Supplementary Information

The following information is associated with Network Rail Standard:
NR CIV/SD/820 Rev A

Additional Content Access

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CAD Drawing

- CIV/SD/820

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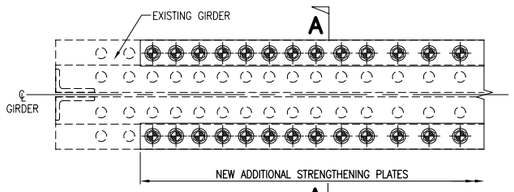
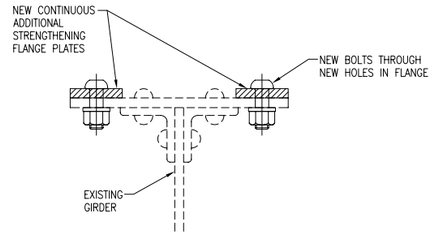
STRENGTHENING TYPE 1



PLAN ON TOP FLANGE
SCALE 1:10



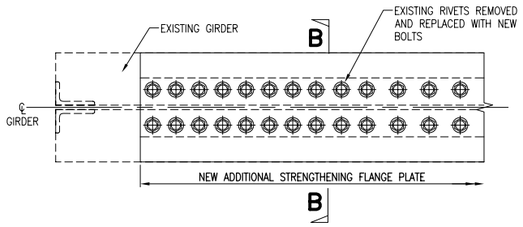
SECTION A–A
SCALE 1:5

STRENGTHENING TYPE 1
PROPOSED SEQUENCE OF WORKS (INDICATIVE)

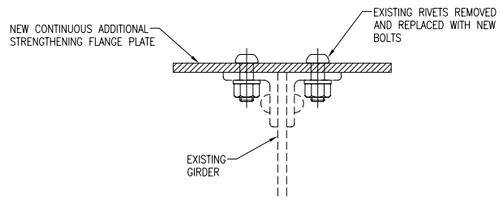
1. EXISTING OUTER RIVETS TO BE REMOVED ONE AT A TIME AND LEFT BLANK WITH TEMPORARY BOLTS INSTALLED IN EVERY SIXTH HOLE TO MAINTAIN CLAMPING OF PLATES DURING THE TEMPORARY CONDITION.
2. REMOVE EXISTING PROTECTIVE PAINT FROM FLANGE TO RECEIVE NEW PLATES TO MEET REQUIRED FAYING SURFACE.
3. INSTALL NEW STRENGTHENING PLATES TO EXISTING FLANGE WITH PERMANENT BOLTS AND HAND TIGHT CONNECTIONS.
4. DURING A POSSESSION FULLY TORQUE BOLTS.

SAFETY THE DESIGNER IS TO CONFIRM THE INSTALLATION SEQUENCE AND CHECK IF UNDER PERMANENT AND LIVE LOAD CONDITIONS THAT HOLES CAN BE DRILLED THROUGH THE FLANGE PLATES EITHER ONE SIDE AT A TIME OR SIMULTANEOUSLY.

STRENGTHENING TYPE 2



PLAN ON TOP FLANGE
SCALE 1:10



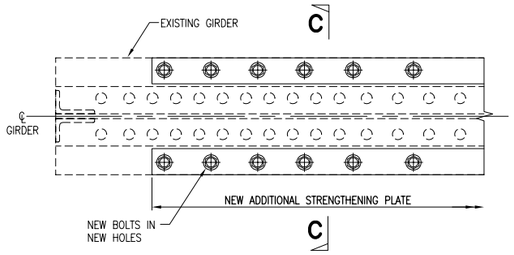
SECTION B–B
SCALE 1:5

STRENGTHENING TYPE 2
PROPOSED SEQUENCE OF WORKS (INDICATIVE)

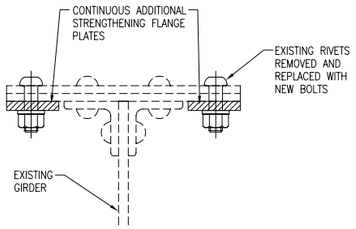
1. DRILL NEW HOLES IN EXISTING ANGLES OUTSIDE OF POSSESSIONS
2. REMOVE EXISTING PROTECTIVE PAINT FROM FLANGE TO RECEIVE NEW PLATES TO MEET REQUIRED FAYING SURFACE.
3. INSTALL NEW STRENGTHENING PLATES AND FASTEN TO EXISTING ANGLES WITH PERMANENT BOLTS DURING A POSSESSION.

