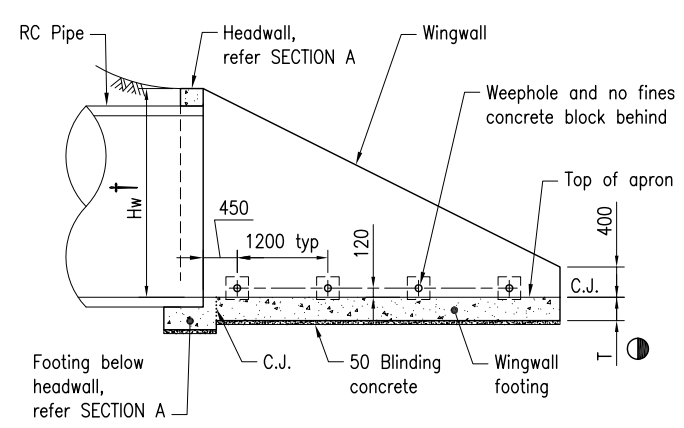


PLAN



SECTION X - ELEVATION AT WINGWALL - CONCRETE DETAILS

† Hw = Internal pipe diameter (d) + pipe thickness (t) + 230. Refer table on Drawing 2

● T is a constant thickness for wingwalls and footings. Refer table on Drawing 2

The purpose of This Standard Drawing is to provide typical standard details. The fitness for purpose of these details for a specific project shall be designed and certified by an RPEQ. The details specific to the project location shall be shown on the project specific drawings.

NOTES:

- PIPE CULVERT END STRUCTURES shall be in accordance with MRTS03. The purpose of this drawing is to detail wingwalls, headwall and apron for culverts with pipe diameter 750 to 2400. Refer Standard Drawing 1305 for details of headwall and apron for culverts with pipe diameter 375 to 675. Refer Standard Drawing 1359 for details of culvert installation and earthworks.
- PIPE DIAMETERS greater than 2400 require a special design.
- Where CULVERT APRONS are longer than 20m, the project specific design shall be developed with a transverse contraction joint, with direction of flow, at every 20m length. Typical contraction joint details provided in this standard drawing are to be used.
- 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.

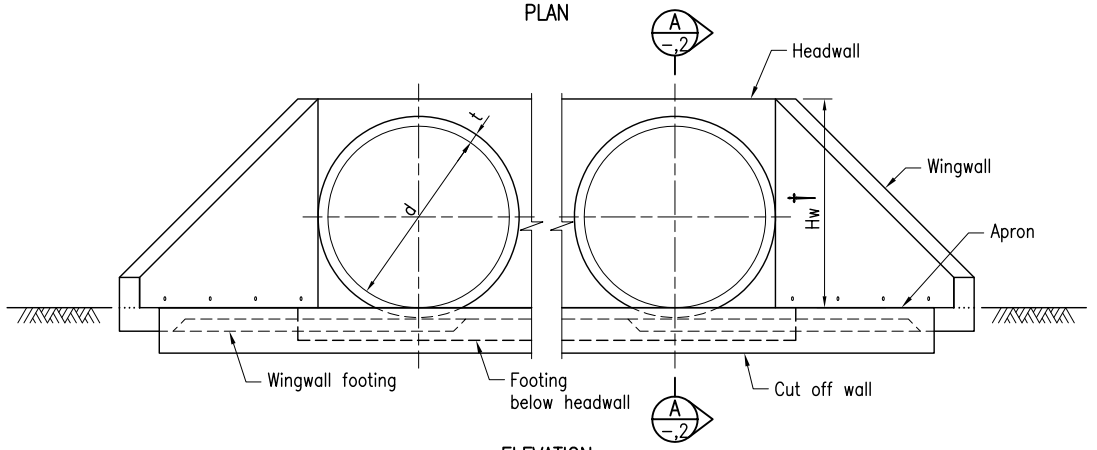
Exposure classification	minimum B2	C1	C2
Minimum concrete strength	S40/20	S50/20	S55/20
Minimum Cover UN0	60	70	80

Blinding concrete N20/20.

