Supplementary Information

The following information is associated with Network Rail Standard:
NR CIV/SD/1702 Rev B

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CAD Drawing

- CIV/SD/1702

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USE OF DRAWINGS

1. THE STANDARD DRAWING SERIES AVAILABLE TO THE DESIGNER ARE:
   NR/CIV/SD/1700 CONCRETE UNDERBRIDGE DRAWINGS
   NR/CIV/SD/1800 UNDERBRIDGE ANCILLARY ITEMS
   NR/CIV/SD/1900 STANDARD WALKWAY DRAWINGS
2. THE STANDARD DRAWINGS TOGETHER WITH DRAWINGS OF THE PARTICULAR DECK SHALL BE REFERRED TO BY THE CONTRACTOR WHEN PREPARING HIS WORKING DRAWINGS.
3. THESE DRAWINGS DO NOT REPLACE THE NEED FOR THE CONTRACTOR TO PREPARE WORKING DRAWINGS OR WRITTEN WELD PROCEDURES.

BRIDGE INSTALLATION LEVELS.

4. BEARINGS TO BE INSTALLED AT LEVELS SUCH THAT A CONSTANT LEVEL DIFFERENCE '△L' BETWEEN EACH LONGITUDINAL SPANNING MEMBER IS MAINTAINED THROUGHOUT THE SPAN UNDER INSTALLATION LOADS AND EACH LONGITUDINAL SPANNING MEMBER IS ON A COMMON CURVE RADIUS Rg EQUAL TO THE MEMBER PRE-CAMBER LESS THE PERMANENT LOAD DEFLECTION AS SHOWN. THE LEVEL DIFFERENCE BETWEEN THE DECK ENDS BEARINGS SHOULD NORMALLY REFLECT THE TRACK GRADIENT OVER THAT DISTANCE. THE DESIGNER SHOULD REFER TO THE USERS MANUAL FOR COMMENTARY.

TRIAL ERECTION REQUIREMENTS

5. THE DECK SHALL BE FULLY TRIAL ERECTED ON ALL ITS BEARINGS AT THE SAME RELATIVE LEVELS AS INTENDED FOR THE PERMANENT ERECTION. THE ERECTION SHALL ALSO INCLUDE PRECAST CONCRETE CILL BEAMS, BALLAST WALLS, ETC, WHERE PROVIDED TO THEIR CORRECT RELATIVE LEVEL AND ALIGNMENT.
6. ALL LEVELS AND DIMENSIONS OF THE FULLY TRIAL ERECTED BRIDGE SHALL BE CHECKED AND RECORDED.
7. WHERE PROVIDED, WALKWAY AND PARAPET UNITS SHALL BE INSERTED, BUT NOT FIXED.
8. ALL STEELWORK OR CONCRETE IS TO BE INDIVIDUALLY MATCHMARKED AT TRIAL ERECTION FOR SUBSEQUENT MATCHING DURING ERECTION AT SITE.

PERMANENT ERECTION REQUIREMENTS

9. INDICATIVE LIFTING LOCATIONS WHERE SHOWN SHALL BE USED STRICTLY AS INTENDED AND SHOWN. ALL LIFTING ARRANGEMENT MUST BE DESIGNED BY THE CONTRACTOR AND SUBJECT TO THE ENGINEERS WRITTEN AND FORM C APPROVAL.
10. THE DESIGNER IS TO SPECIFY MINIMUM ACCEPTABLE CONCRETE COMPRESSIBLE STRENGTH PRIOR TO LIFTING FROM PRECAST WORKS.
11. SITE WATERPROOFING OF DECK JOINTS SHALL NOT COMMENCE UNTIL ALL DECK JOINTS HAVE CURED.

