NZ TRANSPORT AGENCY
WAKA KOTAHI

Standard precast concrete bridge beams

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Research Report 364

Standard precast concrete bridge beams

Beca Carter Hollings & Ferner Ltd (Beca)

Opus International Consultants Ltd (Opus)

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We also acknowledge the contribution made by various members of the precast industry during several workshops held during the preparation of these standard designs.

Keywords: Precast concrete, bridge decks, standard designs for New Zealand, Super T, I beams, Hollow core

An important note for the reader

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This research report is the final stage of a project commissioned by Transfund New Zealand before 2004 and is published by the NZ Transport Agency.

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Additional note

The NZ Transport Agency (NZTA) was formally established on 1 August 2008, combining the functions and expertise of Land Transport NZ and Transit NZ. The new organisation will provide an integrated approach to transport planning, funding and delivery.

This research report was prepared prior to the establishment of the NZTA and may refer to Land Transport NZ and Transit NZ.

Abstract

Hollow core units for bridge spans of various length.
The standardised designs for precast bridge beams presented in this publication are expected to result in significant economies for NZ Transport Agency bridge projects utilising these elements in New Zealand

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200 mm
100
50
10 mm
0

AMENDMENT | APP'D | DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

GENERAL
DRAWING INDEX

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GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

INTRODUCTION

ENCLOSED ARE STANDARD DRAWINGS FOR HOLLOW CORE, SUPER 'T' AND 'I' GIRDER PRECAST BEAMS, AND BRIDGE DECK ARRANGEMENTS. SIMPLY SUPPORTED BRIDGE DECKS UP TO 30 M IN SPAN ARE DETAILED ON THE DRAWINGS.

THE DESIGNS ARE FOR A SINGLE CARRIAGEWAY CROSS SECTION CONSISTING OF 2 NO. 3.5 M LANES AND 2 NO. 1.2 M SHOULDERS. OTHER CARRIAGEWAY CONFIGURATIONS HAVE NOT BEEN CONSIDERED. THE DESIGNS ARE APPLICABLE FOR BRIDGE SKEWS UP TO 15°. THE DECKS ARE DESIGNED TO SUPPORT TL4 RIGID CONCRETE BARRIER EDGE PROTECTION.

THE FOLLOWING ITEMS ARE NOT COVERED IN THE STANDARD DESIGNS:

- SUBSTRUCTURES
- SEISMIC DESIGN (SOME STANDARD DETAILS ARE INCLUDED HOWEVER SPECIFIC DESIGNS OF LINKAGE BOLTS, SHEAR KEYS AND SUCH LIKE ARE REQUIRED)
- BEARINGS (GRAVITY AND LIVE LOADINGS, AND ROTATIONS UNDER LIVE LOADINGS ARE LISTED)
- BRIDGE JOINTS.

BACKGROUND

IN THE MID 1970S THE MINISTRY OF WORKS (MWD) DESIGNED A RANGE OF TWIN HOLLOW CORE, 'I' AND 'U' PRECAST CONCRETE BRIDGE BEAMS WHICH WERE ADOPTED AS NEW ZEALAND INDUSTRY STANDARDS. USE OF THESE STANDARD DESIGNS LED TO MORE COST-EFFICIENT DESIGN AND CONSTRUCTION.

THE STANDARD MWD BRIDGE BEAM DESIGNS COMPLETED IN THE 1970S ARE NOW OUT OF DATE, BOTH WITH RESPECT TO DESIGN CODES AND HIGHER STRENGTH MATERIALS NOW COMMONLY USED. IN PARTICULAR, CHANGES TO CONCRETE DURABILITY, BRIDGE DECK WIDTH AND SIDE PROTECTION REQUIREMENTS HAVE LED TO THE EXISTING DESIGNS NO LONGER COMPLYING WITH CURRENT STANDARDS. DISCUSSIONS WITH A WIDE RANGE OF INDUSTRY PARTICIPANTS (CONSULTANTS, BRIDGE CONTRACTORS, CONCRETE PRECASTERS AND ROAD CONTROLLING AUTHORITIES [RCAS]) INDICATED STRONG SUPPORT FOR A NEW RANGE OF STANDARD BEAM DESIGNS. SUBSEQUENTLY, A LAND TRANSPORT NZ SPONSORED PROJECT WAS INSTIGATED TO BEGIN THE PROCESS OF UPDATING THE STANDARD BEAM DESIGNS. THE CEMENT & CONCRETE ASSOCIATION AND PRECAST NEW ZEALAND ALSO PROVIDED FINANCIAL SUPPORT FOR THE PROJECT. THE DESIGNS INCLUDED HEREIN ARE THE FINAL OUTCOMES OF THIS PROJECT.

THE PROJECT

GENERAL

BECA AND OPUS WERE COMMISSIONED TO DEVELOP THE NEW STANDARD BEAM DESIGNS. A STEERING GROUP WAS SET UP TO GUIDE THE PROJECT FROM THE OUTSET. THIS GROUP INCLUDED END USERS, PRECASTERS, CONSULTANTS, CONTRACTORS, PRECAST NEW ZEALAND AND CEMENT & CONCRETE ASSOCIATION.

STAGE 1

THE INITIAL STAGE OF THE PROJECT INVOLVED IDENTIFYING THE MOST APPROPRIATE CONCRETE BRIDGE BEAM SHAPES AND SPANS THAT SHOULD BE ADOPTED AS INDUSTRY STANDARDS FOR THE FUTURE. AFTER EXTENSIVE CONSULTATION WITH THE INDUSTRY, TWO EXISTING BEAM TYPES WERE RETAINED AS STANDARD BEAM SHAPES:

- HOLLOW CORE BEAMS – CURRENTLY SUITABLE FOR SPANS UP TO 20 M (587 MM AND 650 MM DEEP), BUT TO BE EXTENDED FOR SPANS UP TO 25 M (900 MM DEEP)
- I-BEAMS – FOR A SPAN RANGE OF 16-24 M.

IN ADDITION TO THE ABOVE, A NOW COMMONLY USED NEW SHAPE WAS SELECTED: THE SUPER T BEAM, WHICH IS WIDELY USED IN AUSTRALIA. BEAM DEPTHS FOR DESIGN ARE AS FOLLOWS:

- 1025 MM FOR SPANS UP TO 22.5 M
- 1225 MM FOR SPANS UP TO 30 M.

STAGE 2

THIS STAGE INVOLVED CARRYING OUT DESIGN CALCULATIONS AND PRODUCING CONSTRUCTION DRAWINGS FOR THE ABOVE BEAM CONFIGURATIONS.

DESIGN STANDARDS

THE MAIN STANDARDS AND CODES USED FOR THE DESIGN PHASE INCLUDED:

- TRANSIT NEW ZEALAND BRIDGE MANUAL, 2ND EDITION, (TNZBM), INCLUDING AMENDMENTS ISSUED IN SEPTEMBER 2004 AND DECEMBER 2004
- CONCRETE STRUCTURES STANDARD, NZS 3101: 2006
- CONCRETE CONSTRUCTION NZS 3109: 1997.

DESIGN METHODOLOGY

CALCULATION OF SECTION DEMANDS

THE BRIDGE DECKS HAVE BEEN ANALYSED USING A TWO-DIMENSIONAL PLANE FRAME GRILLAGE MODEL TO TAKE ADVANTAGE OF THE TRANSVERSE LOAD SPREAD THAT OCCURS IN BRIDGE DECKS.

SERVICEABILITY LIMIT STATE DESIGN OF BEAMS

PARTIAL PRESTRESS (CRACKED SECTION) ANALYSIS OF THE BEAMS IN ACCORDANCE WITH NZS 3101 WAS UNDERTAKEN TO ENSURE MAXIMUM ECONOMIES IN DESIGN WERE ACHIEVED.

ULTIMATE LIMIT STATE

THE DESIGN PROCEDURES IN NZS 3101 WERE ADOPTED FOR CALCULATING SECTION CAPACITIES.

GENERAL LIMITATIONS OF STANDARD DESIGNS

THE DESIGNS HAVE BEEN DEVELOPED FOR THE TWO-LANE CARRIAGEWAY ARRANGEMENT; OTHER CARRIAGEWAY CONFIGURATIONS WILL REQUIRE SPECIFIC DESIGNS TO BE CARRIED OUT.

THE DESIGNS ARE SUITABLE FOR SKEWS UP TO 15° MAXIMUM. BRIDGES WITH HIGHER SKEWS WOULD REQUIRE BRIDGE SPECIFIC DESIGNS TO BE UNDERTAKEN.

SEISMIC DESIGN IS NOT ADDRESSED IN THESE STANDARD DESIGNS. THE DESIGNS ARE SUITABLE FOR MULTIPLE SIMPLY SUPPORTED SPAN ARRANGEMENTS. SEISMIC DETAILING INCLUDING LINKAGE SYSTEMS WOULD NEED TO BE DESIGNED TO SUIT LOCALITY REQUIREMENTS.

SUBSTRUCTURE DETAILS ARE NOT INCLUDED. THESE WILL NEED TO BE DESIGNED TAKING INTO ACCOUNT LOCALITY, GEOTECHNICAL CONDITIONS, SEISMICITY AND OTHER RELEVANT FACTORS.

SPECIFICATION REQUIREMENTS

THE DESIGNS ARE BASED ON MATERIAL AND WORKMANSHIP BEING IN ACCORDANCE WITH THE SPECIFICATION DEVELOPED IN CONJUNCTION WITH THE STANDARD DRAWINGS.

SUBSEQUENT AMENDMENTS

THE CONTINUOUS DEVELOPMENT OF BRIDGE TECHNOLOGY AND OF NEW PRODUCTS AND MATERIALS IS EXPECTED TO RESULT IN FUTURE AMENDMENTS AND ADDITIONAL STANDARD BEAMS BEING REQUIRED.

DISCLAIMER

THE NZ TRANSPORT AGENCY IS A CROWN ENTITY ESTABLISHED UNDER THE LAND TRANSPORT MANAGEMENT ACT 2003. THE OBJECTIVE OF THE NZ TRANSPORT AGENCY IS TO UNDERTAKE ITS FUNCTIONS IN A WAY THAT CONTRIBUTES TO AN AFFORDABLE, INTEGRATED, SAFE, RESPONSIVE, AND SUSTAINABLE LAND TRANSPORT SYSTEM. EACH YEAR, THE NZ TRANSPORT AGENCY INVESTS A PORTION OF ITS FUNDS ON RESEARCH THAT CONTRIBUTES TO THIS OBJECTIVE.

THIS RESEARCH REPORT IS THE FINAL STAGE OF A PROJECT COMMISSIONED BY TRANSFUND NEW ZEALAND BEFORE 2004 AND IS PUBLISHED BY THE NZ TRANSPORT AGENCY.

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AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

GENERAL USER NOTES

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		S0.02			0

GRAPHIC SCALES: 200 mm, 100, 50, 10 mm, 0

ORIGINAL SHEET SIZE A3 [420x297]

www.nzta.govt.nz/resources/standard-precast-concrete-bridge-beams

1. GENERAL

a. THE FOLLOWING DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE USER NOTES AND THE SPECIFICATION

b. ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE CURRENT CODES OF PRACTICE, EXCEPT WHERE VARIED BY THE SPECIFICATION AND/OR DRAWINGS

c. ANY CODES OF PRACTICE AND OR STANDARDS REFERRED TO ON THE DRAWINGS AND/OR SPECIFICAITON REFER TO THE LATEST ISSUE AND AMENDMENTS CURRENT AT THE TIME OF PREPARING THESE DRAWINGS

d. REQUIREMENTS FOR:
- SHOP DRAWINGS
- PROPPING DOCUMENTATION
- INSPECTION AND TESTING DOCUMENTS
- MATERIAL SPECIFICATION
- TOLERANCES

ARE INCLUDED IN THE SPECIFICATION.

2. DIMENSIONS

a. ALL DIMENSIONS ARE IN MILLIMETRES, UNLESS NOTED OTHERWISE.

3. ABBREVIATIONS

ALT	ALTERNATE
APPROX	APPROXIMATE
B	BOTTOM
C	COVER
CJ	CONSTRUCTION JOINT
CL ℄	CENTRELINE
COL	COLUMN
CONC	CONCRETE
CRS	CENTRES
CS	CRITICAL SECTION
D	DEFORMED BAR GRADE 300E
DH	DEFORMED BAR GRADE 500E
DIA ø	DIAMETER
DWG	DRAWING
EF	EACH FACE
EQ	EQUAL
EW	EACH WAY
FF	FAR FACE
GL	GROUND LEVEL
LV	LENGTH VARIES
MAX	MAXIMUM
MIN	MINIMUM
NF	NEAR FACE
NOM	NOMINAL
R	PLAIN BAR GRADE 300E
RB	REIDBAR
REF	REFER
REINF	REINFORCEMENT
RH	PLAIN BAR GRADE 500E
RL	REDUCED LEVEL
T	TOP
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE

4. REINFORCED CONCRETE

4.1 CONCRETE STRENGTHS

CONCRETE STRENGTHS ARE 'SPECIFIED 28 DAY COMPRESSIVE STRENGTHS' AS DEFINED IN NZS3109.
CONCRETE STRENGTHS ARE GENERALLY SPECIFIED ON INDIVIDUAL DRAWINGS. WHERE NOT SPECIFIED CONCRETE STRENGTH SHALL BE 40 MPa.

4.2 CONCRETE FINISHES

WHERE NOT SPECIFIED AND NOT SHOWN ON DRAWINGS, SURFACE FINISHES SHALL BE AS FOLLOWS: (REFER NZS 3114 FOR DEFINITIONS)

a. CONCEALED FORMED SURFACES — F1
b. EXPOSED FORMED SURFACES — F4
c. EXPOSED UNFORMED SURFACES — U2
d. CONCEALED UNFORMED SURFACES — U1
e. CORNERS TO BE RADIUSED OR CHAMFERED UNLESS NOTED OTHERWISE.

4.3 CONCRETE COVER TO REINFORCEMENT

MINIMUM CONCRETE COVERS ARE GENERALLY SPECIFIED ON INDIVIDUAL DRAWINGS.
WHERE NOT SPECIFIED, MINIMUM CONCRETE COVERS SHALL BE AS FOLLOWS:

EXPOSURE SITUATION		BEAMS		SLABS
		MAIN BARS	STIRRUPS & TIES	ALL BARS
EXPOSED TO WEATHER	CAST–IN PLACE	40	40	50
	PRECAST	40	40	40
NOT EXPOSED TO WEATHER	CAST–IN PLACE	30	30	30
	PRECAST	30	30	30

NOTE:
(i) TOLERANCES ON COVERS SHALL BE IN ACCORDANCE WITH NZS3109, THE SPECIFICATION AND THE DRAWINGS AS APPROPRIATE.
(ii) PRECAST IN THE CONTEXT OF THIS TABLE MEANS CONCRETE CAST UNDER PLANT CONTROL CONDITIONS, UTILISING RIGID FORMWORK AND INTENSE COMPACTION.
(iii) TIES MAY INTRUDE 10mm MAXIMUM INTO THE SPECIFIED CONCRETE COVER

4.4 PLACING AND SPACING OF REINFORCEMENT

a. SPLICING OF REINFORCEMENT, WHETHER BY LAPPING OR MECHANICAL SPLICE, SHALL ONLY BE CARRIED OUT AS SHOWN ON THE DRAWINGS.
b. ALL HOOKS ON STIRRUPS AND TIES MUST FIT CLOSELY AROUND MAIN BARS UNO; FIRST STIRRUP TO BE PLACED NOT FURTHER THAN THE LESSER OF HALF THE STIRRUP SPACING OR 50mm FROM SUPPORT FACE.

4.5 LAP SPLICES IN REINFORCEMENT

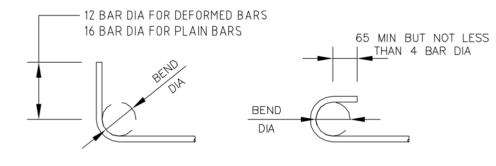
a. LAP LENGTHS FOR DEFORMED BARS SHALL BE AS SHOWN IN THE FOLLOWING TABLES WHERE SPACING OF ADJACENT BARS IS EQUAL TO OR GREATER THAN 2.5 db.
b. LAP LENGTHS FOR PLAIN ROUND BARS SHALL BE TWICE THOSE SHOWN IN THE FOLLOWING TABLES.
c. ALL BEAM MAIN REINFORCEMENT LAP SPLICES SHALL HAVE CRANKED LAPS UNLESS NOTED OTHERWISE.
d. LAP LENGTHS ARE IN ACCORDANCE WITH NZS 3101.

NOTE. RE: USE OF FOLLOWING TABLES
TOP BAR FACTOR IS 1.0 FOR ALL VERTICAL BARS AND FOR HORIZONTAL BARS WITH LESS THAN 300mm OF FRESH CONCRETE CAST BENEATH BAR (TYPICALLY BEAM BOTTOM BARS AND SLAB BARS).
TOP BAR FACTOR IS 1.3 FOR ALL HORIZONTAL BARS WITH MORE THAN 300mm OF FRESH CONCRETE CAST BENEATH THE BAR (TYPICALLY BEAM TOP BARS).

		BAR DIAMETER					
		10	12	16	20	25	32
CONCRETE 30 MPa, STEEL GRADE 300 MPa	TOP BAR FACTOR = 1.3	360	430	575	715	895	1140
	BAR FACTOR = 1	300	330	440	550	690	880
CONCRETE 40 MPa, STEEL GRADE 300 MPa	TOP BAR FACTOR = 1.3	310	375	495	620	775	990
	BAR FACTOR = 1	300	300	380	475	595	760
CONCRETE 50 MPa, STEEL GRADE 300 MPa	TOP BAR FACTOR = 1.3	300	335	445	555	690	885
	BAR FACTOR = 1	300	300	340	425	535	680
CONCRETE 30 MPa, STEEL GRADE 500 MPa	TOP BAR FACTOR = 1.3	595	715	950	1190	1485	1900
	BAR FACTOR = 1	460	550	735	915	1145	1485
CONCRETE 40 MPa, STEEL GRADE 500 MPa	TOP BAR FACTOR = 1.3	515	620	825	1030	1290	1645
	BAR FACTOR = 1	400	475	635	795	990	1270
CONCRETE 50 MPa, STEEL GRADE 500 MPa	TOP BAR FACTOR = 1.3	465	555	740	920	1150	1475
	BAR FACTOR = 1	355	425	570	710	885	1135

4.6 BENDING OF REINFORCEMENT

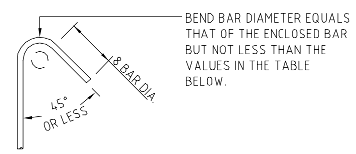
a. BENDS FOR ALL BARS EXCEPT STIRRUPS AND TIES.



STANDARD HOOK — STANDARD 180° HOOK

STEEL GRADE	BAR DIAMETER	MINIMUM BEND DIAMETER
GRADE 300	6 TO 20	5 BAR DIAMETERS
GRADE 500 FOR CONCRETE STRENGTH EQUAL TO OR MORE THAN 40 MPa	25 AND ABOVE	6 BAR DIAMETERS

b. BENDS FOR STIRRUPS AND TIES



STANDARD STIRRUP & TIE HOOK

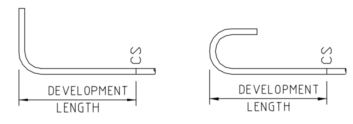
STEEL GRADE	BAR DIAMETER	MINIMUM BEND DIAMETER	
		PLAIN BARS	DEFORMED BARS
GRADE 300/500	6 TO 20	2 BAR DIAMETERS	4 BAR DIAMETERS
GRADE 300/500	25 TO 32	3 BAR DIAMETERS	6 BAR DIAMETERS

c. BARS PARTIALLY EMBEDDED IN CONCRETE SHALL NOT BE SITE BENT UNLESS SHOWN ON THE DRAWINGS OR SPECIFICALLY APPROVED BY THE ENGINEER.

4.7 REINFORCEMENT ANCHORAGE WITH STANDARD HOOKS

a. DEVELOPMENT LENGTH PAST CRITICAL SECTION (SHOWN CS ON DRAWING) FOR DEFORMED BARS SHALL BE AS PER TABLE BELOW.

b. DEVELOPMENT LENGTHS FOR PLAIN ROUND BARS SHALL BE TWICE THOSE SHOWN IN THE FOLLOWING TABLE:

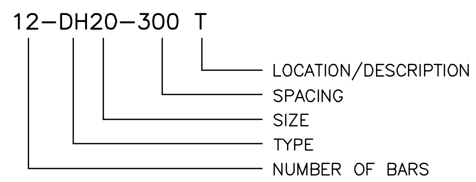


NOTES:
SIDE COVER FACTOR = 0.7 — FOR SIDE COVER EQUAL TO OR GREATER THAN 60mm, WITH HOOK COVER NOT LESS THAN 40mm.
SIDE COVER FACTOR = 1.0 — IN ALL OTHER SITUATIONS.

		BAR DIAMETER					
		10	12	16	20	25	32
CONCRETE 30 MPa, STEEL GRADE 300 MPa	COVER FACTOR = 1	135	160	215	265	330	425
	COVER FACTOR = 0.7	95	115	150	185	235	295
CONCRETE 40 MPa, STEEL GRADE 300 MPa	COVER FACTOR = 1	115	140	185	230	290	365
	COVER FACTOR = 0.7	85	100	130	165	205	260
CONCRETE 50 MPa, STEEL GRADE 300 MPa	COVER FACTOR = 1	105	125	165	205	260	330
	COVER FACTOR = 0.7	85	100	130	165	205	260
CONCRETE 30 MPa, STEEL GRADE 500 MPa	COVER FACTOR = 1	220	265	355	440	550	705
	COVER FACTOR = 0.7	155	185	250	310	385	495
CONCRETE 40 MPa, STEEL GRADE 500 MPa	COVER FACTOR = 1	195	230	305	380	475	610
	COVER FACTOR = 0.7	135	160	215	270	335	430
CONCRETE 50 MPa, STEEL GRADE 500 MPa	COVER FACTOR = 1	175	205	275	340	425	545
	COVER FACTOR = 0.7	120	145	195	240	300	385

NOTE: INTERPOLATE FOR CONCRETE STRENGTHS IN BETWEEN

4.8 REINFORCEMENT NOTATION



AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

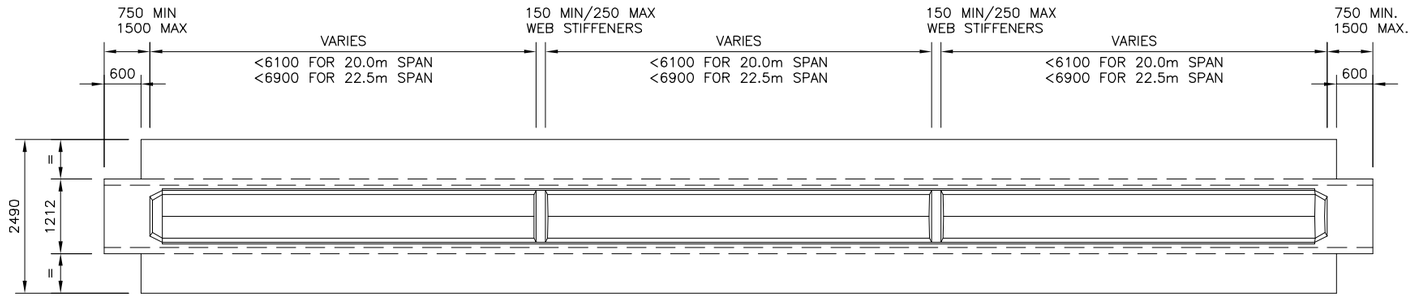
TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS
GENERAL CONCRETE NOTES

STATUS	FOR PUBLICATION	FILE	0242S003
SCALE	PLOT DATE	DRAWING NO. S0.03	CODE	SHEET	REVISION 0

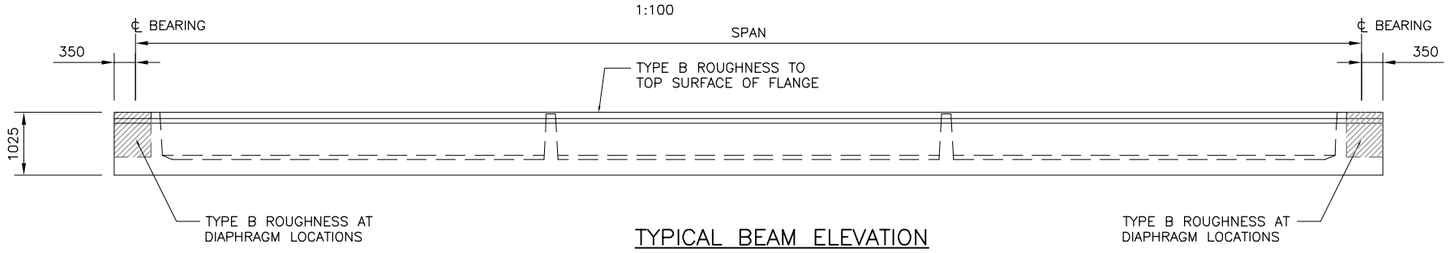
GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

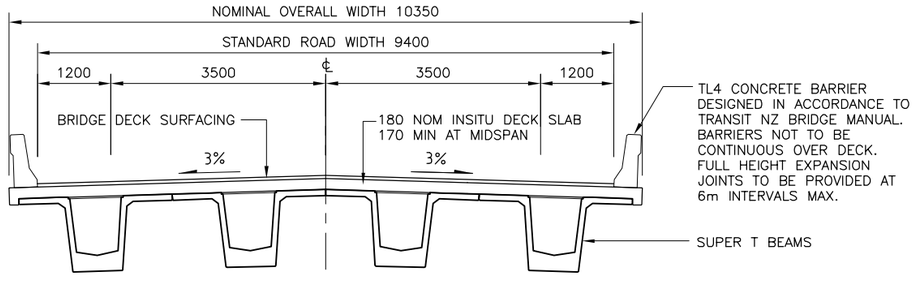
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



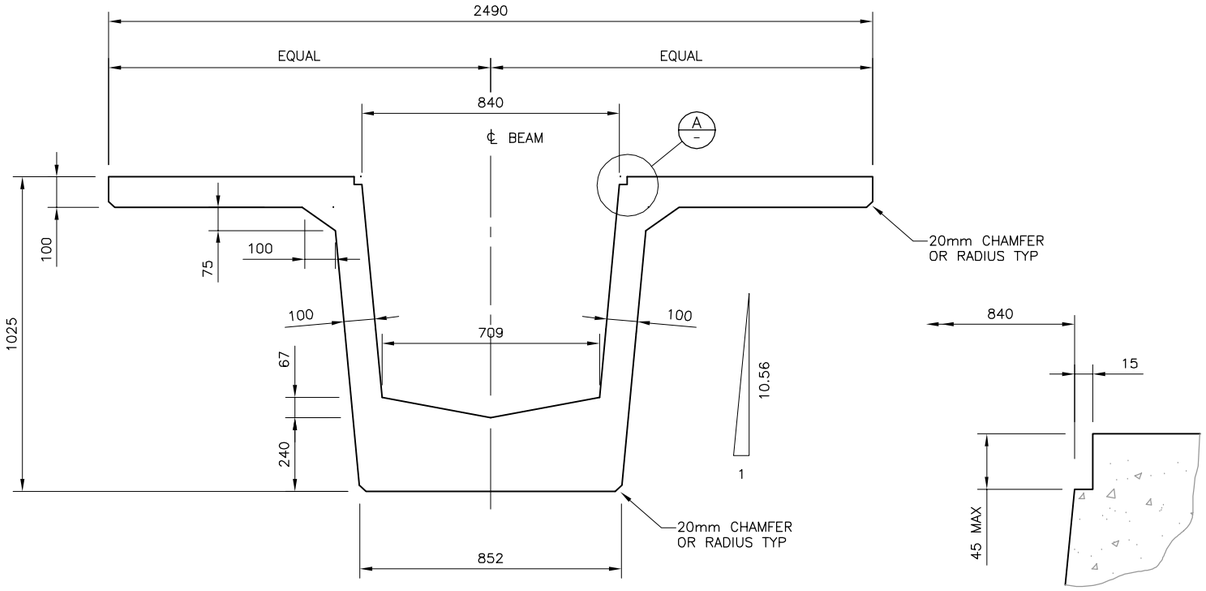
TYPICAL BEAM PLAN
1:100



TYPICAL BEAM ELEVATION
1:100



TYPICAL BRIDGE SECTION
1:100



TYPICAL UNIT SECTION
1:20

DETAIL A
1:5

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			DRAWN			
			APPROVED			
AMENDMENT	APP'D	DATE	This drawing and its contents are the property of Land Transport New Zealand. Any unauthorised employment or reproduction, in full or in part, is forbidden.			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

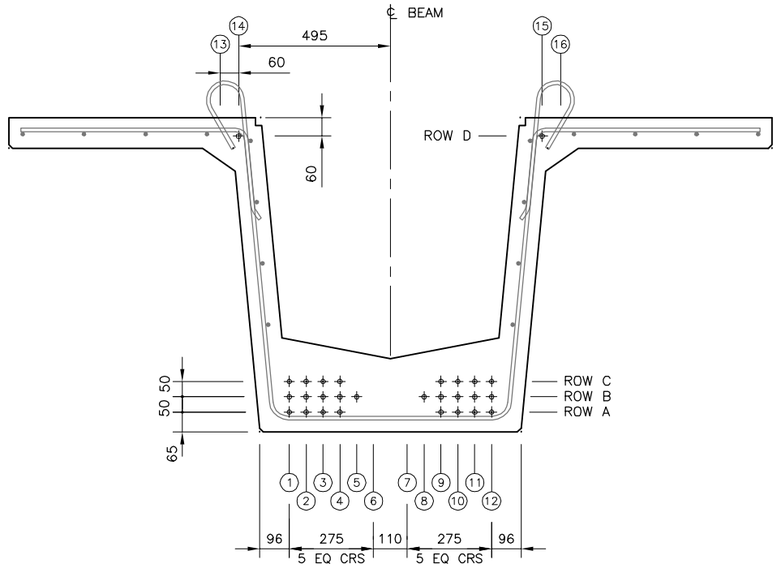
SUPER T BEAM 1025 DEEP – 20m & 22.5m SPAN
ARRANGEMENT AND DIMENSIONS

STATUS	FILE				
FOR PUBLICATION	0242S101				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
AS SHOWN		S1.01			0

DOCUMENT: D:\171\171\0242\CAD\0242S101.dwg

GRAPHIC SCALES: 200 mm, 100, 50, 10 mm, 0

ORIGINAL SHEET SIZE A3 [420x297]



TYPICAL STRAND ARRANGEMENT

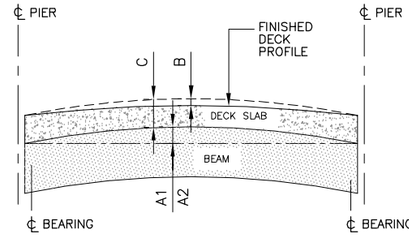
1:20

STRAND NO.	DEBOND LENGTH 'L' mm															STRANDS PER ROW
	13	14	1	2	3	4	5	6	7	8	9	10	11	12	15	16	
ROW D		0													0		2
ROW C			0	0	0	0					0	0	0	0			8
ROW B			0	0	0	2000	0			0	2000	0	0	0			10
ROW A			0	0	0	0					0	0	0	0			8
														TOTAL PER BEAM			28

NOTE:
THE MANUFACTURERS CAN CHOOSE TO HAVE 2 STRANDS IN ROW D AND STRESSED TO THE VALUE SPECIFIED IN CLAUSE 2.d ON DRAWING S1.05 OR 4 STRANDS IN ROW D AND STRESSED TO 50% OF THE VALUE SPECIFIED IN CLAUSE 2.d ON DRAWING S1.05

STRAND LAYOUT AND DEBONDING SCHEDULE

NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



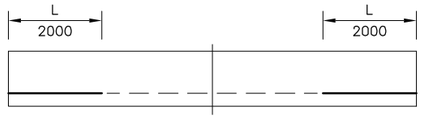
BEAM PRECAMBER

PRESTRESSING DETAILS – 20m SPAN

LEGEND:

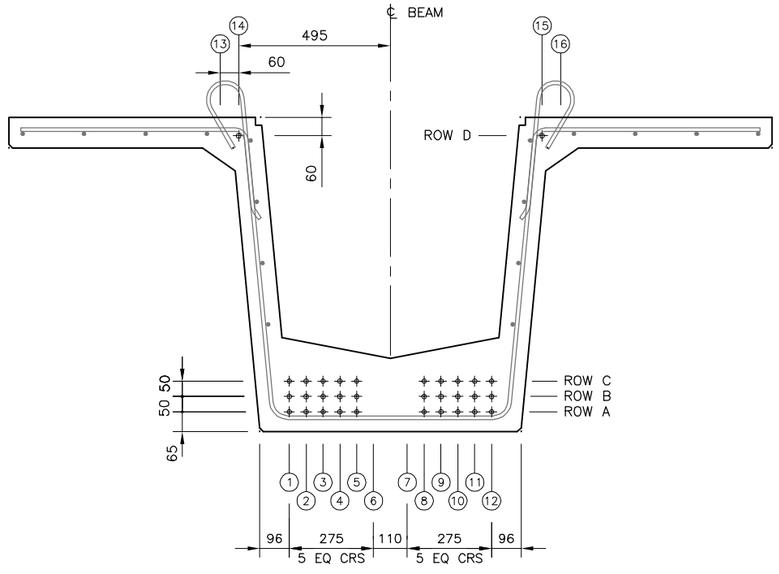
0 PRESTRESS STRAND BONDED FOR FULL LENGTH OF BEAM (NO DEBONDING)

2000 PRESTRESS STRAND IS DEBONDED AT THE SPECIFIED LENGTH 'L' (2000 MEASURED FROM CONCRETE FACE) EACH END OF BEAM, AS INDICATED BELOW.



TYPICAL BEAM

KEY	DESCRIPTION	SPAN (m)	
		20	22.5
A1	ESTIMATE HOG OF BEAM AT TRANSFER	+15mm	+20mm
A2	ESTIMATED HOG AT 100 DAYS AFTER TRANSFER	+35mm	+40mm
B	ESTIMATED INSTANT AMENDED DEFLECTION AT CASTING OF TOP SLAB	+15mm	+20mm
C	PERMITTED TOP SLAB THICKNESS AT MIDSPAN	180mm ±10mm	



TYPICAL STRAND ARRANGEMENT

1:20

STRAND NO.	DEBOND LENGTH 'L' mm															STRANDS PER ROW
	13	14	1	2	3	4	5	6	7	8	9	10	11	12	15	16	
ROW D		0													0		2
ROW C			0	2500	0	0	0			0	0	0	2500	0			10
ROW B			0	0	0	0	0			0	0	0	0	0			10
ROW A			0	0	2500	0	0			0	0	2500	0	0			10
														TOTAL PER BEAM			32

NOTE:
THE MANUFACTURERS CAN CHOOSE TO HAVE 2 STRANDS IN ROW D AND STRESSED TO THE VALUE SPECIFIED IN CLAUSE 2.d ON DRAWING S1.05 OR 4 STRANDS IN ROW D AND STRESSED TO 50% OF THE VALUE SPECIFIED IN CLAUSE 2.d ON DRAWING S1.05

STRAND LAYOUT AND DEBONDING SCHEDULE

PRESTRESSING DETAILS – 22.5m SPAN

			BY	CHECKED	DATE
			DESIGN		
			DRAWN		
			APPROVED		
A A	PG		This drawing and its contents are the property of Land Transport New Zealand. Any unauthorised employment or reproduction, in full or in part, is forbidden.		
AMENDMENT	APP'D	DATE			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS

SUPER T BEAM 1025 DEEP – 20m & 22.5m SPAN PRESTRESSING DETAILS

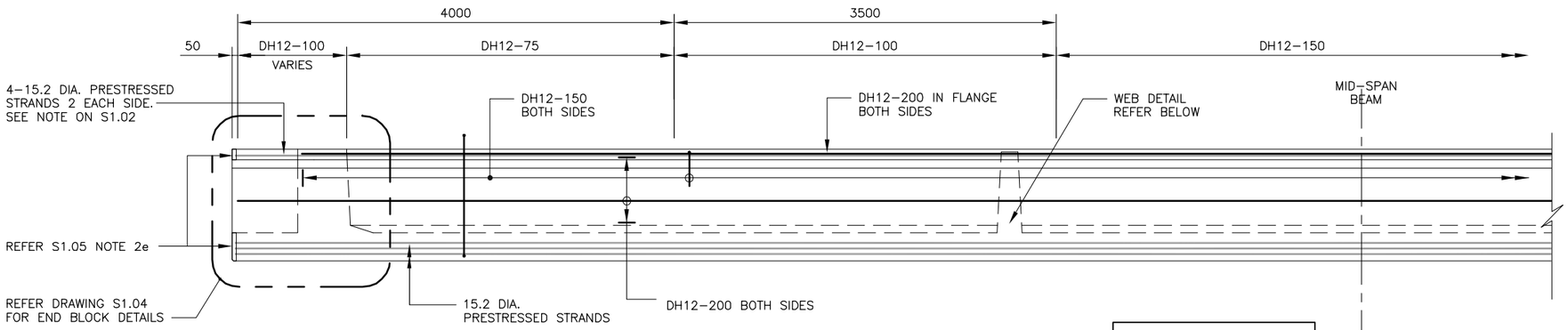
STATUS	FILE				
FOR PUBLICATION	0242S102				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:20		S1.02			0

DOCUMENT: P:\271\2710242\CAD\0242S102.dwg

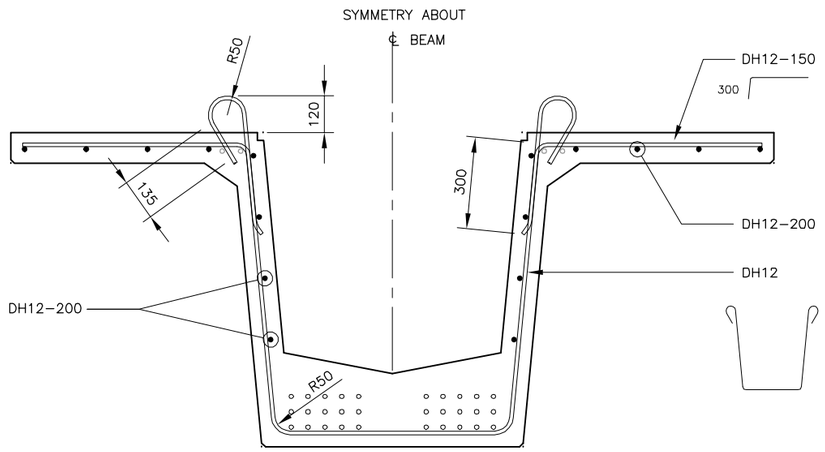
GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

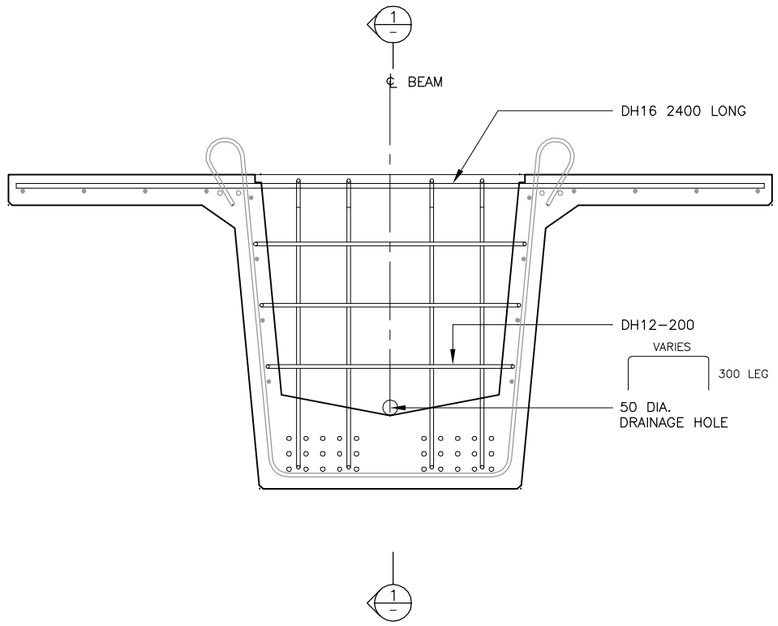
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



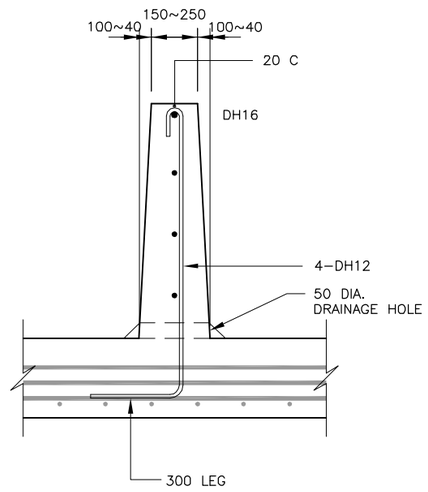
BEAM ELEVATION
1:50



TYPICAL SECTION
1:20



TYPICAL WEB ELEVATION
1:20



TYPICAL SECTION 1/–
1:20

				BY	CHECKED	DATE
			DESIGN			
			DRAWN			
			APPROVED			
AMENDMENT	APP'D	DATE	This drawing and its contents are the property of Land Transport New Zealand. Any unauthorised employment or reproduction, in full or in part, is forbidden.			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

SUPER T BEAM 1025 DEEP – 20m & 22.5m SPAN REINFORCEMENT SHEET 1

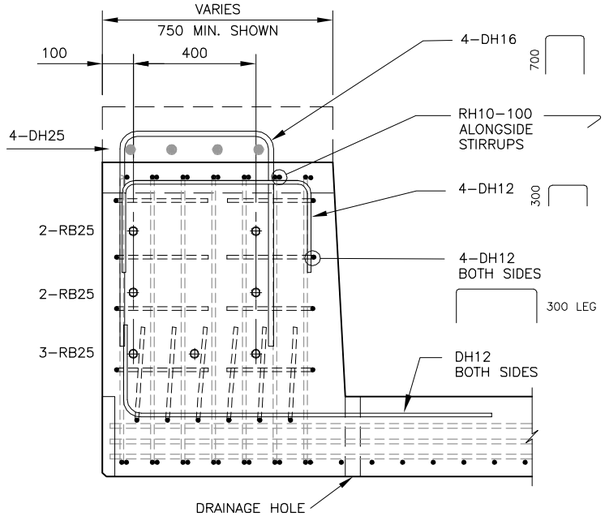
STATUS		FILE			
FOR PUBLICATION		0242S103			
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
AS SHOWN		S1.03			0

DOCUMENT: P:\171\2710242\CAD\0242S103.dwg

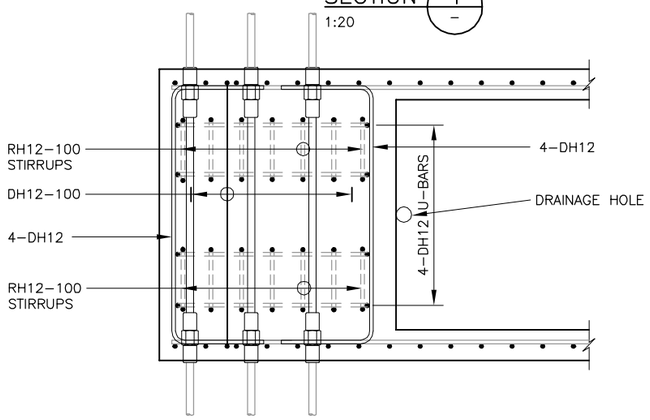
GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

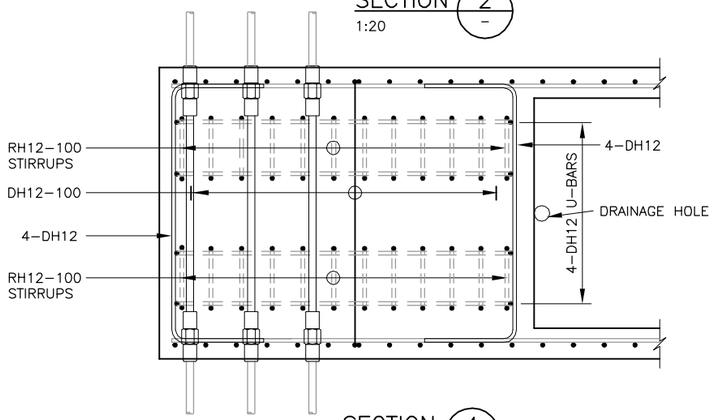
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



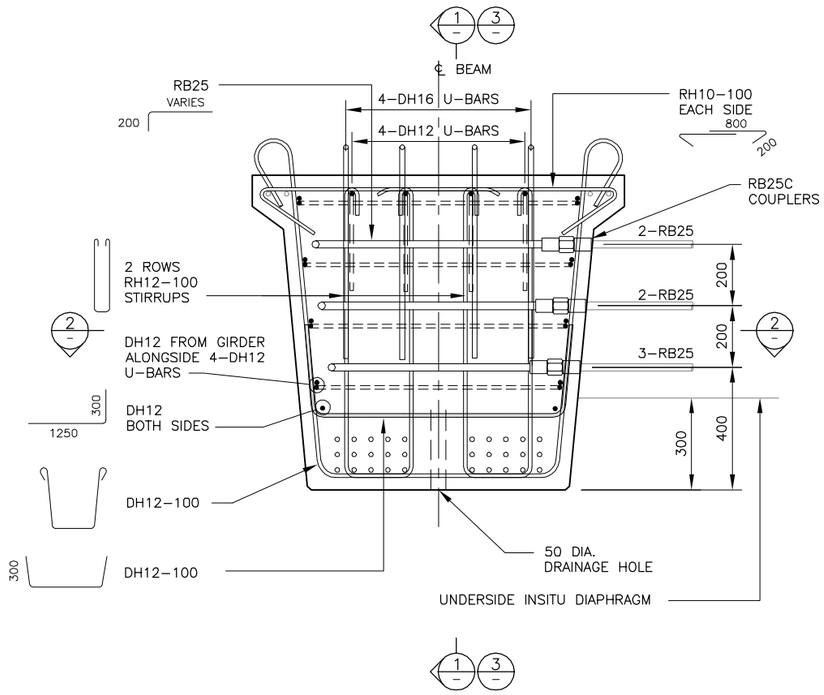
SECTION 1
1:20



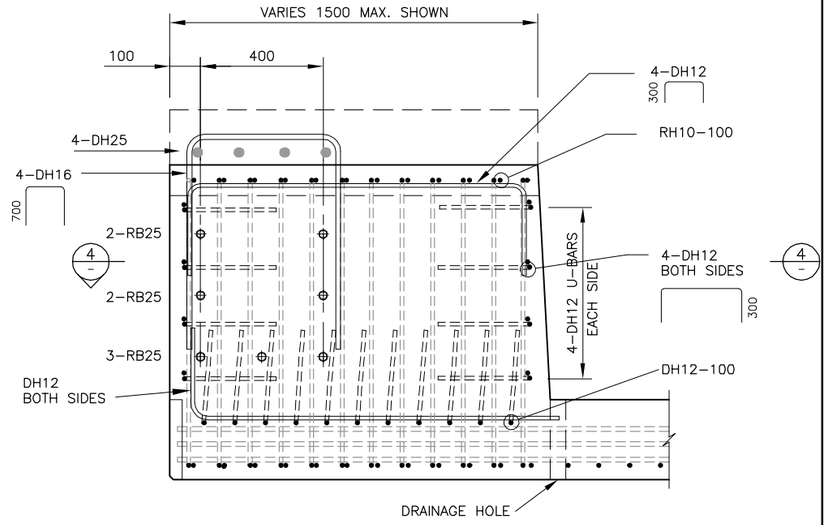
SECTION 2
1:20



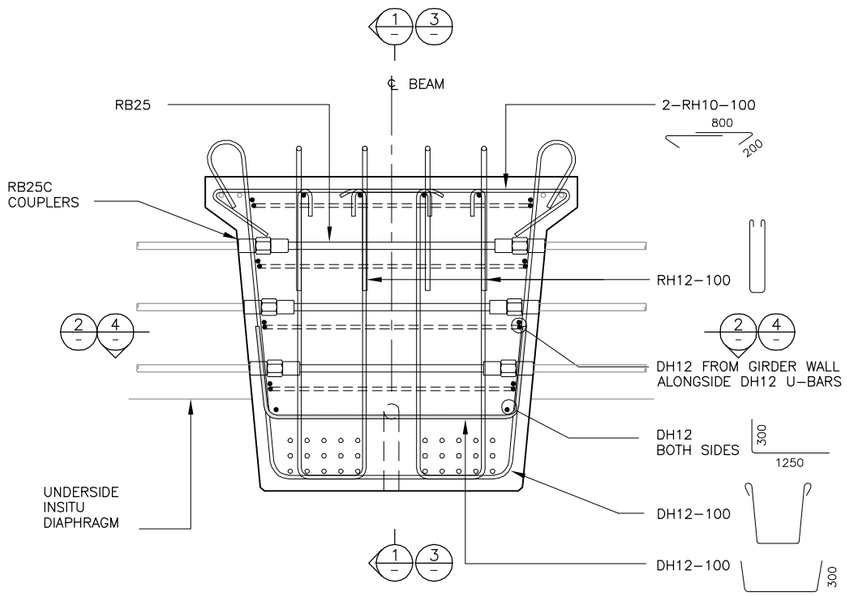
SECTION 4
1:20



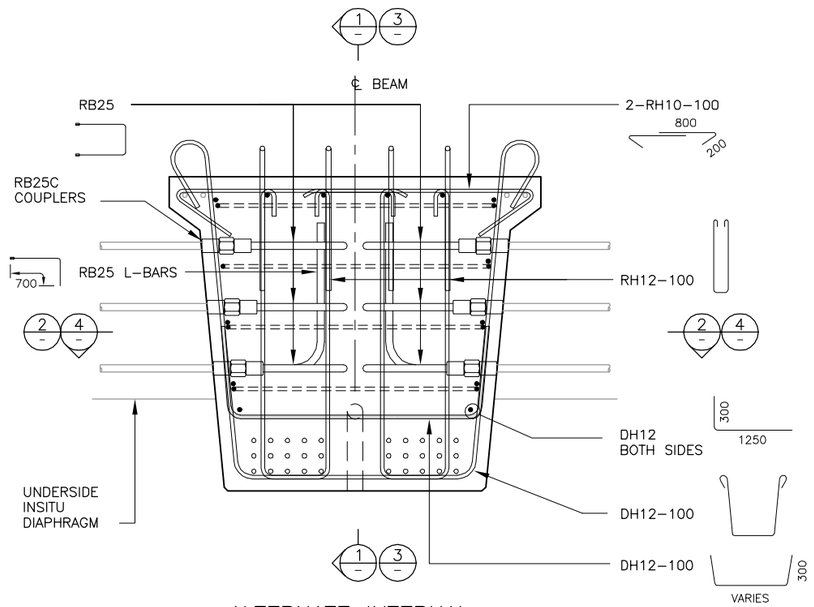
EXTERNAL BEAM END BLOCK
1:20



SECTION 3
1:20



INTERNAL BEAM END BLOCK
1:20



ALTERNATE INTERNAL BEAM END BLOCK
1:20

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

SUPER T BEAM 1025 DEEP 20m & 22.5m SPAN REINFORCEMENT SHEET 2

STATUS	FILE				
FOR PUBLICATION	0242S104				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:20		S1.04			0

DOCUMENT: P:\271\271042\pdn\0242S104.dwn

GRAPHIC SCALES
200 mm
100
50
10 mm
0

ORIGINAL SHEET SIZE A3 [420x297]

NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.