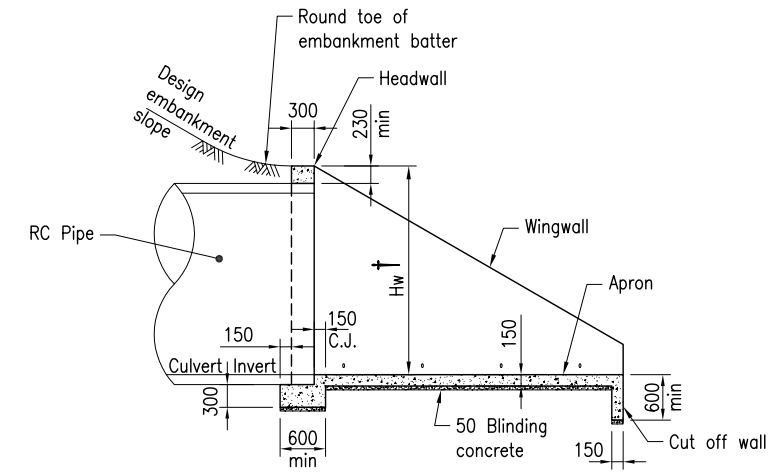
- REINFORCING STEEL shall be read in conjunction with Standard Drawings 1043 and 1044, and shall be in accordance with MRTS71 and AS/NZS 4671. Deformed bars Grade D500N. Round bars Grade R250N. Mesh Grade D500L. Reinforcement shall be hot dip galvanised to AS/NZS 4680 where shown.
- TACK WELDING to reinforcement for location purposes to AS/NZS 1554.3. Welding consumables to be controlled hydrogen type: G49X to AS/NZS ISO 14341-B or T49X to AS/NZS ISO 17632-B.
- WEEPHOLES shall be provided horizontally in wingwalls, with a no fines concrete block or approved equivalent at each weephole as a drainage filter. Location of weepholes shall be determined ensuring cover requirements are met.
- PROJECT-SPECIFIC INFORMATION to be shown on the drawings: Exposure classification; Culvert chainage; Skew angle; Base and apron setout and extents; Headwall and wingwall extents (W1, W2,  $\alpha$ ,  $\beta$ ).
- DIMENSIONS are in millimetres.

ASSOCIATED DEPARTMENTAL DOCUMENTS:  
Design Criteria for Bridges and Other Structures  
Road Drainage Manual (RDM)

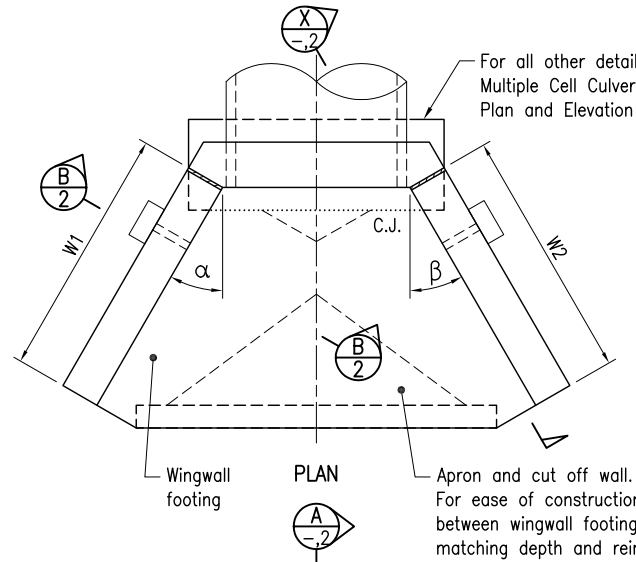
REFERENCED DOCUMENTS:  
Departmental Standard Drawings:  
1043 Reinforcing Steel - Standard Bar Shapes  
1044 Reinforcing Steel - Lap Lengths  
1305 Pipe Culverts - Headwall and Apron for Pipe Diameter 375 to 675  
1359 Culverts - Installation, Bedding and Filling/Backfilling Against/Over Culverts  
Departmental Specifications:  
MRTS03 Drainage, Retaining Structures and Protective Treatments  
MRTS70 Concrete  
MRTS71 Reinforcing Steel