PARTICULAR HEALTH & SAFETY ASPECTS

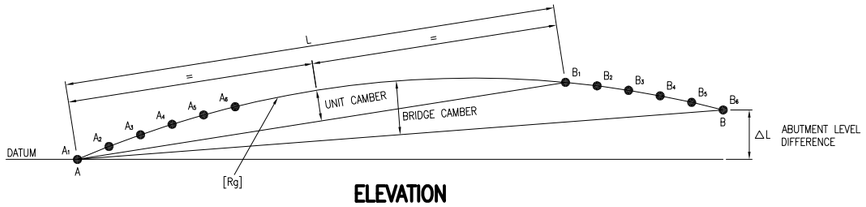
13. ALL DECKS OR INDIVIDUAL ITEMS REQUIRING LIFTING OR MOVING SHALL BE CLEARLY MARKED WITH THEIR WEIGHT MARKING CLEARLY VISIBLE IN POOR LIGHT.
14. ALL PROCESSES (e.g. WELDING, PAINTING AND WATERPROOFING) SHALL BE CARRIED OUT IN A SAFE MANNER AND ALL SUBSTANCES SHALL BE USED IN ACCORDANCE WITH C.O.S.H.H. REGULATIONS. SOME OF THE SUBSTANCES INVOLVED ARE HAZARDOUS WITHIN THE REGULATIONS.

B

EXECUTION

15. THE STANDARD UNDERBRIDGE DETAILS SHALL BE CLASSED AS EXECUTION CLASS EXC 3 IN ACCORDANCE WITH BSEN1090-2 AND BSEN13670

PLAN



ELEVATION

BEARING LEVELS ARE DENOTED A_1, A_2...., B_1, B_2....
ABUTMENT LEVEL DIFFERENCE △L = A–B
PLINTH VARYING DIMENSION A_2–A, A_3–A.... B_1–B, B_2–B....

CONCRETE UNDERBRIDGE STANDARD DRAWINGS – DESIGN PARAMETERS.

THE BRIDGE IS TO BE DESIGNED WITH DUE CONSIDERATION TO THE FOLLOWING PARAMETERS:

LOADS: RAILWAY	LM71 WITH ALPHA FACTOR VALUE 1.21 (TO BS EN 1991-2) B
LOADS: WALKWAY	ALL NOMINAL: 5kN/m² LIVELOAD + 1kN/m FOR CABLES + 2kN POINT LOAD. WALKWAY WEIGHT (MAX) 4.1kN/m ACTING 1m FROM CENTROID OF BOLT GROUP. (REFER TO DRAWING SERIES NR/CIV/SD/1900).
LOADS: WIND	FUNDAMENTAL BASIC WIND VELOCITY, Vb.map = 29m/s.
MAXIMUM EFFECTIVE BRIDGE TEMPERATURE MINIMUM EFFECTIVE BRIDGE TEMPERATURE	39°C + 10°C (TO NR/L2/CIV/020 (DRAFT 12)) B -24°C
MAXIMUM TRACK C/L OFFSET	DECK JOINTS ARE TO BE PREFERABLY POSITIONED AWAY FROM RAIL LOCATIONS DESIGNER TO DETERMINE ACTUAL DECK WIDTH FOR MINIMUM RADIUS WITH CENTRIFUGAL LOAD TYPICALLY LIMITED TO 0.20P.
MAXIMUM CENTRIFUGAL FORCE FACTOR ALLOWED FOR	0.20P (SEE USER MANUAL FOR DEFINITION)
SPAN RANGE SKEW RANGE (ON BEARING CENTRELINE) DECK WIDTH	TYPICALLY UP TO 20m TYPICALLY 0° TO 50° (MAX) DESIGNER TO DETERMINE PREFERABLY 1500mm CLEARANCE FROM NEAREST RAIL TO ROBUST KERB
ABSOLUTE MAXIMUM TRACK CANT TYPICAL MAXIMUM TRACK CANT ON DECK TYPICAL MAXIMUM TRACK GRADIENT (RELATIVE TO DECK) TYPICAL MAXIMUM DECK CANT (RELATIVE TO DECK)	(DECK + TRACK) 150mm 150mm: SCHEME DESIGNER TO ALLOW FOR INCREASED BALLAST DEPTH BELOW HIGH RAIL 50mm 100mm RELATIVE TO RAILS / DECK GRADIENT 1:14
TYPICAL MAXIMUM BALLAST DEPTH (BELOW SLEEPER) STANDARD BALLAST DEPTH TYPICAL MAXIMUM WATERPROOFING THICKNESS (INCLUDING ANY PROTECTION BOARDS)	400mm (AVERAGE ON SPAN) 300mm (AT MID SPAN UNDER 'LOW' RAIL) 15mm

