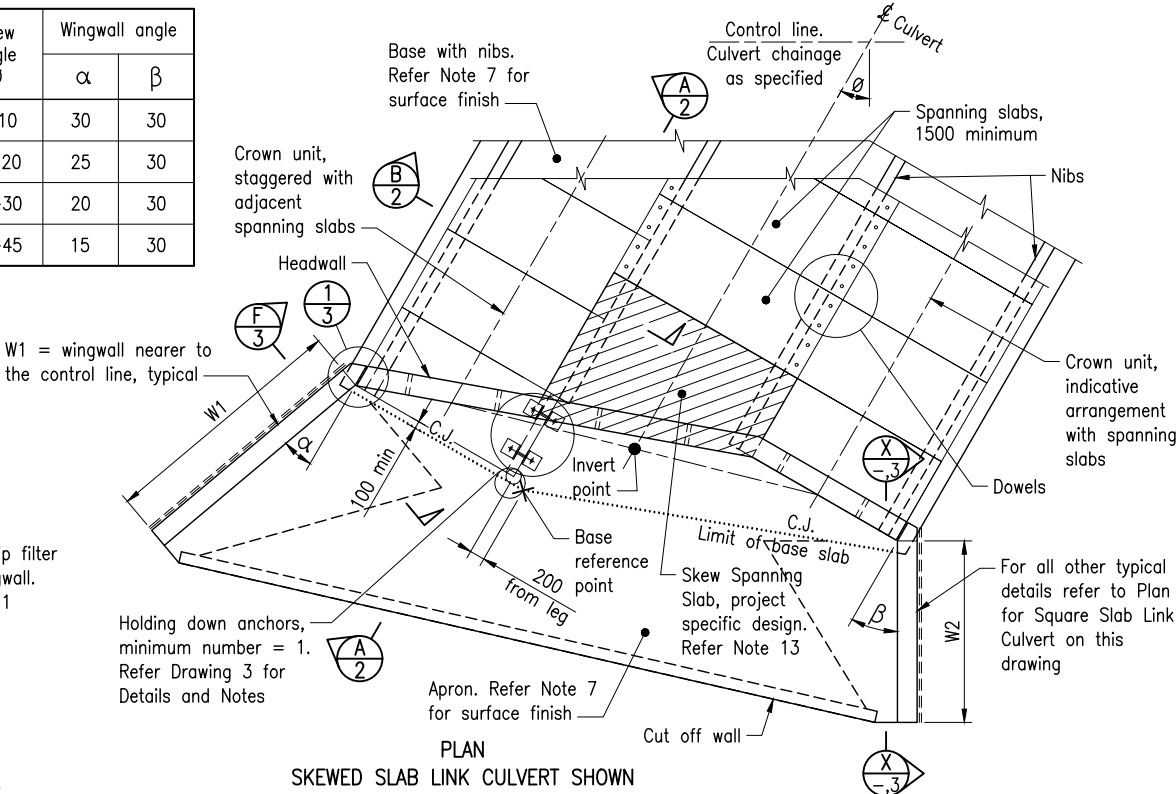
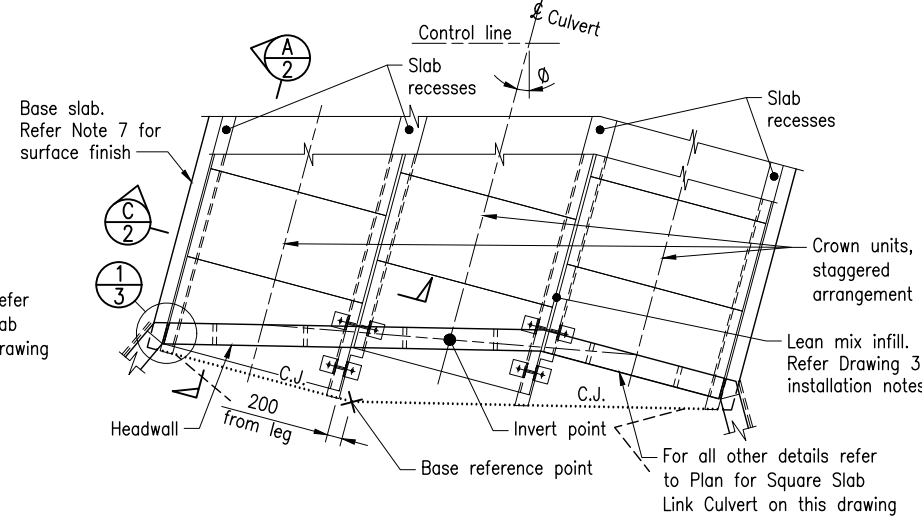
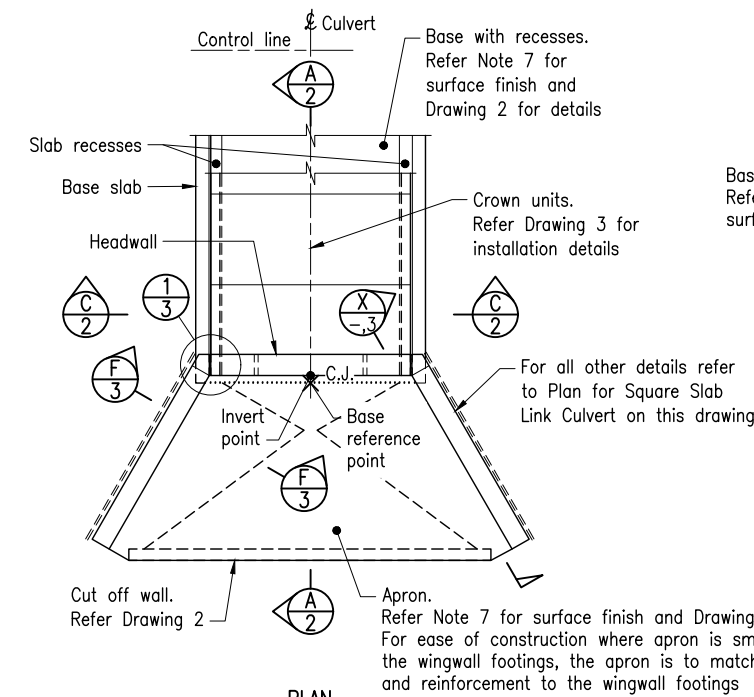


