

ENGINEER:



06 Oliewen Park
Bloemfontein
9301

CLIENT:

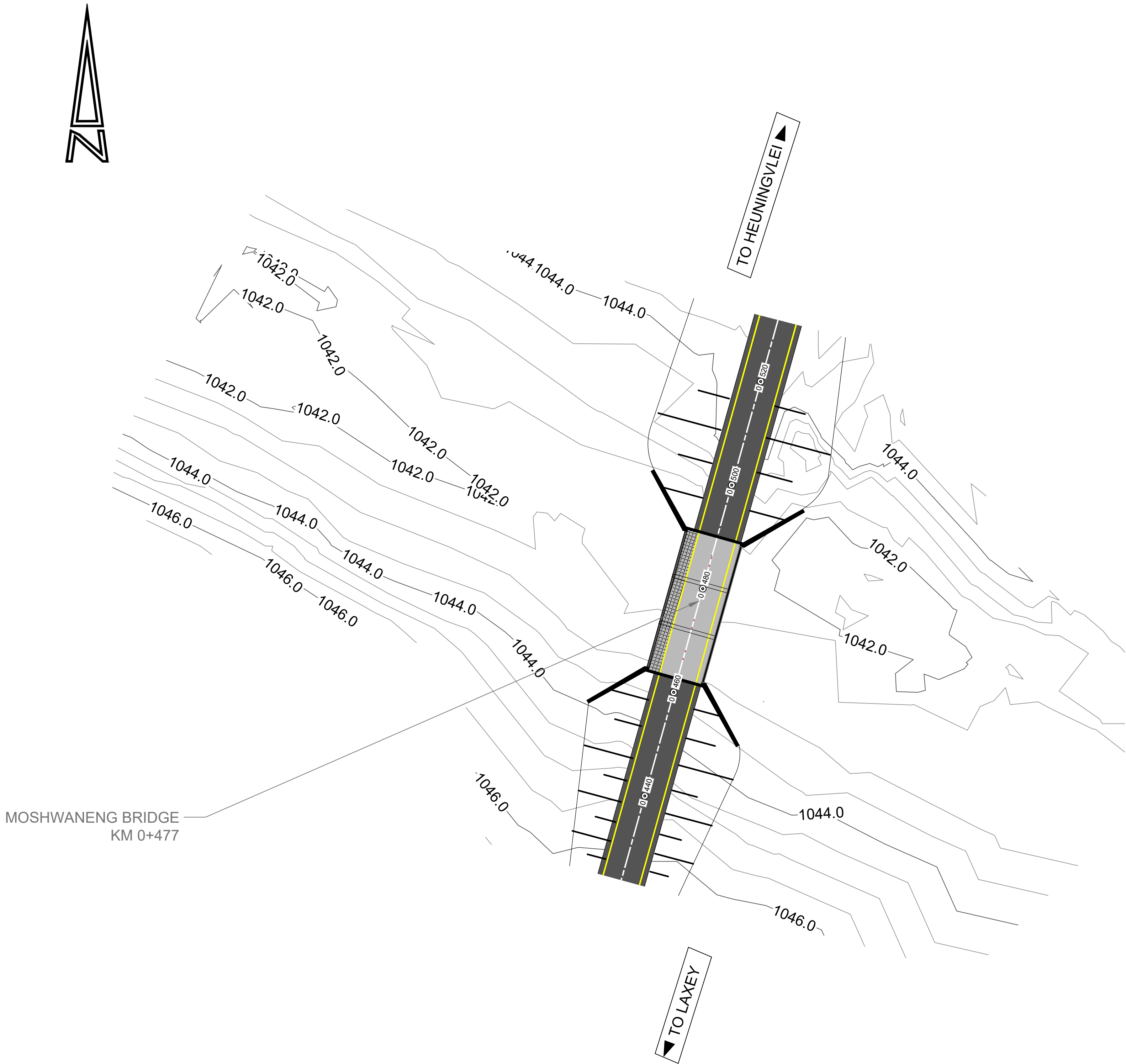
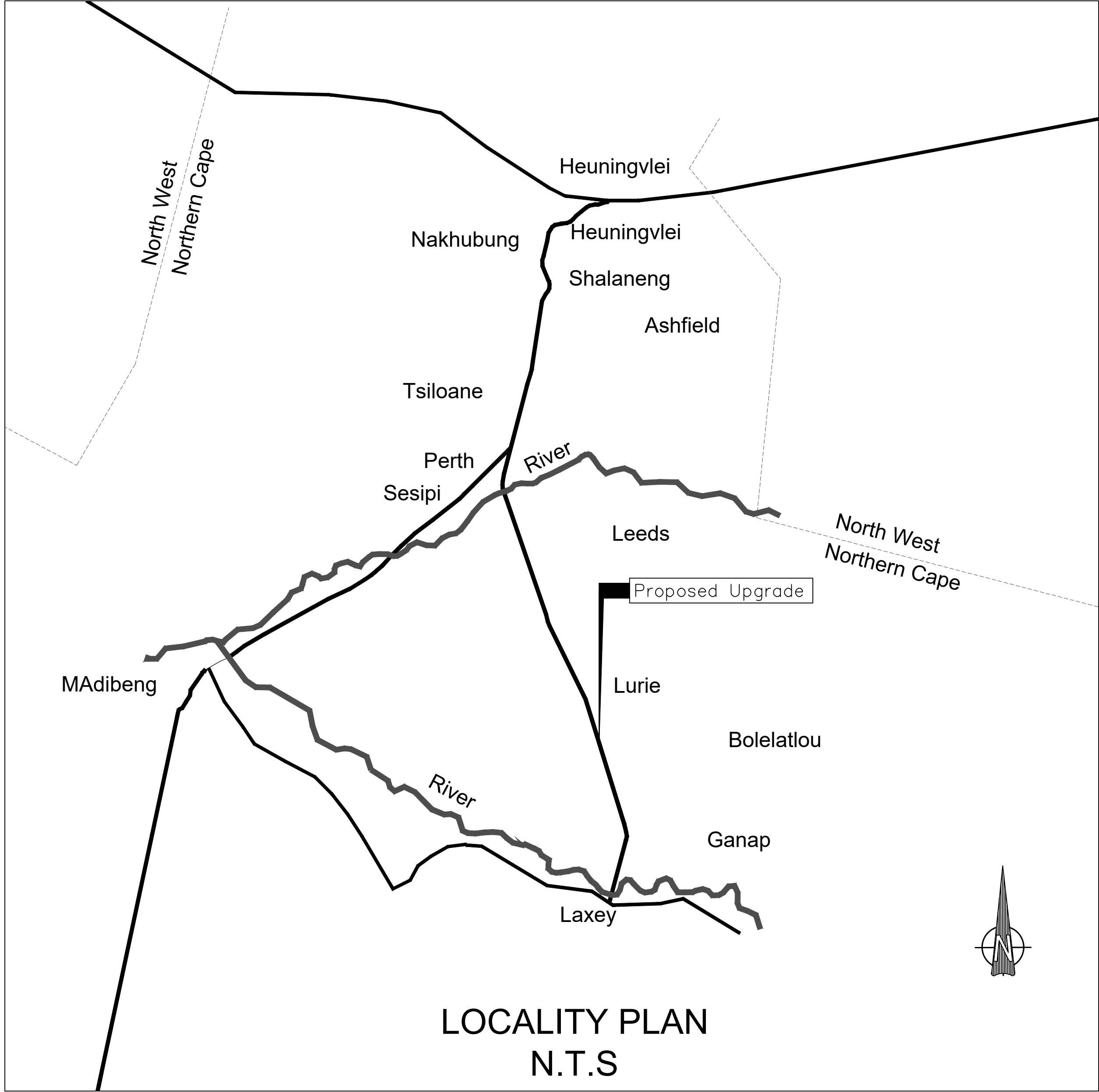


P.O BOX 3132
KIMBERLEY
8300
TEL NO: (053) 839 2100
FAX: (053) 839 2291

UPGRADING OF A SECTION OF MAIN ROAD 974 BETWEEN LAXEY AND PROVINCIAL
BOARDER NEAR HEUNINGVLEI PHASE 1

APRIL 2024

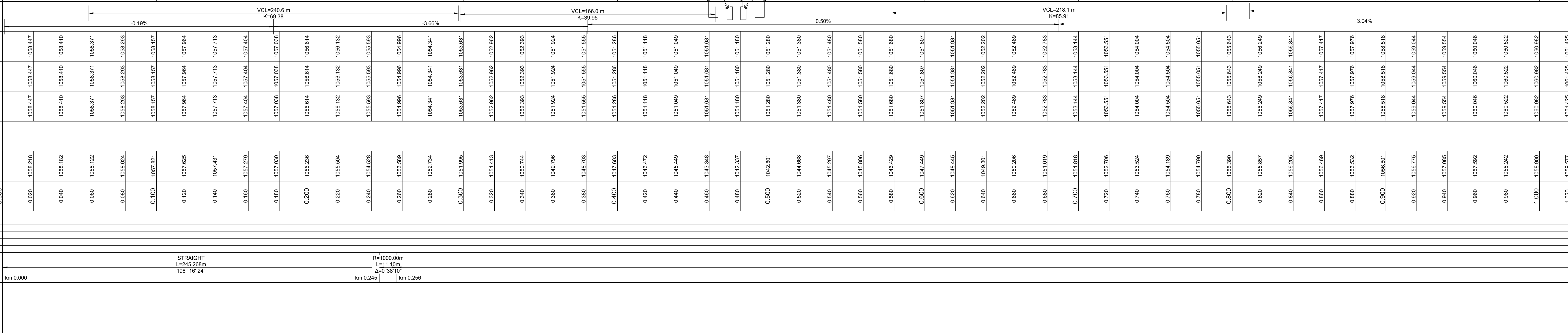
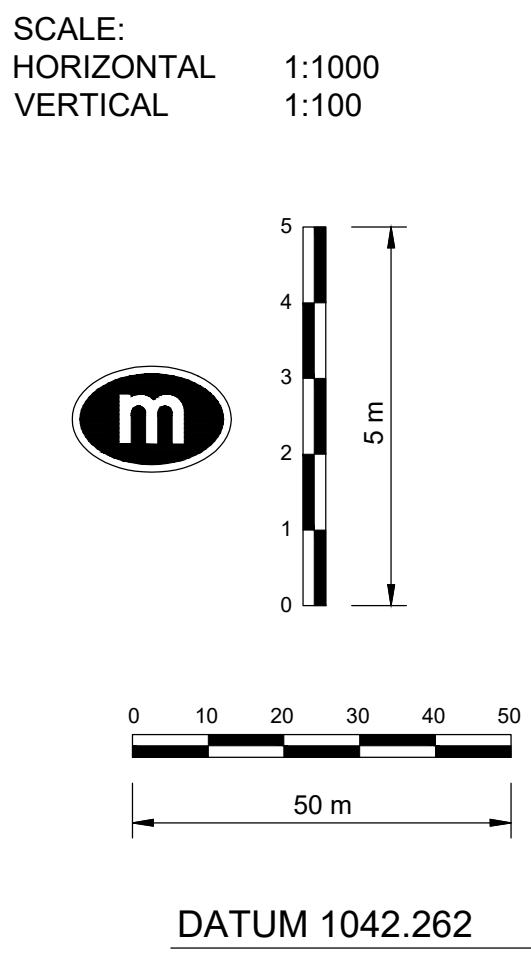
TENDER DESIGN DRAWINGS



LIST OF DRAWINGS			
DRAWING No.	DRAWING DESCRIPTION	STATUS	DATE
DRPW/BR/DR/001	COVER PAGE	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/002	SITE PLAN	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/003	LONGSECTION	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/004	GENERAL ARRANGEMENT PLAN	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/005	FOOTINGS AND PILE LAYOUTS FOR ABUTMENTS, PIERS AND WINGWALLS	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/006	NORTH AND SOUTH ABUTMENT LAYOUT, ELEVATION AND DETAILS	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/007	PIER DETAILS - PIER 1 AND PIER 2	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/008	BRIDGE DECK LAYOUT	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/009	SUPPORT DETAIL 1	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/010	SUPPORT DETAIL 2	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/012	SUPPORT DETAIL 3	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/013	SUPPORT DETAIL 4	ISSUED FOR TENDER	2024/04/12
DRPW/BR/DR/014	SUPPORT DETAIL 5	ISSUED FOR TENDER	
DRPW/BR/DR/015	REINFORCEMENT SOUTH ABUTMENT	TO BE ISSUED FOR CONSTRUCTION	TO BE CONFIRMED
DRPW/BR/DR/016	REINFORCEMENT NORTH ABUTMENT	TO BE ISSUED FOR CONSTRUCTION	TO BE CONFIRMED
DRPW/BR/DR/017	REINFORCEMENT PIER 1 AND PIER 2	TO BE ISSUED FOR CONSTRUCTION	TO BE CONFIRMED
DRPW/BR/DR/018	SOUTH ABUTMENT BENDING SCHEDULES	TO BE ISSUED FOR CONSTRUCTION	TO BE CONFIRMED
DRPW/BR/DR/019	NORTH ABUTMENT BENDING SCHEDULES	TO BE ISSUED FOR CONSTRUCTION	TO BE CONFIRMED
DRPW/BR/DR/020	DECK REBAR DETAILS	TO BE ISSUED FOR CONSTRUCTION	TO BE CONFIRMED

GENERAL LAYOUT
SCALE 1:500

					ISSUED FOR TENDER	Continued from:	Designed by:	Client: Northern Cape Department of Roads and Public Works	Designed by:	25 Highfield Road Kimberley 1619	Transportation Engineering: Chief Engineer	ROAD MR974 AND DR3497	Staked km distance	Sheet: 1 of: 1
					Supervising engineer	Continued on:	Checked by:			P.O. Box 3132 Kimberley 8300 Tel No:(053) 839 2100 Fax:(053) 839 2291				
						Cross Section No:	Drawn by:							
						Longitudinal Section No:	Checked by:							
Symbol	Date	Description	Checked	Signed	Supervising Authority	Design Plan No:	Date of approval:-		Signature	Date	Head: Transport	Drawing title: THE UPGRADING OF MR974 AND DR3497 SECTION OF BETWEEN LAXEY AND PROVINCIAL BORDER NEAR HEUNINGVLEI	Scale AS SHOWN	Plan No: DRPW-BR-DR-002
AMENDMENTS					SITE PLAN AND LIST OF DRAWINGS									