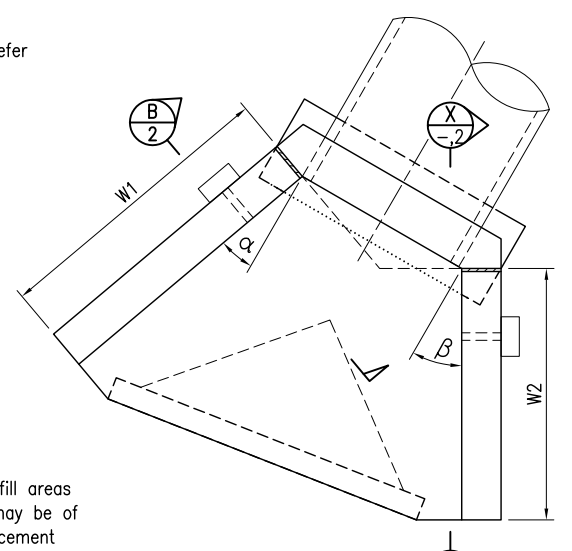
ELEVATION  
MULTIPLE CELL CULVERT



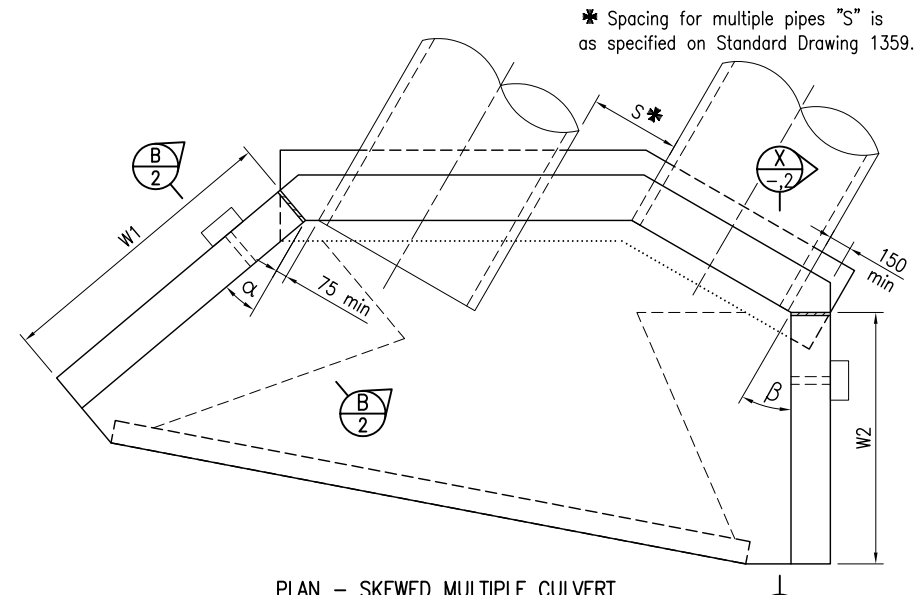
SECTION A - HEADWALL AND APRON - CONCRETE DETAILS



For all other details refer Multiple Cell Culvert Plan and Elevation  
For ease of construction infill areas between wingwall footings may be of matching depth and reinforcement



