Supplementary Information

The following information is associated with Network Rail Standard:
NR CIV/SD/801 Rev A

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Drawings

- CIV/SD/801

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GENERAL NOTES

1. THE STANDARD DRAWINGS SHALL BE USED BY THE DESIGNER WHEN PREPARING HIS WORKING DRAWINGS OF THE PARTICULAR MEMBER OR ELEMENT SUBJECT TO REPAIR OR STRENGTHENING.
2. THESE DRAWINGS DO NOT REPLACE THE NEED FOR THE CONTRACTOR TO PREPARE WORKING DRAWINGS OR WRITTEN WELD PROCEDURES.

SCHEDULE OF DRAWINGS

DRAWING NO.	TITLE
NR/CIV/SD/801	SPECIFICATION FOR THE WORKS
NR/CIV/SD/802	HALF THROUGH RAIL UNDERBRIDGE WITH TROUGH FLOOR REFERENCE PLAN
NR/CIV/SD/803	HALF THROUGH RAIL UNDERBRIDGE WITH CROSS GIRDER FLOOR REFERENCE PLAN
NR/CIV/SD/804	WEB STRENGTHENING TROUGH INTERFACE TYPE 1
NR/CIV/SD/805	WEB STRENGTHENING TROUGH INTERFACE TYPE 2
NR/CIV/SD/806	WEB STRENGTHENING TROUGH INTERFACE TYPE 3
NR/CIV/SD/807	WEB STRENGTHENING TROUGH INTERFACE TYPE 4
NR/CIV/SD/808	WEB STRENGTHENING CROSS GIRDER INTERFACE TYPE 1
NR/CIV/SD/809	WEB STRENGTHENING CROSS GIRDER INTERFACE TYPE 2
NR/CIV/SD/810	WEB STRENGTHENING CROSS GIRDER INTERFACE TYPE 3
NR/CIV/SD/811	WEB STRENGTHENING CROSS GIRDER INTERFACE TYPE 4
NR/CIV/SD/812	WELDED WEB STRENGTHENING CROSS GIRDER INTERFACE TYPE 2
NR/CIV/SD/813	TOP HAT STRENGTHENING DETAILS – SHEET 1 OF 2
NR/CIV/SD/814	TOP HAT STRENGTHENING DETAILS – SHEET 2 OF 2
NR/CIV/SD/815	CROSS GIRDER WEB STRENGTHENING DETAILS
NR/CIV/SD/816	BOTTOM FLANGE STRENGTHENING DETAILS – SHEET 1 OF 4
NR/CIV/SD/817	BOTTOM FLANGE STRENGTHENING DETAILS – SHEET 2 OF 4
NR/CIV/SD/818	BOTTOM FLANGE STRENGTHENING DETAILS – SHEET 3 OF 4
NR/CIV/SD/819	BOTTOM FLANGE STRENGTHENING DETAILS – SHEET 3 OF 4
NR/CIV/SD/820	TOP FLANGE STRENGTHENING DETAILS – SHEET 1 OF 3
NR/CIV/SD/821	TOP FLANGE STRENGTHENING DETAILS – SHEET 2 OF 3
NR/CIV/SD/822	TOP FLANGE STRENGTHENING DETAILS – SHEET 3 OF 3
NR/CIV/SD/823	L FRAME / NEW CROSS GIRDER ARRANGEMENT
NR/CIV/SD/824	L FRAME / NEW CROSS GIRDER FRAME WITHIN A TROUGH FLOOR TYPE 1
NR/CIV/SD/825	L FRAME / NEW CROSS GIRDER FRAME WITHIN A TROUGH FLOOR TYPE 2
NR/CIV/SD/826	U FRAME STRENGTHENING
NR/CIV/SD/827	WEB REPAIR DETAILS
NR/CIV/SD/828	FLANGE REPAIR DETAILS
NR/CIV/SD/829	STIFFENER REPAIRS AND STRENGTHENING
NR/CIV/SD/830	TROUGH REPAIR DETAILS – SHEET 1 OF 2
NR/CIV/SD/831	TROUGH REPAIR DETAILS – SHEET 2 OF 2