P.O Box 3132
Kimberley
8300
Tel No:(053) 839 2100
Fax:(053) 839 2291



25 Highveld Road
Kempston Park
1619
Tel No: (011) 970 7134
Fax: (086) 525 3681

Transportation
Engineering: Chief Engineer

Head: Transport

ROAD MR974 AND DR3497

Drawing title: THE UPGRADING OF MR974 AND DR3497 SECTION OF BETWEEN LAXEY AND PROVINCIAL BORDER NEAR HEUNINGVLEI

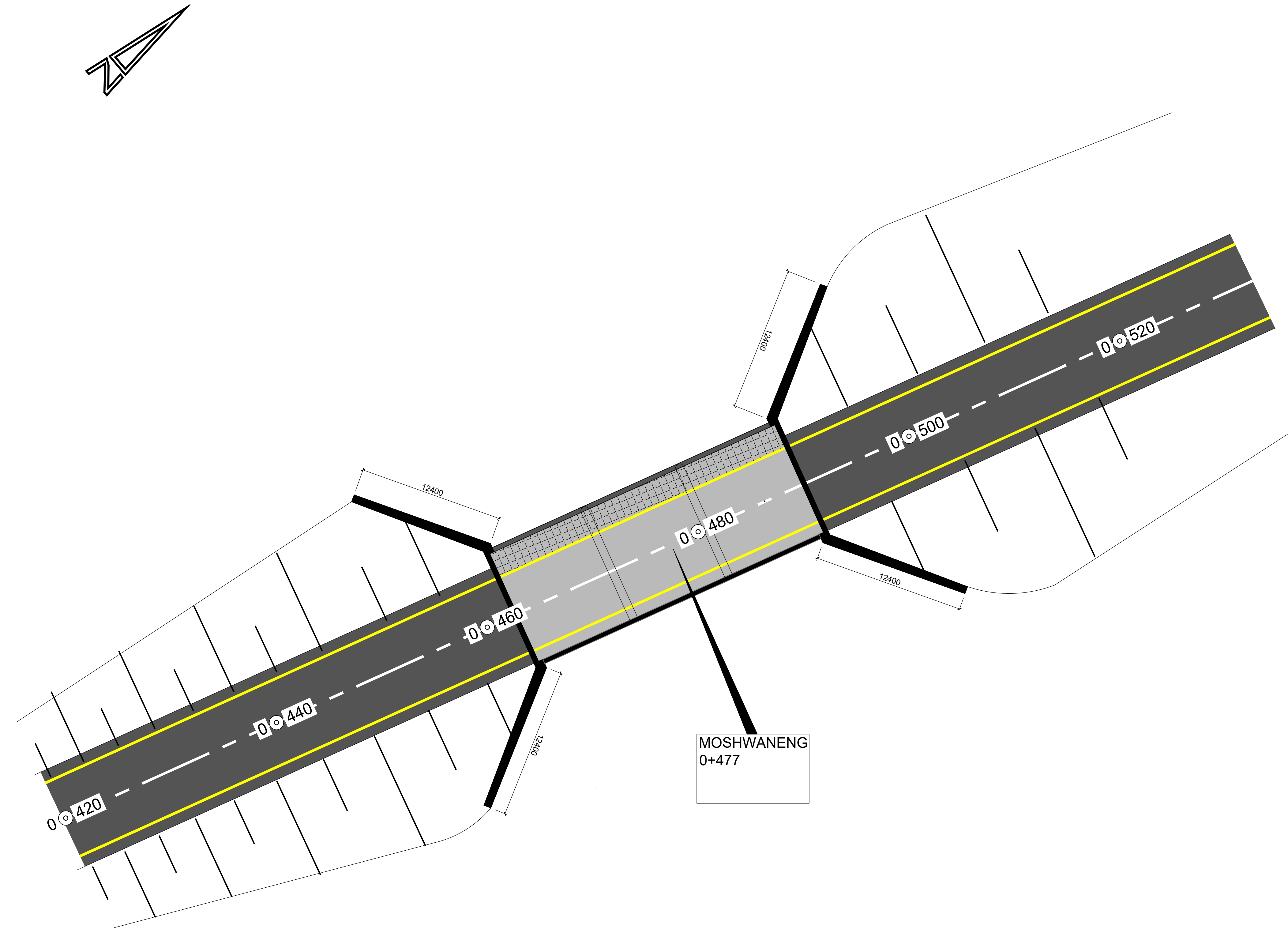
SITE PLAN AND LIST OF DRAWINGS

Staked km distance

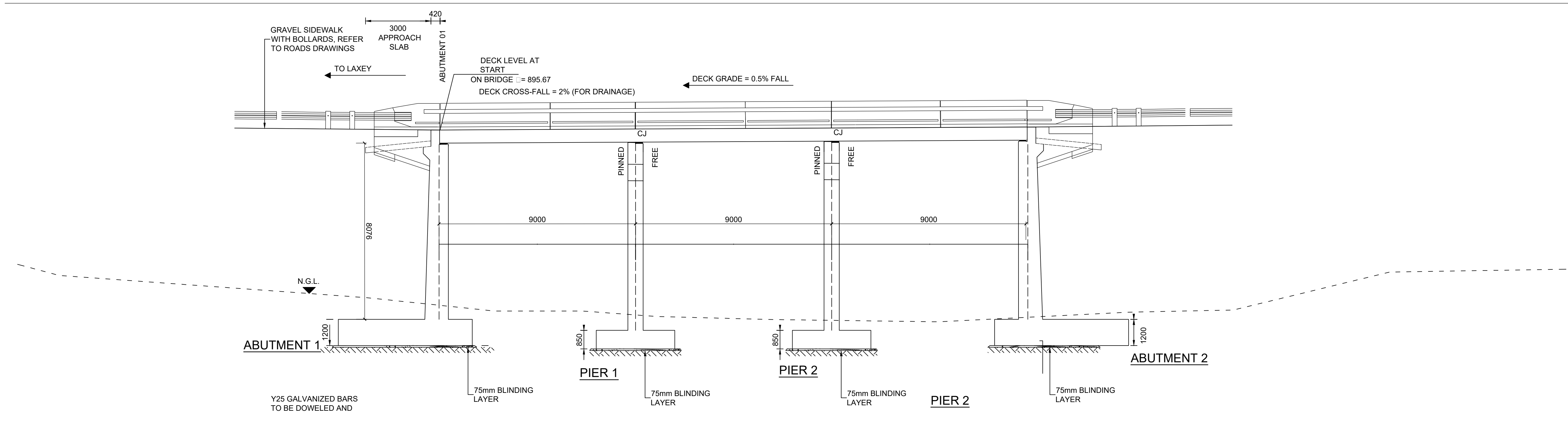
Scale

AS SHOWN

Plan No:
DRPW-BR-DR-003



BRIDGE (B5619 A & B) LAYOUT
SCALE 1:200



ELEVATION BRIDGE
SCALE 1:100

NOTES:

1. DESIGN

- 1.1. THE SUPERSTRUCTURE OF THE BRIDGE CONSISTS OF A SINGLE SPAN, SIMPLY SUPPORTED BEAM AND SLAB DECK. THE SUBSTRUCTURE IS FOUNDED ON PRECAST, POST-TENSIONED PILES. ABUTMENTS ARE OF THE WALL TYPE WITH SPRAYED WINGS WALLS.
- 1.2. THE LIMIT STATE DESIGN METHOD IS USED.
- 1.3. THE BRIDGE IS DESIGNED IN ACCORDANCE WITH THE "CODE OF PRACTICE FOR THE DESIGN OF HIGHWAY BRIDGES AND CULVERTS IN SOUTH AFRICA" TMH7 PART 1, 2 (1985) AS AMENDED (1988) AND PART 3 (1989).
- 1.4. THE BRIDGE WAS ANALYSED USING A SPACE FRAME GRILLAGE ANALYSIS PROGRAM ("RM" AND "PROKON").

2. DESIGN LOADING

- 2.1. THE DESIGN LOADING IS IN ACCORDANCE WITH TMH7 PART 2 AS AMENDED 1988.
- 2.2. THE FOLLOWING DESIGN VALUES HAVE BEEN USED:
 - LIVE LOAD: NA, NS-36 AND NC 36-4-40
 - DEAD LOAD: REINFORCED CONCRETE 25.0 kN/m³
STRESSED CONCRETE 25.5 kN/m³
ROAD SURFACING 23.0 kN/m³
 - EARTH PRESSURE: RANKING THEORY
DENSITY OF SOIL 20.0 kN/m³
ANGLE OF INTERNAL FRICTION 35°
- 2.3. THE PARAPET HAS BEEN DESIGNED IN ACCORDANCE WITH TMH7 PART 1 AND 2, CLASS 1 BALUSTRADE.

3. DESIGN PARAMETERS

- 3.1. MODULUS OF ELASTICITY (YOUNG'S MODULUS)
 - CONCRETE (30MPa) 28 Gpa
 - CONCRETE (40MPa) 31 Gpa
 - REINFORCED STEEL 200 Gpa
 - PRESTRESSING STEEL 195 Gpa
- 3.2. PRESTRESSED CONCRETE
 - CREEP FACTOR 2.75
 - SHRINKAGE COEFFICIENT 290E-6
 - COEFFICIENT OF THERMAL EXPANSION 12E-6/°C
- 3.3. PRESTRESSING
 - FRICTION COEFFICIENT (u) 0.25
 - REVERSED FRICTION COEFFICIENT (20% MORE) 0.30
 - WOBBLE FACTOR (k) 0.0027/m
 - WEDGE SLIP 10mm
- 3.4. BEARING
 - LAMINATED RUBBER BEARINGS: FRICTION COEFFICIENT 0.30

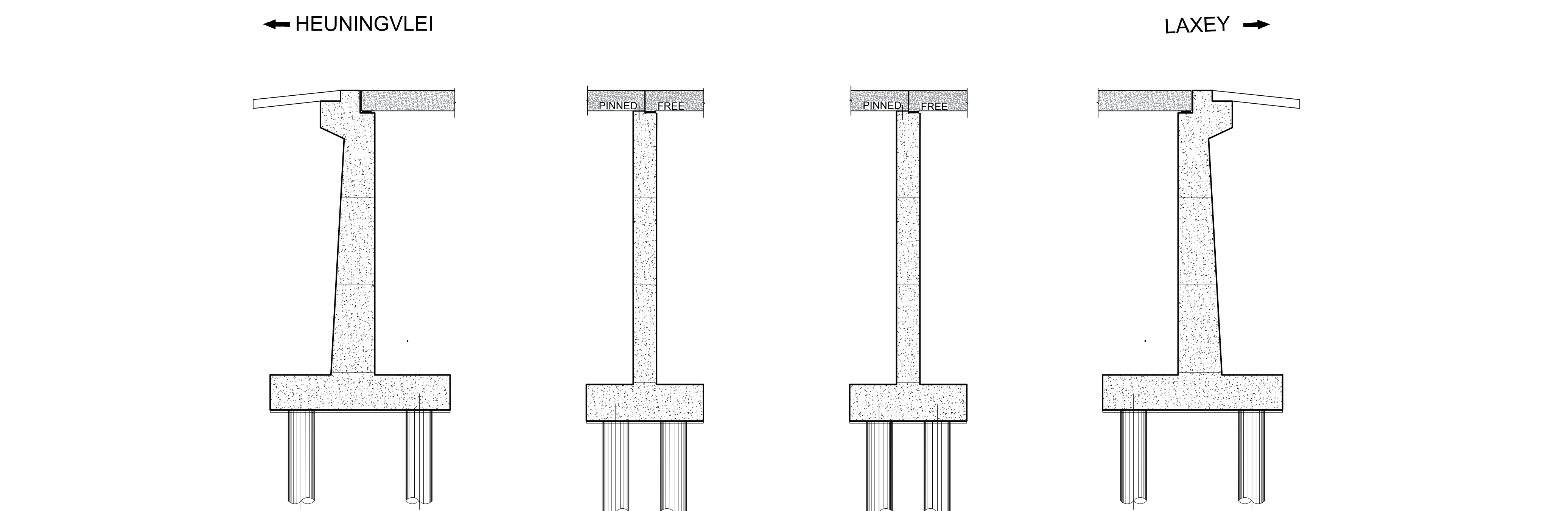
4. MATERIALS

- 4.1. CONCRETE CLASSES (CHARACTERISTIC STRENGTH (MPa) / STONE SIZE (mm))
 - BLINDING/SCREED 15/19
 - MASS CONCRETE 15/38
 - FOOTINGS, APPROACH SLABS 30/19
 - ABUTMENTS, PILES 30/19
 - DECK, PARAPETS 40/19
 - CONCRETE CHANNEL 40/13
- 4.2. REINFORCEMENT TO BE HOT ROLLED AND TO COMPLY WITH THE STANDARD SPECIFICATIONS FOR STEEL BARS FOR CONCRETE REINFORCEMENT SANS 920
 - MINIMUM CHARACTERISTIC STRENGTH:
 - MILD STEEL BARS (R) 250 MPa
 - HIGH YIELD STRESS STEEL BARS (Y) 450 MPa
 - WELDED MESH IN ACCORDANCE WITH SANS 1024
- 4.3. PRESTRESSING STEEL TO BE LOW RELAXATION SUPER GRADE STEEL WITH A MINIMUM CHARACTERISTIC STRENGTH (CS) OF 1770 MPa AND TO COMPLY WITH BS 5896. THE APPLIED STRESSES ARE:
 - JACKING STRESSES (MAX) 77% OF CS
 - TRANSFER STRESSES 70% OF CS
 - FINAL STRESSES 60% OF CS
 - STEEL RELAXATION 1.2% OF JACKED FORCE
- 4.4. BEARINGS
 - SHALL COMPLY WITH BS5400 PART 9
- 4.5. LAMINATED RUBBER WITH IRON HARDNESS 60°
- 4.5. HOT DIP GALVANIZING IN ACCORDANCE WITH SANS 121

