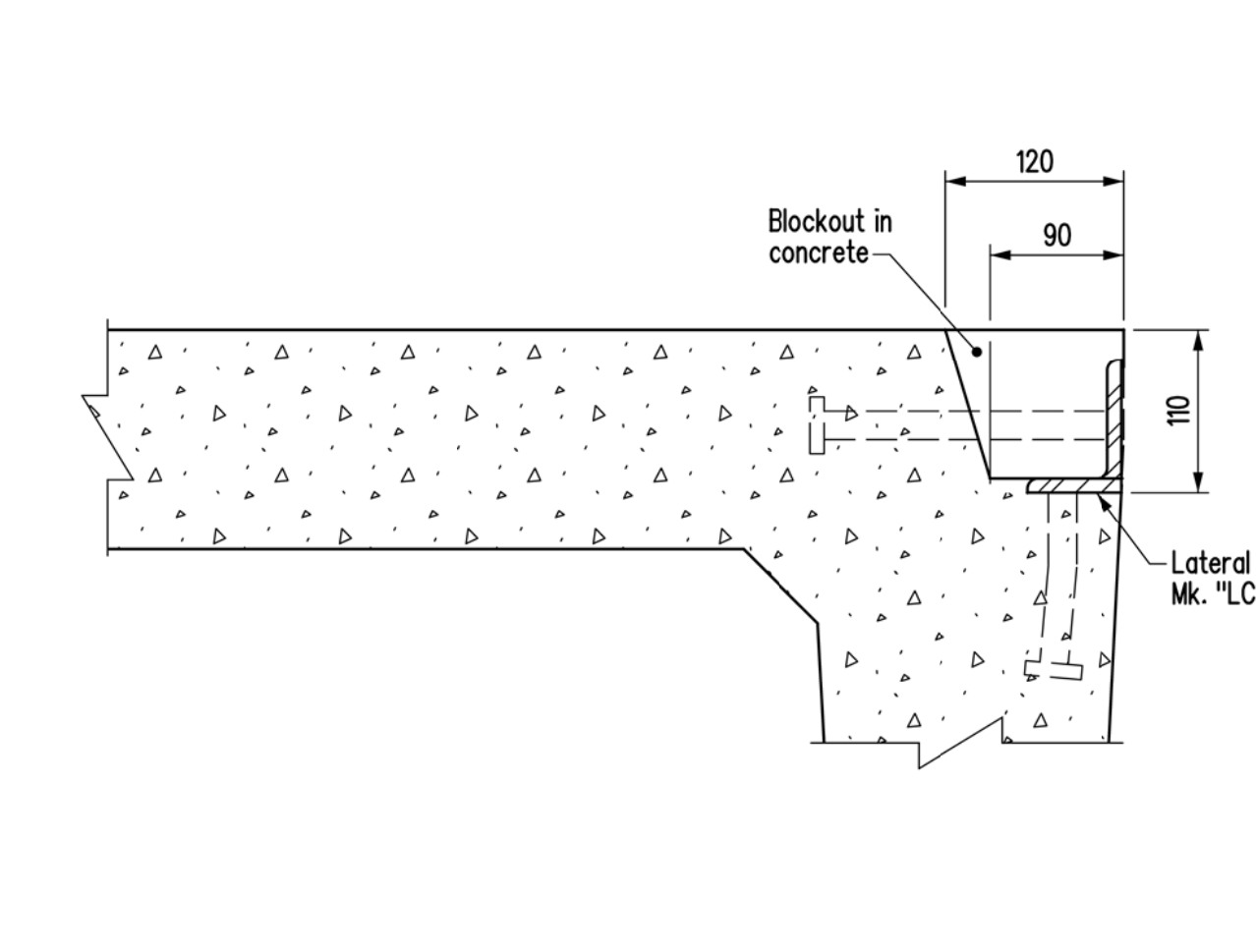


SECTION C-C

DETAIL "A"  
Scale 1:5



ELEVATION

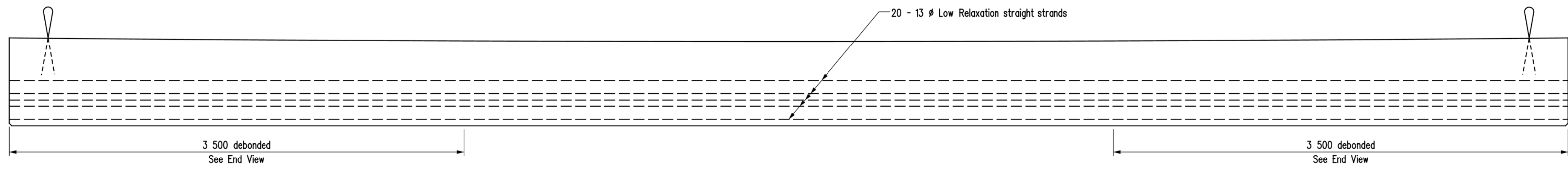


SECTION D-D

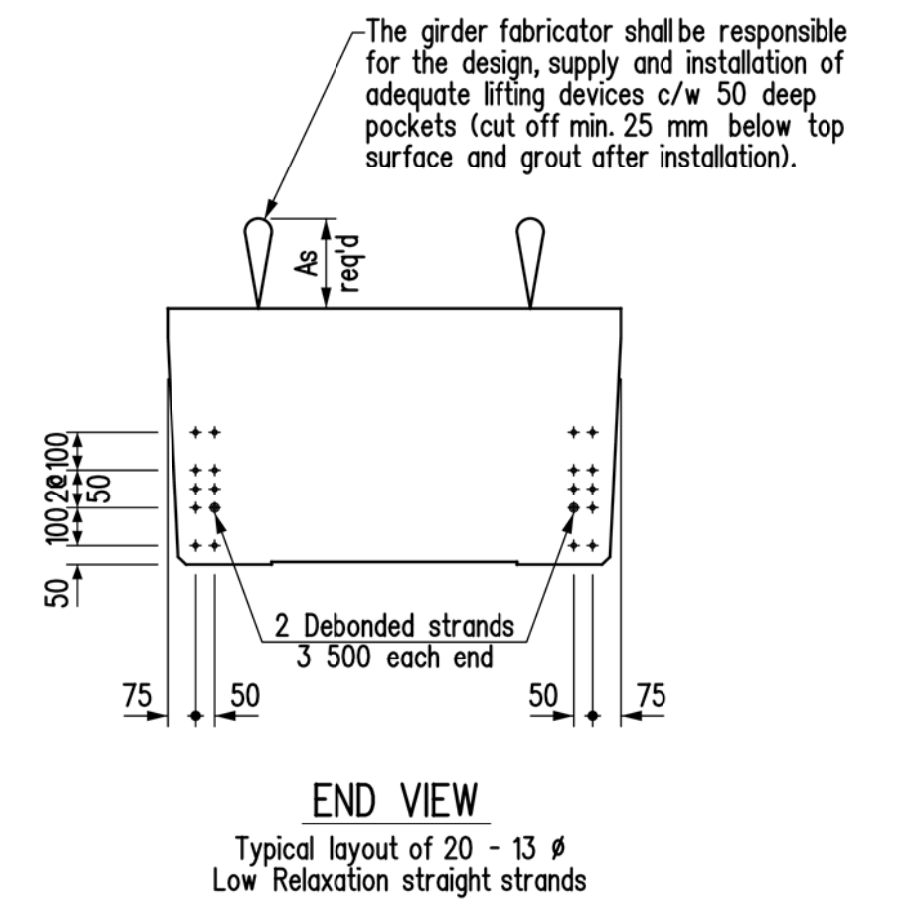
DETAIL "B"  
Scale 1:5

- 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

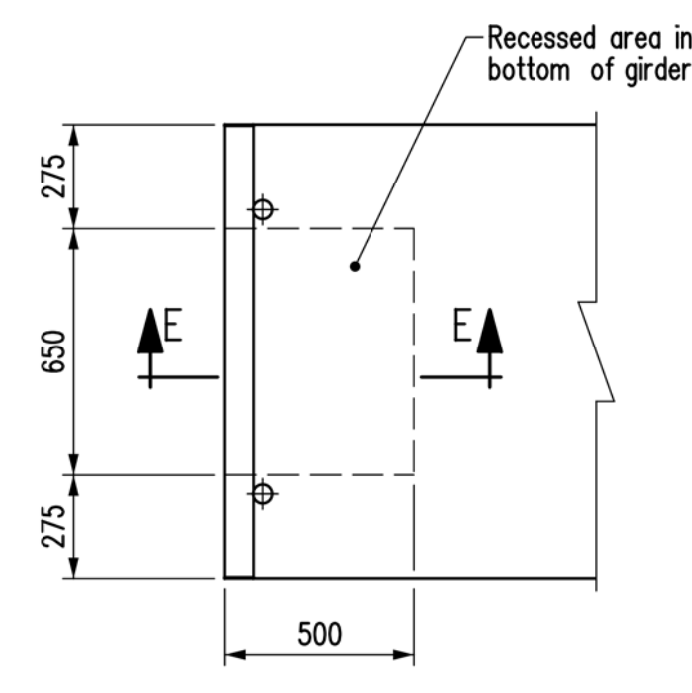
REVISIONS		PRECAST PRESTRESSED CHANNEL GIRDER DETAILS	
DATE	BY	DESIGN SEAL	RECORD SEAL
<p>PLACE ENGINEERS ELECTRONIC SEAL HERE</p>		<p>Manitoba Infrastructure Water Management and Structures</p>	
<p>DESIGN BY: B.A.N.</p>		<p>RELEASED FOR CONSTRUCTION BY:</p>	
<p>CHECKED: K.P.</p>		<p>EXECUTIVE DIRECTOR OF STRUCTURES DATE</p>	
<p>DETAILS CHECKED:</p>		<p>SCALE: Scale 1:40 SHEET No. G1</p>	
<p>or as shown</p>		<p>SITE No. _____</p>	