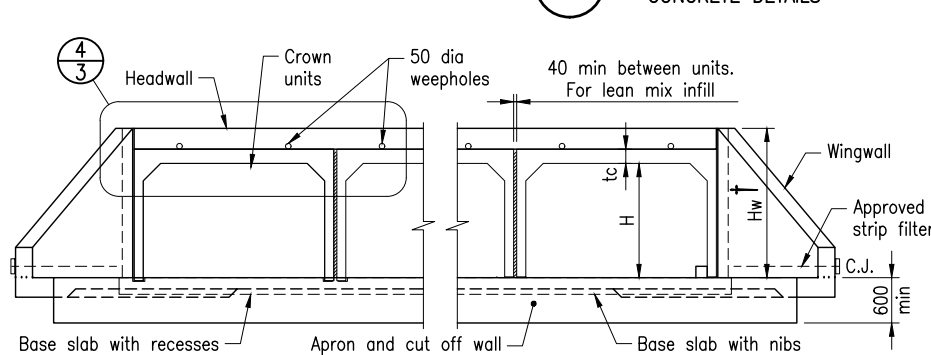
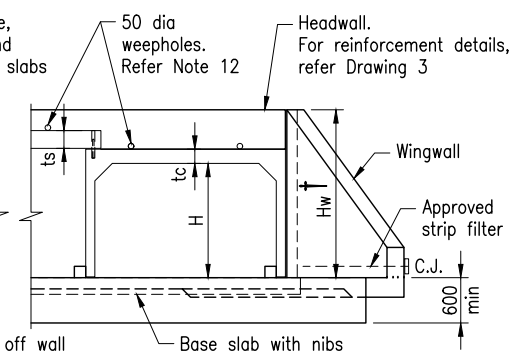
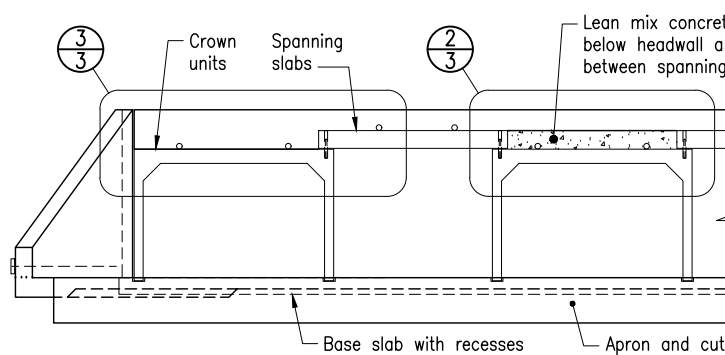
Skew angle $\theta$	Wingwall angle	
	$\alpha$	$\beta$
0-10	30	30
11-20	25	30
21-30	20	30
31-45	15	30



### TYPICAL FRAMING LAYOUTS FOR BASE SLAB WITH NIBS

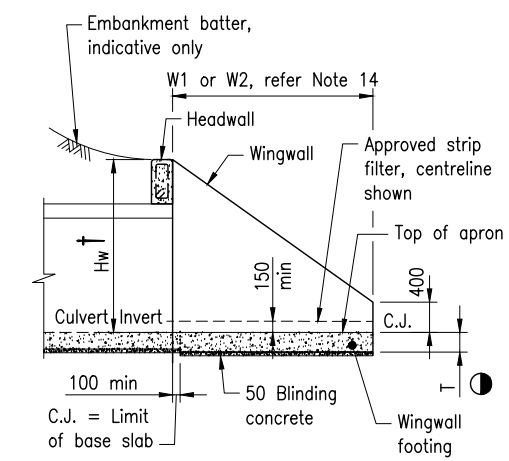


### TYPICAL FRAMING LAYOUTS FOR BASE SLAB WITH RECESSES



where  $H_w = H + t_c + 10 + t_s + 275$   
height of opening H;  
thickness of culvert tc;  
thickness of slab ts.  
Refer table on Drawing 3

T is a constant thickness for wingwalls and footings. Refer table on Drawing 3



### TYPICAL ELEVATION AT WINGWALL - CONCRETE DETAILS

The purpose of this Standard Drawing is to provide typical standard details that shall be used within the limitations specified in the drawing and in accordance with the following:

- The adaptability of the standard details shall be assessed by the project designer in respect of specific project geometric, appropriate foundation and scour conditions.
- In reactive soils: this standard drawing is only applicable for reactive soils with linear shrinkage up to 8%. Specialist geotechnical design advice shall be sought otherwise.
- If the insitu bearing capacity is inadequate, the following options may be explored subject to review and acceptance by E&T Structures and Geotechnical sections:
  - Insitu ground improvement, and/or
  - Redesign of the base slab.
Any redesign works shall be RPEQ certified by appropriate engineering disciplines for compliance.
- When there is uncertainty regarding the application of the standard details on this drawing for a specific project, advice shall be sought from E&T Structures.

