

GENERAL:

1. IN ACCORDANCE WITH AUSTRALIA STANDARD AS5100.5-2017, THE MINIMUM REQUIRED CONCRETE COVER UNDER DIFFERENT EXPOSURE CLASSIFICATIONS ARE AS SHOWN BELOW.

EXPOSURE CLASS / CONCRETE STRENGTH	MINIMUM COVER (mm)		CONCRETE CLASS
	40MPa	50MPa	
B1	50	-	N
B2	55	50	SB
C	-	70	SC
U	CONFIRM THE VALUE WITH A CERTIFIED STRUCTURAL ENGINEER		SU

CONDUCT TESTING OF SITE ENVIRONMENT TO IDENTIFY THE EXPOSURE CLASS AS PER AS5100.5-2017 AND INCORPORATE RELEVANT INFORMATION FROM TABLE ABOVE INTO PROJECT DESIGN.

CONCRETE CLASS ARE SPECIFIED AS PER AS1379-2007. WHEN SPECIAL CLASS 'S' CONCRETE IS REQUIRED, THE AGGREGATES ARE TO BE TESTED AS PER AS2758.1-2014 AND SEEK SUPERINTENDENT'S APPROVAL FOR TYPE OF CEMENT.

- APPLIED DESIGN LOADS HLP320, MS1600, A160 AND W80 IN ACCORDANCE WITH AS5100.2-2017.
- WORKING LOADS ARE THOSE DUE TO FILL MATERIAL AND STANDARD HIGHWAY VEHICLE AS PER AS3725-2007. ALLOWANCE FOR CONSTRUCTION LOADS SHALL COMPLY WITH DEPARTMENT'S STANDARD SPECIFICATION FOR ROADWORK.
- MAXIMUM FILL OF 2 METRES. SEEK DESIGN ADVICES FOR FILL HEIGHTS GREATER THAN 2 METRES.
- ALLOWABLE BEARING PRESSURE FOR CULVERT BASES IS 150kPa.
- REFER TO NOTE 1 FOR SUITABLE CONCRETE CLASS USE IN DIFFERENT EXPOSURE CLASS.
- ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.

REINFORCEMENT:

- REINFORCING STEEL TO BE IN ACCORDANCE WITH AS/NZS 4671-2019.
DEFORMED BARS - GRADE D500N
ROUND BARS - R250N
DEFORMED WIRE - GRADE D500L
ALL REINFORCING STEEL TO BE ACRS CERTIFIED.
- DOWELS, RESTRAINING PLATES HOT DIP GALVANISED TO AS 4680-2006.
- LAPS SHALL BE MADE SO THAT THE TWO OUTERMOST WIRES OF ONE MESH OVERLAP WITH THE TWO OUTERMOST WIRES OF THE SHEET BEING LAPPED.



- COMPLY WITH AS 3600-2018, AS 3610.1-2018 AND AS 1379-2007.
- REINFORCEMENT SHALL BE AS PER MINIMUM REINFORCING SHOWN ON THE DRAWINGS.
- MESH DENOTED 'SLXX' SHALL BE 'DL500SLXX' MESH TO AS 4671-2019 TYP.
- MESH DENOTED 'RLXXX' SHALL BE 'D500RLXXX' MESH TO AS 4671-2019 TYP.
- BARS NOTED 'N10' SHALL BE 'DN500N10' TO AS 4671-2019.
- EXCESS BAR LENGTH PROTRUDING OUTSIDE THE DIMENSIONS OF THE WALL OR FOOTING SHALL BE CURED TO PROVIDE THE MINIMUM COVER
- STRUCTURE REINFORCED THROUGH OUT WITH REINFORCEMENT AS PER MINIMUM REINFORCEMENT REQUIREMENTS. REINFORCEMENT SHALL BE CENTRALLY PLACED BOTH WAYS.