DESIGN

1. THE STRENGTHENING, ALTERATION OR DESIGN OF REPAIRS SHALL BE DESIGNED TO SATISFY THE REQUIREMENTS OF NR/L3/CIV/020 AS A MINIMUM.
2. CONSIDERATION SHALL BE GIVEN TO THE INTERFACE BETWEEN THE NEW AND EXISTING PART. THE DESIGNER IS TO CHECK THAT THERE ARE NO DETRIMENTAL EFFECTS ON THE EXISTING PARTS RESULTING FROM THE INSTALLATION OF THE NEW PARTS.
3. NEW ELEMENTS SHALL BE DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF NR/L3/CIV/020 AS FOR A NEW BRIDGE.
4. THE SLIP FACTOR FOR FAYING SURFACES IS TO BE SHOWN ON THE WORKING DRAWINGS TO ENSURE THE DESIGNED MATING SURFACES ARE ACHIEVED ON SITE. (SEE TUM FOR GUIDANCE)
5. FAYING SURFACES SHOULD BE CLEARLY DEFINED ON THE WORKING DRAWINGS TO ENSURE THE DESIGNED MATING SURFACE AREAS ARE ACHIEVED ON SITE. (SEE TUM FOR GUIDANCE)
6. THE DESIGN SHOULD GIVE FULL CONSIDERATION TO THE CONTRACTORS TIGHTENING EQUIPMENT IN TERMS OF ACCESS AND CONFIGURATION OF STEELWORK AND ORIENTATION OF BOLTS OR WELDED CONNECTIONS. (SEE TUM FOR GUIDANCE)
7. STRENGTHENING AND REPAIR DETAILS SHOULD TAKE DUE ACCOUNT OF THE AVAILABILITY AND LENGTH OF POSSESSIONS. ANY SINGLE ELEMENT SHOULD BE DESIGNED SO THAT IT CAN BE INSTALLED OR PART INSTALLED WITHOUT WEAKENING THE EXISTING STRUCTURE, AND WHERE APPROPRIATE WITHIN AN ANTICIPATED 8 HOUR DURATION.
8. THE PERMITTED CONSTRUCTION TOLERANCE FOR THE INSTALLATION OF STRENGTHENING AND REPAIR WORKS IS TO BE CONSIDERED IN THE DESIGN WITH PARTICULAR ATTENTION GIVEN TO:

   i) STRUCTURE GAUGE CLEARANCE
   ii) HEADROOM CLEARANCE
   iii) ELECTRICAL CLEARANCE

   THESE TOLERANCES ARE TO BE CONSIDERED FOR ALL STAGES OF THE WORKS.
9. THE LOCATION OF EXISTING SERVICES AND RAILWAY INFRASTRUCTURE IS TO BE VERIFIED ON SITE AND APPROPRIATE PROTECTION MEASURES ALLOWED FOR WITHIN THE DESIGN.
10. PRIOR TO FABRICATION THE CONTRACTOR IS TO UNDERTAKE DETAILED DIMENSIONAL SURVEYS OF THE EXISTING STRUCTURE SUFFICIENT TO VERIFY DIMENSIONS SHOWN ON THE DESIGN DRAWINGS. IT SHOULD BE NOTED THAT DETAILS PROVIDED WHICH INTERFERE WITH THE EXISTING STRUCTURE MAY NEED TO BE MODIFIED TO SUIT EACH INDIVIDUAL APPLICATION.
11. EXISTING STRUCTURE DRAWINGS MAY EXIST WITHIN NETWORK RAIL ARCHIVES AND SHALL BE OBTAINED TO ASSIST THE DESIGN.
12. THE DESIGN SHALL IDENTIFY THE REQUIREMENTS FOR PROVIDING PROTECTION TO THE WORK AREAS TO ELIMINATE THE RISK OF PERSONNEL / EQUIPMENT / PLANT AND MATERIALS STRAYING ONTO THE RAILWAY.

