The following information is associated with Network Rail Standard:
NR CIV/SD/1715 Rev B

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CAD Drawing

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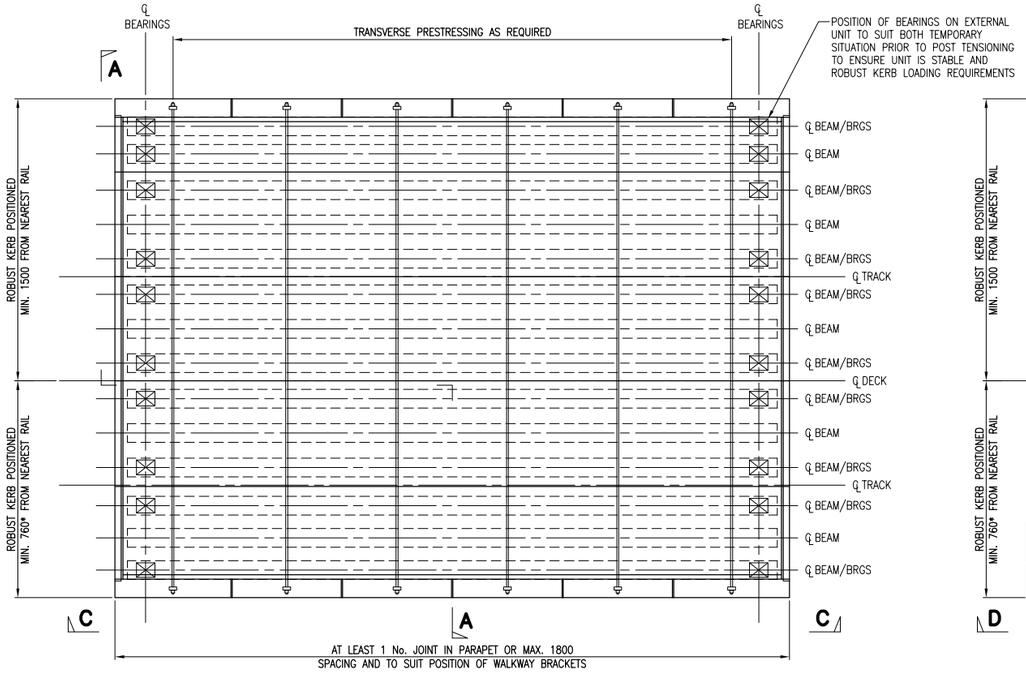
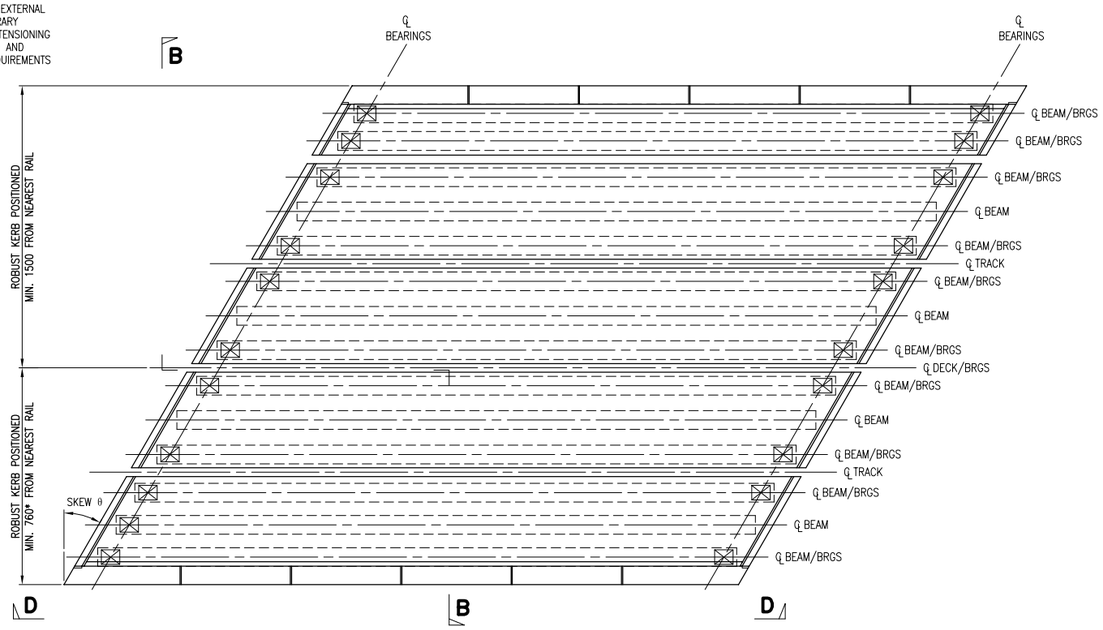