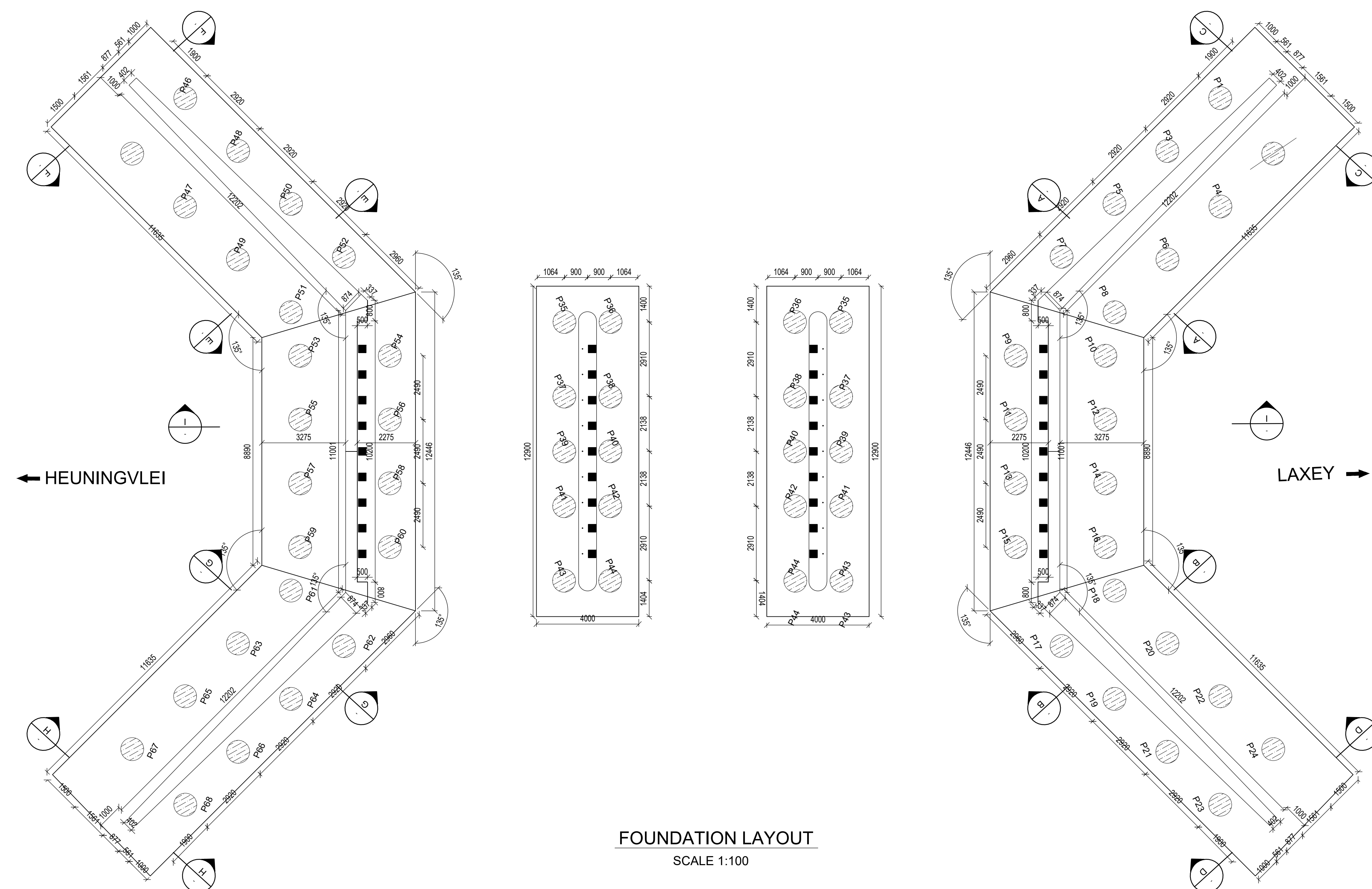
5. SUBSTRUCTURE

- 5.1. ALL VISIBLE SHARP EDGES TO BE CHAMFERED 25 x 25mm
- 5.2. CONCRETE FINISH TO FORMED SURFACES:
 - ALL EXPOSED FACES CLASS F2
 - ALL OTHER FACES CLASS F1
- 5.3. CONCRETE FINISH TO UNFORMED SURFACES:
 - ALL EXPOSED SURFACES CLASS U2
 - ALL OTHER SURFACES CLASS U1
- 5.4. MINIMUM CONCRETE COVER TO REINFORCEMENT:
 - FOOTINGS AND ABUTMENTS 50mm
 - PILES 75mm
- 5.5. TYPE OF FOUNDING MATERIAL:
 - MEDIUM HARD ROCK MUDROCK FOR PILES
 - MAXIMUM ALLOWABLE BEARING PRESSURE: 5000 kPa
 - MAXIMUM ACTUAL BEARING PRESSURE: 1000 kPa
 - ALL PILES TO BE SOCKETED BY A MINIMUM OF 1.5 x PILE DIA.
- 5.6. FOUNDING METHOD
 - 900mm AUGER PILES WITH 1.2m PILE CAPS.
6. SUPERSTRUCTURE
- 6.1. METHOD OF ANALYSIS: GRILLAGE
- 6.2. ALL SHARP EDGES TO THE BALUSTADES TO BE ROUNDED 20 x 20mm AND ALL OTHER SHARP EDGES TO BE CHAMFERED 25 x 25mm
- 6.3. CONCRETE FINISH TO FORMED SURFACES:
 - ALL EXPOSED FACES CLASS F2
 - OTHER FACES CLASS F1
 - BALUSTRADES CLASS F3
- 6.4. CONCRETE FINISH TO UNFORMED SURFACES:
 - TOP OF BALUSTRADES CLASS U3
 - TOP OF DECK SLAB CLASS U2
 - OTHER SURFACES CLASS U1
- 6.5. MINIMUM CONCRETE COVER TO REINFORCEMENT:
 - DECK 40mm
 - BALUSTRADES 40mm
- 6.6. EXPANSION JOINTS:
 - ASPHALTIC PLUG "THORMA" OR SIMILAR
- 6.7. MAXIMUM DEFLECTIONS AT MIDSPAN:
 - SHORT TERM - LIVE LOAD 20.0mm

Please be advised that the pile information represented on the drawings is subject to pending geotechnical study. Accurate soil profiles will be reflected on the drawings upon the conclusion of this study. Until the geotechnical study is finalized, the current pile information remains provisional and subject to change.

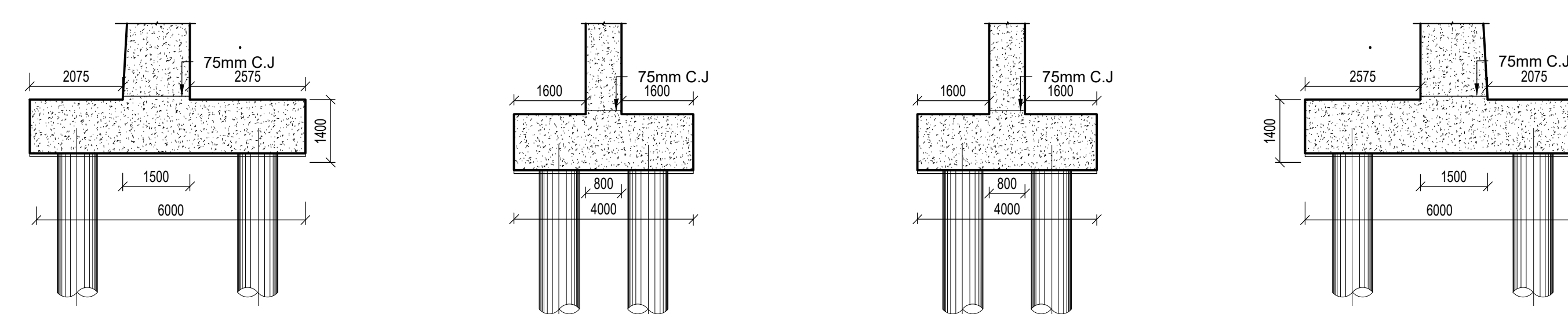


BRIDGE STRUCTURAL ELEMENTS ARRANGEMENT



FOUNDATION LAYOUT

SCALE 1:100

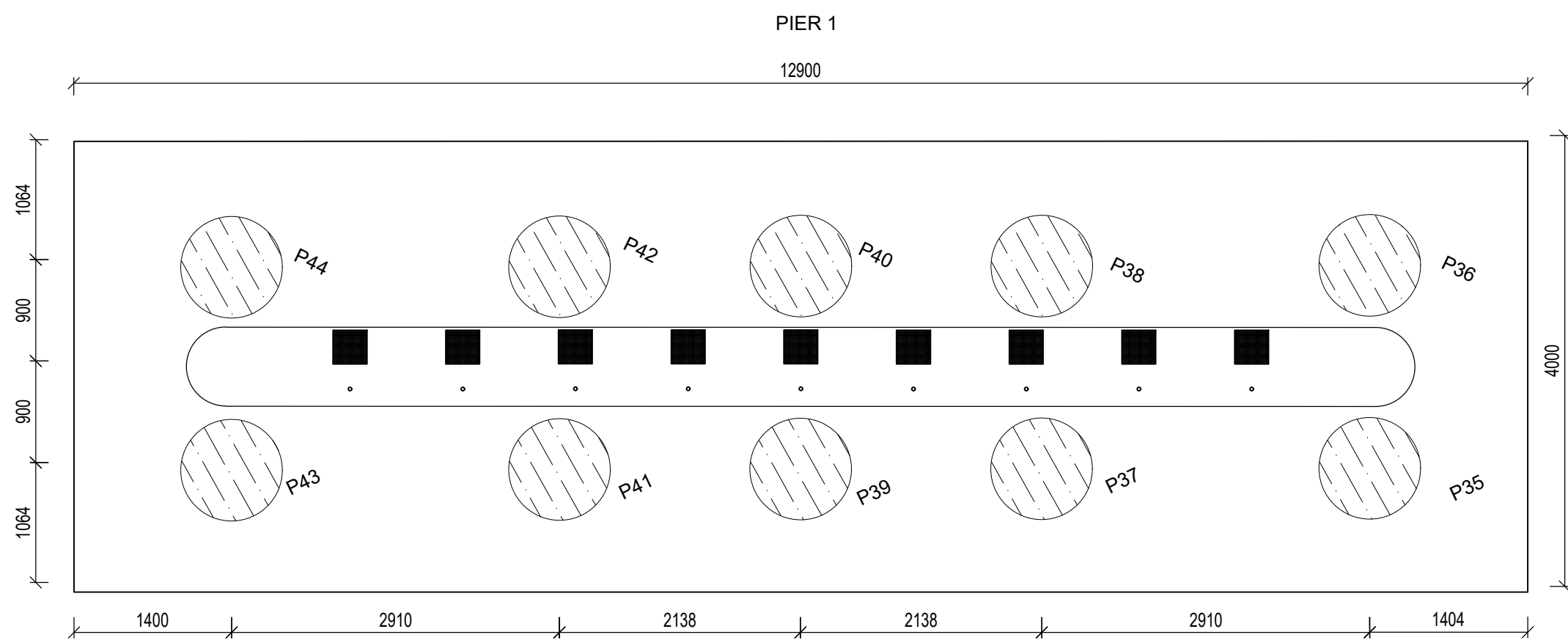


SECTION I-I
SCALE 1:100

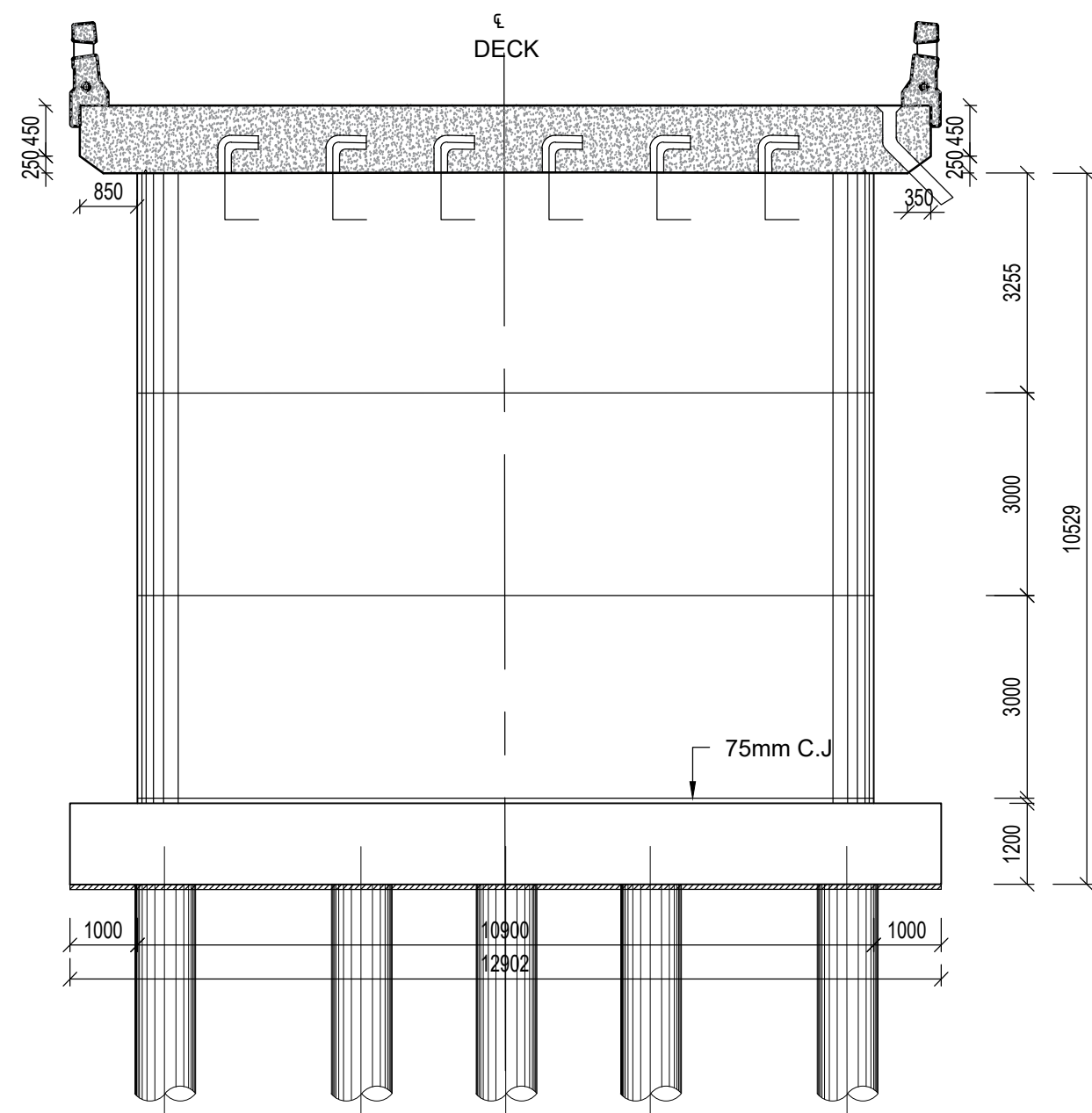
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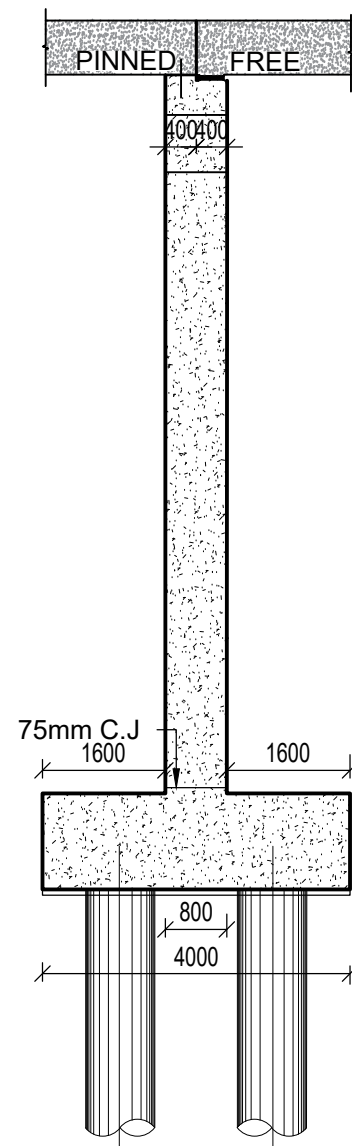
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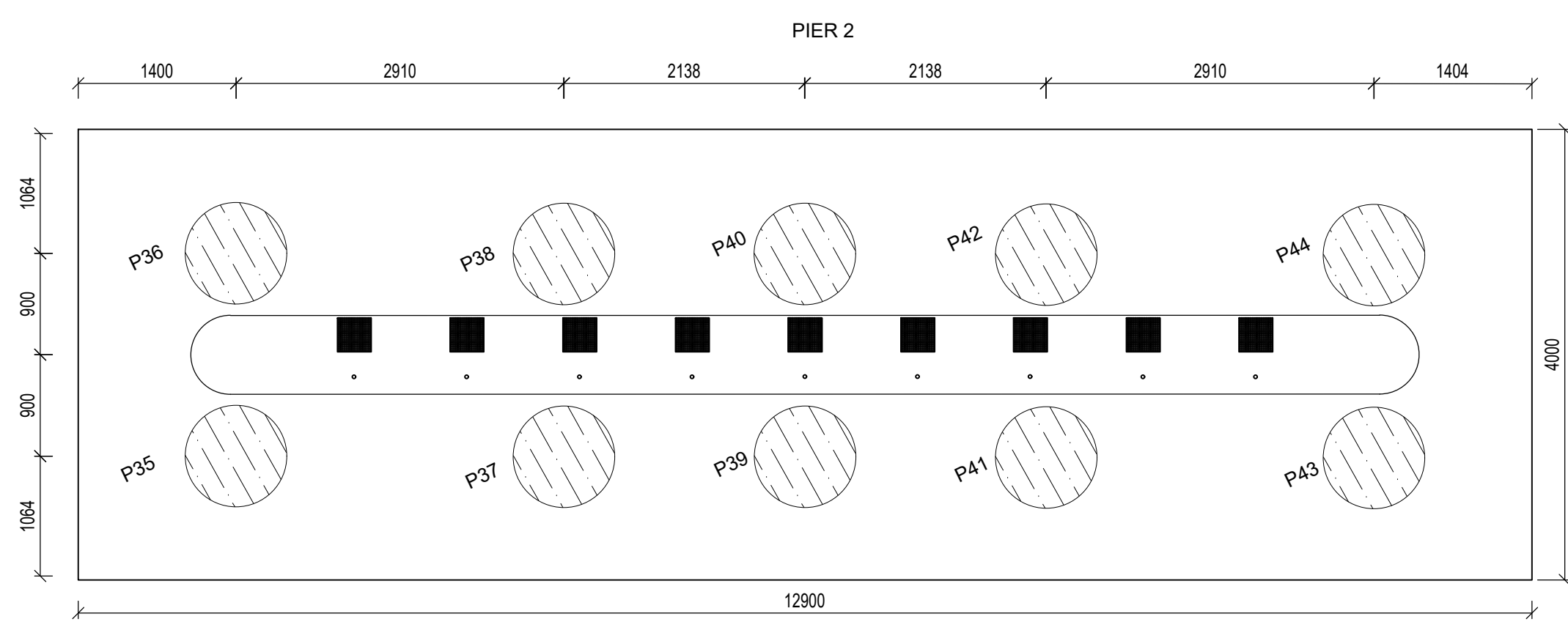
PLAN VIEW OF PIER 1
SCALE 1:50



