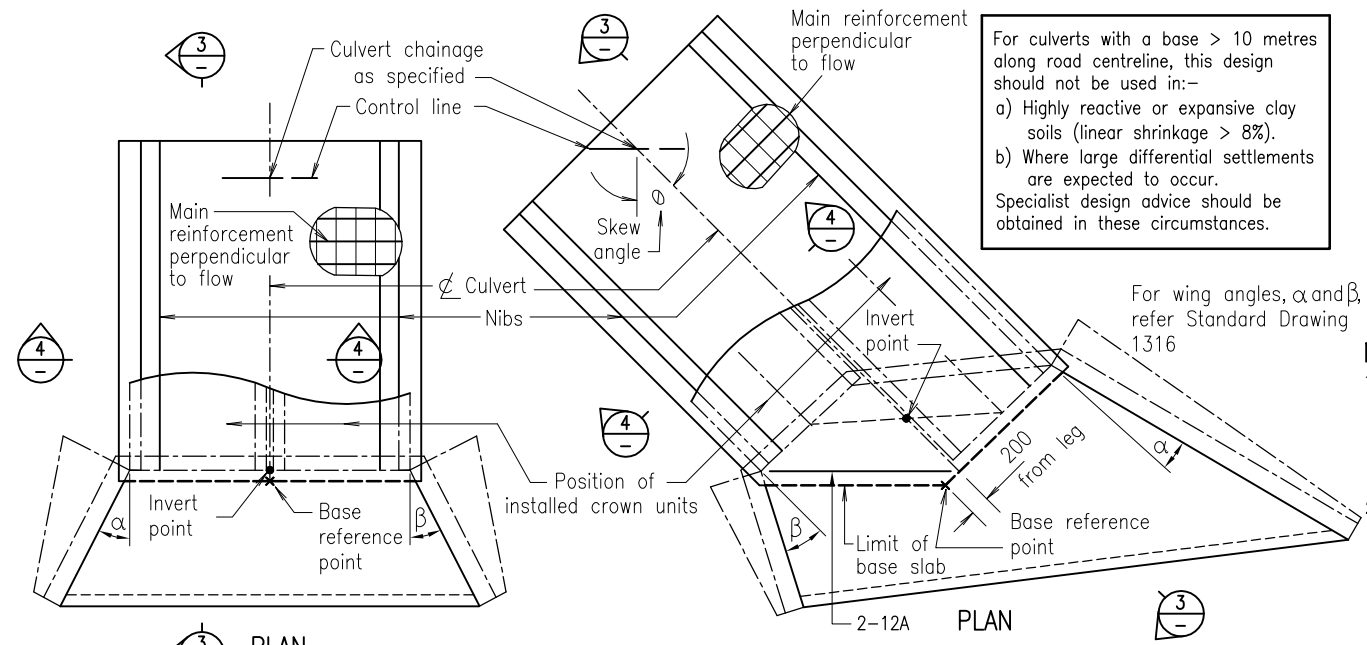


PLAN
SLAB & APRON DETAILS FOR CULVERTS WITHOUT WINGWALLS

For construction detail refer Standard Drawing 1174



PLAN
SLAB & APRON DETAILS FOR CULVERTS WITH WINGWALLS

For construction detail refer Standard Drawing 1319

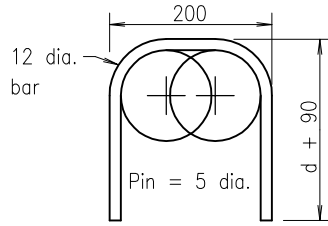
For culverts with a base > 10 metres along road centreline, this design should not be used in:-
 a) Highly reactive or expansive clay soils (linear shrinkage > 8%).
 b) Where large differential settlements are expected to occur.
 Specialist design advice should be obtained in these circumstances.

Span	Thickness of slab, d	Main Reinforcement	Secondary Reinforcement	Position	Length of nib bars	
600	180 (210)	RL1218	12 at 200	Single mat on centre line	N/A	
750	180 (210)	RL1218	12 at 200		625	
900	180 (210)	RL1218	12 at 200		665	
1200	180 (210)	RL1218	12 at 200		665	
1500	190 (210)	RL1218	12 at 200		705	
1800	190 (210)	RL1218	12 at 200		705	
2100	210 (210)	RL1218	12 at 200		745	
2400	220 (220)	RL1218	12 at 200		765	
2700	240 (280)	RL1218	12 at 200		Top mat 55 (70) and bottom mat	745
3000	240 (280)	RL1218	12 at 200		75 (90) cover	745
3300	250 (290)	RL1218	12 at 200		765	
3600	260 (300)	RL1218	12 at 200		785	