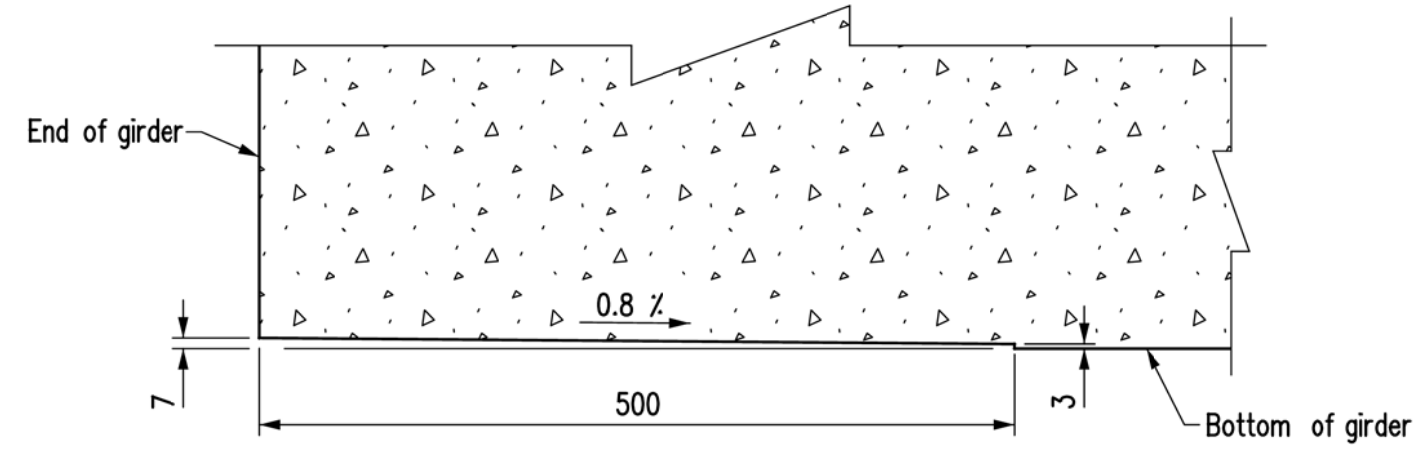
ELEVATION  
GIRDER STRAND LAYOUT



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

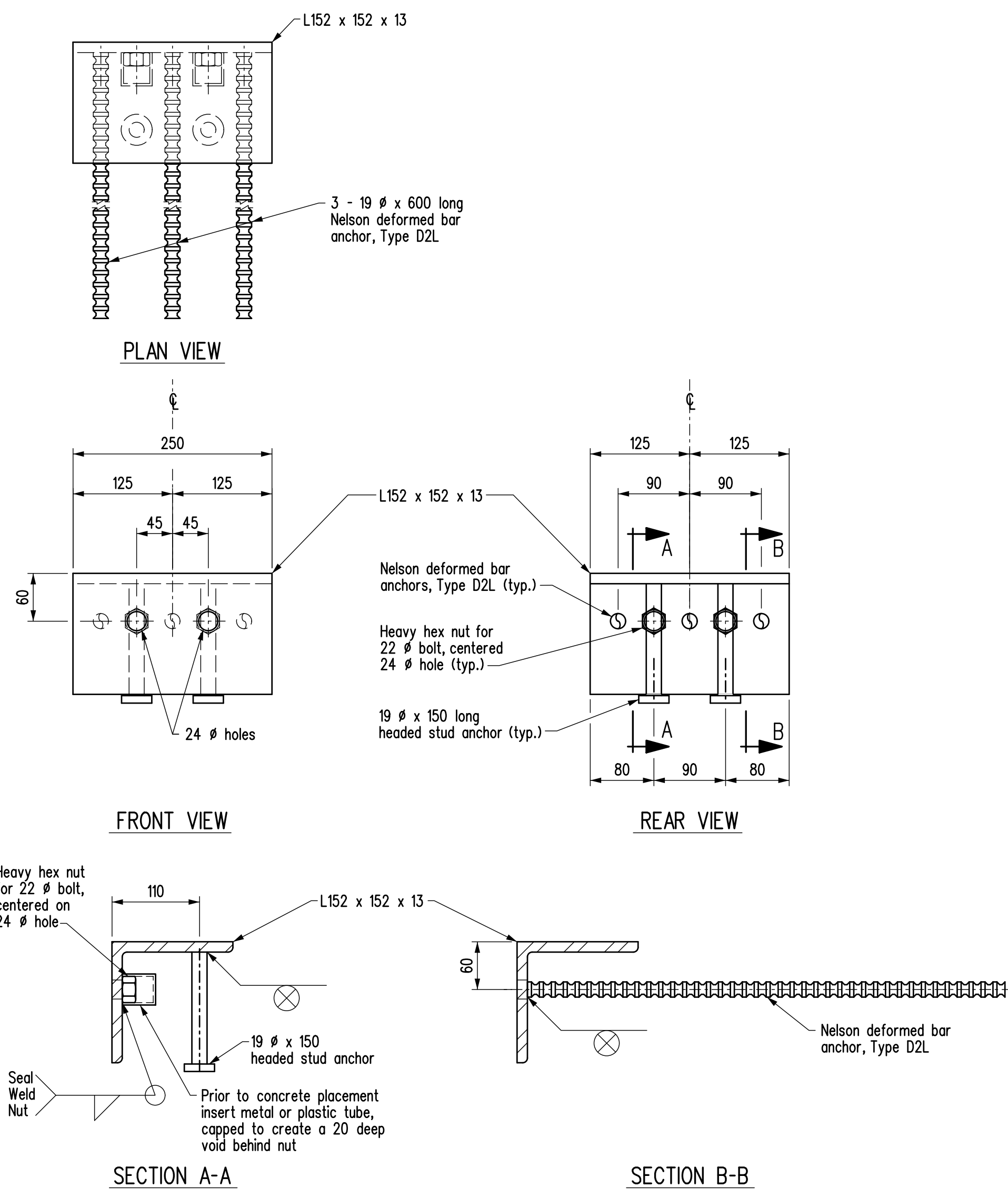
BEARING RECESS DETAILS

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. 0000

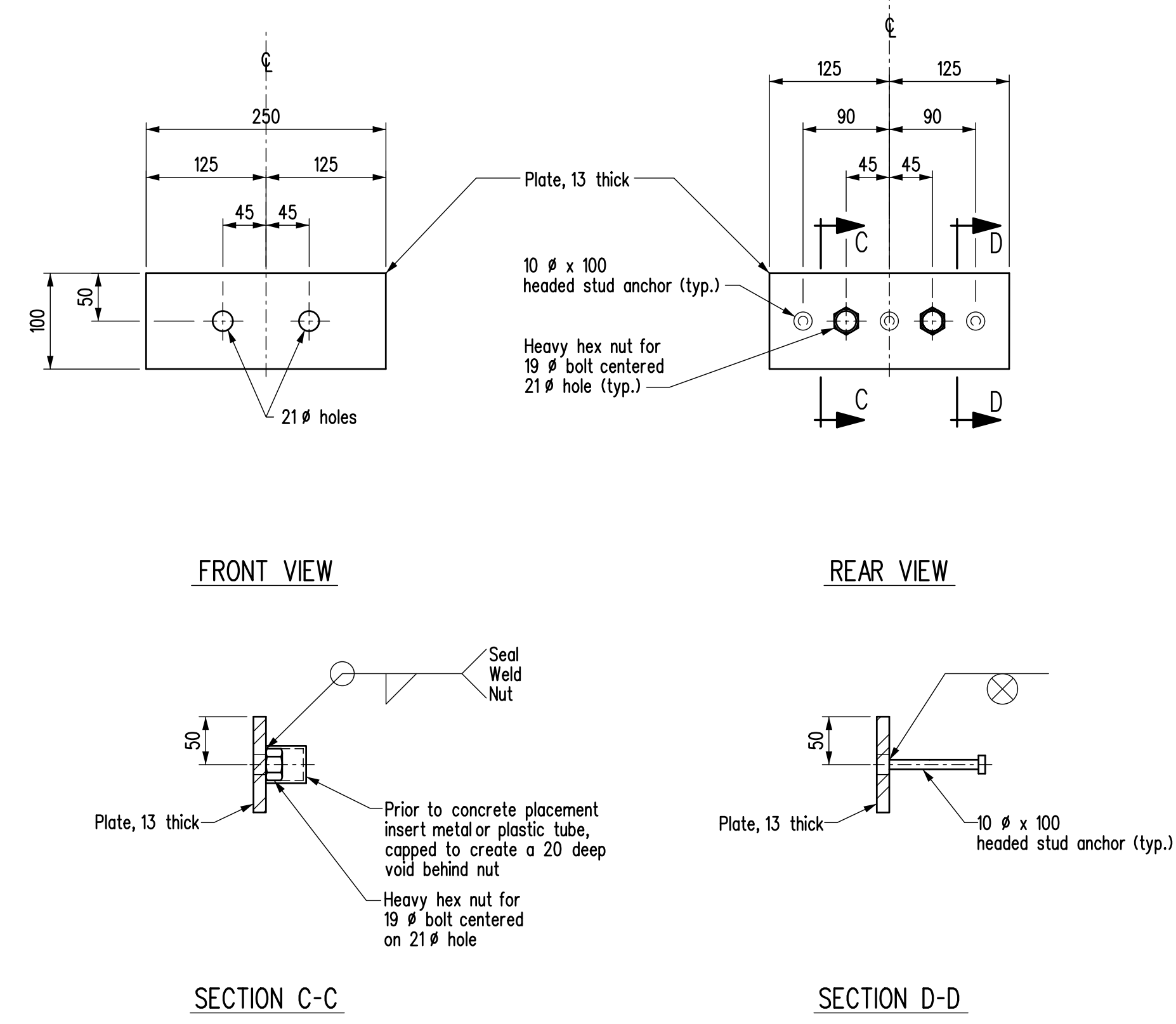
  

PLACE ENGINEERS ELECTRONIC SEAL HERE	DESIGN	BY: B.A.N.	
	CHECKED:		
	DETAILS	BY: K.P.	
	CHECKED:		

