Supplementary Information

The following information is associated with Network Rail Standard:
NR CIV/SD/108 Rev A

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CAD Drawing

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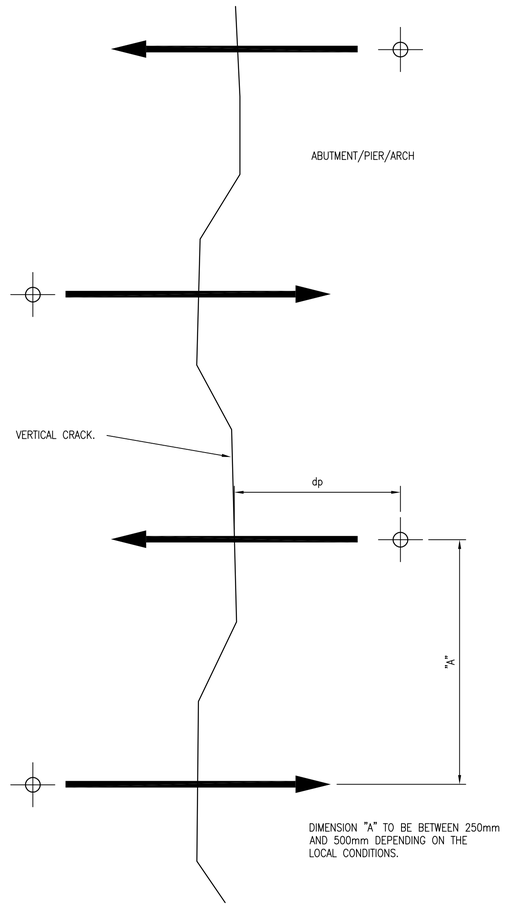
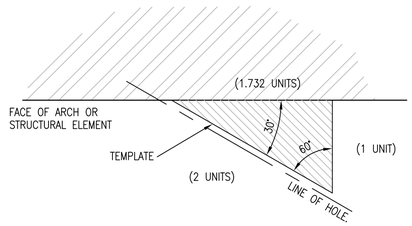


SPACING OF STITCHING BARS ALONG LENGTH OF CRACK

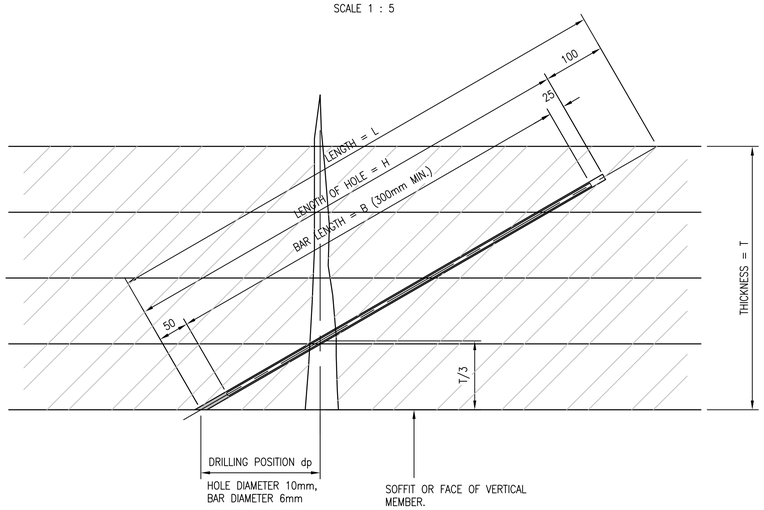
SCALE 1 : 5

NOTE : TO ENSURE THE CORRECT DRILLING ANGLE IS MAINTAINED DURING INSTALLATION OF THE BARS A TEMPLATE SHOULD BE USED. THIS SHOULD BE CUT TO GIVE THE REQUIRED DRILLING ANGLE.