TYPICAL SPLIT SQUARE ARRANGEMENT PLAN

(10m SPAN DOUBLE TRACK TRANSVERSE POST TENSIONED DECK SHOWN)

SCALE 1:50



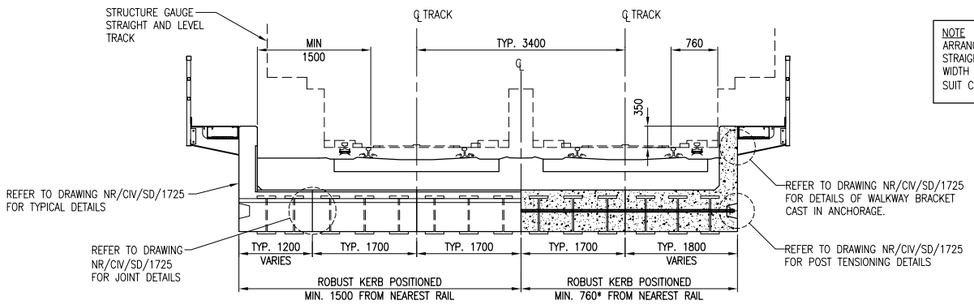
TYPICAL SPLIT SKEW ARRANGEMENT PLAN

(10m SPAN DOUBLE TRACK STITCH JOINT 30° SHOWN)

SCALE 1:50

SPAN RANGE	SPAN/DEPTH RATIO
< 5m	MIN 400 SLAB
5m <> 10m	1:12.5 TO 1:15
10m <> 15m	1:15 TO 1:20
> 15m	1:20 TO 1:25

INDICATIVE SPAN/DEPTH RATIO OF FILLER BEAM DECKS WITH FULLY ENCASED SECTIONS.



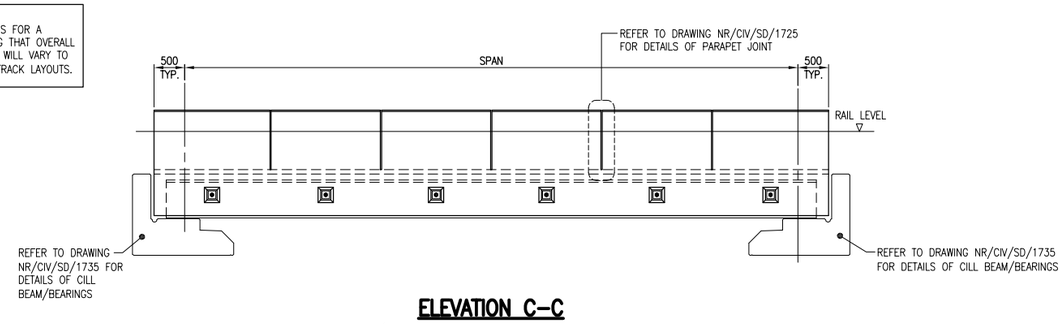
TYPICAL SECTION A–A

(DOUBLE TRACK SHOWN)

SCALE 1:50

*CONSTRUCTION/FABRICATION TOLERANCE TO BE ALLOWED FOR. REFER TO TECHNICAL USER MANUAL FOR GUIDANCE.

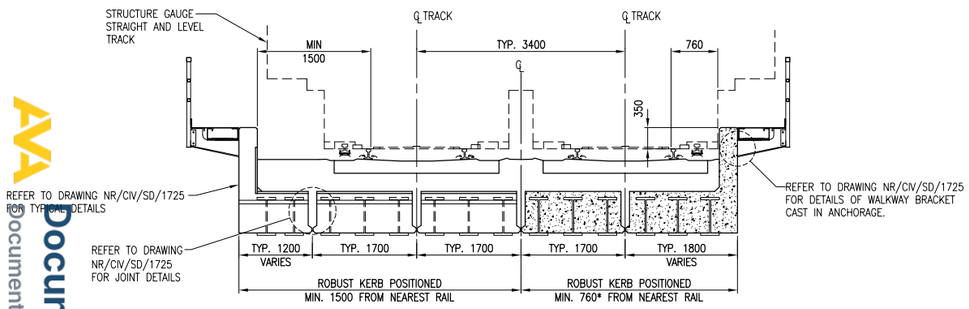
NOTE
ARRANGEMENT SHOWN IS FOR A STRAIGHT TRACK NOTING THAT OVERALL WIDTH OF DECK SLABS WILL VARY TO SUIT CURVED/CANTED TRACK LAYOUTS.