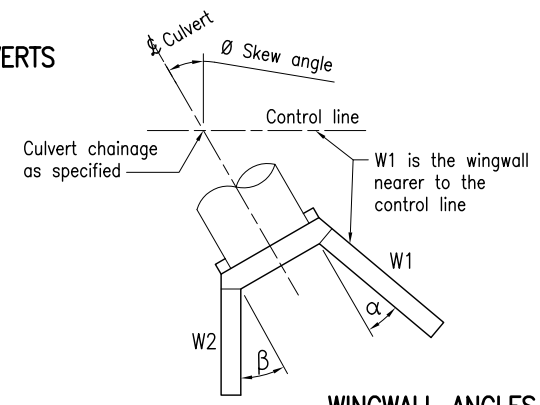
PLAN - SKEWED SINGLE CULVERT



PLAN - SKEWED MULTIPLE CULVERT

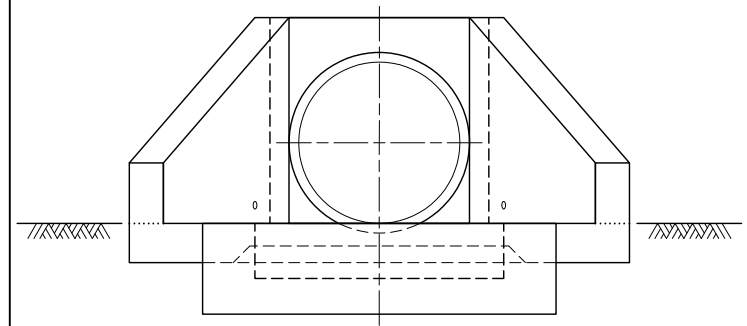
\* Spacing for multiple pipes "S" is as specified on Standard Drawing 1359.