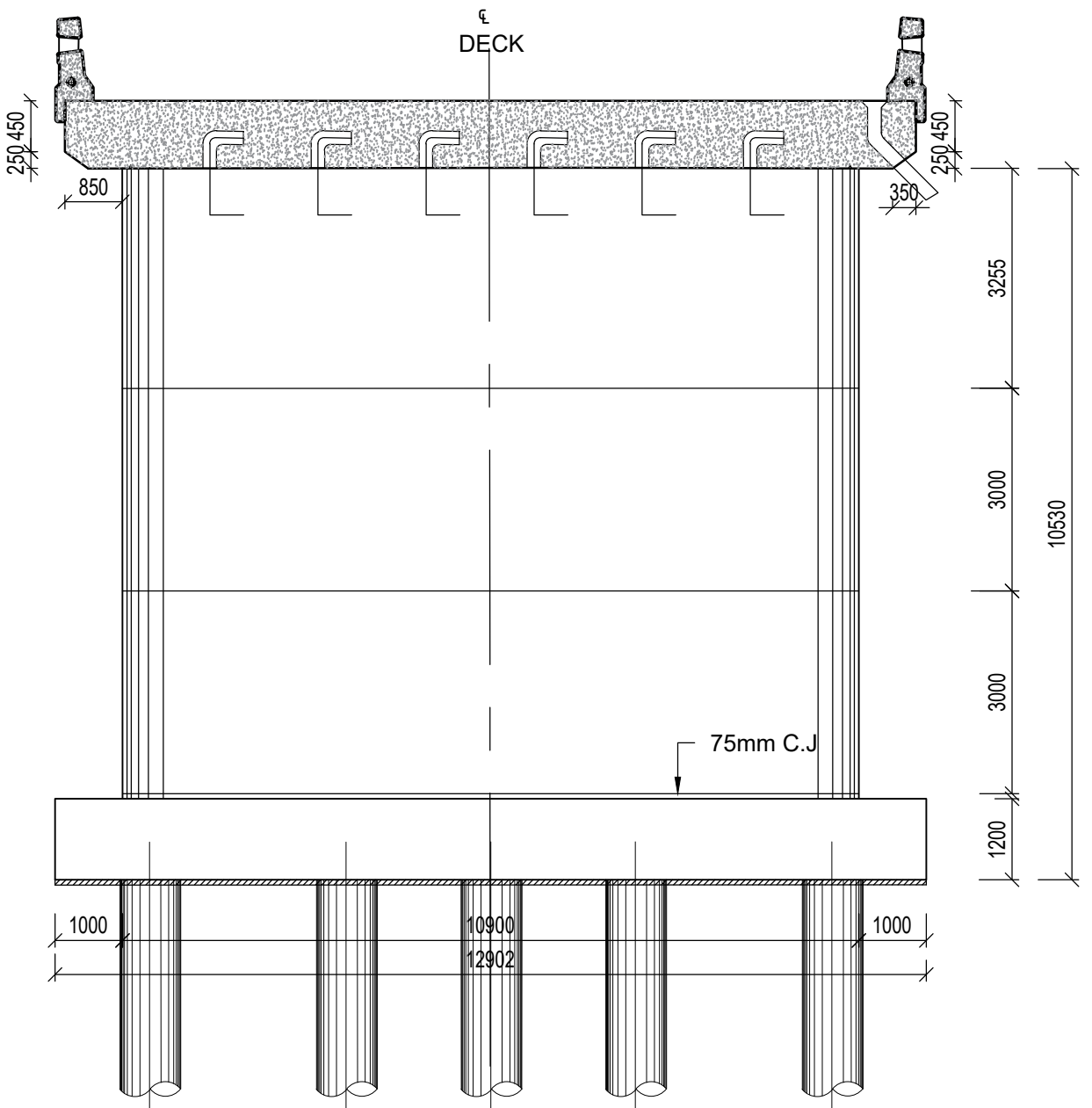
TYPICAL SECTION THROUGH DECK & ELEVATION VIEW OF PIER1
SCALE 1:100



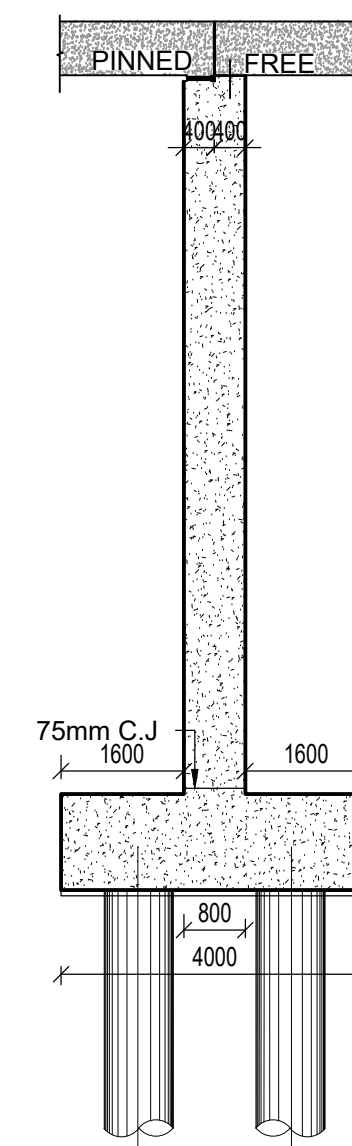
TYPICAL SECTION THROUGH PIER 1
SCALE 1:100



PLAN VIEW OF PIER 2
SCALE 1:50



TYPICAL SECTION THROUGH DECK & ELEVATION VIEW OF PIER 2
SCALE 1:100



TYPICAL SECTION THROUGH PIER 2
SCALE 1:100

					AS BUILT	Continued from:	Designed by:	Client:	Designed by:		ROAD MR974 AND DR3497	Staked km distance	Sheet: 1 of: 1
					Supervising engineer	Continued on:	Checked by:						
					Date	Cross Section No:	Drawn by:						
						Longitudinal Section No:	Checked by:						
					Supervising Authority	Design Plan No:	Date of approval: -						
Symbol	Date	Description	Checked	Signed									
AMENDMENTS													