STEELWORK

1. STEEL TO BE IN ACCORDANCE WITH BS EN 10025.
2. BOLTS SHALL BE CLASS HR 8.8 TO BS EN 14399–3 AND SUPPLIED WITH DIRECT TENSIONS INDICATOR WASHERS AND NUTS TO CLASS HR8. GRADE S10T TENSION CONTROL BOLTS MAY BE USED AS AN ALTERNATIVE.
3. STEELWORK SHALL COMPLY WITH BS EN 1990–2 FOR EXECUTION CLASS EXC3 AND TOLERANCE CLASS 2.
4. ALL WELDS SHALL MEET THE REQUIREMENTS OF TABLES 8.1 TO 8.5 OF BS EN 1993–1–9 INCLUSIVE FOR THE MINIMUM DETAIL CATEGORY, AS AMENDED BY THE UK NATIONAL ANNEX NA BS EN 1993–1–9. WHERE A HIGHER DETAIL CATEGORY AND ADDITIONAL REQUIREMENTS ARE NECESSARY, THE REQUIRED DETAIL CATEGORY IS DENOTED THUS:

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   THE QUALITY OF WELD SHALL CONFORM TO THE STANDARDS APPROPRIATE TO THESE CLASSIFICATIONS AS DEFINED BY THE SPECIFICATION.
5. METALLIC EPOXY FILLER MAY BE USED TO TAKE OUT DIFFERENCE IN LEVEL/PROFILE BETWEEN EXISTING AND PROPOSED MATING SURFACES. IT IS NOT TO BE USED AS A PACKING MATERIAL.
6. ALL TEMPORARY BOLTS SHALL NOT BE REUSED IN THE PERMANENT WORKS.
7. WHERE NON SPECIFIED PACK PLATES ARE REQUIRED THEY ARE TO BE MADE UP OF 10MM, 5MM, 2MM OR 1MM PLATES WITH NO MORE THAN FOUR INDIVIDUAL PLATES AT ANY ONE LOCATION.
8. RIVETS ARE NOT TO BE REMOVED, OTHER THAN THOSE INDICATED ON THE DRAWINGS – RIVETS ARE TO BE REMOVED BY APPROVED MECHANICAL TECHNIQUES WITHOUT DAMAGE TO THE EXISTING STRUCTURE. (SEE TUM FOR GUIDANCE)
9. EXISTING PLATES WHICH HAVE SUFFERED CORROSION AND ARE NOT TO BE REPAIRED TO BE GROUND BACK TO AT LEAST 3MM SO THAT PROTECTIVE TREATMENT CAN BE APPLIED.
10. WHERE NOTCHES ARE PRESENT IN PLATES THAT DO NOT REQUIRE STRENGTHENING THESE SHOULD BE REMOVED BY GRINDING BACK TO A DISTANCE THAT IS FIVE TIMES THE DEPTH OF THE NOTCH TO EITHER SIDE OF THE NOTCH.
11. ALL EDGES AND PERIPHERIES OF NEW TO EXISTING STEELWORK AND ALL BOLTS SHALL BE SEALED WITH APPROVED GUN GRADE SEALANT.