ELEVATION C–C

(ELEVATION D–D SIMILAR BUT NO TRANSVERSE PRESTRESSING)

SCALE 1:50



TYPICAL SECTION B–B

(DOUBLE TRACK SHOWN)

SCALE 1:50

*CONSTRUCTION/FABRICATION TOLERANCE TO BE ALLOWED FOR.

GUIDANCE FOR DESIGNERS

1. THE DESIGNER IS TO DETERMINE THE TYPE OF JOINT BETWEEN ADJACENT UNITS TO SUIT LOADING REQUIREMENTS AND POSSESSION CONSTRAINTS NOTING THAT THE FOLLOWING JOINTS ARE AVAILABLE FOR SELECTION.

(i) NO SHEAR CONNECTION JOINT
(ii) MATCH CAST / POST TENSION JOINT
(iii) IN SITU STITCH JOINT

REFER TO TECHNICAL USER MANUAL FOR GUIDANCE ON JOINT SELECTION.

2. WHERE SKEW SPANS ARE IN EXCESS OF 10° EITHER IN–SITU STITCH JOINT OR NO SHEAR CONNECTION BETWEEN UNITS SHOULD BE USED. (REFER TO TECHNICAL USER MANUAL FOR GUIDANCE).

3. TRANSVERSE POST TENSIONING SHOULD GENERALLY BE ONLY ADOPTED FOR SQUARE OR SKEW SPANS LESS THAN 10° WHEREBY THE TRANSVERSE BARS ARE SET OUT PERPENDICULAR TO THE BRIDGE ELEVATION.

(i) NO SHEAR CONNECTION JOINT

4. DECK UNITS TO BE GENERALLY FABRICATED SIMILAR TO IN SITU STITCH JOINT WITH THE EXCEPTION OF PROTRUDING LINKS ARE NOT REQUIRED.

5. ALTERNATIVE ARRANGEMENTS ARE PERMITTED TO REDUCE OR ELIMINATE NIB TO PROVIDE A NOMINAL GAP BETWEEN UNITS WITH THE WATERPROOFING MODIFIED TO SUIT.

ii) MATCH CAST / POST TENSION JOINT

6. ADJACENT CONCRETE UNITS TO BE MATCH CAST DURING FABRICATION TO ACHIEVE FIT UP. A MORTAR LEVELLING SCREED IS TO BE APPLIED BETWEEN THE TWO UNITS IMMEDIATELY PRIOR TO PLACEMENT AND TORQUING OF TRANSVERSE POST TENSIONING.

7. POST TENSIONING SYSTEM TO BE A PROPRIETARY PRODUCT PREFERABLY HIGH TENSILE STAINLESS STEEL WITH COMPATIBLE DUCTS, WASHERS AND FLAT NUTS WITH SUITABLE ACCESS FOR JACKING FROM AT LEAST ONE END.

8. DIAMETER AND SPACING OF POST TENSIONING TO BE DETERMINED BY THE DESIGNER BASED ON FRICTIONAL RESISTANCE REQUIRED BETWEEN UNITS TO TRANSFER LOAD ACROSS THE JOINT (ROBUST KERB IMPACT).

9. TORQUE TO BE APPLIED TO THE POST TENSIONING TO BE DETERMINED BY THE SCHEME DESIGNER, WHICH WILL BE A FUNCTION OF THE DESIRED AXIAL LOAD REQUIRED, BAR DIAMETER AND THE THREAD ON THE BAR (NUMBER OF NUT ROTATIONS).

10. POST TENSIONING DESIRED AXIAL LOAD SHOULD NOT EXCEED 0.7 UTS OF THE BAR UNDER CONSIDERATION.

11. POST TENSIONING DESIRED AXIAL LOAD SHOULD NOT BE LESS THAN 0.25 UTS OF THE BAR UNDER CONSIDERATION.

12. POST TENSIONING BAR DIAMETER TO BE GENERALLY NO LESS THAN 32mm DIAMETER AND NO GREATER THAN 50mm DIAMETER.

13. DESIGNER TO DETERMINE REQUIREMENT FOR END BLOCK REINFORCEMENT AS NECESSARY.

(iii) IN SITU STITCH JOINT

14. IN SITU STITCH JOINT TO GENERALLY ADOPT THE PRINCIPLES OF THE PRECAST PRESTRESS SOLID BOX BEAM DESIGN

15. DESIGNER TO DETERMINE THE RAPID HARDENING CEMENTIOUS MATERIAL FOR THE STITCH TO SUIT THE RAPID STRENGTH GAIN AND HIGH EARLY STRENGTH TO SATISFY BOTH DESIGN REQUIREMENTS AND TIME TO SAFELY PERMIT LOADING/TRAFFICKING OF THE STRUCTURE.