1. SPECIFIED CONCRETE COMPRESSIVE STRENGTHS

PRECAST BEAMS AT TRANSFER – PRETENSIONING	– 30MPa
PRECAST BEAMS AT 28 DAYS	– 50MPa
INSITU CONCRETE (DECK SLAB, DIAPHRAGMS) AT 28 DAYS	– 40MPa

2. REINFORCEMENT & PRESTRESSING

a. ALL REINFORCEMENT SHALL BE GRADE 500E TO AS/NZS4671
b. ALL PRESTRESSING STRAND SHALL BE 15.2mm DIAMETER LOW RELAXATION STRESS RELIEVED SUPER GRADE 7 WIRE STRAND COMPLYING WITH AS/NZS 4672 OR BS 5896
c. MINIMUM BREAKING LOAD OF STRAND 250 kN
d. FORCE IN STRANDS IMMEDIATELY PRIOR TO TRANSFER SHALL BE 185 kN. RELAXATION PRIOR TO TRANSFER SHALL BE ACCOUNTED FOR IN THE JACKING FORCE REQUIRED TO ACHIEVE THIS VALUE. TYPICALLY RELAXATION PRIOR TO TRANSFER IS IN THE ORDER OF 1%. WHERE CURING AT ELEVATED TEMPERATURES IS EMPLOYED, HIGHER RELAXATION RATES MAY RESULT AND DUE ALLOWANCE FOR THIS SHALL BE MADE BY THE PRECASTER IN DETERMINING THE JACKING FORCE REQUIRED TO ACHIEVE THE MINIMUM FORCE STATED ABOVE.
e. ENDS OF STRAND SHALL BE CUT FLUSH AND PROTECTED WITH A MINIMUM OF 5mm EPOXY MORTAR.
f. UPWARD DEFLECTION OF GIRDERS DUE TO PRESTRESS IS GIVEN IN THE BEAM HOG TABLE. THESE ARE ESTIMATES ONLY. ESTIMATES ARE MADE FOR HOG AT TRANSFER AND AT 100 DAYS WITH DUE ALLOWANCE FOR INCREASE IN HOG DUE TO CREEP OF CONCRETE UNDER SUSTAINED LOAD.
g. COMPONENTS PREFIXED RB ARE REIDBAR ITEMS. REIDBAR SHALL BE GRADE 500E TO AS/NZS4671.

3. CONCRETE COVER (MINIMUM)

COVER TO ALL PRESTRESSING COMPONENTS	– 40mm
COVER TO ALL REINFORCEMENT EXPOSED SURFACE	– 40mm
COVER TO ALL REINFORCEMENT INTERNAL SURFACE	– 30mm
COVER ADJACENT TO CORED HOLES	– 30mm
COVER TO BRIDGE DECK & ALL CAST INSITU CONCRETE	– 50mm
COVER TO BARRIER FIXING STEEL (WITHIN BARRIER)	– 50mm

4. DESIGN LOADING

HN–HO–72 (INCLUDING SLS LIVE LOAD FACTOR OF 1.35)

5. SPECIFICATION

THIS DESIGN IS BASED ON LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2006)

6. TOLERANCES

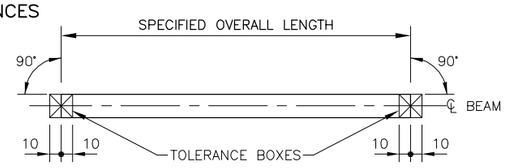


DIAGRAM A
N.T.S.

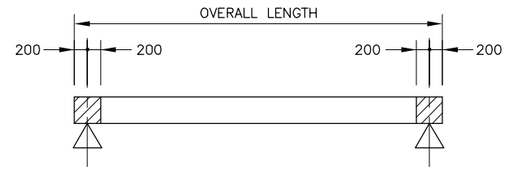
6.1. DIMENSIONS AT TIME OF ERECTION

ACTUAL OVERALL LENGTH AND SQUARENESS
a. THE UNDERSIDE OF THE BEAM FOR THE END 700mm SHALL BE TRUE PLANE.
b. THE BEAM END SURFACES SHALL LIE WITHIN THE "TOLERANCE BOXES" SHOWN IN DIAGRAM A
c. PLANE SURFACE, DEVIATION FROM A 1.5m STRAIGHT EDGE 5mm
d. BEAM HOGGING (SEE SPECIFICATION)
e. CROSS SECTION DIMENSIONS UP TO 0.5m ..... ±5mm
f. CROSS SECTION DIMENSIONS 0.5m TO 2.0m ..... ±10mm
g. HORIZONTAL BOW OF LONGITUDINAL AXIS ..... ±20mm

6.1. DIMENSIONS AT TIME OF ERECTION
a. LONGITUDINAL STEEL ARRANGEMENT ..... ±10mm
b. LOCATION OF AN ITEM IN RELATION TO ANY OTHER ITEM WITHIN ITS GROUP OR TO THE MIDPOINT OF THE BEAM ENDS ..... ±10mm
c. PRETENSIONING PRESTRESSING STRANDS IN ANY DIRECTION ..... ±5mm

7. HANDLING

EXTREMES OF VERTICAL LIFTING POINTS OR GROUND SUPPORT SHOWN HATCHED.
CENTRAL SUPPORT POSITION AS SHOWN IS PREFERRED (BEAM IN UPRIGHT POSITION AT ALL TIMES)



BEAM SUPPORT & LIFTING POINTS
N.T.S.

8. METHOD OF MANUFACTURE

BEAMS SHALL BE MANUFACTURED UNDER FACTORY CONDITIONS

9. SURFACE FINISHES

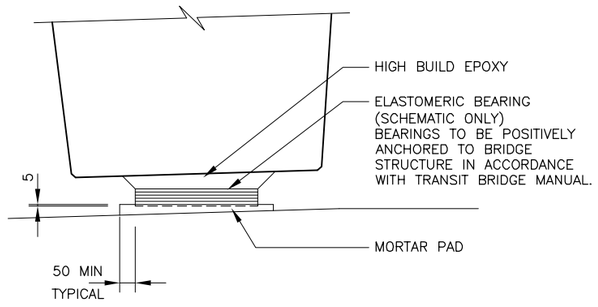
BEAMS

TOP SURFACE OF FLANGE	TYPE B CONSTRUCTION JOINT
IN DIRECT CONTACT WITH INSITU DIAPHRAGM	TYPE B CONSTRUCTION JOINT
HIDDEN FORMED SURFACE	F1
ALL OTHER FORMED SURFACE	F4

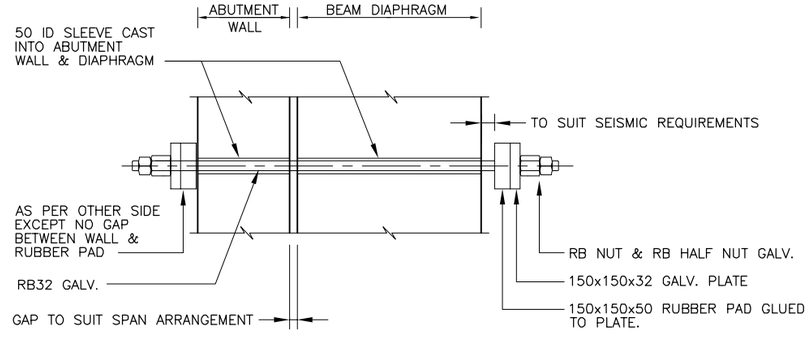
DIAPHRAGM SURFACE FINISH TO BE BASIC FINISH IN ACCORDACE WITH LTNZ STANDARD BEAM SPECIFICATION (2006)

10. BEARING DESIGN DATA

SPAN (m)	REACTION (kN)			ROTATION (x 10^{-3} RADIANS)	
	DEAD LOAD (UNFACTORED)	LIVE LOAD (1.35 HN x I)	OVERLOAD (HO x I)	LIVE LOAD (1.35 HN x I)	OVERLOAD (HO x I)
20	430	465	570	1.7	2.0
22.5	475	485	590	2.2	2.5



OPTION FOR BEARING ARRANGEMEMT
1:20



OPTION FOR LINKAGE BAR DETAIL
1:20

200 mm
100
50
10 mm
0

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM 1025 DEEP – 20m & 22.5m SPAN UNIT DATA

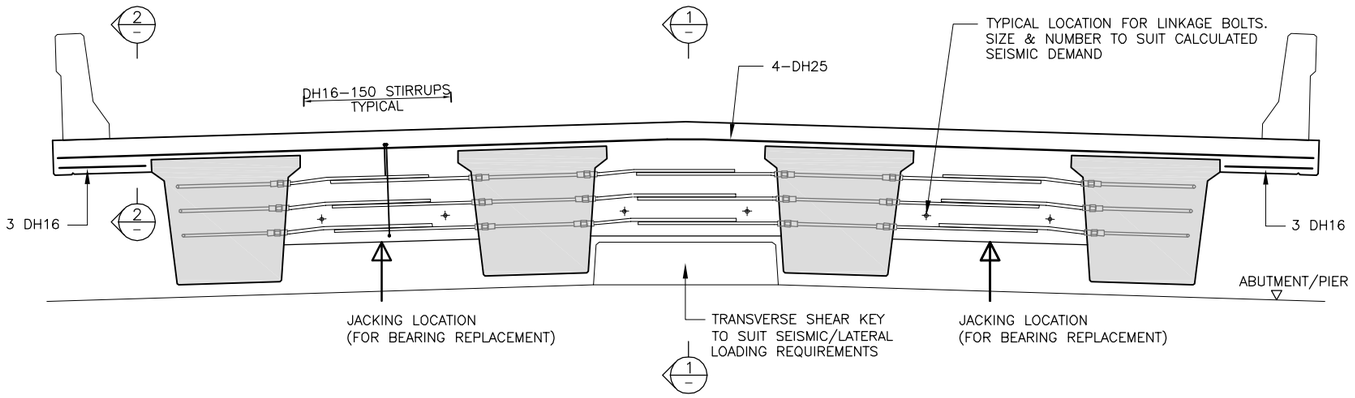
STATUS	FILE				
FOR PUBLICATION	0242S105				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
AS SHOWN		S1.05			0

DOCUMENT: P:\271\0710042\cad\0242S105.dwn

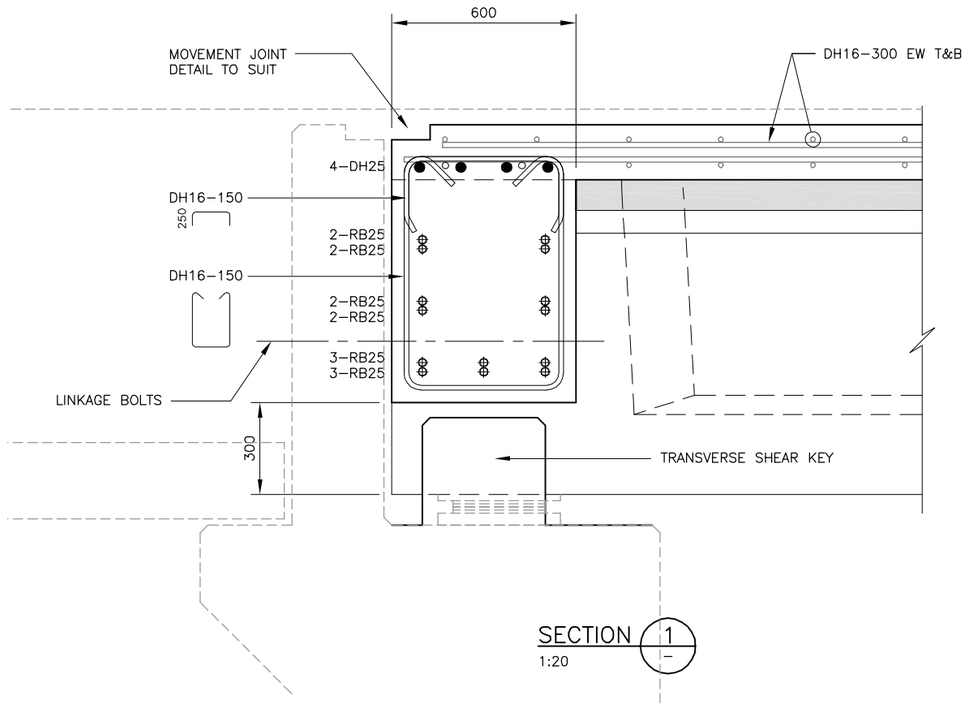
GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

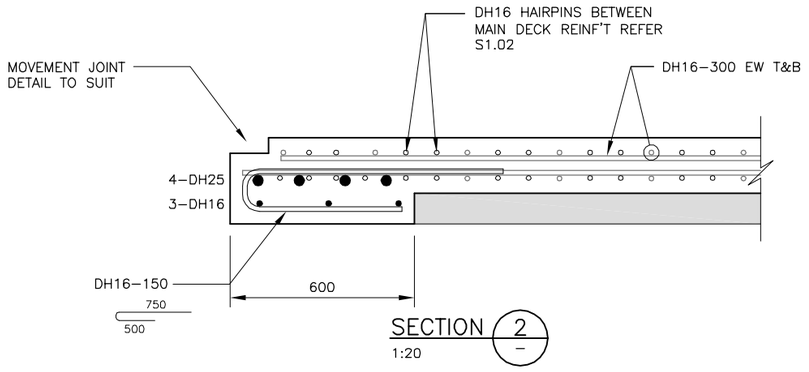
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



ELEVATION INSITU DIAPHRAGM
1:50



SECTION 1
1:20



SECTION 2
1:20

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM 1025 DEEP – 20m & 22.5m SPAN INSITU END DIAPHRAGM DETAILS

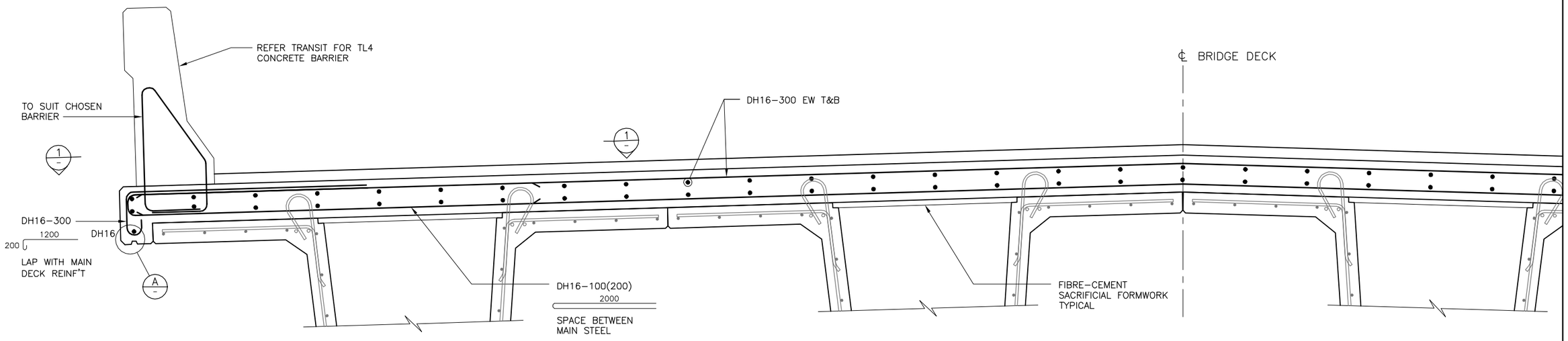
STATUS	FILE				
FOR PUBLICATION	0242S106				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:50, 1:20		S1.06			0

GRAPHIC SCALES
200 mm
100
50
10 mm
0

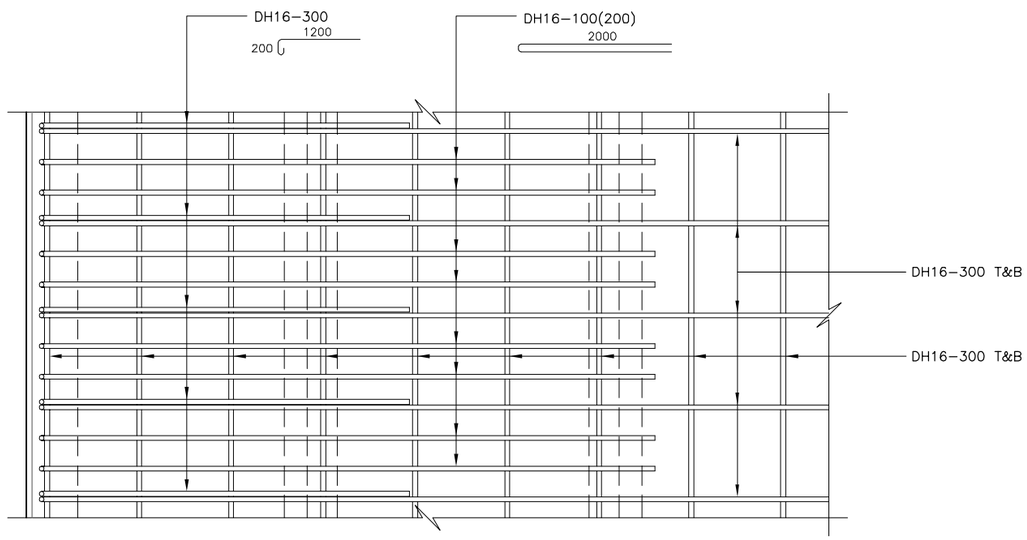
ORIGINAL SHEET SIZE A3 [420x297]

UNCONTROLLED WHEN PRINTED

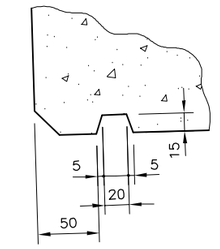
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



TYPICAL BRIDGE DECK SECTION
1:20



SECTION PLAN 1/–
1:20



DRIP DETAIL A/–
1:5

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

SUPER T BEAM BRIDGE DECK – 20m & 22.5m SPAN DECK DETAILS

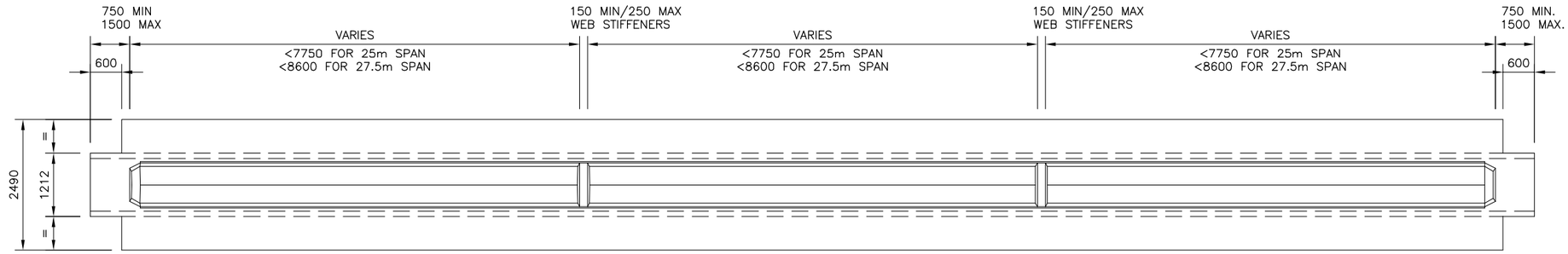
STATUS	FILE				
FOR PUBLICATION	0242S107				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:20 1:5		S1.07			0

DOCUMENT: D:\27\271024\CAD\0242S107.dwg

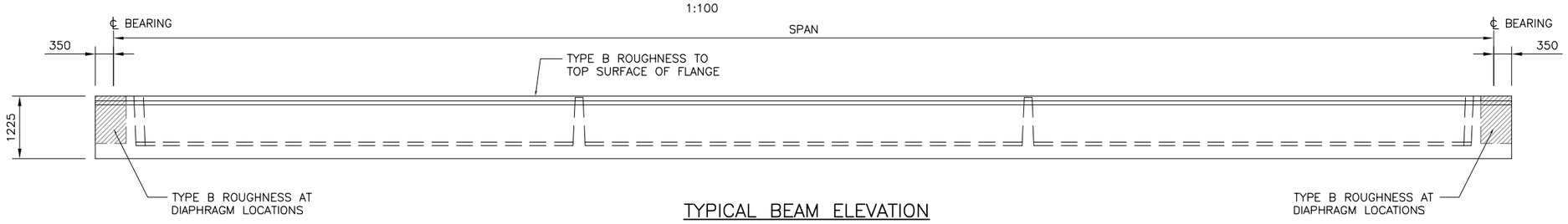
GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

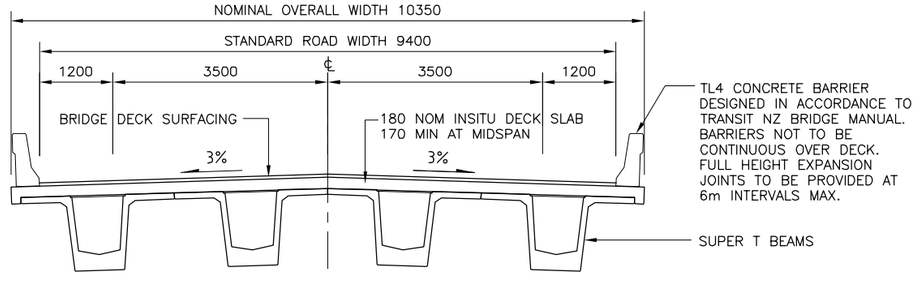
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



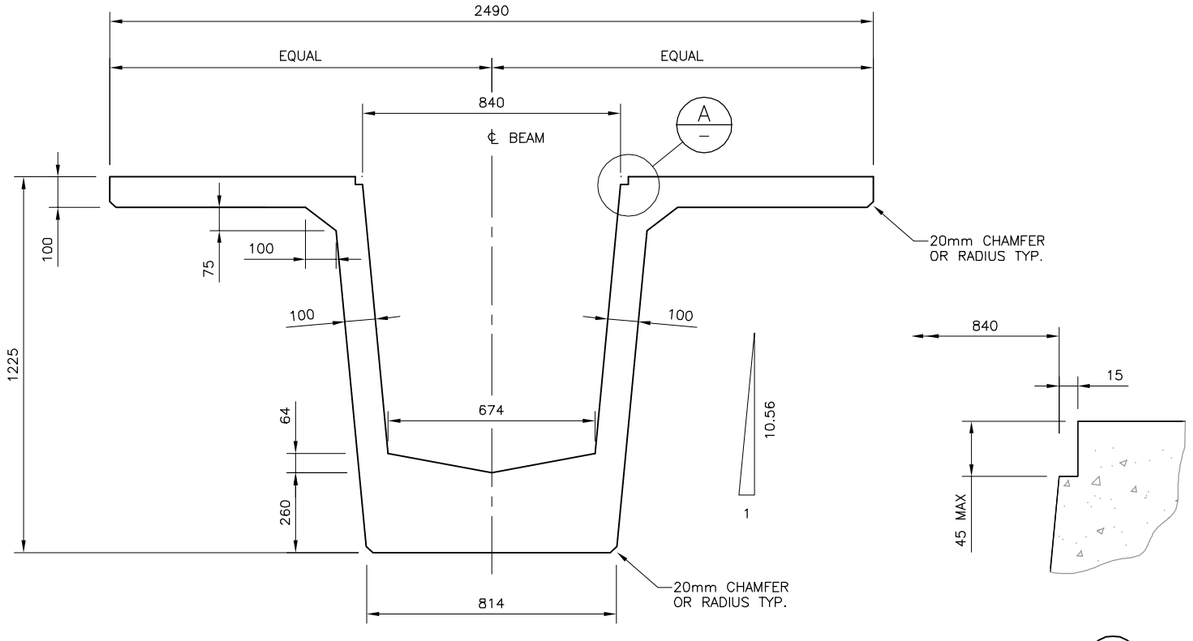
TYPICAL BEAM PLAN
1:100



TYPICAL BEAM ELEVATION
1:100



TYPICAL BRIDGE SECTION
1:100



TYPICAL UNIT SECTION
1:20

DETAIL A
1:5

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED	AS SHOWN		

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM 1225 DEEP – 25m & 27.5m SPAN ARRANGEMENT AND DIMENSIONS

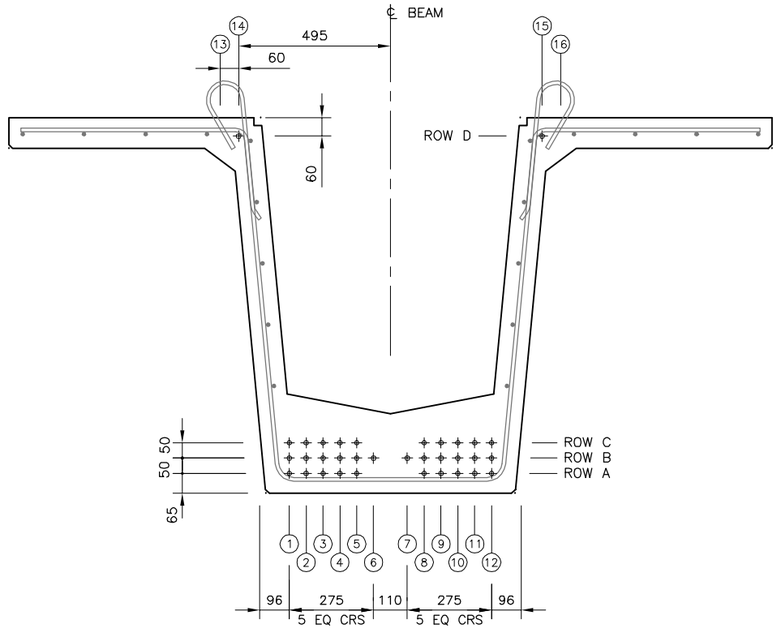
STATUS	FILE				
FOR PUBLICATION	0242S111				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:100 1:20 1:5		S1.11			0

GRAPHIC SCALES: 200 mm, 100, 50, 10 mm, 0

DOCUMENT: P:\271\310242\CAD\0242S111.dwg

ORIGINAL SHEET SIZE A3 [420x297]

NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



TYPICAL STRAND ARRANGEMENT

1:20

STRAND NO.	DEBOND LENGTH 'L' mm															STRANDS PER ROW
	13	14	1	2	3	4	5	6	7	8	9	10	11	12	15	16	
ROW D		0													0		2
ROW C			0	2500	0	0	0			0	0	0	2500	0			10
ROW B			0	0	0	6500	0	0	0	0	6500	0	0	0			12
ROW A			0	2500	0	0	0			0	0	0	2500	0			10
														TOTAL PER BEAM			34

NOTE: THE MANUFACTURERS CAN CHOOSE TO HAVE 2 STRANDS IN ROW D AND STRESSED TO THE VALUE SPECIFIED IN CLAUSE 2.d ON DRAWING S1.15 OR 4 STRANDS IN ROW D AND STRESSED TO 50% OF THE VALUE SPECIFIED IN CLAUSE 2.d ON DRAWING S1.15

STRAND LAYOUT AND DEBONDING SCHEDULE

PRESTRESSING DETAILS – 25m SPAN

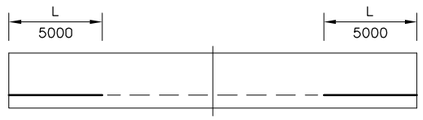
TYPICAL STRAND ARRANGEMENT

1:20

LEGEND:

0 PRESTRESS STRAND BONDED FOR FULL LENGTH OF BEAM (NO DEBONDING)

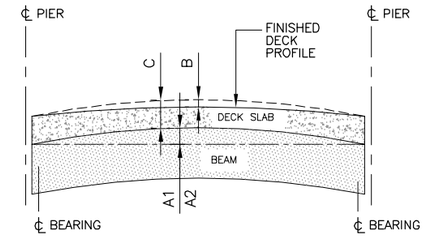
5000 PRESTRESS STRAND IS DEBONDED AT THE SPECIFIED LENGTH 'L' (5000 MEASURED FROM CONCRETE FACE) EACH END OF BEAM, AS INDICATED BELOW.



TYPICAL BEAM

STRAND NO.	DEBOND LENGTH 'L' mm															STRANDS PER ROW
	13	14	1	2	3	4	5	6	7	8	9	10	11	12	15	16	
ROW D	0	0													0	0	4
ROW C			0	7000	0	0	0	0	0	0	0	0	7000	0			12
ROW B			0	0	0	3000	0	3000	3000	0	3000	0	0	0			12
ROW A			0	7000	0	0	0	0	0	0	0	0	7000	0			12
														TOTAL PER BEAM			40

STRAND LAYOUT AND DEBONDING SCHEDULE



BEAM PRECAMBER

KEY	DESCRIPTION	SPAN (m)	
		25	27.5
A1	ESTIMATE HOG OF BEAM AT TRANSFER	+20mm	+30mm
A2	ESTIMATED HOG AT 100 DAYS AFTER TRANSFER	+40mm	+50mm
B	ESTIMATED INSTANT AMENDED DEFLECTION AT CASTING OF TOP SLAB	+20mm	+25mm
C	PERMITTED TOP SLAB THICKNESS AT MIDSPAN	180mm ±10mm	

PRESTRESSING DETAILS – 27.5m SPAN

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

SUPER T BEAM 1225 DEEP – 25m & 27.5m SPAN PRESTRESSING DETAILS

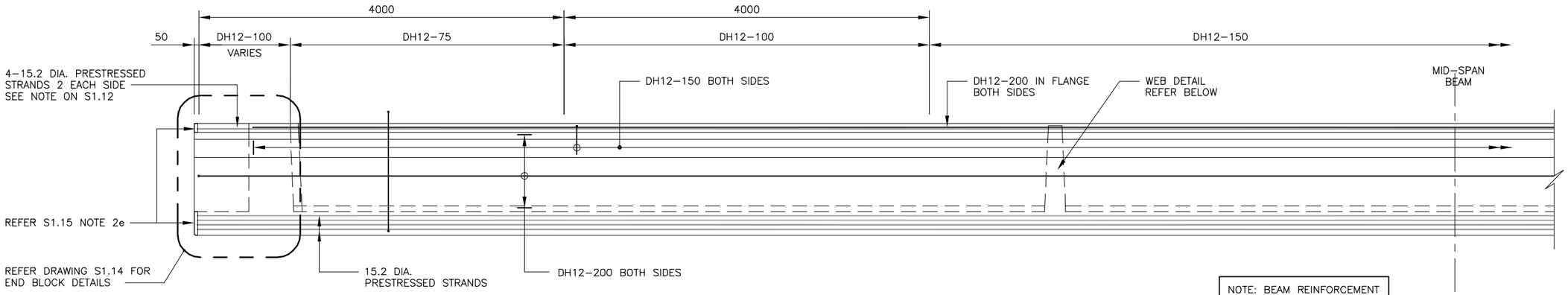
STATUS	FILE				
FOR PUBLICATION	0242S112				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:20		S1.12			0

DOCUMENT: P:\271\2710242\CAD\0242S112.dwn

GRAPHIC SCALES: 200 mm, 100, 50, 10 mm, 0

ORIGINAL SHEET SIZE A3 [420x297]

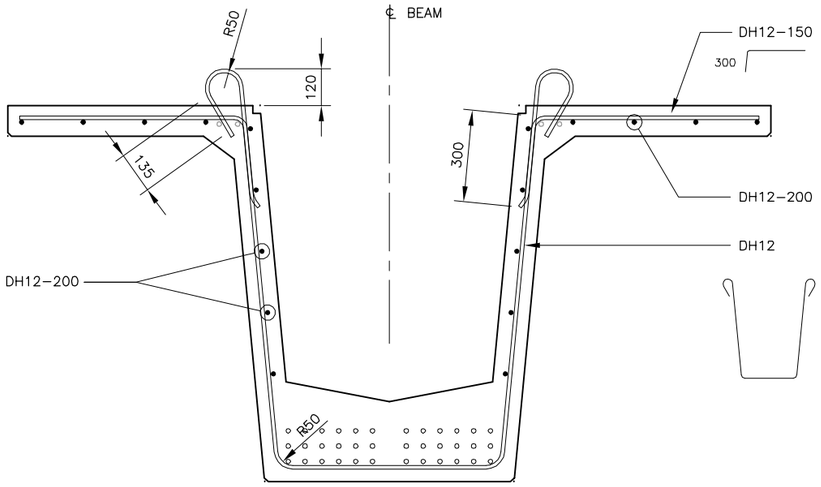
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



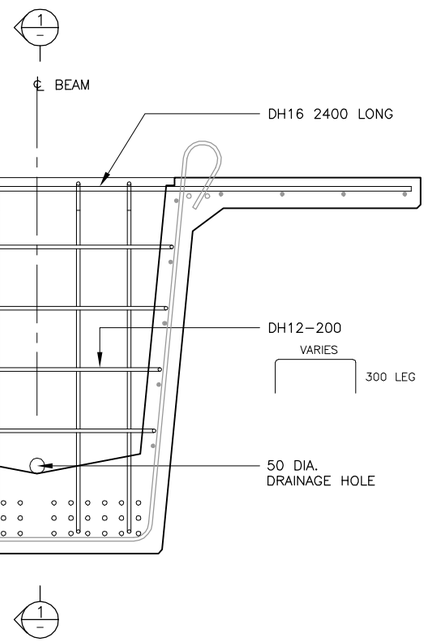
NOTE: BEAM REINFORCEMENT IS SYMMETRICAL ABOUT ℄

BEAM ELEVATION
1:50

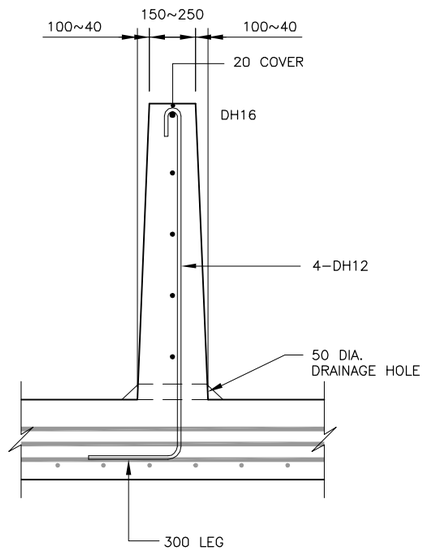
NOTES:
1. REFER DRAWING S0.03 FOR CONCRETE NOTES.



TYPICAL SECTION
1:20



TYPICAL WEB ELEVATION
1:20



TYPICAL SECTION 1/–
1:20

AMENDMENT		APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

SUPER T BEAM 1225 DEEP – 25m & 27.5m SPAN REINFORCEMENT SHEET 1

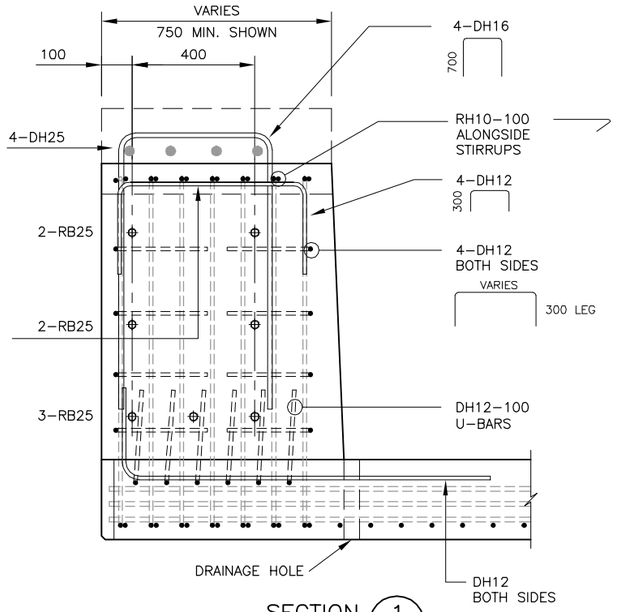
STATUS	FILE				
FOR PUBLICATION	0242S113				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:50 1:20		S1.13			0

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

DOCUMENT: P:\271\2710242\CAD\0242S113.dwg

NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



SECTION 1
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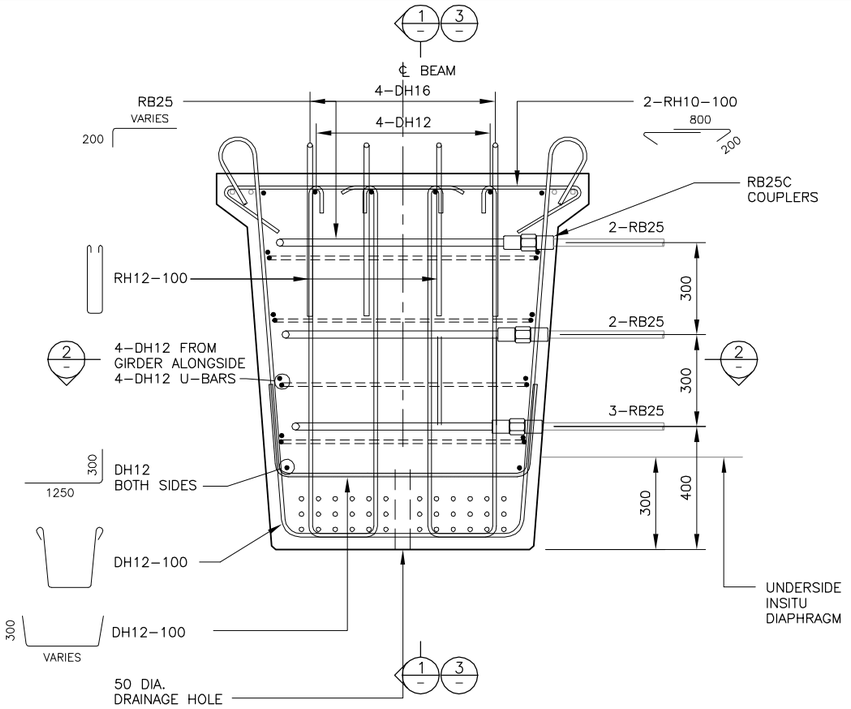
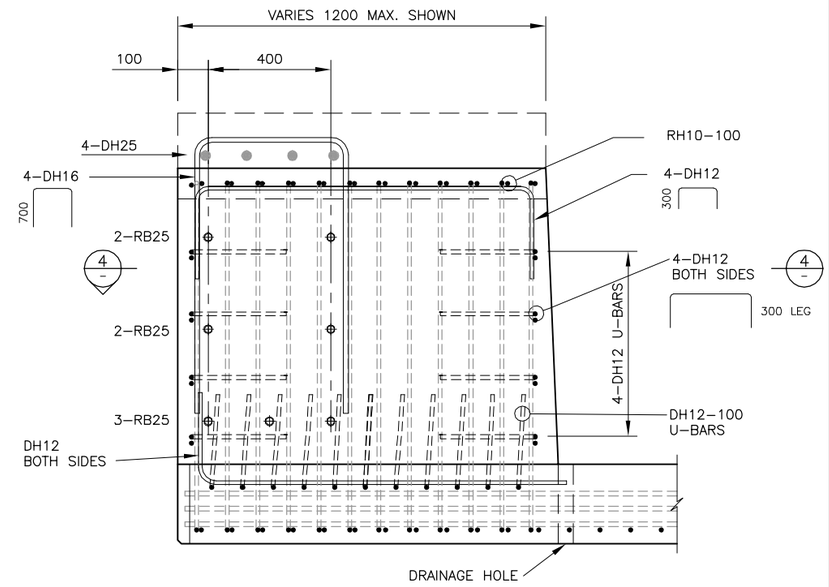
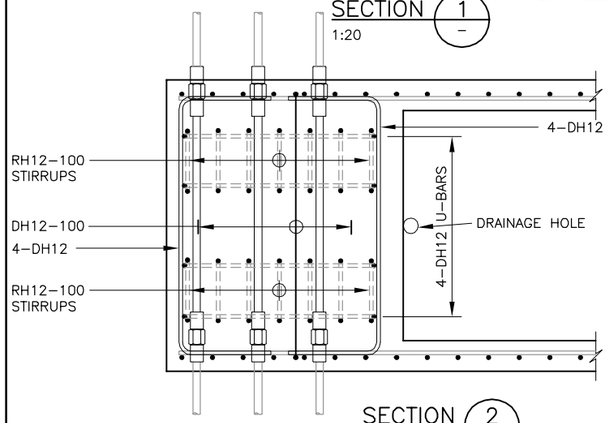


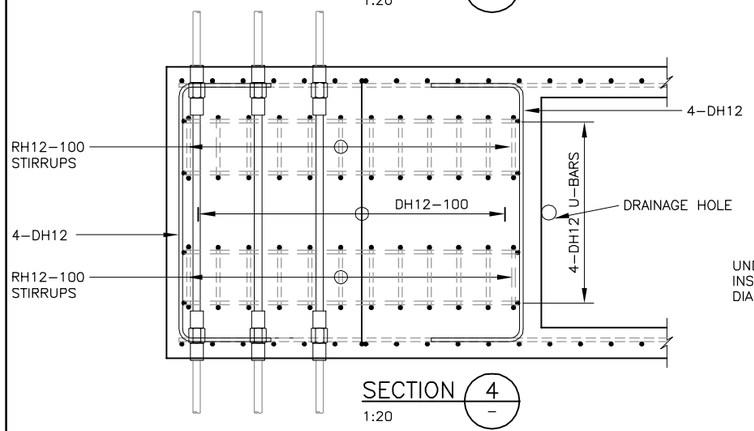
EXTERNAL BEAM END BLOCK
1:20



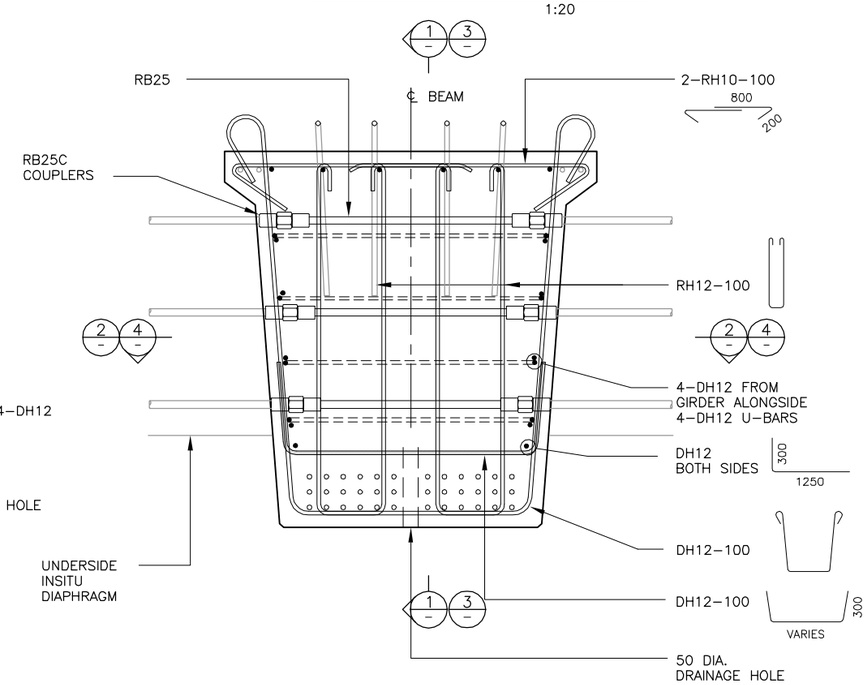
SECTION 3
1:20



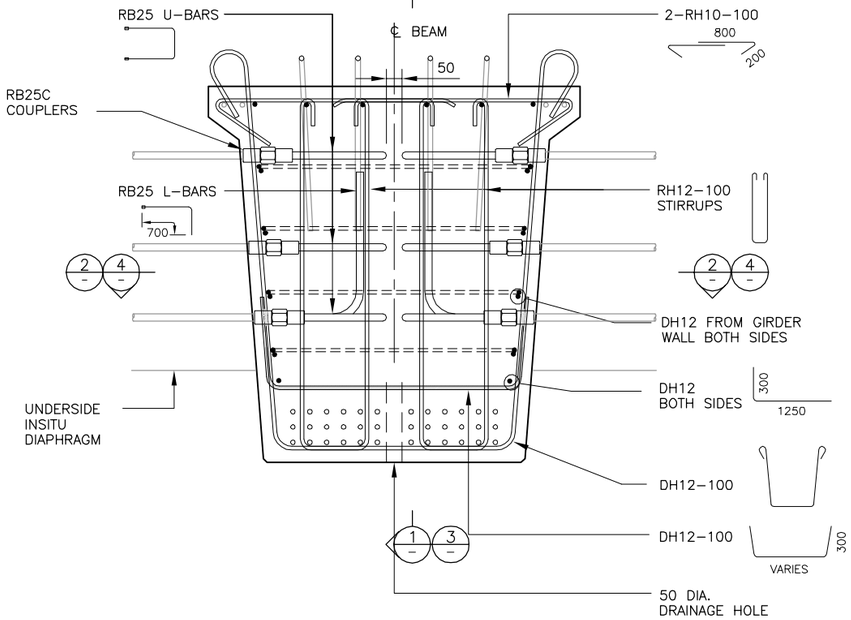
SECTION 2
1:20



SECTION 4
1:20



INTERNAL BEAM END BLOCK
1:20



ALTERNATE INTERNAL
BEAM END BLOCK 1:20

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM 1225 DEEP – 25m & 27.5m SPAN REINFORCEMENT SHEET 2

STATUS	FILE				
FOR PUBLICATION	0242S114				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:20		S1.14			0

GRAPHIC SCALES: 200 mm, 100, 50, 10 mm, 0

ORIGINAL SHEET SIZE A3 [420x297]

DOCUMENT: P:\771\37110242\CAD\0242S114.dwg

1. SPECIFIED CONCRETE COMPRESSIVE STRENGTHS

PRECAST BEAMS AT TRANSFER – PRETENSIONING	– 30MPa
PRECAST BEAMS AT 28 DAYS	– 50MPa
INSITU CONCRETE (DECK SLAB, DIAPHRAGMS) AT 28 DAYS	– 40MPa

2. REINFORCEMENT & PRESTRESSING

a. ALL REINFORCEMENT SHALL BE GRADE 500E TO AS/NZS4671
b. ALL PRESTRESSING STRAND SHALL BE 15.2mm DIAMETER LOW RELAXATION STRESS RELIEVED SUPER GRADE 7 WIRE STRAND COMPLYING WITH AS/NZS 4672 OR BS 5896
c. MINIMUM BREAKING LOAD OF STRAND 250 kN
d. FORCE IN STRANDS IMMEDIATELY PRIOR TO TRANSFER SHALL BE 185 kN. RELAXATION PRIOR TO TRANSFER SHALL BE ACCOUNTED FOR IN THE JACKING FORCE REQUIRED TO ACHIEVE THIS VALUE. TYPICALLY RELAXATION PRIOR TO TRANSFER IS IN THE ORDER OF 1%. WHERE CURING AT ELEVATED TEMPERATURES IS EMPLOYED, HIGHER RELAXATION RATES MAY RESULT AND DUE ALLOWANCE FOR THIS SHALL BE MADE BY THE PRECASTER IN DETERMINING THE JACKING FORCE REQUIRED TO ACHIEVE THE MINIMUM FORCE STATED ABOVE.
e. ENDS OF STRAND SHALL BE CUT FLUSH AND PROTECTED WITH A MINIMUM OF 5mm EPOXY MORTAR.
f. UPWARD DEFLECTION OF GIRDERS DUE TO PRESTRESS IS GIVEN IN THE BEAM HOG TABLE. THESE ARE ESTIMATES ONLY. ESTIMATES ARE MADE FOR HOG AT TRANSFER AND AT 100 DAYS WITH DUE ALLOWANCE FOR INCREASE IN HOG DUE TO CREEP OF CONCRETE UNDER SUSTAINED LOAD.
g. COMPONENTS PREFIXED RB ARE REIDBAR ITEMS. REIDBAR SHALL BE GRADE 500E TO AS/NZS4671.