### GENERAL NOTES:

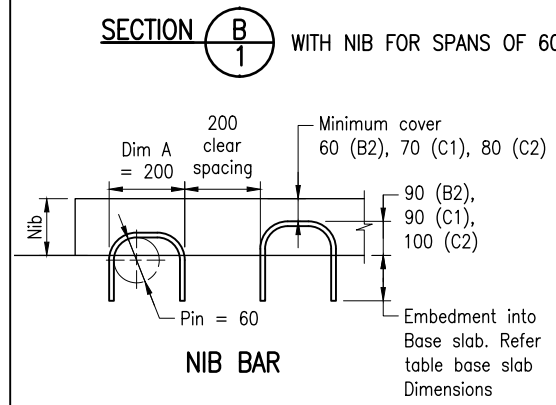
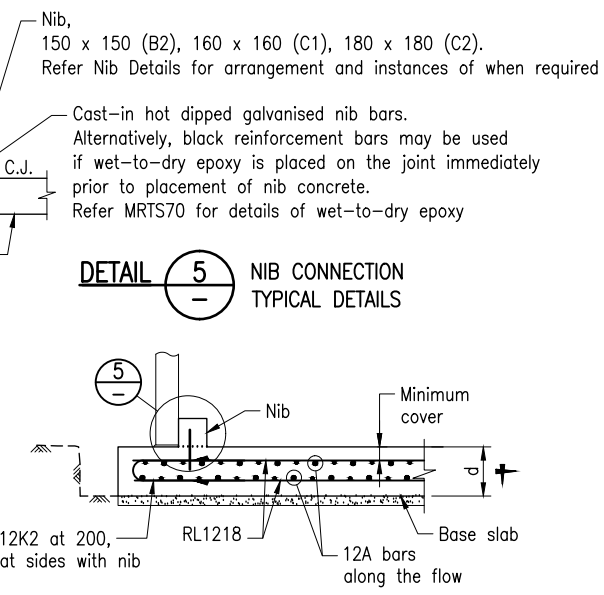
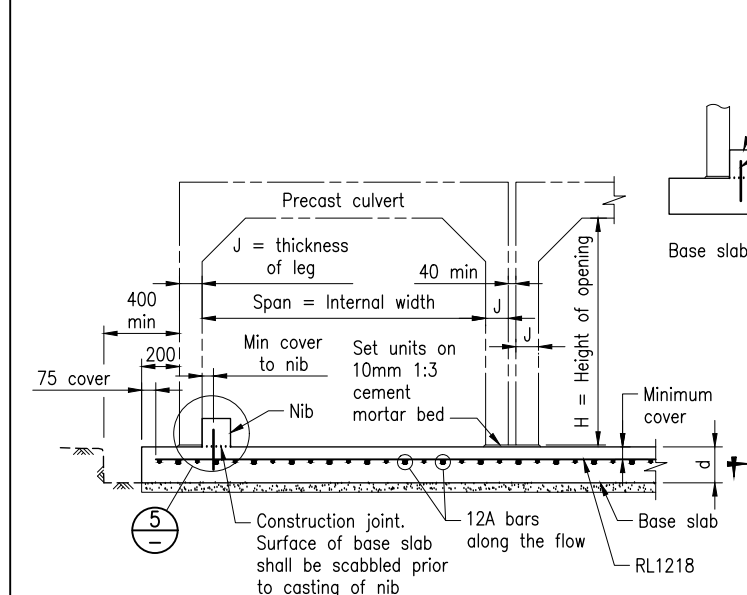
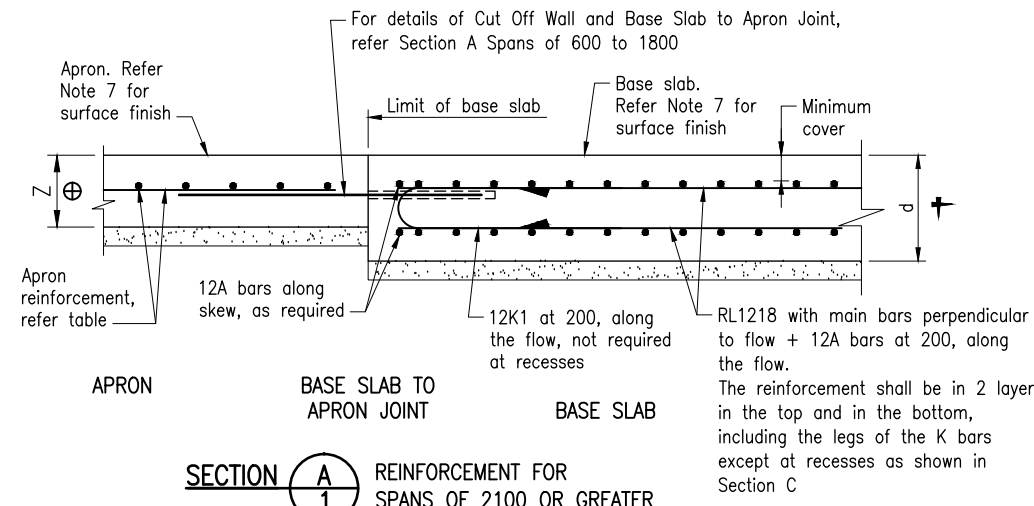
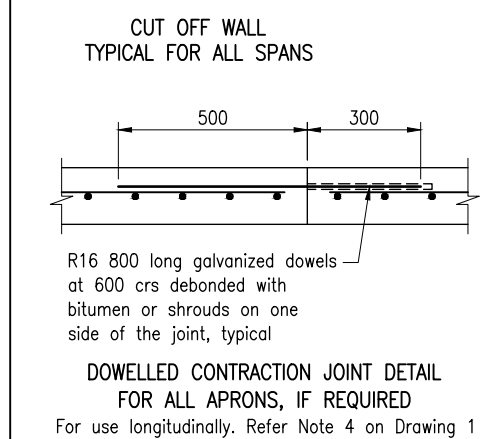
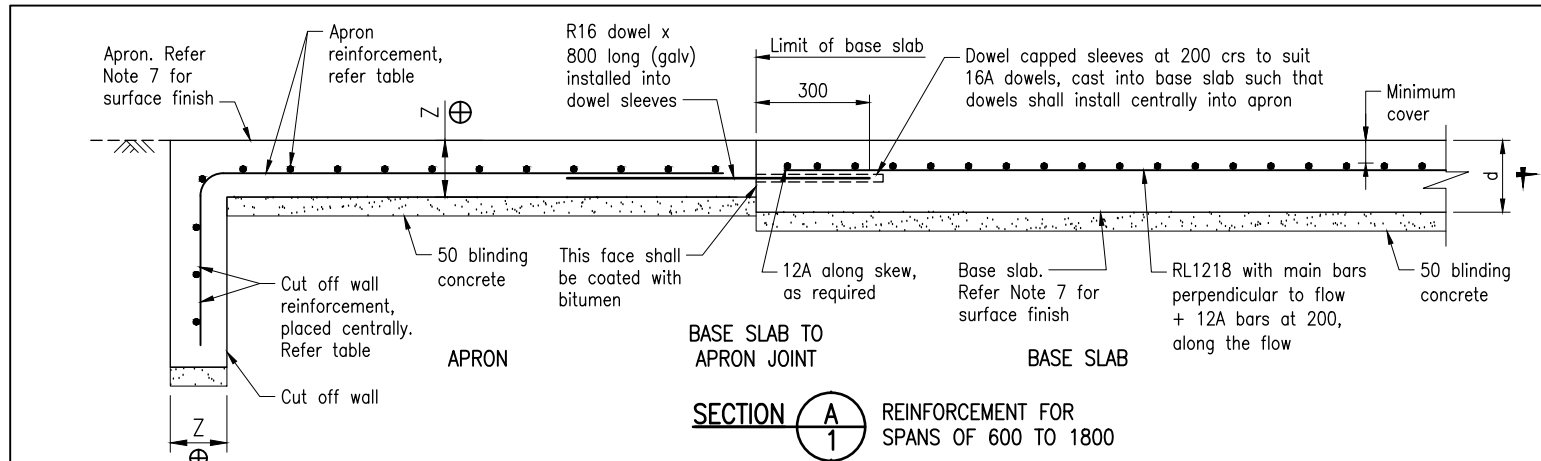
- SCOPE: This drawing is to detail cast insitu base slab, aprons, headwalls and wingwalls for precast RC Box Culverts and Slab Link Box Culverts where H (height of opening) > 600.  
This drawing supersedes Standard Drawings 1303, 1316, 1317, 1318 and 1320.  
This drawing does not provide details of fish passage requirements. Where project specific environmental assessment determines that waterway barrier works are required, additional details shall be developed and included in the project drawings.
- BOX CULVERTS shall be constructed in accordance with MRTS03.
- DESIGN TRAFFIC LOADING: HLP400, M1600, A160 and W80 are in accordance with AS 5100.2.  
Maximum height of fill over the culvert shall be 2000.  
Maximum design pressure ( $E_d$ ) under the culvert slab bases is provided in the Base slab Details table on drawing 2.  
Maximum design pressure ( $E_d$ ) under the culvert apron is 75 kPa.
- DOWELLED CONTRACTION JOINTS shall be provided where (a) the length and/or (b) the width of the base slab exceed 20m. When contraction joints are required across the width, they shall be located at 1/4 span points of crown units and are to be continued across the aprons and cut off walls. 24 hours minimum shall be allowed between pours.
- APRON AND BASE SLAB MINIMUM REINFORCEMENT for shrinkage and temperature effects are designed considering the full restraint condition to AS 5100. For the slab on ground condition, only the top half of the slab thickness is considered for calculation of this reinforcement.
- WINGWALLS for skewed culverts with angle greater than 45 require a special design.
- CONCRETE shall be in accordance with MRTS70.  
Design life 100 years.  
Exposure classification and cover to reinforcement shall be in accordance with AS 5100. Minimum concrete strength and cover to reinforcement shall be as shown in table below.