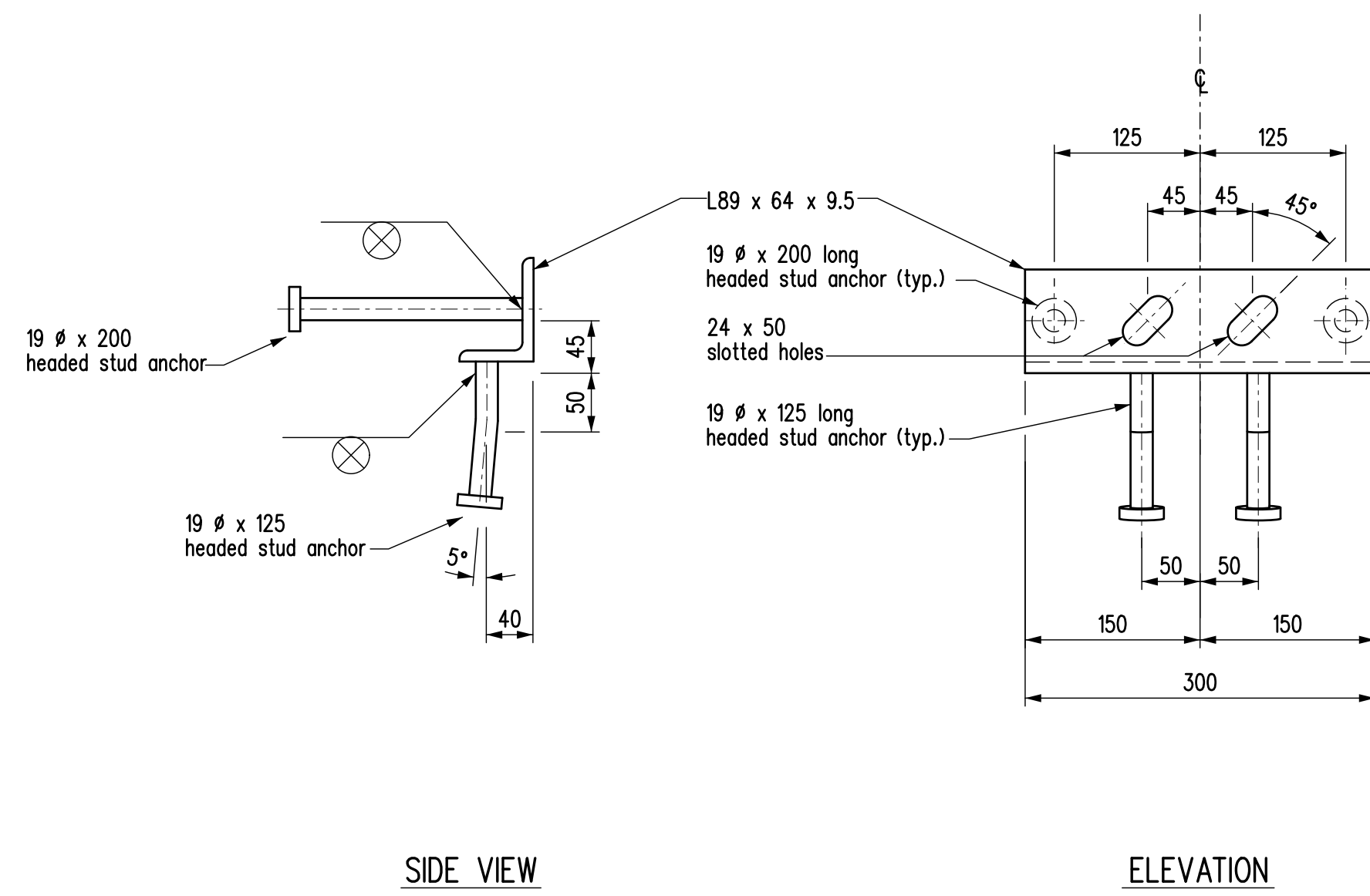




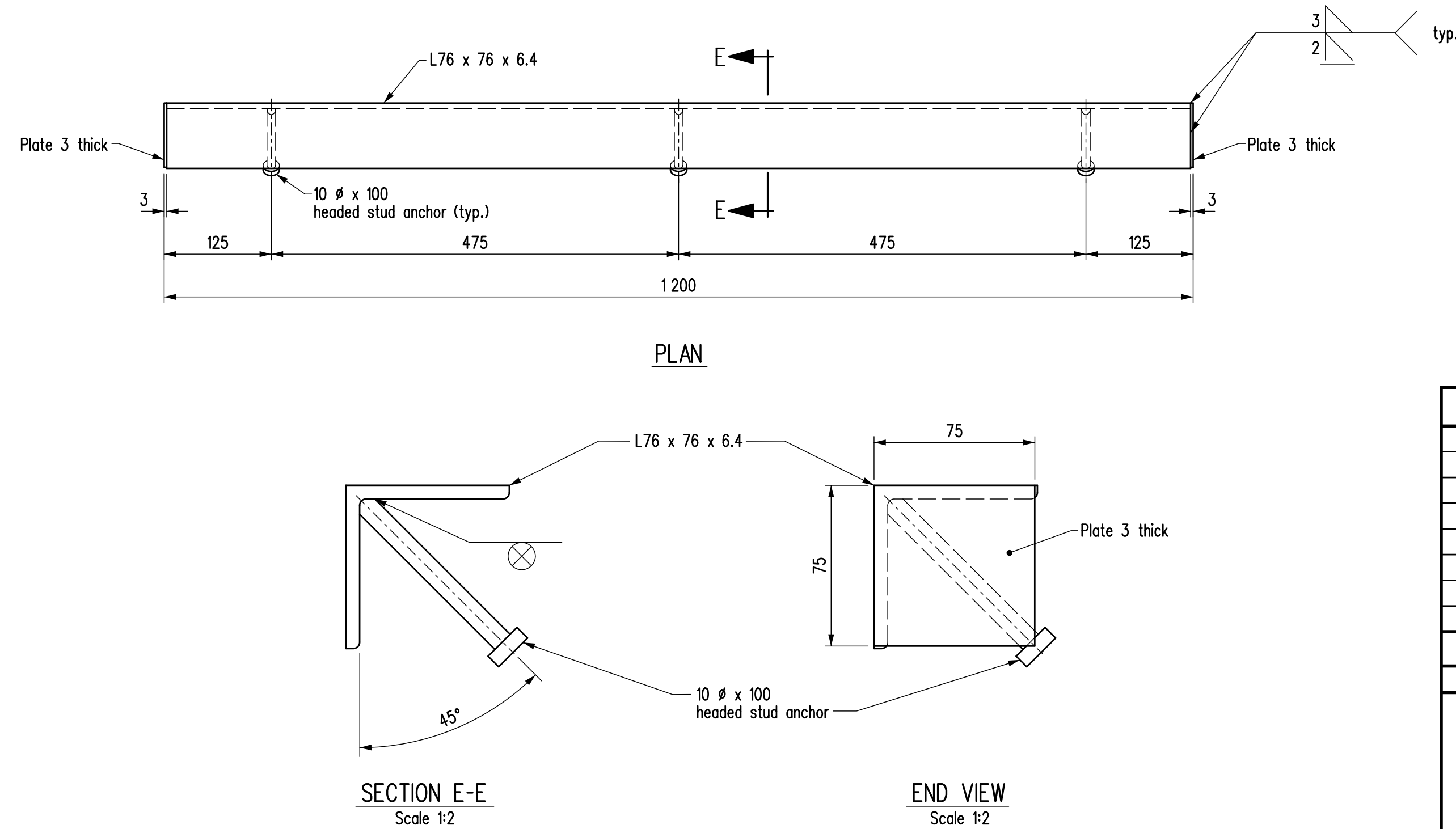
**RAILPOST ANCHOR UNIT MK. "U1"**



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



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



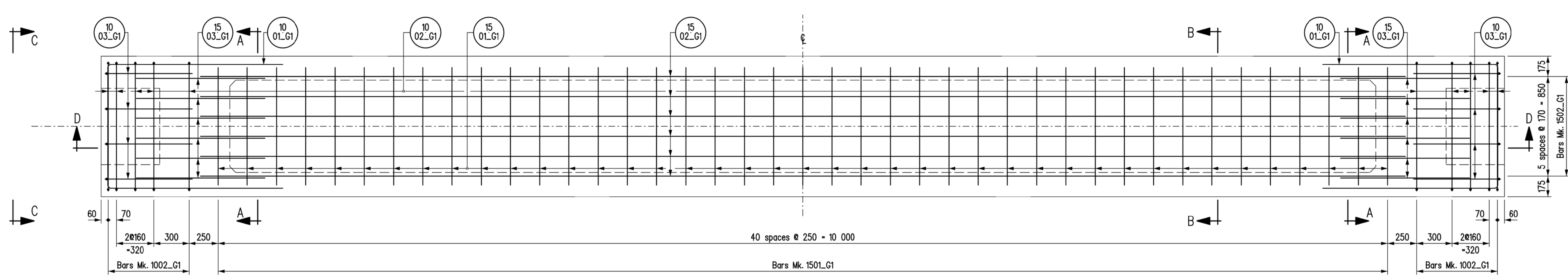
**GIRDER END ANGLE MK. "S7"**

BILL OF MISCELLANEOUS METAL		for 12 m LONG GIRDERS 10 800 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
		3 - 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	128	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	36	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
	36	Ferrule loop insert	Stainless steel	for 13 dia. bolt		Richmond anchor, Type LF-W with mounting washer
TR2	18	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