3. CONCRETE COVER (MINIMUM)

COVER TO ALL PRESTRESSING COMPONENTS	– 40mm
COVER TO ALL REINFORCEMENT EXPOSED SURFACE	– 40mm
COVER TO ALL REINFORCEMENT INTERNAL SURFACE	– 30mm
COVER ADJACENT TO CORED HOLES	– 30mm
COVER TO BRIDGE DECK & ALL CAST INSITU CONCRETE	– 50mm
COVER TO BARRIER FIXING STEEL (WITHIN BARRIER)	– 50mm

4. DESIGN LOADING

HN–HO–72 (INCLUDING SLS LIVE LOAD FACTOR OF 1.35)

5. SPECIFICATION

THIS DESIGN IS BASED ON LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2006)

6. TOLERANCES

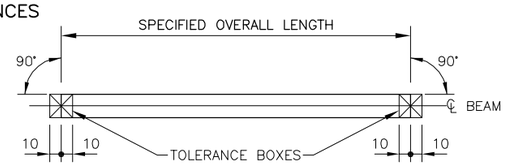


DIAGRAM A
N.T.S.

6.1. DIMENSIONS AT TIME OF ERECTION

ACTUAL OVERALL LENGTH AND SQUARENESS

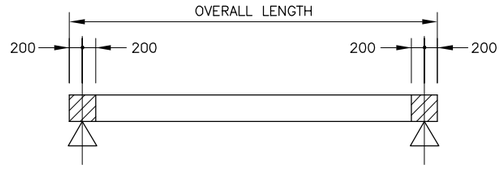
a. THE UNDERSIDE OF THE BEAM FOR THE END 700mm SHALL BE TRUE PLANE.
b. THE BEAM END SURFACES SHALL LIE WITHIN THE "TOLERANCE BOXES" SHOWN IN DIAGRAM A
c. PLANE SURFACE, DEVIATION FROM A 1.5m STRAIGHT EDGE 5mm
d. BEAM HOGGING (SEE SPECIFICATION)
e. CROSS SECTION DIMENSIONS UP TO 0.5m ..... ±5mm
f. CROSS SECTION DIMENSIONS 0.5m TO 2.0m ..... ±10mm
g. HORIZONTAL BOW OF LONGITUDINAL AXIS ..... ±20mm

6.1. DIMENSIONS AT TIME OF ERECTION

a. LONGITUDINAL STEEL ARRANGEMENT ..... ±10mm
b. LOCATION OF AN ITEM IN RELATION TO ANY OTHER ITEM WITHIN ITS GROUP OR TO THE MIDPOINT OF THE BEAM ENDS ..... ±10mm
c. PRETENSIONING PRESTRESSING STRANDS IN ANY DIRECTION ..... ±5mm

7. HANDLING

EXTREMES OF VERTICAL LIFTING POINTS OR GROUND SUPPORT SHOWN HATCHED.
CENTRAL SUPPORT POSITION AS SHOWN IS PREFERRED (BEAM IN UPRIGHT POSITION AT ALL TIMES)



BEAM SUPPORT & LIFTING POINTS
N.T.S.

8. METHOD OF MANUFACTURE

BEAMS SHALL BE MANUFACTURED UNDER FACTORY CONDITIONS

9. SURFACE FINISHES

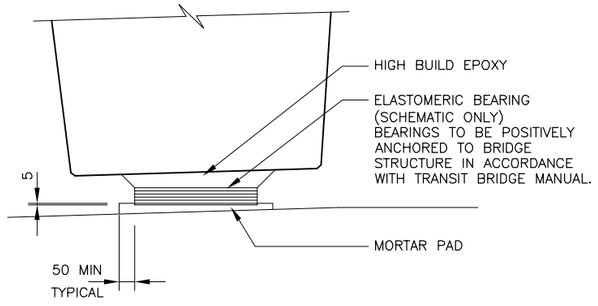
BEAMS

TOP SURFACE OF FLANGE	TYPE B CONSTRUCTION JOINT
IN DIRECT CONTACT WITH INSITU DIAPHRAGM	TYPE B CONSTRUCTION JOINT
HIDDEN FORMED SURFACE	F1
ALL OTHER FORMED SURFACE	F4

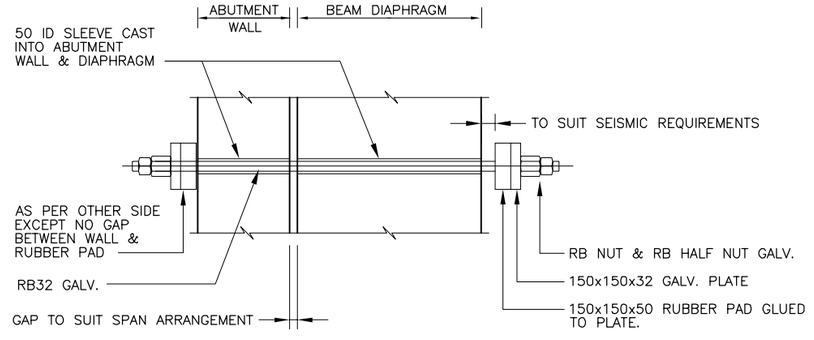
DIAPHRAGM SURFACE FINISH TO BE BASIC FINISH IN ACCORDACE WITH LTNZ STANDARD BEAM SPECIFICATION (2006)

10. BEARING DESIGN DATA

SPAN (m)	REACTION (kN)			ROTATION (x 10^{-3} RADIANS)	
	DEAD LOAD (UNFACTORED)	LIVE LOAD (1.35 HN x I)	OVERLOAD (HO x I)	LIVE LOAD (1.35 HN x I)	OVERLOAD (HO x I)
25	540	510	610	2.0	2.1
27.5	585	530	630	2.5	2.7



OPTION FOR BEARING ARRANGEMEMT
1:20



OPTION FOR LINKAGE BAR DETAIL
1:20

NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM 1225 DEEP – 25m & 27.5m SPAN UNIT DATA

STATUS	FILE				
FOR PUBLICATION	0242S105				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
AS SHOWN		S1.15			0

DOCUMENT: P:\271\0710042\CAD\0242S115.dwn

GRAPHIC SCALES
200 mm
100
50
10 mm
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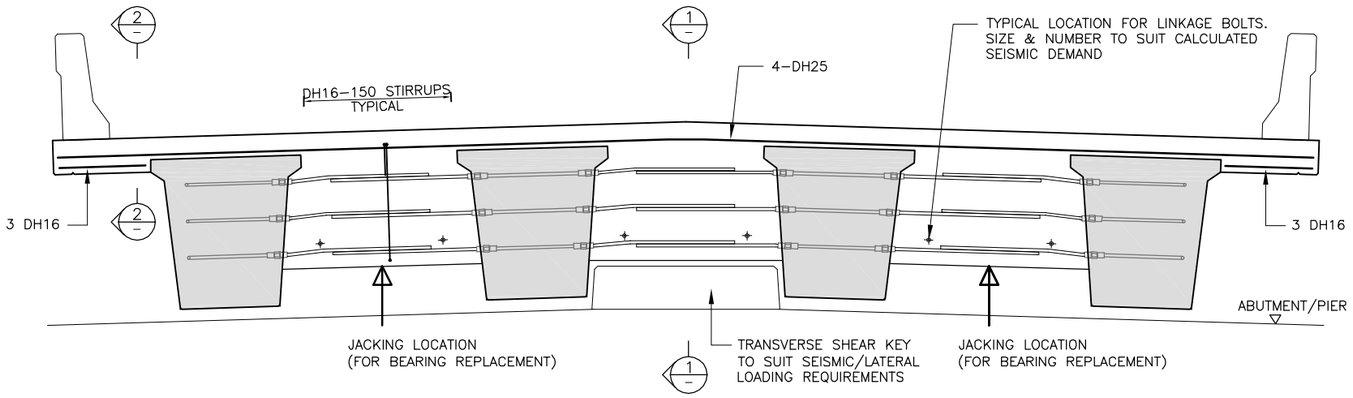
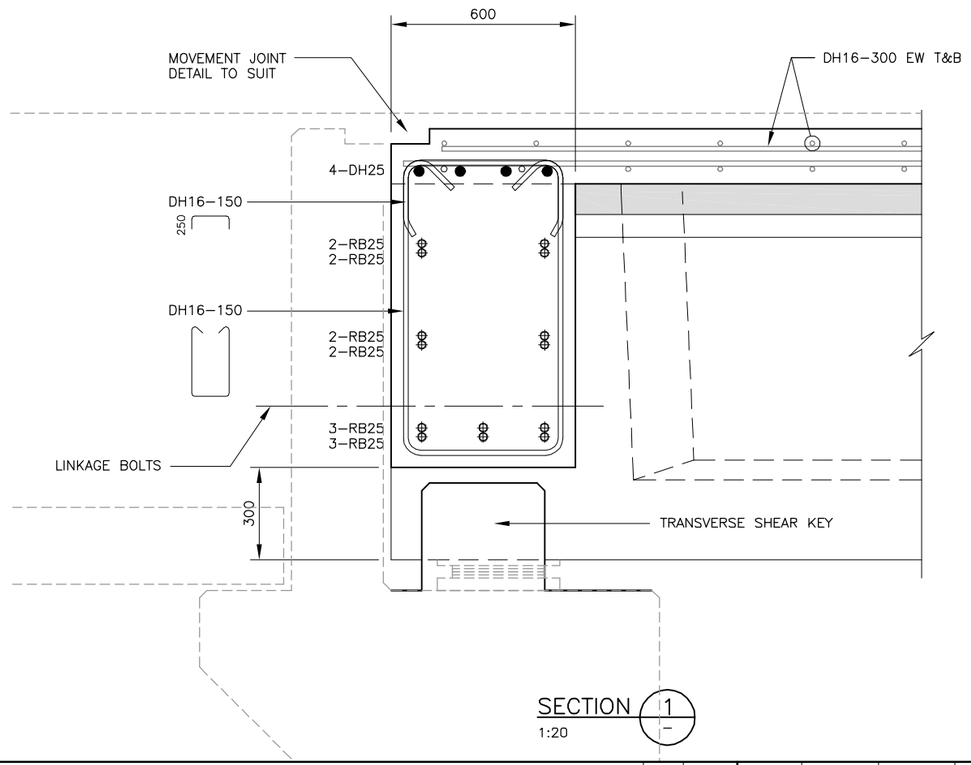
ORIGINAL SHEET SIZE A3 [420x297]

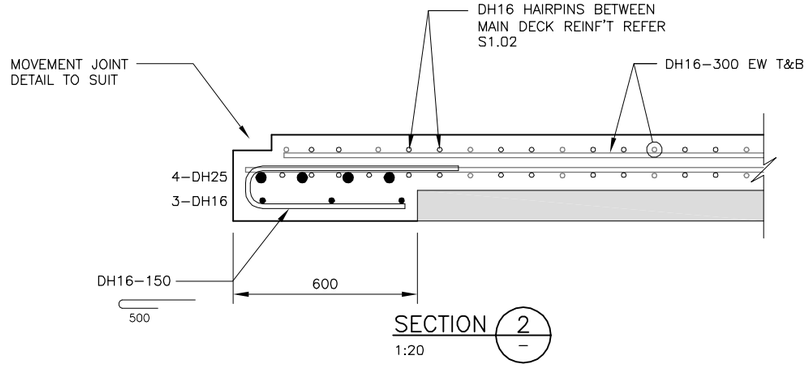
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



ELEVATION INSITU DIAPHRAGM
1:50



SECTION 1
1:20



SECTION 2
1:20

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

SUPER T BEAM 1225 DEEP – 25m & 27.5m SPAN END DIAPHRAGM DETAILS

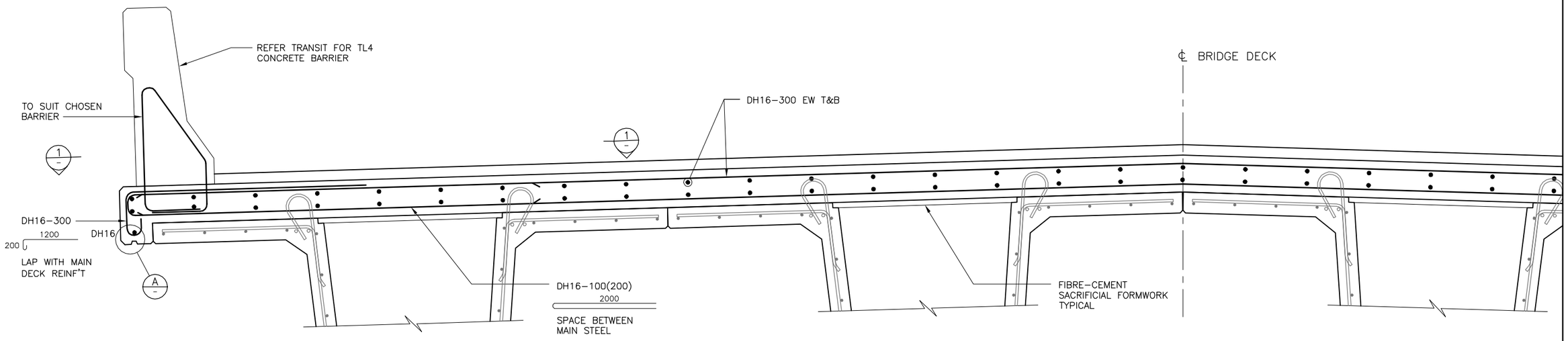
STATUS	FILE				
FOR PUBLICATION	0242S115				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:50 1:20		S1.16			0

DOCUMENT: 0242S115.dwn

GRAPHIC SCALES

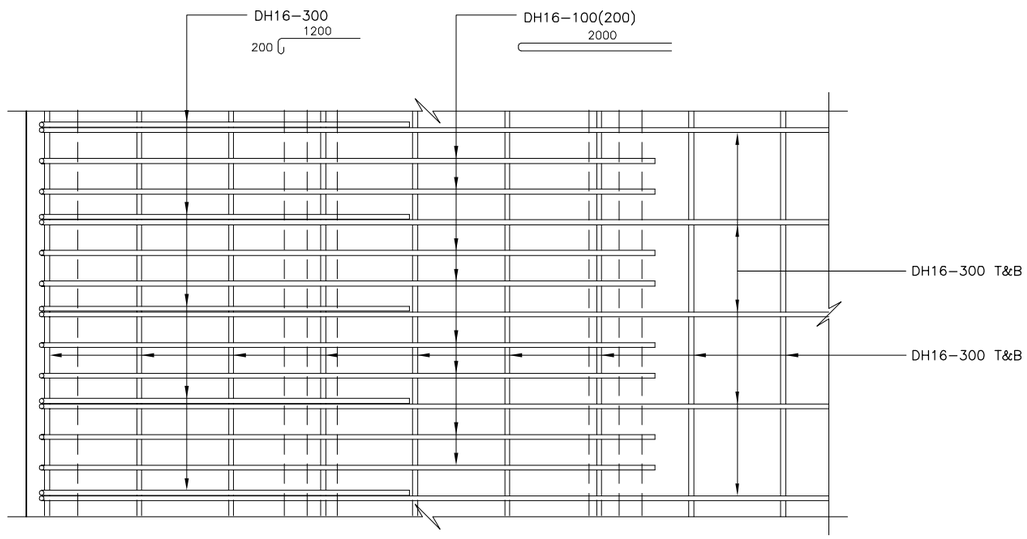
ORIGINAL SHEET SIZE A3 [420x297]

NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.

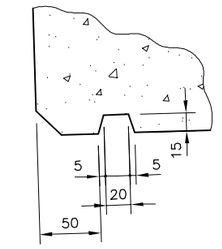


TYPICAL BRIDGE DECK SECTION
1:20

NOTES:
1. REFER DRAWING S0.03 FOR CONCRETE NOTES.



SECTION PLAN 1 –
1:20



DRIP DETAIL A –
1:5

				BY	CHECKED	DATE
			DESIGN			
			DRAWN			
			APPROVED			
AMENDMENT	APP'D	DATE	This drawing and its contents are the property of Land Transport New Zealand. Any unauthorised employment or reproduction, in full or in part, is forbidden.			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

SUPER T BEAM BRIDGE DECK – 25m & 27.5m SPAN DECK DETAILS

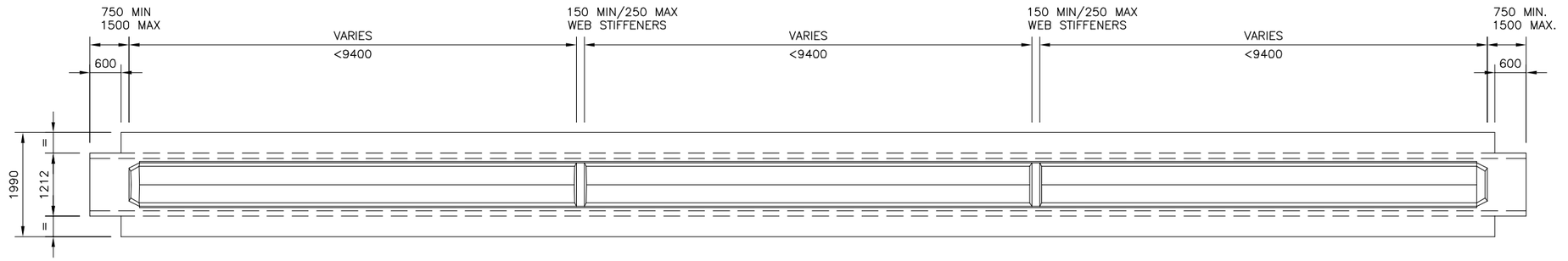
STATUS	FILE				
FOR PUBLICATION	0242S107				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:20 1:5		S1.17			0

DOCUMENT: P:\271\0242\CAD\0242S117.dwn

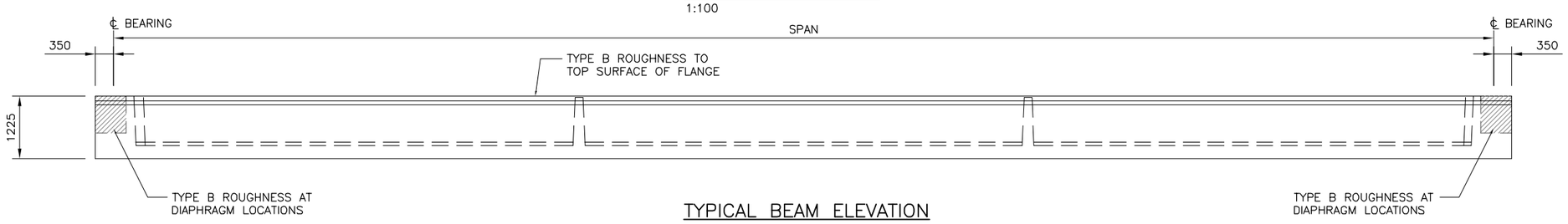
GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

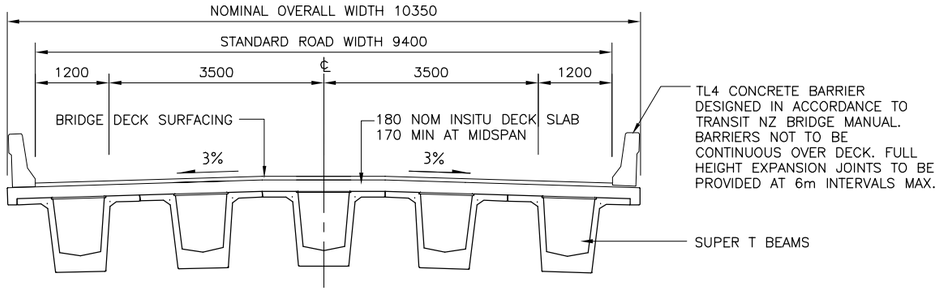
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



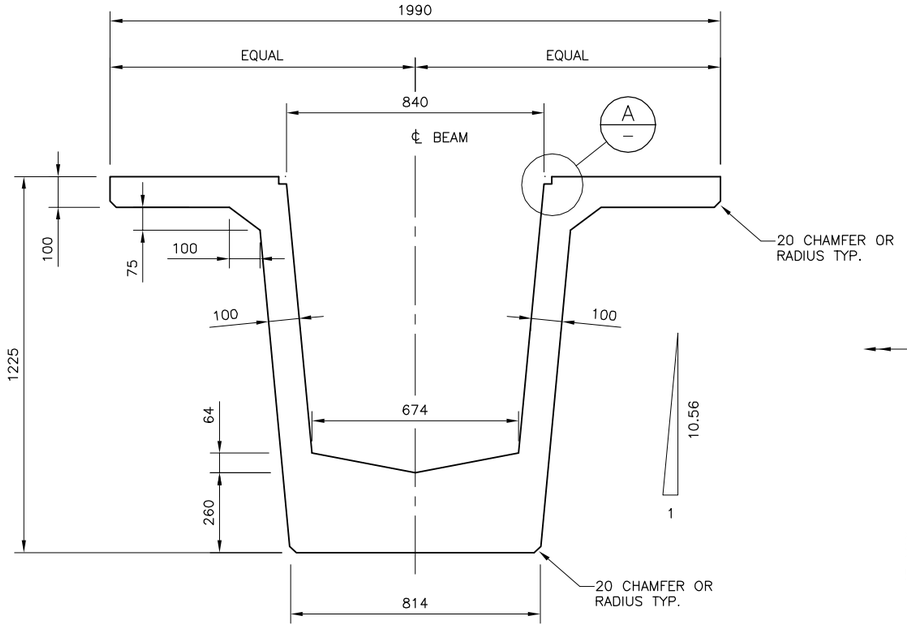
TYPICAL BEAM PLAN
1:100



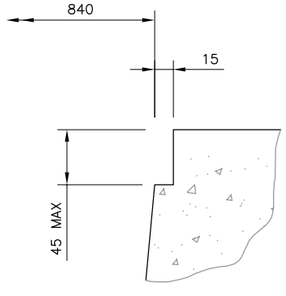
TYPICAL BEAM ELEVATION
1:100



TYPICAL BRIDGE SECTION
1:100



TYPICAL UNIT SECTION
1:20



DETAIL A
1:5

				BY	CHECKED	DATE
			DESIGN			
			DRAWN			
			APPROVED			
AMENDMENT	APP'D	DATE				

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

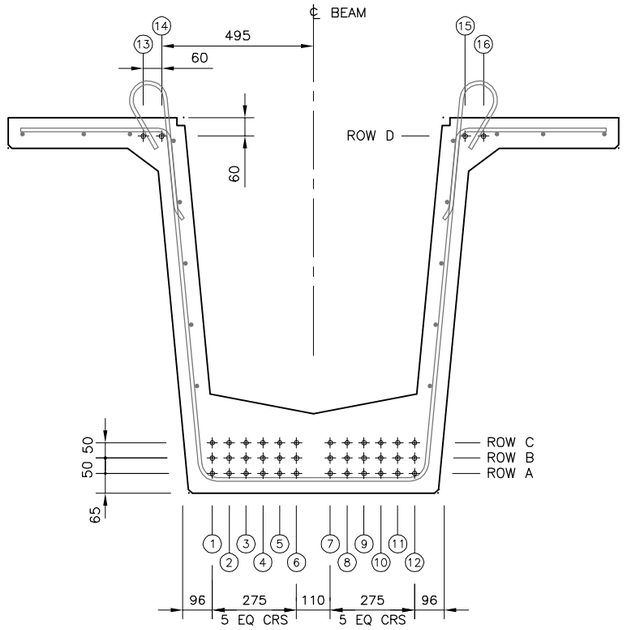
ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM 1225 DEEP – 30m SPAN ARRANGEMENT AND DIMENSIONS

STATUS	FILE				
FOR PUBLICATION	0242S121				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:100 1:20 1:5		S1.21			0

GRAPHIC SCALES
200 mm
100
50
10 mm
0

ORIGINAL SHEET SIZE A3 [420x297]



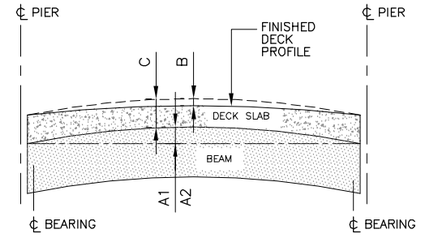
TYPICAL STRAND ARRANGEMENT

1:20

STRAND NO.	DEBOND LENGTH 'L' mm																STRANDS PER ROW
	13	14	1	2	3	4	5	6	7	8	9	10	11	12	15	16	
ROW D	0	0													0	0	4
ROW C			0	2500	0	5000	0	0	0	0	5000	0	2500	0			12
ROW B			0	5000	0	2500	0	0	0	0	2500	0	5000	0			12
ROW A			0	0	0	0	0	0	0	0	0	0	0	0			12
														TOTAL PER BEAM			40

STRAND LAYOUT AND DEBONDING SCHEDULE

NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



BEAM PRECAMBER

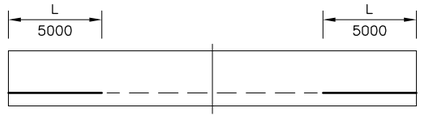
KEY	DESCRIPTION	SPAN (m)
		30
A1	ESTIMATE HOG OF BEAM AT TRANSFER	+35mm
A2	ESTIMATED HOG AT 100 DAYS AFTER TRANSFER	+65mm
B	ESTIMATED INSTANT AMENDED DEFLECTION AT CASTING OF TOP SLAB	+30mm
C	PERMITTED TOP SLAB THICKNESS AT MIDSPAN	180mm ±10mm

PRESTRESSING DETAILS 30m SPAN

LEGEND:

0 PRESTRESS STRAND BONDED FOR FULL LENGTH OF BEAM (NO DEBONDING)

5000 PRESTRESS STRAND IS DEBONDED AT THE SPECIFIED LENGTH 'L' (5000 MEASURED FROM CONCRETE FACE) EACH END OF BEAM, AS INDICATED BELOW.



TYPICAL BEAM

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

SUPER T BEAM 1225 DEEP – 30m SPAN PRESTRESSING DETAILS

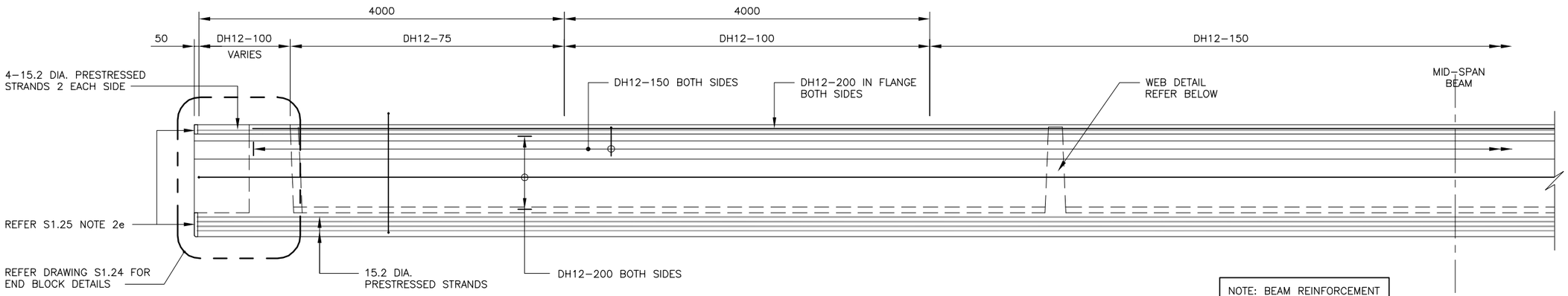
STATUS	FILE				
FOR PUBLICATION	0242S122				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:20		S1.22			0

DOCUMENT: P:\271\2710242\CAD\0242S122.dwn

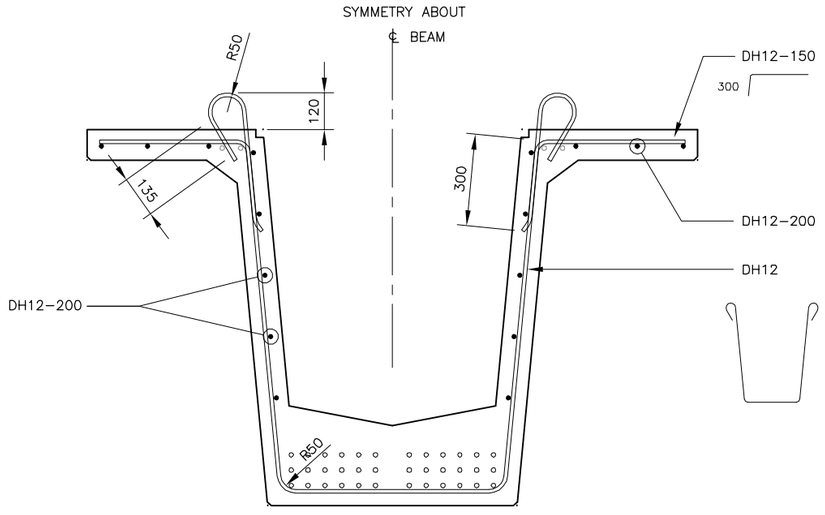
GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

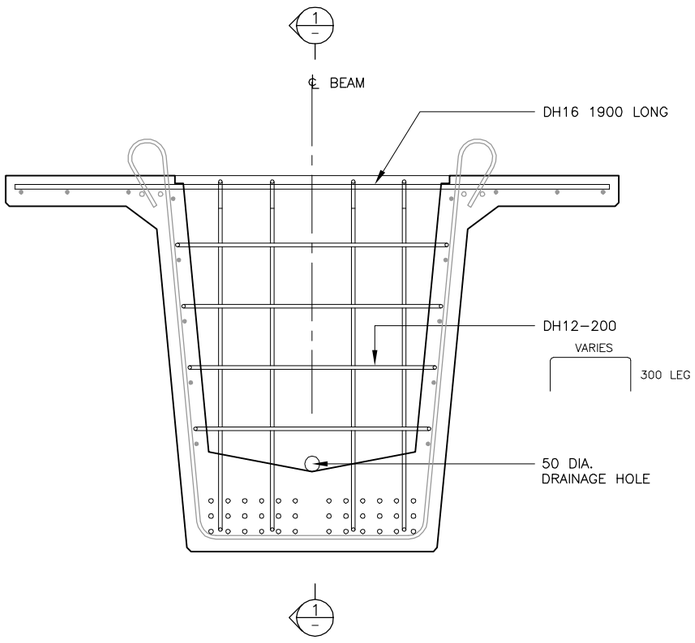
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



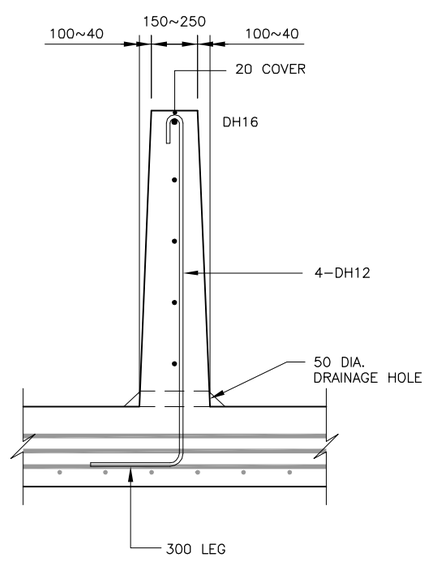
BEAM ELEVATION
1:50



TYPICAL SECTION
1:20



TYPICAL WEB ELEVATION
1:20



TYPICAL SECTION 1 –
1:20

				BY	CHECKED	DATE
			DESIGN			
			DRAWN			
			APPROVED			
AMENDMENT	APP'D	DATE	This drawing and its contents are the property of Land Transport New Zealand. Any unauthorised employment or reproduction, in full or in part, is forbidden.			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM 1225 DEEP – 30m SPAN REINFORCEMENT SHEET 1

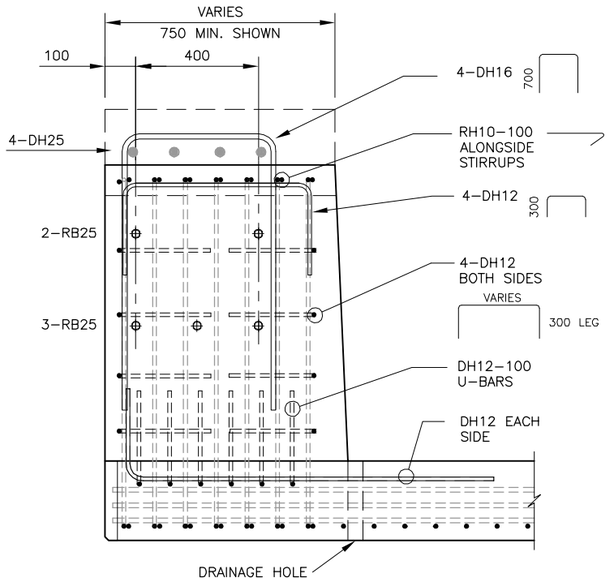
STATUS	FILE				
FOR PUBLICATION	0242S123				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:50 1:20		S1.23			0

GRAPHIC SCALES
200 mm
100
50
10 mm
0

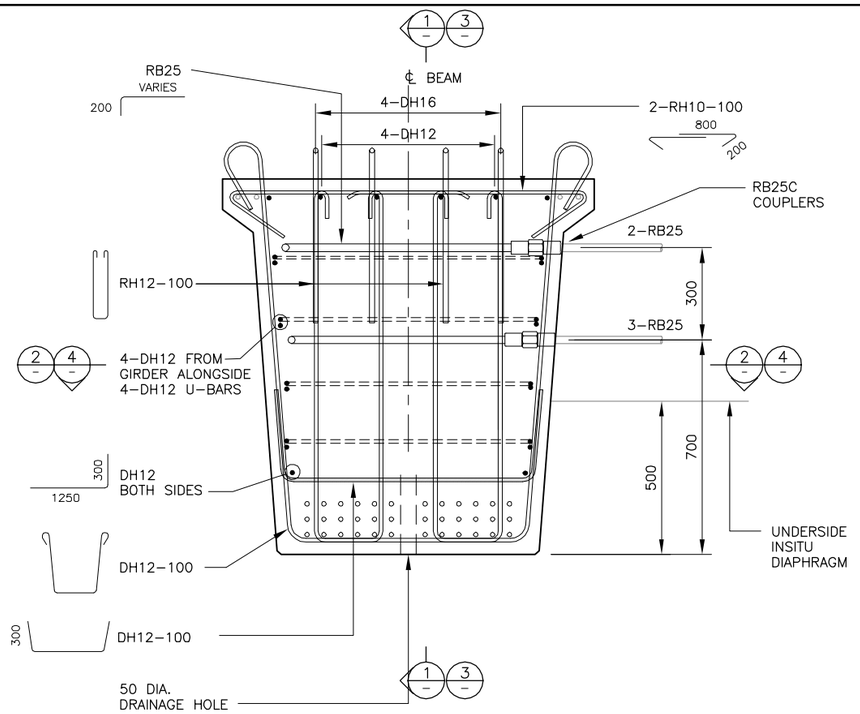
ORIGINAL SHEET SIZE A3 [420x297]

DOCUMENT: P:\271\270110242\CAD\0242S123.dwg

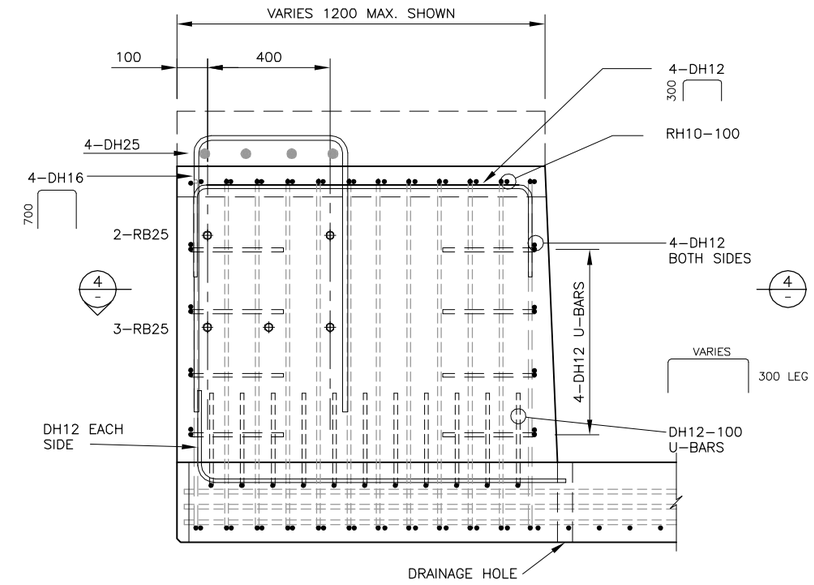
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



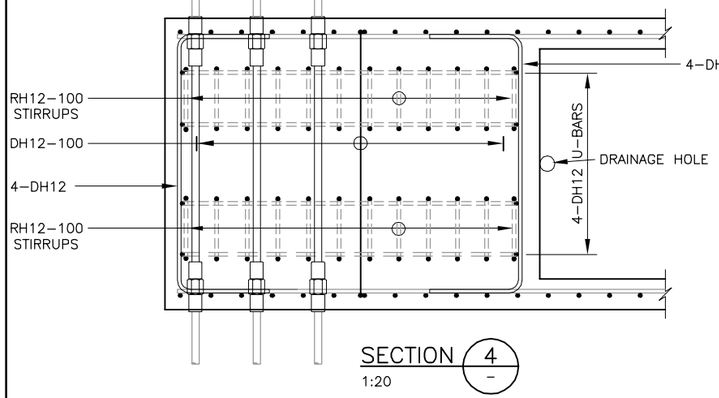
SECTION 1
1:20



EXTERNAL BEAM END BLOCK
1:20

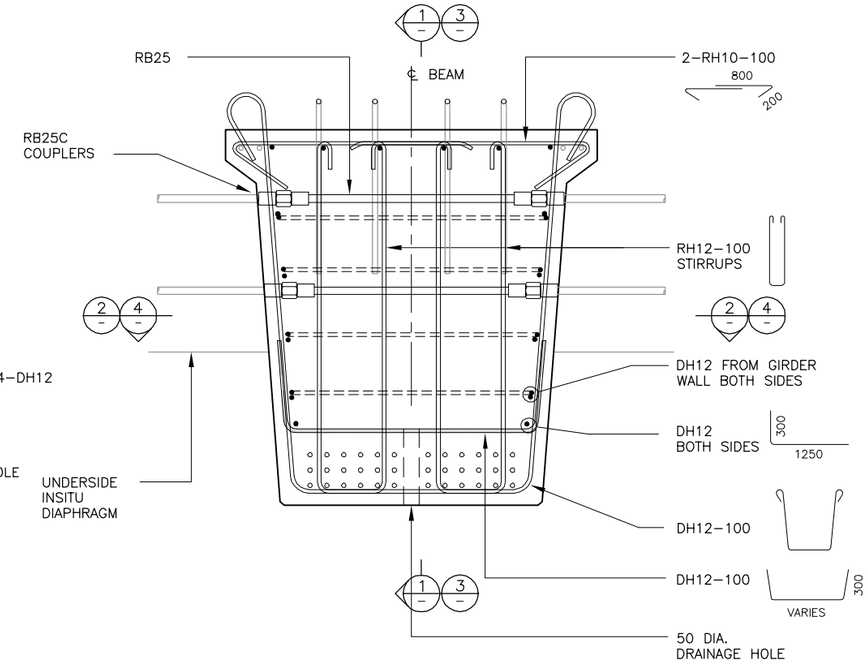


SECTION 3
1:20

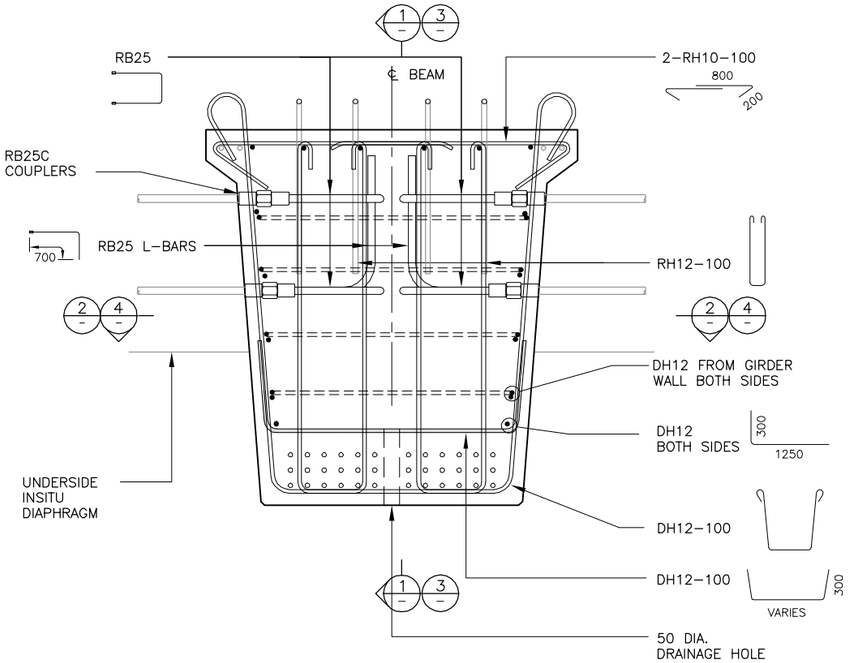


SECTION 2
1:20

SECTION 4
1:20



INTERNAL BEAM END BLOCK
1:20



ALTERNATE INTERNAL
BEAM END BLOCK 1:20

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM 1225 DEEP – 30m SPAN REINFORCEMENT SHEET 2

STATUS	FILE				
FOR PUBLICATION	0242S124				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:20		S1.24			0

DOCUMENT: P:\971\371042\CAD\0242S124.dwn

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

1. SPECIFIED CONCRETE COMPRESSIVE STRENGTHS

PRECAST BEAMS AT TRANSFER – PRETENSIONING	– 30MPa
PRECAST BEAMS AT 28 DAYS	– 50MPa
INSITU CONCRETE (DECK SLAB, DIAPHRAGMS) AT 28 DAYS	– 40MPa

2. REINFORCEMENT & PRESTRESSING

a. ALL REINFORCEMENT SHALL BE GRADE 500E TO AS/NZS4671
b. ALL PRESTRESSING STRAND SHALL BE 15.2mm DIAMETER LOW RELAXATION STRESS RELIEVED SUPER GRADE 7 WIRE STRAND COMPLYING WITH AS/NZS 4672 OR BS 5896
c. MINIMUM BREAKING LOAD OF STRAND 250 kN
d. FORCE IN STRANDS IMMEDIATELY PRIOR TO TRANSFER SHALL BE 185 kN. RELAXATION PRIOR TO TRANSFER SHALL BE ACCOUNTED FOR IN THE JACKING FORCE REQUIRED TO ACHIEVE THIS VALUE. TYPICALLY RELAXATION PRIOR TO TRANSFER IS IN THE ORDER OF 1%. WHERE CURING AT ELEVATED TEMPERATURES IS EMPLOYED, HIGHER RELAXATION RATES MAY RESULT AND DUE ALLOWANCE FOR THIS SHALL BE MADE BY THE PRECASTER IN DETERMINING THE JACKING FORCE REQUIRED TO ACHIEVE THE MINIMUM FORCE STATED ABOVE.
e. ENDS OF STRAND SHALL BE CUT FLUSH AND PROTECTED WITH A MINIMUM OF 5mm EPOXY MORTAR.
f. UPWARD DEFLECTION OF GIRDERS DUE TO PRESTRESS IS GIVEN IN THE BEAM HOG TABLE. THESE ARE ESTIMATES ONLY. ESTIMATES ARE MADE FOR HOG AT TRANSFER AND AT 100 DAYS WITH DUE ALLOWANCE FOR INCREASE IN HOG DUE TO CREEP OF CONCRETE UNDER SUSTAINED LOAD.
g. COMPONENTS PREFIXED RB ARE REIDBAR ITEMS. REIDBAR SHALL BE GRADE 500E TO AS/NZS4671.