Exposure classification	minimum B2	C1	C2
Minimum concrete strength	S40/20	S50/20	S55/20
Minimum Cover UNO	60	70	80

- Triple-blend concrete in accordance with MRTS70 is required for Exposure classifications C1 and C2.  
Blinding concrete N20/20.  
Surface roughening of the aprons, and traversable areas of slabs between nibs or recesses if required, shall be broom finish using a broom not less than 400 wide to achieve an average texture depth of 0.8. The direction of brushing shall be perpendicular to the direction of flow.  
All exposed edges shall have 19 x 19 chamfers, unless nominated otherwise.
- PRECAST CONCRETE CULVERTS shall be designed and manufactured in accordance with MRTS24.
  - STEELWORK shall be fabricated to the requirements of MRTS78.  
Flat bar and angle shall be Grade 300 to AS/NZS 3679.1. Bolts and screws Class 4.6 to AS 1111.1. Nuts Class 5 to AS 1112.1. Washers Class 5 to AS 1237.1. After fabrication all bolts and nuts shall be hot dip galvanised to AS 1214, and all other steelwork to AS/NZS 4680.

General Notes are continued on Drawing 2.

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R C BOX CULVERTS AND SLAB LINK BOX CULVERTS		
CULVERTS HEIGHT > 600 DRAWING 1 OF 3		Standard Drawing No <b>1250</b>
GENERAL ARRANGEMENT AND NOTES		Date 3/2023
A	B	C
D	E	F



TYPICAL BASE SLAB WITH NIBS

Arrangements:	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

NIB DETAILS

**APRON AND CUT OFF WALL DIMENSIONS AND MINIMUM REINFORCEMENT REQUIREMENTS**

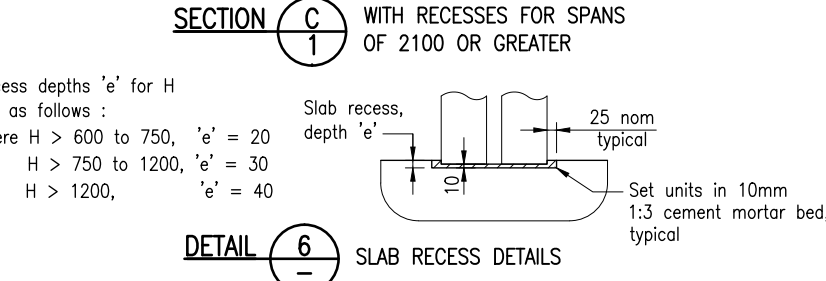
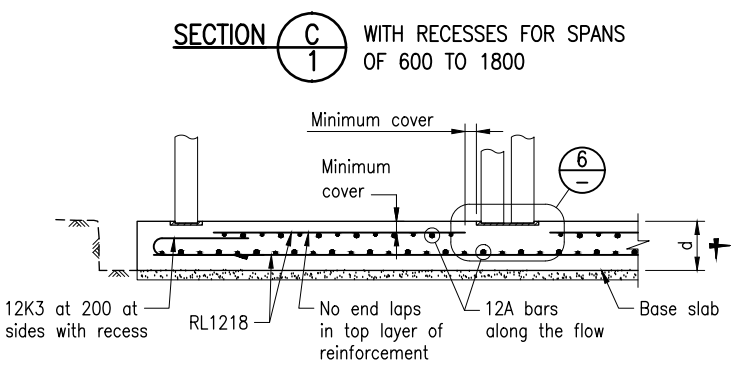
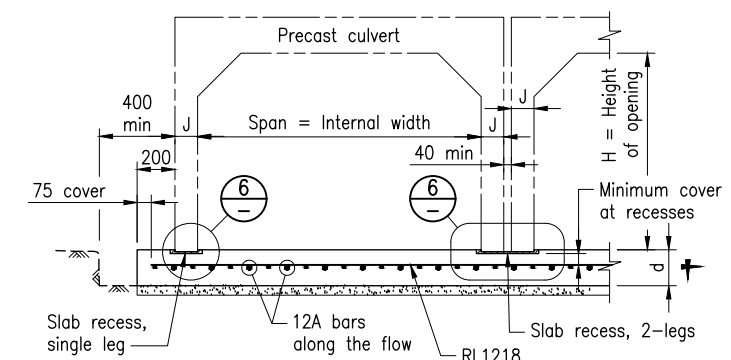
Exposure classification	Apron and Cut off wall #	
	Thickness Z ⊕	Reinforcement
B2	150	N12 at 150 both ways
C1	175	N12 at 150 both ways
C2	190	N12 at 125 both ways

⊕ where Z is a constant thickness for aprons and cut off walls.  
# Refer Note 5 of Drawing 1

**BASE SLAB DETAILS**

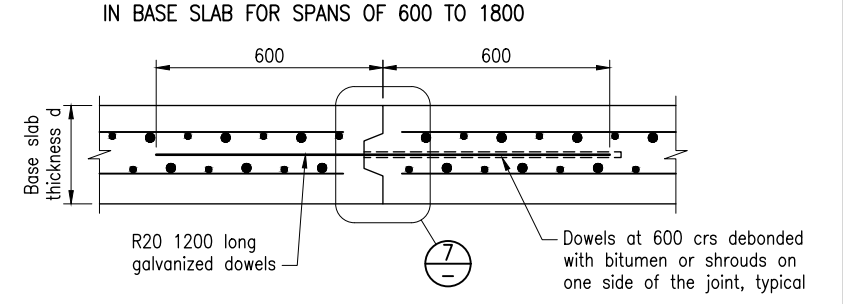
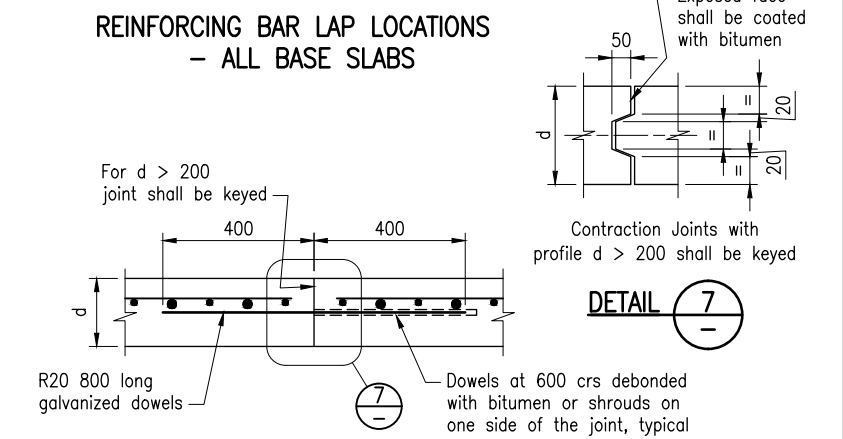
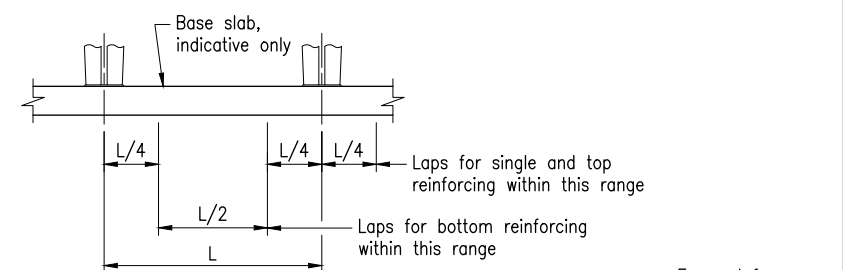
Up to Span	Maximum design pressure (E <sub>d</sub> ) kPa		Base slab thickness d for Exposure classification			Depth of embedment of 12E nib bar
	H < 1500	H ≥ 1500	B2	C1	C2	
750	190	180	180	190	200	120
900			180	190	200	
1200			180	190	200	
1500			190	200	210	
1800	180	170	190	200	210	150
2100			220	240	260	
2400			245	255	265	
2700			255	265	275	
3000			260	270	280	
3300			265	275	285	200
3600			275	285	295	