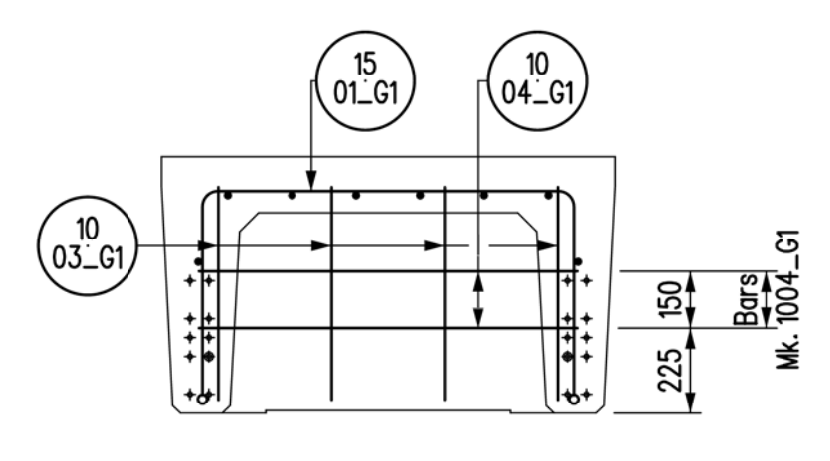
**NOTES:**

- 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.

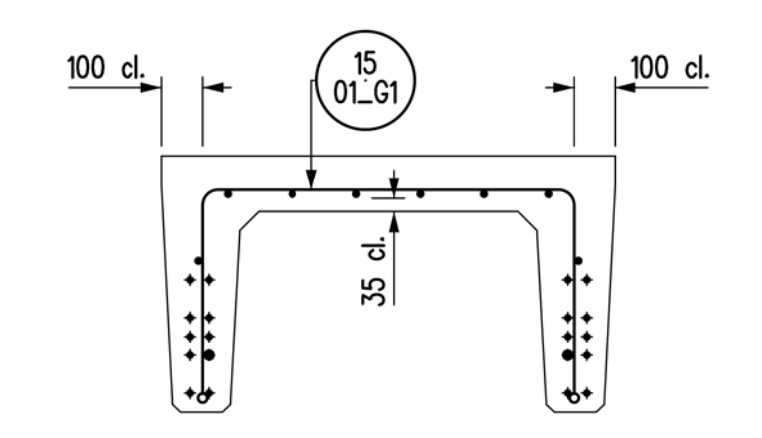
REVISIONS			PRECAST PRESTRESSED CHANNEL GIRDER DETAILS		
DATE	BY	DESCRIPTION	RELEASED FOR CONSTRUCTION BY:		
DESIGN SEAL	RECORD SEAL				
<b>PLACE ENGINEERS ELECTRONIC SEAL HERE</b>			<b>Manitoba</b> Infrastructure Water Management and Structures		
			BY: _____ <b>B.A.N.</b> _____	EXECUTIVE DIRECTOR OF STRUCTURES DATE	
			CHECKED: _____	Scale: _____ Scale 1:5	SHEET No. <b>G3</b>
			BY: _____ <b>K.P.</b> _____		or as shown
CHECKED: _____		SITE No. _____			