3. CONCRETE COVER (MINIMUM)

COVER TO ALL PRESTRESSING COMPONENTS	– 40mm
COVER TO ALL REINFORCEMENT EXPOSED SURFACE	– 40mm
COVER TO ALL REINFORCEMENT INTERNAL SURFACE	– 30mm
COVER ADJACENT TO CORED HOLES	– 30mm
COVER TO BRIDGE DECK & ALL CAST INSITU CONCRETE	– 50mm
COVER TO BARRIER FIXING STEEL (WITHIN BARRIER)	– 50mm

4. DESIGN LOADING

HN–HO–72 (INCLUDING SLS LIVE LOAD FACTOR OF 1.35)

5. SPECIFICATION

THIS DESIGN IS BASED ON LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2006)

6. TOLERANCES

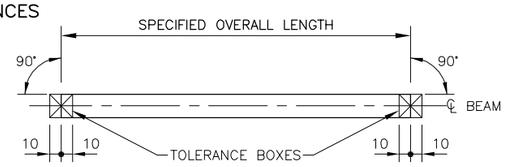


DIAGRAM A
N.T.S.

6.1. DIMENSIONS AT TIME OF ERECTION

ACTUAL OVERALL LENGTH AND SQUARENESS

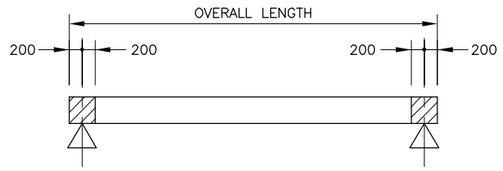
a. THE UNDERSIDE OF THE BEAM FOR THE END 700mm SHALL BE TRUE PLANE.
b. THE BEAM END SURFACES SHALL LIE WITHIN THE "TOLERANCE BOXES" SHOWN IN DIAGRAM A
c. PLANE SURFACE, DEVIATION FROM A 1.5m STRAIGHT EDGE 5mm
d. BEAM HOGGING (SEE SPECIFICATION)
e. CROSS SECTION DIMENSIONS UP TO 0.5m ..... ±5mm
f. CROSS SECTION DIMENSIONS 0.5m TO 2.0m ..... ±10mm
g. HORIZONTAL BOW OF LONGITUDINAL AXIS ..... ±20mm

6.1. DIMENSIONS AT TIME OF ERECTION

a. LONGITUDINAL STEEL ARRANGEMENT ..... ±10mm
b. LOCATION OF AN ITEM IN RELATION TO ANY OTHER ITEM WITHIN ITS GROUP OR TO THE MIDPOINT OF THE BEAM ENDS ..... ±10mm
c. PRETENSIONING PRESTRESSING STRANDS IN ANY DIRECTION ..... ±5mm

7. HANDLING

EXTREMES OF VERTICAL LIFTING POINTS OR GROUND SUPPORT SHOWN HATCHED.
CENTRAL SUPPORT POSITION AS SHOWN IS PREFERRED (BEAM IN UPRIGHT POSITION AT ALL TIMES)



BEAM SUPPORT & LIFTING POINTS
N.T.S.

8. METHOD OF MANUFACTURE

BEAMS SHALL BE MANUFACTURED UNDER FACTORY CONDITIONS

9. SURFACE FINISHES

BEAMS

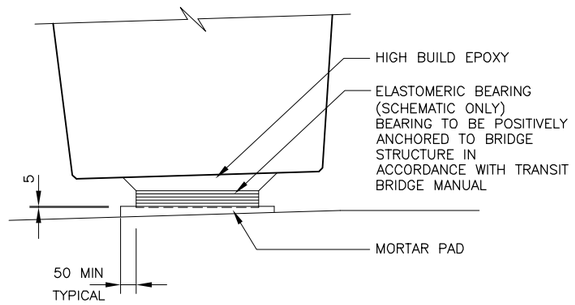
TOP SURFACE OF FLANGE	TYPE B CONSTRUCTION JOINT
IN DIRECT CONTACT WITH INSITU DIAPHRAGM	TYPE B CONSTRUCTION JOINT
HIDDEN FORMED SURFACE	F1
ALL OTHER FORMED SURFACE	F4

DIAPHRAGM SURFACE FINISH TO BE BASIC FINISH IN ACCORDACE WITH LTNZ STANDARD BEAM SPECIFICATION (2006)

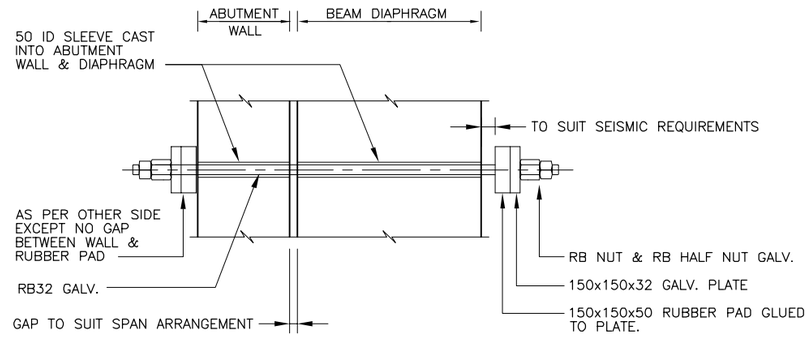
10. BEARING DESIGN DATA

SPAN (m)	REACTION (kN)			ROTATION (x 10^{-3} RADIANS)	
	DEAD LOAD (UNFACTORED)	LIVE LOAD (1.35 HN x I)	OVERLOAD (HO x I)	LIVE LOAD (1.35 HN x I)	OVERLOAD (HO x I)
30	580	440	515	2.7	2.8

NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



OPTION FOR BEARING ARRANGEMEMT
1:20



OPTION FOR LINKAGE BAR DETAIL
1:20

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM 1225 DEEP – 30m SPAN
UNIT DATA

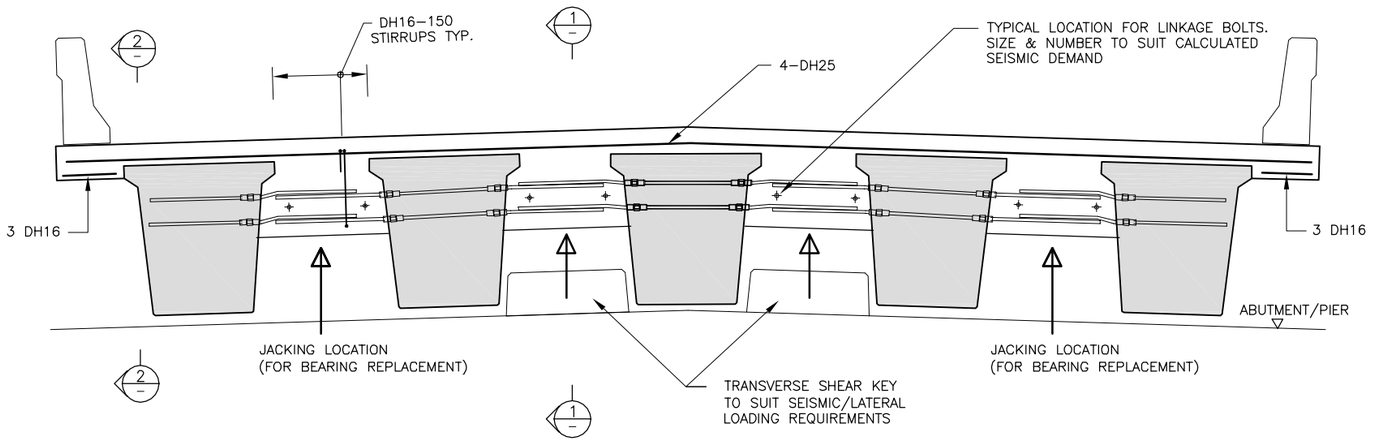
STATUS	FILE				
FOR PUBLICATION	0242S125				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
AS SHOWN		S1.25			0

DOCUMENT: P:\171\0710242\cad\0242S125.dwg

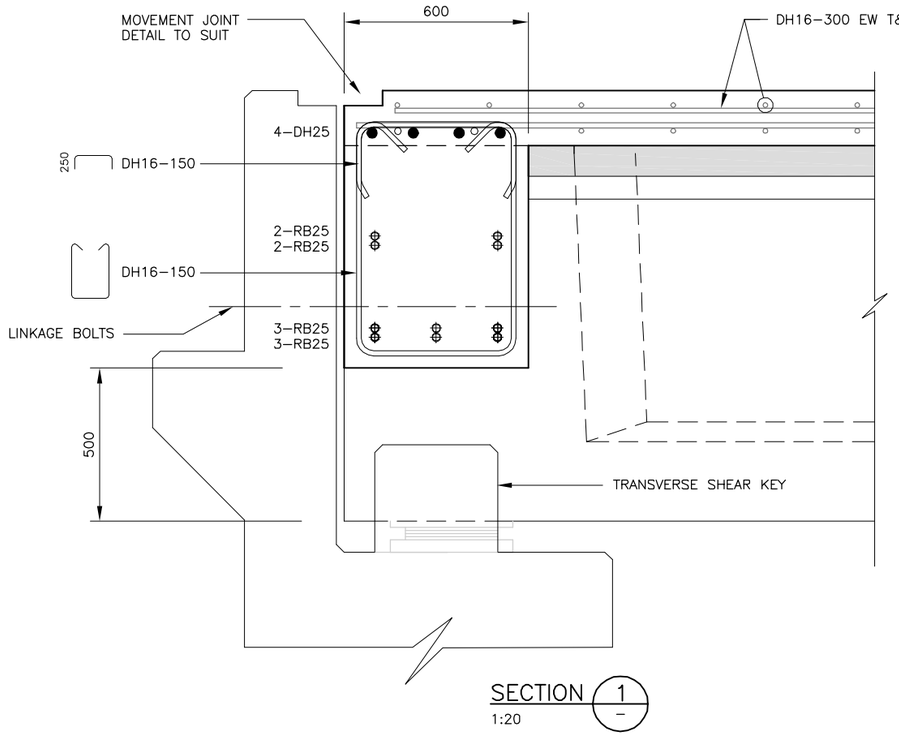
GRAPHIC SCALES
200 mm
100
50
10 mm
0

ORIGINAL SHEET SIZE A3 [420x297]

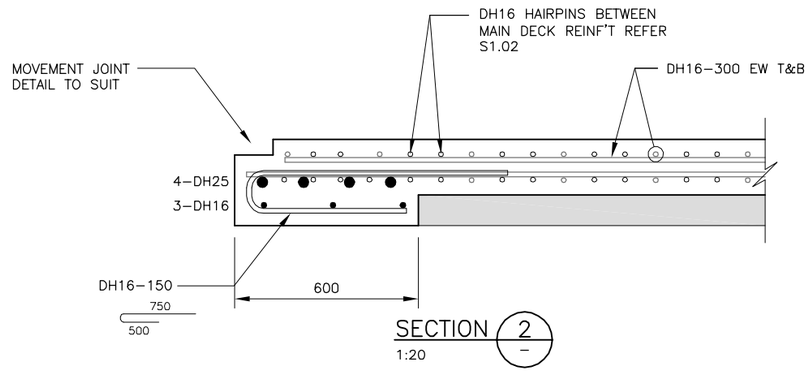
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



ELEVATION INSITU DIAPHRAGM
1:50



SECTION 1
1:20



SECTION 2
1:20

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM 1225 DEEP – 30m SPAN
END DIAPHRAGM DETAILS

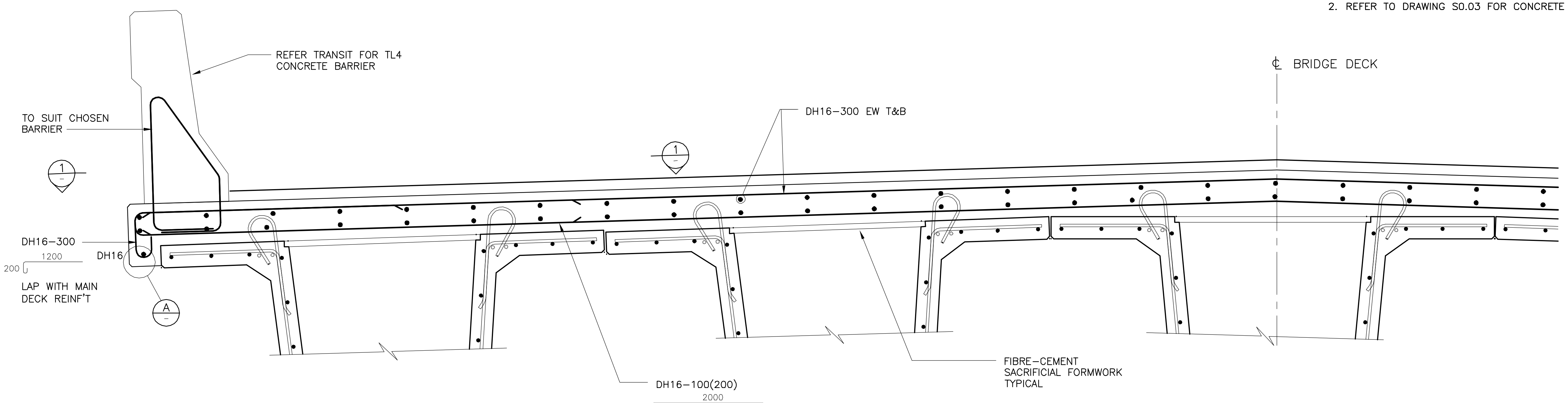
STATUS	FILE				
FOR PUBLICATION	0242S126				
SCALE	PLOT DATE	DRAWING NO.	CODE	SHEET	REVISION
1:100 1:20		S1.26			0

DOCUMENT: P:\271\271104\CAD\0242S126.dwn

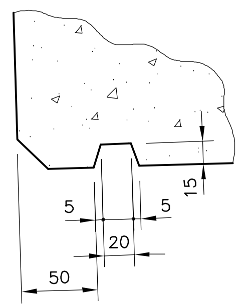
GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

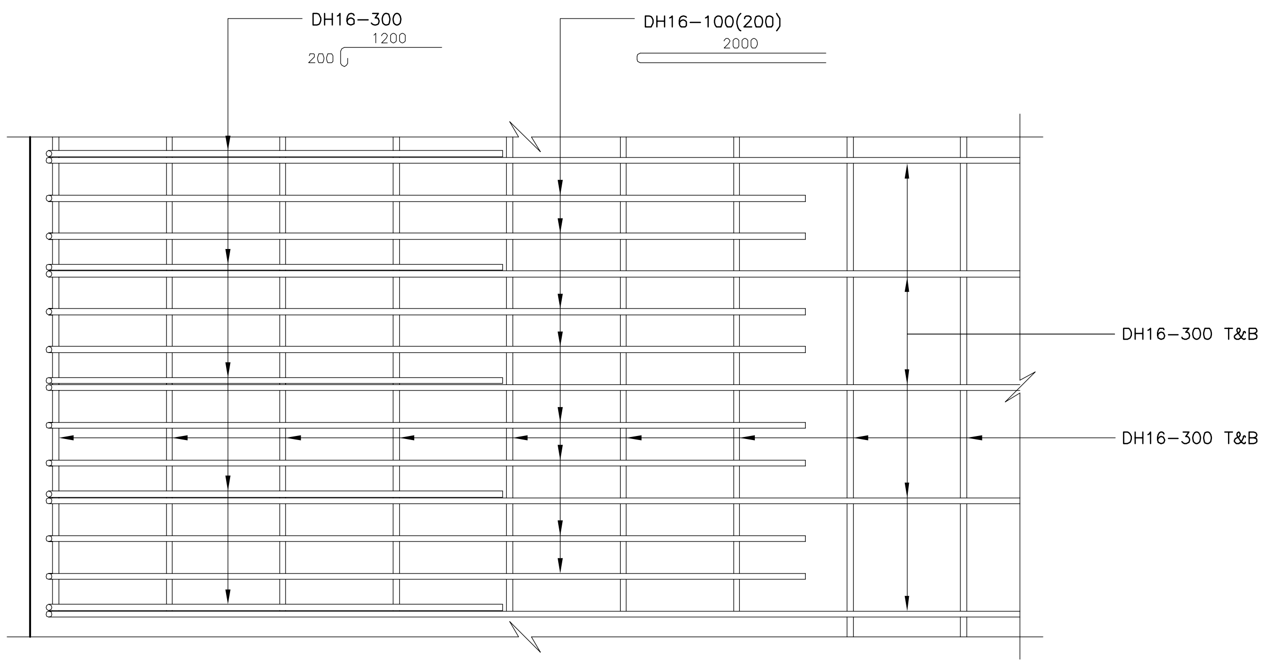
NOTES:
1. REFER TO DRAWING S0.02 FOR GENERAL NOTES.
2. REFER TO DRAWING S0.03 FOR CONCRETE NOTES.



TYPICAL BRIDGE DECK SECTION
1:20



DRIP DETAIL (A)
1:5



SECTION PLAN (1)
1:20

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

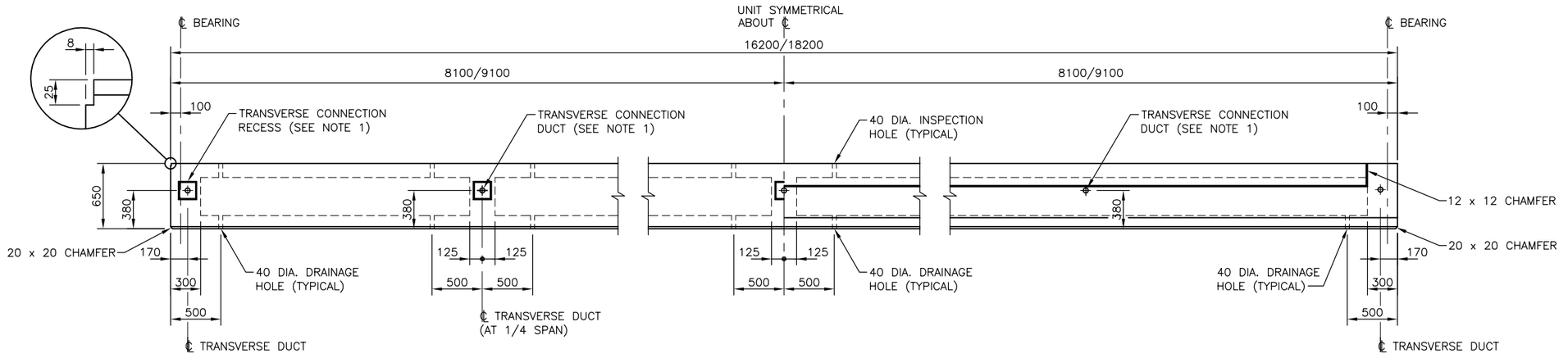
ORIGINATOR: OPUS Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS
SUPER T BEAM BRIDGE DECK – 30m SPAN DECK DETAILS

STATUS	FOR PUBLICATION	FILE	0242S127		
SCALE	1:50 1:20	PLOT DATE	DRAWING NO. S1.27	CODE	SHEET	REVISION 0

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

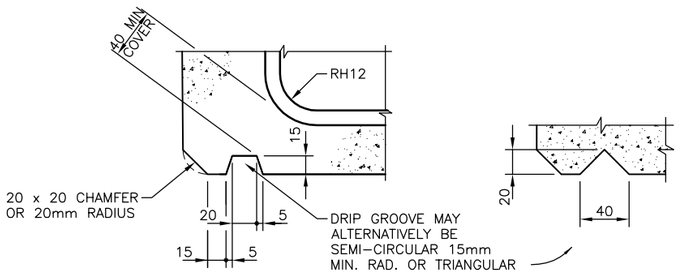


OUTER FACE – OUTER UNIT

INNER UNIT

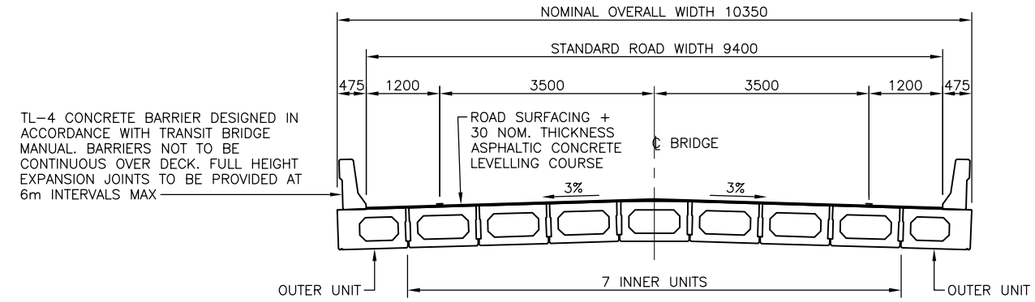
PART ELEVATION – DIMENSIONS

1:50



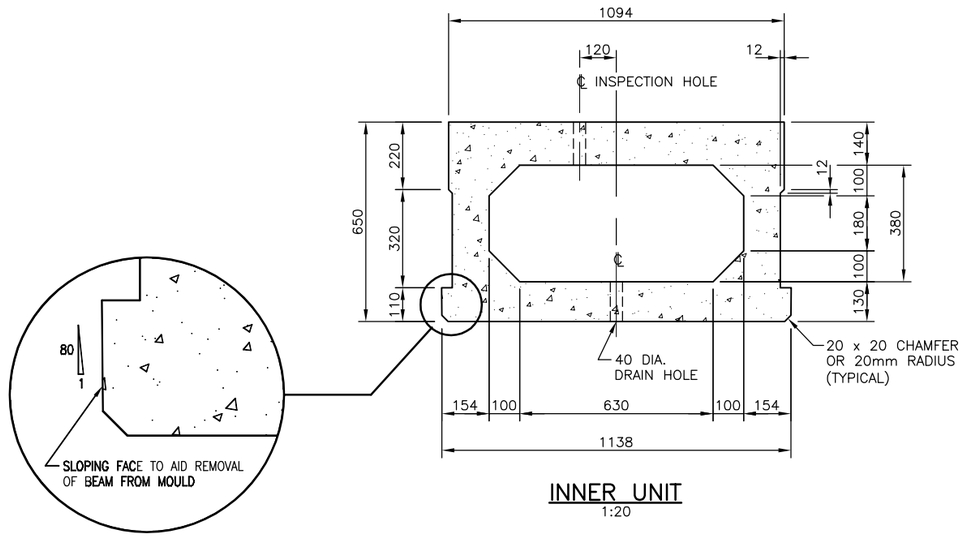
DRIP GROOVE DETAIL

1:5



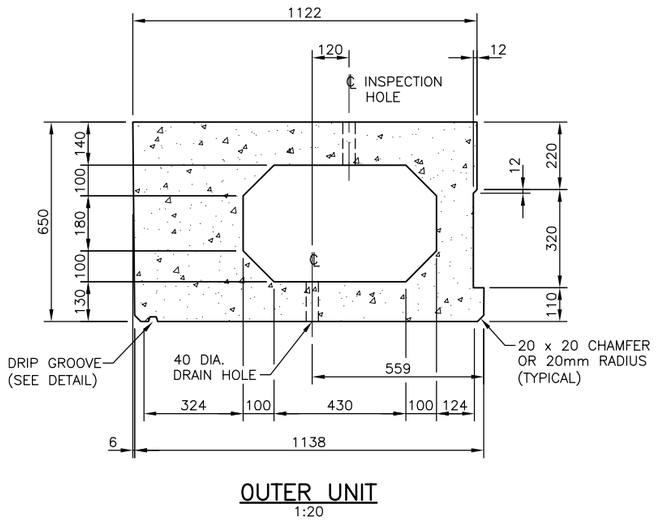
TYPICAL BRIDGE CROSS–SECTION

1:100



INNER UNIT

1:20



OUTER UNIT

1:20

NOTES:

1. RECESS FOR TRANSVERSE CONNECTION IN OUTER UNIT SHALL BE DIMENSIONED TO SUIT THE TYPE OF CONNECTION SYSTEM ADOPTED.
2. DRAINAGE HOLES SHALL EXTEND INTO THE VOID.
3. INSPECTION HOLES SHALL EXTEND TO THE VOID FORMER ONLY AND SHALL BE MORTARED AFTER FINAL INSPECTION OF THE UNIT.
4. INNER UNITS HAVE BEEN DESIGNED ON THE BASIS OF BEING CONFINED BY OTHER UNITS BEING PLACED AND STRESSED AGAINST THEM. THEY ARE NOT TO BE USED AS SINGLE UNITS IN ISOLATION.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

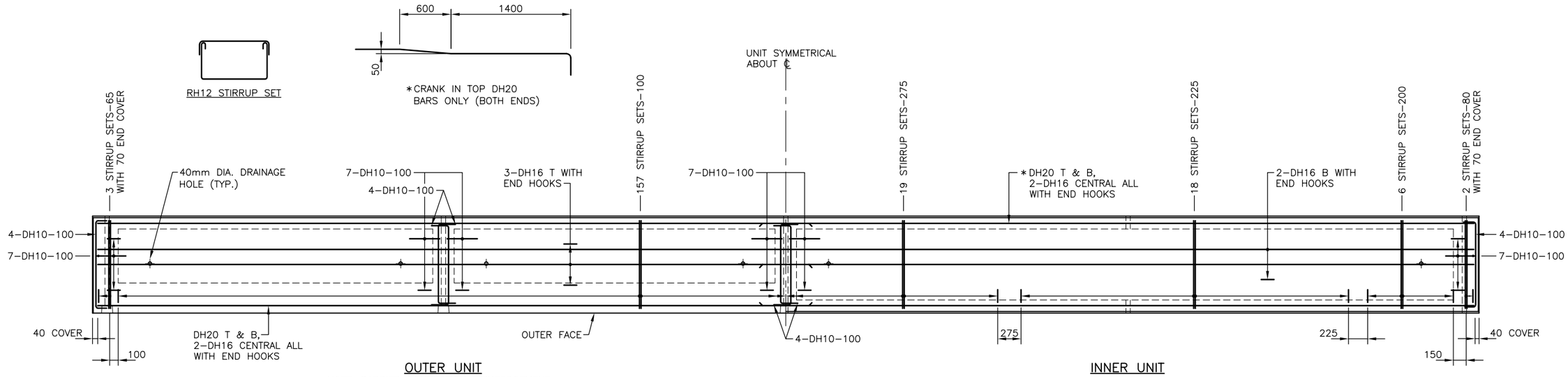
650mm DEEP SINGLE HOLLOW CORE BEAMS – 16m & 18m SPAN ARRANGEMENT & DIMENSIONS

STATUS	FILE				
FOR PUBLICATION	99/401/1/7504/1				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S2.01			0

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\shcurrits\99_401_1_7504_1.dwg

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]



OUTER UNIT

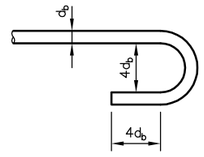
INNER UNIT

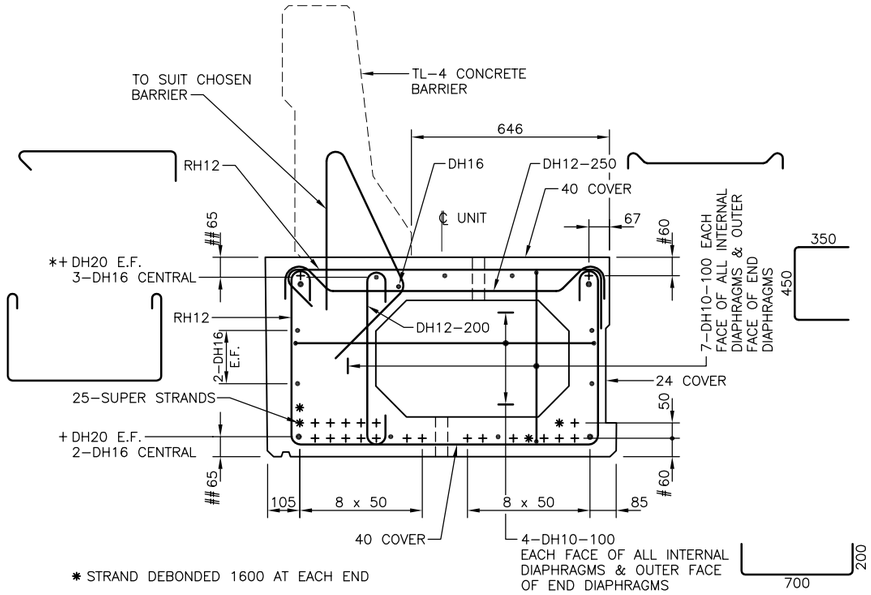
NOTE: BARRIER CONNECTION REINFORCEMENT OMITTED FOR CLARITY.

PART PLAN – DIMENSIONS

1:50

NOTE: – END HOOKS TO LONGITUDINAL BARS TO BE SEMI–CIRCULAR STANDARD HOOKS
– END HOOKS TO LONGITUDINAL BARS TO BE INSIDE VOLUME OF CONCRETE WITH REQUIRED COVER PROVIDED



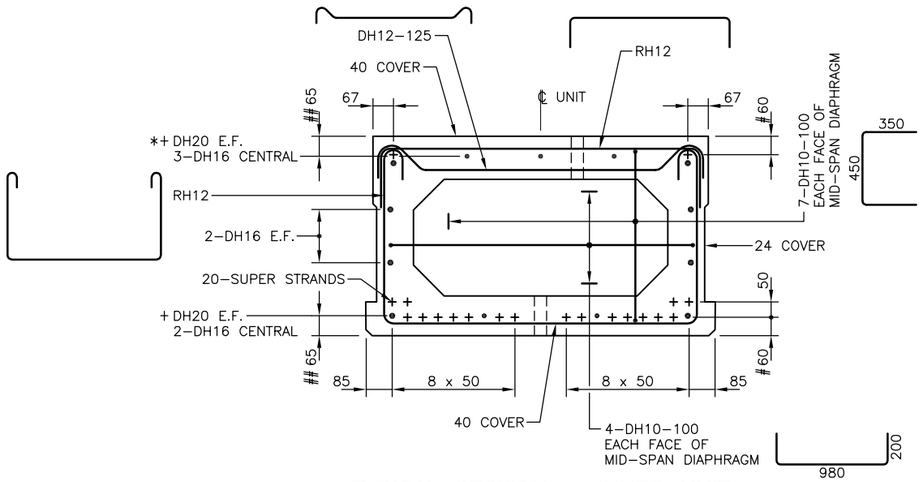


* STRAND DEBONDED 1600 AT EACH END

TYPICAL SECTION – OUTER UNIT REINFORCEMENT & STRAND LAYOUT WITH CONCRETE BARRIER FIXING

1:20

NOTE: END FACE REINFORCEMENT (NOT SHOWN) TO BE AS FOR INNER UNIT.



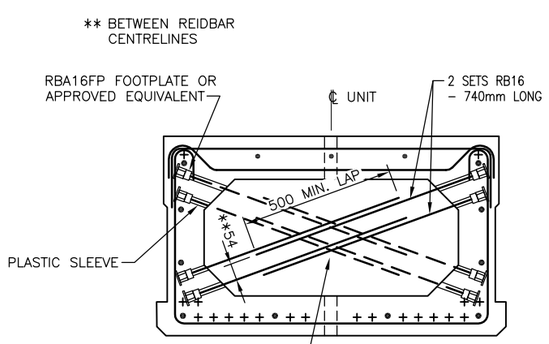
TYPICAL SECTION – INNER UNIT REINFORCEMENT & STRAND LAYOUT

1:20

NOTE: REINFORCEMENT SYMMETRICAL ABOUT ℄ UNIT

\# TO STRAND ℄
\## TO BAR ℄
* BUNDLED WITH STRAND (CORNER BARS ONLY)
\+ IF PRESTRESSING STRAND (12.9mm DIA. CBL 186kN) IS SUBSTITUTED FOR LONGITUDINAL CORNER REINFORCING BARS, ADDITIONAL REINFORCING BARS ANCHORED WITH HOOKS ARE REQUIRED AT BEAM ENDS TO SATISFY TORSION CAPACITY REQUIREMENTS.

** BETWEEN REIDBAR CENTRELINES



SECTION AT INNER UNIT END DIAPHRAGM – REINFORCEMENT

1:20

NOTES:

1. REFER ALSO TO TYPICAL SECTION FOR REINFORCEMENT DETAILS.
2. APPLY TORQUE TO REIDBARS TO SCREW BAR TIGHTLY AGAINST FOOTPLATE END STOP. USE A WRENCH OF MINIMUM LENGTH 300mm TO FULLY ENGAGE BAR.
3. FOOTPLATES AND PLASTIC SLEEVES TO BE CAST IN AND HELD RIGIDLY IN POSITION DURING CONCRETE POURING. POSITION AS REQUIRED TO SUIT THE LAPS AND BAR OFFSET AND AS NEAR TO PERIMETER TIES AS POSSIBLE.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

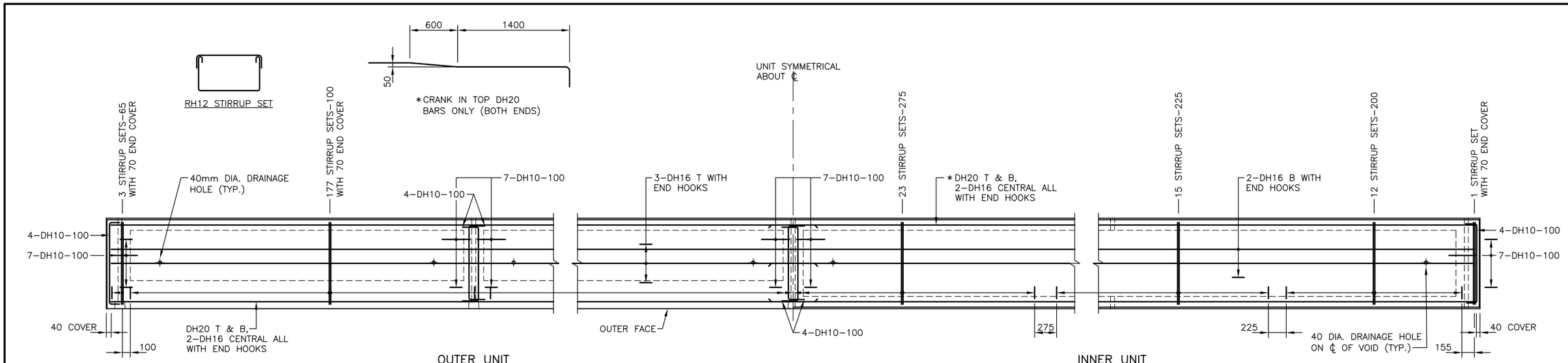
650mm DEEP SINGLE HOLLOW CORE BEAMS – 16m SPAN REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/1/7504/2				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S2.02			0

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\shcurits\99_401_1_7504_2.dwg



OUTER UNIT

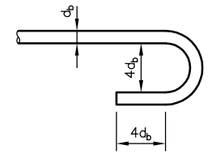
NOTE: BARRIER CONNECTION REINFORCEMENT OMITTED FOR CLARITY.

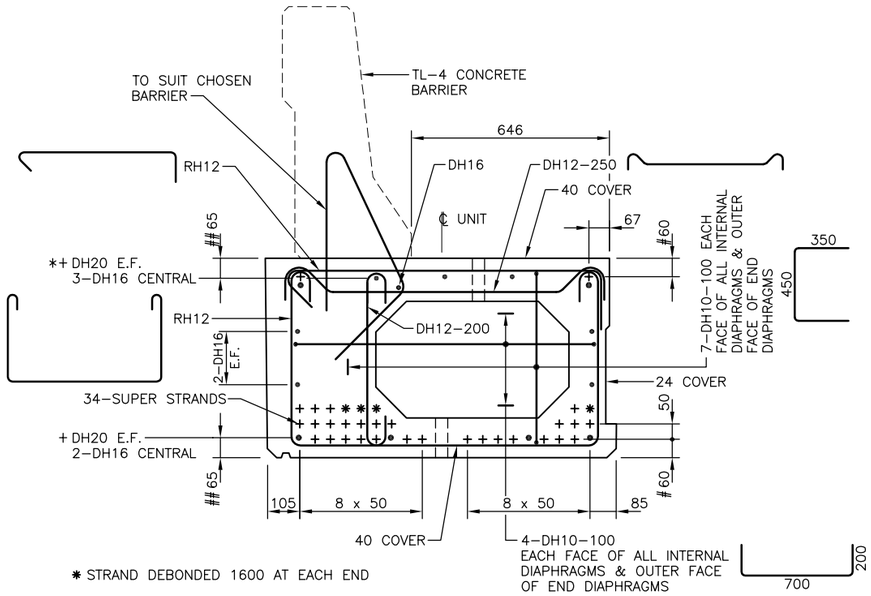
INNER UNIT

PART PLAN – DIMENSIONS

1:50

NOTE: – END HOOKS TO LONGITUDINAL BARS TO BE SEMI–CIRCULAR STANDARD HOOKS
– END HOOKS TO LONGITUDINAL BARS TO BE INSIDE VOLUME OF CONCRETE WITH REQUIRED COVER PROVIDED



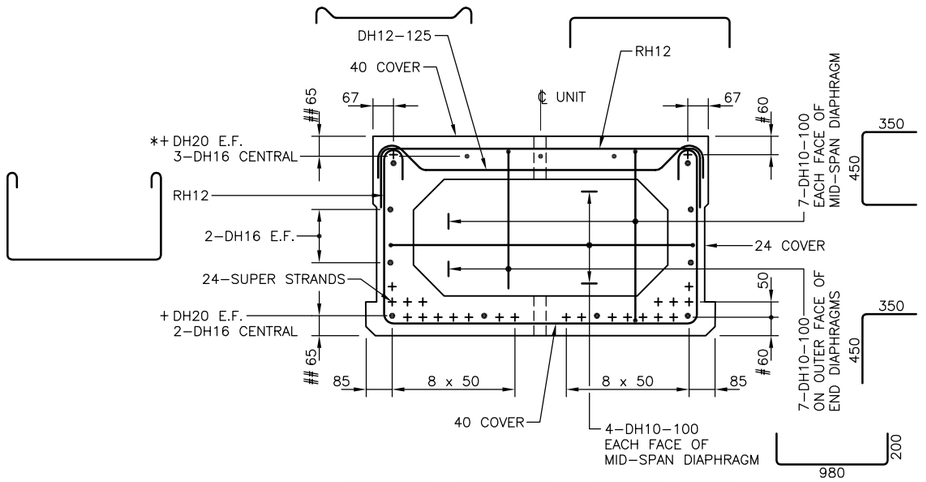


* STRAND DEBONDED 1600 AT EACH END

TYPICAL SECTION – OUTER UNIT REINFORCEMENT & STRAND LAYOUT WITH CONCRETE BARRIER FIXING

1:20

NOTE: END FACE REINFORCEMENT (NOT SHOWN) TO BE AS FOR INNER UNIT.

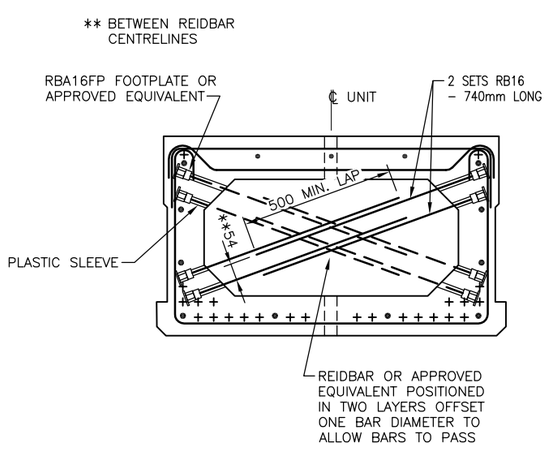


TYPICAL SECTION – INNER UNIT REINFORCEMENT & STRAND LAYOUT

1:20

NOTE: REINFORCEMENT SYMMETRICAL ABOUT ℄ UNIT

\# TO STRAND ℄
TO BAR ℄
* BUNDLED WITH STRAND (CORNER BARS ONLY)
+ IF PRESTRESSING STRAND (12.9mm DIA. CBL 186kN) IS SUBSTITUTED FOR LONGITUDINAL CORNER REINFORCING BARS, ADDITIONAL REINFORCING BARS ANCHORED WITH HOOKS ARE REQUIRED AT BEAM ENDS TO SATISFY TORSION CAPACITY REQUIREMENTS.



SECTION AT INNER UNIT END DIAPHRAGM – REINFORCEMENT

1:20

NOTES:

1. REFER ALSO TO TYPICAL SECTION FOR REINFORCEMENT DETAILS.
2. APPLY TORQUE TO REIDBARS TO SCREW BAR TIGHTLY AGAINST FOOTPLATE END STOP. USE A WRENCH OF MINIMUM LENGTH 300mm TO FULLY ENGAGE BAR.
3. FOOTPLATES AND PLASTIC SLEEVES TO BE CAST IN AND HELD RIGIDLY IN POSITION DURING CONCRETE POURING. POSITION AS REQUIRED TO SUIT THE LAPS AND BAR OFFSET AND AS NEAR TO PERIMETER TIES AS POSSIBLE.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS

650mm DEEP SINGLE HOLLOW CORE BEAMS – 18m SPAN
REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/1/7504/3				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S2.03			0

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\shcurits\99_401_1_7504_3.dwg

1. PRESTRESSING FORCE AT INITIAL TENSIONING

ALL SUPERSTRANDS SHALL BE 12.7mm SUPER 7 WIRE STRANDS, COMPLYING WITH AS/NZS 4672, AND ASSUMED TO HAVE A MINIMUM BREAKING LOAD OF 184kN PER STRAND WITH INTIAL LOADING AS FOLLOWS:

- TOP TWO STRANDS TO BE INITIALLY LOADED TO 127KN PER STRAND
- OTHER STRANDS TO BE INITIALLY LOADED TO 130KN PER STRAND

STRANDS SHALL BE RELEASED SLOWLY AND AFTER RELEASE SHALL BE CUT AND GROUND FLUSH WITH THE CONCRETE AT THE END OF THE UNIT. A THICK COATING OF HIGH BUILD EPOXY PAINT SHALL BE APPLIED AFTER GRINDING BEFORE THE UNIT LEAVES THE CASTING YARD.

2. TOLERANCES

TOLERANCES ARE TO BE IN ACCORDANCE WITH NZS 3109:1997 TABLE 5.1 UNLESS STATED OTHERWISE BELOW.

2.1 DIMENSIONS AT TIME OF ERECTION

ACTUAL OVERALL LENGTH AND SQUARENESS.
THE UNIT END SURFACES SHALL LIE WITHIN THE TOLERANCE BOXES SHOWN IN DIAGRAM A.

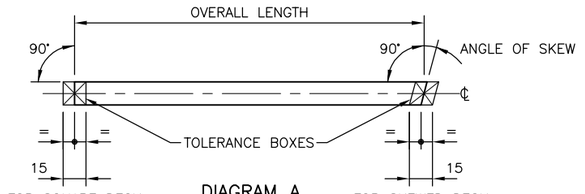


DIAGRAM A
N.T.S.

a. OVERALL LENGTH	±12mm
b. PLANE SURFACE DEVIATION FROM 1.5m STRAIGHT EDGE	±6mm
c. CROSS–SECTIONAL DIMENSION (OVERALL)	±8mm
d. DIFFERENCE IN LEVEL OF TOP SURFACE BETWEEN ADJACENT UNITS IN PLACE	±15mm
e. HORIZONTAL DEVIATION (SEE SPECIFICATION)	±6mm
f. SMALLEST WEB THICKNESS	+6mm,–4mm
g. SMALLEST FLANGE THICKNESS	±6mm
h. DIAPHRAGM THICKNESS	±12mm
j. HOGGING VARIATION (SEE SPECIFICATION)	±15mm
k. MAXIMUM HOG	25mm

2.2 LOCATION OF STEEL AND CAST–IN ITEMS

a. PRESTRESSING STRANDS IN ANY DIRECTION	±3mm
b. LOCATION OF AN ITEM IN RELATION TO ANY OTHER WITHIN ITS GROUP	±10mm
c. TRANSVERSE DUCT POSITION	±12mm
d. VOID FORMERS	±12mm

3. CONCRETE COVER

COVER TO ALL PRESTRESSING COMPONENTS	40mm
COVER TO ALL REINFORCING STEEL	40mm UNLESS SHOWN OTHERWISE
COVER ADJACENT TO VOIDS	30mm
COVER ADJACENT TO SHEAR KEYS	24mm
COVER BARRIER FIXING STEEL (WITHIN BARRIER)	65mm

4. CONCRETE STRENGTH

MINIMUM COMPRESSIVE STRENGTH AT TRANSFER	30MPa
SPECIFIED COMPRESSIVE STRENGTH AT 28 DAYS	50MPa
INFILL CONCRETE BETWEEN UNITS	30MPa
MORTAR BACKFILL TO TRANSVERSE STRAND ANCHORAGE POCKETS	50MPa
NON–SHRINK GROUT TO TRANSVERSE PRESTRESSING STRAND DUCTS	40MPa

5. DESIGN LOADING

HN–HO–72 (INCLUDING SLS LIVE LOAD FACTOR OF 1.35)

6. SPECIFICATION

THIS DESIGN IS BASED ON MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2007).