P.O. Box 3132
Kimberley
8300
Tel No: (053) 839 2100
Fax: (053) 839 2291

25 Highveld Road
Kempston Park
1619
Tel No: (011) 970 7134
Fax: (086) 525 3681

Transportation
Engineering: Chief Engineer

Head: Transport

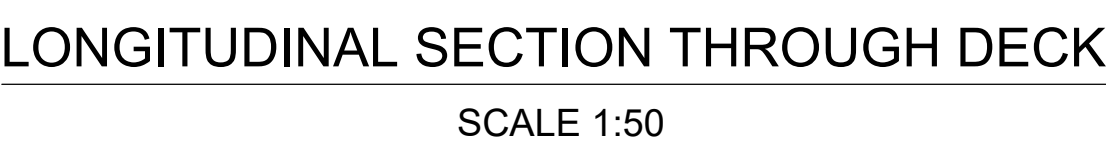
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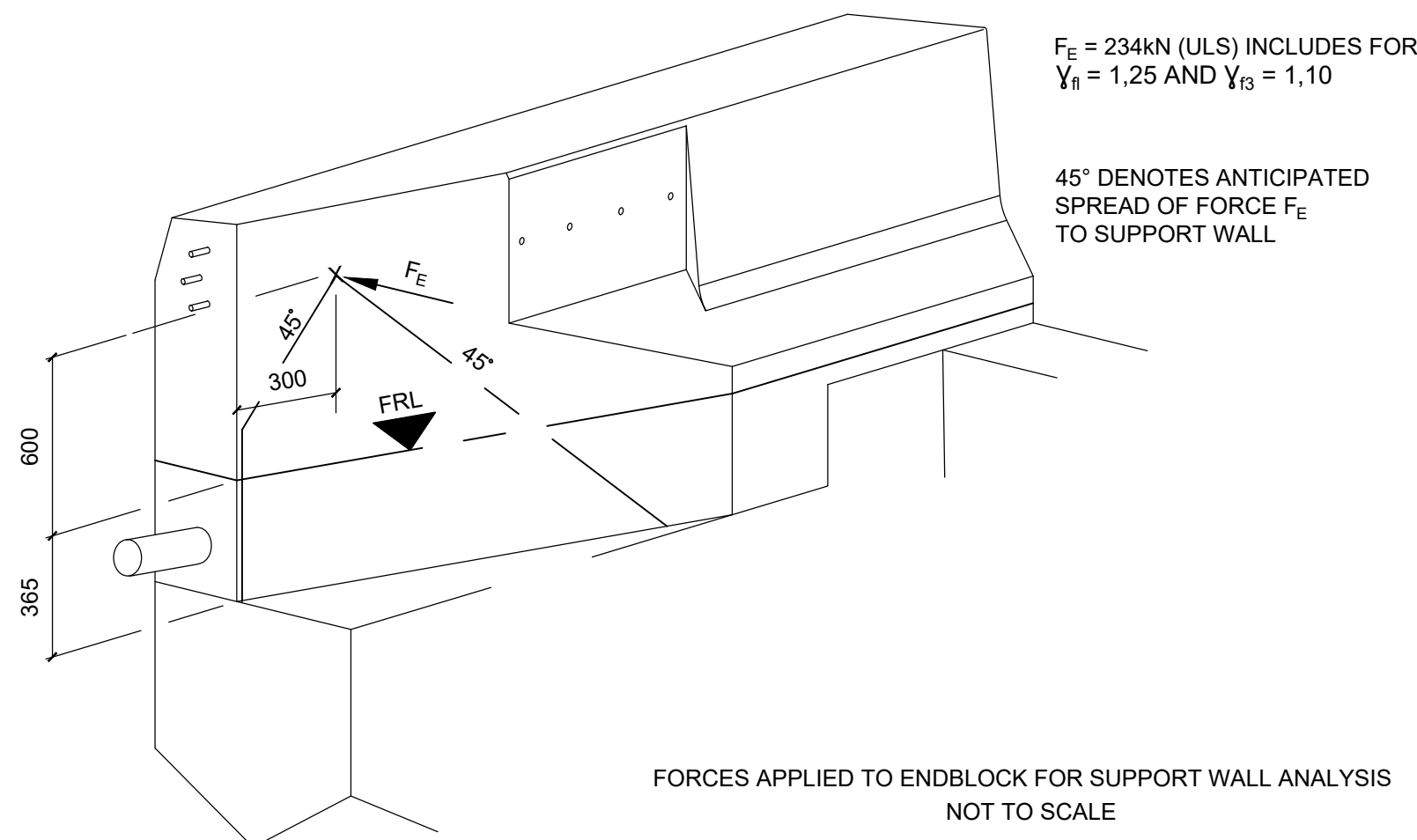
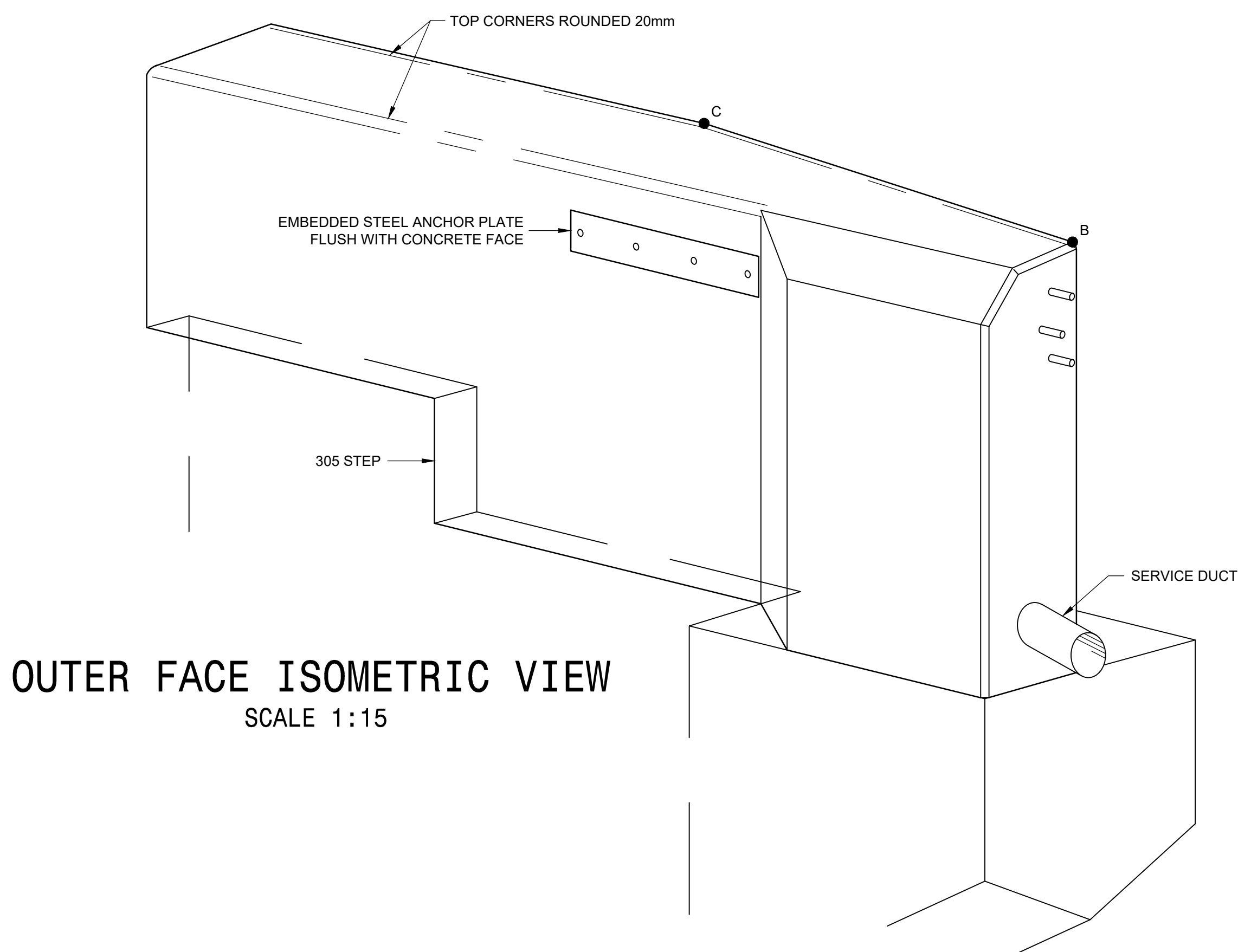
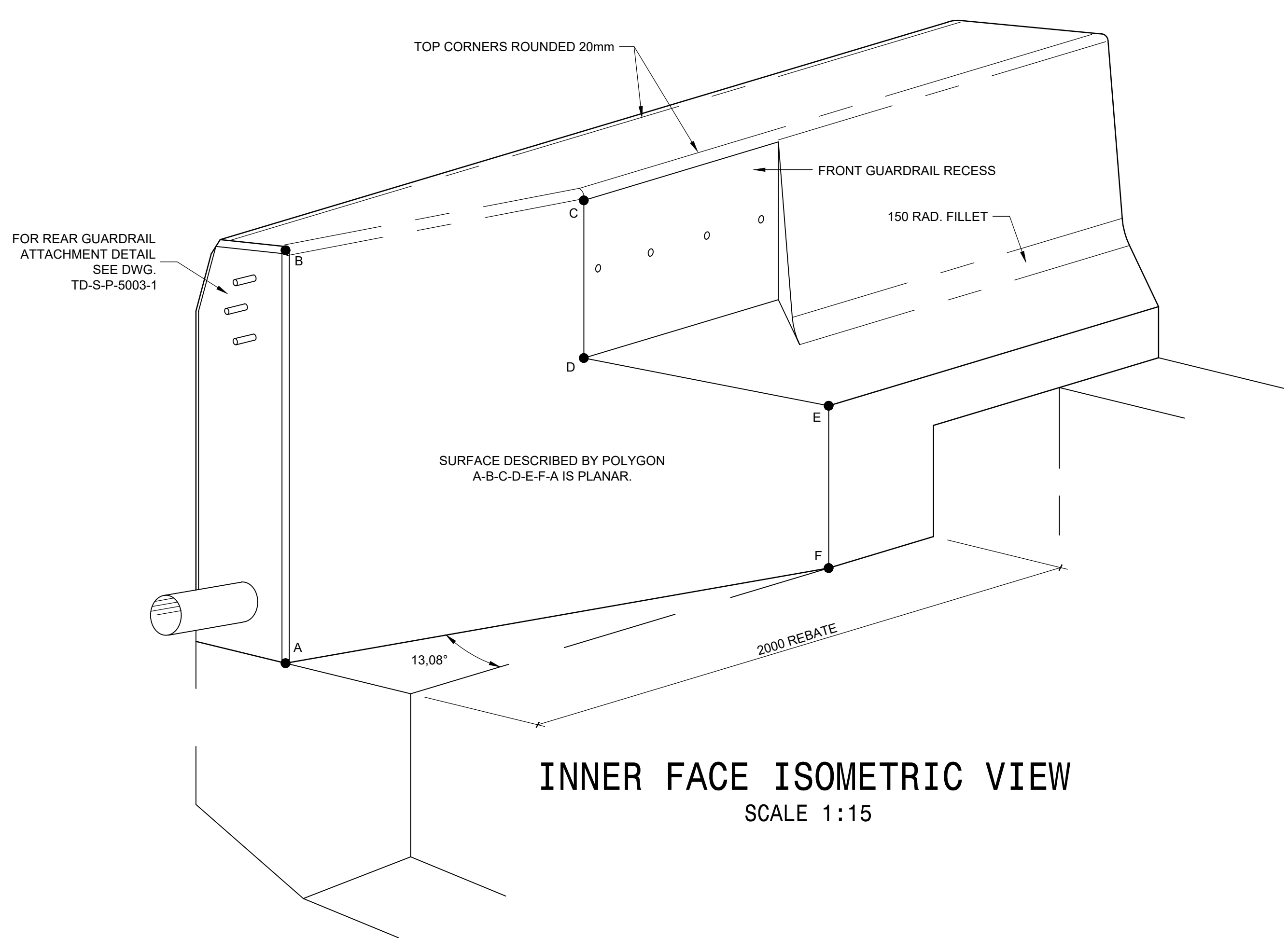
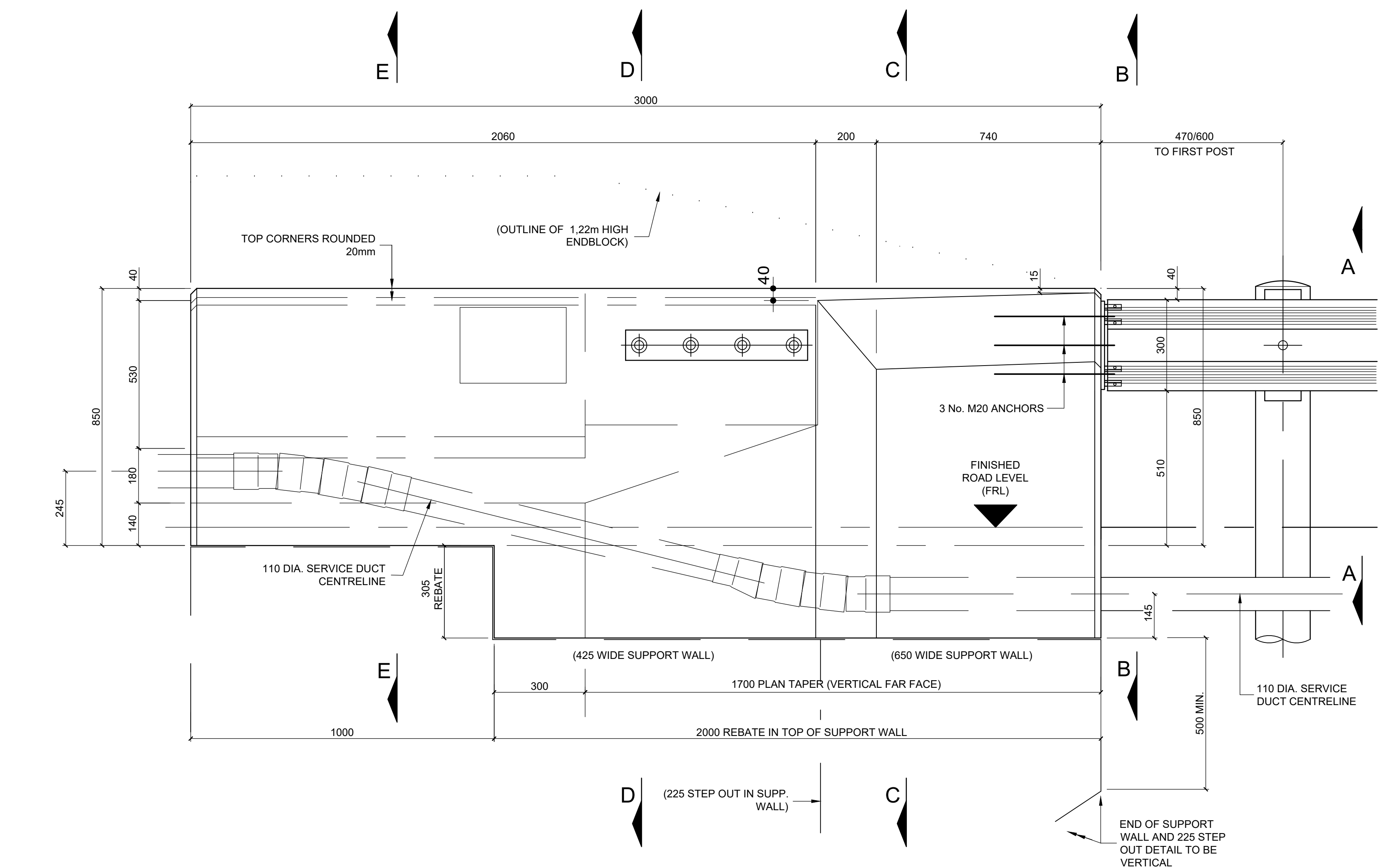
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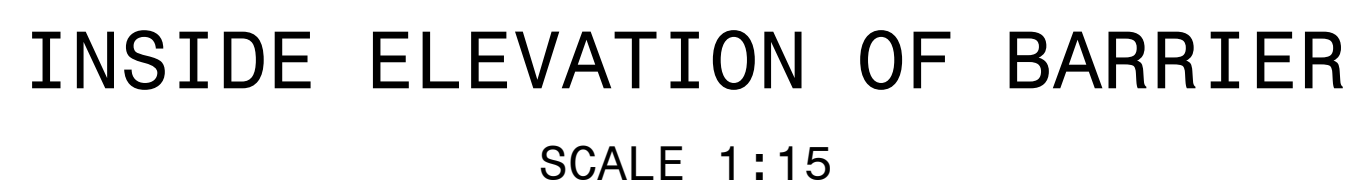
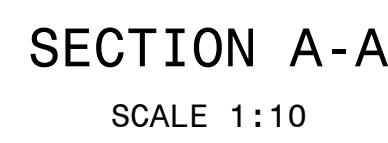
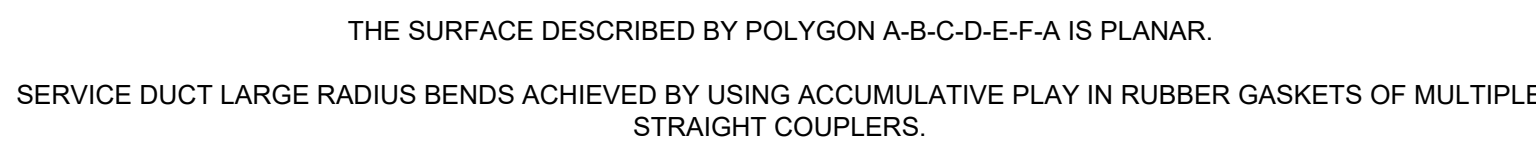
Drawing title: THE UPGRADING OF MR974 AND DR3497 SECTION OF BETWEEN LAXEY AND PROVINCIAL BORDER NEAR HEUNINGVLEI PIERS LAYOUT, SECTIONS AND DETAILS.

