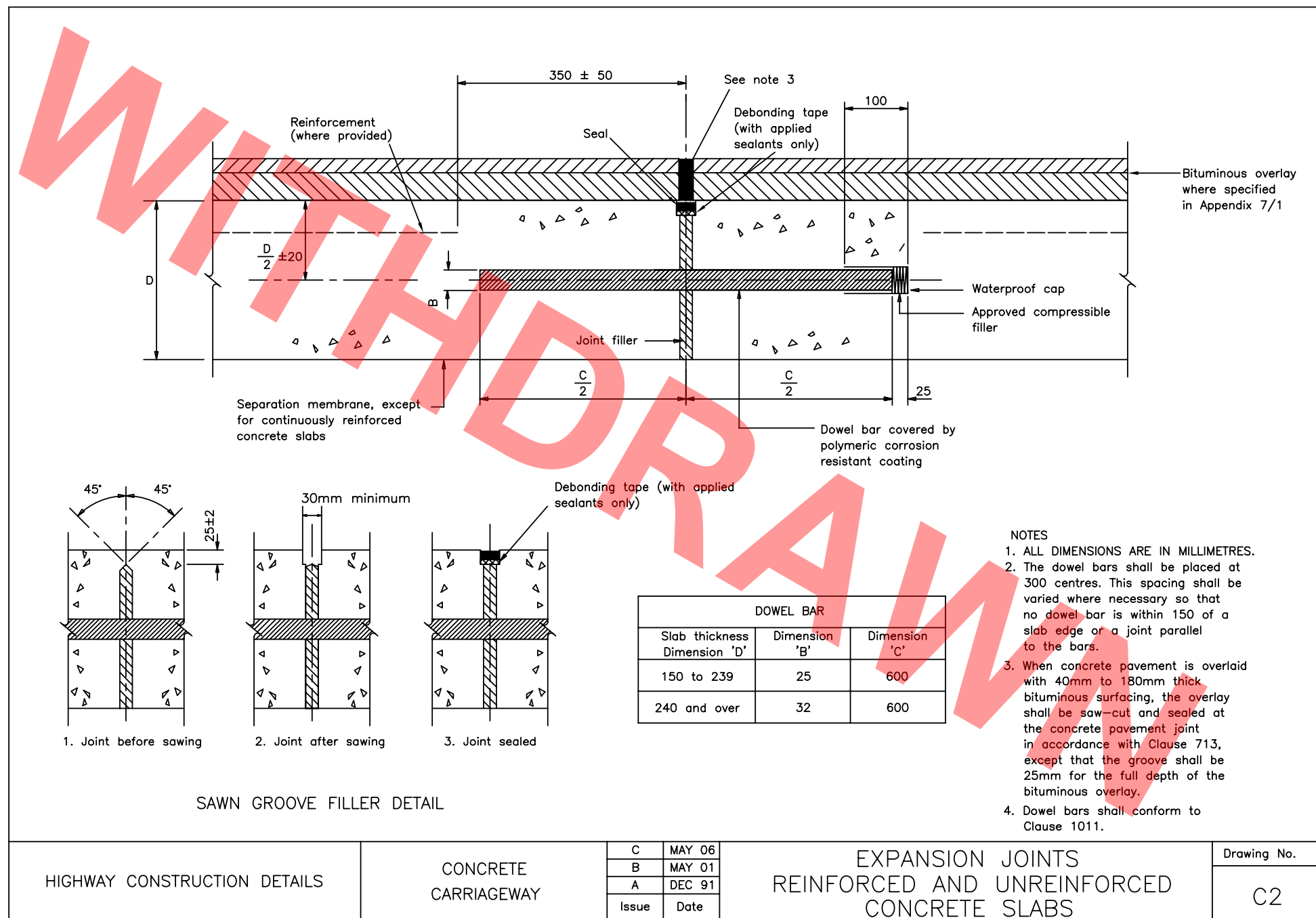


HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	E	MAY 06	TYPES OF CONCRETE PAVEMENTS LONGITUDINAL SECTIONS	Drawing No.
		D	MAY 02		C1
		C	MAY 01		
		B	MAR 98		
		A	DEC 91		
	Issue	Date			



HIGHWAY CONSTRUCTION DETAILS

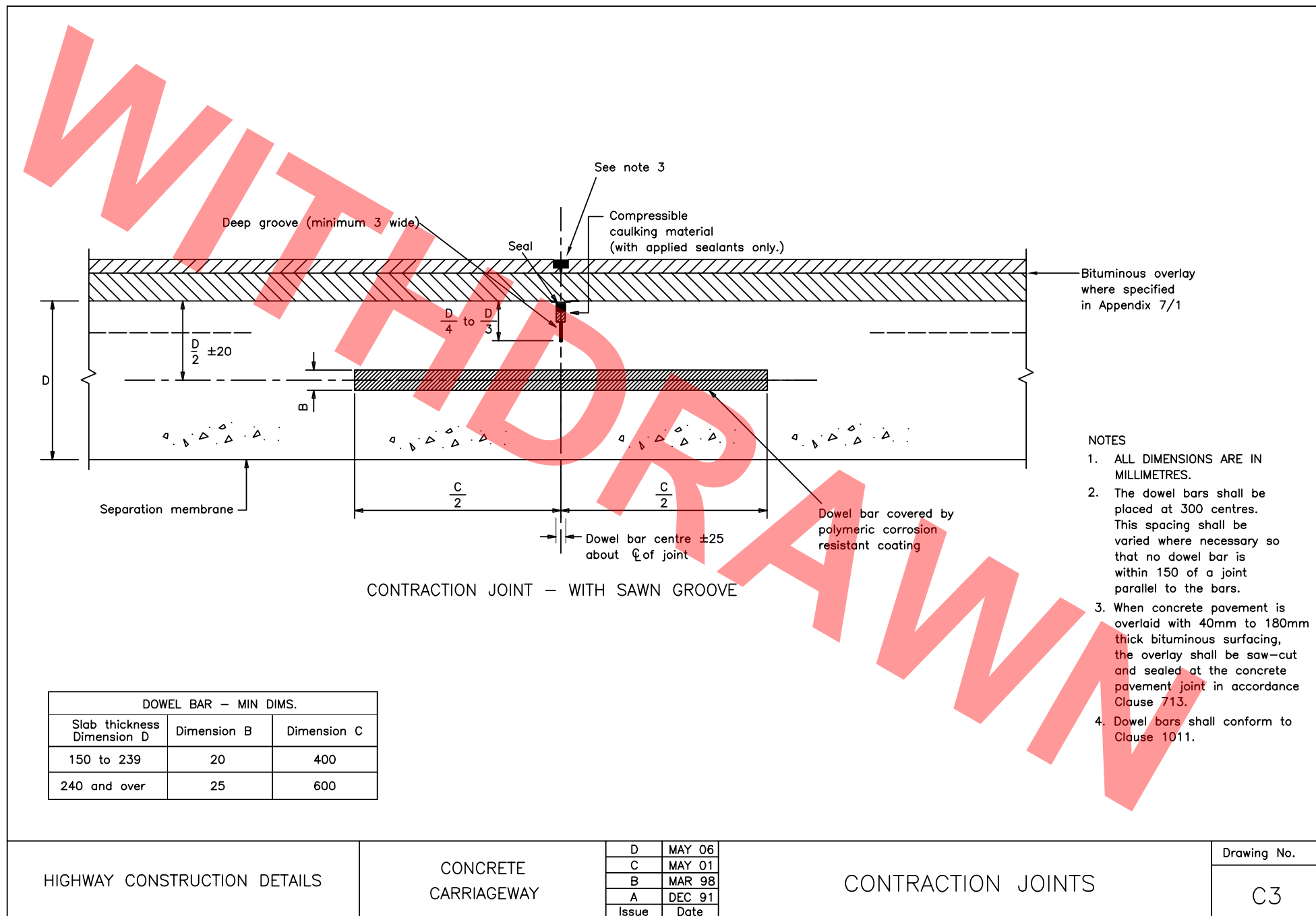
CONCRETE
CARRIAGEWAY

C	MAY 06
B	MAY 01
A	DEC 91
Issue	Date

EXPANSION JOINTS
REINFORCED AND UNREINFORCED
CONCRETE SLABS

Drawing No.

C2



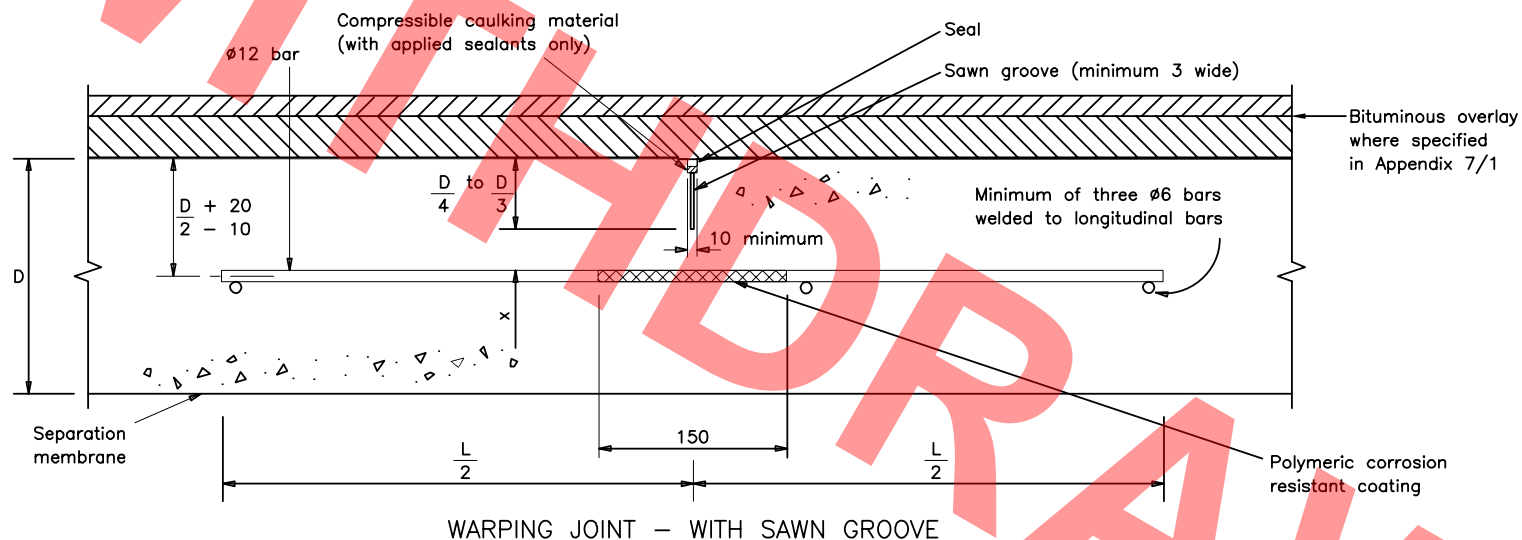
- NOTES**
1. ALL DIMENSIONS ARE IN MILLIMETRES.
 2. The dowel bars shall be placed at 300 centres. This spacing shall be varied where necessary so that no dowel bar is within 150 of a joint parallel to the bars.
 3. When concrete pavement is overlaid with 40mm to 180mm thick bituminous surfacing, the overlay shall be saw-cut and sealed at the concrete pavement joint in accordance Clause 713.
 4. Dowel bars shall conform to Clause 1011.

DOWEL BAR - MIN DIMS.		
Slab thickness Dimension D	Dimension B	Dimension C
150 to 239	20	400
240 and over	25	600

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	D	MAY 06	CONTRACTION JOINTS	Drawing No.
		C	MAY 01		
		B	MAR 98		C3
		A	DEC 91		
		Issue	Date		

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. Warping joints shall be constructed and sealed in accordance with the Specification. The tie bar spacing shall be varied where necessary so that no tie bar is within 150 of a slab edge or a joint parallel to the bars.
3. Reinforcement shall conform to Clause 1008.