WELDING

1. EXPERIENCED FABRICATORS WITH A PROVEN TRACK RECORD IN MATCHING WELD PROCEDURES WITH METALLURGY OF EXISTING MATERIAL, WELD SEQUENCING AND MINIMIZING RESTRAINT SHOULD BE USED.
2. AREAS OF EXISTING METALWORK TO RECEIVE WELDING SHALL REQUIRE SAMPLING AND TESTING TO DETERMINE THE WELDABILITY OF THE MATERIAL AND TO ESTABLISH THE APPROPRIATE WELDING PROCEDURES / METHODOLOGY. SITE TRIALS AS NECESSARY SHOULD BE UNDERTAKEN TO CONFIRM THESE PROCEDURES ARE APPROPRIATE.
3. CONSIDERATION TO BE GIVEN TO BESPOKE WELD PROCEDURES, OR ADJUSTMENT TO EXISTING WELD PROCEDURES TO SUIT ACTUAL CHEMISTRY OF MATERIAL PRESENT ON SITE, WHICH WILL REQUIRE SAMPLING OF THE ELEMENT TO BE BE WELDED AND THE APPROPRIATE TESTING.
4. UNLESS SUITABLE PROTECTION IS IN PLACE, WELDING SHALL NOT BE CARRIED OUT DURING INCLEMENT WEATHER.
5. WELDING TRIALS AND SUBSEQUENT ADJUSTMENT OF PROPOSED METHOD OF WORKING MAY BE NECESSARY.
6. WELDING ON A STRUCTURE WHILST ANY VEHICLE IS PASSING OVER OR STANDING UPON SHOULD BE DISCOURAGED. IN THE EVENT THAT THIS IS CONSIDERED NECESSARY TO IMPLEMENT THE WORKS JUSTIFICATION SHALL BE PROVIDED AND WRITTEN ACCEPTANCE OBTAINED.
7. CARE MUST BE TAKEN TO AVOID LOCKED IN STRESSES RESULTING FROM WELD SHRINKAGE ETC.

PROTECTIVE TREATMENT

1. THE PRIMARY PAINT SYSTEM FOR STRENGTHENING PLATES IS N4 UNLESS OTHERWISE AGREED WITH THE PROJECT SPONSOR IN ACCORDANCE WITH NR/L3/CIV/039.
2. EACH AREA TO RECEIVE PROTECTIVE SYSTEM AS DEFINED BY THE PAIRED BOXES

DESCRIPTION OF AREA AFFECTED	DESCRIPTION OF PAINT SYSTEM

3. THE REQUIREMENTS OF NETWORK RAIL SPECIFICATION NR/GN/CIV/002 SHALL BE COMPLIED WITH.
4. ALL FAYING SURFACES TO BOLTED CONNECTIONS TOGETHER WITH AN AREA EXTENDING 12MM BEYOND THE PERIPHERY THEREOF, SHALL BE MASKED WITH WATERPROOF TAPE TO PROTECT THEM FROM FURTHER COATINGS. THIS TAPE SHALL THEN BE REMOVED, AND THE FAYING SURFACES CLEANED WITH WHITE SPIRIT.
5. AFTER ASSEMBLY OF BOLTED CONNECTIONS ON SITE ANY EXPOSED AREAS OF FAYING SURFACE ARE TO RECEIVE FULL PAINT SYSTEM AS SPECIFIED.
6. AFTER TIGHTENING BOLTS, CLEAN OFF ANY OIL WITH WHITE SPIRIT AND WIRE BRUSH AND DUST OFF PRIOR TO RECEIVING FULL PAINT SYSTEM.
7. EXPOSED PARTS OF FASTENERS TO RECEIVE THE FOLLOWING TREATMENTS:–

   WHERE N4 IS SPECIFIED:–

   A) APPLY THE FULL NUMBER OF COATS OF PAINT, INCLUDING AN ADDITIONAL COAT OF EPOXY PRIMER (RT.98 ITEM 7.1.4) TO THE JOINT PERIPHERY AND A STRIPE COAT BUT EXCLUDING TOP COAT.

   B) ALL LOAD INDICATING WASHERS SHALL BE SEALED WITH A BUTYL RUBBER SINGLE PART BRUSH GRADE SEALANT TO RT98 ITEM 8.1 APPLIED IN TWO COATS.

   C) APPLY FINAL COAT OF PAINT SYSTEM.
9. UPON COMPLETION OF SITE PAINTING A RECORD OF THE PROTECTIVE TREATMENT IS TO MADE, AND A TABLE PAINTED ON THE STRUCTURE WITH WHITE LETTERING 20MM HIGH X 12MM WIDE IN RT98 ITEM 5.13.5.