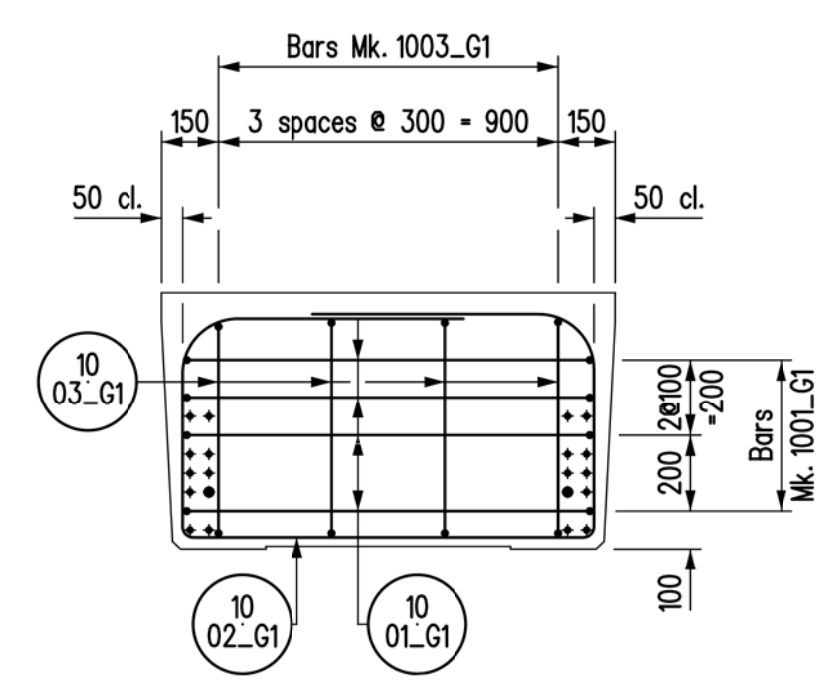
PLAN OF GIRDER



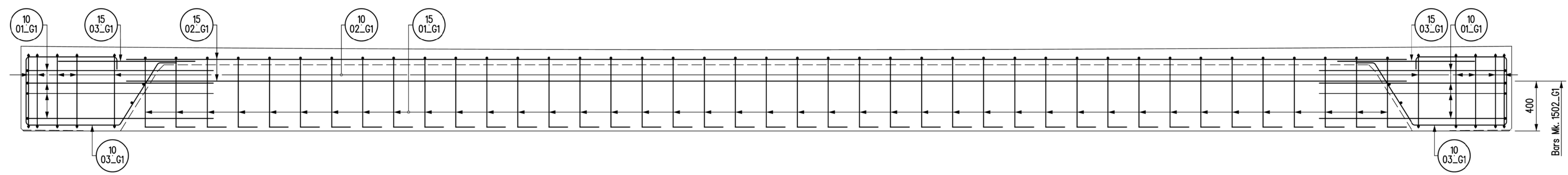
SECTION A-A



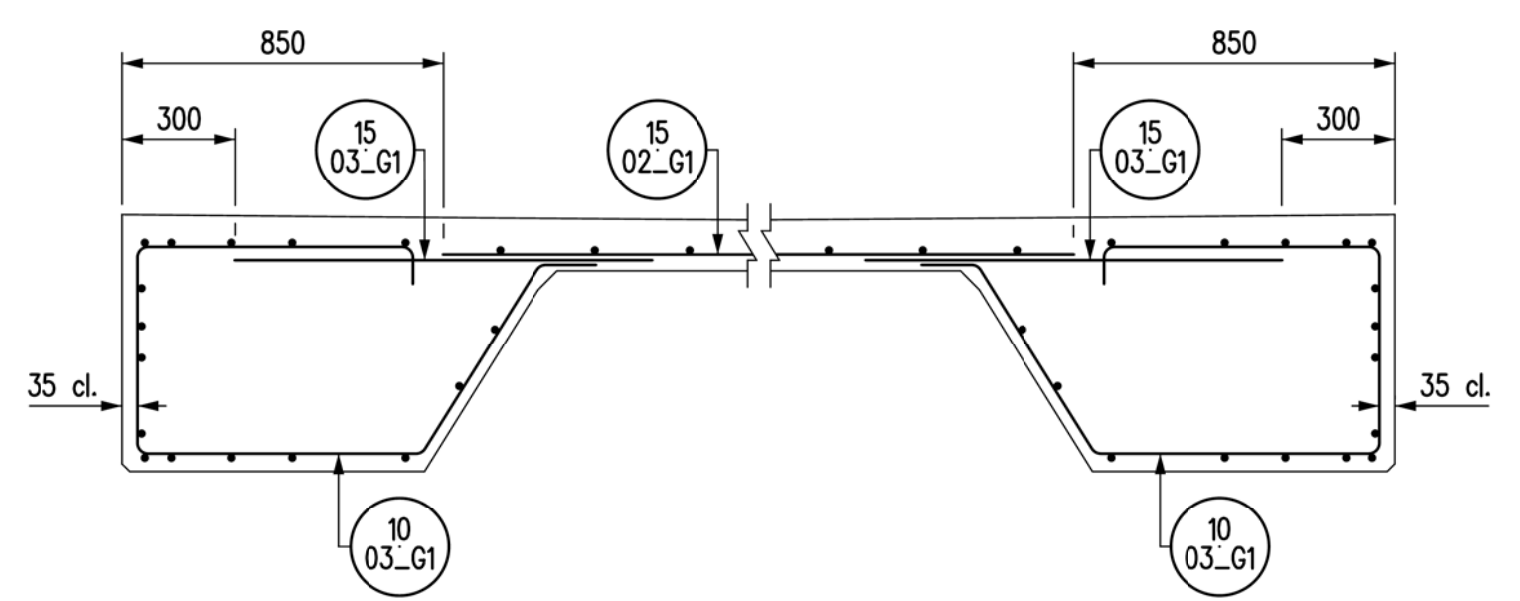
SECTION B-B



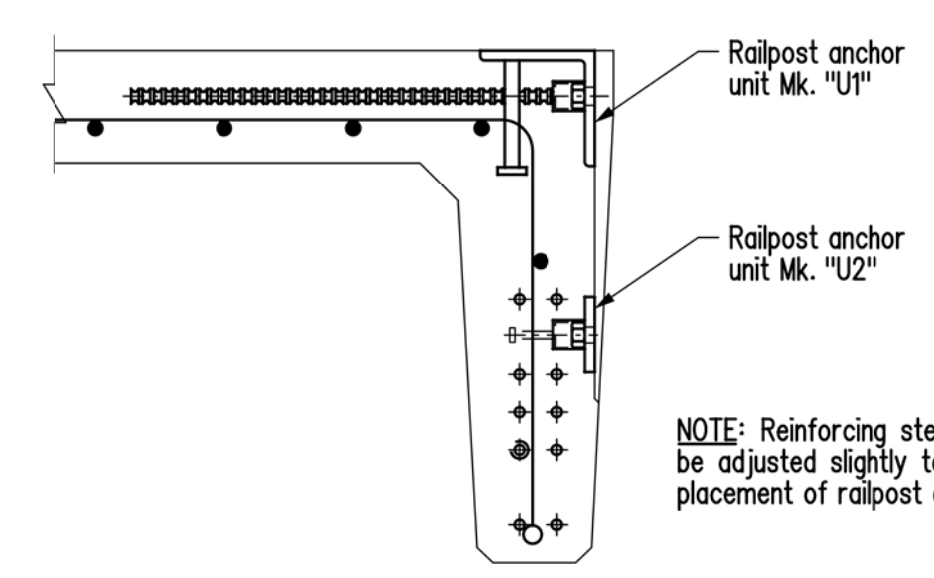
END VIEW C-C



ELEVATION OF GIRDER



PART SECTION D-D



DETAIL AT RAILPOST ANCHOR

Scale 1:10

NOTE: Reinforcing steel placement may be adjusted slightly to allow accurate placement of railpost anchors.

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:
DESIGN SEAL	RECORD SEAL		EXECUTIVE DIRECTOR OF STRUCTURES DATE
PLACE ENGINEERS ELECTRONIC SEAL HERE		 Infrastructure Water Management and Structures	BY: <u>B.A.N.</u> CHECKED: _____ BY: <u>K.P.</u> CHECKED: _____