TABLE 1 - SLAB DETAILS (Refer notes 8 and 9)

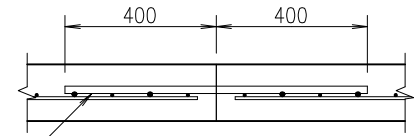
NOTES :

- CONTRACTION JOINTS are to be provided where (a) the length of the base slab and/or (b) the width of the base slab exceed 20 metres. When contraction joints are required across the width of the base slab, they are to be located at 1/4 span points of crown units. Contraction joints across the width of the base slab are to be continued across the aprons. For apron contraction joints refer to detail for single reinforcement layer. 24 hours minimum is to be allowed between pours.
- APRONS, where unreinforced wingwalls are used, shall be grouted rock pitching (Type 1), rock filled wire mattresses (Type 2) or concrete reinforced with SL62 mesh (Type 3), refer Standard Drawing 1306. Where RC wingwalls are used, refer Standard Drawing 1303 for apron details. Protection works at outlets and inlets are typical and may be varied as shown in documents. If aprons are specified, apron lengths shall be nominally between ends of the wings as drawn. Any extended or reduced length will be shown on the drawings.
- BASE DIMENSIONS given are applicable to a maximum fill height over the culvert crown of 2 metres. An on site check of the units dimensions should be made before setting out the base slab as there are variations between manufacturers.
- UNIT DIMENSIONS :
 H = Height of opening
 J = Thickness of leg
 Span = Internal width
- MESH LAPS shall be made so that the two outermost wires of one fabric overlap the two outermost wires of the sheet being lapped.
- REINFORCING BAR LAPS :
 300 for 12 dia. secondary reinforcement
- DETAILS TO BE SHOWN ELSEWHERE IN THE DOCUMENTS :
 Apron type, depth of Type 2 apron (if required).
 Apron cutoff wall, U/S and/or D/S (if required).
 Exposure classification treatment (if required).
 Culvert location (chainage) and base distance and height.
- EXPOSURE CLASSIFICATIONS B2 : Dimensions indicating slab thickness, steel cover and concrete class are shown in brackets for salt-rich arid areas and tidal or splash zones (ie. exposure classification C). Specialist design advice should be obtained for aggressive soils (ie. exposure classification U).
- DESIGN LOADING HLP400, M1600, A160 and W80.
 EMBANKMENT - Maximum height of fill to be 2 metres.
 CULVERT BASE - Maximum pressure to be 150 kPa.
- NIB DETAILS are as follows :
 Arrangements: for H = 600 - no nibs.
 for RCBC H > 600 - nibs supporting external legs of external cells.
 for SLBC H > 600 to 900 - nibs supporting external legs of external cells.
 for SLBC H > 900 - nibs supporting both legs of external cells.
 Installation: for H < 1500 - nibs cast before placement of units.
 for H ≥ 1500 - nibs cast after placement of units.
- CONCRETE :
 S40/20 (S50/20)
- STEEL :
 Reinforcing bars to be grade D500N to AS/NZS 4671.
 20 dia. dowels to be grade R250N to AS/NZS 4671 & galvanized to AS/NZS 4680.
 Reinforcing mesh to AS/NZS 4671. All reinforcing steel to be ACRS certified. Steel reinforcement to be read in conjunction with Standard Drawings 1043 and 1044.
- REINFORCEMENT BAR IN THE SECONDARY DIRECTION is to be offset from the secondary (cross) wires of the mesh by 100.
- DIMENSIONS are in millimetres unless shown otherwise.

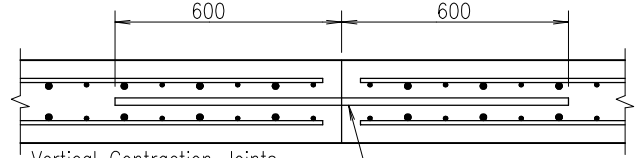


NIB BAR DETAIL

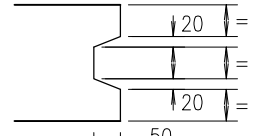
Length of nib bars = $2(d+48)+229$
 d = Thickness of slab