GENERAL ARRANGEMENT - SKEWED CULVERTS



WINGWALL ANGLES

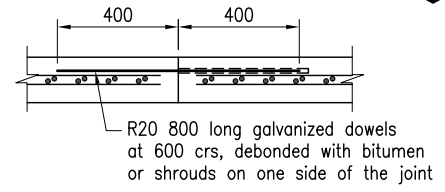
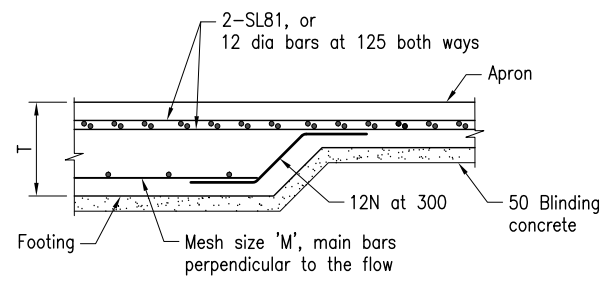
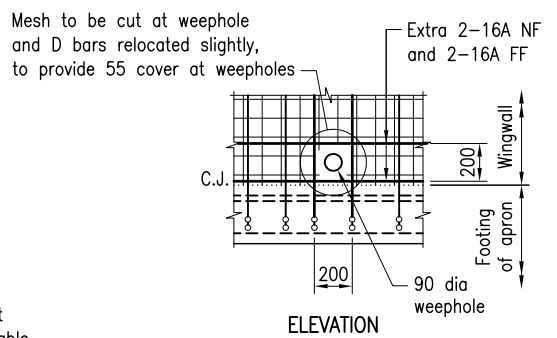
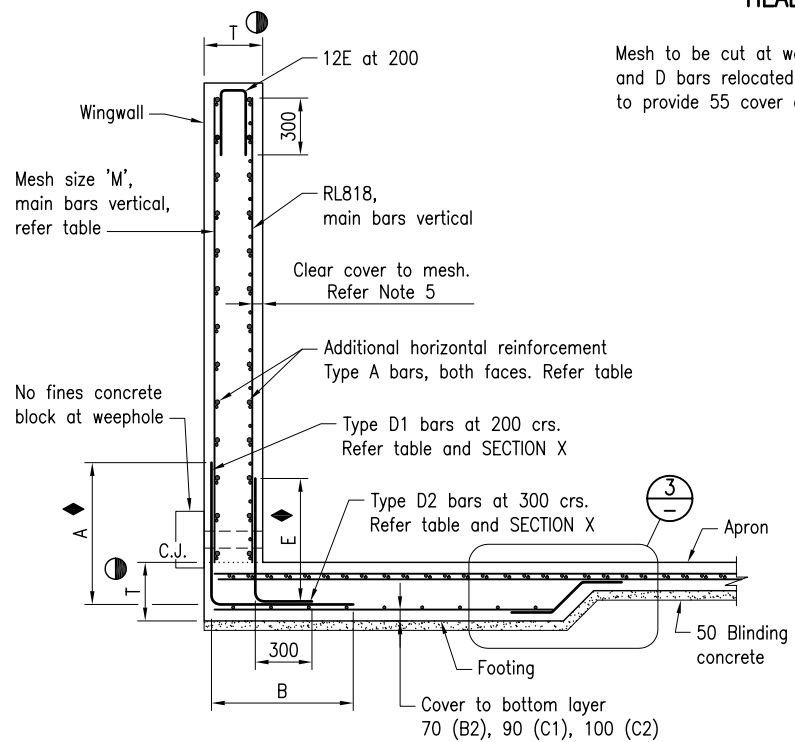
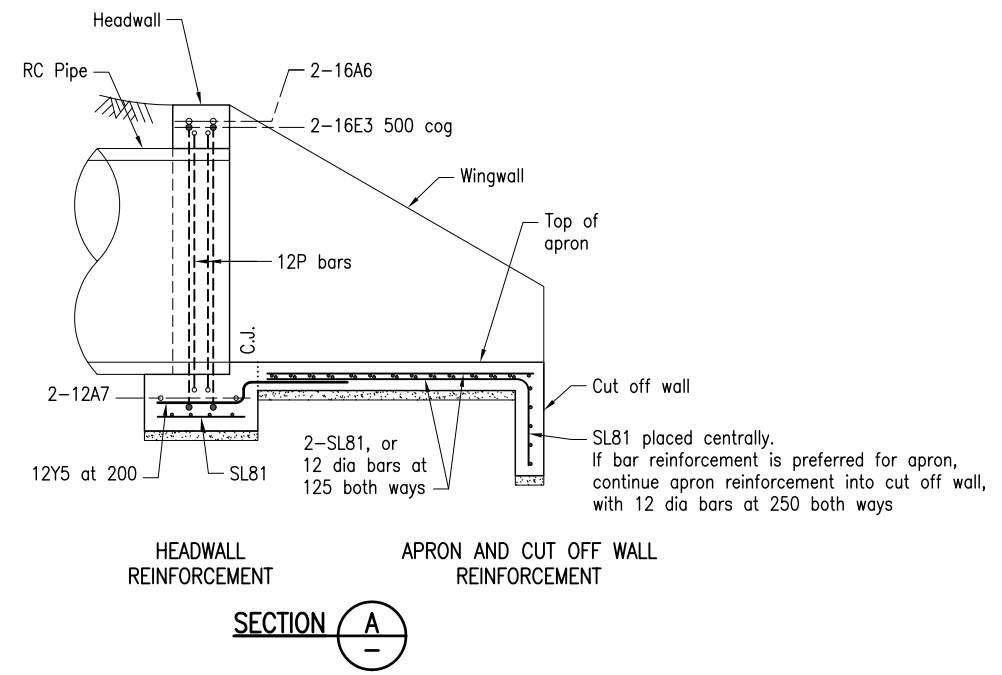