		SCALE: Scale 1 : 20 SHEET No. <u>G4</u>	
		or as shown SITE No. <u>      </u>	
		_____ _____	

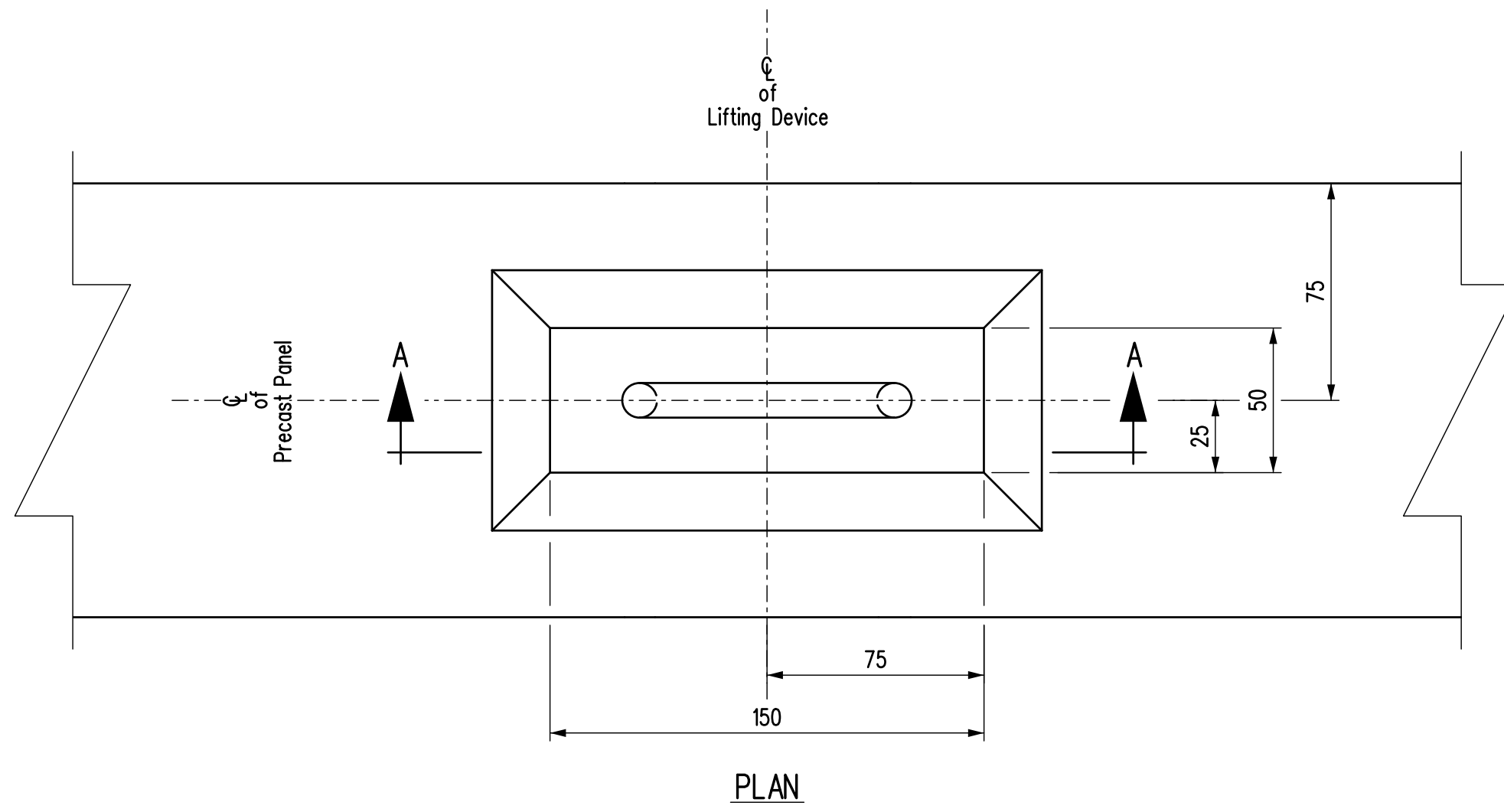
BILL OF REINFORCING STEEL - 12 M GIRDERS								SITE No.
MARK	TYPE	PIN DIAMETER	LENGTH	GIRDER TYPE	No. of GIRDERS	No. of BARS PER GIRDER	TOTAL No. of BARS PER GIRDER TYPE	BENDING DIAGRAM
1001_G1	BENT	45	4 080	G1	4	8	32	
1002_G1	BENT	45	3 660	G1	4	10	40	
1003_G1	BENT	45	2 950	G1	4	8	32	
1004_G1	STR		1 000	G1	4	4	16	
1501_G1	BENT	65	2 440	G1	4	41	164	
1502_G1	STR		10 300	G1	4	8	32	
1503_G1	STR		1 100	G1	4	12	48	
1001_G2	BENT	45	4 080	G2	14	8	112	
1002_G2	BENT	45	3 660	G2	14	10	140	
1003_G2	BENT	45	2 950	G2	14	8	112	
1004_G2	STR		1 000	G2	14	4	56	