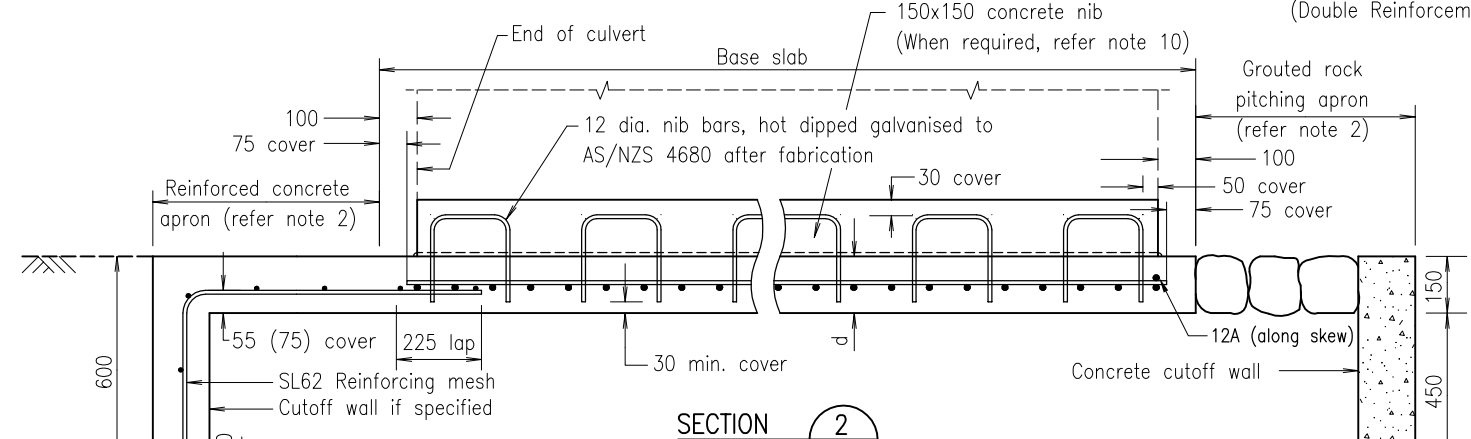
CONTRACTION JOINT
 (Single Reinforcement Layer) Refer note 1



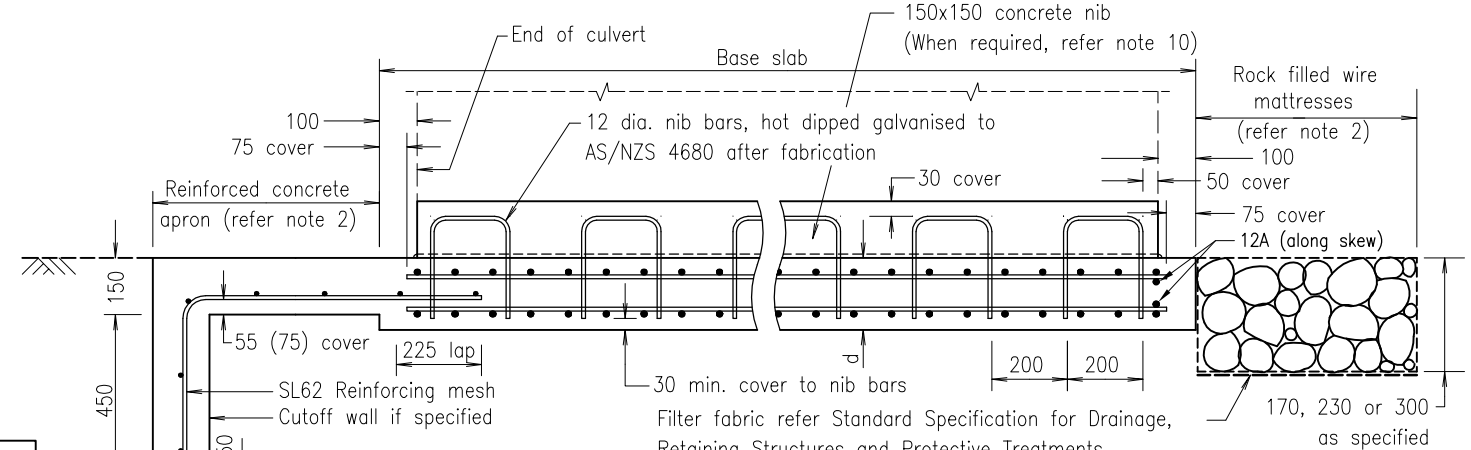
CONTRACTION JOINT
 (Double Reinforcement Layer) Refer note 1