Tie bar dimensions

Grade	B500B or B500C
Tie bar diameter	12
Tie bar length L	750

Cover to tie bars

Slab thickness D	>200	<200
Cover x	30	20

HIGHWAY CONSTRUCTION DETAILS

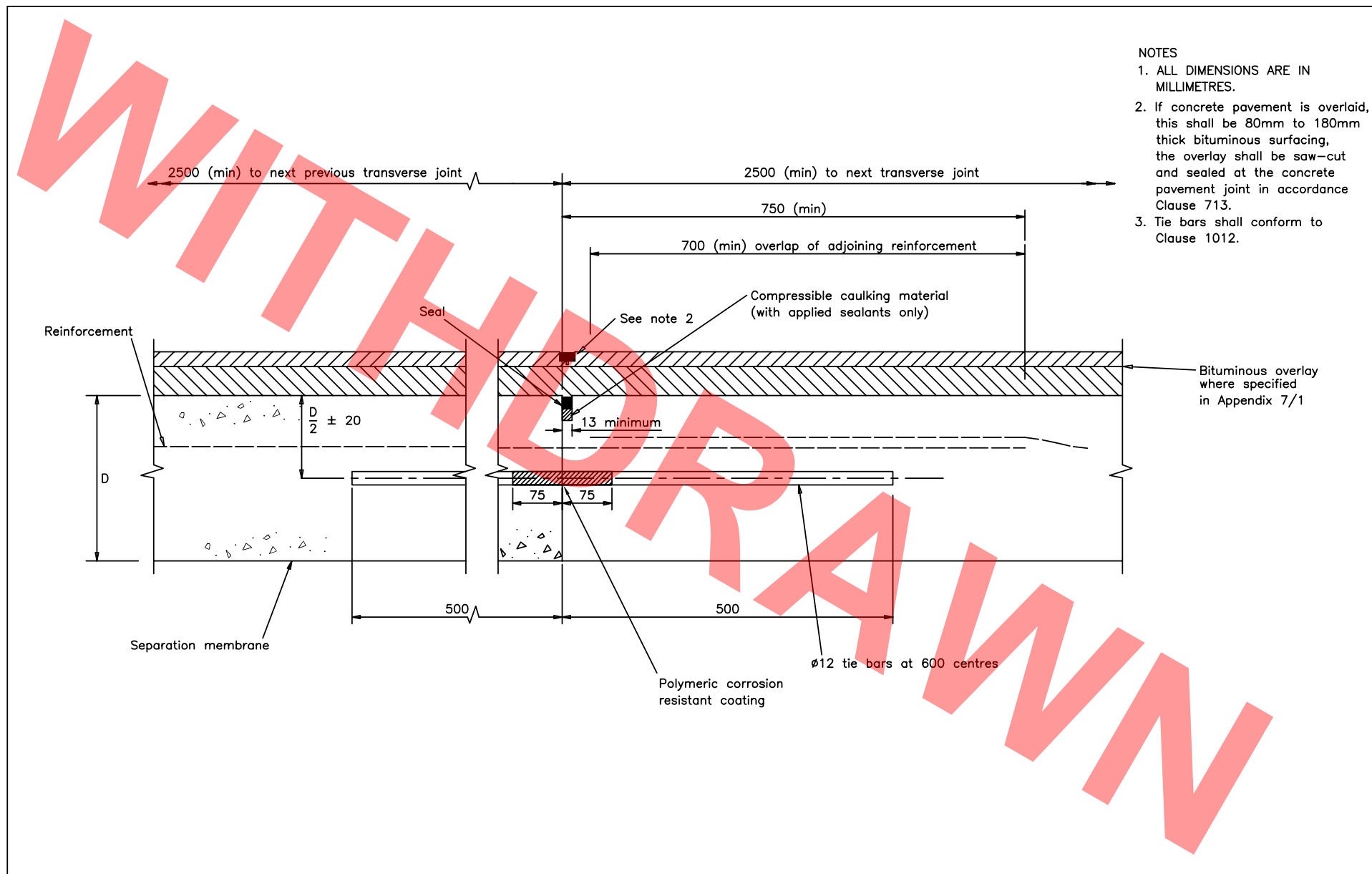
CONCRETE
CARRIAGEWAY

D	MAY 06
C	MAY 01
B	MAR 98
A	DEC 91
Issue	Date

WARPING JOINTS
(UNREINFORCED SLABS ONLY)

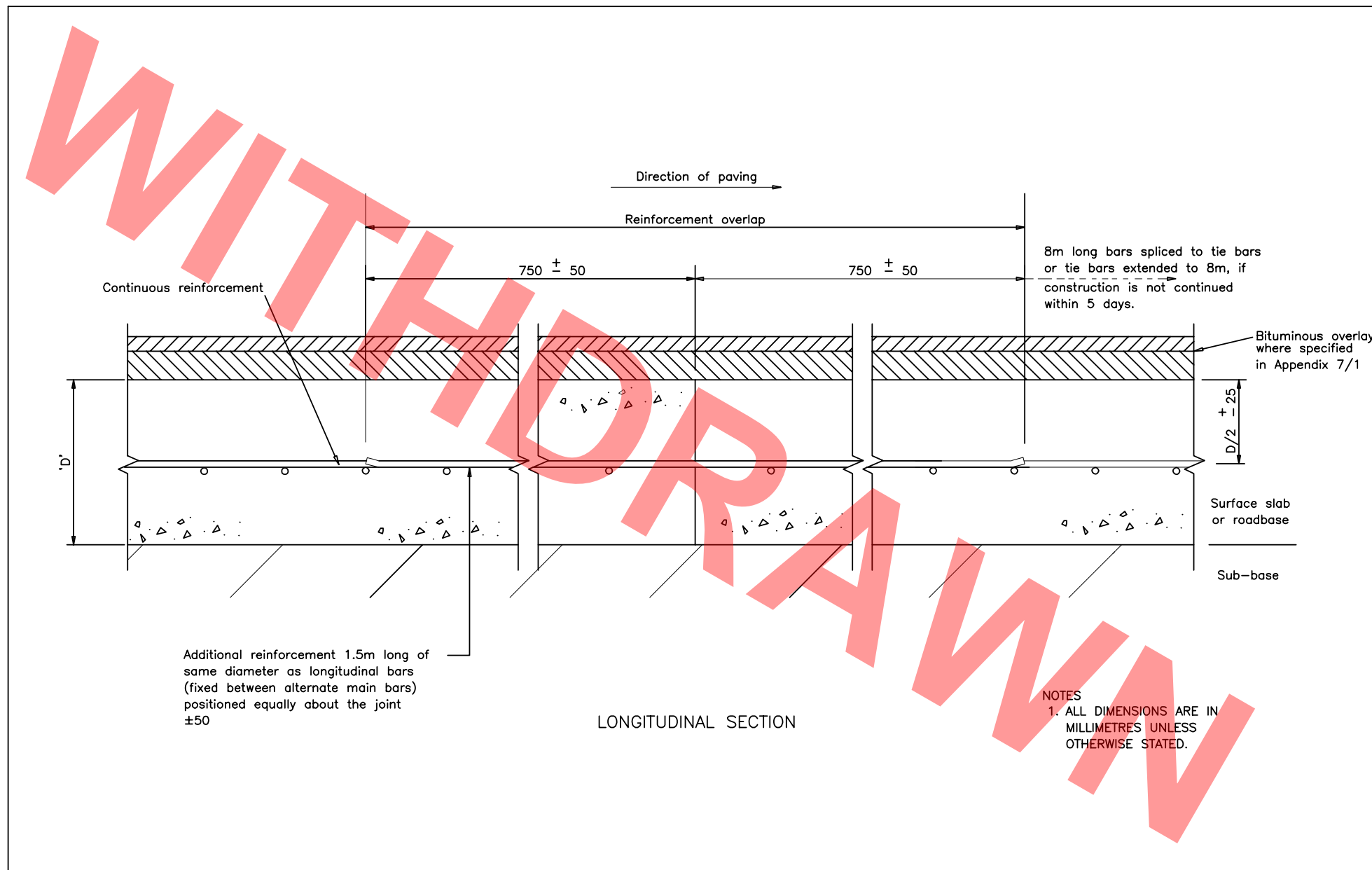
Drawing No.

C4



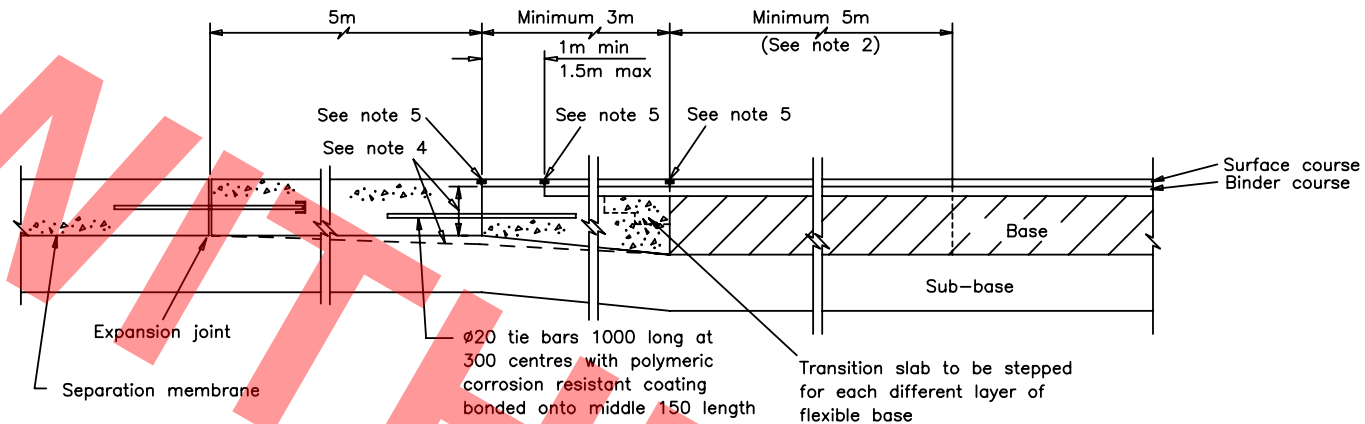
- NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES.
 2. If concrete pavement is overlaid, this shall be 80mm to 180mm thick bituminous surfacing, the overlay shall be saw-cut and sealed at the concrete pavement joint in accordance Clause 713.
 3. Tie bars shall conform to Clause 1012.

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	C	MAY 06	EMERGENCY TRANSVERSE CONSTRUCTION JOINT (JOINTED REINFORCED CONCRETE SLABS ONLY)	Drawing No.
		B	MAY 01		C5
		A	DEC 91		
		Issue	Date		

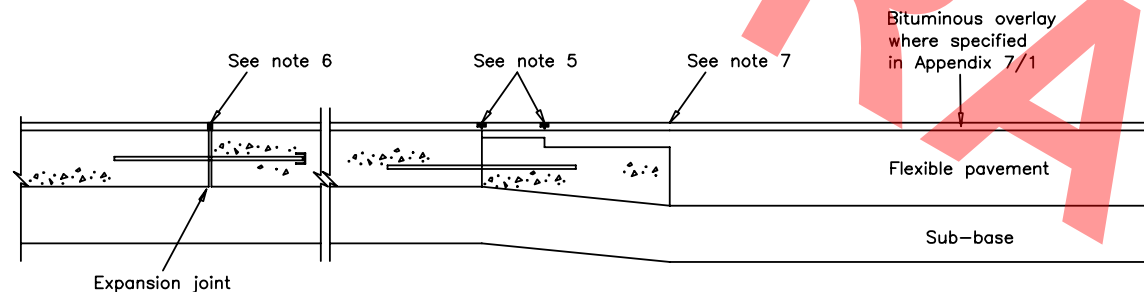


NOTES
 1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	B	MAY 01	TRANSVERSE CONSTRUCTION JOINT (CONTINUOUSLY REINFORCED CONCRETE PAVEMENT OR ROADBASE)	Drawing No.
		A	DEC 91		C6
		Issue	Date		



RIGID URC OR JRC TO FLEXIBLE CONSTRUCTION (SURFACE SLABS)

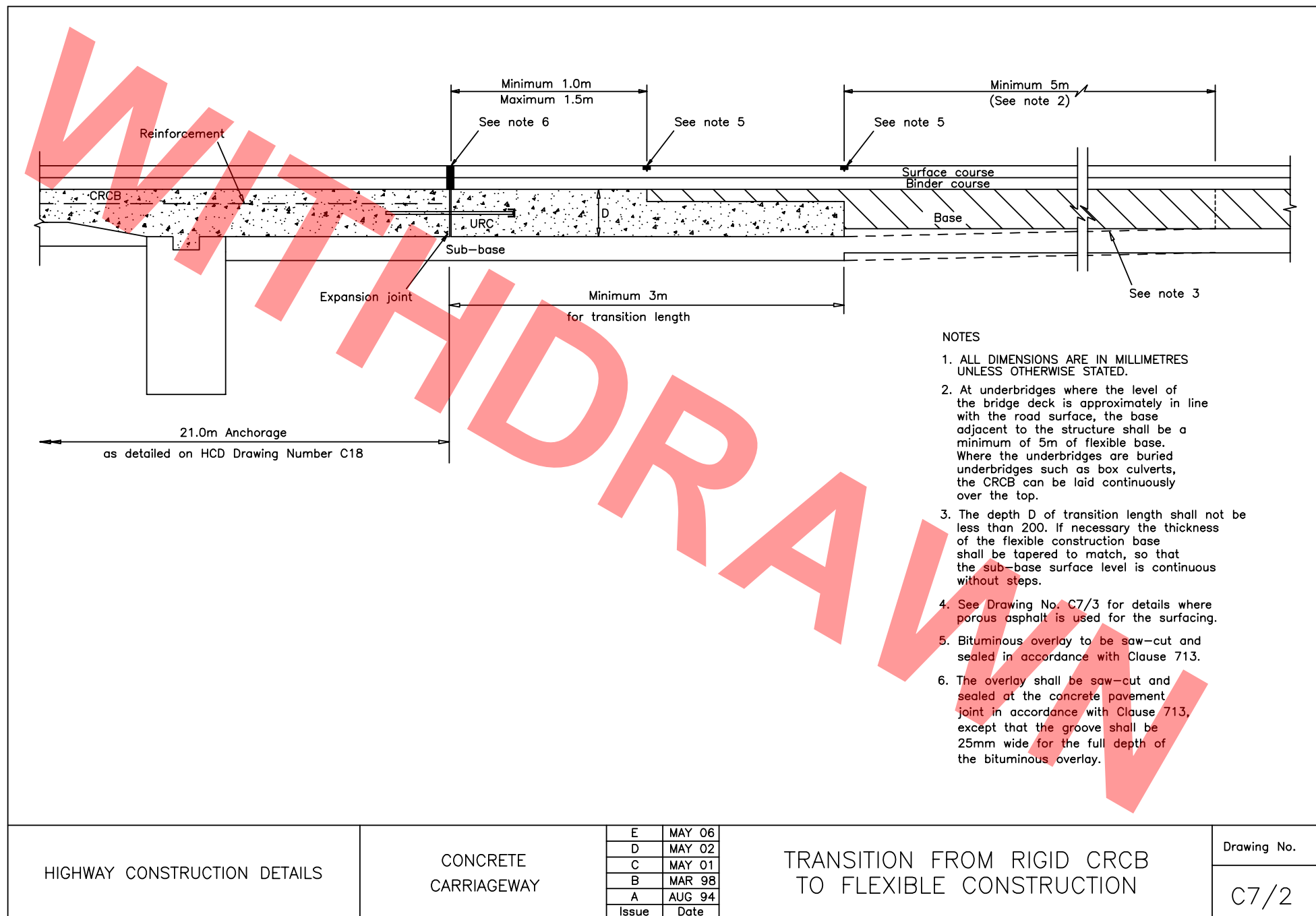


RIGID TO FLEXIBLE CONSTRUCTION (SURFACE SLAB WITH BITUMINOUS OVERLAY)

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. At underbridges the base adjacent to the structure shall be a minimum of 5m of flexible base.
3. At buried structures the base and sub-base shall be continued over the structure. The sub-base shall be isolated from the structure by not less than 150mm of granular fill.
4. The depth of transition slab shall not be less than 200. If necessary, the thickness of the last bay of rigid pavement shall be tapered to match, so that the sub-base surface level is continuous without steps.
5. Bituminous construction to be saw-cut and sealed in accordance with Clause 713.
6. If concrete pavement is overlaid, this shall be 80mm to 180mm thick bituminous surfacing, the overlay shall be saw-cut and sealed at the concrete pavement joint in accordance with Clause 713, except that the groove shall be 25mm wide for the full depth of the bituminous overlay.
7. Bituminous overlay to be saw-cut and sealed in accordance with Clause 713, where existing surfacing is cracked.
8. Tie bars shall conform to Clause 1012.