7. HANDLING

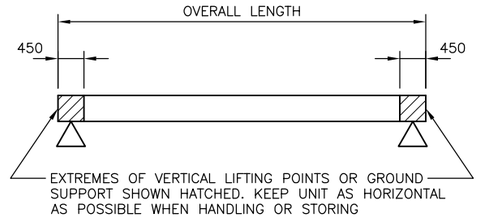
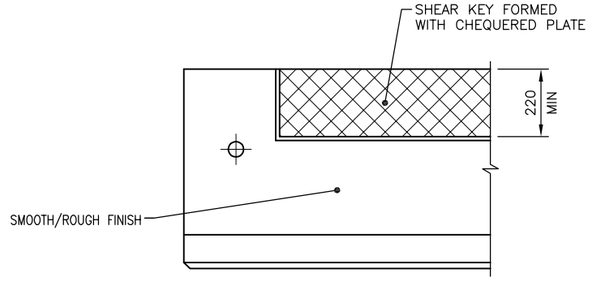


DIAGRAM B
N.T.S.

8. SURFACE FINISHES

a. TOP SURFACE – BROOM FINISH.

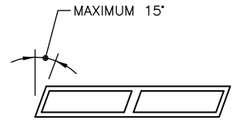
b. SIDE AND UNDERSIDE SURFACE – SMOOTH/ROUGH FINISH EXCEPT SHEAR KEY. SEE DETAIL 1



DETAIL 1

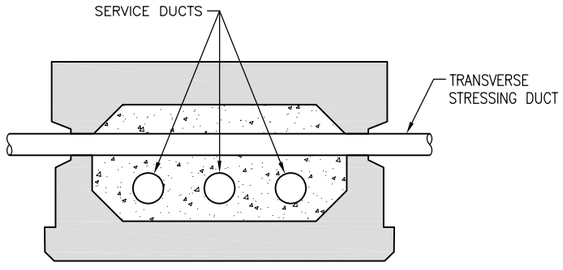
9. SKEW

THE MAXIMUM PERMISSIBLE SKEW OF THE UNITS SHALL BE 15° UNLESS A SPECIFIC LIVE LOAD ANALYSIS IS MADE. THE END DIAPHRAGMS OF THE UNIT SHALL BE SKEWED TO THE REQUIRED ANGLE – SEE DETAIL 2.



DETAIL 2

STIRRUPS SHALL BE PLACED PARALLEL TO THE LINE OF SKEW WITHIN 1m OF EACH END DIAPHRAGM. STIRRUPS ALONG THE SPAN SHALL BE PLACED NORMAL TO LONGITUDINAL STEEL WITH THE SKEW/NORMAL STIRRUP INTERFACE HAVING ADDITIONAL STIRRUPS IN A FAN ARRANGEMENT WITH THE SPECIFIED MAXIMUM STIRRUP SPACING ON THE OUTSIDE OF THE 'FAN'.



DETAIL 3 – SECTION AT END DIAPHRAGM

NOTES:

1. CABLES AND SMALL SERVICES MAY BE ACCOMMODATED IN THE HOLLOW CORE BUT NOWHERE ELSE IN THE UNIT. THE SERVICES DUCTS ARE TO BE NO GREATER THAN 100mm IN DIAMETER AND A CLEARANCE OF 40mm FROM TRANSVERSE STRESSING DUCTS SHALL BE MAINTAINED. THE TOTAL CROSS–SECTIONAL AREA OF CABLES AND SERVICE DUCTS WITHIN A UNIT SHALL NOT EXCEED 8% OF THE CROSS–SECTIONAL AREA OF THE UNIT INTERNAL VOID. NO TWO CABLES OR SERVICE DUCTS SHALL BE POSITIONED CLOSER TOGETHER THAN THE DIAMETER OF THE SMALLER CABLE OR DUCT OR 50mm. AT END AND INTERNAL DIAPHRAGMS A MINIMUM CLEARANCE OF 50mm SHALL BE PROVIDED BETWEEN THE CABLES/SERVICES DUCTS AND THE BASE OF THE VOID.
2. AN ALLOWANCE FOR TOLERANCES HAS BEEN MADE IN THE NOMINAL OVERALL WIDTH DIMENSION SHOWN IN THE TYPICAL SECTIONS. UNITS ARE SPACED AT 1.150m CENTRES TO ALLOW A WORKING TOLERANCE ON WIDTH & STRAIGHTNESS.
3. IN THE JACKING OF AN ASSEMBLED BRIDGE DECK, JACKS BEARING ON UNITS CONTAINING SERVICE DUCTS SHALL BE POSITIONED TO BEAR UNDER THE WEBS OF THE UNITS. ONE JACK PER UNIT TO BE PROVIDED AT EACH END OF THE DECK WHEN JACKING.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS

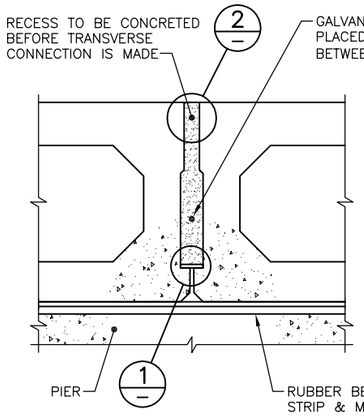
650mm DEEP SINGLE HOLLOW CORE BEAMS – 16m & 18m SPAN UNIT DATA

STATUS	FILE				
FOR PUBLICATION	99/401/1/7504/4				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
		S2.04			0

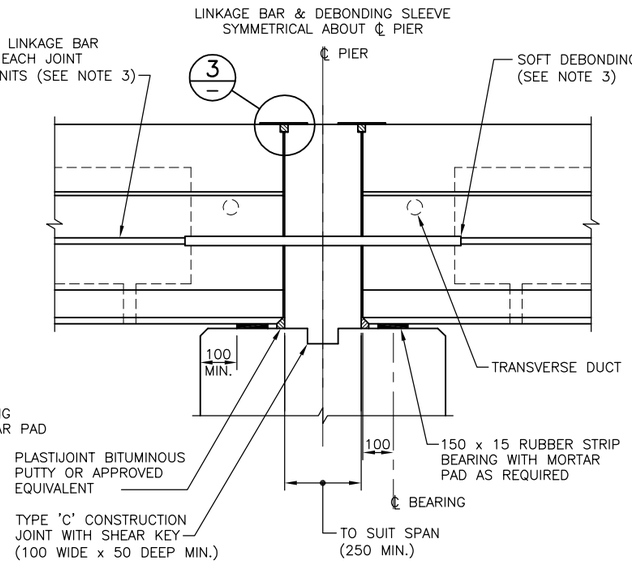
DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\shcurrits\99_401_1_7504_4.dwg

GRAPHIC SCALES

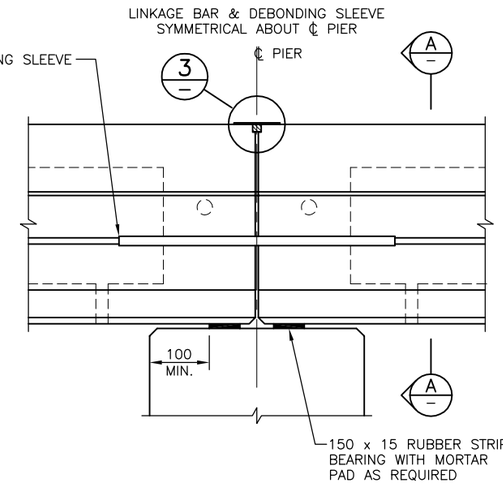
ORIGINAL SHEET SIZE A3 [420x297]



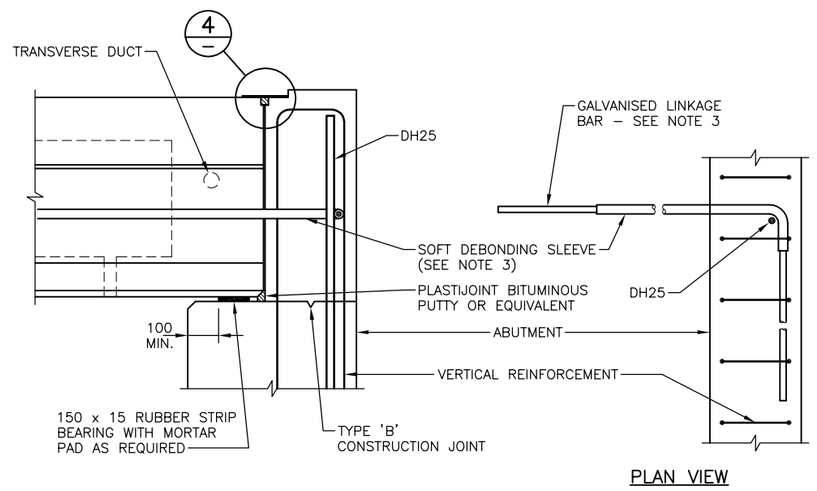
SECTION A
1:20



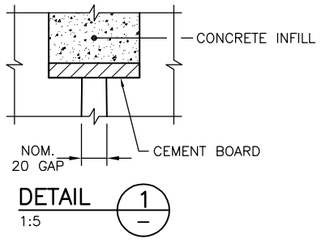
PIER CONNECTION (ALTERNATIVE 1)
1:20



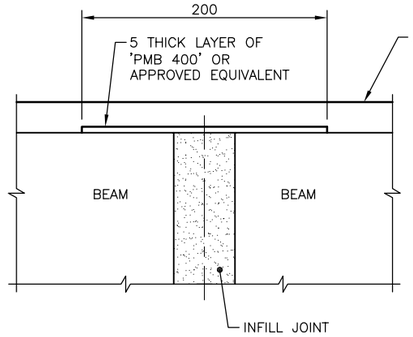
PIER CONNECTION (ALTERNATIVE 2)
1:20



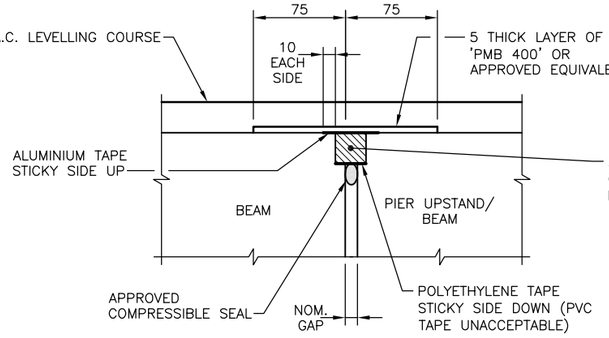
ABUTMENT CONNECTION
1:20



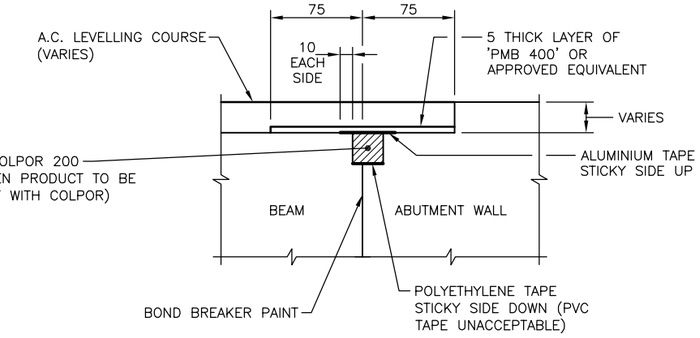
DETAIL 1
1:5



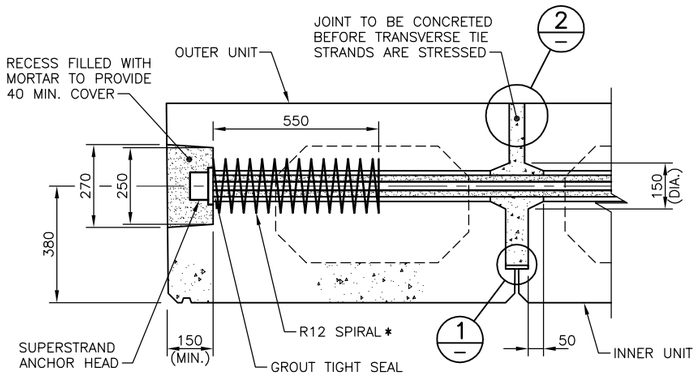
DETAIL 2
1:5



DETAIL 3
1:5

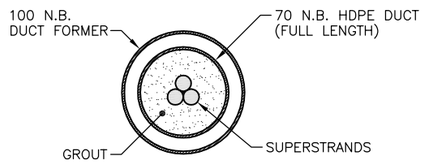


DETAIL 4
1:5



TRANSVERSE CONNECTION REQUIREMENTS:
* REFER TO TABLE OF TRANSVERSE STRESSING REQUIREMENTS

TRANSVERSE TIE DETAILS
1:20



SUPERSTRAND DUCT DETAIL
1:5

TRANSVERSE STRESSING REQUIREMENTS

SPAN (m)	NUMBER OF TRANSVERSE TENDONS	NO. OF 12.7mm SUPERSTRANDS PER TENDON			ANCHOR CONFINING STEEL
		AT UNIT ENDS	AT QUARTER SPAN	AT MID-SPAN	SPIRALS
16	5	3	3	3	R12/175mm DIA./40mm PITCH
18	5	3	3	3	R12/175mm DIA./40mm PITCH

NOTES:

1. LINKAGE BAR DEBONDING SLEEVES MAY BE REPLACED WITH AN ALTERNATIVE BOND BREAKING MATERIAL OF EQUIVALENT THICKNESS. (E.G. 'DENSO' OR 'PROTECTO' TAPE).
2. LINKAGE BAR DETAILS AS SHOWN ARE SUITABLE FOR MOST HOLLOW CORE UNIT INSTALLATIONS. ALTERNATIVE CONNECTIONS CAN BE USED IF REQUIRED.
3. LINKAGE BARS TO BE GRADE 500E. THE DESIGNER SHALL DETERMINE THE REQUIRED LINKAGE BAR SIZE AND LENGTH ACCORDING TO THE BRIDGE FORM AND SEISMICITY OF THE BRIDGE SITE.
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2007).
5. TRANSVERSE STRAND STRESSED TO 70% OF MINIMUM BREAKING LOAD (184kN/STRAND).

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS

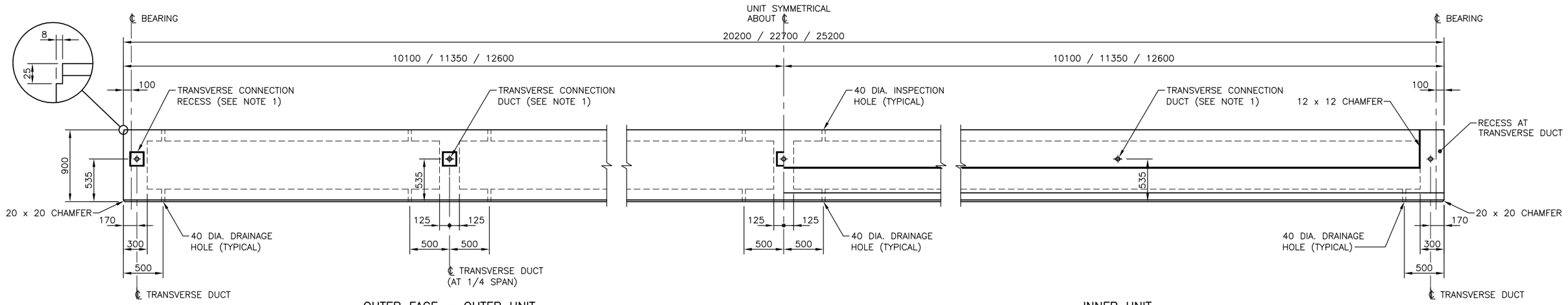
650mm DEEP SINGLE HOLLOW CORE BEAMS – 16m & 18m SPAN
LINKAGE BAR & TRANSVERSE CONNECTION DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/1/7504/5				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S2.05			0

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\shcurrits\99_401_1_7504_5.dwg

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

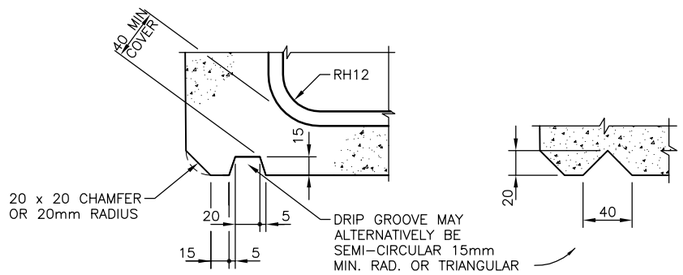


OUTER FACE – OUTER UNIT

INNER UNIT

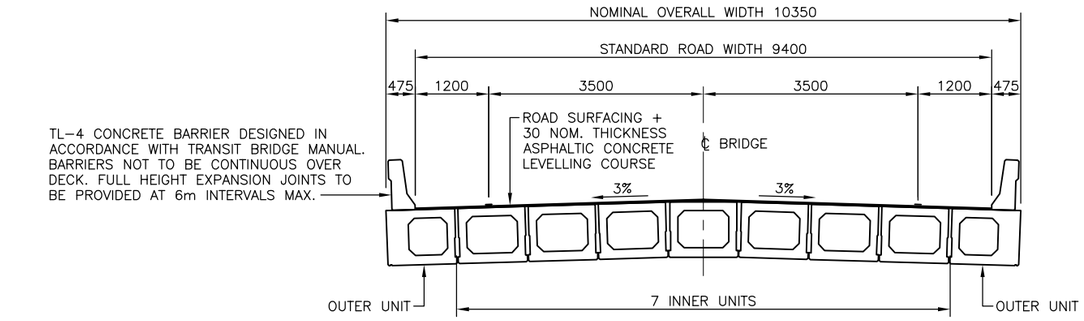
PART ELEVATION – DIMENSIONS

1:50



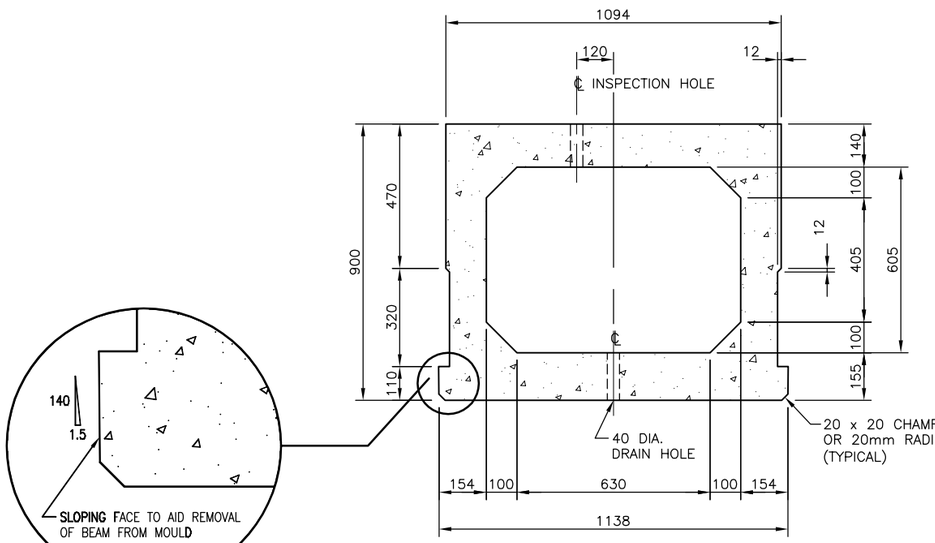
DRIP GROOVE DETAIL

1:5



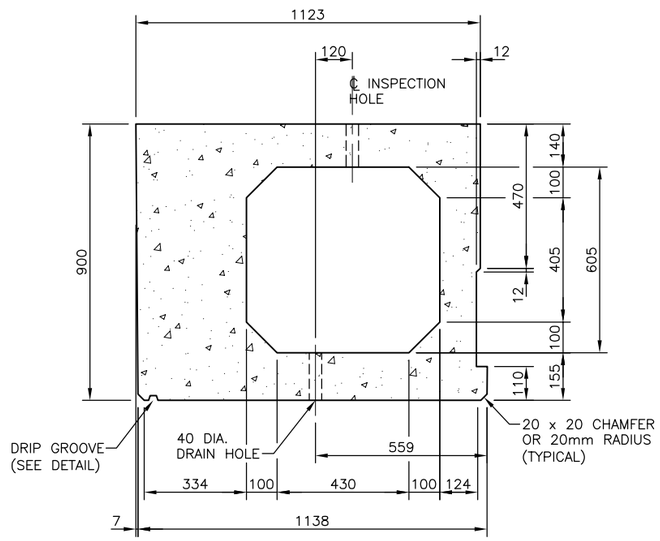
TYPICAL BRIDGE CROSS–SECTION

1:100



INNER UNIT

1:20



OUTER UNIT

1:20

NOTES:

1. RECESS FOR TRANSVERSE CONNECTION IN OUTER UNIT SHALL BE DIMENSIONED TO SUIT THE TYPE OF CONNECTION SYSTEM ADOPTED.
2. DRAINAGE HOLES SHALL EXTEND INTO THE VOID.
3. INSPECTION HOLES SHALL EXTEND TO THE VOID FORMER ONLY AND SHALL BE MORTARED AFTER FINAL INSPECTION OF THE UNIT.
4. INNER UNITS HAVE BEEN DESIGNED ON THE BASIS OF BEING CONFINED BY OTHER UNITS BEING PLACED AND STRESSED AGAINST THEM. THEY ARE NOT TO BE USED AS SINGLE UNITS IN ISOLATION.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

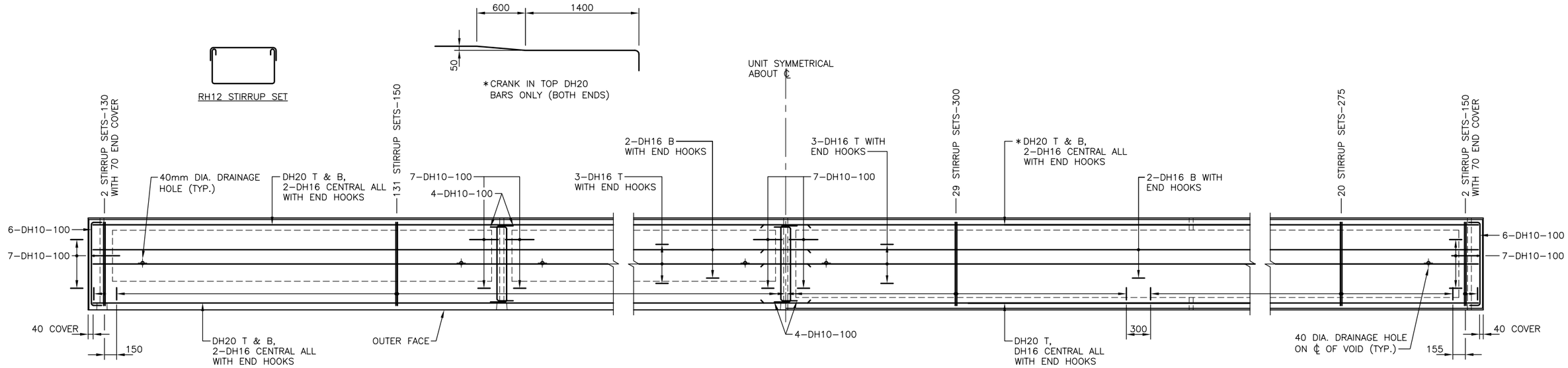
900mm DEEP SINGLE HOLLOW CORE BEAMS – 20m, 22.5m & 25m SPAN ARRANGEMENT & DIMENSIONS

STATUS	FILE				
FOR PUBLICATION	99/401/2/7504/1				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S2.10			0

DOCUMENT: G:\Transport\NZTA\pwgs\miscelleneous\Standard bridge beams\shcurrits\99_401_2_7504_1.dwg

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

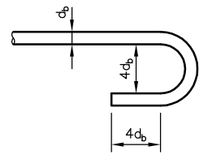


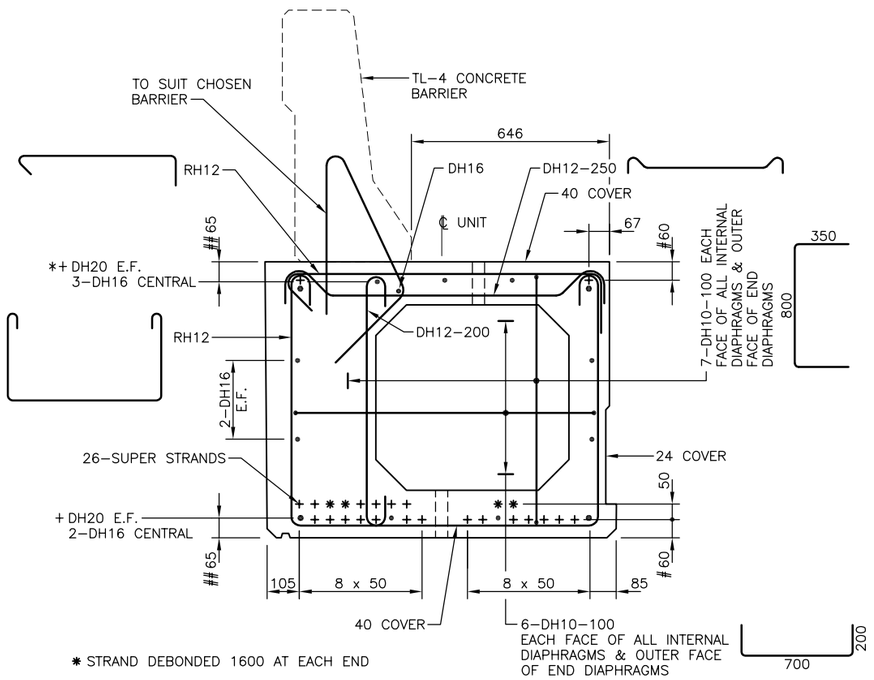
NOTE: BARRIER CONNECTION REINFORCEMENT OMITTED FOR CLARITY.

PART PLAN – DIMENSIONS

1:50

NOTE: – END HOOKS TO LONGITUDINAL BARS TO BE SEMI–CIRCULAR STANDARD HOOKS
– END HOOKS TO LONGITUDINAL BARS TO BE INSIDE VOLUME OF CONCRETE WITH REQUIRED COVER PROVIDED



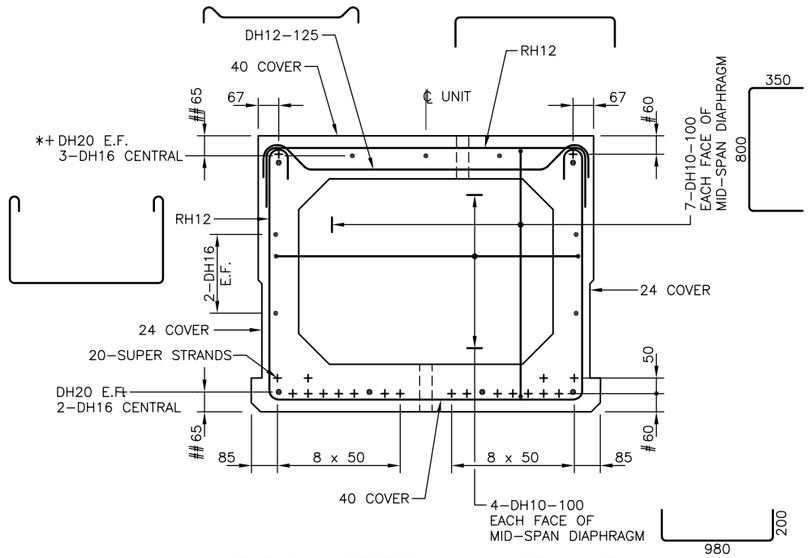


* STRAND DEBONDED 1600 AT EACH END

TYPICAL SECTION – OUTER UNIT REINFORCEMENT & STRAND LAYOUT WITH CONCRETE BARRIER FIXING

1:20

NOTE: END FACE REINFORCEMENT (NOT SHOWN) TO BE AS FOR INNER UNIT.

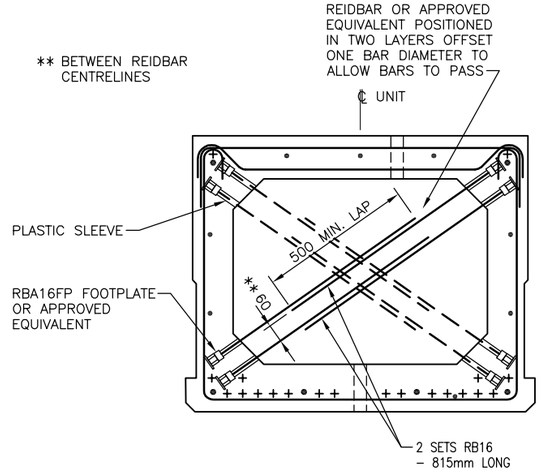


TYPICAL SECTION – INNER UNIT REINFORCEMENT & STRAND LAYOUT

1:20

NOTE: REINFORCEMENT SYMMETRICAL ABOUT ℄ UNIT

\# TO STRAND ℄
TO BAR ℄
* BUNDLED WITH STRAND (CORNER BARS ONLY)
\+ IF PRESTRESSING STRAND (12.9mm DIA. CBL 186kN) IS SUBSTITUTED FOR LONGITUDINAL CORNER REINFORCING BARS, ADDITIONAL REINFORCING BARS ANCHORED WITH HOOKS ARE REQUIRED AT BEAM ENDS TO SATISFY TORSION CAPACITY REQUIREMENTS.



SECTION AT INNER UNIT END DIAPHRAGM – REINFORCEMENT

1:20

NOTES:

1. REFER ALSO TO TYPICAL SECTION FOR REINFORCEMENT DETAILS.
2. APPLY TORQUE TO REIDBARS TO SCREW BAR TIGHTLY AGAINST FOOTPLATE END STOP. USE A WRENCH OF MINIMUM LENGTH 300mm TO FULLY ENGAGE BAR.
3. FOOTPLATES AND PLASTIC SLEEVES TO BE CAST IN AND HELD RIGIDLY IN POSITION DURING CONCRETE POURING. POSITION AS REQUIRED TO SUIT THE LAPS AND BAR OFFSET AND AS NEAR TO PERIMETER TIES AS POSSIBLE.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

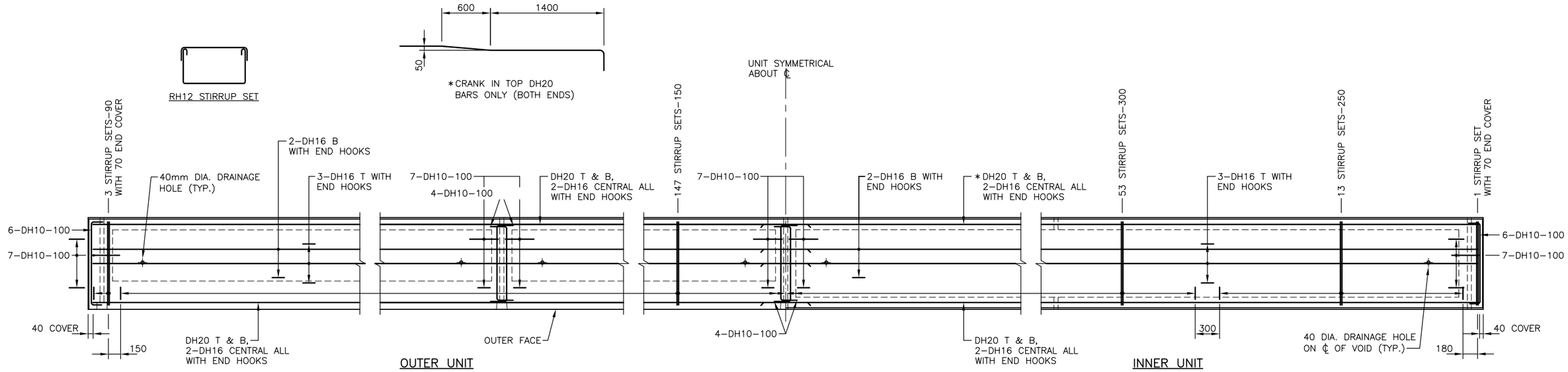
900mm DEEP SINGLE HOLLOW CORE BEAMS – 20m SPAN
REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/2/7504/2				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S2.11			0

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\shcunits\99_401_2_7504_2.dwg

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

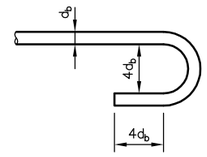


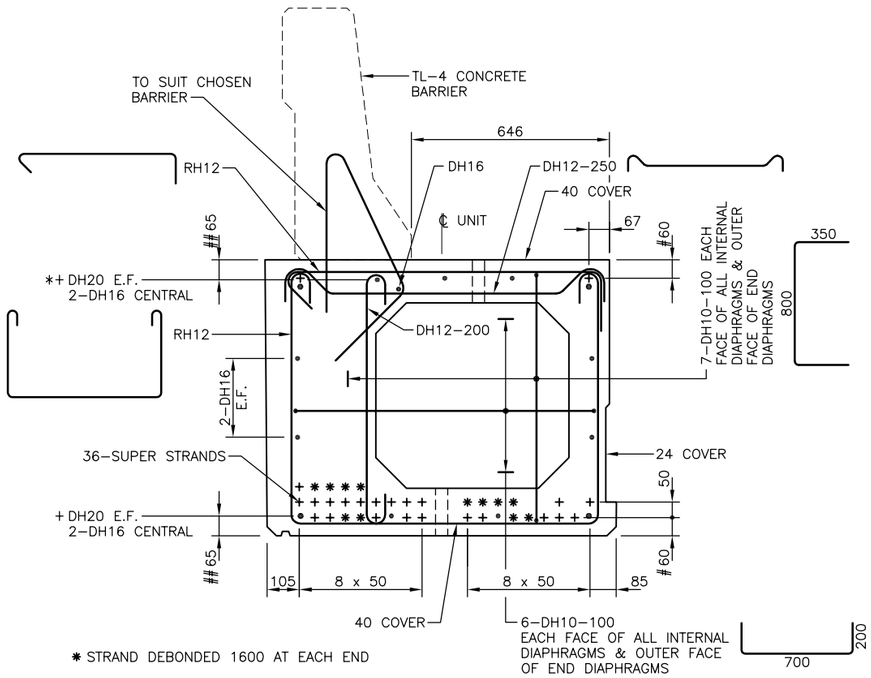
NOTE: BARRIER CONNECTION REINFORCEMENT OMITTED FOR CLARITY.

PART PLAN – DIMENSIONS

1:50

NOTE: – END HOOKS TO LONGITUDINAL BARS TO BE SEMI-CIRCULAR STANDARD HOOKS
– END HOOKS TO LONGITUDINAL BARS TO BE INSIDE VOLUME OF CONCRETE WITH REQUIRED COVER PROVIDED



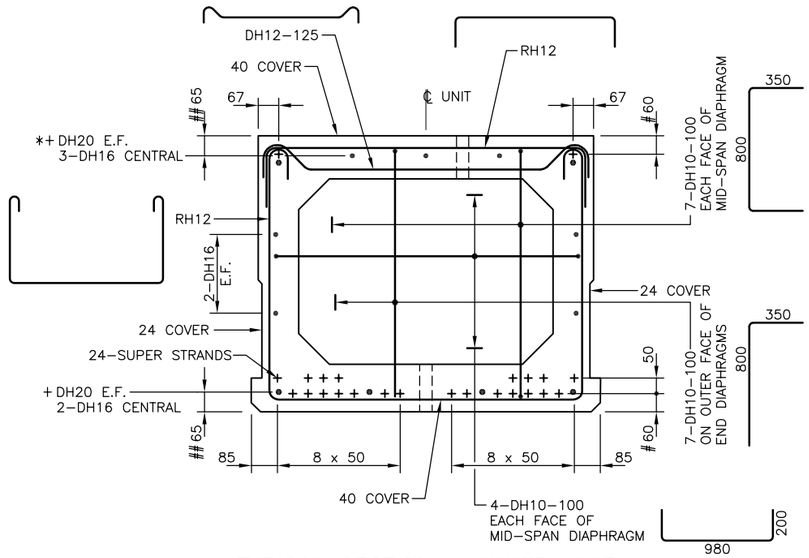


* STRAND DEBONDED 1600 AT EACH END

TYPICAL SECTION – OUTER UNIT REINFORCEMENT & STRAND LAYOUT WITH CONCRETE BARRIER FIXING

1:20

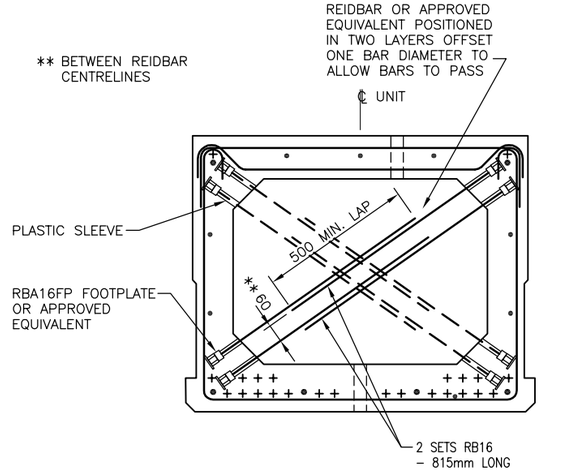
NOTE: END FACE REINFORCEMENT (NOT SHOWN) TO BE AS FOR INNER UNIT.



TYPICAL SECTION – INNER UNIT REINFORCEMENT & STRAND LAYOUT

1:20

NOTE: REINFORCEMENT SYMMETRICAL ABOUT ℄ UNIT



SECTION AT INNER UNIT END DIAPHRAGM – REINFORCEMENT

1:20

NOTES:

1. REFER ALSO TO TYPICAL SECTION FOR REINFORCEMENT DETAILS.
2. APPLY TORQUE TO REIDBARS TO SCREW BAR TIGHTLY AGAINST FOOTPLATE END STOP. USE A WRENCH OF MINIMUM LENGTH 300mm TO FULLY ENGAGE BAR.
3. FOOTPLATES AND PLASTIC SLEEVES TO BE CAST IN AND HELD RIGIDLY IN POSITION DURING CONCRETE POURING. POSITION AS REQUIRED TO SUIT THE LAPS AND BAR OFFSET AND AS NEAR TO PERIMETER TIES AS POSSIBLE.

TO STRAND ℄
TO BAR ℄
* BUNDLED WITH STRAND (CORNER BARS ONLY)
+ IF PRESTRESSING STRAND (12.9mm DIA. CBL 186kN) IS SUBSTITUTED FOR LONGITUDINAL CORNER REINFORCING BARS, ADDITIONAL REINFORCING BARS ANCHORED WITH HOOKS ARE REQUIRED AT BEAM ENDS TO SATISFY TORSION CAPACITY REQUIREMENTS.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

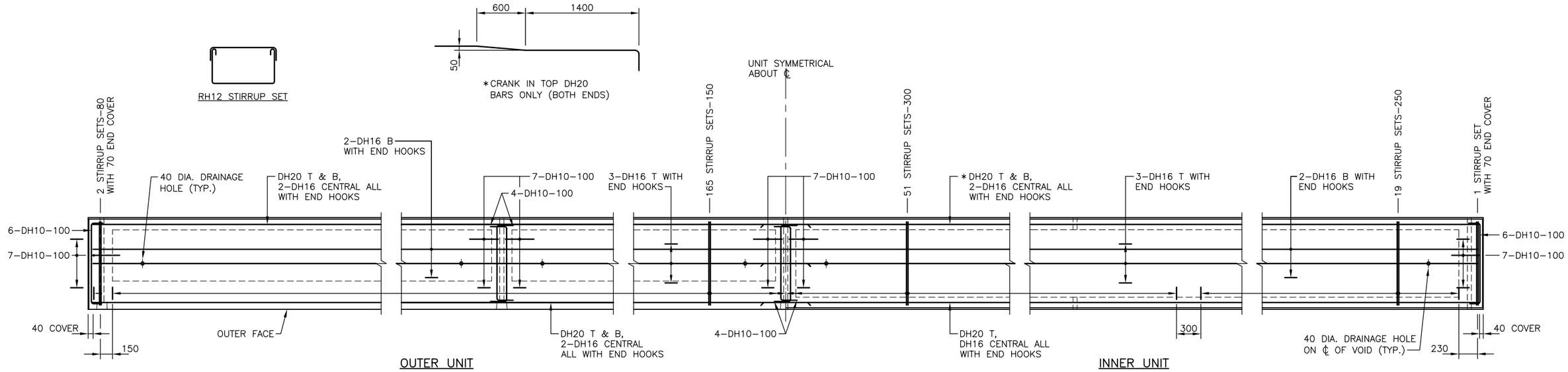
900mm DEEP SINGLE HOLLOW CORE BEAMS – 22.5m SPAN
REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/2/7504/3				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S2.12			0

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\shcunits\99_401_2_7504_3.dwg

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

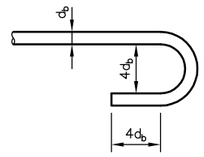


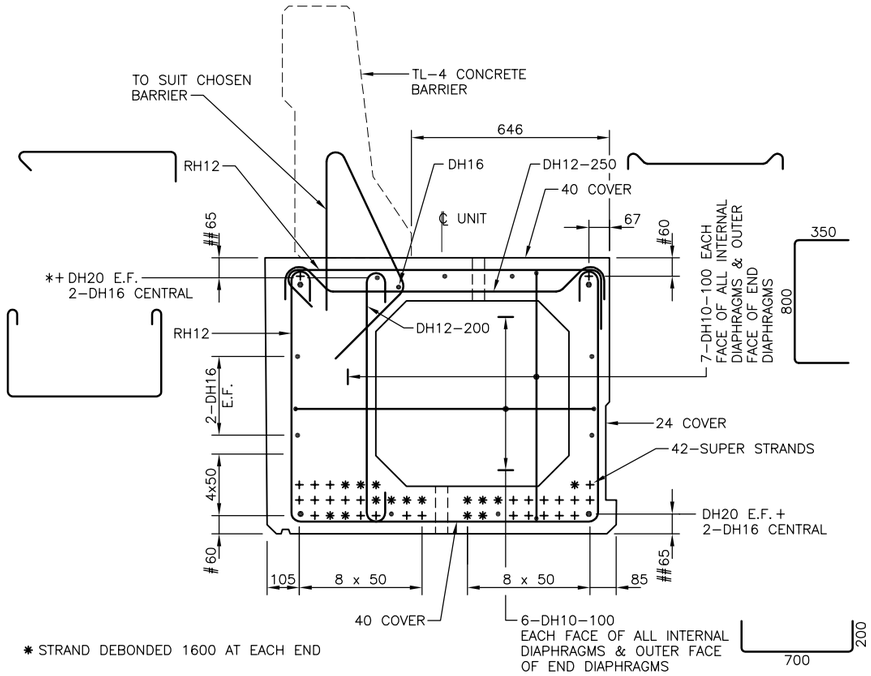
NOTE: BARRIER CONNECTION REINFORCEMENT OMITTED FOR CLARITY.

PART PLAN – DIMENSIONS

1:50

NOTE: – END HOOKS TO LONGITUDINAL BARS TO BE SEMI–CIRCULAR STANDARD HOOKS
– END HOOKS TO LONGITUDINAL BARS TO BE INSIDE VOLUME OF CONCRETE WITH REQUIRED COVER PROVIDED



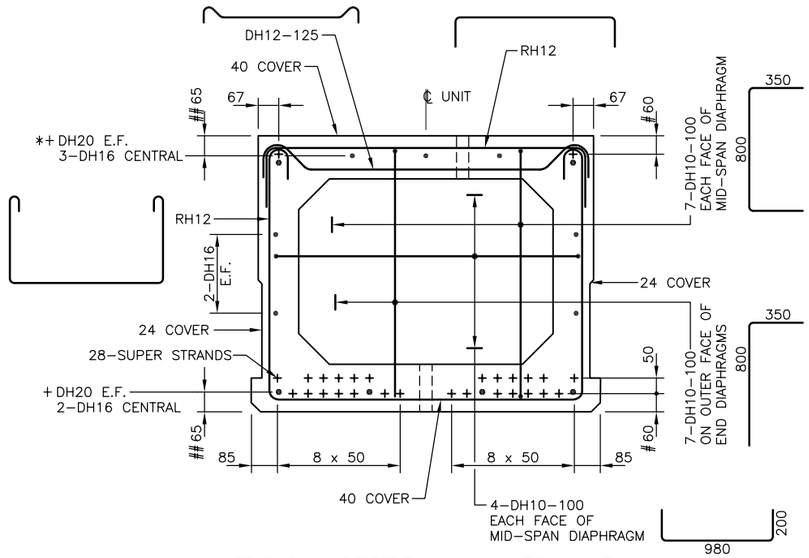


* STRAND DEBONDED 1600 AT EACH END

TYPICAL SECTION – OUTER UNIT REINFORCEMENT & STRAND LAYOUT WITH CONCRETE BARRIER FIXING

1:20

NOTE: END FACE REINFORCEMENT (NOT SHOWN) TO BE AS FOR INNER UNIT.

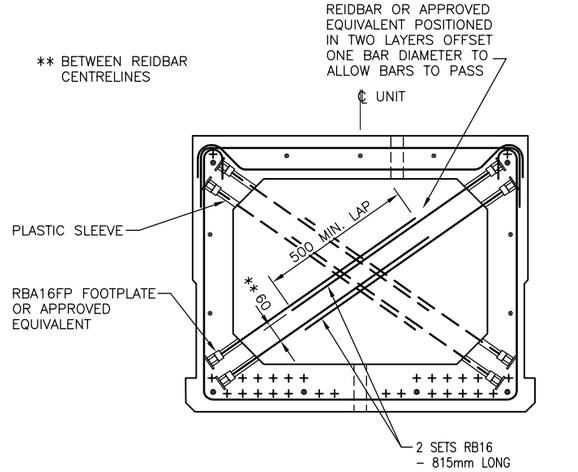


TYPICAL SECTION – INNER UNIT REINFORCEMENT & STRAND LAYOUT

1:20

NOTE: REINFORCEMENT SYMMETRICAL ABOUT ℄ UNIT

\# TO STRAND ℄
TO BAR ℄
* BUNDLED WITH STRAND (CORNER BARS ONLY)
\+ IF PRESTRESSING STRAND (12.9mm DIA. CBL 186kN) IS SUBSTITUTED FOR LONGITUDINAL CORNER REINFORCING BARS, ADDITIONAL REINFORCING BARS ANCHORED WITH HOOKS ARE REQUIRED AT BEAM ENDS TO SATISFY TORSION CAPACITY REQUIREMENTS.