⊕ where d is a constant thickness for base slab





TYPICAL BASE SLAB WITH RECESSES

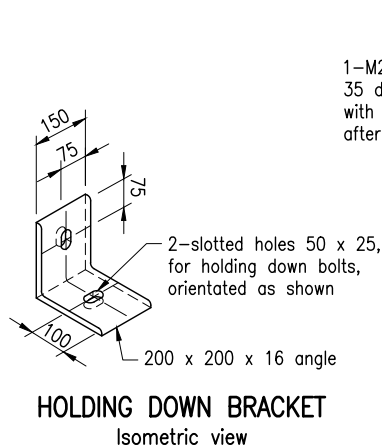
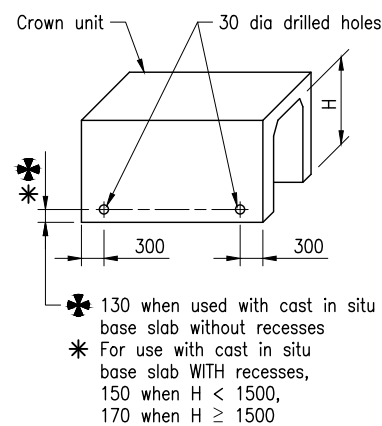
- GENERAL NOTES, continued from Drawing 1:**
10. REINFORCING STEEL shall be read in conjunction with Standard Drawings 1043 and 1044, shall be in accordance with MRTS71 and AS/NZS 4671, and ACRS certified. Deformed bars Grade D500N. Round bars Grade R250N. Mesh Grade D500L. Reinforcement shall be hot dip galvanised to AS/NZS 4680 where shown. Reinforcing Steel welding shall be in accordance with Standard Drawing 1044.
  11. WINGWALL DRAINAGE shall be provided behind wingwalls to prevent hydrostatic pressure being applied to the wingwall. A strip filter shall be used at each wingwall to drain out at the low end of the wingwall as shown.
  12. WEEPHOLES shall be provided horizontally at headwalls, a minimum of 2 weepholes for each culvert crown or link slab, located such that reinforcement cover requirements are met, and a 300 x 300 x 150 no fines concrete block or approved equivalent shall be provided at each weephole as a drainage filter.
  13. Refer Standard Drawing 1359 for details of earthworks to culverts.
  14. PROJECT-SPECIFIC INFORMATION to be shown on the drawings: Exposure classification; Culvert chainage; Skew angle; Base and apron setout, surface roughening, extents and details; Skew spanning slab details (if required); Headwall and wingwall extents (W1, W2, α, β) and details; Requirements for fish passage.
  15. DIMENSIONS are in millimetres.
- ASSOCIATED and REFERENCED DEPARTMENTAL DOCUMENTS:  
Design Criteria for Bridges and Other Structures; Road Drainage Manual (RDM)  
Standard Drawing 1359 Culverts – Installation, Bedding and Filling/Backfilling  
MRTS03 Drainage, Retaining Structures and Protective Treatments  
MRTS24 Manufacture of Precast Concrete Culverts  
MRTS70 Concrete; MRTS71 Reinforcing Steel; MRTS78 Structural Steelwork



IN BASE SLAB FOR SPANS OF 2100 OR GREATER

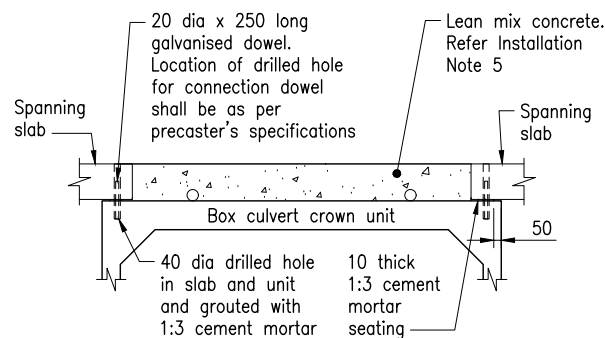
**BASE SLAB DOWELLED CONTRACTION JOINTS, IF REQUIRED**  
For use transversely and/or longitudinally. Refer Note 4 on Drawing 1

Department of Transport and Main Roads		 	
R C BOX CULVERTS AND SLAB LINK BOX CULVERTS		©The State of Queensland (Department of Transport and Main Roads) 2023 <a href="http://creativecommons.org/licenses/by/4.0/">http://creativecommons.org/licenses/by/ 4.0/</a>	
CULVERTS HEIGHT > 600		A3	Standard Drawing No
DRAWING 2 OF 3		Not to Scale	1250
CONSTRUCTION OF BASE SLABS AND APRONS			Date 3/2023
		A	B C D E F