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	E	MAY 06	TRANSITION FROM RIGID URC OR JRC TO FLEXIBLE CONSTRUCTION	Drawing No.
		D	MAY 02		C7/1
C	MAY 01				
B	MAR 98				
A	DEC 91				
	Issue	Date			



HIGHWAY CONSTRUCTION DETAILS

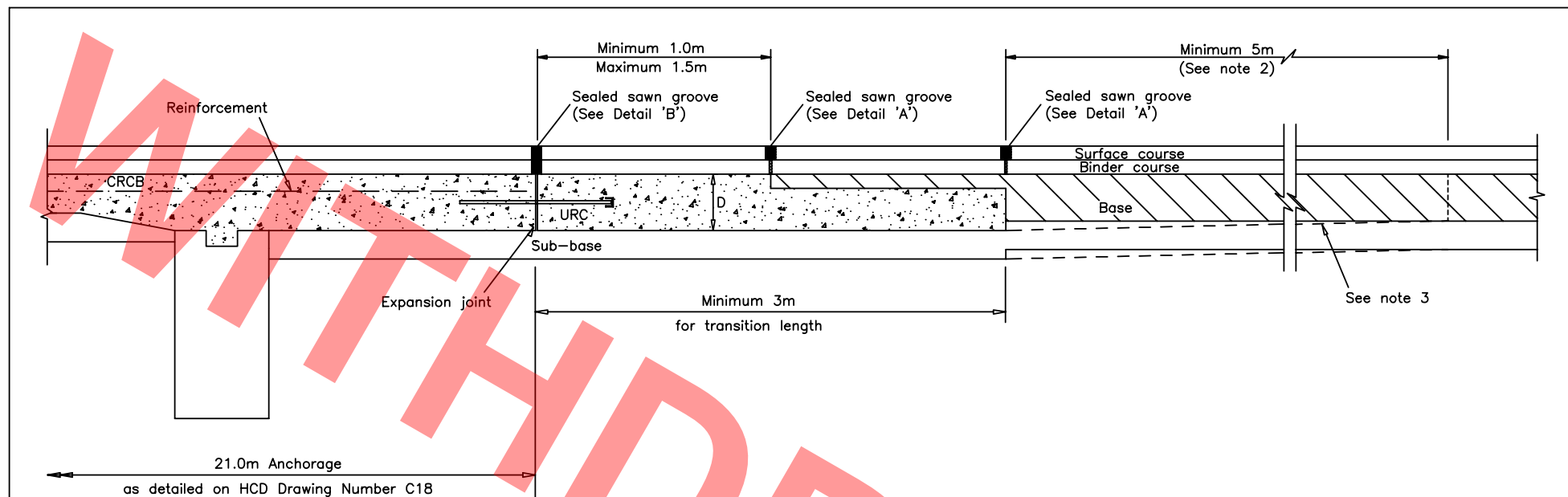
CONCRETE
CARRIAGEWAY

E	MAY 06
D	MAY 02
C	MAY 01
B	MAR 98
A	AUG 94
Issue	Date

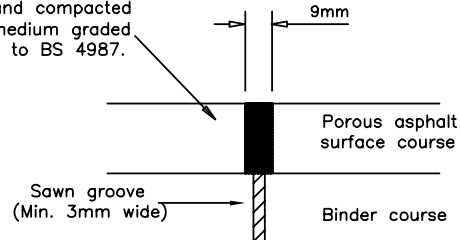
TRANSITION FROM RIGID CRCB
TO FLEXIBLE CONSTRUCTION

Drawing No.

C7/2

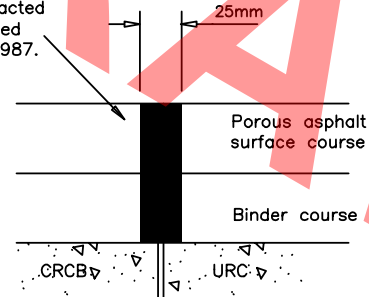


Sawn groove filled with well rammed and compacted 0/6mm size medium graded surface course to BS 4987.



DETAIL 'A'
SEALED SAWN GROOVE

Sawn groove filled with well rammed and compacted 6mm size medium graded surface course to BS 4987.



DETAIL 'B'
SEALED SAWN GROOVE
OVER EXPANSION JOINT

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. At underbridges where the level of the bridge deck is approximately in line with the road surface, the base adjacent to the structure shall be a minimum of 5m of flexible base. Where the underbridges are buried underbridges such as box culverts, the CRCB can be laid continuously over the top.
3. The depth of transition length shall not be less than 200. If necessary the thickness of the end section of the CRCB shall be tapered to match, so that the sub-base surface level is continuous without steps.

HIGHWAY CONSTRUCTION DETAILS

CONCRETE
CARRIAGEWAY

E	MAY 06
D	MAY 02
C	MAY 01
B	MAR 98
A	AUG 94
Issue	Date

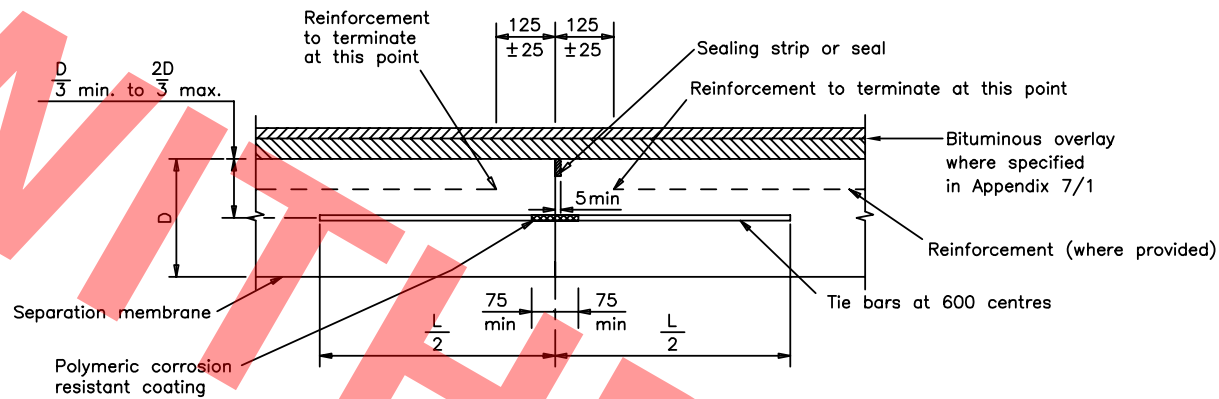
TRANSITION FROM RIGID CRCB
TO FLEXIBLE CONSTRUCTION
WITH POROUS ASPHALT SURFACING

Drawing No.

C7/3

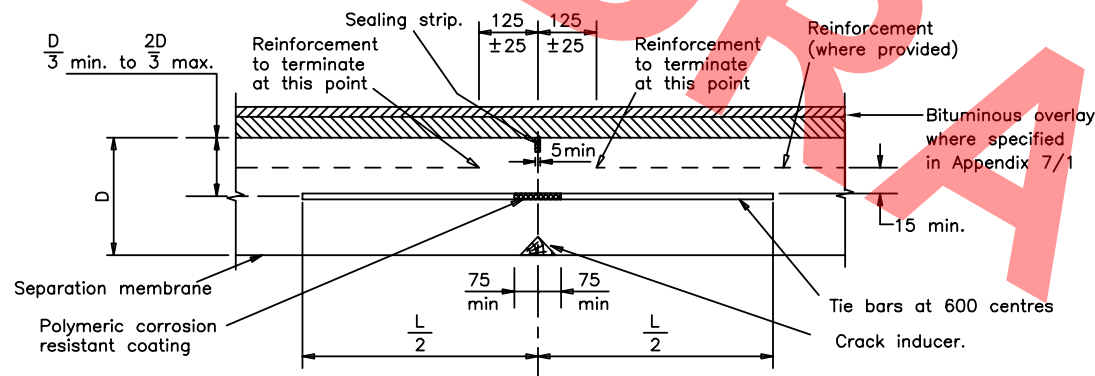
NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. Tie bars shall conform to Clause 1012.



TYPE 1

Longitudinal construction joint between two separately constructed unreinforced or jointed reinforced slabs



TYPE 2

Wet formed longitudinal joint for slabs more than one lane width constructed in one operation

TIE BARS		
Dia	Length L	Grade
12	750	B500B or B500C
16	600	B500B or B500C
20	500	B500B or B500C

HIGHWAY CONSTRUCTION DETAILS

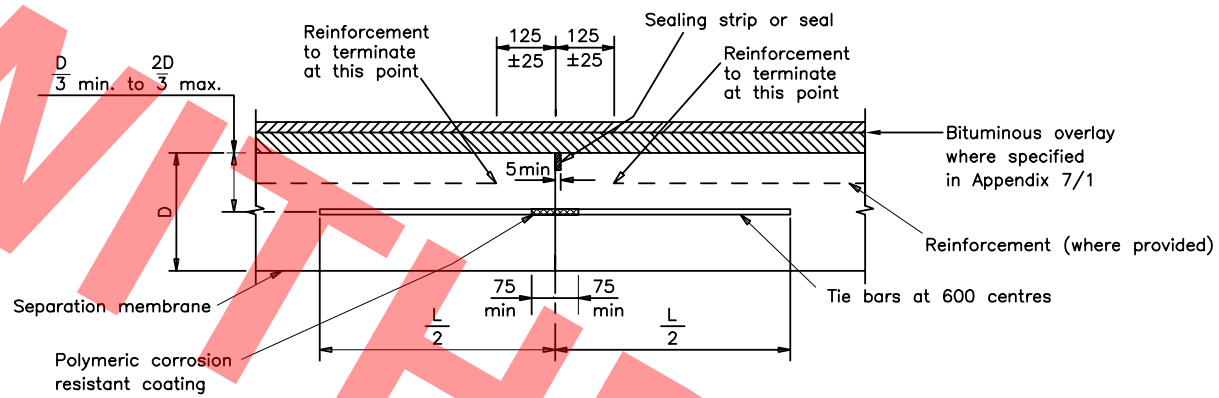
CONCRETE
CARRIAGEWAY

C	MAY 06
B	MAY 01
A	MAR 98
Issue	Date

LONGITUDINAL JOINTS
FOR URC OR JRC SLABS

Drawing No.

C8/1



NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. Tie bars shall conform to Clause 1012.

TYPE 5
Sawn longitudinal joint for unreinforced or jointed slabs
(More than one lane width constructed in one operation)

HIGHWAY CONSTRUCTION DETAILS

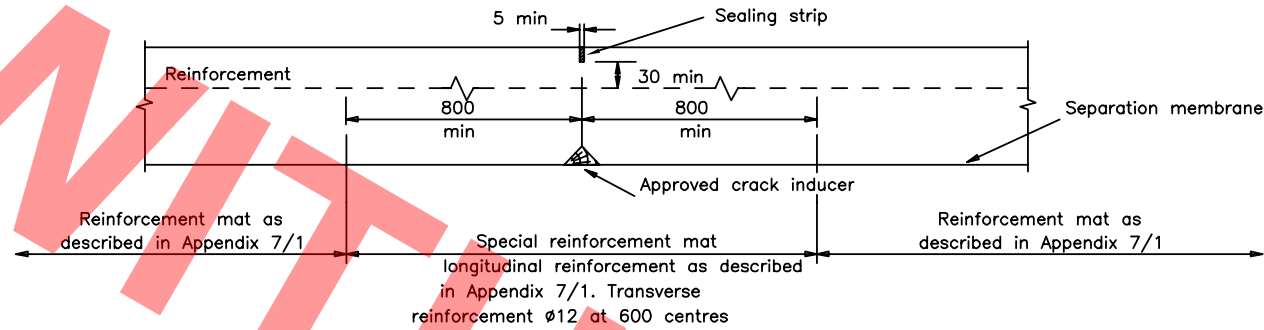
CONCRETE
CARRIAGEWAY

C	MAY 06
B	MAY 01
A	MAR 98
Issue	Date

LONGITUDINAL JOINTS
FOR URC OR JRC SLABS

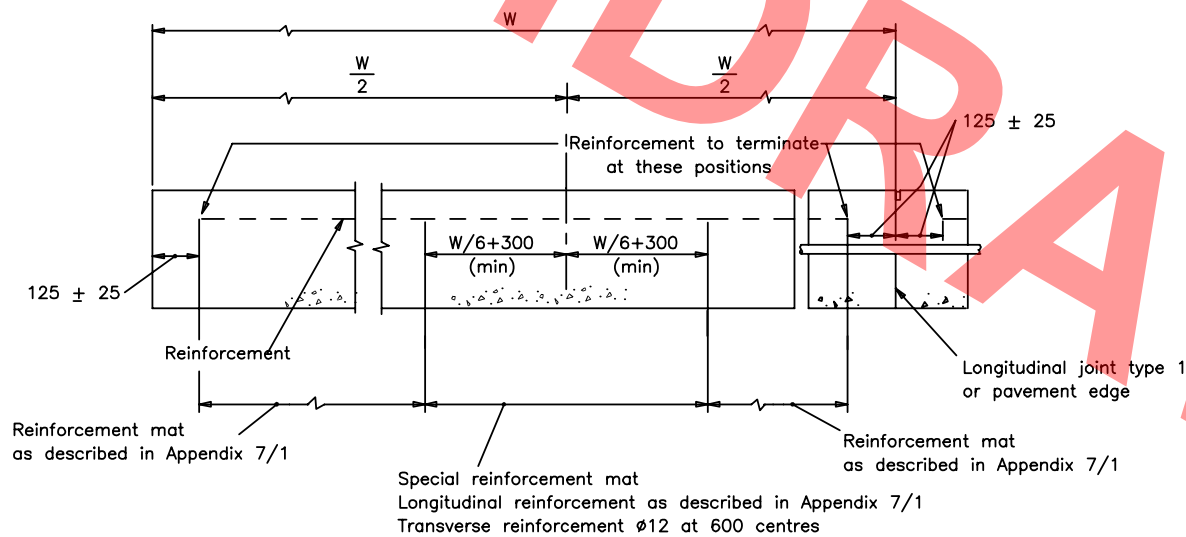
Drawing No.