SECTION AT INNER UNIT END DIAPHRAGM – REINFORCEMENT

1:20

NOTES:

1. REFER ALSO TO TYPICAL SECTION FOR REINFORCEMENT DETAILS.
2. APPLY TORQUE TO REIDBARS TO SCREW BAR TIGHTLY AGAINST FOOTPLATE END STOP. USE A WRENCH OF MINIMUM LENGTH 300mm TO FULLY ENGAGE BAR.
3. FOOTPLATES AND PLASTIC SLEEVES TO BE CAST IN AND HELD RIGIDLY IN POSITION DURING CONCRETE POURING. POSITION AS REQUIRED TO SUIT THE LAPS AND BAR OFFSET AND AS NEAR TO PERIMETER TIES AS POSSIBLE.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

900mm DEEP SINGLE HOLLOW CORE BEAMS – 25m SPAN
REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/2/7504/4				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S2.13			0

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\shcunits\99_401_2_7504_4.dwg

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

1. PRESTRESSING FORCE AT INITIAL TENSIONING

ALL SUPERSTRANDS SHALL BE 12.7mm SUPER 7 WIRE STRANDS, COMPLYING WITH AS/NZS 4672 AND ASSUMED TO HAVE A MINIMUM BREAKING LOAD OF 184kN PER STRAND WITH INTITIAL LOADING AS FOLLOWS:

- TOP TWO STRANDS TO BE INITIALLY LOADED TO 127KN PER STRAND
- OTHER STRANDS TO BE INITIALLY LOADED TO 130KN PER STRAND

STRANDS SHALL BE RELEASED SLOWLY AND AFTER RELEASE SHALL BE CUT AND GROUND FLUSH WITH THE CONCRETE AT THE END OF THE UNIT. A THICK COATING OF HIGH BUILD EPOXY PAINT SHALL BE APPLIED AFTER GRINDING BEFORE THE UNIT LEAVES THE CASTING YARD.

2. TOLERANCES

TOLERANCES ARE TO BE IN ACCORDANCE WITH NZS 3109:1997 TABLE 5.1 UNLESS STATED OTHERWISE BELOW.

2.1 DIMENSIONS AT TIME OF ERECTION

ACTUAL OVERALL LENGTH AND SQUARENESS.
THE UNIT END SURFACES SHALL LIE WITHIN THE TOLERANCE BOXES SHOWN IN DIAGRAM A.

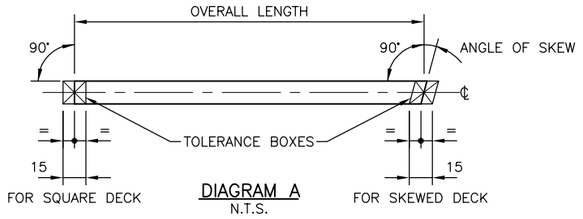


DIAGRAM A
N.T.S.

a. OVERALL LENGTH	±12mm
b. PLANE SURFACE DEVIATION FROM 1.5m STRAIGHT EDGE	±6mm
c. CROSS–SECTIONAL DIMENSION (OVERALL)	±8mm
d. DIFFERENCE IN LEVEL OF TOP SURFACE BETWEEN ADJACENT UNITS IN PLACE	±15mm
e. HORIZONTAL DEVIATION (SEE SPECIFICATION)	±6mm
f. SMALLEST WEB THICKNESS	+6mm,–4mm
g. SMALLEST FLANGE THICKNESS	±6mm
h. DIAPHRAGM THICKNESS	±12mm
j. HOGGING VARIATION (SEE SPECIFICATION)	±15mm
k. MAXIMUM HOG	25mm

2.2 LOCATION OF STEEL AND CAST–IN ITEMS

a. PRESTRESSING STRANDS IN ANY DIRECTION	±3mm
b. LOCATION OF AN ITEM IN RELATION TO ANY OTHER WITHIN ITS GROUP	±10mm
c. TRANSVERSE DUCT POSITION	±12mm
d. VOID FORMERS	±12mm

3. CONCRETE COVER

COVER TO ALL PRESTRESSING COMPONENTS	40mm
COVER TO ALL REINFORCING STEEL	40mm UNLESS SHOWN OTHERWISE
COVER ADJACENT TO VOIDS	30mm
COVER ADJACENT TO SHEAR KEYS	24mm
COVER TO BARRIER FIXING STEEL (WITHIN BARRIER)	65mm

4. CONCRETE STRENGTH

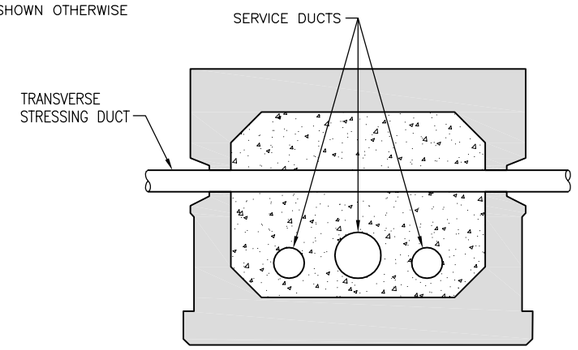
MINIMUM COMPRESSIVE STRENGTH AT TRANSFER	30MPa
SPECIFIED COMPRESSIVE STRENGTH AT 28 DAYS	50MPa
INFILL CONCRETE BETWEEN UNITS	30MPa
MORTAR BACKFILL TO TRANSVERSE STAND ANCHORAGE POCKETS	50MPa
NON–SHRINK GROUT TO TRANSVERSE PRESTRESSING STRAND DUCTS	40MPa

5. DESIGN LOADING

HN–HO–72 (INCLUDING SLS LIVE LOAD FACTOR OF 1.35)

6. SPECIFICATION

THIS DESIGN IS BASED ON MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2007).



DETAIL 3 – SECTION AT END DIAPHRAGM

7. HANDLING

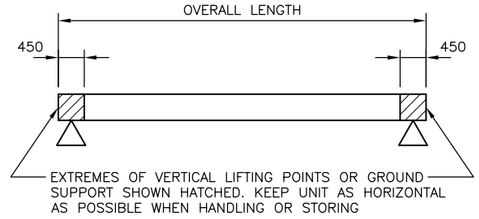
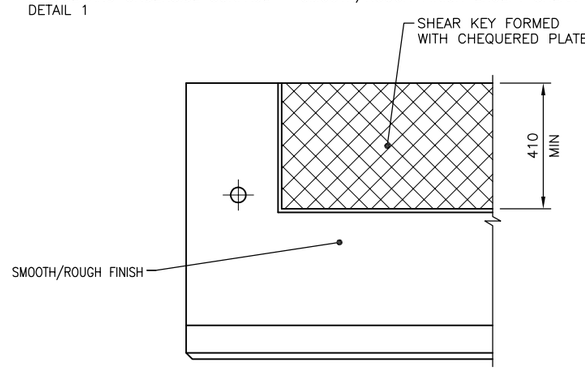


DIAGRAM B
N.T.S.

8. SURFACE FINISHES

a. TOP SURFACE – BROOM FINISH.

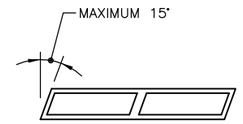
b. SIDE AND UNDERSIDE SURFACE – SMOOTH/ROUGH FINISH EXCEPT SHEAR KEY. SEE DETAIL 1



DETAIL 1

9. SKEW

THE MAXIMUM PERMISSIBLE SKEW OF THE UNITS SHALL BE 15° UNLESS A SPECIFIC LIVE LOAD ANALYSIS IS MADE. THE END DIAPHRAGMS OF THE UNIT SHALL BE SKEWED TO THE REQUIRED ANGLE – SEE DETAIL 2.



DETAIL 2

STIRRUPS SHALL BE PLACED PARALLEL TO THE LINE OF SKEW WITHIN 1m OF EACH END DIAPHRAGM. STIRRUPS ALONG THE SPAN SHALL BE PLACED NORMAL TO LONGITUDINAL STEEL WITH THE SKEW/NORMAL STIRRUP INTERFACE HAVING ADDITIONAL STIRRUPS IN A FAN ARRANGEMENT WITH THE SPECIFIED MAXIMUM STIRRUP SPACING ON THE OUTSIDE OF THE 'FAN'.

NOTES:

1. CABLES AND SMALL SERVICES MAY BE ACCOMMODATED IN THE HOLLOW CORE BUT NOWHERE ELSE IN THE UNIT. THE SERVICES DUCTS ARE TO BE NO GREATER THAN 150mm IN DIAMETER AND A CLEARANCE OF 40mm FROM TRANSVERSE STRESSING DUCTS SHALL BE MAINTAINED. THE TOTAL CROSS–SECTIONAL AREA OF CABLES AND SERVICE DUCTS WITHIN A UNIT SHALL NOT EXCEED 8% OF THE CROSS–SECTIONAL AREA OF THE UNIT INTERNAL VOID. NO TWO CABLES OR SERVICE DUCTS SHALL BE POSITIONED CLOSER TOGETHER THAN THE DIAMETER OF THE SMALLER CABLE OR DUCT OR 50mm. AT END AND INTERNAL DIAPHRAGMS A MINIMUM CLEARANCE OF 50mm SHALL BE PROVIDED BETWEEN THE CABLES/SERVICES DUCTS AND THE BASE OF THE VOID.
2. AN ALLOWANCE FOR TOLERANCES HAS BEEN MADE IN THE NOMINAL OVERALL WIDTH DIMENSION SHOWN IN THE TYPICAL SECTIONS. UNITS ARE SPACED AT 1.150m CENTRES TO ALLOW A WORKING TOLERANCE ON WIDTH & STRAIGHTNESS.
3. IN THE JACKING OF AN ASSEMBLED BRIDGE DECK, JACKS BEARING ON UNITS CONTAINING SERVICE DUCTS SHALL BE POSITIONED TO BEAR UNDER THE WEBS OF THE UNITS. ONE JACK PER UNIT TO BE PROVIDED AT EACH END OF THE DECK WHEN JACKING.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS

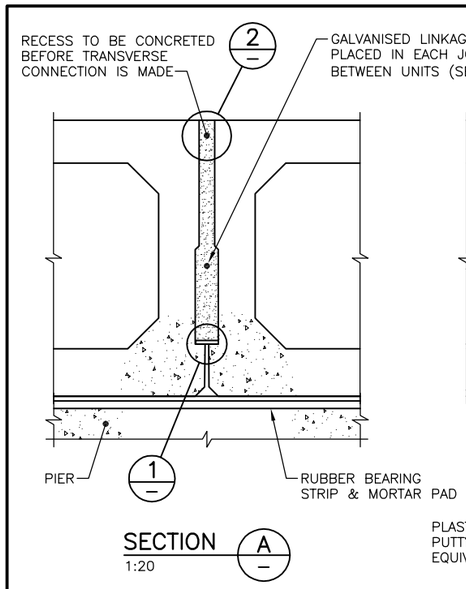
900mm DEEP SINGLE HOLLOW CORE BEAMS – 20m, 22.5m & 25m SPAN UNIT DATA

STATUS	FILE				
FOR PUBLICATION	99/401/2/7504/5				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
		S2.14			0

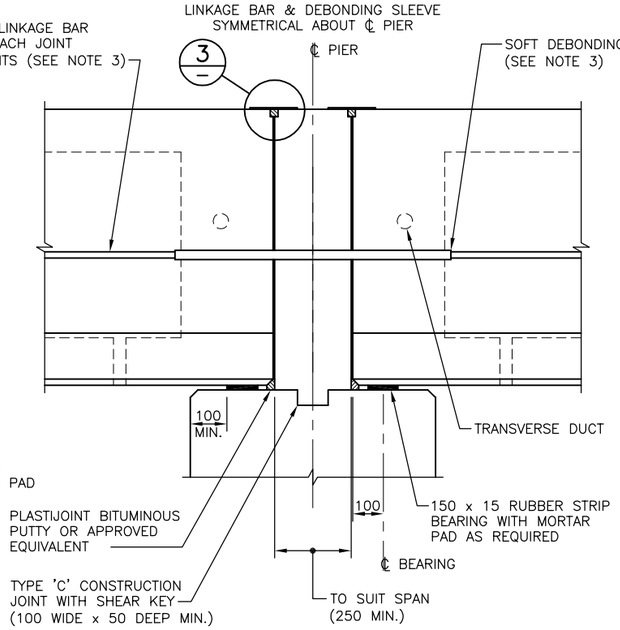
DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\shcunits\99_401_2_7504_5.dwg

GRAPHIC SCALES

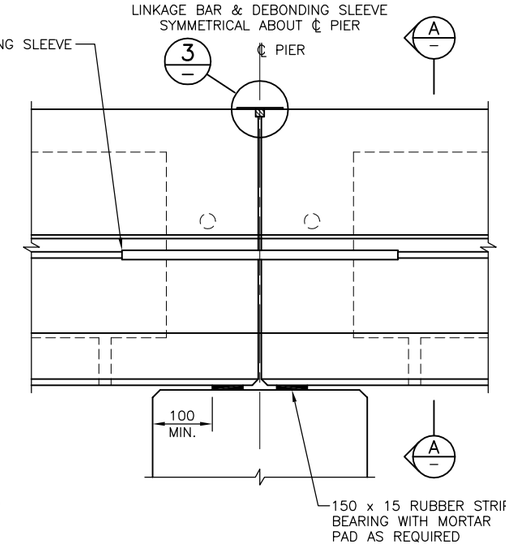
ORIGINAL SHEET SIZE A3 [420x297]



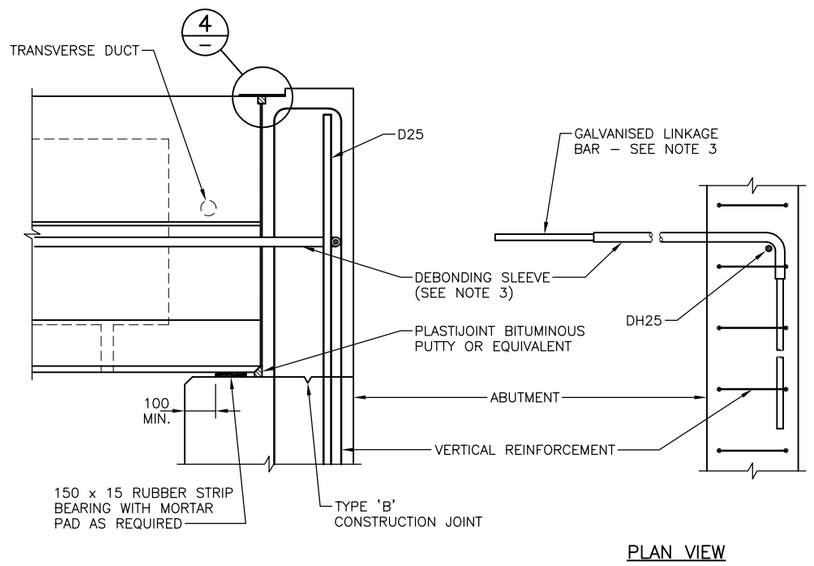
SECTION A
1:20



PIER CONNECTION (ALTERNATIVE 1)
1:20

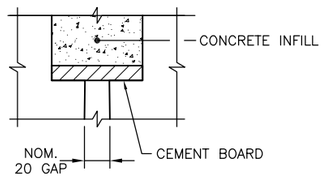


PIER CONNECTION (ALTERNATIVE 2)
1:20

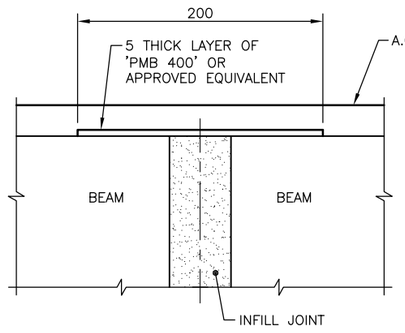


PLAN VIEW

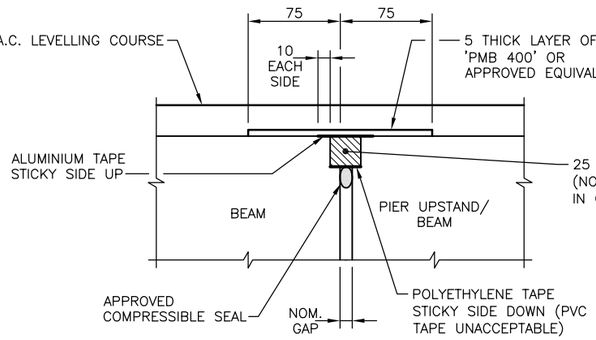
ABUTMENT CONNECTION
1:20



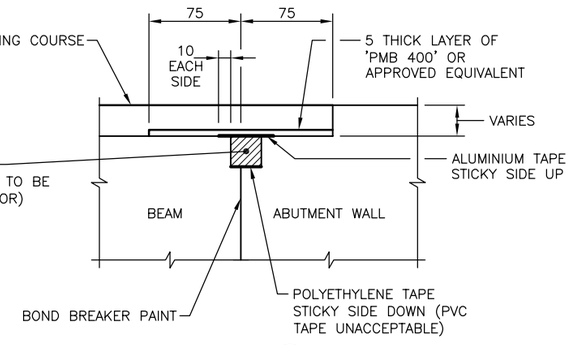
DETAIL 1
1:5



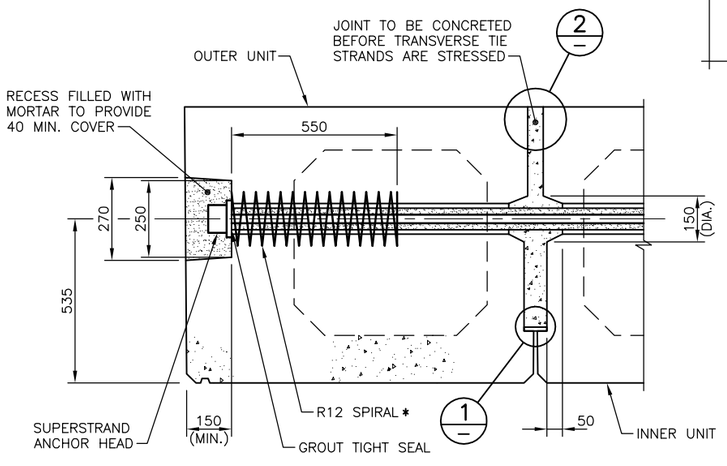
DETAIL 2
1:5



DETAIL 3
1:5

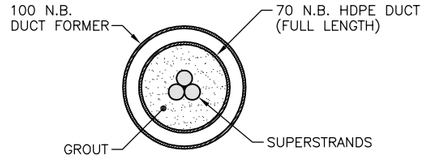


DETAIL 4
1:5



TRANSVERSE CONNECTION REQUIREMENTS:
* REFER TO TABLE OF TRANSVERSE STRESSING REQUIREMENTS

TRANSVERSE TIE DETAILS
1:20



SUPERSTRAND DUCT DETAIL
1:5

TRANSVERSE STRESSING REQUIREMENTS

SPAN (m)	NUMBER OF TRANSVERSE TENDONS	NO. OF 12.7mm SUPERSTRANDS PER TENDON			ANCHOR CONFINING STEEL
		AT UNIT ENDS	AT QUARTER SPAN	AT MID-SPAN	SPIRALS
20	5	3	3	3	R12/175mm DIA./40mm PITCH
22.5	5	3	3	3	R12/175mm DIA./40mm PITCH
25	5	3	3	3	R12/175mm DIA./40mm PITCH

NOTES:

1. LINKAGE BAR DEBONDING SLEEVES MAY BE REPLACED WITH AN ALTERNATIVE BOND BREAKING MATERIAL OF EQUIVALENT THICKNESS. (E.G. 'DENSO' OR 'PROTECTO' TAPE).
2. LINKAGE BAR DETAILS AS SHOWN ARE SUITABLE FOR MOST HOLLOW CORE UNIT INSTALLATIONS. ALTERNATIVE CONNECTIONS CAN BE USED IF REQUIRED.
3. LINKAGE BARS TO BE GRADE 500E. THE DESIGNER SHALL DETERMINE THE REQUIRED LINKAGE BAR SIZE AND LENGTH ACCORDING TO THE BRIDGE FORM AND SEISMICITY OF THE BRIDGE SITE.
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2007).
5. TRANSVERSE STRAND STRESSED TO 70% OF MINIMUM BREAKING LOAD (184kN/STRAND).

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

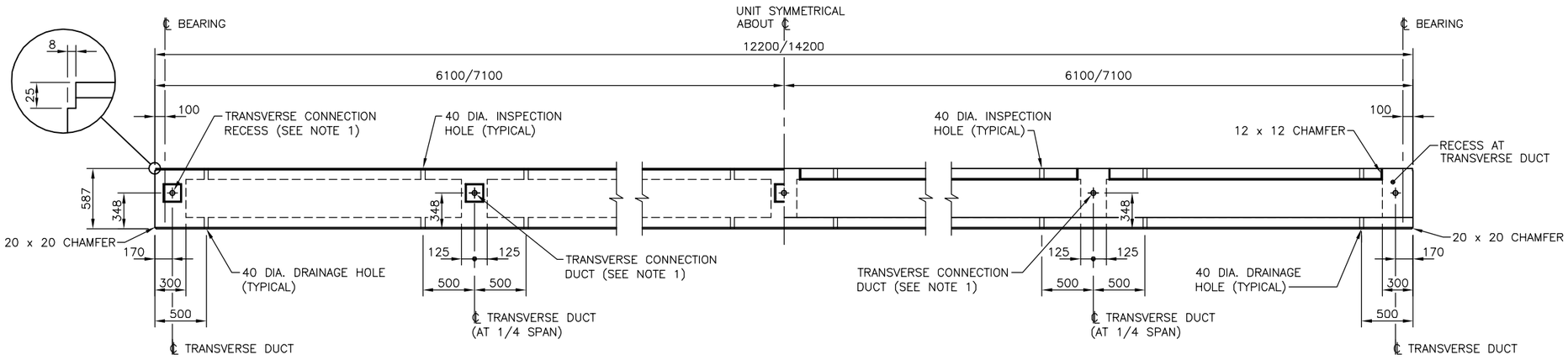
900mm DEEP SINGLE HOLLOW CORE BEAMS – 20m, 22.5m & 25m SPAN
LINKAGE BAR & TRANSVERSE CONNECTION DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/2/7504/6				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S2.15			0

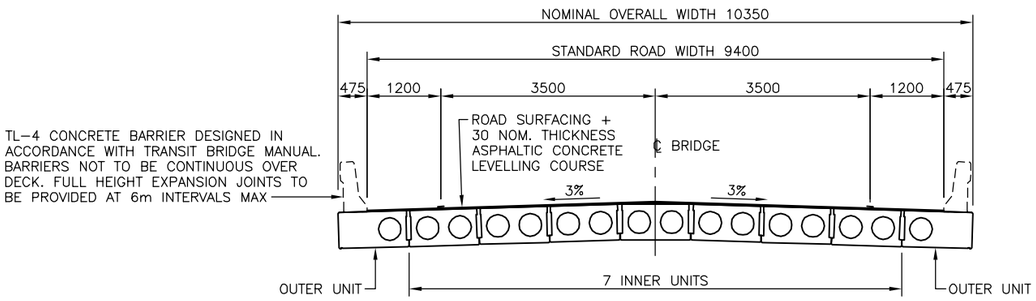
DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\shcunits\99_401_2_7504_6.dwg

GRAPHIC SCALES

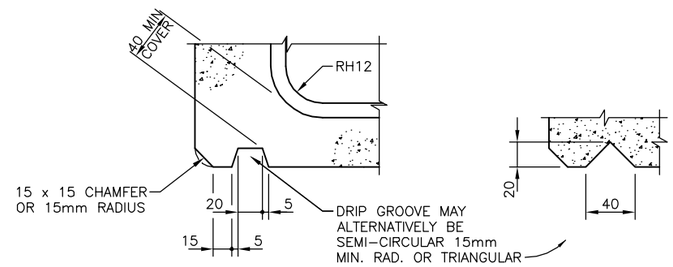
ORIGINAL SHEET SIZE A3 [420x297]



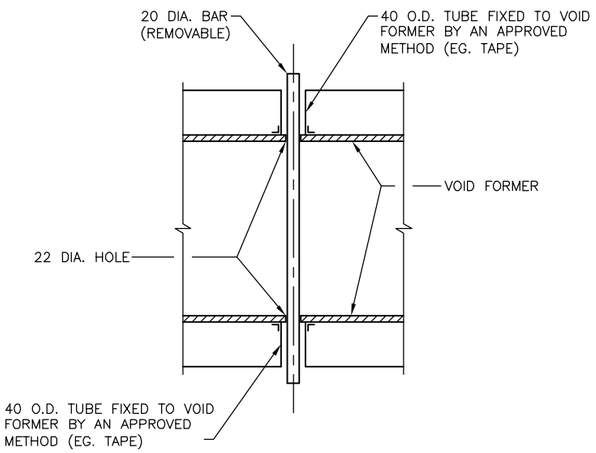
PART ELEVATION – DIMENSIONS
1:50



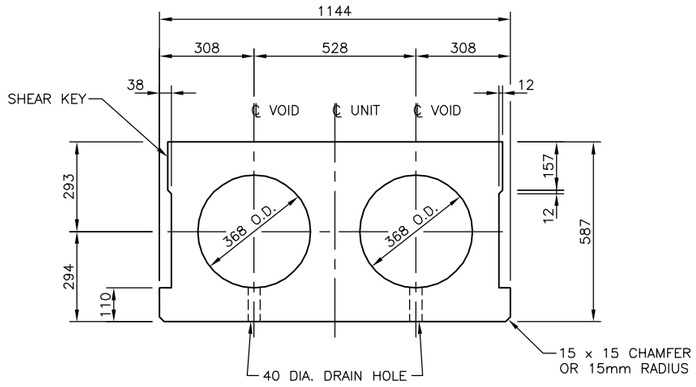
TYPICAL BRIDGE CROSS–SECTION
1:100



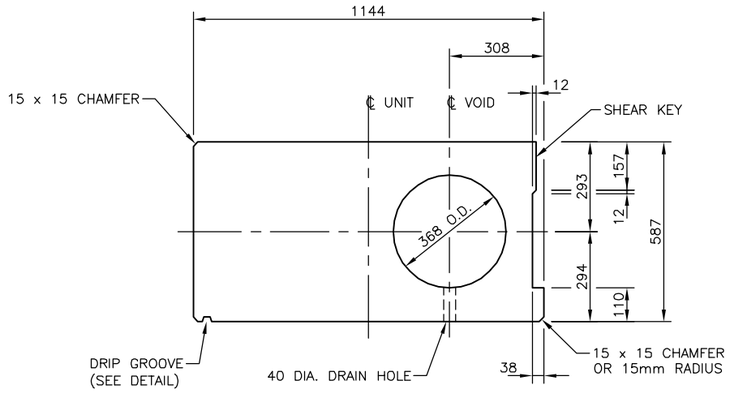
DRIP GROOVE DETAIL
1:5



INSPECTION AND DRAINAGE HOLE DETAILS



TYPICAL SECTION – INNER UNIT DIMENSIONS
1:20



TYPICAL SECTION – OUTER UNIT DIMENSIONS
1:20

NOTES:

1. RECESS FOR TRANSVERSE CONNECTION IN OUTER UNIT SHALL BE DIMENSIONED TO SUIT THE TYPE OF CONNECTION SYSTEM ADOPTED.
2. INSPECTION HOLES SHALL EXTEND TO THE VOID FORMERS ONLY AND SHALL BE MORTARED AFTER FINAL INSPECTION OF THE UNITS. DRAINAGE HOLES SHALL EXTEND THROUGH THE VOID FORMERS AND INTO THE VOID.
3. INNER UNITS HAVE BEEN DESIGNED ON THE BASIS OF BEING CONFINED BY OTHER UNITS BEING PLACED AND STRESSED AGAINST THEM. THEY ARE NOT TO BE USED AS SINGLE UNITS IN ISOLATION.
4. VOID SHAPE MAY BE HEXAGONAL PROVIDED THE SAME CROSS–SECTIONAL AREAS, COVER, WEB THICKNESS, LOCATION & UNIT WEIGHT IS MAINTAINED.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

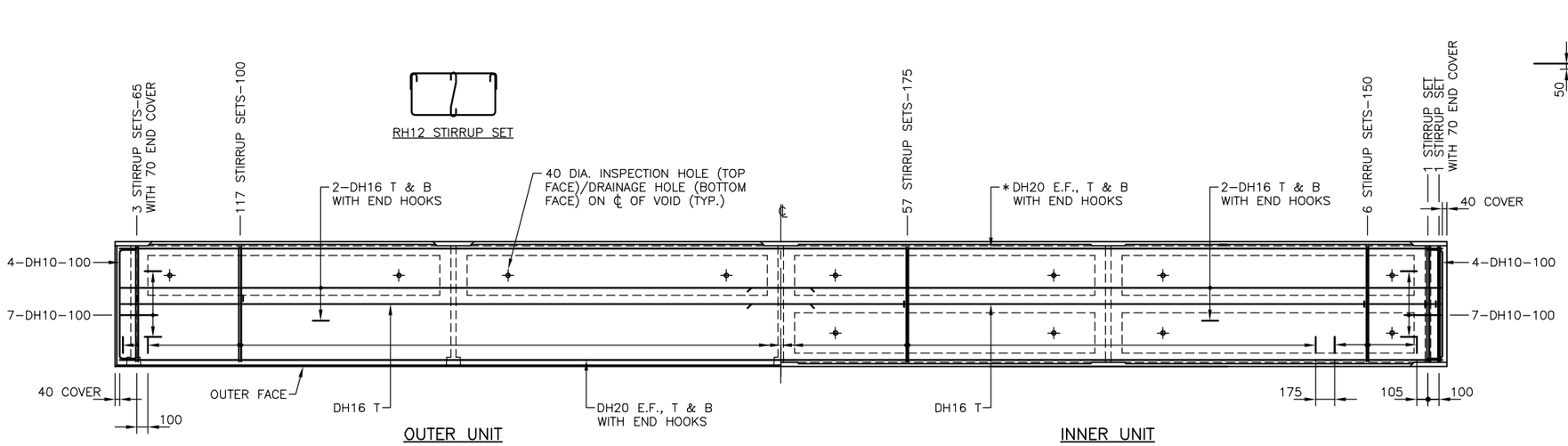
TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS
587mm DEEP DOUBLE HOLLOW CORE BEAMS – 12m & 14m SPAN ARRANGEMENT & DIMENSIONS

STATUS	FILE				
FOR PUBLICATION	99/401/3/7504/1				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S3.01			0

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\dhcunits\99_401_3_7504_1.dwg

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

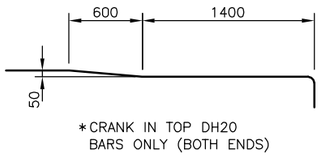


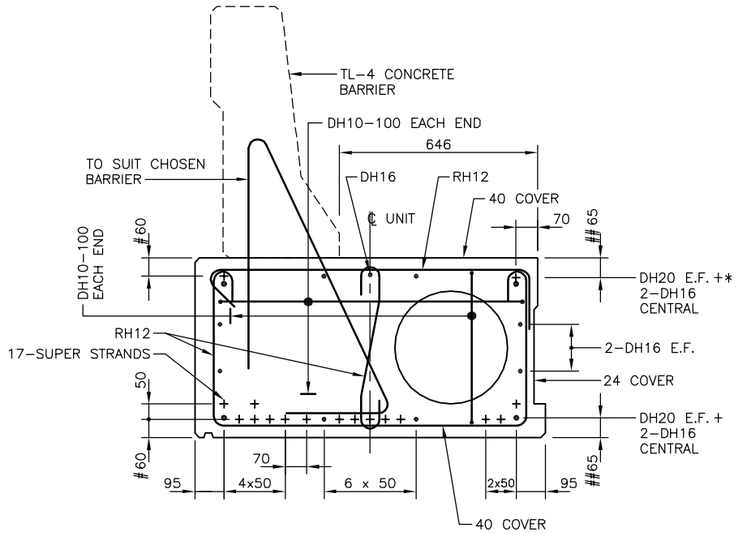
NOTE: BARRIER CONNECTION REINFORCEMENT OMITTED FOR CLARITY.

PART PLAN – REINFORCEMENT

1:50

NOTE: – END HOOKS TO BE SEMI–CIRCULAR STANDARD HOOKS
– END HOOKS TO BE INSIDE VOLUME OF CONCRETE WITH REQUIRED COVER PROVIDED

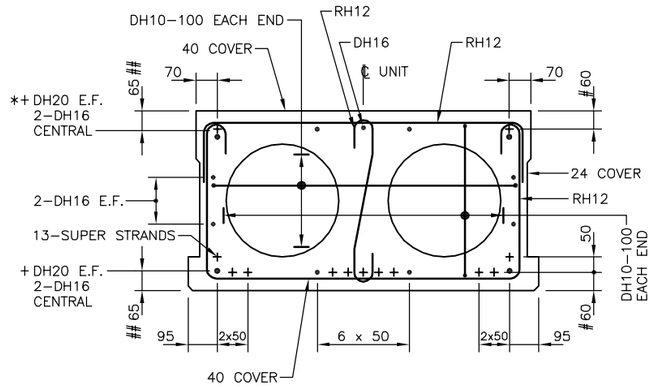




TYPICAL SECTION – OUTER UNIT REINFORCEMENT & STRAND LAYOUT WITH CONCRETE BARRIER FIXING

1:20

\# TO STRAND ℄
TO BAR ℄
* BUNDLED WITH STRAND (CORNER BARS ONLY)
\+ IF PRESTRESSING STRAND (12.9mm DIA. CBL 186kN) IS SUBSTITUTED FOR LONGITUDINAL CORNER REINFORCING BARS, ADDITIONAL REINFORCING BARS ANCHORED WITH HOOKS ARE REQUIRED AT BEAM ENDS TO SATISFY TORSION CAPACITY REQUIREMENTS.



TYPICAL SECTION – INNER UNIT REINFORCEMENT & STRAND LAYOUT

1:20

NOTE: REINFORCEMENT SYMMETRICAL ABOUT ℄ UNIT

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

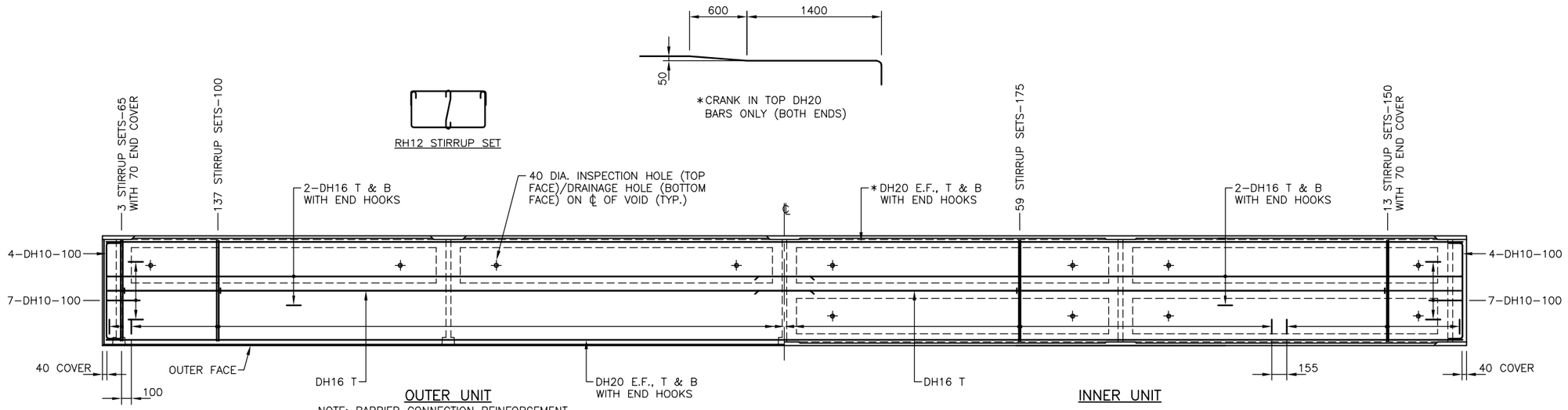
587mm DEEP DOUBLE HOLLOW CORE BEAMS – 12m SPAN
REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/3/7504/2				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S3.02			0

DOCUMENT: G:\Transport\NZTA\Dwgs\miscelloneous\Standard bridge beams\bhcunits\99_401_3_7504_2.dwg

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

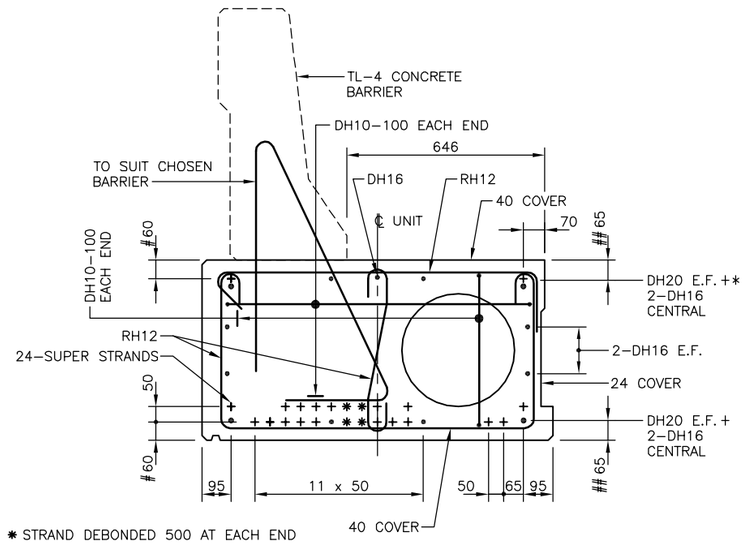


NOTE: BARRIER CONNECTION REINFORCEMENT OMITTED FOR CLARITY.

PART PLAN – REINFORCEMENT

1:50

NOTE: – END HOOKS TO BE SEMI–CIRCULAR STANDARD HOOKS
– END HOOKS TO BE INSIDE VOLUME OF CONCRETE WITH REQUIRED COVER PROVIDED

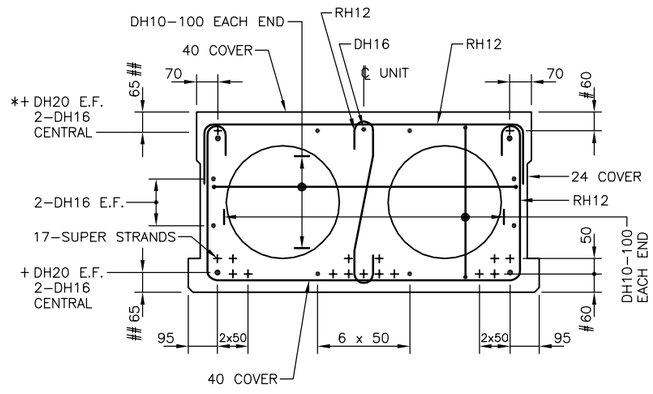


✱ STRAND DEBONDED 500 AT EACH END

TYPICAL SECTION – OUTER UNIT REINFORCEMENT & STRAND LAYOUT WITH CONCRETE BARRIER FIXING

1:20

\# TO STRAND ℄
TO BAR ℄
* BUNDLED WITH STRAND (CORNER BARS ONLY)
\+ IF PRESTRESSING STRAND (12.9mm DIA. CBL 186kN) IS SUBSTITUTED FOR LONGITUDINAL CORNER REINFORCING BARS, ADDITIONAL REINFORCING BARS ANCHORED WITH HOOKS ARE REQUIRED AT BEAM ENDS TO SATISFY TORSION CAPACITY REQUIREMENTS.



TYPICAL SECTION – INNER UNIT REINFORCEMENT & STRAND LAYOUT

1:20

NOTE: REINFORCEMENT SYMMETRICAL ABOUT ℄ UNIT

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

587mm DEEP DOUBLE HOLLOW CORE BEAMS – 14m SPAN
REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/3/7504/3				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S3.03			0

GRAPHIC SCALES 200 mm 100 50 10 mm 0

ORIGINAL SHEET SIZE A3 [420x297]

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\dhcunits\99_401_3_7504_3.dwg

1. PRESTRESSING FORCE AT INITIAL TENSIONING

ALL SUPERSTRANDS SHALL BE 12.7mm SUPER 7 WIRE STRANDS, COMPLYING TO AS/NZS 4672 AND ASSUMED TO HAVE A MINIMUM BREAKING LOAD OF 184kN PER STRAND WITH INITIAL LOADING AS FOLLOWS:

- TOP TWO STRANDS TO BE INITIALLY LOADED TO 127KN PER STRAND
- OTHER STRANDS TO BE INITIALLY LOADED TO 130KN PER STRAND

STRANDS SHALL BE RELEASED SLOWLY AND AFTER RELEASE SHALL BE CUT AND GROUND FLUSH WITH THE CONCRETE AT THE END OF THE UNIT. A THICK COATING OF HIGH BUILD EPOXY PAINT SHALL BE APPLIED AFTER GRINDING BEFORE THE UNIT LEAVES THE CASTING YARD.

2. TOLERANCES

TOLERANCES ARE TO BE IN ACCORDANCE WITH NZS 3109:1997 TABLE 5.1 UNLESS STATED OTHERWISE BELOW.

2.1 DIMENSIONS AT TIME OF ERECTION

ACTUAL OVERALL LENGTH AND SQUARENESS.
THE UNIT END SURFACES SHALL LIE WITHIN THE TOLERANCE BOXES SHOWN IN DIAGRAM A.

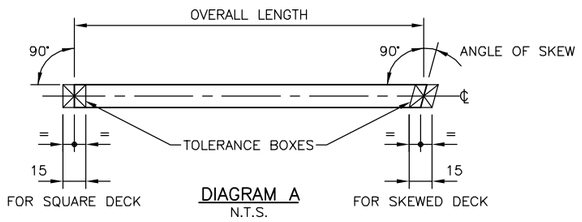


DIAGRAM A
N.T.S.

a. OVERALL LENGTH	±12mm
b. PLANE SURFACE DEVIATION FROM 1.5m STRAIGHT EDGE	±6mm
c. CROSS–SECTIONAL DIMENSION (OVERALL)	±8mm
d. DIFFERENCE IN LEVEL OF TOP SURFACE BETWEEN ADJACENT UNITS IN PLACE	±15mm
e. HORIZONTAL DEVIATION (SEE SPECIFICATION)	±6mm
f. SMALLEST WEB THICKNESS	+6mm,–4mm
g. SMALLEST FLANGE THICKNESS	±6mm
h. DIAPHRAGM THICKNESS	±12mm
j. HOGGING VARIATION (SEE SPECIFICATION)	±15mm
k. MAXIMUM HOG	25mm

2.2 LOCATION OF STEEL AND CAST–IN ITEMS

a. PRESTRESSING STRANDS IN ANY DIRECTION	±3mm
b. LOCATION OF AN ITEM IN RELATION TO ANY OTHER WITHIN ITS GROUP	±10mm
c. TRANSVERSE DUCT POSITION	±12mm
d. VOID FORMERS	±12mm

3. CONCRETE COVER

COVER TO ALL PRESTRESSING COMPONENTS	40mm
COVER TO ALL REINFORCING STEEL	40mm UNLESS SHOWN OTHERWISE
COVER ADJACENT TO VOIDS	30mm
COVER BETWEEN VOIDS AND SHEAR KEYS	24mm
COVER TO BARRIER FIXING STEEL (WITHIN BARRIER)	65mm

4. CONCRETE STRENGTH

MINIMUM COMPRESSIVE STRENGTH AT TRANSFER	30MPa
SPECIFIED COMPRESSIVE STRENGTH AT 28 DAYS	50MPa
INFILL CONCRETE BETWEEN UNITS	30MPa
MORTAR BACKFILL TO TRANSVERSE STRAND ANCHORAGE POCKETS	50MPa
NON–SHRINK GROUT TO TRANSVERSE PRESTRESSING STRAND DUCTS	40MPa

5. DESIGN LOADING

HN–HO–72 (INCLUDING SLS LIVE LOAD FACTOR OF 1.35)

6. SPECIFICATION

THIS DESIGN IS BASED ON MATERIALS AND WORKMANSHIP IN ACCORDANCE WITH THE LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2007).

NOTES:

1. CABLES AND SMALL SERVICES MAY BE ACCOMMODATED IN THE HOLLOW CORES BUT NOWHERE ELSE IN THE UNIT. THE SERVICE DUCTS ARE TO BE LIMITED TO 100mm O.D. WITH NO MORE THAN ONE DUCT IN EACH HOLLOW CORE. CLEARANCE TO THE TRANSVERSE DUCTS SHALL BE NOT LESS THAN 40mm.
2. AN ALLOWANCE FOR TOLERANCES HAS BEEN MADE IN THE NOMINAL OVERALL WIDTH DIMENSION SHOWN IN THE TYPICAL SECTIONS. UNITS ARE SPACED AT 1.150m CENTRES TO ALLOW A WORKING TOLERANCE ON WIDTH & STRAIGHTNESS.

7. HANDLING

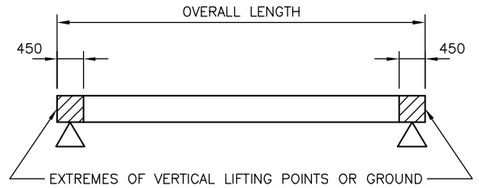
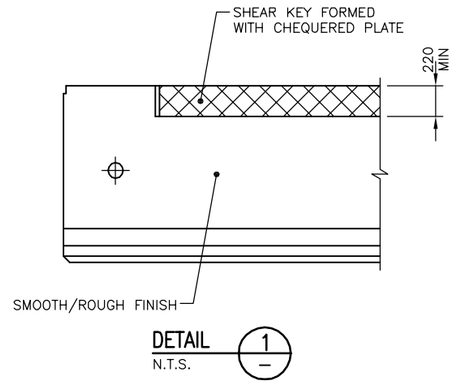


DIAGRAM B
N.T.S.

8. SURFACE FINISHES

a. TOP SURFACE – BROOM FINISH.

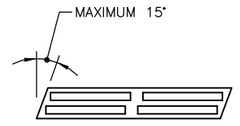
b. SIDE AND UNDERSIDE SURFACE – SMOOTH/ROUGH FINISH EXCEPT SHEAR KEY. SEE DETAIL 1



DETAIL 1
N.T.S.

9. SKEW

THE MAXIMUM PERMISSIBLE SKEW OF THE UNITS SHALL BE 15° UNLESS A SPECIFIC LIVE LOAD ANALYSIS IS MADE. THE CORES SHALL BE STAGGERED TO ALLOW SKEW OF THE TRANSVERSE DUCT. THE END OF THE UNIT SHALL BE SKEWED TO THE REQUIRED ANGLE – SEE DETAIL 2.



DETAIL 2

STIRRUPS SHALL BE PLACED PARALLEL TO THE LINE OF SKEW WITHIN 1m OF EACH END DIAPHRAGM. STIRRUPS ALONG THE SPAN SHALL BE PLACED NORMAL TO LONGITUDINAL STEEL WITH THE SKEW/NORMAL STIRRUP INTERFACE HAVING ADDITIONAL STIRRUPS IN A FAN ARRANGEMENT WITH THE SPECIFIED MAXIMUM STIRRUP SPACING ON THE OUTSIDE OF THE 'FAN'.

10. VOID FORMERS

SURFACES OF VOIDS ARE TO BE RENDERED IMPERMEABLE TO WATER PENETRATION FOR THE DESIGN LIFE OF THE UNIT, EITHER BY SURFACE TREATMENT OR USE OF HOLLOW OR LIGHTWEIGHT SOLID VOID FORMERS OR SUITABLE MATERIAL. PROPOSED METHOD SHALL BE TO THE ENGINEER'S CONSENT.