Scale AS SHOWN

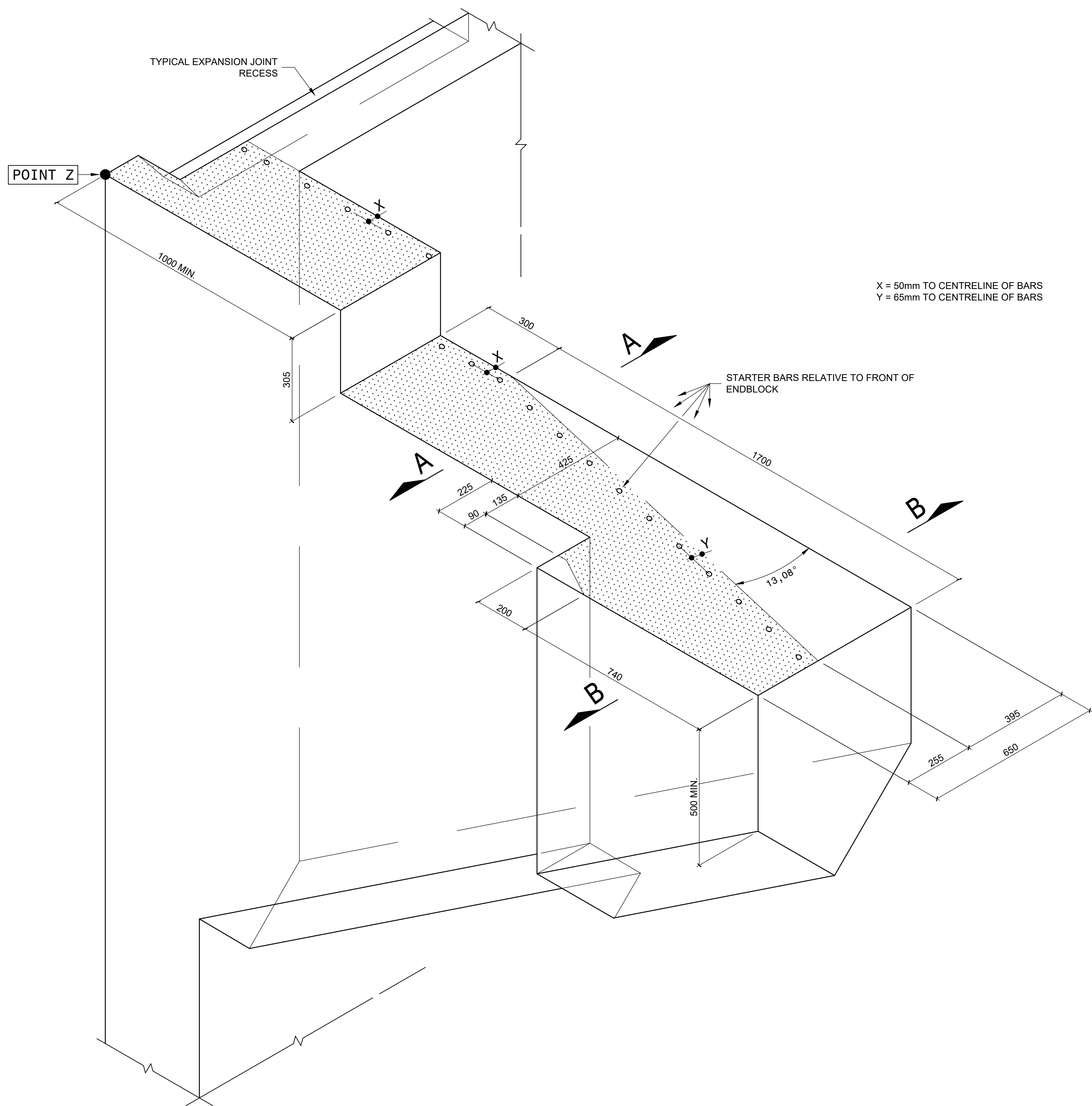
Plan No: DRPW-BR-DR-007

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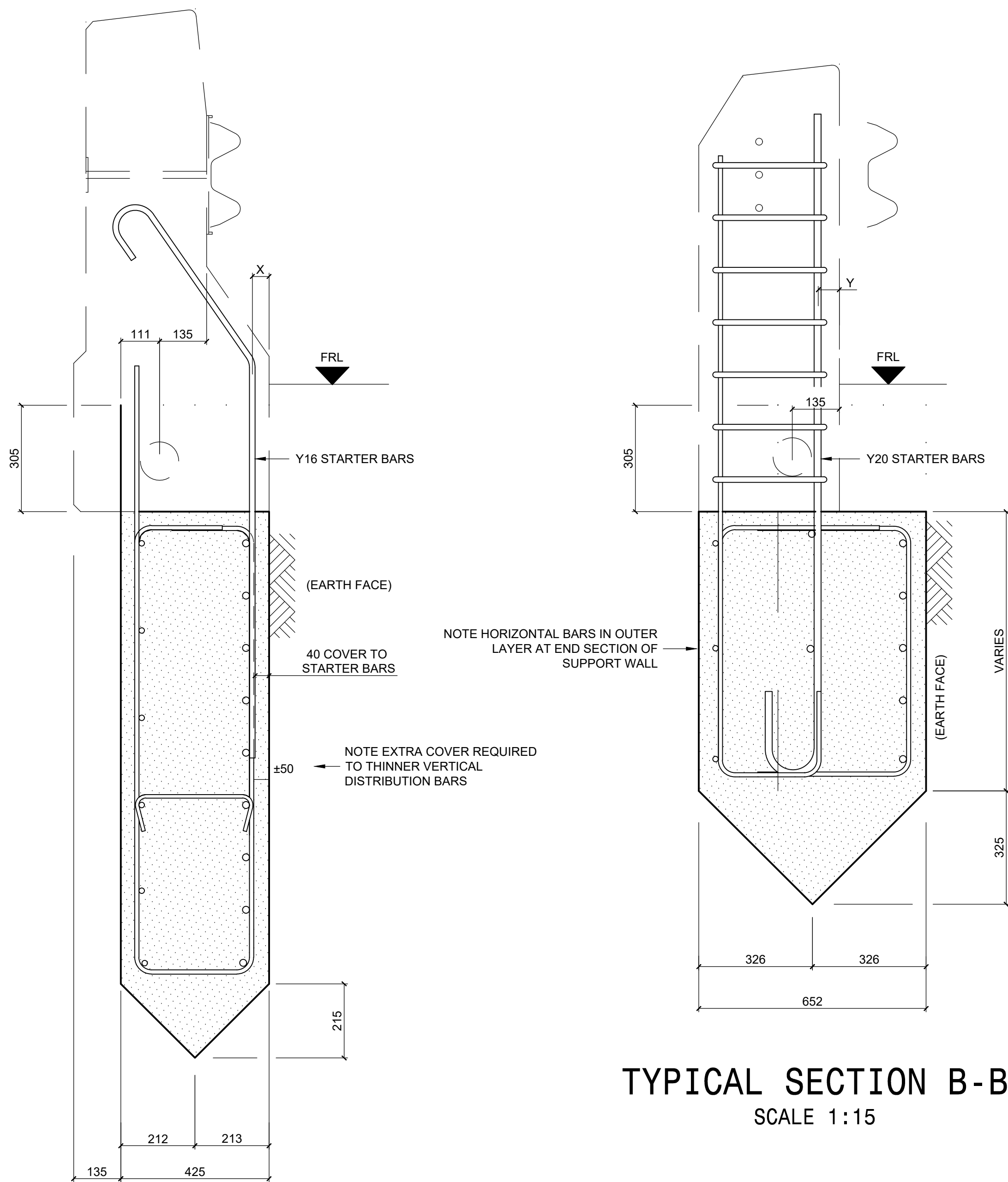


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DRPW-BR-DR-010



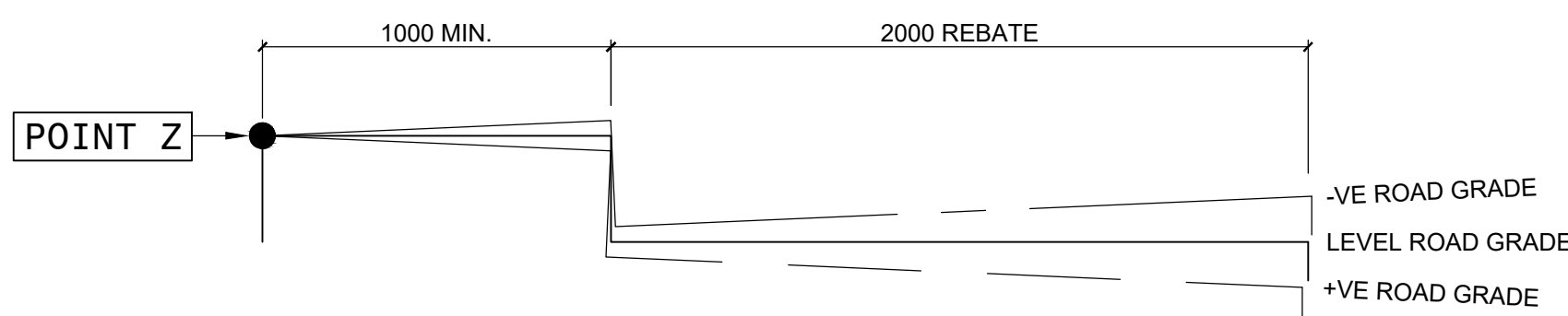
ISOMETRIC VIEW OF TYPICAL SUPPORT WALL
SCALE 1:15

ENDBLOCK FOOTPRINT
SHOWN SHADED



TYPICAL SECTION A-A
SCALE 1:15

TYPICAL SECTION B-B
SCALE 1:15



SIDE VIEW OF TOP OF SUPPORT WALL
NTS

NOTE : TOPS OF SUPPORT WALL, INCLUDING FOR SHADED AND NON-SHADED AREAS, ARE PARALLEL TO THE ADJACENT ROAD GRADE AND ROTATE ABOUT POINT Z

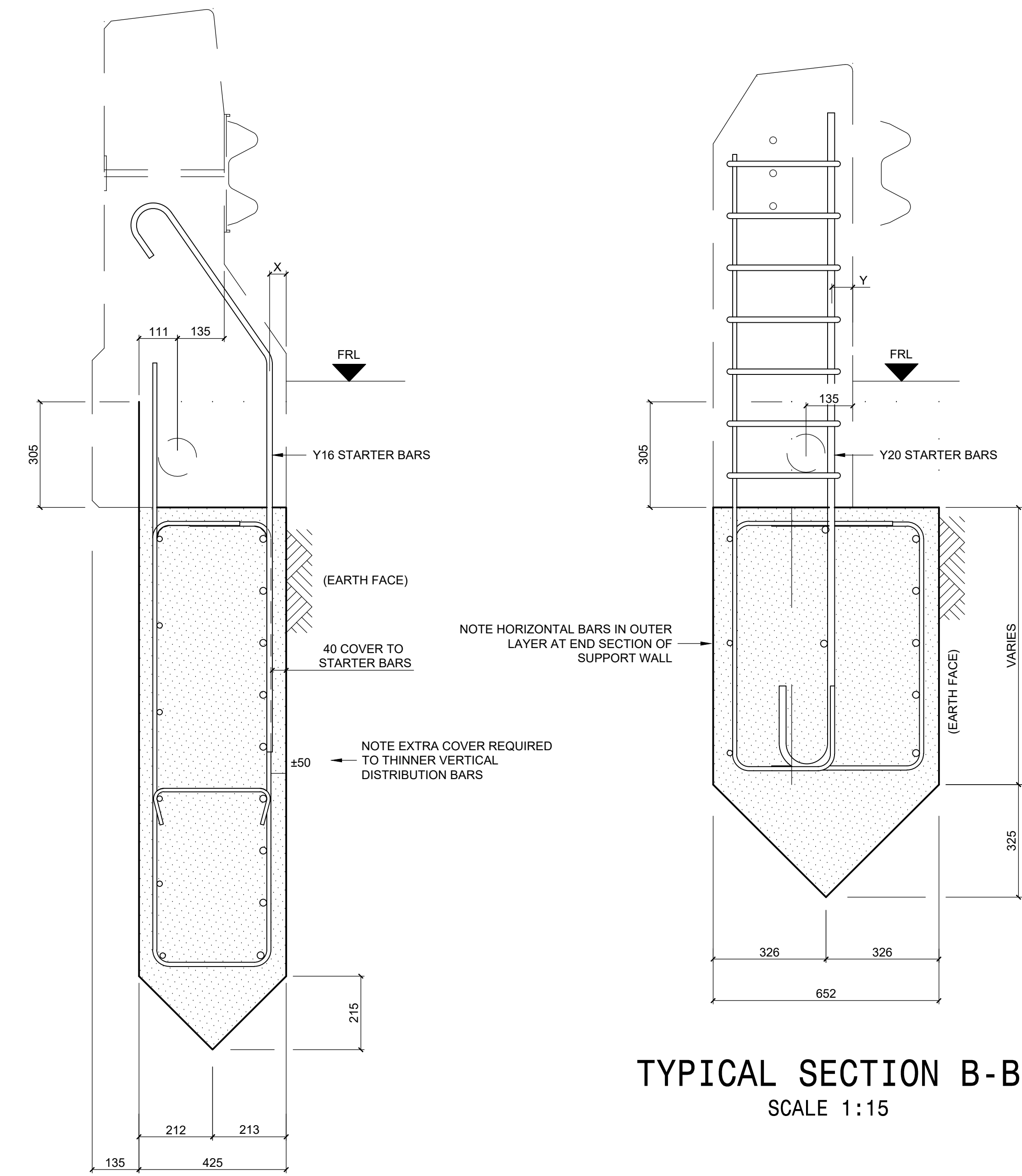
NOTES

- GENERAL**
 - INSPECTION EYES SHALL BE PROVIDED AT DISTANCES NOT EXCEEDING 50m.
 - THE RECESSES FOR EXPANSION JOINT CONSTRUCTION AND THE EXPANSION JOINT COVER PLATES ARE SUBJECT TO THE DETAILS OF THE EXPANSION JOINT SYSTEM FINALLY APPROVED. THE CONTRACTOR SHALL CONFIRM THE DIMENSIONS OF THE RECESSES WITH THE ENGINEER PRIOR TO THE CASTING OF THE BARRIER.
 - *T = 60mm MIN (20mm LEVELLING COURSE + 40mm ASPHALT)
OR 100mm MAX (20mm LEVELLING COURSE + 2x40mm ASPHALT)
- MATERIAL AND FINISHES**

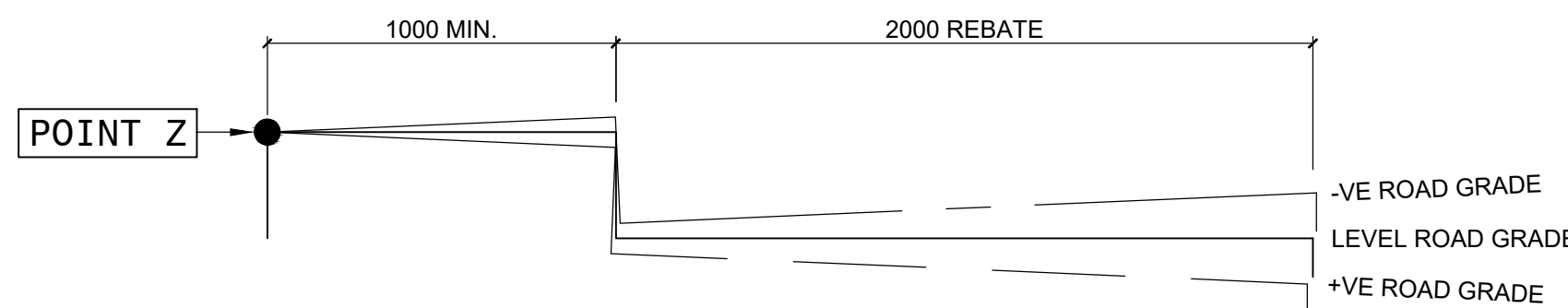
THE MATERIAL AND WORK SHALL COMPLY WITH THE RELEVANT CLAUSES OF SERIES 6000 AND 8000 OF THE STANDARD SPECIFICATIONS, THE PROJECT SPECIFICATIONS AND SHALL INCLUDE THE FOLLOWING:

 - SERVICE DUCTS : 110 Ø uPVC NORMAL DUTY (SDR 51) PIPES TO SANS 791:2004
 - CONCRETE CLASS (MPa/mm) : W30/19 UNLESS DURABILITY CONCRETE IS NOT REQUIRED (EXPOSURE CLASS XC1a)
 - SURFACE FINISHES : (EXPOSED FACES)
 - CLASS F3 - STEEL SHUTTER FINISH
 - CLASS U3 - STEEL TRONEL FINISH
 - ALL EXPOSED VERTICAL SHARP CORNERS SHALL BE CHAMFERED 20 x 20mm AND ROUNDED 20mm HORIZONTALLY EXCEPT WHERE OTHERWISE INDICATED ON DETAIL DRAWING.
 - THE DRAW WIRE PROVIDED IN THE SERVICE DUCTS SHALL BE IN ONE CONTINUOUS LENGTH, EXTENDING NOT LESS THAN 3m BEYOND THE END FACE OF THE ABUTMENT END BLOCKS. THE DRAW WIRE SHALL BE NON CORRODABLE NYLON ROPE OR PVC COATED STEEL WIRE OF NOT LESS THAN 5000N TENSILE STRENGTH.
 - CURING
PARAPETS ARE TO BE CURED BY EITHER METHOD (d), (e) OR (f) OF COLTO CLAUSE 6409, AS AGREED WITH ENGINEER.
- TOLERANCES**
 - TOLERANCES APPLICABLE TO ERECTION OF UNITS:
 - DIMENSION FROM SETTING OUT LINE TO FRONT FACES : 10mm OUTWARDS, 0mm INWARDS
 - STEPS IN CONCRETE FRONT FACES AT ABUTTING UNITS : 3mm
 - DEVIATION FROM LINE AND LEVEL MEASURED OVER 5m : 5mm

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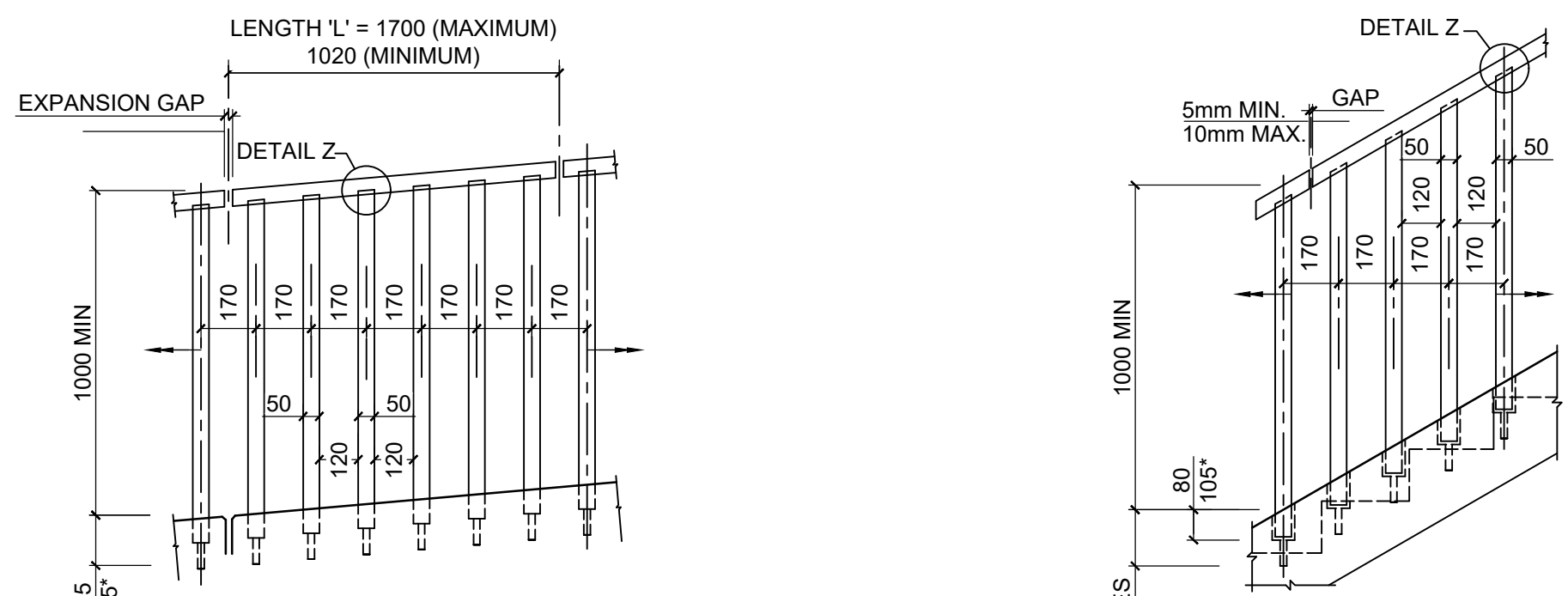
TYPICAL SECTION A-A
SCALE 1:15