C8/2



LONGITUDINAL JOINT TYPE 3 (Alternative to TYPE 2)

Formed longitudinal joint for slabs constructed in more than one lane width in one operation.



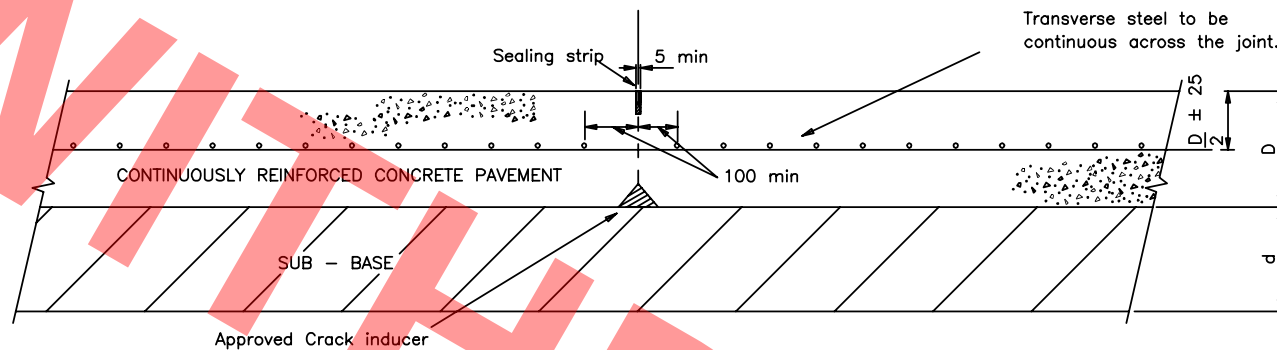
TYPE 4

Alternative to a longitudinal joint for wide reinforced slabs up to 6m width

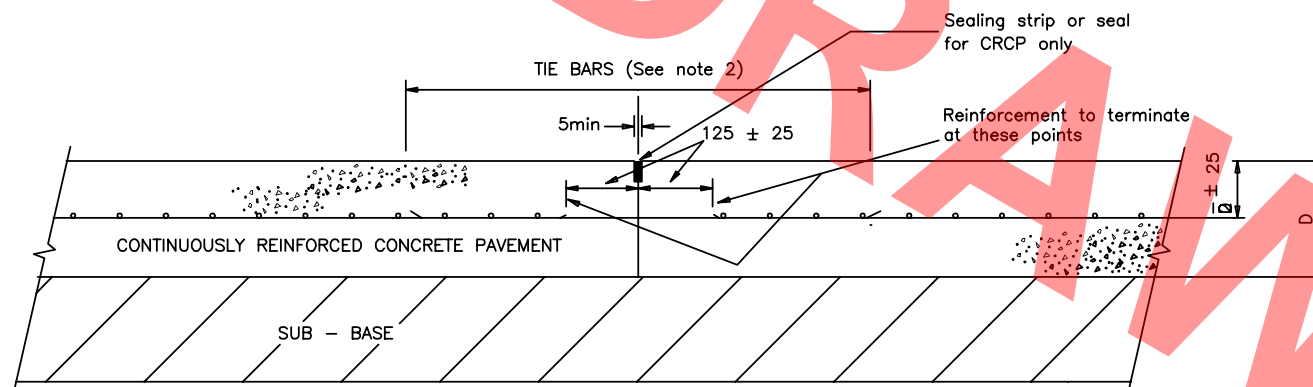
NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. W equals slab width laid in one operation between 4m and 6m.
3. The special transverse reinforcement shall be lapped with or be continuous with the normal specified transverse reinforcement.
4. Reinforcement shall conform to Clause 1008.

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	B	MAY 06	LONGITUDINAL JOINTS JOINTED REINFORCED CONCRETE SLABS	Drawing No.
		A	DEC 91		C9
		Issue	Date		



FORMED LONGITUDINAL JOINT FOR CRCP OR CRCB
(constructed in more than one lane width in one operation)



CRCP or CRCB BUTT TYPE CONSTRUCTION JOINT
(between separately constructed slabs)

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. Tie bars shall be placed equally about the joint ± 50 at the same spacing as and adjacent to the transverse reinforcement. Protective coating to be applied to the centre 150 (min) of tie bars.
3. Reinforcement shall conform to Clause 1008.

TIE BARS		
Dia	Length L	Grade
12	750	B500B or B500C
16	600	B500B or B500C
20	500	B500B or B500C

HIGHWAY CONSTRUCTION DETAILS

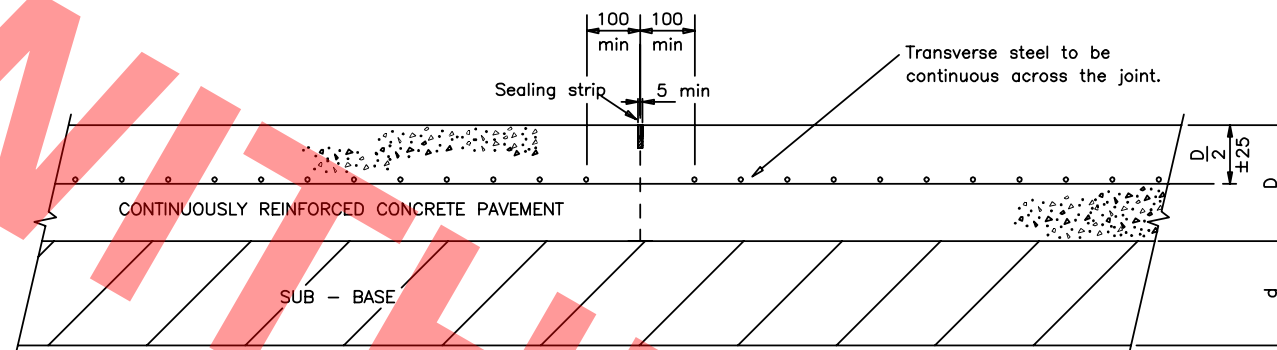
CONCRETE CARRIAGEWAY

B	MAY 06
A	MAR 98
Issue	Date

LONGITUDINAL JOINT
(CONTINUOUSLY REINFORCED CONCRETE PAVEMENT OR BASE)

Drawing No.

C10/1



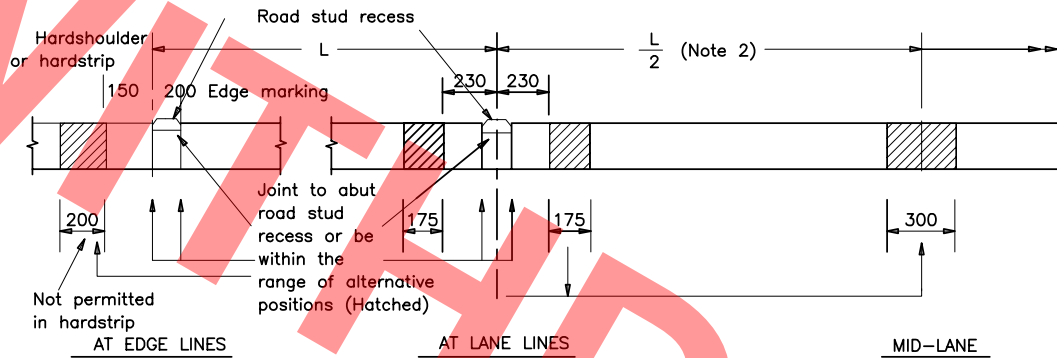
SAWN LONGITUDINAL JOINT FOR CRCP OR CRCB
(constructed in more than one lane width in one operation)

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. Tie bars shall be placed equally about the joint ± 50 at the same spacing as and adjacent to the transverse reinforcement. Protective coating to be applied to the centre 150 (min) of tie bars.
3. Reinforcement shall conform to Clause 1008.

TIE BARS		
Dia	Length L	Grade
12	750	B500B or B500C
16	600	B500B or B500C
20	500	B500B or B500C

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	B	MAY 06	LONGITUDINAL JOINT (CONTINUOUSLY REINFORCED CONCRETE PAVEMENT OR BASE)	Drawing No.
		A	MAR 98		C10/2
		Issue	Date		



PERMITTED ALTERNATIVE LONGITUDINAL JOINT POSITIONS

Longitudinal joint positions.

Joints shall be positioned beside or close to edge or lane markings, road studs or their recesses, or in mid-lane so that the maximum slab width is not exceeded (see note 3). Permitted alternative joint positions are shown by arrows above. Tolerances for alternative joint positions are shown by shading. Joints in CRC pavement shall only be construction joints at positions agreed by the Engineer, to suit the method of construction, avoiding positions under the wheeltracks.

Lane markings and reflecting road studs

Lane and edge markings shall be placed as shown on the Drawings. Reflecting road studs shall be placed centrally in lane markings or adjacent to edge markings unless otherwise shown on the Drawings.

Minor adjustments to the lane line position of up to 100mm may be made where the joint and lane line would conflict or otherwise fall outside the permitted tolerances, provided that there are no offset discontinuities in the markings and the adjustments are approved by the Engineer.

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. L= Lane width. For dual carriageways joint position may be at L/2. For position of joints in single carriageways see drawing no. C12 to C17.
3. Maximum slab widths:
Aggregate- Limestone All others
4. For transverse joint arrangements in hardstrips see drg no C26.
5. Road stud recesses not to be within 150 min of transverse joints.