BRITISH & EUROPEAN STANDARDS USED IN THE STANDARD DESIGNS.

COMMON STANDARDS

GC/RT5112	LOADING REQUIREMENTS FOR THE DESIGN OF BRIDGES
GC/RC5510	RECOMMENDATIONS FOR THE DESIGN OF BRIDGES
BA 24/87	EARLY THERMAL CRACKING OF CONCRETE
BD 28/87	EARLY THERMAL CRACKING OF CONCRETE
UIC 776 3R	DEFORMATION OF BRIDGES
NR/L2/CIV/020	DESIGN OF BRIDGES AND CULVERTS (DRAFT 12)

BRITISH STANDARDS

BS5400-1:1978	GENERAL STATEMENT
BS5400-2:2006	SPECIFICATION FOR LOADS
BS5400-3:2000	CODE OF PRACTICE FOR DESIGN OF STEEL BRIDGES
BS5400-4:1990	CODE OF PRACTICE FOR DESIGN OF CONCRETE BRIDGES
BS5400-5:2005	CODE OF PRACTICE FOR DESIGN OF COMPOSITE BRIDGES
BS5400-9:1983	BRIDGE BEARINGS
BS5400-10:1980	CODE OF PRACTICE FOR FATIGUE

EUROPEAN STANDARDS

THE FOLLOWING EUROCODES AND ALL EUROCODES REFERENCED THEREIN, PLUS THE UK NATIONAL ANNEX;

BS EN 1990, + A1 EUROCODE-BASIS OF STRUCTURAL DESIGN (+A1:2005)
(INCORPORATING CORRIGENDUM DECEMBER 2008) (NOTE ANNEX A2 INCLUDED)
BS EN 1991-1-1: 2002, EUROCODE 1: ACTIONS ON STRUCTURES-PART 1-1:
GENERAL ACTIONS-DENSITIES, SELF-WEIGHT, IMPOSED LOADS FOR BUILDINGS
BS EN 1991-1-3: 2003, EUROCODE 1: ACTIONS ON STRUCTURES-PART 1-3:
GENERAL ACTIONS-SNOW LOADS
BS EN 1991-1-4: 2005, EUROCODE 1: ACTIONS ON STRUCTURES-PART 1-4:
GENERAL ACTIONS-WIND ACTIONS
BS EN 1991-1-5: 2003, EUROCODE 1: ACTIONS ON STRUCTURES-PART 1-5:
THERMAL ACTIONS
BS EN 1991-2-2003, EUROCODE 1: ACTIONS ON STRUCTURES-PART 2:
TRAFFIC LOADS ON BRIDGES
BS EN 1992-2: 2005, EUROCODE 2: DESIGN OF CONCRETE STRUCTURES PART 2:
CONCRETE BRIDGES DESIGN AND DETAILING RULES
BS EN 1994-2: 2005, EUROCODE 4: DESIGN OF COMPOSITE STEEL AND CONCRETE
STRUCTURES-PART 2: GENERAL RULES AND RULES FOR BRIDGES

THE FOLLOWING NCCI:

PD 6687-2: 2008, RECOMMENDATIONS FOR THE DESIGN OF STRUCTURES TO BS EN 1992-2: 2005
PD 6696-2: 2007, BACKGROUND PAPER TO BS EN 1994-2 AND THE UK NATIONAL ANNEX TO BS EN 1994-2 EUROCODE 4