MAXIMUM WEIGHT OF VOID FORMER = 6kg/m

GRAPHIC SCALES
200 mm
100
50
10 mm
0

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

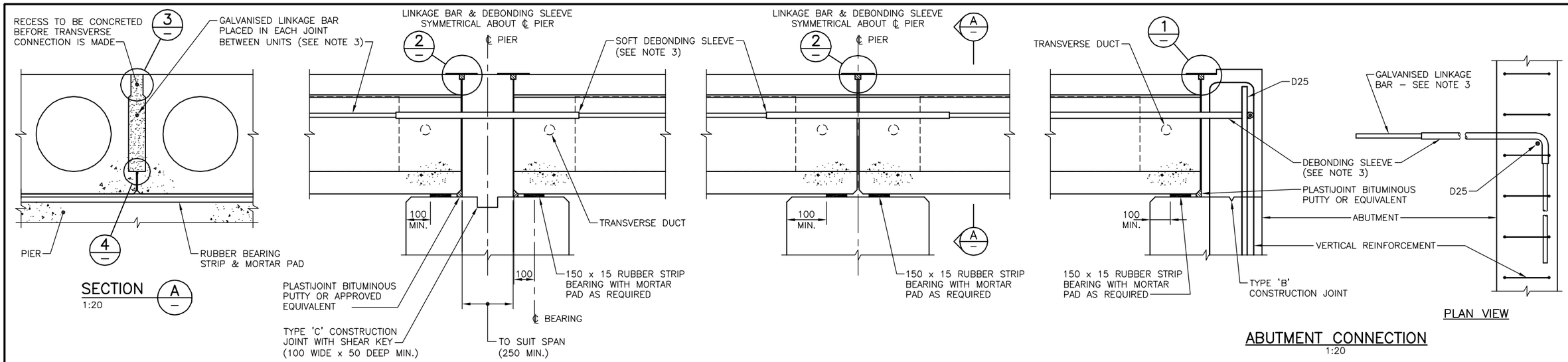
TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS
587mm DEEP DOUBLE HOLLOW CORE BEAMS – 12m & 14m SPAN
UNIT DATA

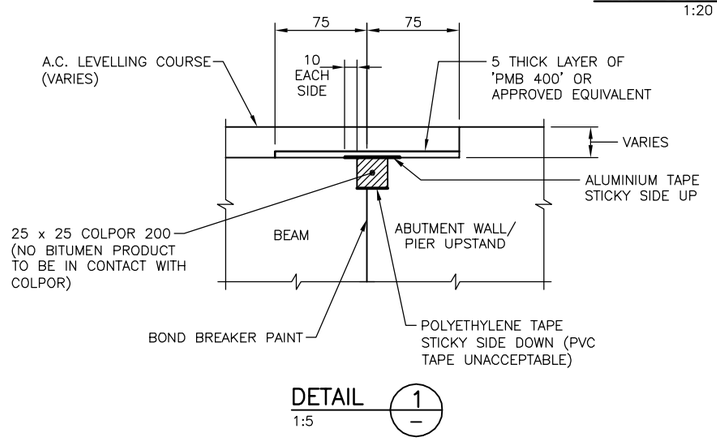
STATUS	FILE	DRAWING NUMBER	CODE	SHEET	REVISION
FOR PUBLICATION	99/401/3/7504/4	S3.04			0

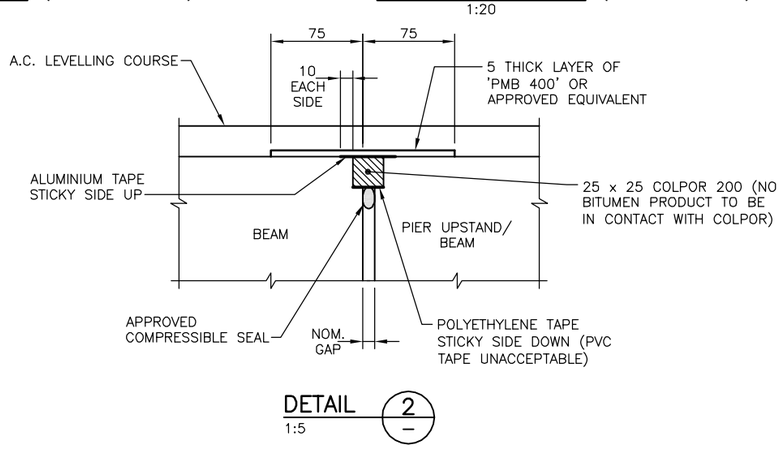
SCALE | PLOT DATE

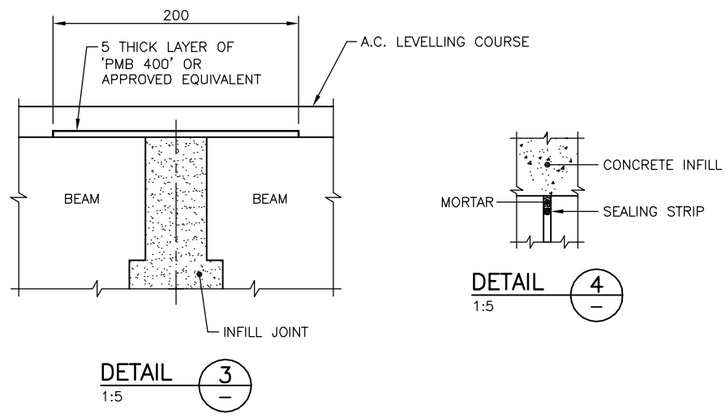
DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\dhcunits\99_401_3_7504_4.dwg

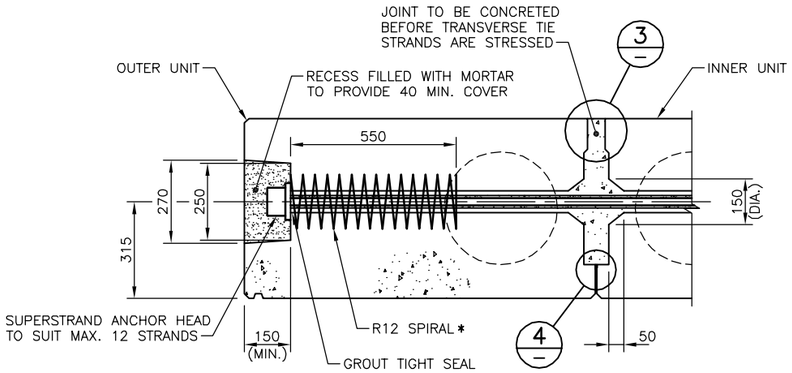
ORIGINAL SHEET SIZE A3 [420x297]

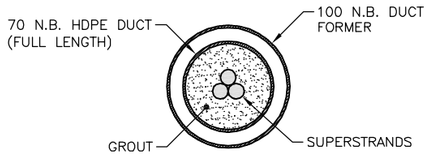












TRANSVERSE STRESSING REQUIREMENTS

SPAN (m)	NUMBER OF TRANSVERSE TENDONS	NO. OF 12.7mm SUPERSTRANDS PER TENDON			ANCHOR CONFINING STEEL
		AT UNIT ENDS	AT QUARTER SPAN	AT MID–SPAN	SPIRALS
12	5	3	3	3	R12/175mm DIA./40mm PITCH
14	5	3	3	3	R12/175mm DIA./40mm PITCH

NOTES:

1. LINKAGE BAR DEBONDING SLEEVES MAY BE REPLACED WITH AN ALTERNATIVE BOND BREAKING MATERIAL OF EQUIVALENT THICKNESS. (E.G. 'DENSO' OR 'PROTECTO' TAPE).
2. LINKAGE BAR DETAILS AS SHOWN ARE SUITABLE FOR MOST DOUBLE HOLLOW CORE UNIT INSTALLATIONS. ALTERNATIVE CONNECTIONS CAN BE USED IF REQUIRED.
3. LINKAGE BARS TO BE GRADE 500E. THE DESIGNER SHALL DETERMINE THE REQUIRED LINKAGE BAR SIZE AND LENGTH ACCORDING TO THE BRIDGE FORM AND SEISMICITY OF THE BRIDGE SITE.
4. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2007).
5. ALTERNATIVE DETAILS TO THOSE SHOWN MAY BE USED WHEN APPROPRIATE.
6. TRANSVERSE STRAND STRESSED TO 70% OF MINIMUM BREAKING LOAD (184kN/STRAND).

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

587mm DEEP DOUBLE HOLLOW CORE – 12m &14m SPAN
LINKAGE BAR & TRANSVERSE CONNECTION DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/3/7504/5				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S3.05			0

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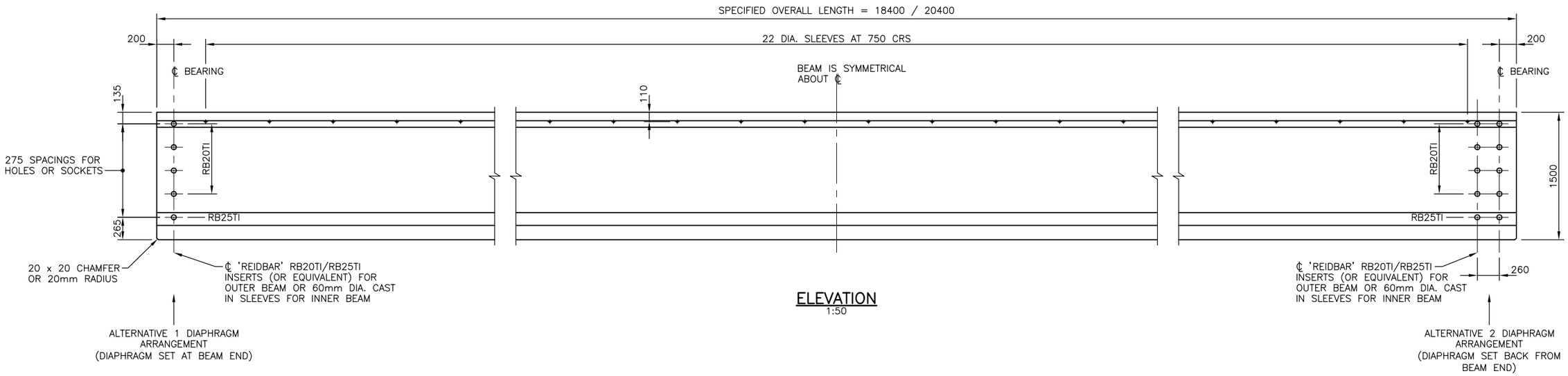
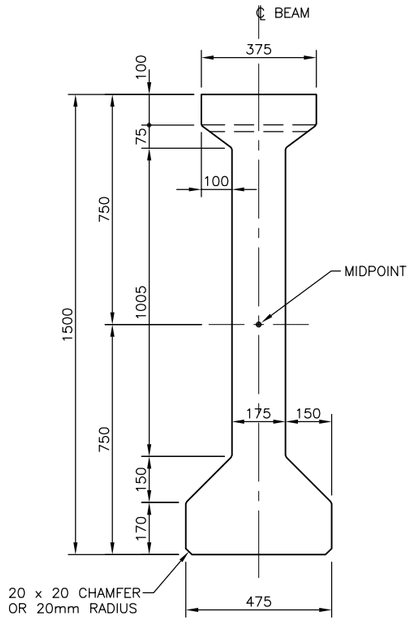
GRAPHIC SCALES

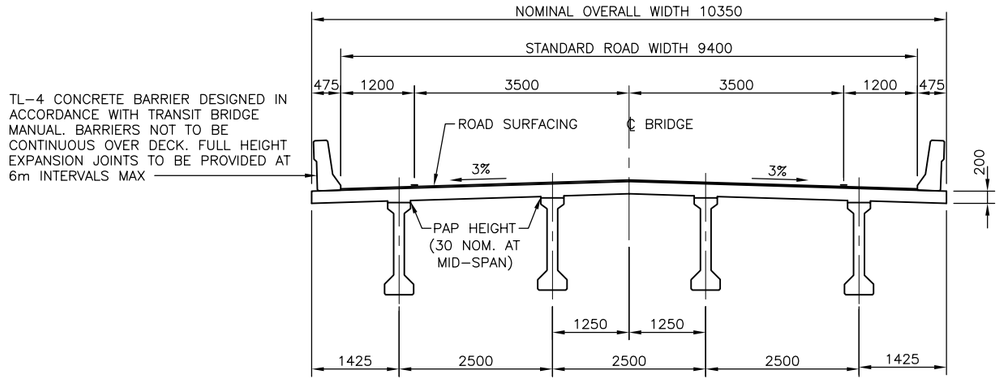
ORIGINAL SHEET SIZE A3 [420x297]



ELEVATION
1:50



TYPICAL SECTION
1:20



TYPICAL BRIDGE CROSS-SECTION
1:100

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS

1500mm DEEP I-BEAMS – 18m & 20m SPAN ARRANGEMENT & DIMENSIONS

STATUS	FILE				
FOR PUBLICATION	99/401/4/7504/1				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S4.01			0

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\I-beams\99_401_4_7504_1D3.dwg

GRAPHIC SCALES

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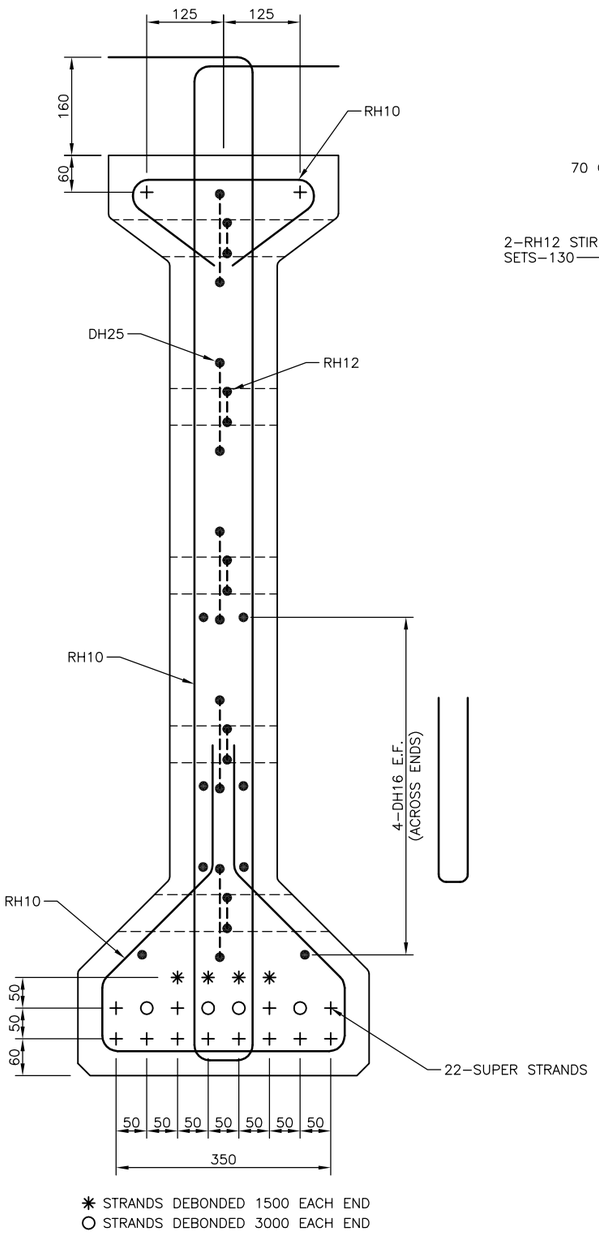
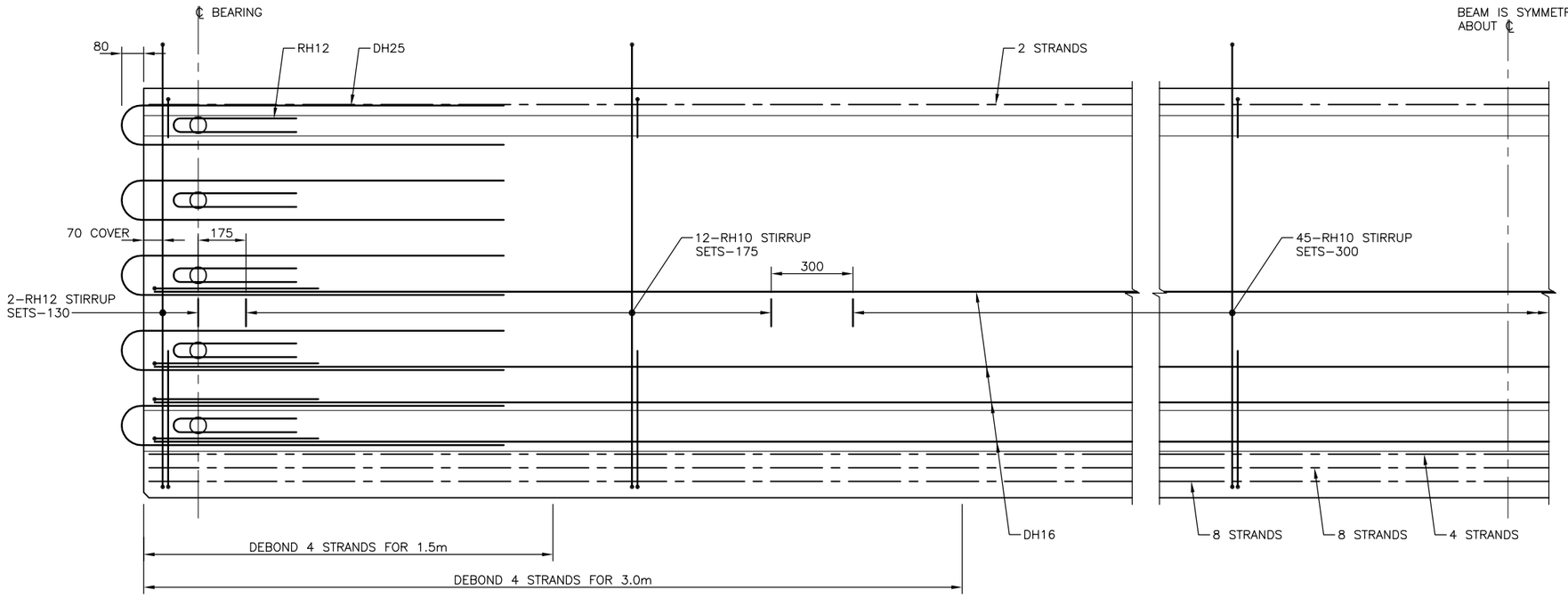
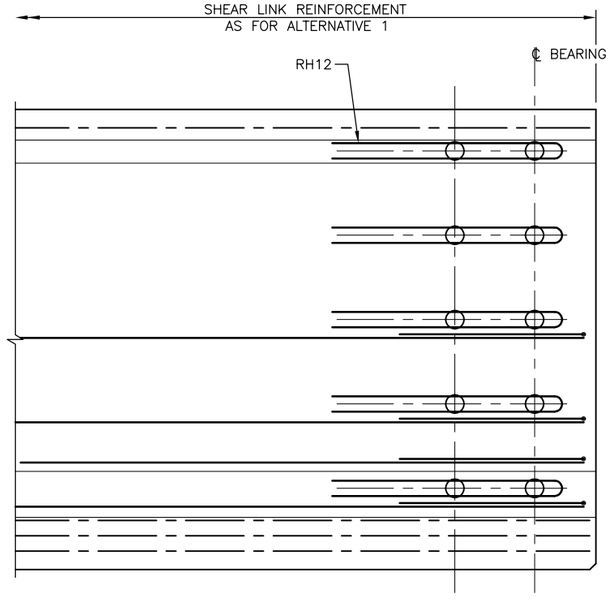


TYPICAL SECTION
REINFORCMENT & STRAND LAYOUT



ALTERNATIVE 1
END DIAPHRAGM ARRANGEMENT

PART ELEVATION
1:20



ALTERNATIVE 2
END DIAPHRAGM ARRANGEMENT

PART ELEVATION
1:20

200 mm
100
50
10 mm
0

GRAPHIC SCALES

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

1500mm DEEP I–BEAMS – 18m SPAN
REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/4/7504/2				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S4.02			0

ORIGINAL SHEET SIZE A3 [420x297]

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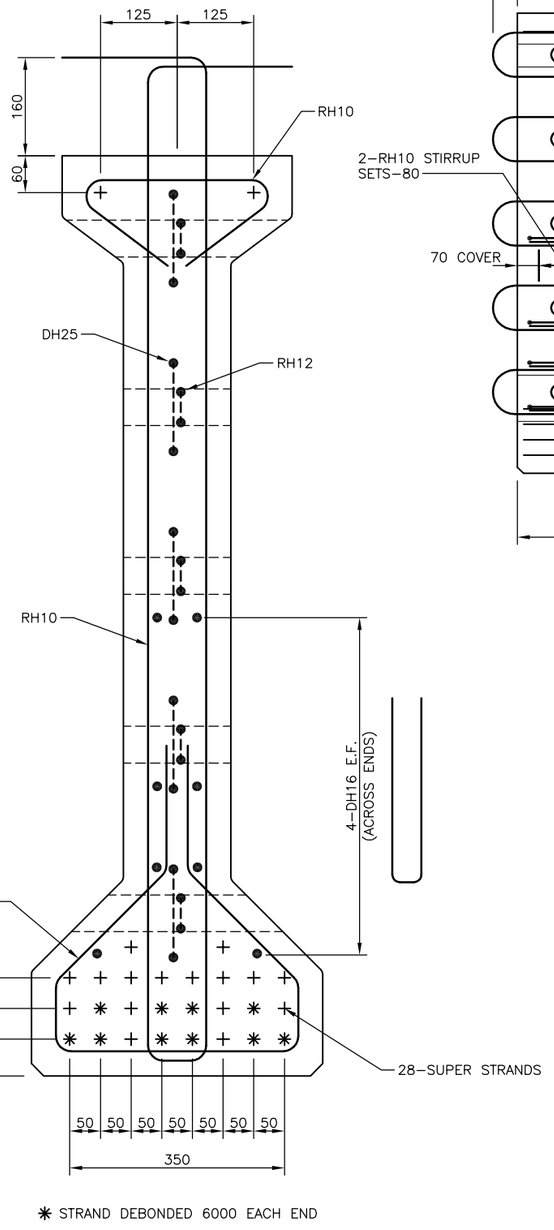
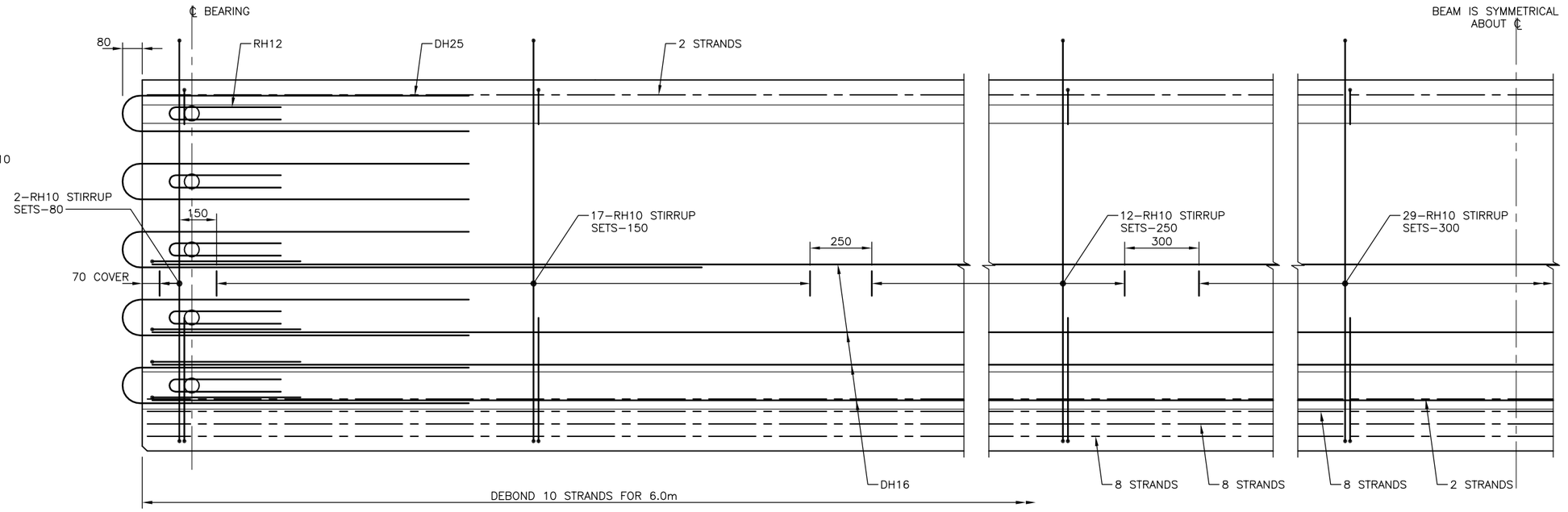


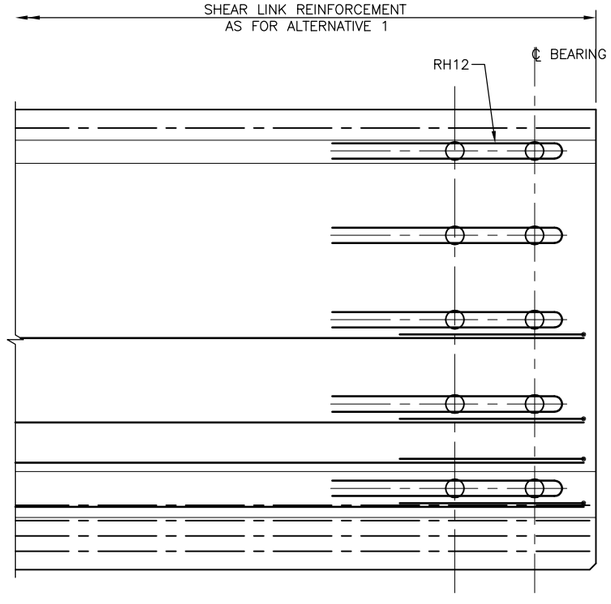
✱ STRAND DEBONDED 6000 EACH END

TYPICAL SECTION
REINFORCMENT & STRAND LAYOUT
1:10



ALTERNATIVE 1
END DIAPHRAGM ARRANGEMENT

PART ELEVATION
1:20



ALTERNATIVE 2
END DIAPHRAGM ARRANGEMENT

PART ELEVATION
1:20

AMENDMENT	APP'D	DATE
		1/08

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

1500mm DEEP I–BEAMS – 20m SPAN
REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/4/7504/3				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S4.03			0

GRAPHIC SCALES: 200 mm, 100, 50, 0, 10 mm

ORIGINAL SHEET SIZE A3 [420x297]

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\I–beams\99_401_4_7504_302.dwg

1. SPECIFIED CONCRETE COMPRESSIVE STRENGTHS

AT TRANSFER – PRETENSIONING – 30MPa
PRECAST BEAMS AT 28 DAYS – 50MPa
IN SITU CONCRETE (DECK SLAB, DIAPHRAGMS) AT 28 DAYS – 40MPa

2. REINFORCEMENT & PRESTRESSING

ALL SUPERSTRANDS SHALL BE 12.7mm SUPER 7 WIRE STRANDS COMPLYING TO AS/NZS 4672 AND ASSUMED TO HAVE A MINIMUM BREAKING LOAD OF 184kN PER STRAND WITH INITIAL LOADING AS FOLLOWS:

- TOP TWO STRANDS TO BE LOADED TO 125kN PER STRAND
- OTHER STRANDS TO BE LOADED TO 136kN PER STRAND

3. CONCRETE COVER (MINIMUM)

COVER TO ALL PRESTESSING COMPONENTS – 40mm
COVER TO REINFORCEMENT UNLESS SHOWN OTHERWISE – 40mm
COVER ADJACENT TO CORED HOLES – 30mm
COVER TO BRIDGE DECK & ALL CAST IN SITU CONCRETE – 50mm
COVER TO BARRIER FIXING STEEL (WITHIN BARRIER) – 50mm

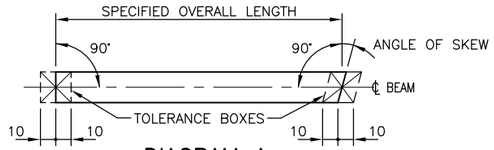
4. DESIGN LOADING

HN–HO–72 (INCLUDING SLS LIVE LOAD FACTOR OF 1.35)

5. SPECIFICATION

THIS DESIGN IS BASED ON LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2007)

6. TOLERANCES



FOR SQUARE DECK **DIAGRAM A** FOR SKEWED DECK

6.1. DIMENSIONS AT TIME OF ERECTION

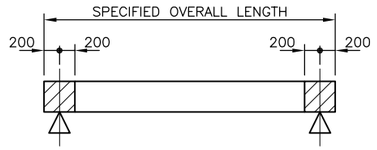
ACTUAL OVERALL LENGTH AND SQUARENESS
a. THE UNDERSIDE OF THE BEAM FOR THE END 700mm SHALL BE TRUE PLANE.
b. THE BEAM END SURFACES SHALL LIE WITHIN THE 'TOLERANCE BOXES' SHOWN IN DIAGRAM A.
c. PLANE SURFACE, DEVIATION FROM A 1.5m STRAIGHT EDGE..... ±5mm
d. BEAM HOGGING (SEE SPECIFICATION)
e. CROSS SECTION DIMENSIONS UP TO 0.5m..... ±5mm
f. CROSS SECTION DIMENSIONS 0.5m TO 2.0m..... ±10mm
g. HORIZONTAL BOW OF LONGITUDINAL AXIS..... ±20mm

6.2. DIMENSIONS AT TIME OF ERECTION

a. LONGITUDINAL STEEL REINFORCEMENT..... ±10mm
b. LOCATION OF AN ITEM IN RELATION TO ANY OTHER ITEM WITHIN ITS GROUP OR TO THE MIDPOINT OF THE BEAM ENDS..... ±10mm
c. PRETENSIONING PRESTRESSING STRANDS IN ANY DIRECTION..... ±5mm
EXCEPT WHERE THE ERROR IN LOCATION REDUCES COVER THE TOLERANCE IS REDUCED TO..... ±3mm

7. HANDLING

EXTREMES OF VERTICAL LIFTING POINTS OR GROUND SUPPORT SHOWN HATCHED.
CENTRAL SUPPORT POSITION AS SHOWN IS PREFERRED (BEAM VERTICAL AT ALL TIMES).



BEAM SUPPORT & LIFTING POINTS

8. METHOD OF MANUFACTURE

BEAMS SHALL BE MANUFACTURED UNDER FACTORY CONDITIONS

9. SURFACE FINISHES

BEAMS a. TOP SURFACE
AS FOR TYPE B CONSTRUCTION JOINT (AS SPECIFIED IN NZS 3109)
b. SIDE SURFACE
FOR HATCHED AREAS ON DIAGRAM B
INNER BEAM BOTH SIDES – AS FOR TYPE B CONSTRUCTION JOINT AT AREA OF CONTACT WITH DIAPHRAGMS
OUTER BEAM, INNER SIDE ONLY – AS FOR TYPE B CONSTRUCTION JOINT AT AREA OF CONTACT WITH DIAPHRAGMS
REMAINING SIDE SURFACE ALL BEAMS – SMOOTH FINISH
c. END SURFACE
ALTERNATIVE 1 ARRANGEMENT – AS FOR TYPE B CONSTRUCTION JOINT
ALTERNATIVE 2 ARRANGEMENT – SMOOTH FINISH WITH STRANDS CUT FLUSH AND PROTECTED WITH A MINIMUM OF 5mm EPOXY MORTAR
UNDERSIDE SURFACE – SMOOTH FINISH

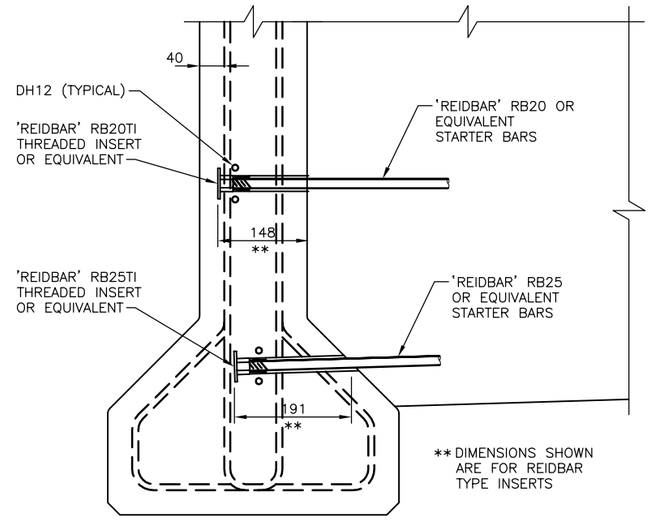
DIAPHRAGM SURFACE FINISH TO BE BASIC FINISH IN ACCORDANCE WITH LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2007).

10. BEARING DESIGN DATA

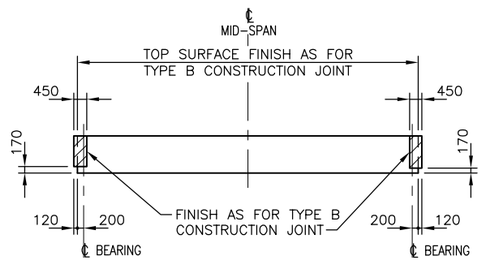
SPAN (m)	REACTION (kN)			ROTATION (x10⁻⁶ RADIANS)	
	DEAD LOAD (UNFACTORED)	LIVE LOAD (1.35HN x I)	OVERLOAD (HO x I)	LIVE LOAD (1.35HN x I)	OVERLOAD (HO x I)
18	323	397	507	802	1001
20	357	406	510	1018	1251

11. AGE AT DECK POURING

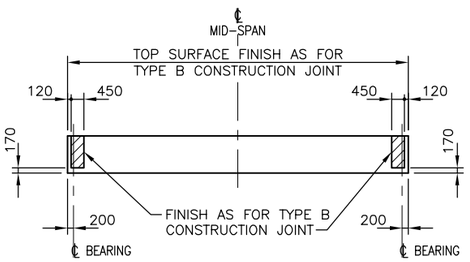
DECK TO BE POURED WITHIN 180 DAYS OF CASTING OF THE FIRST BEAM



TYPICAL END DIAPHRAGM STARTER BAR CONNECTION FOR OUTER BEAM



END DIAPHRAGM SET AT BEAM END (ALTERNATIVE 1 ARRANGEMENT)



END DIAPHRAGM SET BACK FROM BEAM END (ALTERNATIVE 2 ARRANGEMENT)

DIAGRAM B
(SIDE ELEVATION)

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

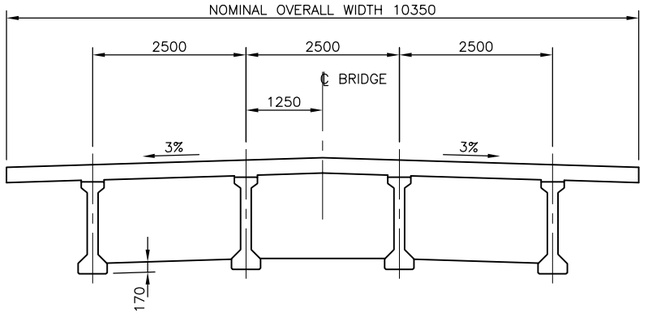
1500mm DEEP I–BEAMS – 18m & 20m SPAN
UNIT DATA

STATUS	FOR PUBLICATION	FILE	99/401/4/7504/4			
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
		S4.04			0

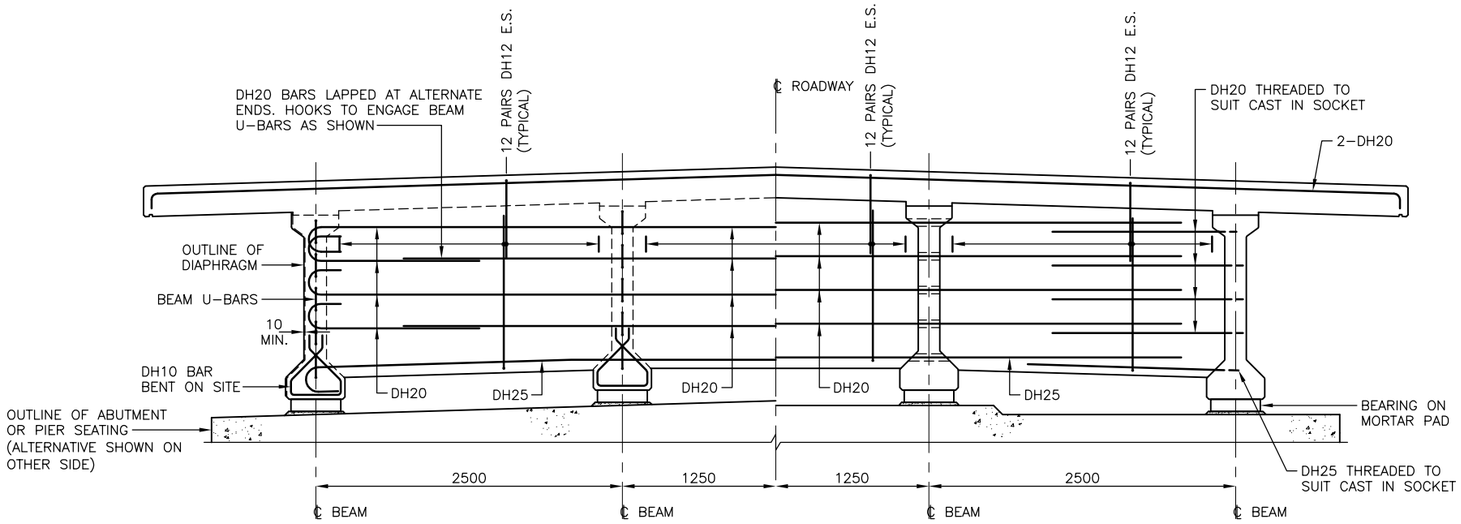
GRAPHIC SCALES
200 mm
100
50
10 mm
0

ORIGINAL SHEET SIZE A3 [420x297]

DOCUMENT: G:\Transport\NZTA\Dwgs\miscellaneous\Standard bridge beams\i–beams\99_401_4_7504_405.dwg



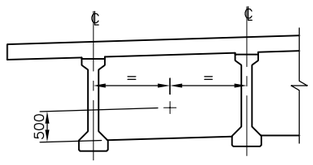
ELEVATION – DIMENSIONS
1:100



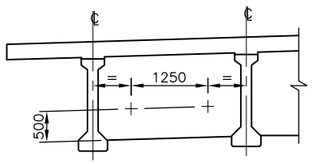
HALF ELEVATION END FACE
(EACH FACE ALTERNATIVE 1 DIAPHRAGM)

HALF ELEVATION SPAN FACE (ALTERNATIVE 1 DIAPHRAGM)
(EACH FACE ALTERNATIVE 2 DIAPHRAGM)

ELEVATION – REINFORCEMENT
1:50

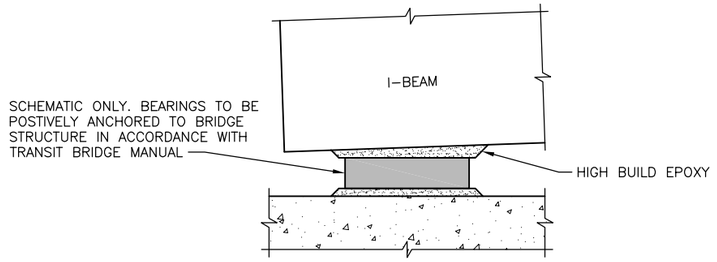


1 BOLT PER DIAPHRAGM BAY

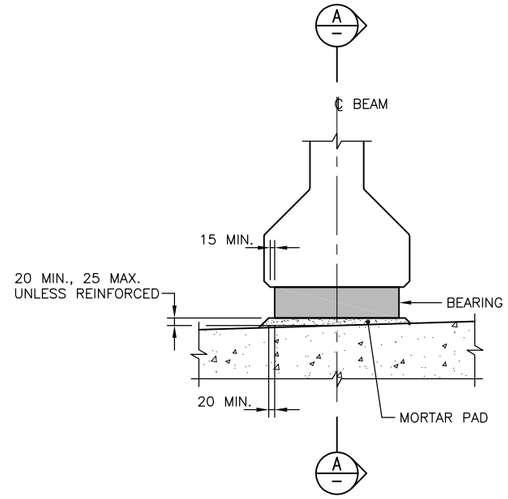


2 BOLTS PER DIAPHRAGM BAY

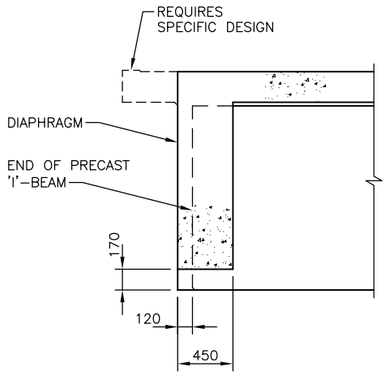
LINKAGE BOLT LAYOUT
N.T.S.
(REFER TO NOTE 2)



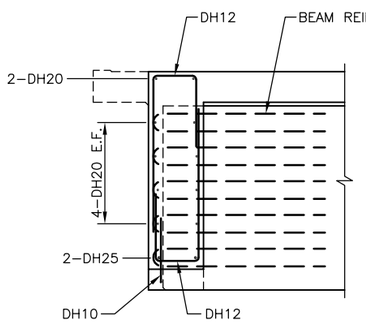
SECTION A–A
N.T.S.
(FOR BEAMS ON LONGITUDINAL SLOPE)



BEARING DETAIL
N.T.S.