Aggregate	Limestone	All others
URC	5.0m	4.2m
JRC	7.3m	6.0m
CRCP		

HIGHWAY CONSTRUCTION DETAILS

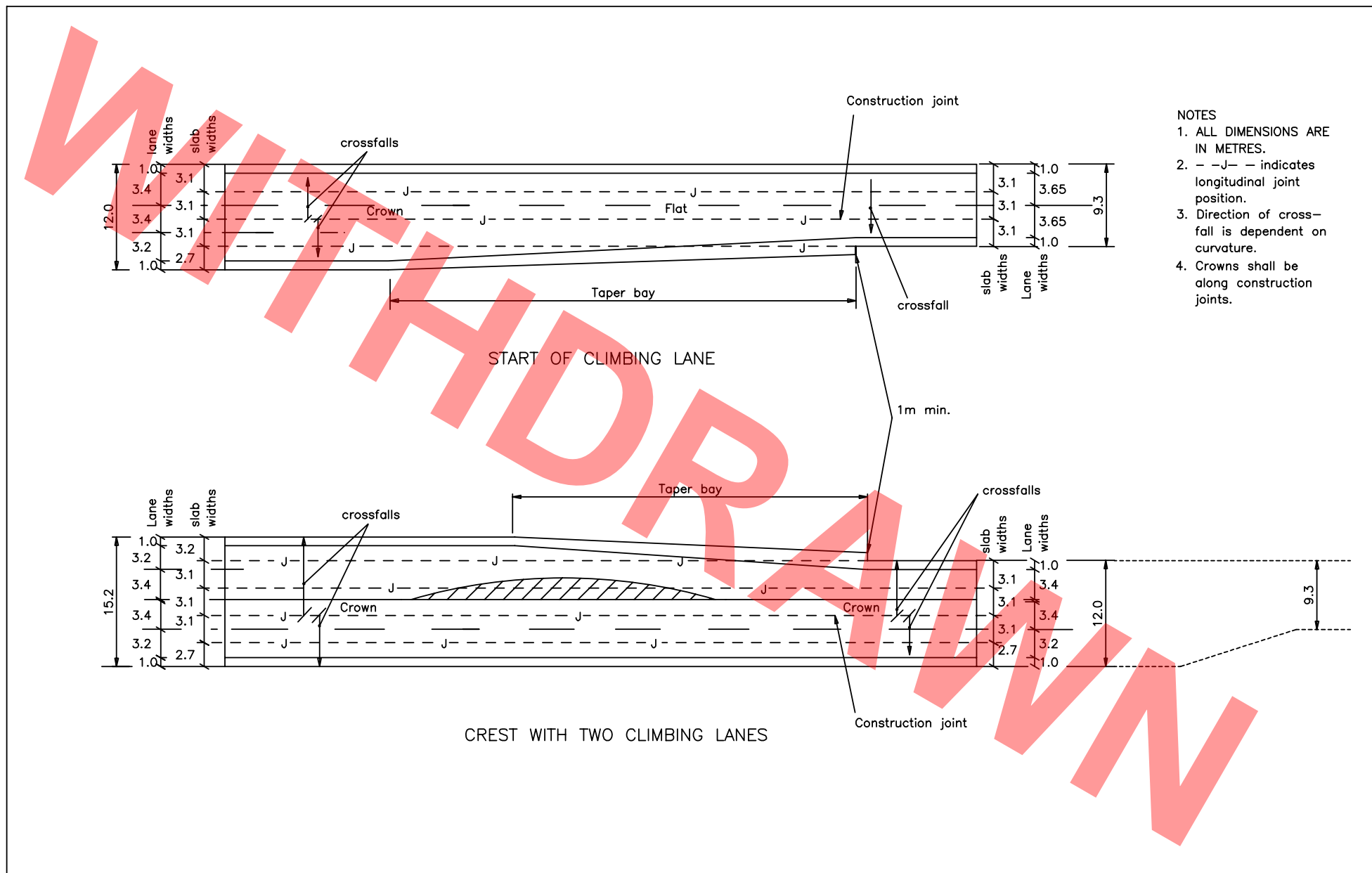
CONCRETE
CARRIAGEWAY

A	DEC 91
Issue	Date

PERMITTED ALTERNATIVE
LONGITUDINAL JOINT
POSITIONS & TOLERANCES

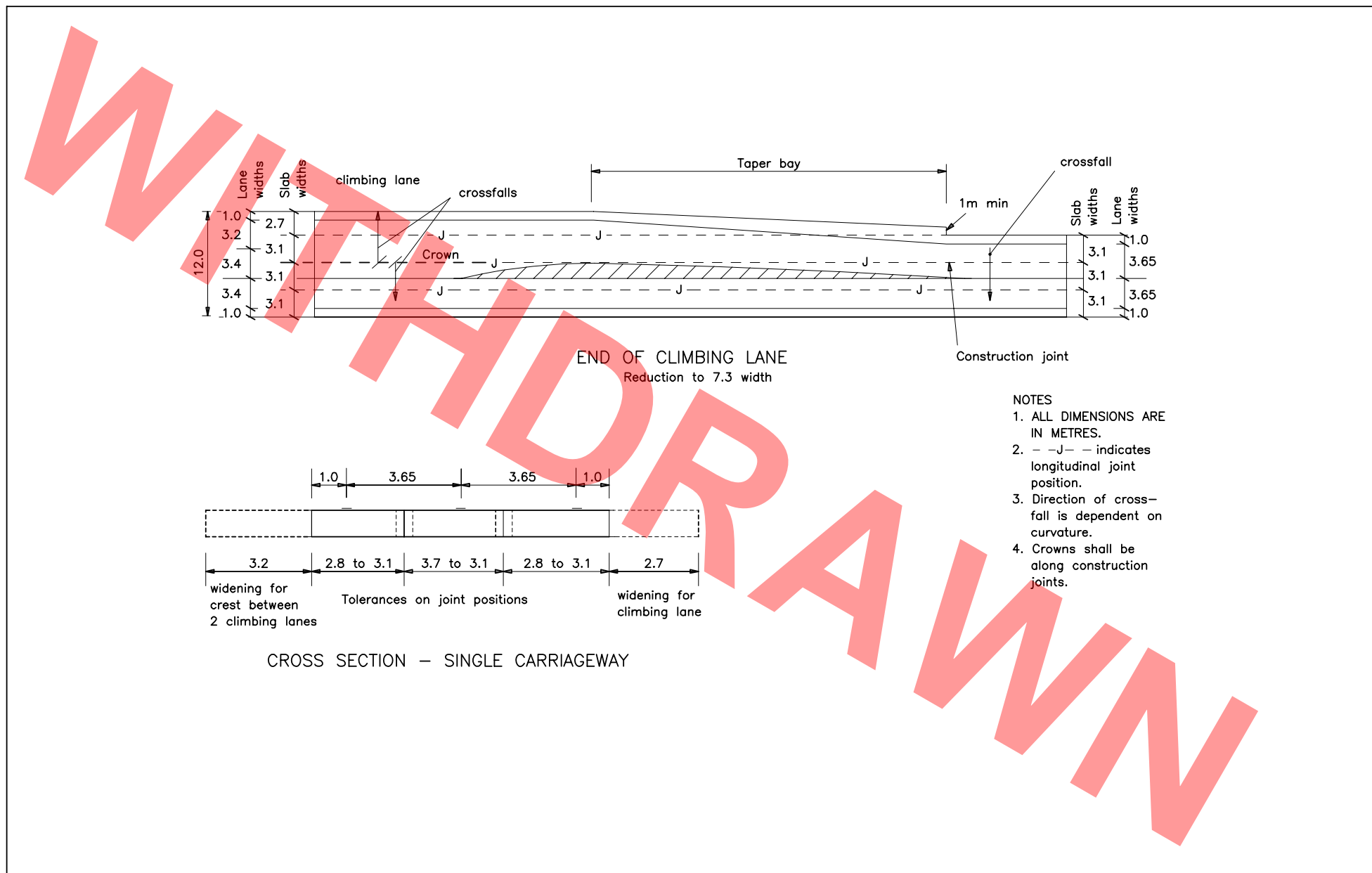
Drawing No.

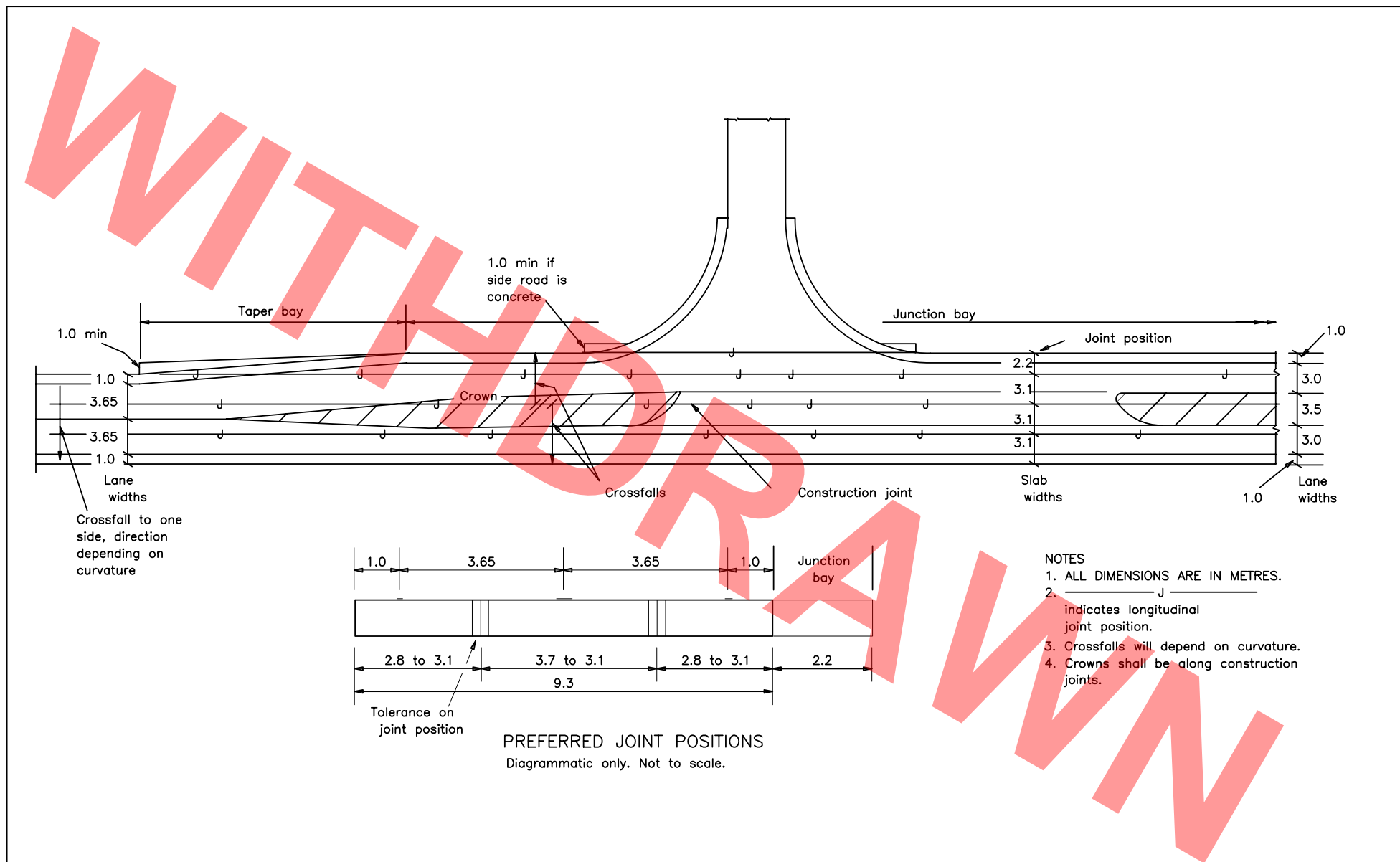
C11



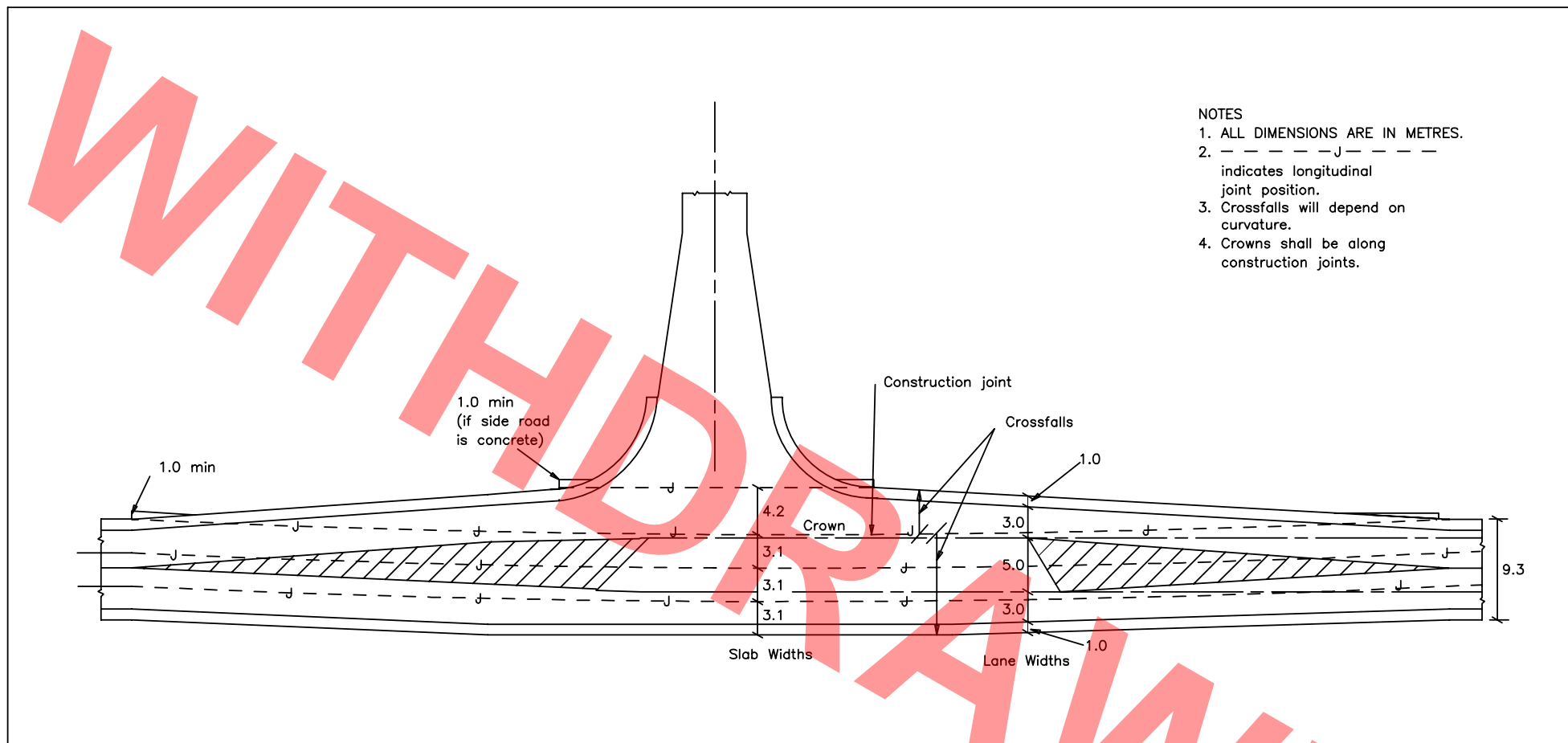
- NOTES
1. ALL DIMENSIONS ARE IN METRES.
 2. - -J- - indicates longitudinal joint position.
 3. Direction of cross-fall is dependent on curvature.
 4. Crowns shall be along construction joints.

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	C	MAY 06	TYPICAL LONGITUDINAL JOINT POSITIONS, UNREINFORCED SLABS 7.3m SINGLE CARRIAGEWAY WITH CLIMBING LANES	Drawing No.
		B	MAR 98		C12
		A	DEC 91		
		Issue	Date		





HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	C	MAY 06	TYPICAL LONGITUDINAL JOINT POSITIONS, UNREINFORCED SLABS 7.3m SINGLE CARRIAGEWAY WITH JUNCTION	Drawing No.
		B	MAR 98		C14
		A	DEC 91		
		Issue	Date		



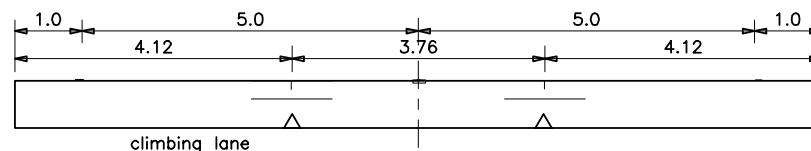
- NOTES
1. ALL DIMENSIONS ARE IN METRES.
 2. - - - - J - - - - indicates longitudinal joint position.
 3. Crossfalls will depend on curvature.
 4. Crowns shall be along construction joints.