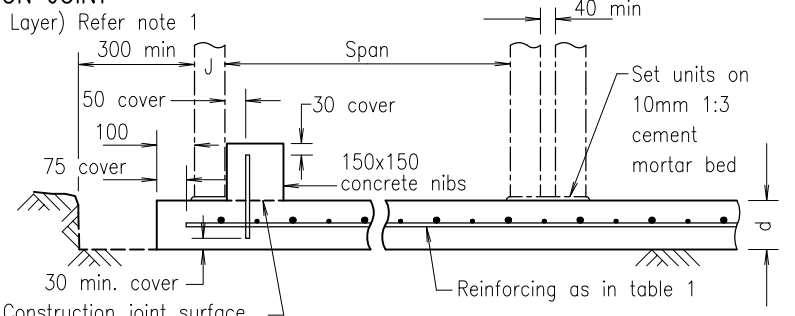
DETAIL A



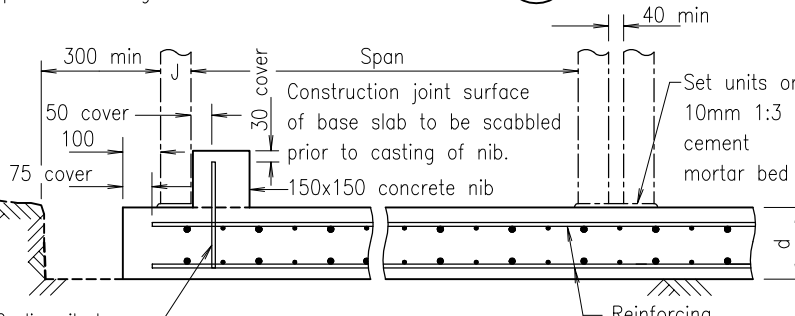
SECTION 2
TYPE 1 APRON
 FOR SPANS OF 600 - 2400
 (Includes cutoff wall)



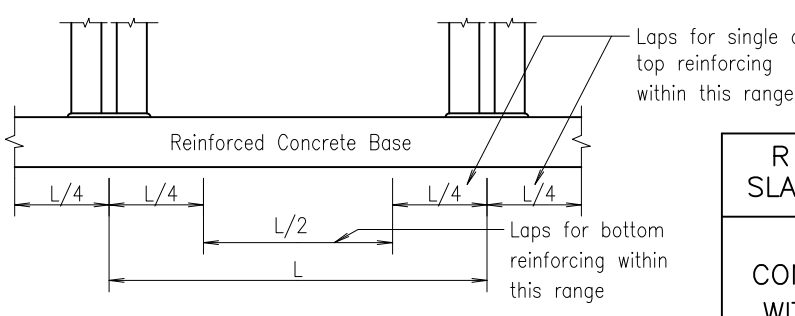
SECTION 3
TYPE 2 APRON
 FOR SPANS OF 2700 OR GREATER



SECTION 1
TYPE 3 APRON
 FOR SPANS OF 600 - 2400



SECTION 4
TYPE 3 APRON
 FOR SPANS OF 2700 OR GREATER



REINFORCING BAR LAPS LOCATION

- CONCRETE :
 S40/20 (S50/20)
- STEEL :
 Reinforcing bars to be grade D500N to AS/NZS 4671.
 20 dia. dowels to be grade R250N to AS/NZS 4671 & galvanized to AS/NZS 4680.
 Reinforcing mesh to AS/NZS 4671. All reinforcing steel to be ACRS certified. Steel reinforcement to be read in conjunction with Standard Drawings 1043 and 1044.
- REINFORCEMENT BAR IN THE SECONDARY DIRECTION is to be offset from the secondary (cross) wires of the mesh by 100.
- DIMENSIONS are in millimetres unless shown otherwise.

ASSOCIATED DOCUMENTS :
 Department of Main Roads Manual of Standard Drawings Roads
 Department of Main Roads Manual of Standard Specifications Roads

REFERENCED DOCUMENTS :
 Standard Drawings :
 1043 Standard Bar Shapes Drawing 1 of 2 and 2 of 2
 1044 Standard Hook, Lap and Bend Details and general Steel Reinforcement Information
 1174 Construction of End Structures H = 150 - 600
 1303 Construction of Reinforced Concrete Wingwalls and Headwalls
 1306 Construction of Unreinforced Wingwalls, Headwalls and Aprons
 1316 General Arrangement and Installation of Precast Units
 1319 Construction of Unreinforced Wingwalls and RC Headwalls H = 750 - 2400

Standard Specifications :
 MRS 11.03 Drainage, Retaining Structures and Protective Treatments
Australian Standards :
 AS/NZS 4671 Steel Reinforcing Materials
 AS/NZS 4680 Hot-dip Galvanized (Zinc) Coatings on Fabricated Ferrous Articles

R C BOX CULVERTS & SLAB LINK BOX CULVERTS			
CONSTRUCTION OF BASES WITH NIBS AND APRONS		Not to Scale	1317
			Date 3/07

1317