TYPICAL 30° TEMPLATE

SCALE 1 : 10



TYPICAL SECTION AT 30° CROSS STITCHING OF ROTATIONAL CRACK IN ARCH OR VERTICAL MEMBER

SCALE 1 : 5

TABLE 2

THICKNESS OF ELEMENT T	DRILLED LENGTH OF HOLES AND BARS INCLUDING POSITION AND INTERSECTION POINT.		
	30°		
RINGS	HOLE H mm	BAR B mm	dp T/3 mm
210 (2)	320	*245*	*121*
320 (3)	540	465	184
430 (4)	760	685	247
540 (5)	980	905	311
650 (6)	1200	1125	374

(SEE NOTE 3)

THE FIGURES IN ITALICS FAIL TO REACH DESIRED VALUES BUT MAY BE USED WITH EMPLOYERS REPRESENTATIVE'S AGREEMENT.

DESIGN ASSUMPTIONS

a) TO DETERMINE THE FRACTURE STITCHING ARRANGEMENT A NUMBER OF FACTORS NEED TO BE ESTABLISHED.

b) LOCATION
ARCH OR FLAT STRUCTURAL ELEMENT.
TYPE OF FRACTURE, ROTATIONAL (TRANSVERSE) OR SHEAR (LONGITUDINAL / STEPPED). IF SHEAR REFER TO DRAWING NR/CIV/SD/109.
THICKNESS OF ELEMENT TO BE DRILLED AND STITCHED.
THE PRESENCE OF WATERPROOFING TO ARCH BACKING, THROUGH WHICH PENETRATION MUST BE AVOIDED WHERE POSSIBLE, UNLESS DIRECTED BY THE EMPLOYERS REPRESENTATIVE.
DRILLING ANGLE OF 30° FROM THE FACE.
THICKNESS ('T') TO BE STITCHED.
CHECK THAT WHEN THE BAR IS IN POSITION THAT IT EXTENDS A MINIMUM 150mm BEYOND THE FRACTURE. THE OPTIMUM LENGTH BEING 300mm. THIS DOES NOT PREVENT GREATER LENGTHS BEING INSTALLED IF REQUIRED AS DIRECTED BY THE EMPLOYERS REPRESENTATIVE.
THE MINIMUM BAR LENGTH IS 300mm.

c) LOCATION: REFER TO CONTRACT DRAWING OR INSPECTION REPORT.
TYPE: REFER TO INSPECTION REPORT. DRILLING ANGLE IS DEPENDANT ON THE LOCATION.

d) THICKNESS ('T') OF VERTICAL MEMBERS MUST BE ESTABLISHED BY TRIAL DRILLING. ARCH THICKNESS MUST BE ASSUMED BY CALCULATING THE THICKNESS GIVEN AT ARCH FACE, WHERE POSSIBLE. TRIAL DRILLING MUST NOT BE UNDERTAKEN IN ARCHES WHERE WATERPROOFING MAY BE DAMAGED, UNLESS DIRECTED BY THE EMPLOYERS REPRESENTATIVE.

e) CALCULATION OF BAR LENGTHS, HOLE DEPTHS AND DRILLING POSITIONS

f) ROTATIONAL CRACK = T/3; DESIRED REPAIR CLOSE TO FACE OF DEFECT.

g) TO ENSURE THAT THE INTERSECTION POINT ('IP') IS NO LESS THAN 125mm FROM THE FACE OF THE INTRADOS OR FACE OF A VERTICAL MEMBER IT MUST ANCHOR INTO AT LEAST THE SECOND RING OR COURSE. HAVING DETERMINED THE DRILLING POSITION, THE MINIMUM BAR LENGTH MUST BE 300mm.

h) THE SPACING OR HALF PITCH OF BARS MEASURED LONGITUDINALLY ALONG THE CRACK SHALL BE UNIFORM THROUGHOUT THE LENGTH. THIS WILL BE PROPORTIONAL TO THE DISTANCE FROM IP NOMINALLY BETWEEN 250mm AND 500mm.

i) FOR BOTH BRICK & MASONRY APPROXIMATELY 500mm EACH SIDE OF THE CRACK MUST BE CLEANED USING A HIGH PRESSURE WATERJET.

j) THE CRACK AND ANY POOR MORTAR JOINTS WITHIN THE CLEANED AREA TO BE RAKED OUT TO A MIN DEPTH OF 25mm/SOUND MATERIAL AND RE-POINTED BY HAND OR AN APPROVED MECHANICAL METHOD. JOINTS TO BE FULLY MORTARED UP AND STRUCK FLUSH.

k) POINTING TO BE ALLOWED TO OBTAIN SUFFICIENT STRENGTH PRIOR TO THE GROUTING. THIS BEING CARRIED OUT AFTER THE STITCHING PROCESS.