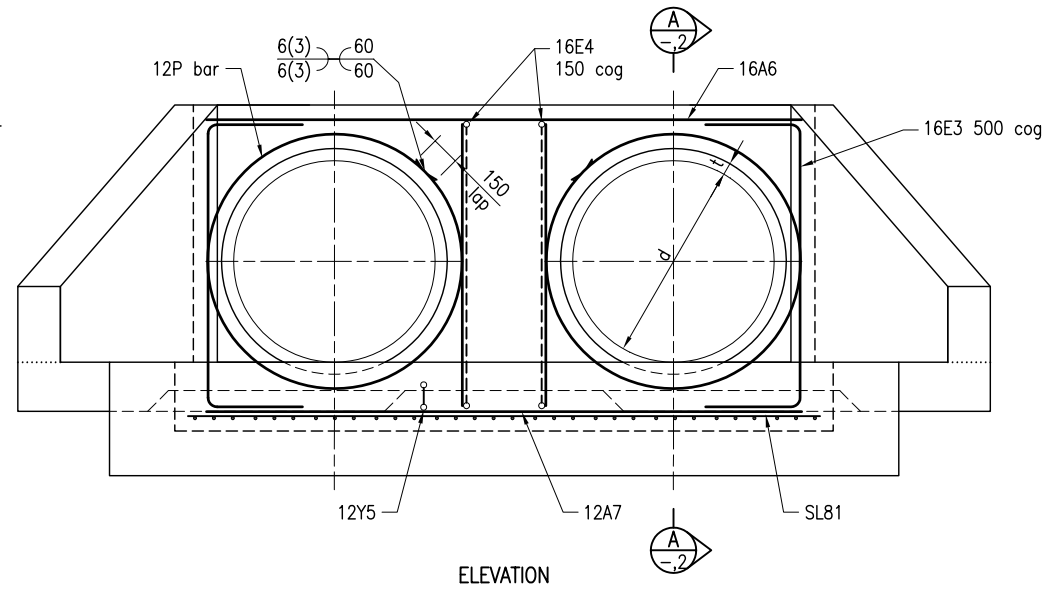
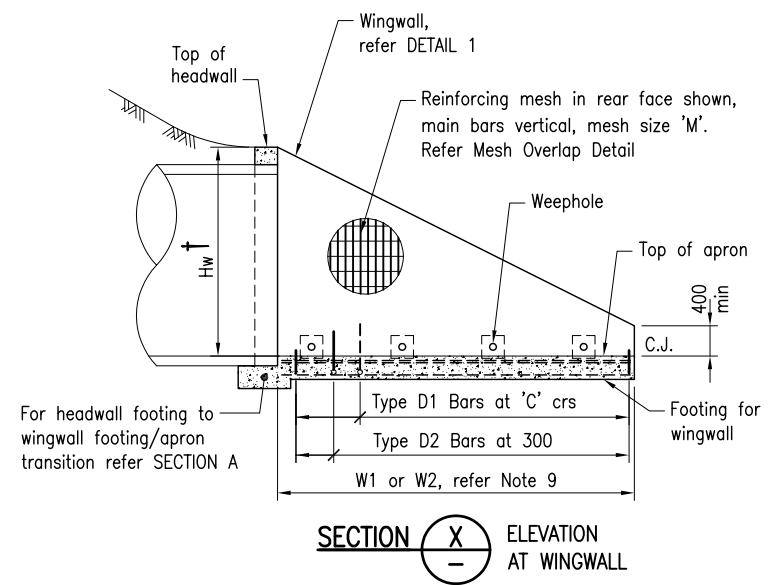
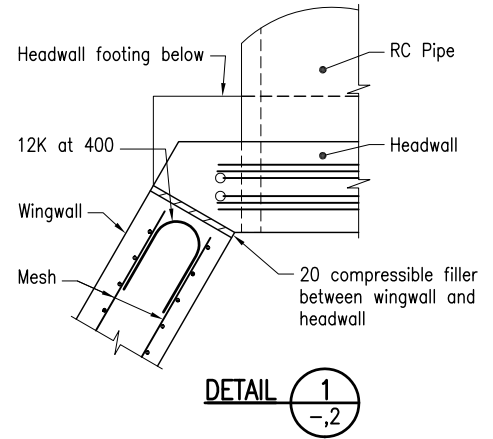
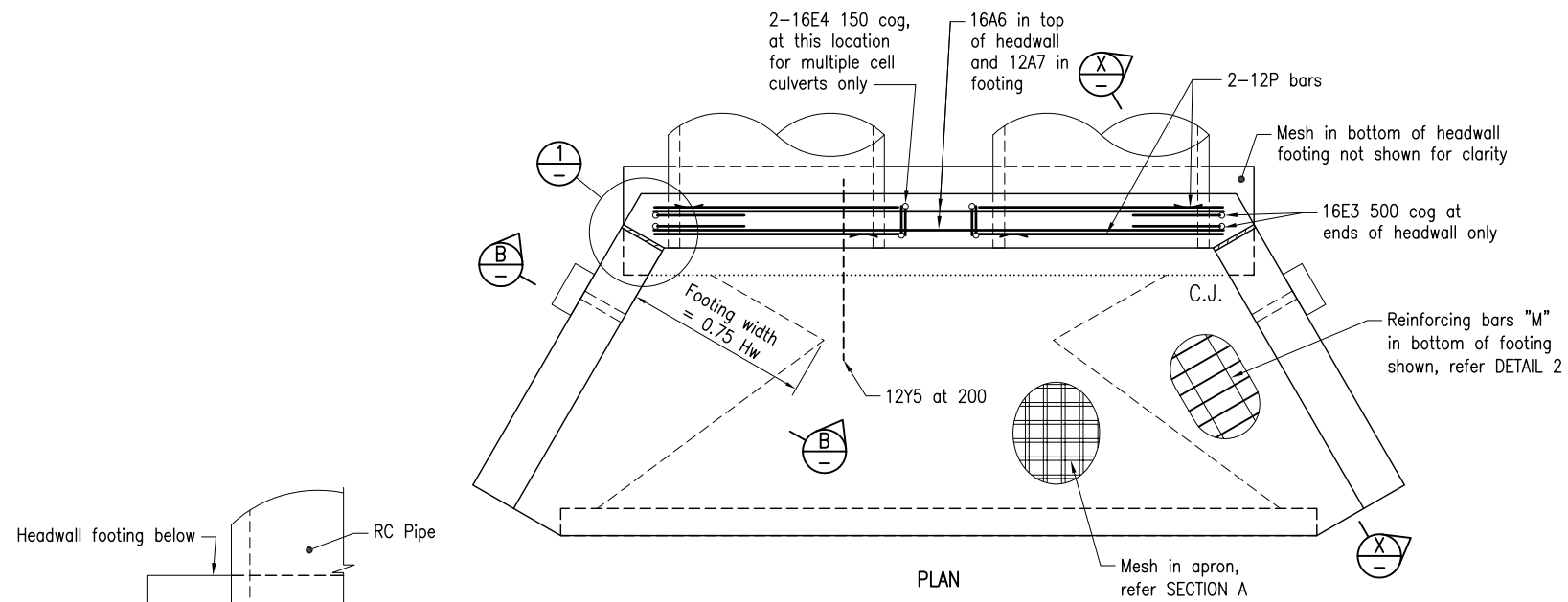
Skew angle $\theta$	Wingwall angle	
	$\alpha$	$\beta$
0 - 10	30	30
11 - 20	25	30
21 - 30	20	30
31 - 45	15	30