16. THE DESIGNER IS TO STATE THE EARLY AGE STRENGTH GAIN AS APPROPRIATE (E.G. 10N/mm² AT 12 HOURS) TO BE READILY OBTAINABLE (USUALLY A PRE–BAG PROPRIETARY MIX) TO SUIT ON SITE POSSESSION APPLICATION STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS (REFER TO TECHNICAL USER MANUAL FOR GUIDANCE).

DRAWING No. NR/CIV/SD/1715

NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE GENERAL NOTES ON DRAWING NR/CIV/SD/1702.
2. ALL CONCRETE, MATERIALS & WORKMANSHIP TO BE IN ACCORDANCE WITH BSEN13670 AS AMMENDED BY THE NETWORK RAIL SPECIFICATION.
3. REINFORCED CONCRETE INFORMATION IN ACCORDANCE WITH BS8500–2:2006 TO BE PROVIDED BY THE DESIGNER:

   MIN CONCRETE GRADE
   REINFORCEMENT TYPE
   MAXIMUM AGGREGATE SIZE
   NOMINAL COVER TO REINFORCEMENT
   FIXING TOLERANCE
   CEMENT TYPE / COMBINATION
   MAXIMUM WATER / CEMENT RATIO
   MINIMUM COMBINATION CONTENT

4. APPROPRIATE EXPOSURE CLASSES TO BE XD3 (SOFFIT) AND XC4 (BELOW WATERPROOFING).
5. ALL REINFORCEMENT TO BE TO GRADE B500B OR B500C CONFORMING TO BS4449:2005
6. ALL REINFORCEMENT TO BE CUT AND BENT TO BS8666:2005
7. BAR BENDING SCHEDULE IS TO BE PREPARED FOR EACH INDIVIDUAL BRIDGE. THERE ARE NO STANDARD SCHEDULES TO ACCOMPANY THE STANDARD DRAWINGS.
8. NO CONSTRUCTION JOINTS OR TIE HOLES WILL BE ALLOWED. DECK TO BE CAST IN A SINGLE POUR, AND SHUTTERING INDEPENDENTLY SUPPORTED OFF THE MAIN GIRDERS.
9. ALL CHAMFERS TO BE 20x20mm.
10. WATERPROOFING TO BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS WHEN CONCRETE HAS ATTAINED ITS SPECIFIED 7 DAY STRENGTH OR AFTER 7 DAYS, WHICHEVER IS THE LONGEST, AND SUITABLE FOR APPLICATION AS CONFIRMED BY TESTING OF SUBSTRATE IN ACCORDANCE WITH NETWORK RAIL SPECIFICATION.
11. STEELWORK SHALL COMPLY WITH BSEN1090–2 AS AMENDED BY THE NETWORK RAIL SPECIFICATION NR/SP/CIV/008/090N.
12. ALL STEEL SHALL BE TO BS EN10025–2:2004 AND BS EN10025–3:2004.
13. THE PRIMARY PAINT SYSTEM IS N1 UNLESS OTHERWISE AGREED WITH THE PROJECT SPONSOR IN ACCORDANCE WITH NR/SP/CIV/039 (SPECIFICATION RT.98)
14. PROTECTIVE TREATMENT TO BE ALLOWED TO CURE FOR 7 DAYS BEFORE STACKING OR TRANSPORTATION OF STEELWORK.
15. FOR DETAILS OF SITE COAT AND REMEDIAL WORK SEE NETWORK RAIL MODEL CLAUSES FOR SPECIFYING CIVIL ENGINEERING WORKS, SECTIONS 170–176.
16. THE DESIGNER IS TO SELECT THE BEARING SIZE BASED ON THE MOST EFFICIENT NUMBER AND ARRANGEMENT TO SUIT THE SPAN, SKEW AND LOADING REQUIREMENTS (REFER TO TECHNICAL USER MANUAL FOR GUIDANCE).

Rev	Date	Description of revision	Design'd	C'kd
B	APR 10	EUROCODE ISSUE	MK	AGW
A	APR 10	FIRST ISSUE	MK	AGW
P2	18.06.09	REVISED WHERE SHOWN	MK	AGW
P1	27.03.09	DRAFT FOR REVIEW	MK	AGW

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Approved	Name	Position	Signature	Date
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Master copy with original signatures held by Network Rail HQ CIVIL ENGINEERING STANDARD DESIGN

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CONCRETE UNDERBRIDGE STANDARD DRAWINGS

PRE–CAST OFF SITE EXPOSED BOTTOM FLANGE FILLER BEAM DECK GENERAL ARRANGEMENT

Scale	AS SHOWN	
Drawing Number	NR/CIV/SD/1715	B

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