   PANELS TO GIVE NAME AND ADDRESS OF:

   A) STEELWORK FABRICATOR
   B) PAINTING CONTRACTOR
   C) PAINT SUPPLIER
   D) PROTECTIVE TREATMENT APPLIED
   E) COLOUR OR TOP COAT
   F) DATE COMPLETED
10. AREAS OF EXISTING PAINTWORK TO RECEIVE OVERCOATING SHALL REQUIRE PAINT SAMPLING AND TESTING TO DETERMINE THE EXISTING PAINTS COMPATIBILITY WITH THE NEW APPLIED PROTECTIVE TREATMENTS.
11. CARE SHOULD BE TAKEN WHEN HANDLING NEW ELEMENTS TO MINIMISE DAMAGE TO THE PROTECTIVE PAINT SYSTEM. DAMAGED AREAS SHALL BE TOUCHED UP IN ACCORDANCE WITH THE APPROPRIATE SYSTEM.

BRITISH & EUROPEAN STANDARDS USED IN THE STANDARD DESIGNS.

COMMON STANDARDS

GC/RT5112	LOADING REQUIREMENTS FOR THE DESIGN OF BRIDGES
NR/L3/CIV/020	DESIGN OF BRIDGES
NR/L3/CIV/025	STRUCTURAL ASSESSMENT OF UNDERBRIDGES
NR/L2/CIV/035	THE ASSESSMENT OF STRUCTURES

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 1993–2: 2006, EUROCODE 3: DESIGN OF STEEL STRUCTURES–PART 2: STEEL BRIDGES
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 6695–1–9: 2008, RECOMMENDATIONS FOR THE DESIGN OF STRUCTURES TO BS EN 1993–1–9
PD 6695–2: 2008, RECOMMENDATIONS FOR DESIGN OF BRIDGES TO BS EN 1993

PD 6696–2: 2007, BACKGROUND PAPER TO BS EN 1994–2 AND THE UK NATIONAL ANNEX TO BS EN 1994–2 EUROCODE 4

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
BREAKING OUT EXISTING RIVETS	C	PROCESS CAN GENERATE HAND / ARM VIBRATION. CONTRACTOR TO USE APPROPRIATE EQUIPMENT FOR RIVET REMOVAL
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.
REMOVAL OF PAINT FOR FAYING SURFACES	D/C	CARRY OUT PAINT ANALYSIS PRIOR TO CONSTRUCTION WORK AND ESTABLISH PROCESS FOR PAINT REMOVAL
TEMPORARY INSTABILITY OF STRUCTURE DURING THE WORKS	D/C	DESIGNER TO SPECIFY 1) LIMITATIONS ON THE NUMBER OF RIVETS TO BE REMOVED FORM ANY ELEMENT AT ANY ONE TIME 2) SPECIFY ANY TEMPORARY WORKS REQUIREMENTS. CONTRACTORS TO INCLUDE WORKS SEQUENCING IN METHOD STATEMENT FOR REVIEW BY THE DESIGNER TO ENSURE THAT STRUCTURE REMAIN STABLE DURING ALL STAGES OF THE WORKS.
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 CAN BE ACCESSED BY PIGEONS TO HAVE PLASTIC ANTI–PERCH SPIKES ATTACHED.

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

DRAWING No. NR/CIV/SD/801

NOTES

Rev	Date	Description of revision	Design'd	C'kd
A	22.06.12	FIRST ISSUE	MK	AGW
P2	01.07.11	DRAFT PUBLICATION ISSUE	MK	AGW
P1	14.04.11	ISSUED FOR FORM A	MK	AGW
P1	24.02.11	ISSUED FOR COMMENT	MK	AGW

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

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METALLIC STRUCTURE REPAIRS STANDARD DRAWINGS

SPECIFICATION FOR THE WORKS

Scale	AS SHOWN
Drawing Number	NR/CIV/SD/801 A

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