SAFETY THE DESIGNER IS TO CONFIRM THE INSTALLATION SEQUENCE AND CHECK IF UNDER PERMANENT AND LIVE LOAD CONDITIONS THAT HOLES CAN BE DRILLED THROUGH THE FLANGE ANGLES EITHER ONE ANGLE AT A TIME OR SIMULTANEOUSLY. IF SIMULTANEOUS HOLES CAN NOT BE DRILLED THE DETAIL MAY BE MODIFIED TO TWO HALVES AS SHOWN IN TYPE 2.

REPAIR TYPE 3



VIEW ON UNDERSIDE OF TOP FLANGE
SCALE 1:10



SECTION C–C
SCALE 1:5

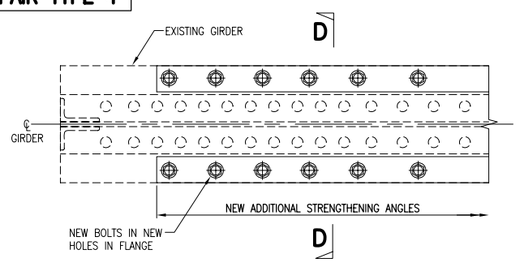
STRENGTHENING TYPE 3
PROPOSED SEQUENCE OF WORKS (INDICATIVE)

1. EXISTING OUTER RIVETS TO BE REMOVED ONE AT A TIME AND LEFT BLANK WITH TEMPORARY BOLTS INSTALLED IN EVERY SIXTH HOLE TO MAINTAIN CLAMPING OF PLATES DURING THE TEMPORARY CONDITION.
2. REMOVE EXISTING PROTECTIVE PAINT FROM FLANGE TO RECEIVE NEW PLATES TO MEET REQUIRED FAYING SURFACE.
3. INSTALL NEW STRENGTHENING PLATES TO EXISTING FLANGE WITH PERMANENT BOLTS AND HAND TIGHT CONNECTIONS.
4. DURING A POSSESSION FULLY TORQUE BOLTS.

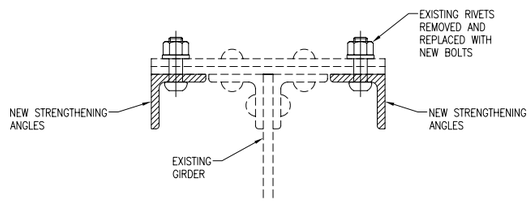
SAFETY THE DESIGNER IS TO CONFIRM THE INSTALLATION SEQUENCE AND CHECK IF UNDER PERMANENT AND LIVE LOAD CONDITIONS THAT HOLES CAN BE DRILLED THROUGH THE FLANGE PLATES EITHER ONE SIDE AT A TIME OR SIMULTANEOUSLY.

THIS STRENGTHENING ARRANGEMENT IS OFTEN NOT SUITED TO CROSS GIRDERS OR MAIN GIRDERS AS INTER CONNECTING CROSS GIRDERS, STIFFENERS, RAIL BEARERS AND THE LIKE PREVENT THE PLATE BEING CONTINUOUS. REFER TO STRENGTHENING TYPE 5 FOR ALTERNATIVE ARRANGEMENT.

REPAIR TYPE 4



VIEW ON UNDERSIDE OF TOP FLANGE
SCALE 1:10



SECTION D–D
SCALE 1:5

STRENGTHENING TYPE 4
PROPOSED SEQUENCE OF WORKS (INDICATIVE)

1. EXISTING OUTER RIVETS TO BE REMOVED ONE AT A TIME AND LEFT BLANK WITH TEMPORARY BOLTS INSTALLED IN EVERY SIXTH HOLE TO MAINTAIN CLAMPING OF PLATES DURING THE TEMPORARY CONDITION.
2. REMOVE EXISTING PROTECTIVE PAINT FROM FLANGE TO RECEIVE NEW PLATES TO MEET REQUIRED FAYING SURFACE.
3. INSTALL NEW STRENGTHENING PLATES TO EXISTING FLANGE WITH PERMANENT BOLTS AND HAND TIGHT CONNECTIONS.
4. DURING A POSSESSION FULLY TORQUE BOLTS.