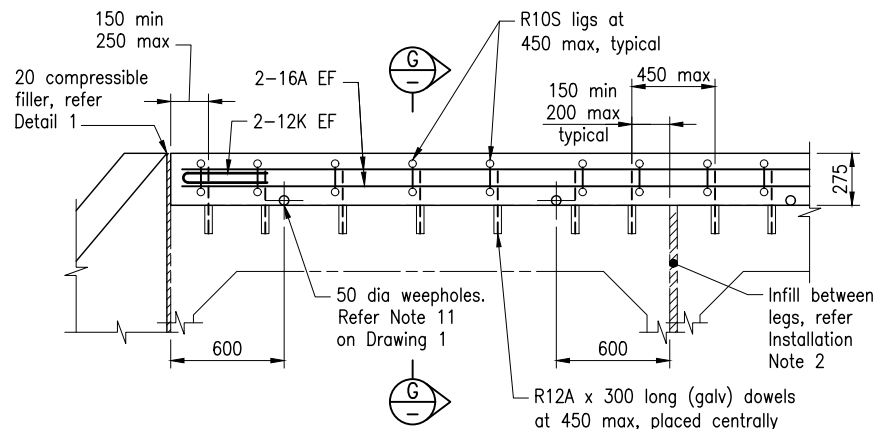


SKewed CULVERTS ONLY

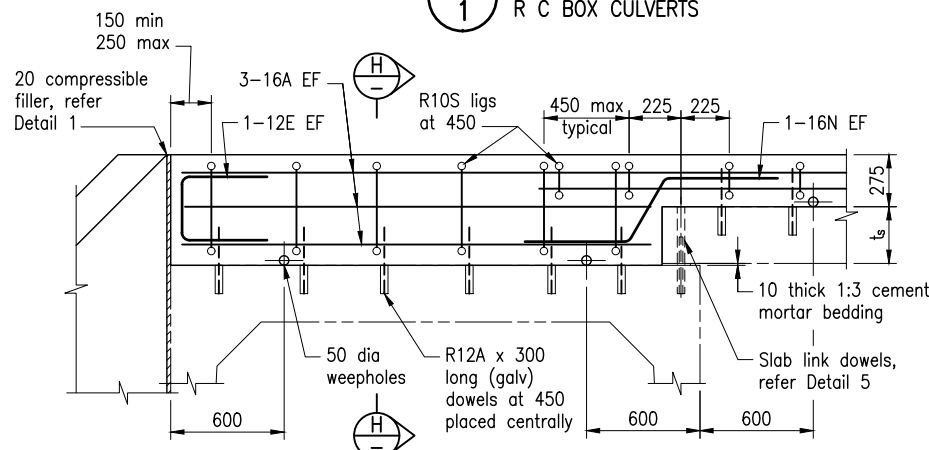
## DRILLED HOLES IN CROWN UNITS FOR HOLDING DOWN ANCHORS



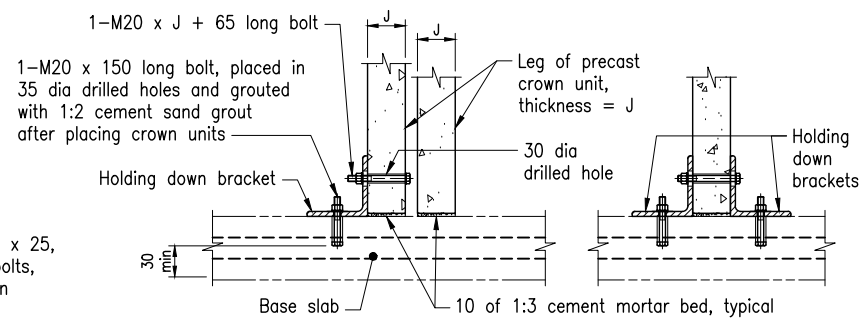
**DETAIL 5** SPANNING SLAB SUPPORT AND LEAN MIX CONCRETE FILL DETAILS



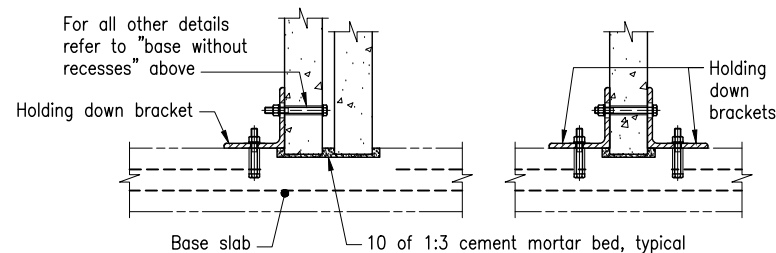
**DETAIL 3** HEADWALL FOR R C BOX CULVERTS