TYPICAL JOINT POSITIONS
Diagrammatic only. Not to scale

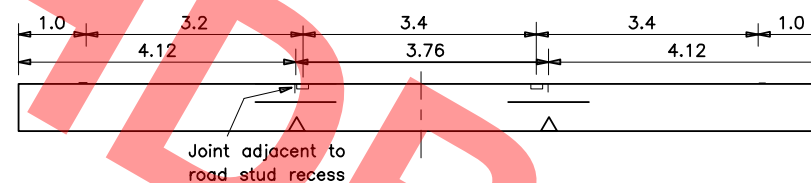
HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	C	MAY 06	TYPICAL LONGITUDINAL JOINT POSITIONS, UNREINFORCED SLABS 7.3m SINGLE CARRIAGEWAY WITH JUNCTION	Drawing No.
		B	MAR 98		C15
		A	DEC 91		
		Issue	Date		

NOTES

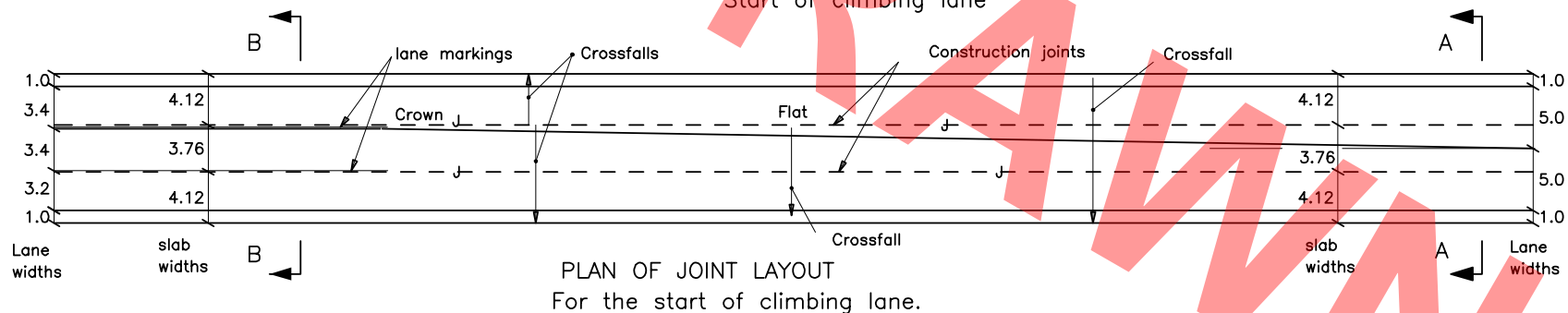
1. All DIMENSIONS ARE IN METRES.
2. - - J - - denotes longitudinal joint position.
3. Crossfalls will depend on curvature.
4. Crowns shall be along construction joints.



SECTION A-A
Standard 10m carriageway

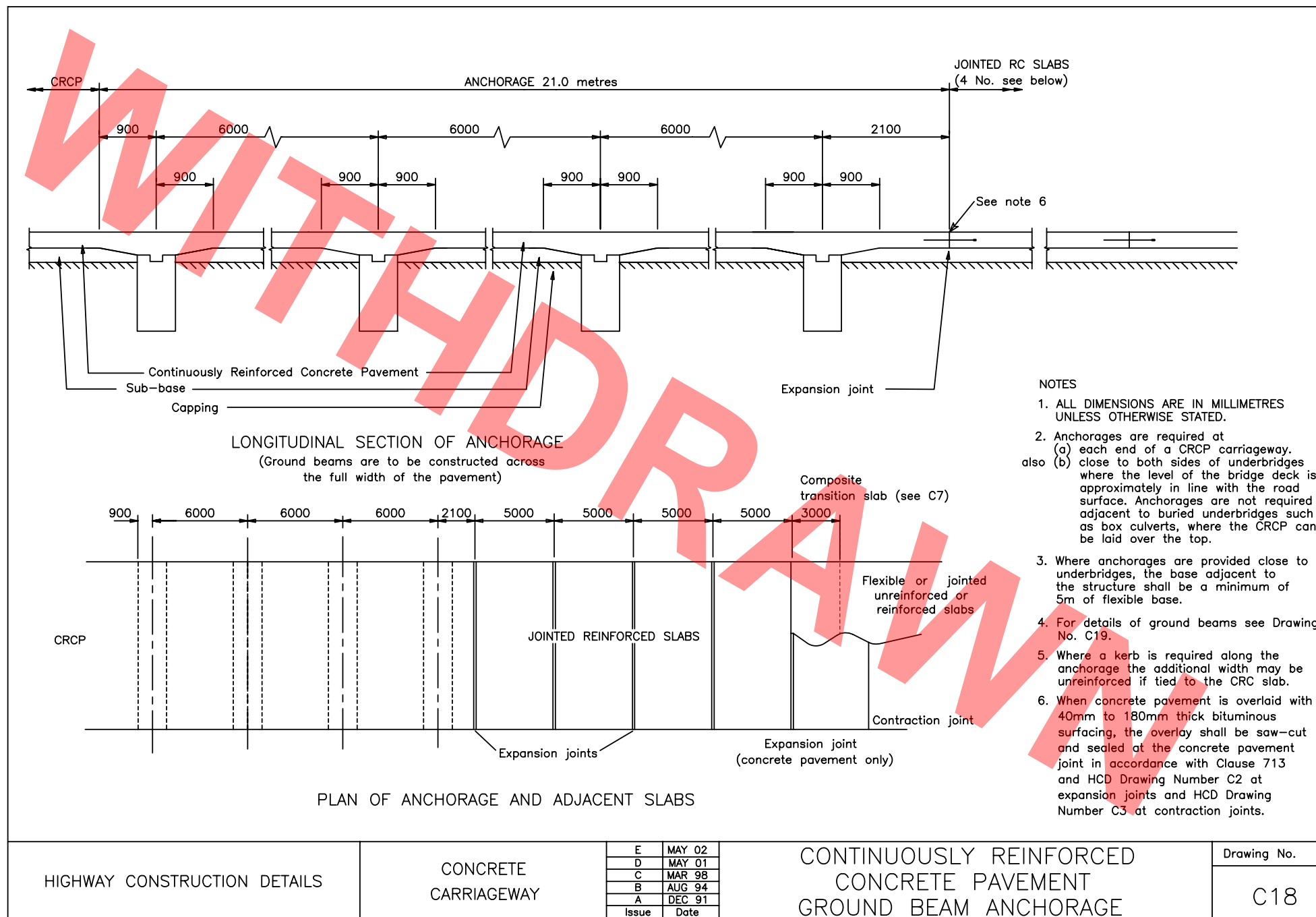


SECTION B-B
Start of climbing lane



PLAN OF JOINT LAYOUT
For the start of climbing lane.

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	B	MAY 06	TYPICAL LONGITUDINAL JOINT POSITIONS, UNREINFORCED SLABS 10m SINGLE CARRIAGEWAY HARDSTRIPS AND CLIMBING LANE	Drawing No.
		A	DEC 91		C16
		Issue	Date		



HIGHWAY CONSTRUCTION DETAILS

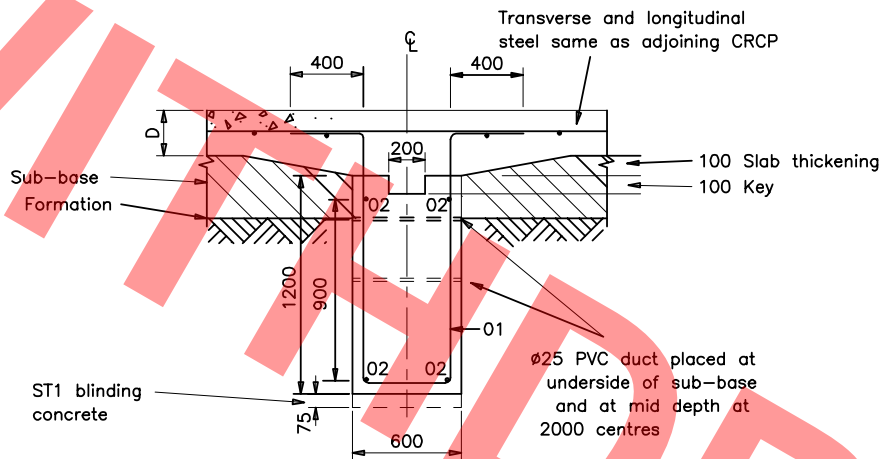
CONCRETE CARRIAGEWAY

E	MAY 02
D	MAY 01
C	MAR 98
B	AUG 94
A	DEC 91
Issue	Date

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
GROUND BEAM ANCHORAGE

Drawing No.

C18



GROUND BEAM
(4 No. in anchorage)

NOTES

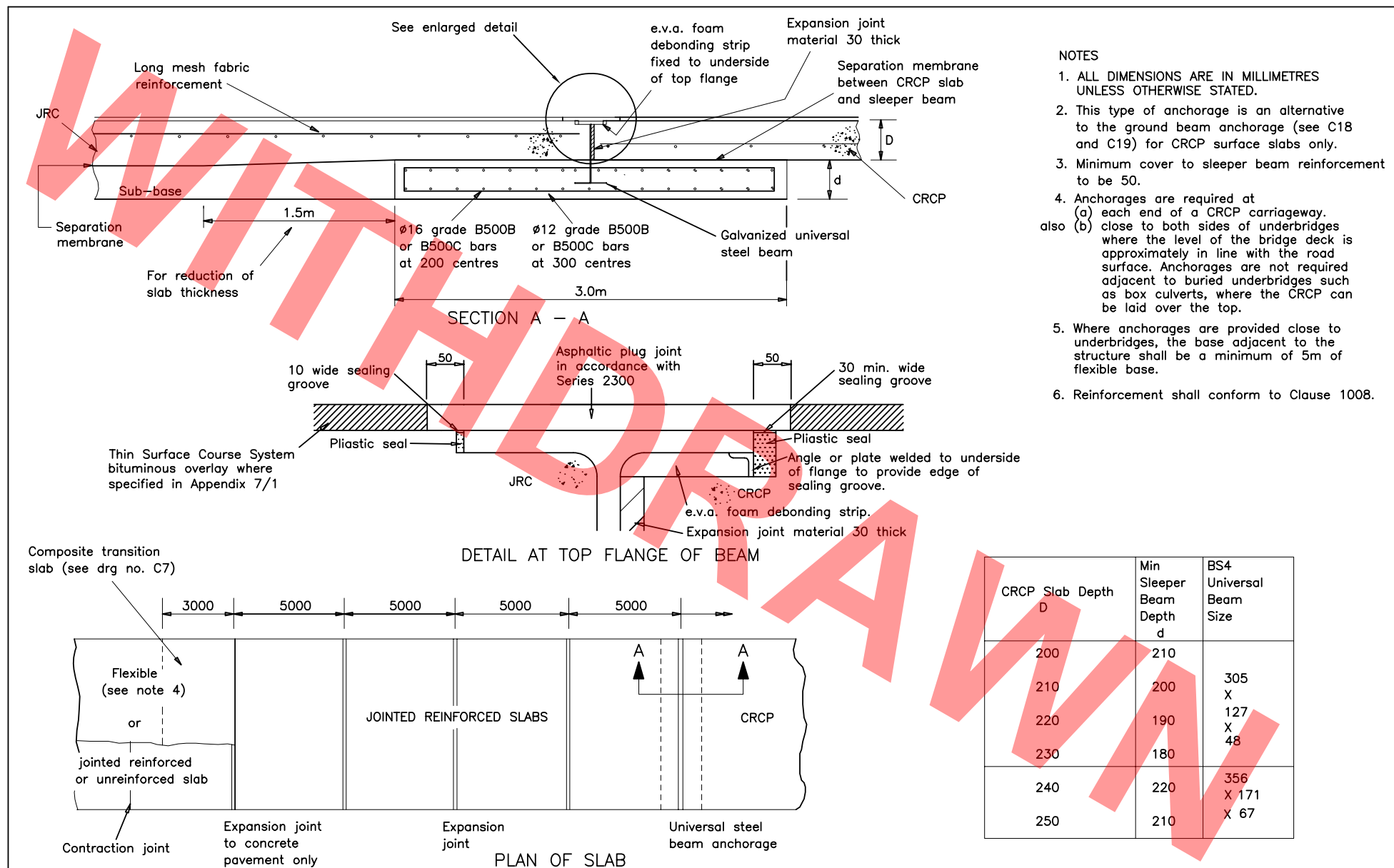
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. Concrete in ground beams to be strength class C25/30 cast in trench below formation level or sub-base surface.
3. Reinforcement shall conform to Clause 1008.
4. Beam reinforcement cover to be 60 ± 10 .

BAR SCHEDULE FOR REINFORCEMENT

MEMBER	BAR Mk	TYPE & SIZE	No.OF Mbrs	No.IN EACH	TOTAL No.	LENGTH OF EACH #	SHAPE CODE	A *	B *	C *	D *	E *
BEAMS	01	H16	4	**	**	3900	44	400	1375	480	1375	-
BEAMS	02	H16	4	4	16	**	00	**	-	-	-	-

- ** Varies with width of anchorage
 * Specified to nearest 5mm
 # Specified to nearest 25mm

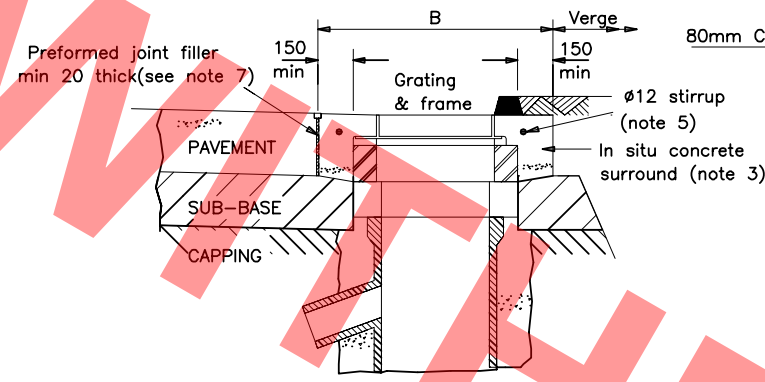
HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	C	MAY 06	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT GROUND BEAM ANCHORAGE DETAILS	Drawing No.
		B	FEB 04		
		A	DEC 91		C19
		Issue	Date		



- NOTES**
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
 2. This type of anchorage is an alternative to the ground beam anchorage (see C18 and C19) for CRCP surface slabs only.
 3. Minimum cover to sleeper beam reinforcement to be 50.
 4. Anchorages are required at
 - (a) each end of a CRCP carriageway.
 - (b) close to both sides of underbridges where the level of the bridge deck is approximately in line with the road surface. Anchorages are not required adjacent to buried underbridges such as box culverts, where the CRCP can be laid over the top.
 5. Where anchorages are provided close to underbridges, the base adjacent to the structure shall be a minimum of 5m of flexible base.
 6. Reinforcement shall conform to Clause 100B.