SAFETY THE DESIGNER IS TO CONFIRM THE INSTALLATION SEQUENCE AND CHECK IF UNDER PERMANENT AND LIVE LOAD CONDITIONS THAT HOLES CAN BE DRILLED THROUGH THE FLANGE PLATES EITHER ONE SIDE AT A TIME OR SIMULTANEOUSLY.

THIS STRENGTHENING ARRANGEMENT IS OFTEN NOT SUITED TO CROSS GIRDERS OR MAIN GIRDERS AS INTER CONNECTING CROSS GIRDERS, STIFFENERS, RAIL BEARERS AND THE LIKE PREVENT THE PLATE BEING CONTINUOUS. REFER TO STRENGTHENING TYPE 5 FOR ALTERNATIVE ARRANGEMENT.

DRAWING No. NR/CIV/SD/820

NOTES

GENERAL NOTES

1. THIS DRAWING SHOWS A TYPICAL EXAMPLE OF TOP FLANGE STRENGTHENING USED TO GENERATE ADDITIONAL CAPACITY TO EXISTING METALLIC LONGITUDINAL GIRDERS.
2. THE SIZES AND DIMENSIONS SHOWN ON THIS DRAWING RELATE TO EITHER A TYPICAL EDGE OR CENTRE LONGITUDINAL GIRDER. THE CONFIGURATION OF STRENGTHENING PLATE IS THE RESPONSIBILITY OF THE DESIGNER.
3. ALL EXISTING PLATES, STIFFENERS AND CONFIGURATION OF THE GIRDER ARE TO BE CONFIRMED ON SITE BY THE DESIGNER.
4. THIS DRAWING TO BE READ IN CONJUNCTION WITH NR/CIV/SD/821.

SPECIFICATION

1. FOR SPECIFICATION REFER TO DRG. NR/CIV/SD/801.

DESIGN ASSUMPTIONS

1. THE DESIGNER SHALL BE RESPONSIBLE FOR THE DESIGN OF THE WEB STRENGTHENING SYSTEM WHICH SHALL ADDRESS AS A MINIMUM THE FOLLOWING.
   - A) CLEARANCES FOR ACCESS TO THE WORKS
   - B) 'LOCKED IN' PERMANENT LOAD STRESSES
   - C) CONDITION OF EXISTING FLANGES
   - D) CLEARANCES BETWEEN BOLTS
   - E) EXTENT AND SEQUENCE OF RIVET REPLACEMENT IF REQUIRED
   - F) INTEGRITY OF FLOOR CONNECTIONS
2. SAFETY THE DESIGNER SHALL CHECK THE VARIOUS STAGES IN THE CONSTRUCTION SEQUENCE TO ENSURE THE INTEGRITY OF THE GIRDER AND OTHER CONNECTING PARTS ARE MAINTAINED THROUGHOUT THE WORKS.
3. THE DESIGNER SHALL SPECIFY THE SLIP FACTOR (μ) REQUIRED FOR FAYING SURFACES TO SATISFY THE DESIGN.
4. SAFETY THE DESIGNER SHALL CHECK THE NUMBER OF RIVETS OR BOLTS THAT CAN BE REMOVED AT ANY ONE TIME UNDER THE LOADING REGIME FOR THE GIVEN WORK ITEM.

NOTE

- DENOTES NEW BOLT IN EXISTING HOLE REAMED TO SUIT.
- DENOTES NEW BOLT IN PRE DRILLED HOLE.
- DENOTES EXISTING RIVET TO BE LEFT IN PLACE.

Rev	Date	Description of revision	Design'd	C'kd
A	22.06.12	FIRST ISSUE	MK	AGW
P3	01.07.11	DRAFT PUBLICATION ISSUE	MK	AGW
P2	14.04.11	ISSUED FOR FORM A	MK	AGW
P2	24.02.11	ISSUED FOR COMMENT	MK	AGW
P1	24.01.11	DRAFT ISSUE	MK	AGW

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Approved	Paul Clark	Head of Engineering Infrastructure Projects Central Region	P.C.	June 12
	Name	Position	Signature	Date

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METALLIC STRUCTURE REPAIRS STANDARD DRAWINGS

TOP FLANGE STRENGTHENING DETAILS

1 OF 3

Scale	AS SHOWN	
Drawing Number	NR/CIV/SD/820	A

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