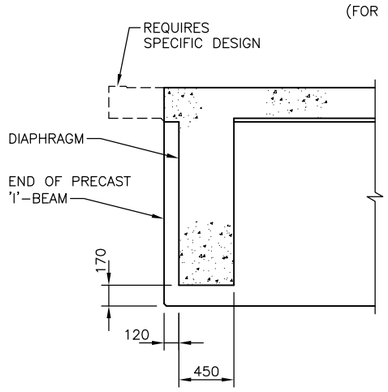


DIMENSIONS

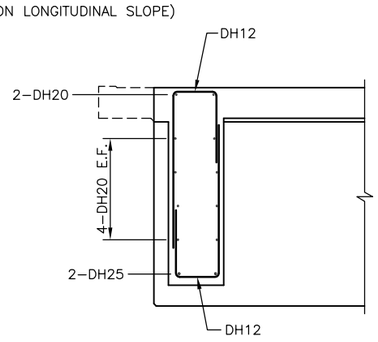


REINFORCEMENT

ALTERNATIVE 1 DIAPHRAGM DETAIL AT BEAM END
(DIAPHRAGM SET AT BEAM END)
1:50



DIMENSIONS



REINFORCEMENT

ALTERNATIVE 2 DIAPHRAGM DETAIL AT BEAM END
(DIAPHRAGM SET BACK FROM BEAM END)
1:50

NOTES:

1. ALL EXPOSED SHARP EDGES AND CORNERS TO HAVE 25 x 25 FILLETS OR CHAMFERS UNLESS SHOWN OTHERWISE.
2. THE NUMBER AND POSITION OF CORED HOLES TO BE CAST INTO DIAPHRAGMS SHALL SUIT THE SEISMIC REQUIREMENTS. CORED HOLES TO BE EITHER 60mm DIA. OR 60 x 200 AS REQUIRED FOR SEISMIC DESIGN.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

1500mm DEEP I–BEAMS – 18m & 20m SPAN
DIAPHRAGM DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/4/7504/5				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S4.05			0

GRAPHIC SCALES
200 mm
100
50
10 mm
0

ORIGINAL SHEET SIZE A3 [420x297]

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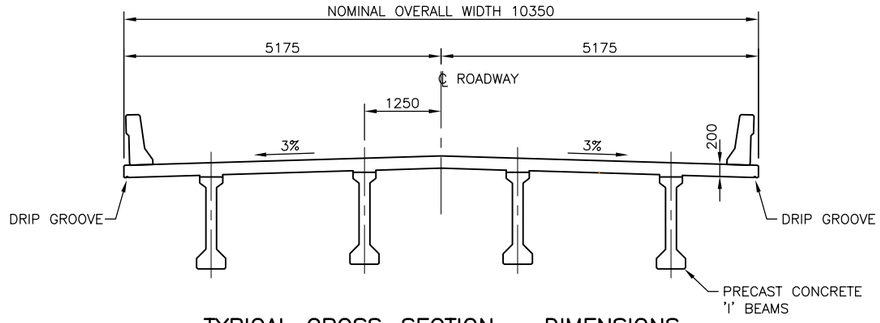
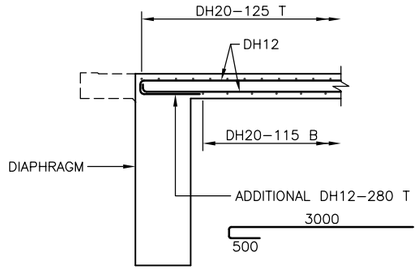
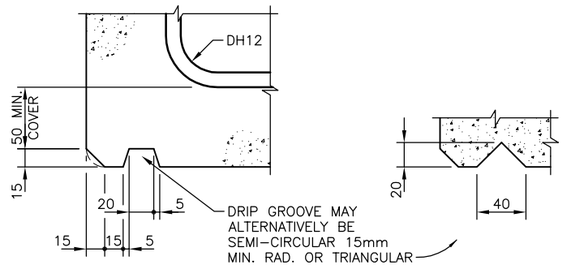


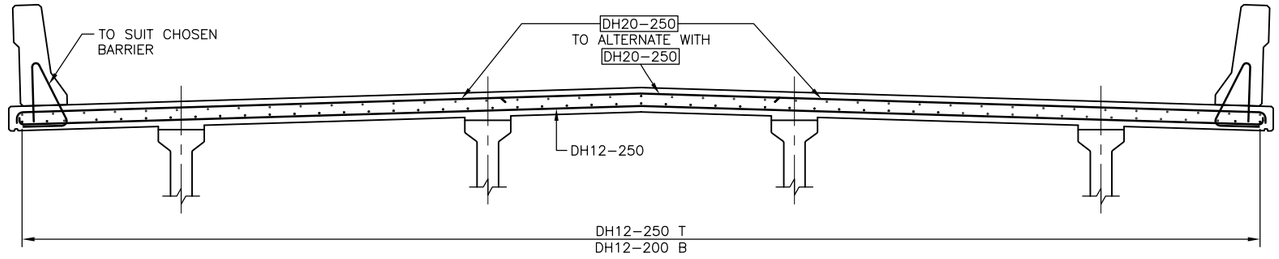
TYPICAL CROSS–SECTION – DIMENSIONS
1:100



END OF DECK AT
EXPANSION JOINT
1:50



DRIP GROOVE DETAIL
1:5



TYPICAL CROSS–SECTION – REINFORCEMENT
1:50

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS

1500mm DEEP I–BEAMS – 18m & 20m SPAN
DECK DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/4/7504/6				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
		S4.06			0

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

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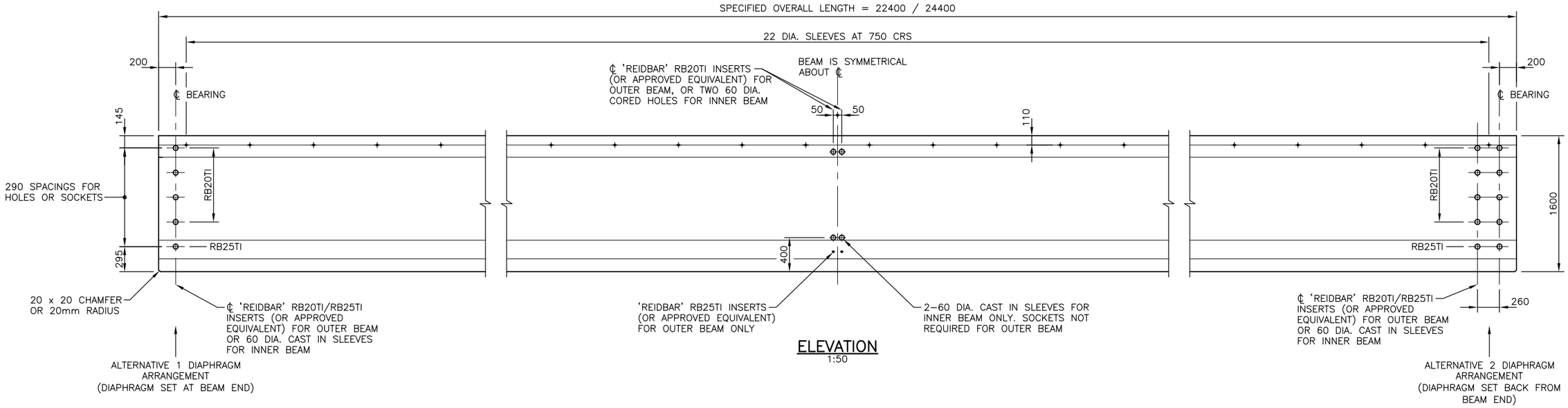
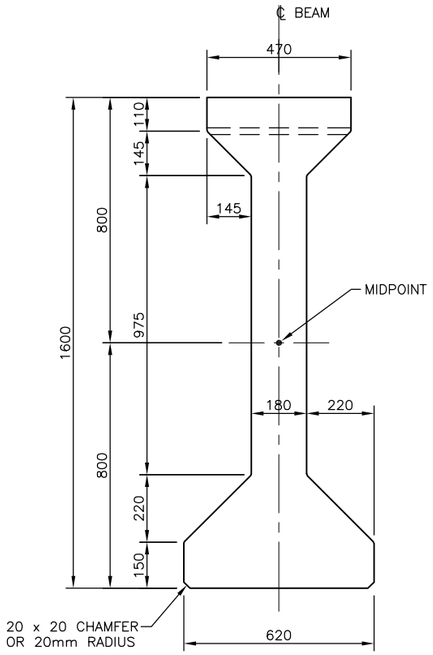
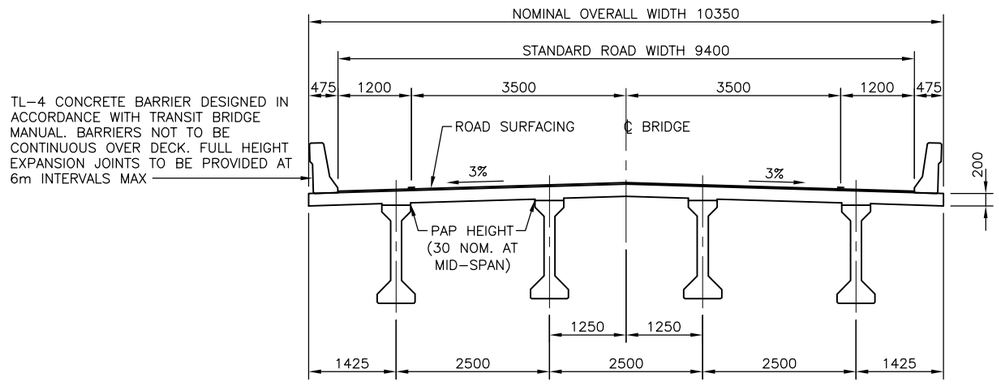


ELEVATION
1:50



TYPICAL SECTION
1:20



TYPICAL BRIDGE CROSS–SECTION
1:100

				BY	CHECKED	DATE
			DESIGN			
			DRAWN			
			APPROVED			
AMENDMENT	APP'D	DATE				

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

1600mm DEEP I–BEAMS – 22m & 24m SPAN ARRANGEMENT & DIMENSIONS

STATUS	PLOT DATE	FILE	CODE	SHEET	REVISION
FOR PUBLICATION		99/401/5/7504/1			
SCALE: AS SHOWN		DRAWING NUMBER: S4.10			0

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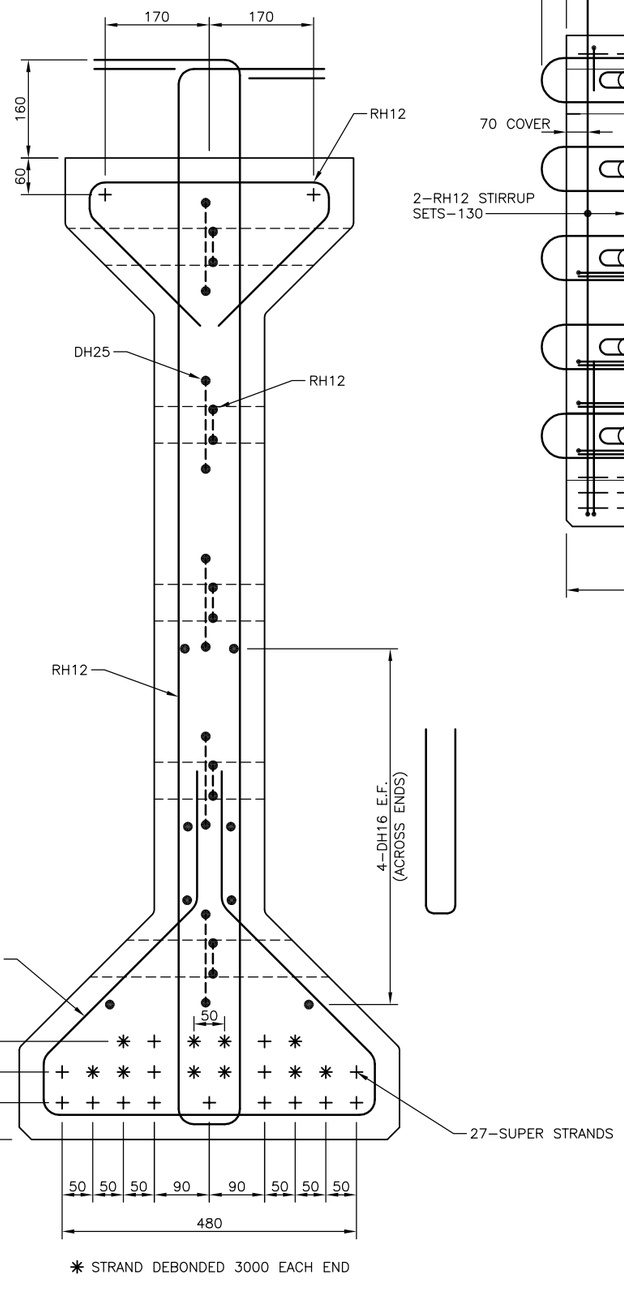
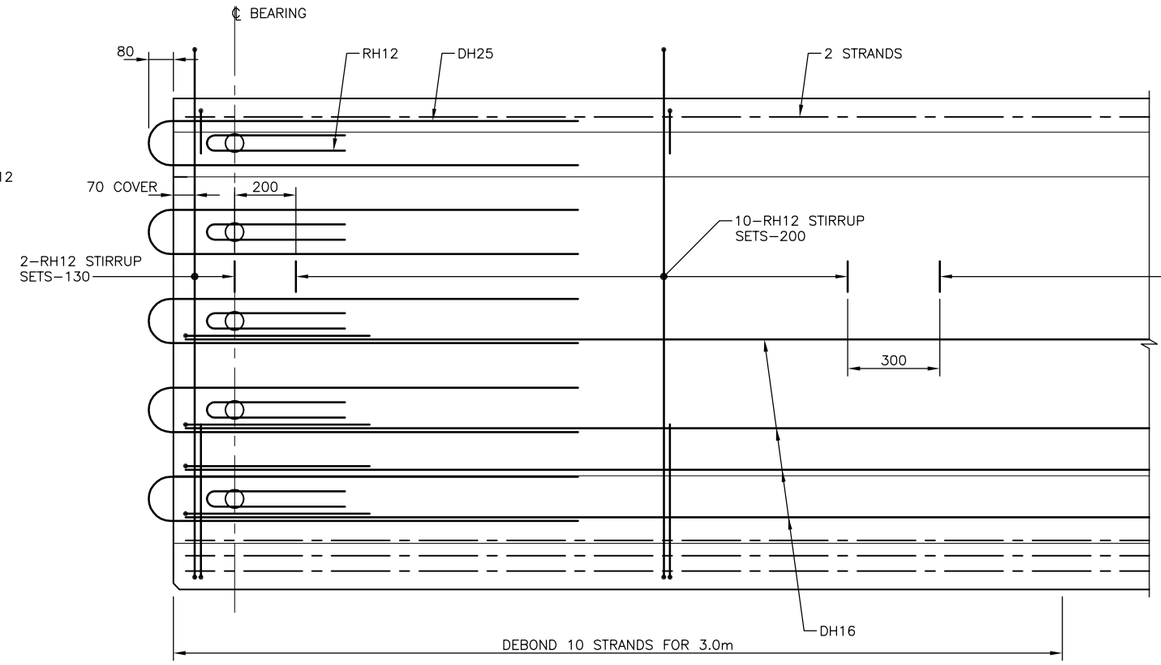
GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

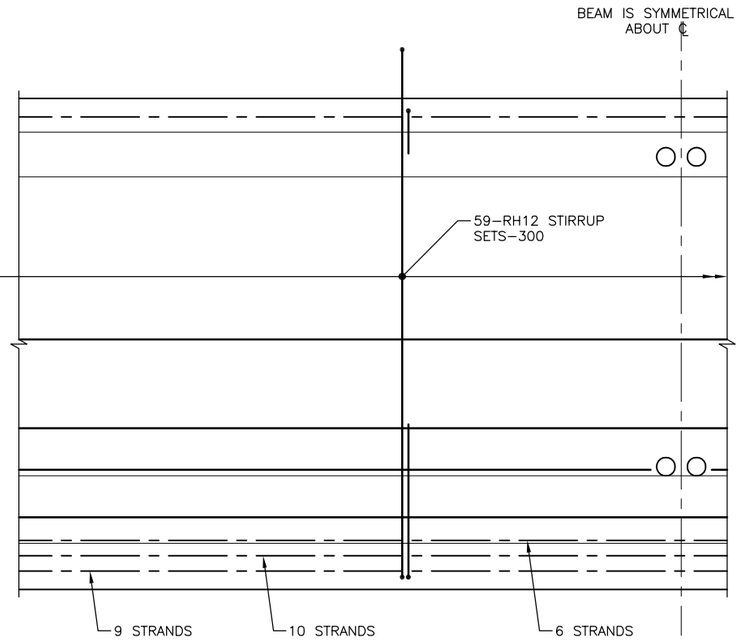


✱ STRAND DEBONDED 3000 EACH END

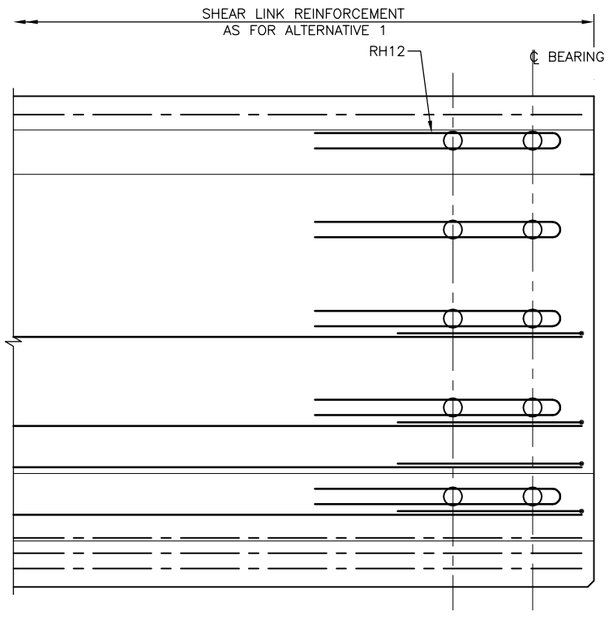
TYPICAL SECTION
REINFORCMENT & STRAND LAYOUT
1:10



ALTERNATIVE 1
END DIAPHRAGM ARRANGEMENT



PART ELEVATION
1:20



ALTERNATIVE 2
END DIAPHRAGM ARRANGEMENT

PART ELEVATION
1:20

200 mm
100
50
10 mm
0

GRAPHIC SCALES

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

1600mm DEEP I–BEAMS – 22m SPAN
REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/5/7504/2				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S4.11			0

ORIGINAL SHEET SIZE A3 [420x297]

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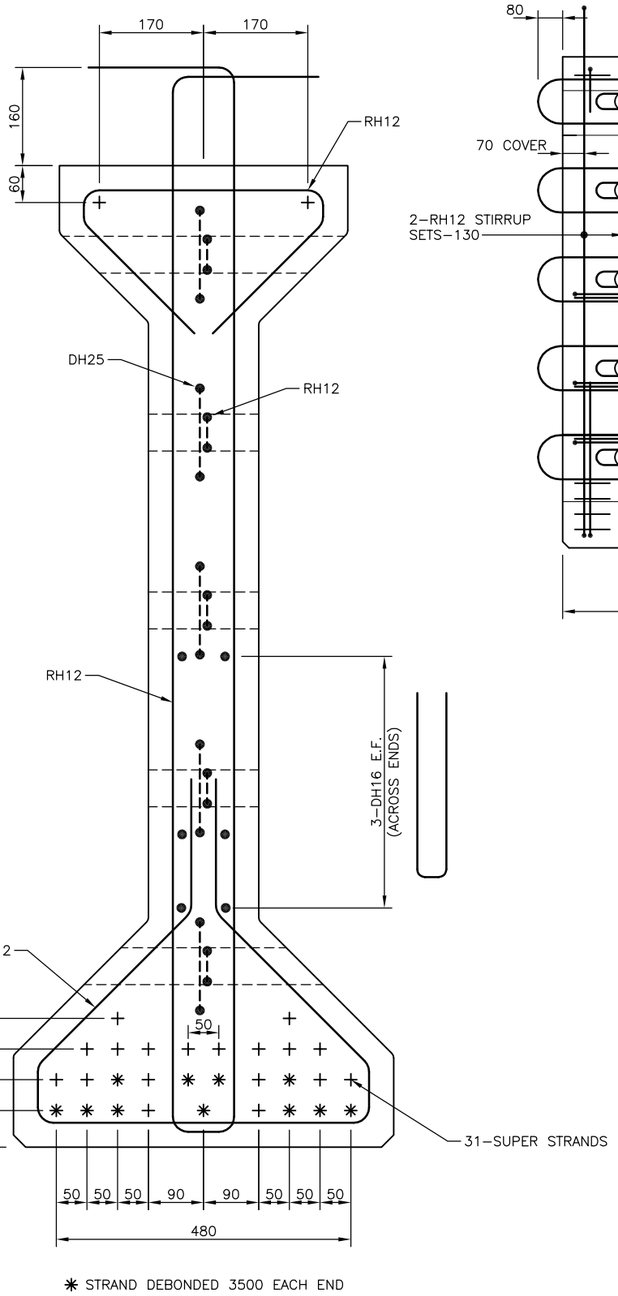
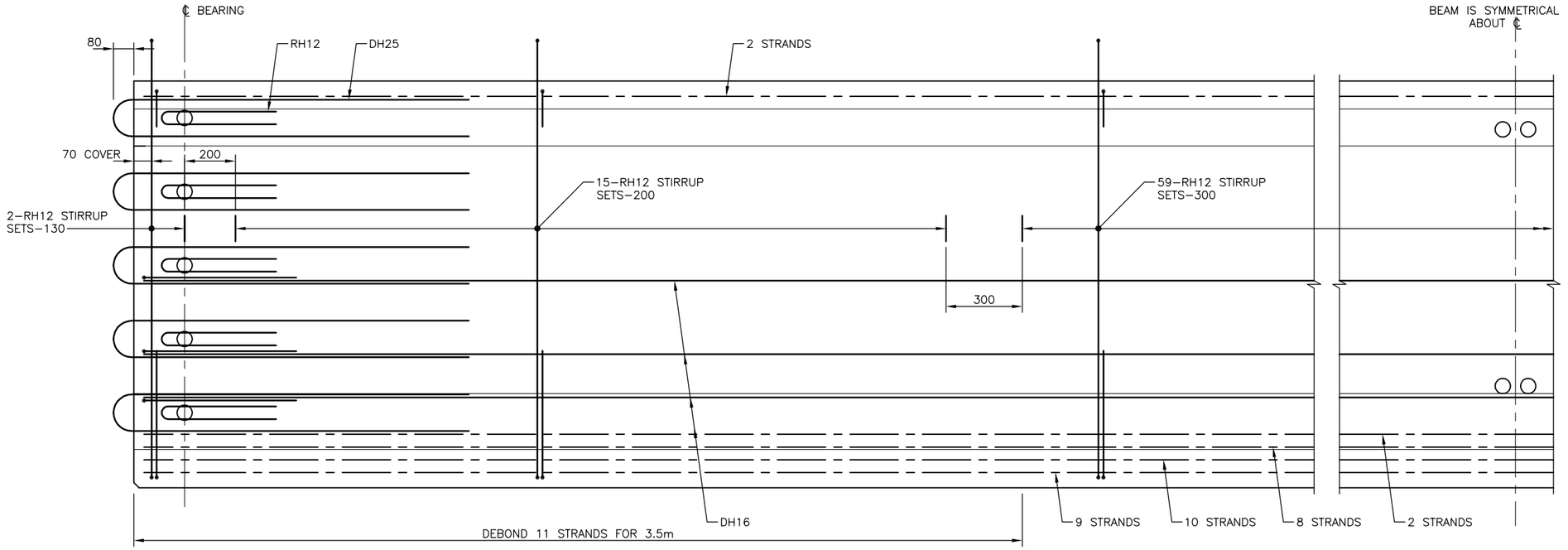


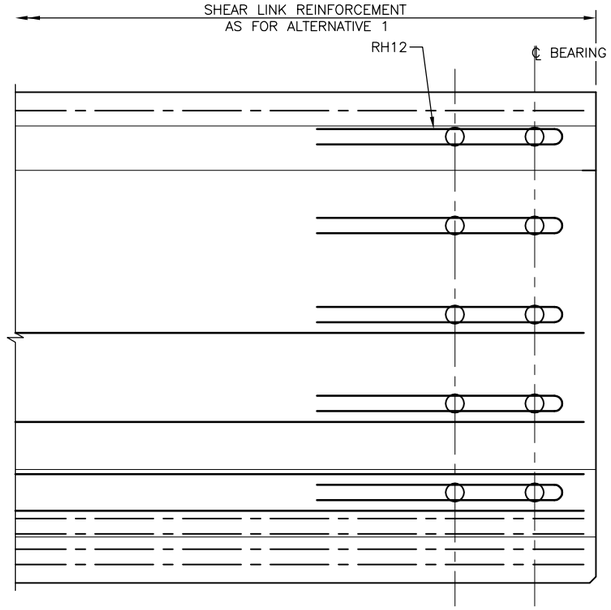
✱ STRAND DEBONDED 3500 EACH END

TYPICAL SECTION
REINFORCMENT & STRAND LAYOUT
1:10



ALTERNATIVE 1
END DIAPHRAGM ARRANGEMENT

PART ELEVATION
1:20



ALTERNATIVE 2
END DIAPHRAGM ARRANGEMENT

PART ELEVATION
1:20

200 mm
100
50
10 mm
0

GRAPHIC SCALES

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS
1600mm DEEP I–BEAMS – 24m SPAN
REINFORCEMENT & STRESSING DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/5/7504/3				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S4.12			0

DOCUMENT: G:\Transport\WZTA\Dwgs\miscelloneous\Standard bridge beams\I–beams\99_401_5_7504_302.dwg

ORIGINAL SHEET SIZE A3 [420x297]

1. SPECIFIED CONCRETE COMPRESSIVE STRENGTHS

AT TRANSFER – PRETENSIONING	– 30MPa
PRECAST BEAMS AT 28 DAYS	– 50MPa
IN SITU CONCRETE (DECK SLAB, DIAPHRAGMS) AT 28 DAYS	– 40MPa

2. REINFORCEMENT & PRESTRESSING

ALL SUPERSTRANDS SHALL BE 12.7mm SUPER 7 WIRE STRANDS COMPLYING TO AS/NZS 4672 AND ASSUMED TO HAVE A MINIMUM BREAKING LOAD OF 184kN PER STRAND WITH INITIAL LOADING AS FOLLOWS:

- TOP TWO STRANDS TO BE LOADED TO 125kN PER STRAND
- OTHER STRANDS TO BE LOADED TO 136kN PER STRAND

3. CONCRETE COVER (MINIMUM)

COVER TO ALL PRESTESSING COMPONENTS	– 40mm
COVER TO REINFORCEMENT UNLESS SHOWN OTHERWISE	– 40mm
COVER ADJACENT TO CORED HOLES	– 30mm
COVER TO BRIDGE DECK & ALL CAST IN SITU CONCRETE	– 50mm
COVER TO BARRIER FIXING STEEL (WITHIN BARRIER)	– 50mm

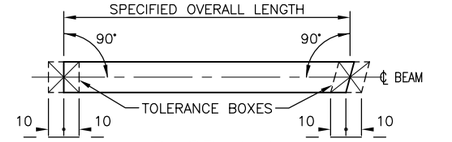
4. DESIGN LOADING

HN–HO–72 (INCLUDING SLS LIVE LOAD FACTOR OF 1.35)

5. SPECIFICATION

THIS DESIGN IS BASED ON LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2007)

6. TOLERANCES



FOR SQUARE DECK — DIAGRAM A — FOR SKEWED DECK

6.1. DIMENSIONS AT TIME OF ERECTION

ACTUAL OVERALL LENGTH AND SQUARENESS

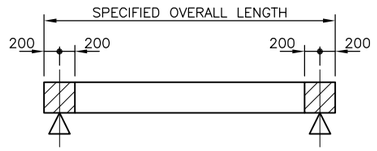
a. THE UNDERSIDE OF THE BEAM FOR THE END 700mm SHALL BE TRUE PLANE.
b. THE BEAM END SURFACES SHALL LIE WITHIN THE 'TOLERANCE BOXES' SHOWN IN DIAGRAM A.
c. PLANE SURFACE, DEVIATION FROM A 1.5m STRAIGHT EDGE ..... ±5mm
d. BEAM HOGGING (SEE SPECIFICATION)
e. CROSS SECTION DIMENSIONS UP TO 0.5m ..... ±5mm
f. CROSS SECTION DIMENSIONS 0.5m TO 2.0m ..... ±10mm
g. HORIZONTAL BOW OF LONGITUDINAL AXIS ..... ±20mm

6.2. DIMENSIONS AT TIME OF ERECTION

a. LONGITUDINAL STEEL REINFORCEMENT ..... ±10mm
b. LOCATION OF AN ITEM IN RELATION TO ANY OTHER ITEM WITHIN ITS GROUP OR TO THE MIDPOINT OF THE BEAM ENDS ..... ±10mm
c. PRETENSIONING PRESTRESSING STRANDS IN ANY DIRECTION ..... ±5mm
EXCEPT WHERE THE ERROR IN LOCATION REDUCES COVER THE TOLERANCE IS REDUCED TO ..... ±3mm

7. HANDLING

EXTREMES OF VERTICAL LIFTING POINTS OR GROUND SUPPORT SHOWN HATCHED.
CENTRAL SUPPORT POSITION AS SHOWN IS PREFERRED (BEAM VERTICAL AT ALL TIMES).



BEAM SUPPORT & LIFTING POINTS

8. METHOD OF MANUFACTURE

BEAMS SHALL BE MANUFACTURED UNDER FACTORY CONDITIONS

9. SURFACE FINISHES

BEAMS a. TOP SURFACE
AS FOR TYPE B CONSTRUCTION JOINT (AS SPECIFIED IN NZS 3109)
b. SIDE SURFACE
FOR HATCHED AREAS ON DIAGRAM B
INNER BEAM BOTH SIDES – AS FOR TYPE B CONSTRUCTION JOINT AT AREA OF CONTACT WITH DIAPHRAGMS
OUTER BEAM, INNER SIDE ONLY – AS FOR TYPE B CONSTRUCTION JOINT AT AREA OF CONTACT WITH DIAPHRAGMS
REMAINING SIDE SURFACE ALL BEAMS – SMOOTH FINISH
c. END SURFACE
ALTERNATIVE 1 ARRANGEMENT – AS FOR TYPE B CONSTRUCTION JOINT
ALTERNATIVE 2 ARRANGEMENT – SMOOTH FINISH WITH STRANDS CUT FLUSH AND PROTECTED WITH A MINIMUM OF 5mm EPOXY MORTAR
UNDERSIDE SURFACE – SMOOTH FINISH

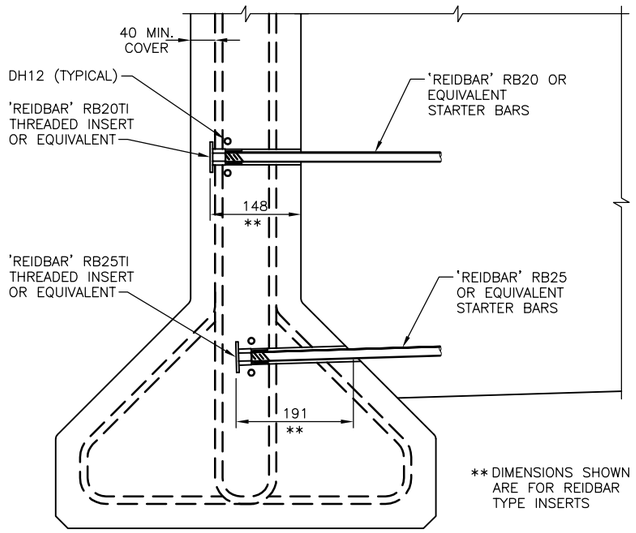
DIAPHRAGM SURFACE FINISH TO BE BASIC FINISH IN ACCORDANCE WITH LTNZ STANDARD BRIDGE BEAM SPECIFICATION (2007).

10. BEARING DESIGN DATA

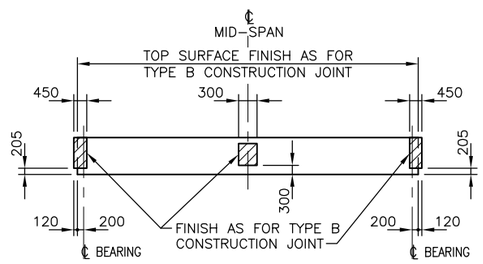
SPAN (m)	REACTION (kN)			ROTATION (x10⁻⁶ RADIANS)	
	DEAD LOAD (UNFACTORED)	LIVE LOAD (1.35HN x I)	OVERLOAD (HO x I)	LIVE LOAD (1.35HN x I)	OVERLOAD (HO x I)
22	417	419	527	865	1045
24	452	435	541	1058	1259

11. AGE AT DECK POURING

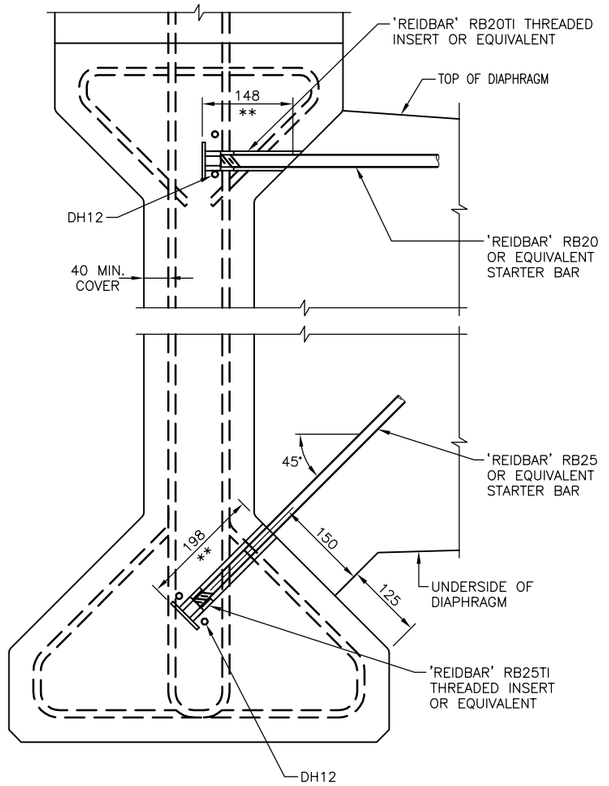
DECK TO BE POURED WITHIN 180 DAYS OF CASTING OF THE FIRST BEAM



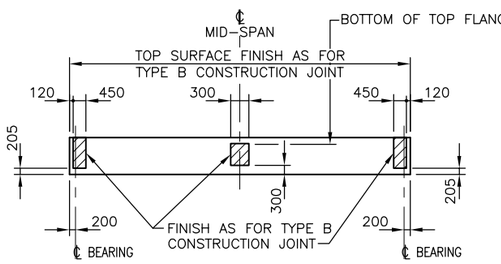
TYPICAL END DIAPHRAGM STARTER BAR CONNECTION FOR OUTER BEAM



END DIAPHRAGM SET AT BEAM END (ALTERNATIVE 1 ARRANGEMENT)



TYPICAL MID–SPAN DIAPHRAGM STARTER BAR CONNECTION FOR OUTER BEAM



END DIAPHRAGM SET BACK FROM BEAM END (ALTERNATIVE 2 ARRANGEMENT)

DIAGRAM B
(SIDE ELEVATION)

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE: STANDARD PRECAST CONCRETE BRIDGE BEAMS

1600mm DEEP I–BEAMS – 22m & 24m SPAN
UNIT DATA

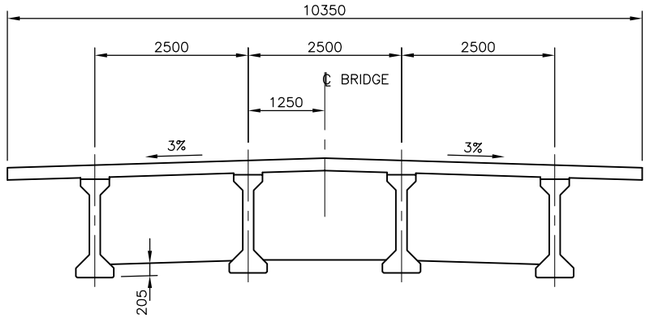
STATUS	FILE	DRAWING NUMBER	CODE	SHEET	REVISION
FOR PUBLICATION	99/401/5/7504/4	S4.13			0

SCALE | PLOT DATE

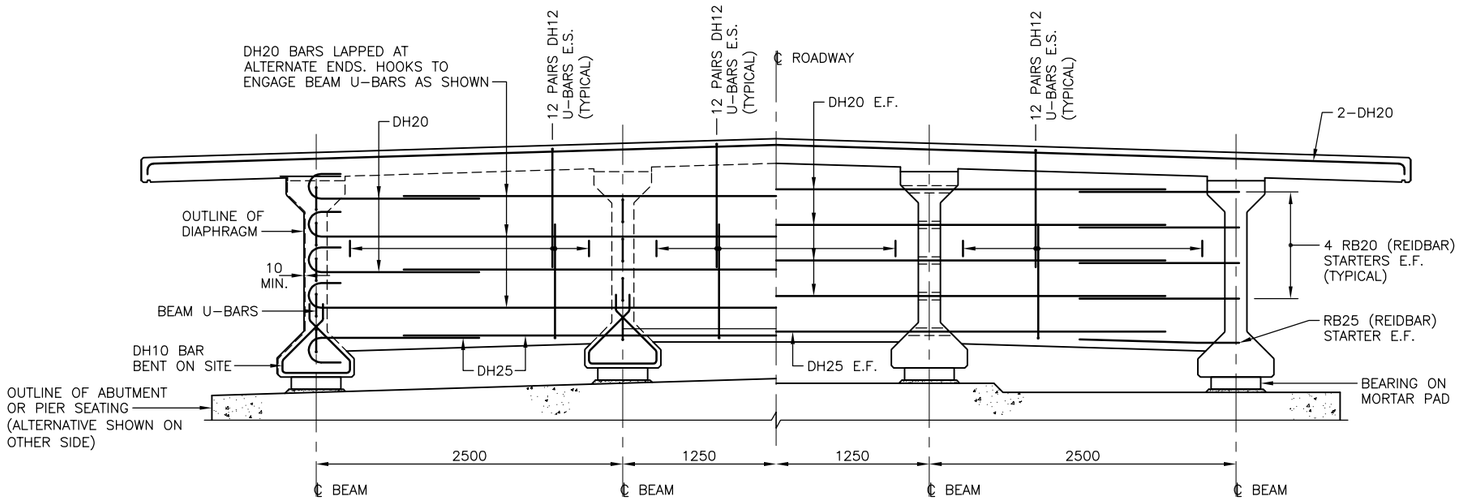
DOCUMENT: G:\Transport\NZTA\Dwgs\miscelleneous\Standard bridge beams\I-beams\99_401_5_7504_405.dwg

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]



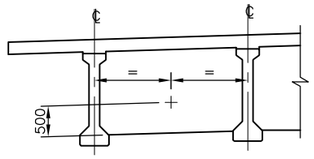
ELEVATION – DIMENSIONS
1:100



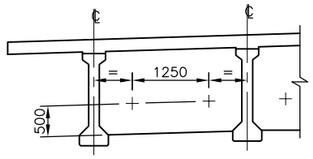
HALF ELEVATION END FACE
(EACH FACE ALTERNATIVE 1 DIAPHRAGM)

HALF ELEVATION SPAN FACE (ALTERNATIVE 1 DIAPHRAGM)
(EACH FACE ALTERNATIVE 2 DIAPHRAGM)

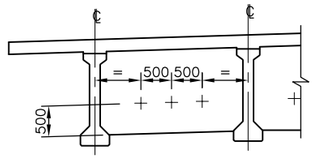
ELEVATION – REINFORCEMENT
1:50



1 BOLT PER DIAPHRAGM BAY

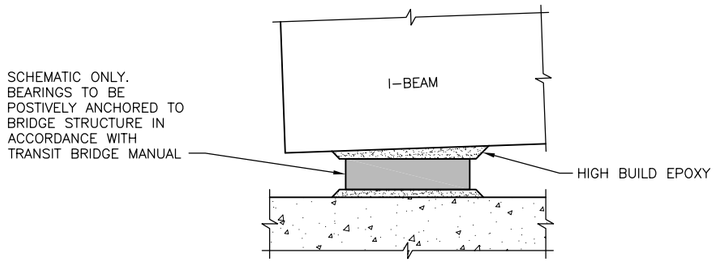


2 BOLTS PER DIAPHRAGM BAY

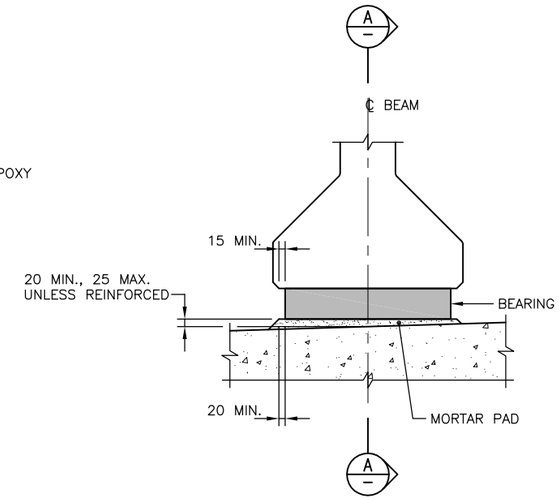


3 BOLTS PER DIAPHRAGM BAY

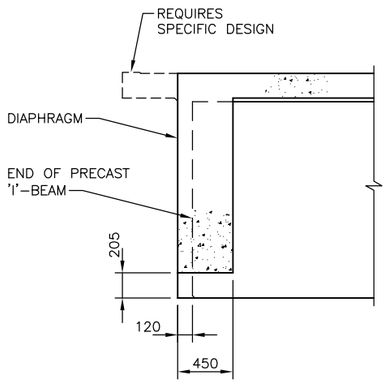
LINKAGE BOLT LAYOUT
N.T.S.
(REFER TO NOTE 2)



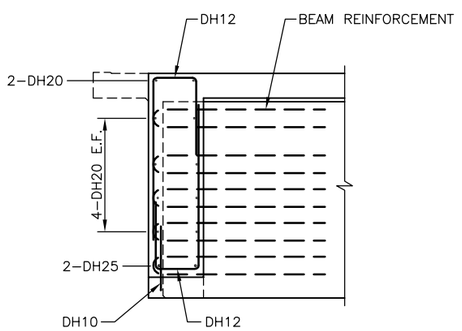
SECTION A–A
N.T.S.
(FOR BEAMS ON LONGITUDINAL SLOPE)



BEARING DETAIL
N.T.S.

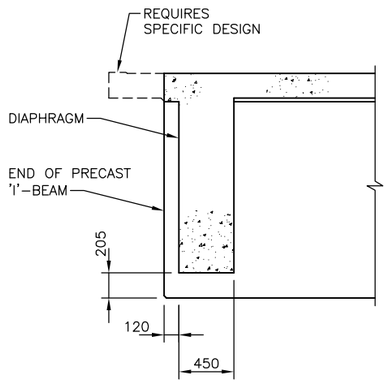


DIMENSIONS

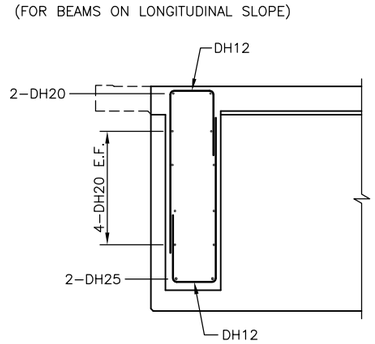


REINFORCEMENT

ALTERNATIVE 1 DIAPHRAGM DETAIL AT BEAM END
(DIAPHRAGM SET AT BEAM END)
1:50



DIMENSIONS



REINFORCEMENT

ALTERNATIVE 2 DIAPHRAGM DETAIL AT BEAM END
(DIAPHRAGM SET BACK FROM BEAM END)
1:50

NOTES:

1. ALL EXPOSED SHARP EDGES AND CORNERS TO HAVE 25 x 25 FILLETS OR CHAMFERS UNLESS SHOWN OTHERWISE.
2. THE NUMBER AND POSITION OF HOLES TO BE CAST INTO DIAPHRAGMS SHALL SUIT THE SEISMIC REQUIREMENTS. HOLES TO BE EITHER 60mm DIA. OR 60 x 200 AS REQUIRED FOR SEISMIC DESIGN.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS

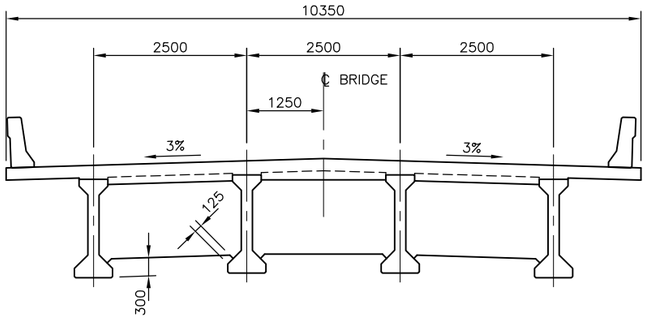
1600mm DEEP I–BEAMS – 22m & 24m SPAN
END DIAPHRAGM DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/5/7504/5				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S4.14			0

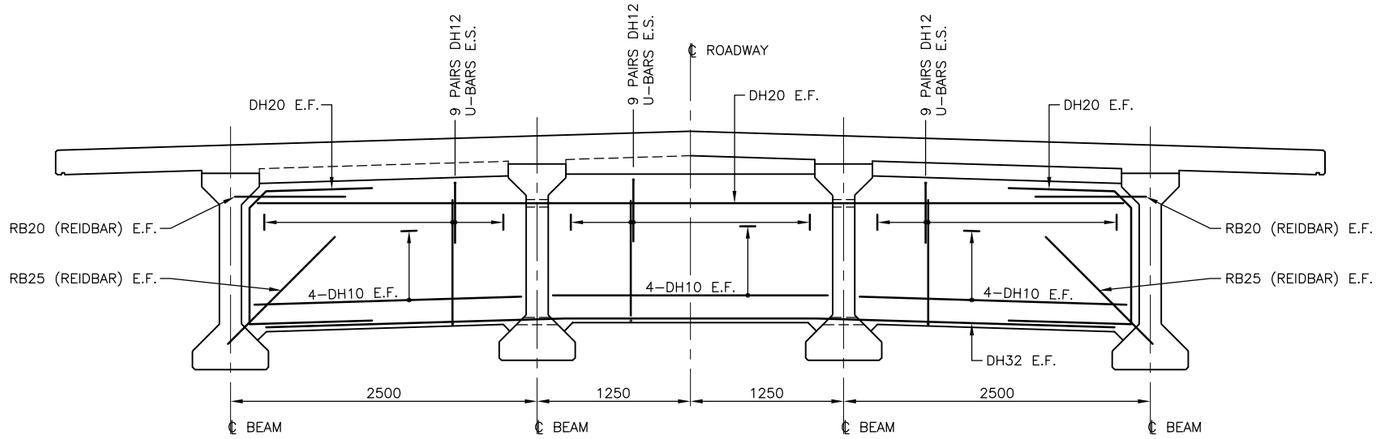
DOCUMENT: G:\Transport\WZTA\Dwgs\miscellaneous\Standard bridge beams\i–beams\99_401_5_7504_502.dwg

GRAPHIC SCALES

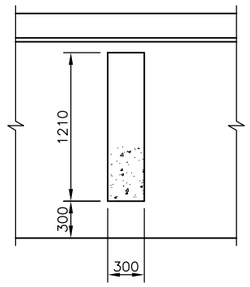
ORIGINAL SHEET SIZE A3 [420x297]



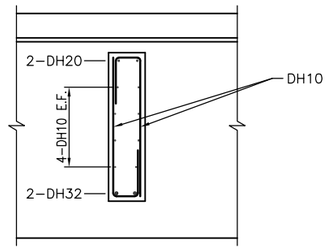
ELEVATION – DIMENSIONS
1:100



ELEVATION – REINFORCEMENT
1:50



DIMENSIONS



REINFORCEMENT

TYPICAL DIAPHRAGM DETAIL
1:50

NOTE:

ALL EXPOSED SHARP EDGES AND CORNERS TO HAVE 25 x 25 FILLETS OR CHAMFERS UNLESS SHOWN OTHERWISE.

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS

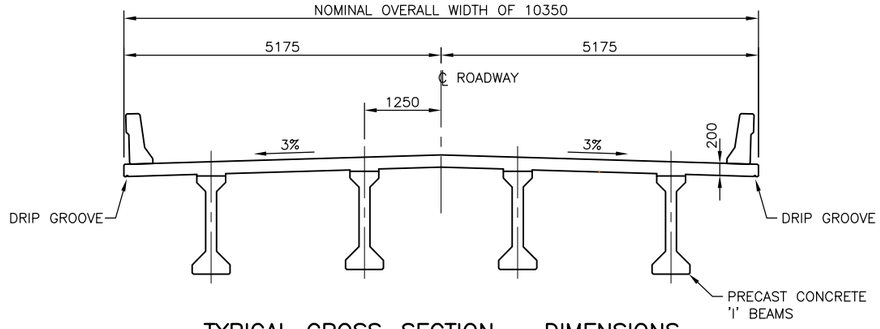
1600mm DEEP I–BEAMS – 22m & 24m SPAN
MIDSPAN DIAPHRAGM DETAILS

STATUS	FILE				
FOR PUBLICATION	99/401/5/7504/6				
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
AS SHOWN		S4.15			0

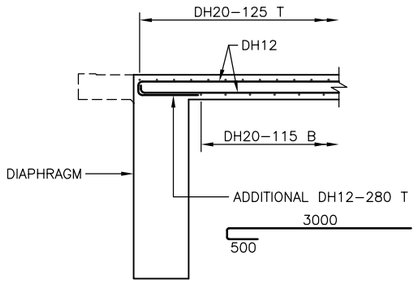
GRAPHIC SCALES
200 mm
100
50
10 mm
0

ORIGINAL SHEET SIZE A3 [420x297]

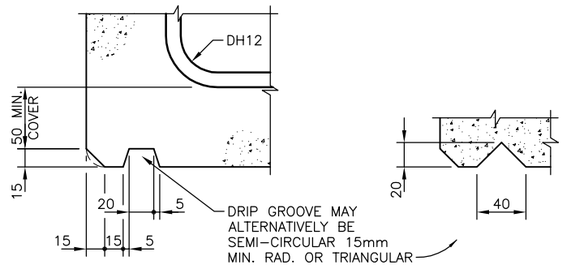
DOCUMENT: G:\Transport\NZTA\Dwgs\miscelloneous\Standard bridge beams\I-beams\99_401_5_7504_602.dwg



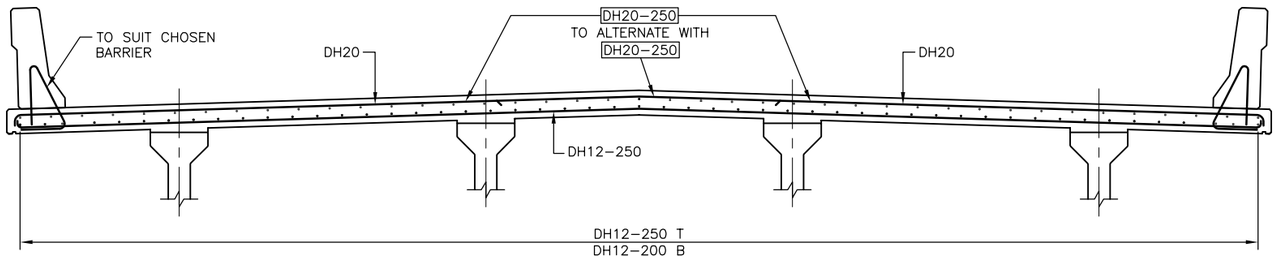
TYPICAL CROSS–SECTION – DIMENSIONS
1:100



END OF DECK AT
EXPANSION JOINT
1:50



DRIP GROOVE DETAIL
1:5



TYPICAL CROSS–SECTION – REINFORCEMENT
1:50

AMENDMENT	APP'D	DATE

	BY	CHECKED	DATE
DESIGN			
DRAWN			
APPROVED			

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

ORIGINATOR: OPUS, Beca

TITLE
STANDARD PRECAST CONCRETE BRIDGE BEAMS

1600mm DEEP I–BEAMS – 22m & 24m SPAN
DECK DETAILS

STATUS	FOR PUBLICATION	FILE	99/401/5/7504/7		
SCALE	PLOT DATE	DRAWING NUMBER	CODE	SHEET	REVISION
		S4.16			0

GRAPHIC SCALES

ORIGINAL SHEET SIZE A3 [420x297]

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