INSTALLATION GUIDANCE

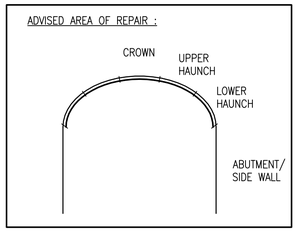
a) HOLES SHALL BE DRILLED, FLUSHED CLEAR OF ALL DUST AND DEBRIS AND WHEREVER REASONABLY PRACTICABLE, BE FORMED THROUGH BRICKS OR MASONRY UNITS AS APPLICABLE AND NOT THROUGH JOINTS.

b) DETAILS OF TOLERANCES WITH RESPECT TO HOLE DIAMETER, LENGTH AND DEVIATION, THE METHOD OF MONITORING HOLE ACCURACY AND ANY CORRECTIVE ACTION SHALL BE INCLUDED IN THE METHOD STATEMENT.

c) THE GROUT TO BE INJECTED AT A PRESSURE AND CONSISTENCY THAT WILL ENSURE THE GROUT TRAVELS AND PERMEATES INTO THE BRICKWORK WITHOUT IMMEDIATELY RUNNING OUT. MINIMISE EXCESSIVE LEAKAGE, GIVING DUE CONSIDERATION TO THE CONDITION OF THE BRICKWORK AND NOT CAUSE 'BLOW-OUT'. CLOSELY MONITOR GROUT 'TAKE' TO MINIMISE LEAKAGE.

d) WHILST GROUT IS STILL 'GREEN' RE-DRILL THE HOLES. NOW INJECT THE ANCHOR GROUT INTO THE HOLE, INSERT THE STITCHING BARS IN THE SAME HOLES. SECURE WITH A TEMPORARY TIMBER BUNG TO PREVENT GROUT LOSS. REMOVE BUNG AFTER SET PERIOD AND POINT UP WITH MORTAR.

ADVISED AREA OF REPAIR :



AREA APPROPRIATE FOR DETAILED REPAIR IS SHOWN BY HEAVY LINE.

NOTES

GENERAL

1. THIS DRAWING SHALL BE USED WHERE CROSS STITCHING & GROUTING IS TO BE UNDERTAKEN FOR SHEAR CRACKS.

2. WHERE BRICKWORK IN THE VICINITY OF THE CRACK REQUIRES REPLACING REFER TO DRAWINGS NR/CIV/SD/103, 104 & 105.

3. TABLE 2 AT THE FOOT OF THE DRAWING IS A GUIDE FOR THE REQUIRED DEPTHS NEEDED TO ENSURE AN ADEQUATE REPAIR. THE VALUES IN ITALICS FOR 2 RINGS INDICATE INSUFFICIENT ANCHORAGE LENGTH. GENERALLY SUCH SMALL BARRELS WOULD NOT BE FOUND OTHER THAN IN CULVERTS AND DUE TO RESTRICTED ACCESS IT WOULD BE IMPRACTICABLE TO CARRY OUT SUCH REPAIRS.

4. ALL TERMINOLOGY IS BASED ON THAT TYPICALLY USED TO DESCRIBE BRIDGE DEFECTS NOT TUNNEL DEFECTS.

SPECIFICATION

REFER TO DESIGN ASSUMPTIONS AND SPECIFICATION ON DRAWING NR/CIV/SD/101.

RISK ASSESSMENT

REFER TO DRAWING NR/CIV/SD/101.

Rev	Date	Description of revision	Design'd	C'kd
A	22.06.06	FIRST ISSUE -NR APPROVED	RMA	NGAY
P3	17.03.06	REVISED FORM B.	RMA	NGAY
P2	31.01.06	FORM B ISSUE.	RMA	NGAY
P1	13.01.06	PRELIMINARY DRAFT	RMA	NGAY

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Authorised	K. TEAGER	Director of Civil Engineering	KT	08.06.06

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BRICK AND MASONRY REPAIR STANDARD DRAWINGS

STITCHING ROTATIONAL CRACKS

Scale	AS SHOWN	
Drawing Number	NR/CIV/SD/108	REV A

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