B

SAFETY, HEALTH & ENVIRONMENT RISK ASSESSMENT

DESIGNERS' NOTE – CDM REG. 13(2)(b)

THE FOLLOWING ARE SIGNIFICANT HAZARDS WHICH MIGHT AFFECT THE HEALTH AND SAFETY OF THOSE UNDERTAKING THE WORKS OUTLINED IN THIS SET OF DRAWINGS ON RAILWAY STRUCTURES OR THOSE AFFECTED BY THESE ACTIVITIES. A SITE SPECIFIC RISK ASSESSMENT SHALL BE UNDERTAKEN PRIOR TO COMMENCING ANY OF THE WORKS DESCRIBED ON SITE.

IT IS ASSUMED THAT A COMPETENT CONTRACTOR IS AWARE OF THE RISKS ASSOCIATED WITH GENERAL CONSTRUCTION ACTIVITIES UNDERTAKEN IN THE RAILWAY ENVIRONMENT.

RISK	STAGE	MITIGATING MEASURES
INJURY LIFTING BRIDGE COMPONENTS	D*	SCHEME AND WORKING DRAWINGS TO INCLUDE COMPONENT CENTROIDS AND WEIGHTS.
INJURY, DIRECTLY OR INDIRECTLY, DUE TO SITE WELDING.	C	COMPONENTS TO BE SHOP WELDED AND CONNECTED USING FRICTION GRIP BOLTS WHERE POSSIBLE, MINIMISING NEED FOR SITE WELDING.
INJURY DUE TO UNSUITABLE CONDITIONS FOR INSPECTION AND REPLACEMENT OF BEARINGS.	D	SUFFICIENT SPACE MUST BE LEFT IN FRONT OF THE ABUTMENTS AND AROUND THE BEARINGS FOR ACCESS TO INSPECT, MAINTAIN AND REPLACE THE BEARINGS.
INJURY DUE TO UNSUITABLE CONDITIONS FOR INSPECTION AND REPLACEMENT OF BEARINGS.	D	STANDARD DESIGNS PROVIDE DETAILS TO FACILITATE THE INSPECTION OF THE BEARINGS, JACKING INFORMATION PROVIDED ON ALL STANDARD DESIGNS TO AID SAFE BEARING REPLACEMENT.
DISEASE FROM VERMIN EXCREMENT	D/O	WHERE NOT PRACTICABLE TO DESIGN OUT HOLLOWS AND LEDGES, ANIMALS (PIGEONS) ARE TO BE DISCOURAGED FROM ROOSTING ON THE STRUCTURE WITH DETERRENTS. ALL HORIZONTAL SURFACES THAT COULD BE ACCESSED BY PIGEONS TO HAVE SPIKES ATTACHED.
COLLAPSE OF STRUCTURE/TRAIN DERAILMENT DUE TO TRAIN STRIKING THE BRIDGE	D*	SELECTION OF DECK GEOMETRY TO ENSURE STRUCTURE GAUGE AND ALLOWANCE FOR FUTURE TRACK RE-ALIGNMENT

NOTE: C = CONSTRUCTION, D = DESIGN, O = OPERATION, D* = SCHEME DESIGN

DRAWING No. NR/CIV/SD/1702

NOTES

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
REV	DATE	DESCRIPTION	DES	C'KD

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	Name	Position	Signature	Date
Approved	Paul Clark	Snr. Proj. Eng. Manager Infrastructure Investment Building and Civils	P.C.	APR 10

Master copy with original signatures held by Network Rail HQ CIVIL ENGINEERING STANDARD DESIGN

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CONCRETE UNDERBRIDGE STANDARD DRAWINGS

GENERAL NOTES AND H&S RISK REGISTER

Scale: AS SHOWN

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