**DETAIL 4** HEADWALL FOR SLAB LINK CULVERTS

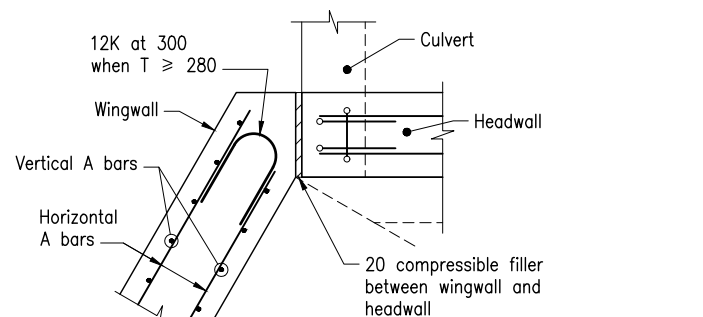


**TYPICAL DETAILS FOR BASE WITHOUT RECESSES**

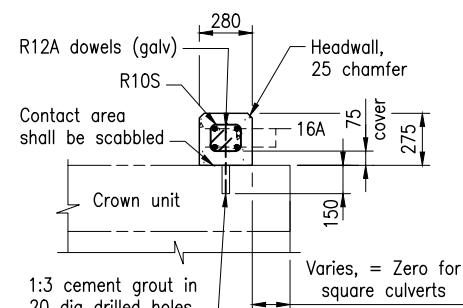


**TYPICAL DETAILS FOR BASE WITH RECESSES**

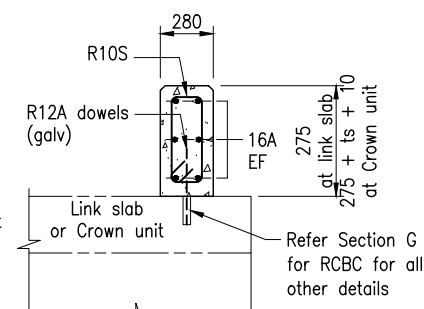
## HOLDING DOWN ANCHORS



**DETAIL 1**

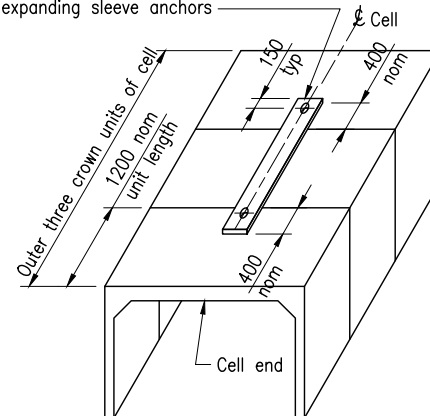


**SECTION G** HEADWALL DETAILS



**SECTION H** HEADWALL DETAILS

Restraining plate, 2000 x 65 x 6 flat with 2-18 dia drilled holes. Refer Installation Note 4. Restraining plate fixed with M12 x 58 expanding sleeve anchors



## RESTRAINING PLATE

FOR USE WITH SLAB LINK BOX CULVERT 1200 LONG CROWN UNITS ONLY

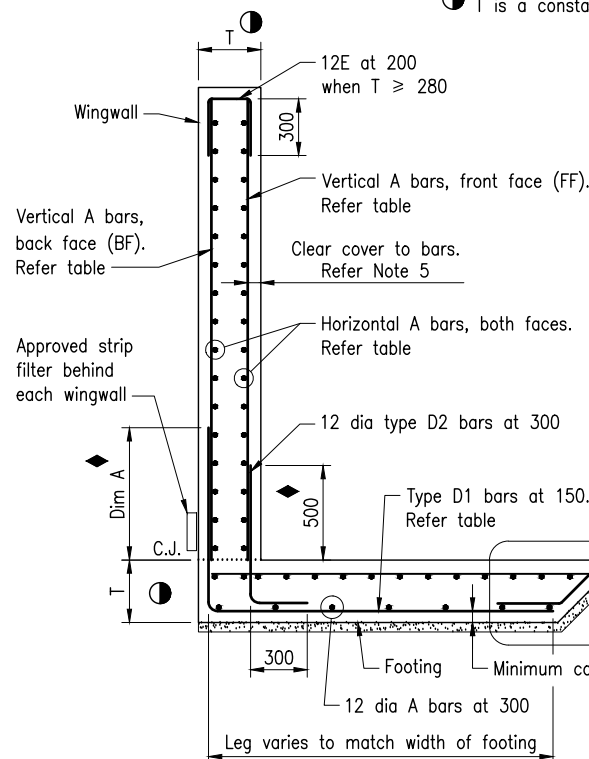
## WINGWALL DIMENSIONS AND MINIMUM REINFORCEMENT REQUIREMENTS

up to $H_w$	T for Exposure classification			Vertical A bars BF		Vertical A bars FF		Horizontal A bars FF and BF						D1 bars	
								B2		C1		C2		Dia	Dim A
	B2	C1	C2	Dia	Spacing	Dia	Spacing	Dia	Spacing	Dia	Spacing	Dia	Spacing		
1000	220	240	260	12	150	12	300	12	150	12	125	12	100	12	500
1500	220	240	260						150		125		100		
2000	260	270	280						125		100		100		
2500	330	340	350	16	150	16	300	16	100	16	150	16	125	16	700
3000	380	390	400						16		125		125		
3700	410	420	430						16		150		175		
4350	440	450	460	20		16		20	175	20	175	20	150	20	800

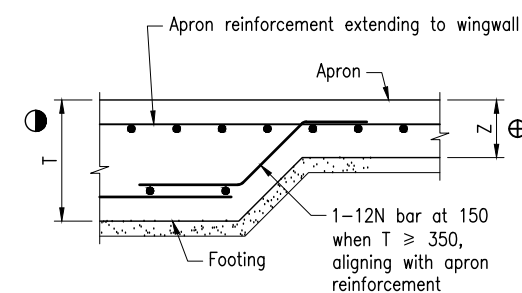
† where  $H_w = H + t_c + 10 + t_s + 275$   
height of opening H; thickness of culvert  $t_c$ ; thickness of slab  $t_s$ .

◆ where type D1 and D2 bars exceed the wall height at the wingwall ends, curtail the bars to match the wall height, ensuring cover requirements are met

● T is a constant thickness for wingwalls and footings





**SECTION F** WINGWALL AND FOOTING REINFORCEMENT DETAILS



**DETAIL 2**

## NOTES:

- Refer Drawings 1 and 2 for all General Notes.
- Refer Drawing 1 for typical General Arrangements for large RCBC and SLBC culverts.
- Refer Drawing 2 for typical details of base slabs for large box culverts.

Department of Transport and Main Roads			
R C BOX CULVERTS AND SLAB LINK BOX CULVERTS			
CULVERTS HEIGHT > 600 DRAWING 3 OF 3 INSTALLATION OF PRECAST UNITS AND CONSTRUCTION OF HEADWALLS & WINGWALLS		Queensland Government	<p>©The State of Queensland (Department of Transport and Main Roads) 2023 <a href="http://creativecommons.org/licenses/by/4.0/">http://creativecommons.org/licenses/by/4.0/</a></p>
		A3	Standard Drawing No
		Not to Scale	1250
			Date 3/2023
A	B	C	D
E	F		