SIDE VIEW OF TOP OF SUPPORT WALL
NTS

ISOMETRIC VIEW OF TYPICAL SUPPORT WALL
SCALE 1:15

1.	GENERAL				
1.1.	THE REQUIRED LENGTH OF THE HANDRAIL, THE LAYOUT AND THE REQUIRED UNIT QUANTITIES AND LENGTHS SHALL BE DETERMINED ON SITE.				
1.2.	THE HANDRAIL (designed for LOADING ON PEDESTRIAN BARRIERS ACCORDING TO TMH V, CLASS II (i.e. 4.5 kN/m VERTICALLY & 3.5 kN/m TRANSVERSE). ALSO TO BE USED FOR 1.5 kN/m LOAD CASE.				
2.0.	MATERIALS AND FINISHES				
	THE MATERIAL AND WORK SHALL COMPLY WITH THE RELEVANT CLAUSES OF SERIES 6000 AND 7000 OF THE STANDARD SPECIFICATIONS, THE PROJECT SPECIFICATIONS AND SHALL INCLUDE THE FOLLOWING.				
2.1.	CHARACTERISTIC STRENGTH OF MATERIALS:				
2.1.1.	REINFORCEMENT:				
	DESCRIPTION	CHARACTERISTIC STRENGTH (MPa)	YOUNG'S MODULUS (GPa)		
	MILD STEEL BARS	250	200		
	HIGH TENSILE STEEL	450	200		
2.1.2.	FLAME RETARDANT POLYCRETE WITH UV STABILISER:				
	DESCRIPTION	CHARACTERISTIC STRENGTH (MPa)	CHARACTERISTIC TENSILE STRENGTH (GPa)		
	PRECAST UNIT	250	70		
			200		
2.2.	SURFACE FINISHES:- CLASS F3 - STEEL SHUTTER FINISH CLASS U3 - STEEL TROWEL FINISH				
2.3.	MINIMUM POLYCRETE COVER : 10mm				
2.4.	MINIMUM LAP LENGTH : 150mm				
3.	MANUFACTURE				
3.1.	THE PRECAST HANDRAIL SHALL CONFORM TO ALL DETAILS, INCLUDING DIMENSIONAL TOLERANCES SHOWN ON THE DRAWINGS.				
3.2.	THE SHUTTER RELEASE AGENT MUST NOT STAIN THE FINISHED PRODUCT. IT MUST BE CLEANED WITH A SOLVENT PRIOR TO APPLYING EPOXY ADHESIVE.				
3.3.	ALL REINFORCEMENT TO BE GALVANIZED IN ACCORDANCE WITH THE SPECIFICATIONS.				
4.	TOLERANCES				
4.1.	MANUFACTURING TOLERANCES:				
	THE MOULD SHALL BE MANUFACTURED TO TOLERANCES THAT WILL ENSURE THAT UNITS COMPLY WITH THE FOLLOWING TOLERANCES AFTER CASTING:				
4.1.1.	DIMENSIONS:				
	SECTIONAL DIMENSIONS	+ 5mm - 0mm			
	LENGTHS	+ 0mm - 5mm			
4.1.2.	SURFACE (IRREGULARITIES AND WARP MEASURED BY MEANS OF A STRAIGHT EDGE):				
	VERTICAL : 2mm				
	HORIZONTAL : 3mm over the LENGTH OF UNIT				
4.1.3.	SQUARENESS OF ENDS:				
	NO DIMENSION SHALL DEVIATE BY MORE THAN 2mm FROM THE THEORETICAL SQUARE PLANE CORRESPONDING TO THE FURTHEST PROJECTING POLYCRETE.				
4.2.	ERECTION TOLERANCE:				
4.2.1.	DIMENSIONS FROM SETTING OUT LINE TO FRONT FACE:				
	5mm OUTWARD, 0mm INWARD.				
4.2.2.	STEPS IN POLYCRETE FRONT FACES AND ABUTTING UNITS: 3mm				
4.2.3.	DEVIATION FROM LINE AND LEVEL MEASURED OVER ANY 5 UNITS: 5mm				
4.2.3.	POSTS SHALL ALWAYS BE FIXED VERTICALLY IN THE CASE OF DECKS ON GRADE AND STEPS IN FOOTBRIDGES. THE ENGINEER TO ADVISE ON VERTICAL ALIGNMENT FOR ALL STRUCTURES ON VERTICAL CURVES.				
5.	ERECTION OF HANDRAIL UNITS				
5.1.	GENERAL:				
5.1.1.	NON-SHRINK CEMENTITIOUS GROUT AND EPOXY GROUT AS APPROVED BY THE ENGINEER.				
5.1.2.	NO UNIT SHALL BE TRANSPORTED OR ERECTED BEFORE IT HAS ATTAINED A CHARACTERISTIC STRENGTH OF 75MPa.				
5.1.3.	IN ORDER TO ACHIEVE GOOD ALIGNMENT WITH A UNIFORM APPEARANCE THE FOLLOWING PROCEDURE SHALL BE FOLLOWED FOR EACH INDIVIDUAL BRIDGE:				
	a) ONLY UNITS OF MATCHING COLOUR AND FINISH FROM ONE MOULD SHALL BE USED FOR A PARTICULAR HANDRAIL.				
	b) LING UP OF THE HANDRAIL UNITS SHALL BE COMPLETED OVER THE FULL LENGTH OF THE HANDRAIL.				
5.1.4.	THE PREPARATION OF THE POLYCRETE SURFACES PRIOR TO THE PLACING AND GROUTING IN OF THE UNITS AND THE GROUTING OPERATION SHALL BE AS SPECIFIED IN THE PROJECT SPECIFICATIONS AND SHALL INCLUDE THE RECOMMENDATIONS OF THE GROUT MANUFACTURER.				
5.2.	ERECTION PROCEDURE:				
5.2.1.	ERECT TEMPORARY PROTECTION SCREEN.				
5.2.2.	REMOVE ANY EXISTING POSTS, BRACKETS AND PATCH BOLT HOLES, WHERE APPLICABLE.				
5.2.3.	DRILL 80 DIA. AND 16 DIA. HOLES INTO THE EXISTING KERB AS PER DETAIL.				
5.2.4.	PREPARE CONCRETE SURFACES TO BE GROUTED IN 1:4 ABOVE PLATE.				
5.2.5.	PLACE AND GROUT VERTICAL POSTS OF PRECAST UNITS AND ENSURE ALIGNMENT AS IN 4.2.				
5.2.6.	GROUT AND FIX TO TOP RAIL.				
5.2.7.	REMOVE TEMPORARY PROTECTION SCREEN AFTER COMPLETION OF WORK.				