CRCP Slab Depth D	Min Sleeper Beam Depth d	BS4 Universal Beam Size
200	210	305 X 127 X 48
210	200	356 X 171 X 67
220	190	356 X 171 X 67
230	180	356 X 171 X 67
240	220	356 X 171 X 67
250	210	356 X 171 X 67

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	E	MAY 06	CONTINUOUSLY REINFORCED CONCRETE PAVEMENT SURFACE SLABS UNIVERSAL STEEL BEAM ANCHORAGE	Drawing No. C20
		D	MAY 01		
		C	MAR 98		
		B	AUG 94		
		A	DEC 91		
	Issue		Date		



SECTION A-A

GULLIES WITHIN THE PAVEMENT

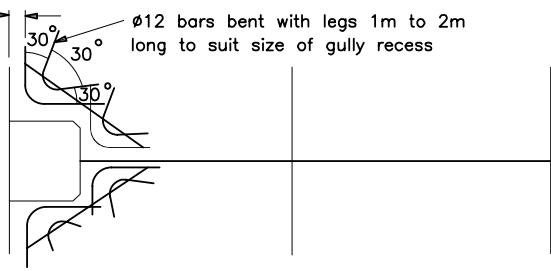


FIG. 1 JOINT WITHIN GULLY DIMENSION (Preferred position)

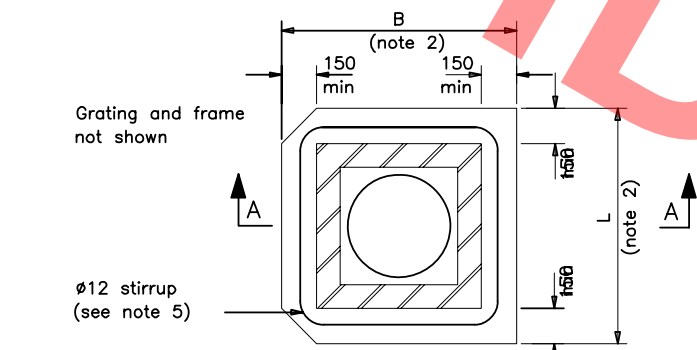


FIG. 2 JOINT ADJACENT TO GULLY

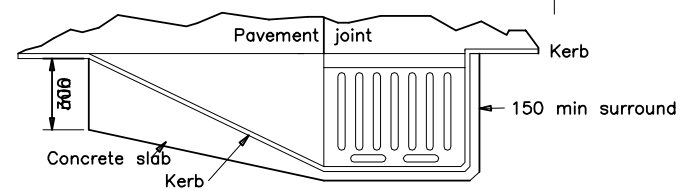


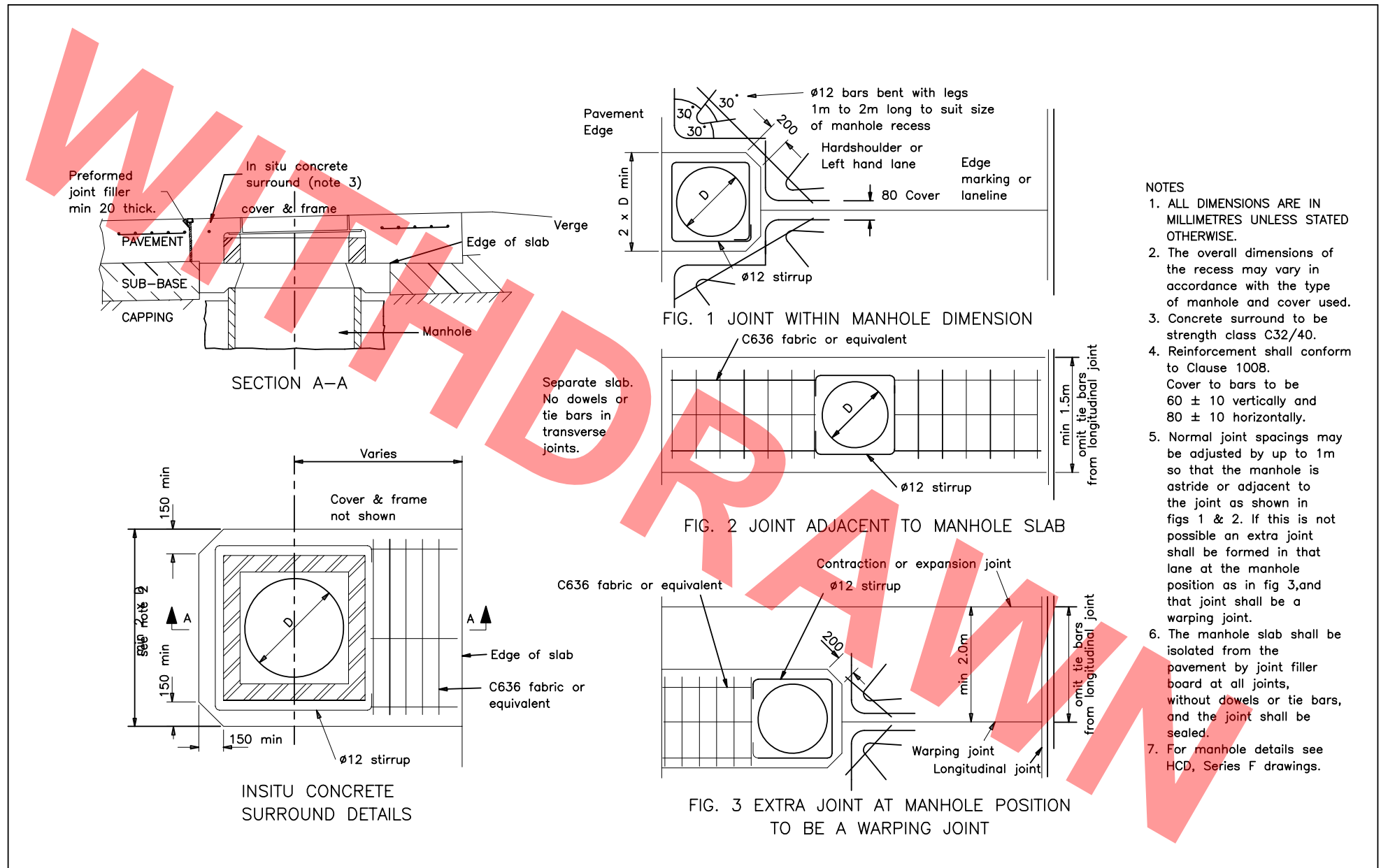
FIG. 3 EXTRA JOINT AT GULLY POSITION

GULLY OUTSIDE EDGE OF PAVEMENT Especially with CRCP & CRCB

NOTES

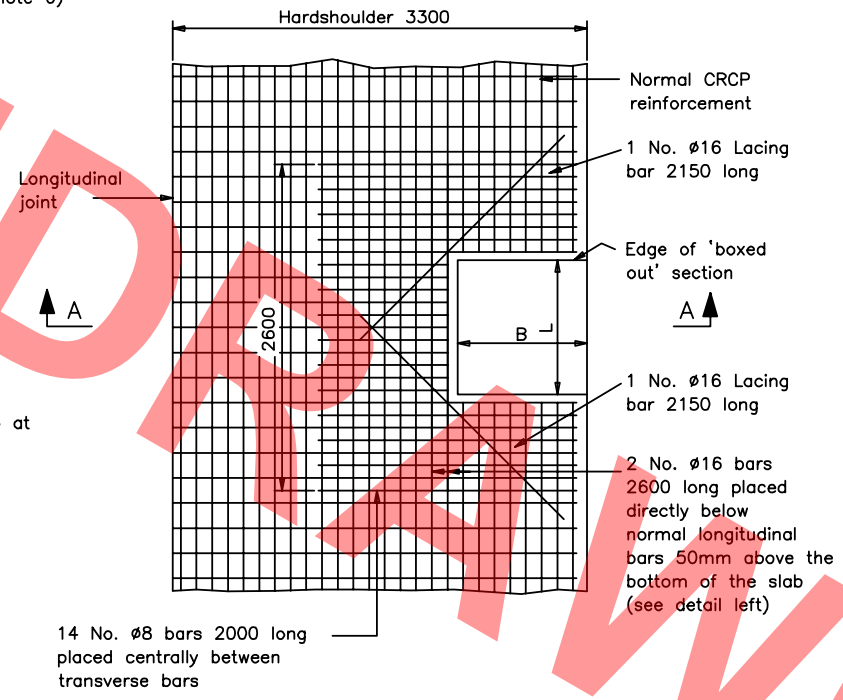
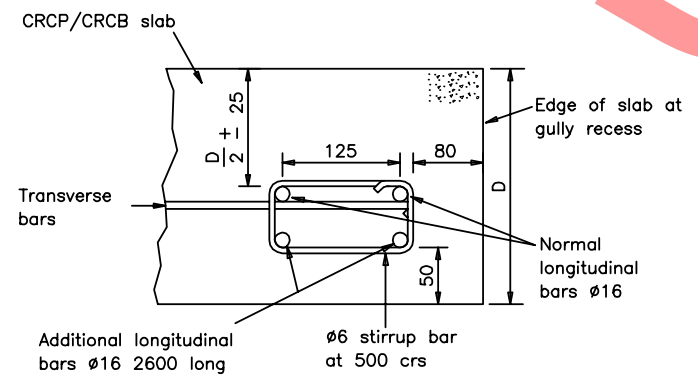
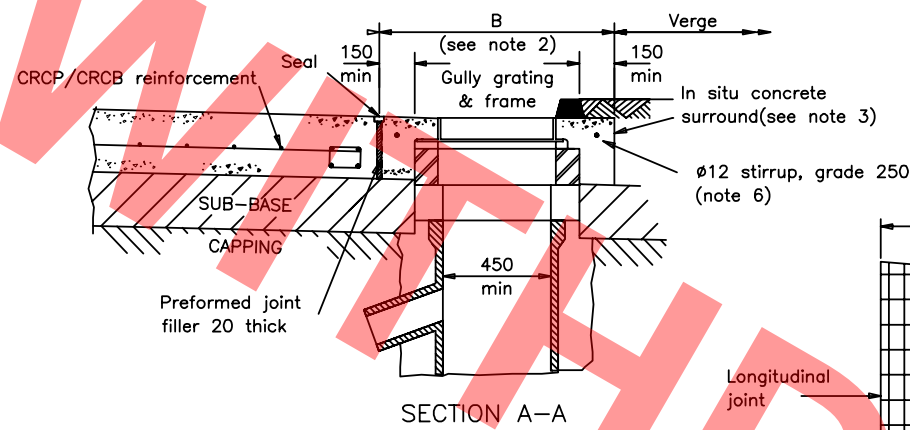
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. The overall dimensions of the recess may vary in accordance with the type of grating used.
3. Concrete surround to be strength class C32/40.
4. All reinforcement to conform to Clause 1008.
Cover to bars to be 60 ± 10 vertically and horizontally.
5. The $\phi 12$ stirrup shall be cut and bent to such dimensions as allow it to be placed centrally within the surround. An overlap of 450 shall be provided in closing the stirrup.
6. Normal joint positions may be adjusted by up to 1m so that the gully is astride or adjacent to the joint. If this is impossible an extra joint shall be formed in the lane at the gully position and shall be a tied warping joint.
7. The gully slab shall be isolated from the pavement at all joints by joint filler board for the full depth of the slab and joints shall be sealed.
8. For details of drainage see HCD, Series F drawings.

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	C	MAY 06	CONCRETE SURROUND TO GULLIES IN JOINTED CONCRETE PAVEMENT	Drawing No.
		B	MAY 04		C21
		A	DEC 91		
		Issue	Date		



HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	C	MAY 06	CONCRETE SURROUND TO MANHOLES IN JOINTED CONCRETE PAVEMENT	Drawing No.
		B	FEB 04		
		A	DEC 91		C22
		Issue	Date		

- NOTES
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
 2. The overall dimensions of the opening may vary in accordance with the type of gully grating used.
 3. Concrete surround to be strength class C32/40.
 4. Normal transverse reinforcement near opening to be strengthened by additional $\phi 8$ bars placed centrally between the transverse bars.
 5. Reinforcement shall conform to Clause 1008.
 6. The $\phi 12$ stirrup shall be cut and bent to such dimensions as allow it to be located centrally within the surround. 450 overlap shall be provided in closing the stirrup.
 7. For gully details see HCD, Series F drawings.