BILL OF REINFORCING STEEL - 12 M GIRDERS								SITE No.
MARK	TYPE	PIN DIAMETER	LENGTH	GIRDER TYPE	No. of GIRDERS	No. of BARS PER GIRDER	TOTAL No. of BARS PER GIRDER TYPE	BENDING DIAGRAM
1501_G2	BENT	65	2 440	G2	14	41	574	
1502_G2	STR		10 300	G2	14	8	112	
1503_G2	STR		1 100	G2	14	12	168	
Total volume of structural concrete per exterior girder							4.94 m³	
Total volume of structural concrete per interior girder							4.93 m³	
NOTES:								
1. 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.								
2. All reinforcing steel shall be deformed steel, unless noted otherwise in the BILL OF REINFORCING STEEL.								
3. 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.								
4. 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.								
5. All bars shall be bent in accordance with the following detail:								

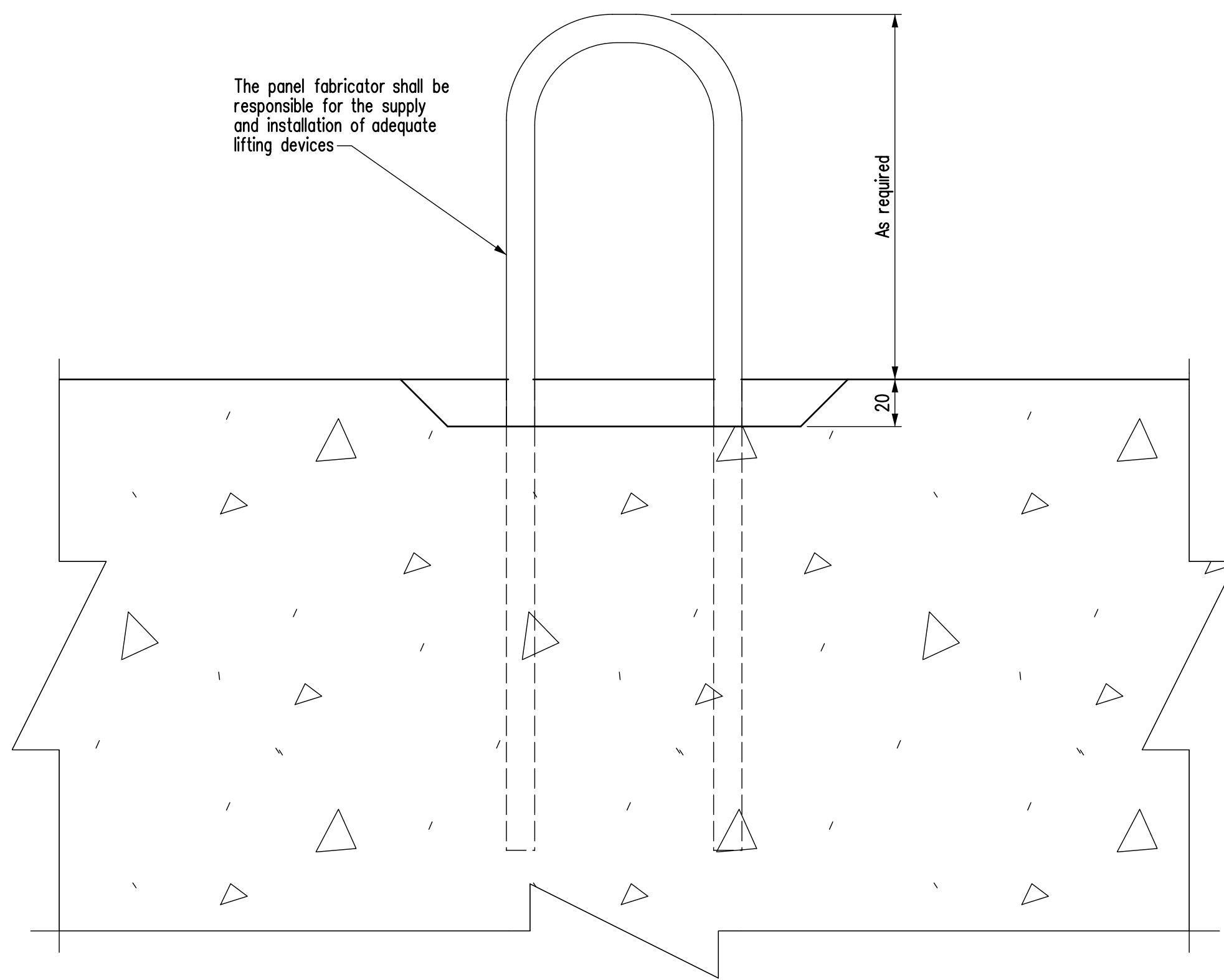
REVISIONS		PRECAST PRESTRESSED CHANNEL GIRDER DETAILS	
DATE	BY	DESIGN	RELEASER FOR CONSTRUCTION
			BY: _____ DATE: _____
DESIGN SEAL	RECORD SEAL		
<div style="text-align: center; font-weight: bold; font-size: 1.2em;">PLACE ENGINEERS ELECTRONIC SEAL HERE</div>		 Infrastructure Water Management and Structures	EXECUTIVE DIRECTOR OF STRUCTURES
		BY: _____ B.A.N. CHECKED: _____ BY: _____ K.P. CHECKED: _____	DATE: _____ SCALE: _____ SHEET No. <b>G5</b> SITE No. _____