ELEVATION  
SINGLE CELL CULVERT

Department of Transport and Main Roads			
PIPE CULVERTS			
WINGWALLS, HEADWALL AND APRON FOR PIPE DIAMETER 750 TO 2400 DRAWING 1 OF 2		A3	Standard Drawing No 1304
		Not to Scale	Date 11/18

- NOTES:**
1. Refer Drawing 1 for all notes.
  2. Refer Drawing 1 for concrete profile and general arrangement



**WINGWALL DIMENSIONS AND MINIMUM REINFORCEMENT REQUIREMENTS**

up to Hw †	T for Exposure classification			Outer mesh M	A bars at 200	Type D1 bars			12 dia Type D2 bars	
	B2	C1	C2			Dia	Dia	A		B
1000	210	230	250	RL918	12	12	550	550	200	650
1500	210	230	250	RL918	12	12	550	550		
2000	260	280	300	RL1018	16	16	600	600		
2500	330	350	370	RL1018	16	16	650	650		
3000	380	400	420	RL1218	16	20	750	750		

† where Hw = Internal pipe diameter d + pipe thickness t + 230  
 ◆ where bars length A and E exceed the wall height, curtail the bars to match the wall height, ensuring cover requirements are met

Department of Transport and Main Roads			
PIPE CULVERTS			
WINGWALLS, HEADWALL AND APRON FOR PIPE DIAMETER 750 TO 2400		A3	Standard Drawing No
DRAWING 2 OF 2		Not to Scale	1304
			Date 11/18