TYPICAL SECTION
OF HANDRAIL

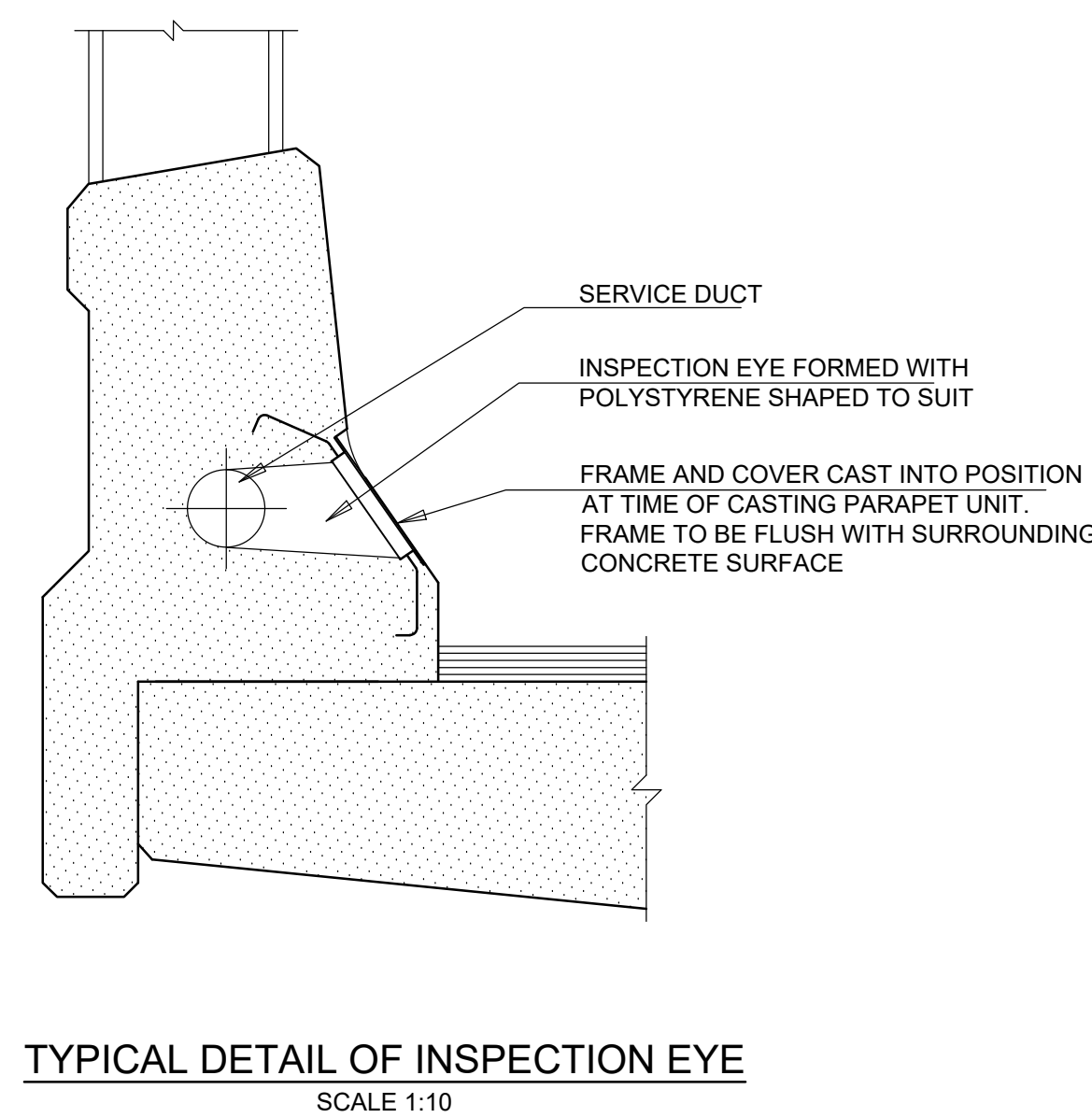
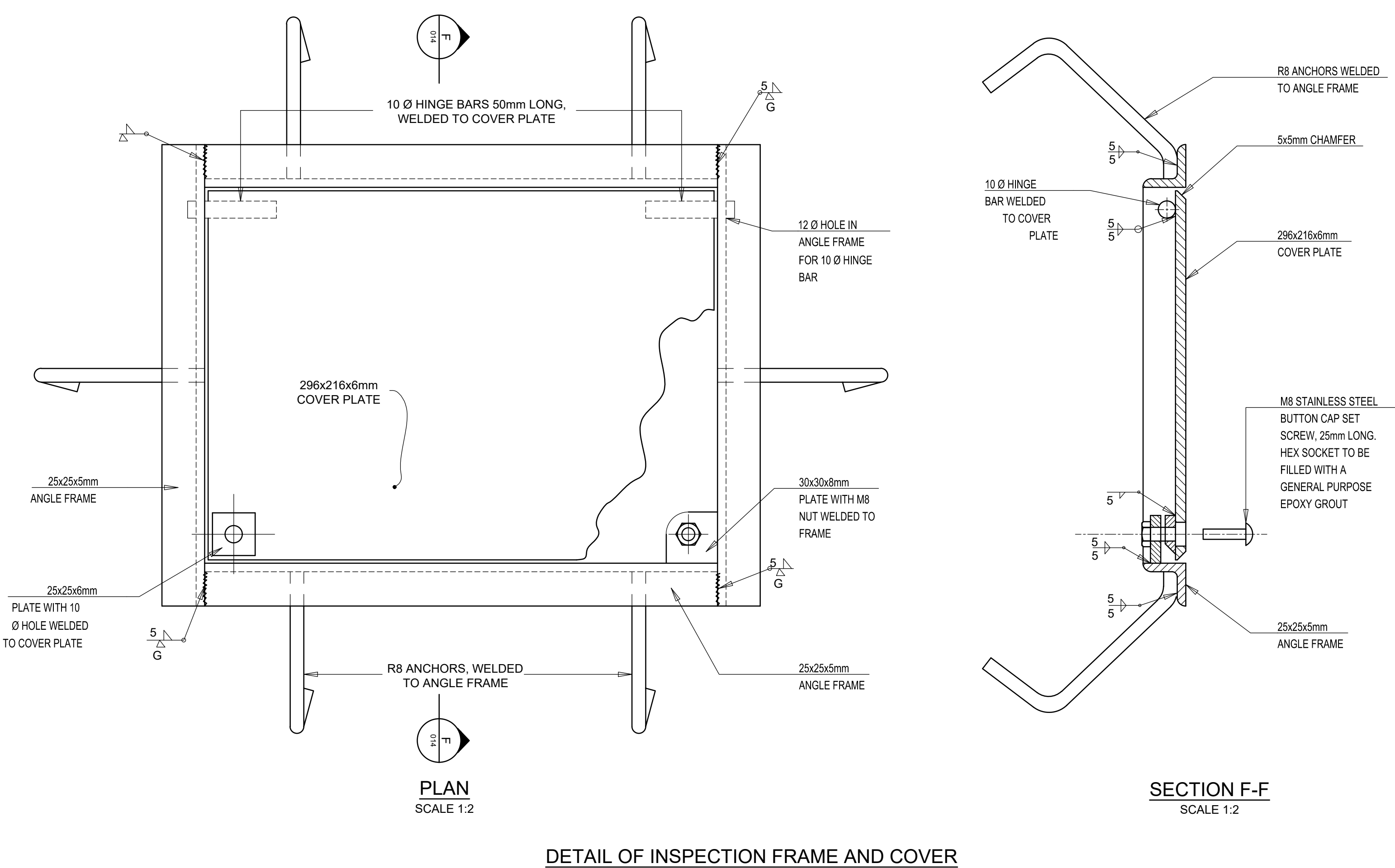
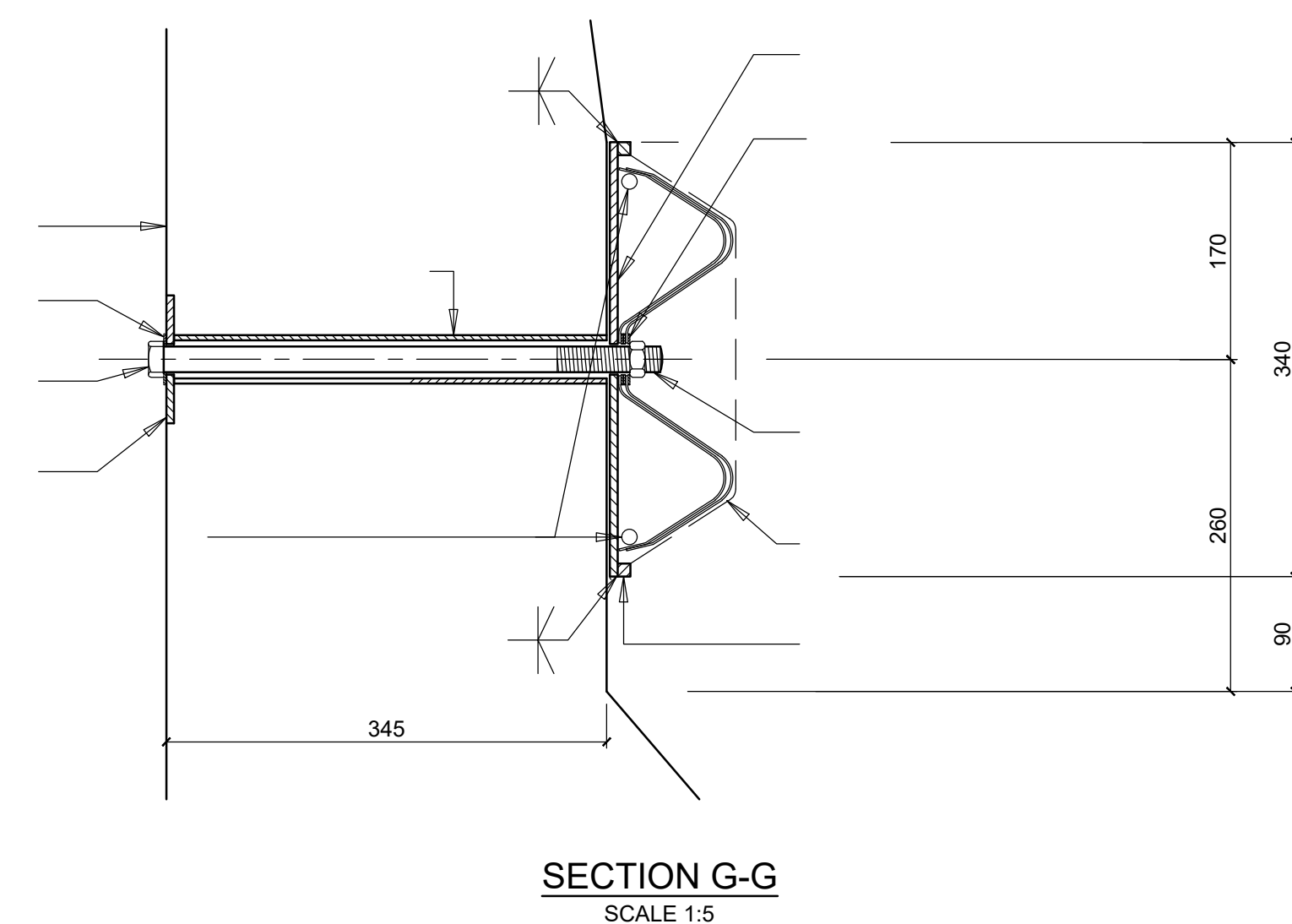
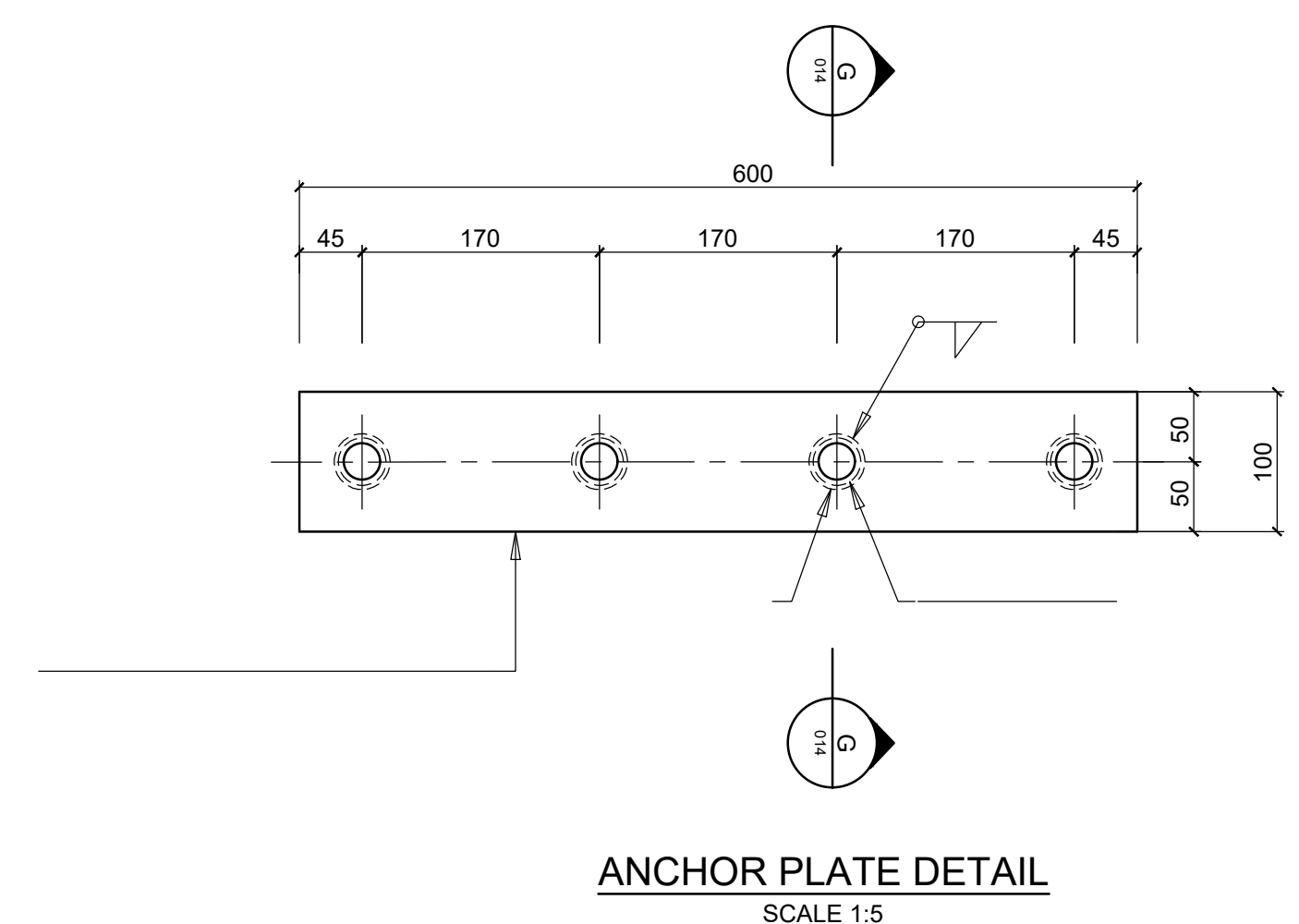
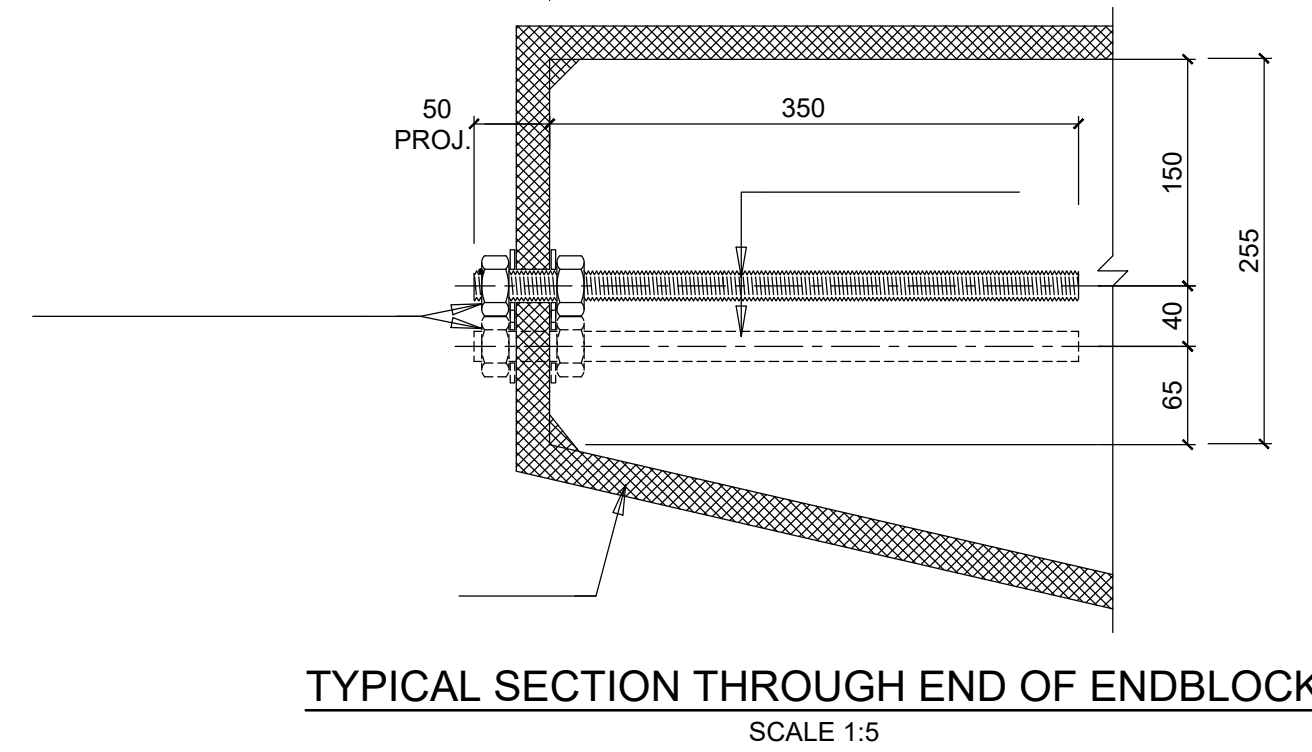
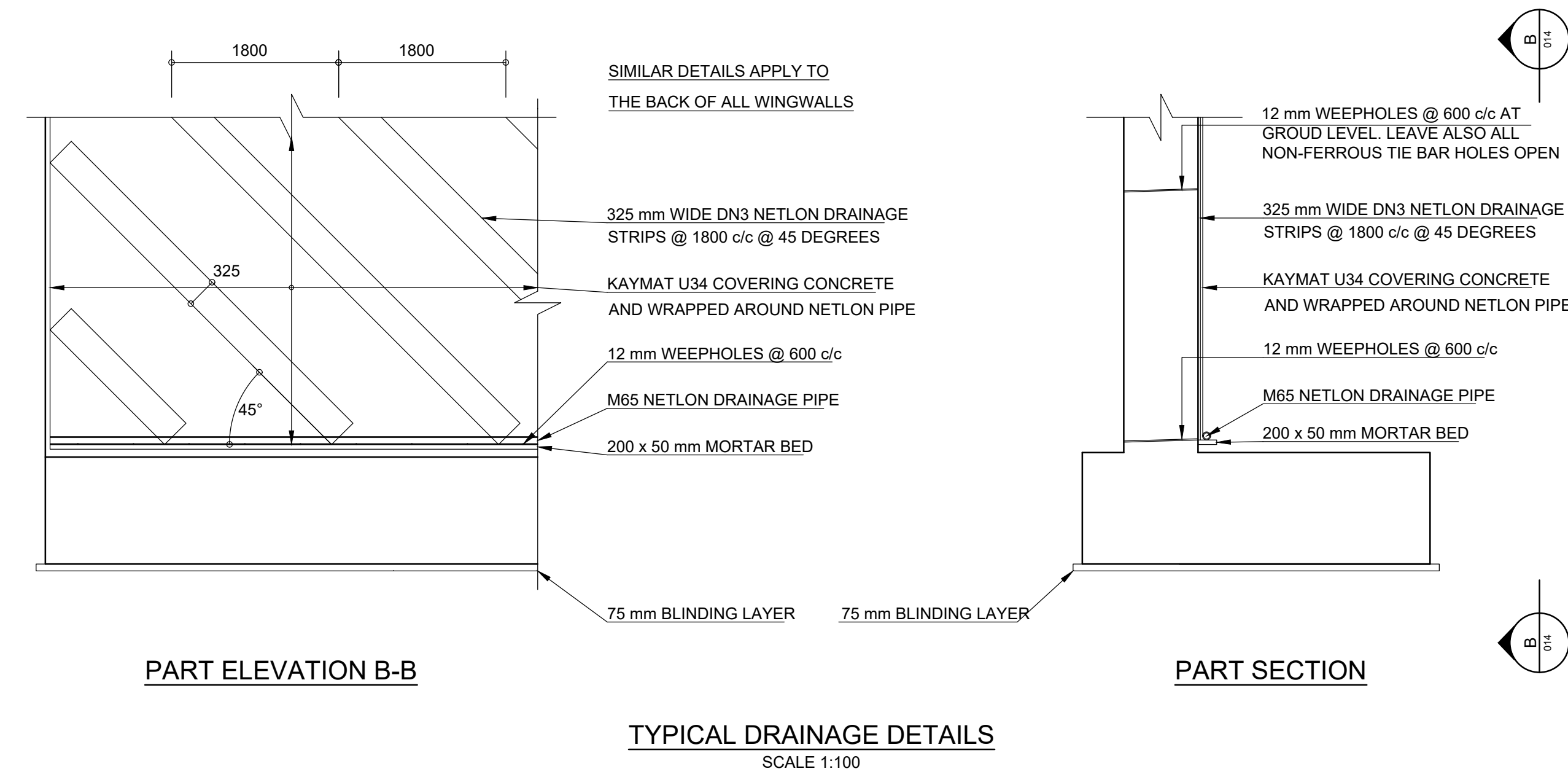
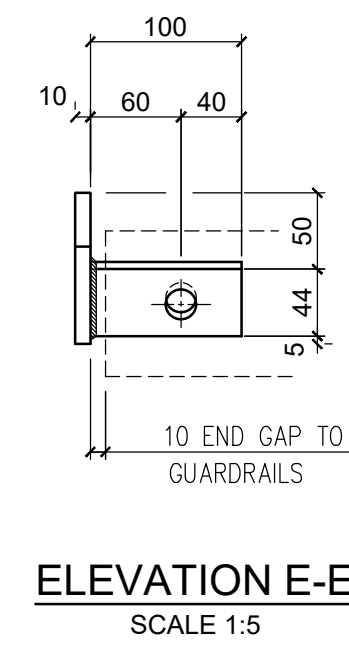
SCALE 1:20

ELEVATION OF
HANDRAIL ON GRADE
SCALE 1:15

ELEVATION OF HANDRAIL
ON FOOTBRIDGE STAIRWAY

SCALE 1:15

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