PLAN



SECTION A-A  
DETAIL "A"

**BILL OF REINFORCING FOR PRECAST PANELS**

SITE \_\_\_\_\_

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		6 300	N1	2	6	12	
1502_N1	STR		600	N1	2	22	44	
1501_N1a	STR		6 300	N1a	2	6	12	
1502_N1a	STR		600	N1a	2	22	44	
1501_N2	STR		7 450	N2	2	10	20	
1502_N2	STR		1 200	N2	2	26	52	
1501_N3	STR		5 150	N3	2	10	20	
1502_N3	STR		1 200	N3	2	18	36	
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	

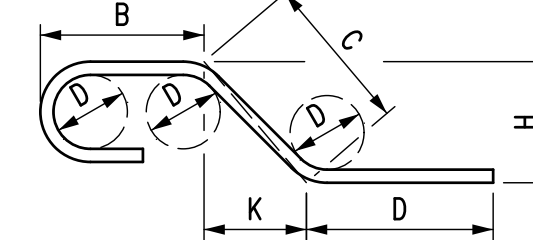
Total mass of reinforcing steel 1576.91 kg

Panel Type	N1	N1a	N2	N3	N4	N4a
Area m <sup>2</sup> /panel	4.50	4.50	9.80	6.80	10.00	10.00

Total area of precast Panels 91.20 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" of "C" 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:



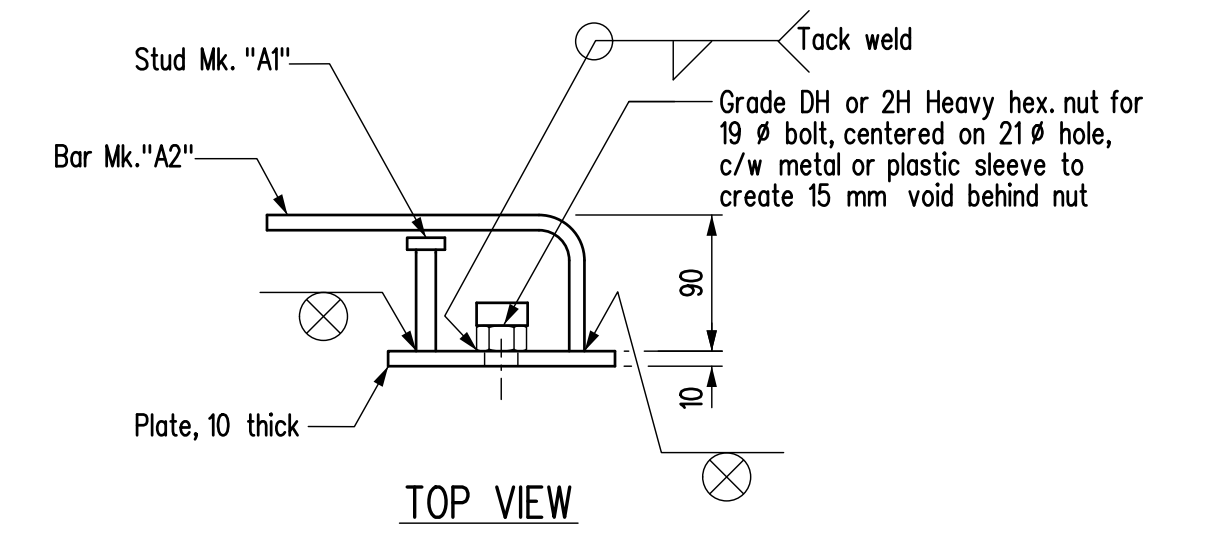
**BILL OF MISCELLANEOUS METAL for PRECAST PANELS**

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

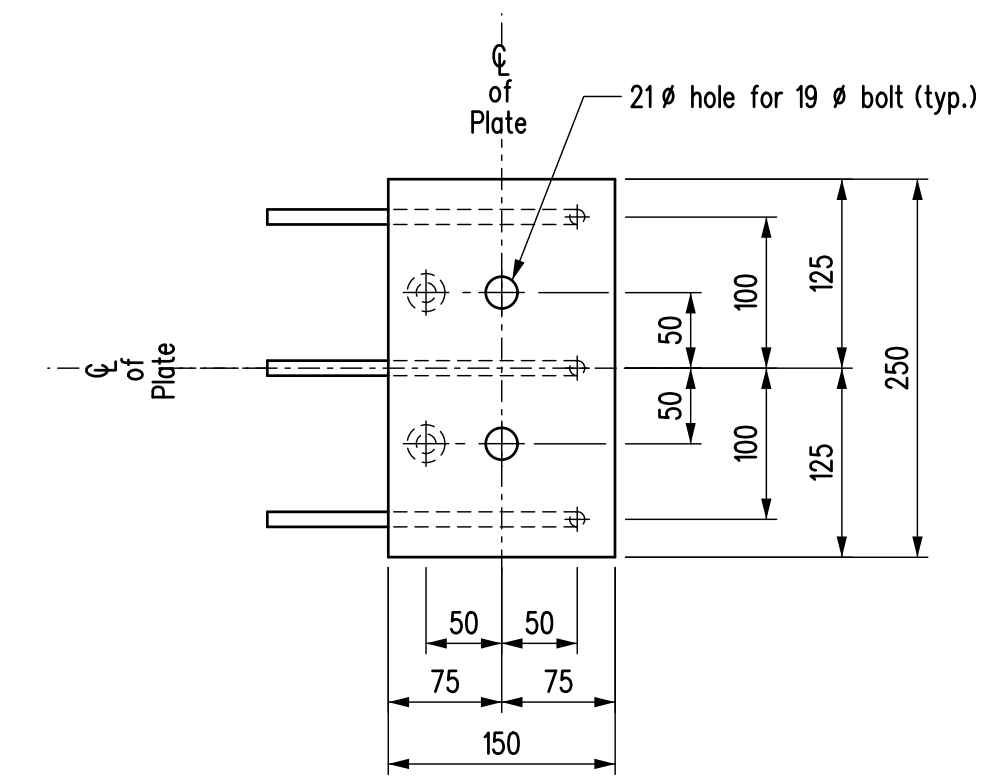
MARK No.	No.	DESCRIPTION	CORROSION PROTECTION	SIZE	LENGTH	REMARKS
Q5	4	Insert units	Hot dip galvanized			
		Each unit is fabricated from:				
		Steel plate		PL 10 x 150	250	As detailed
		2 - Studs Mk. "A1"		13 dia.	75	Nelson headed concrete anchors, Type H4L, Part No. 101-053-002 - As detailed
		3 - 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	
20___/___/___ ISSUED FOR CONSTRUCTION		RELEASED FOR CONSTRUCTION BY:	
DATE	BY	DESIGN	RECORD SEAL
PLACE ENGINEERS ELECTRONIC SEAL HERE		 Infrastructure Water Management and Structures	
		DESIGN BY: B.A.N./_____	SCALE: 1:2
		CHECKED: _____	SHEET No. P2
		DETAILS BY: _____	or as shown
		CHECKED: _____	SITE No. _____