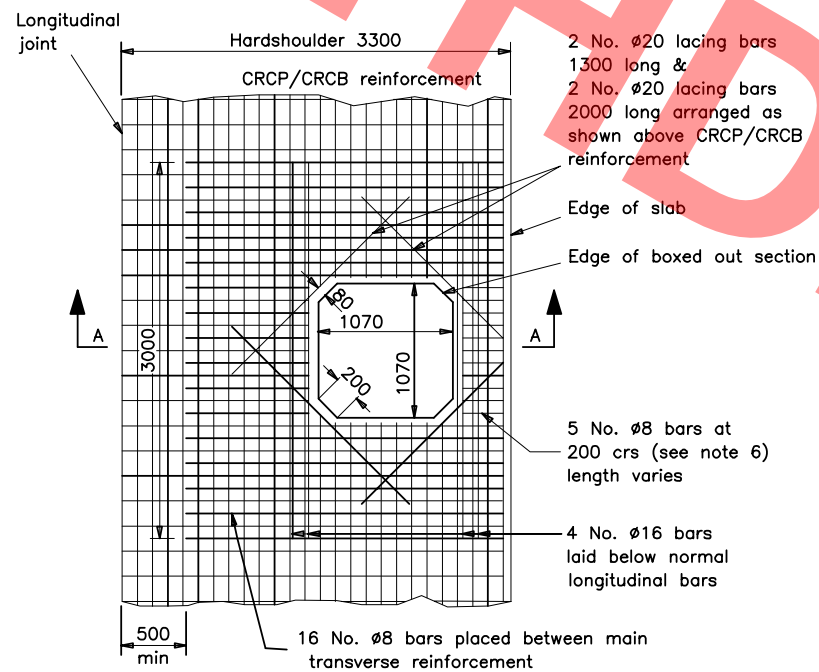
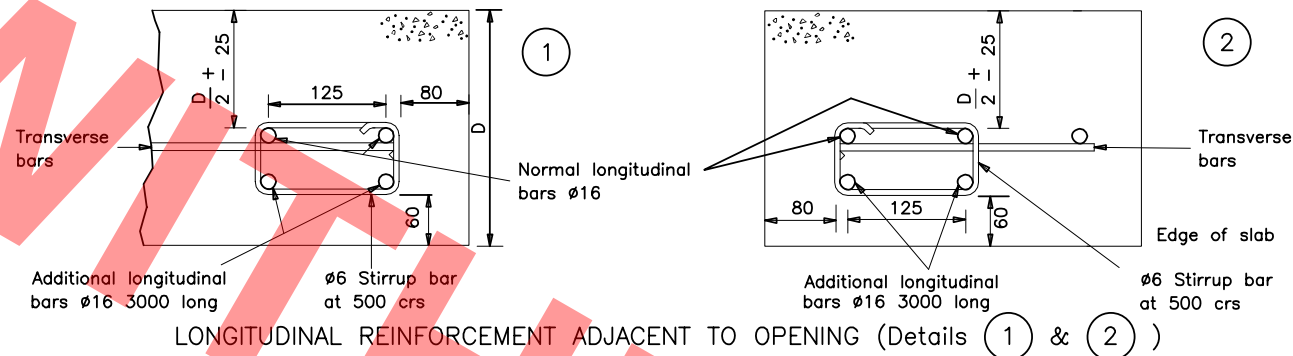
LONGITUDINAL REINFORCEMENT ADJACENT TO OPENING

DETAILS OF GULLY RECESS & CRCP REINFORCEMENT

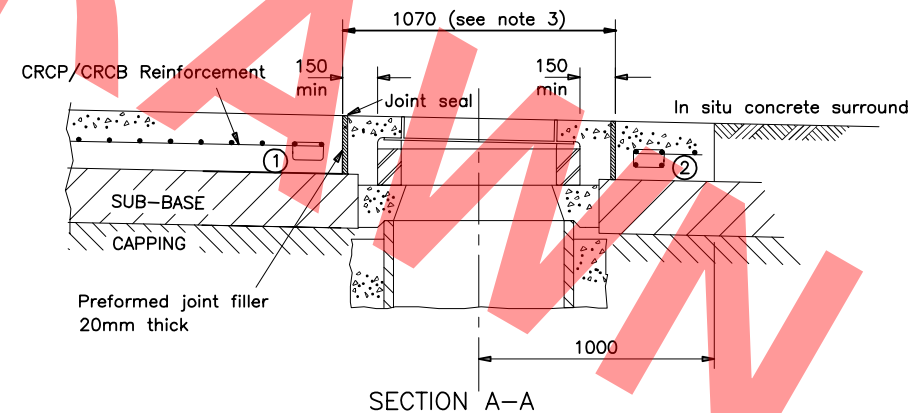
HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	D	MAY 06	GULLIES IN CONTINUOUSLY REINFORCED CONCRETE PAVEMENT OR REINFORCED CONCRETE BASE	Drawing No.
		C	MAY 04		
		B	MAR 98		C23
		A	DEC 91		
		Issue	Date		

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE STATED.
2. The dimensions of the sealing groove and the method of sealing shall comply with the Specification.
3. The overall dimensions the opening may vary in accordance with the type of manhole and cover used.
4. Concrete to be of pavement quality concrete strength class C32/40.
5. Normal transverse reinforcement near opening to be strengthened by additional $\phi 8$ bars placed centrally between the transverse bars.
6. Reinforcement shall conform to Clause 1008.
7. For manhole details see HCD, Series F drawings.



DETAILS OF MANHOLE RECESS & CRCP/CRCB REINFORCEMENT



HIGHWAY CONSTRUCTION DETAILS

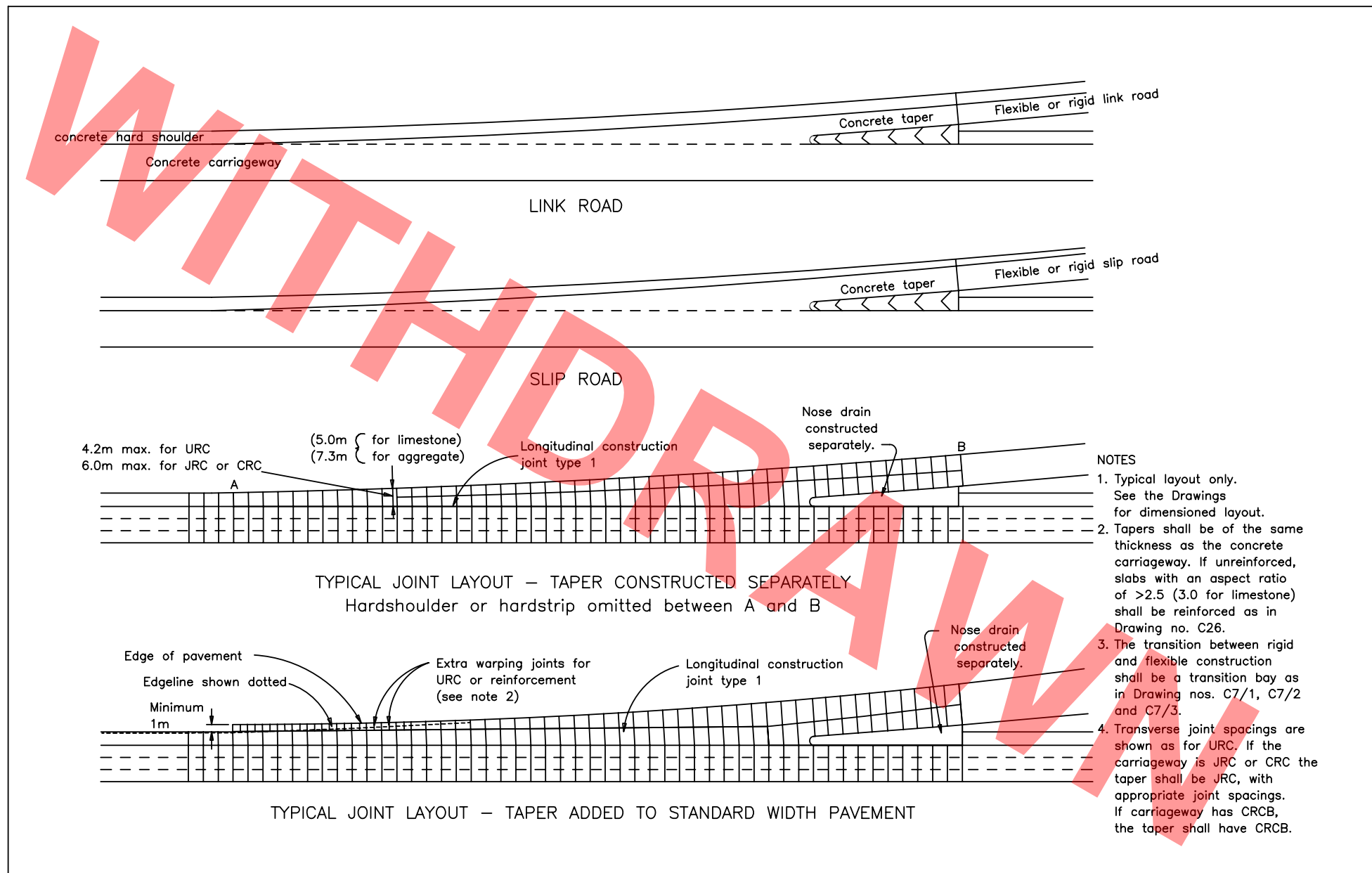
CONCRETE
CARRIAGEWAY

C	MAY 06
B	FEB 04
A	DEC 91
Issue	Date

MANHOLES IN CONTINUOUSLY
REINFORCED CONCRETE PAVEMENT
OR REINFORCED CONCRETE BASE

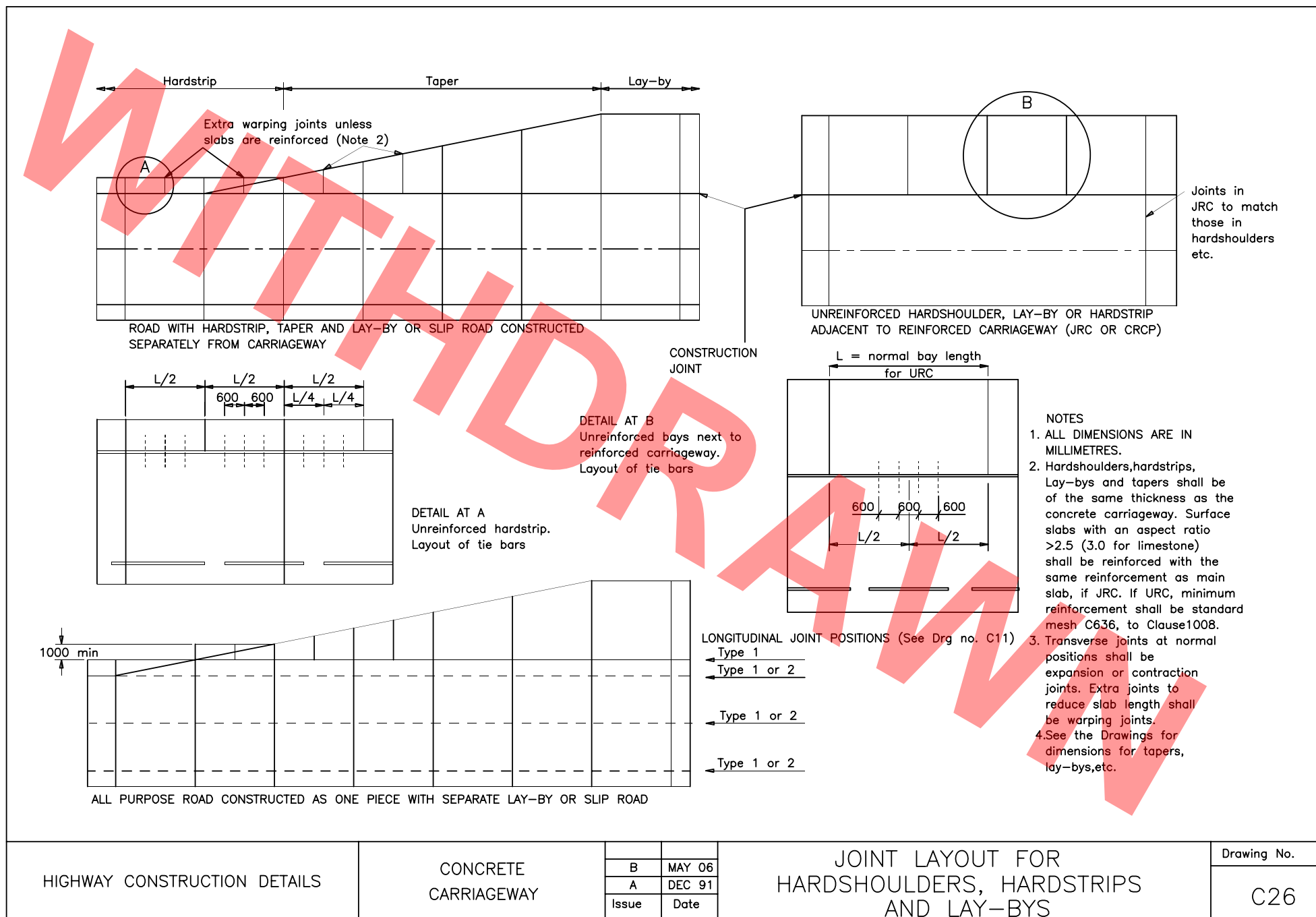
Drawing No.

C24



- NOTES**
1. Typical layout only. See the Drawings for dimensioned layout.
 2. Tapers shall be of the same thickness as the concrete carriageway. If unreinforced, slabs with an aspect ratio of >2.5 (3.0 for limestone) shall be reinforced as in Drawing no. C26.
 3. The transition between rigid and flexible construction shall be a transition bay as in Drawing nos. C7/1, C7/2 and C7/3.
 4. Transverse joint spacings are shown as for URC. If the carriageway is JRC or CRC the taper shall be JRC, with appropriate joint spacings. If carriageway has CRCB, the taper shall have CRCB.

HIGHWAY CONSTRUCTION DETAILS	CONCRETE CARRIAGEWAY	C	MAY 06	SLIP ROAD AND LINK ROAD TAPER CONSTRUCTION AND JOINT LAYOUT	Drawing No.
		B	MAR 98		
		A	DEC 91		C25
		Issue	Date		



HIGHWAY CONSTRUCTION DETAILS

CONCRETE
CARRIAGEWAY

B	MAY 06
A	DEC 91
Issue	Date

JOINT LAYOUT FOR
HARDSHOULDERS, HARDSTRIPS
AND LAY-BYS

Drawing No.

C26