OVERLAY & FILL & BACKFILL:

- MINIMUM DEPTH OF OVERLAY ZONE ABOVE PIPE/BOX CULVERTS AS SHOWN MAY INCLUDE PAVEMENT. PAVEMENT WITHIN THIS AREA TO BE COMPACTED BY HAND OR ALTERNATIVELY A LEAN MIX CONCRETE PAVEMENT LAYER MAY BE USED.
- WINGWALL FILL/BACKFILL MATERIAL SHALL BE PLACED 300mm THICK BEHIND WINGWALLS FOR THE LENGTH AND HEIGHT OF THE WINGS.
- ALL BACKFILL TO BE IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR ROADWORKS
 - BEDDING MATERIAL IN ACCORDANCE WITH THE STANDARD SPECIFICATION FOR ROADWORKS.
 - BACKFILL AROUND THE CULVERT FOR THE FULL WIDTH OF THE TRENCH AND FOR A MINIMUM 300mm ABOVE THE TOP OF THE CULVERT, OR TO SUBGRADE SURFACE IF LESS, WITH SELECT FILL.
 - BACKFILL THE REMAINDER OF THE TRENCH WITH STANDARD FILL.
- STABILISE ALL FILL WITH 2% CEMENT BY MASS AND COMPACT TO 95% MMDD WHERE THE TRENCH OR EMBANKMENT LIES BENEATH A ROAD PAVEMENT.

REINFORCED CONCRETE BOX CULVERT (RCBC):

- FOR MULTIPLE BOX CULVERTS, APRON AND INVERT SLAB TO BE CONTINUOUS.
- HEADWALL ONLY TO BE PROVIDED FOR BOX CULVERTS UP TO AND INCLUDING 600 x 450 (REFER STD. DRAWING CS3102 FOR SIMILAR).
- IN MULTI-CELLS BOX CULVERTS INSTALLATION, CELLS MAY BE PLACED EITHER TOUCHING OR WITH A GAP NO MORE THAN 25mm. THE GAP SHOULD BE GROUTED WITH 1 TO 3 SAND&CEMENT MORTAR OR EQUIVALENT FOR A MINIMUM DEPTH OF AT LEAST THE CROWN THICKNESS AS DETAILS IN AS1597.1-2010 AND AS1597.2-2013.
- HOLDING DOWN ANCHORS ARE TO BE INSTALLED WHERE THE LEG(S) OF THE CROWN UNIT EXTEND MORE THAN 300 BEYOND THE OUTSIDE FACE OF THE HEADWALL. NIBS ARE NOT REQUIRED FOR THESE CROWN UNITS. WHERE NIBS ARE REQUIRED. THEY ARE TO EXTEND FOR THE FULL LENGTH OF ALL OTHER UNITS.

- LEAN MIX CONCRETE IS ONLY TO BE PLACED BETWEEN SPANNING SLABS ON CROWN UNIT CELLS. LEAN MIX CONCRETE INFILL IS NOT REQUIRED ON THE OUTERMOST CROWN UNITS. 5% CEMENT STABILISED SAND IS ACCEPTABLE ALTERNATIVE FOR LEAN MIX CONCRETE INFILL.
- CROWN UNIT RESTRAINING PLATES ARE REQUIRED ON THE OUTER 3 OF ALL INTERNAL CELLS WHEN SLAB LINK BOX CULVERT > 5 CELLS, WHEN CROW UNITS ≥ 1800 HIGH, AND 1200 LONG, ARE USED.

REINFORCED CONCRETE PIPES:

- FOR MULTIPLE PIPES, APRON AND INVERT SLAB TO BE CONTINUOUS.
- FOR NOMINATED PIPE CLASS, REFER TO PROJECT DRAWINGS AND MANUFACTURERS SPECIFICATION.
- MANUFACTURER TO PROVIDE CERTIFICATION OF PIPE CLASS OF PIPES DELIVERED TO SITE.

WEEPHOLES:

- WEEPHOLES SHALL BE PROVIDED HORIZONTALLY AS FOLLOWS:
 - WINGWALLS AND ABUTMENT WALLS, AT 1200 CRS,
 - HEADWALLS, A MINIMUM OF 2 WEEPHOLES FOR EACH CULVERT OR LINK SLAB,
 - LOCATION OF WEEPHOLES SHALL BE DETERMINED SUCH THAT REINFORCEMENT COVER REQUIREMENTS ARE MET,
 - PROVIDE 300 x 300 x 150 DRAINAGE FILTER MATERIAL WRAPPED IN STRENGTH CLASS 'B' GEOTEXTILE BEHIND EACH WEEPHOLE. ALTERNATIVELY, PROVIDE A CONTINUOUS 300 HIGH x 150 WIDE DRAINAGE LAYER WRAPPED IN STRENGTH CLASS 'B' GEOTEXTILE ACROSS THE TOE OF THE WINGWALL.

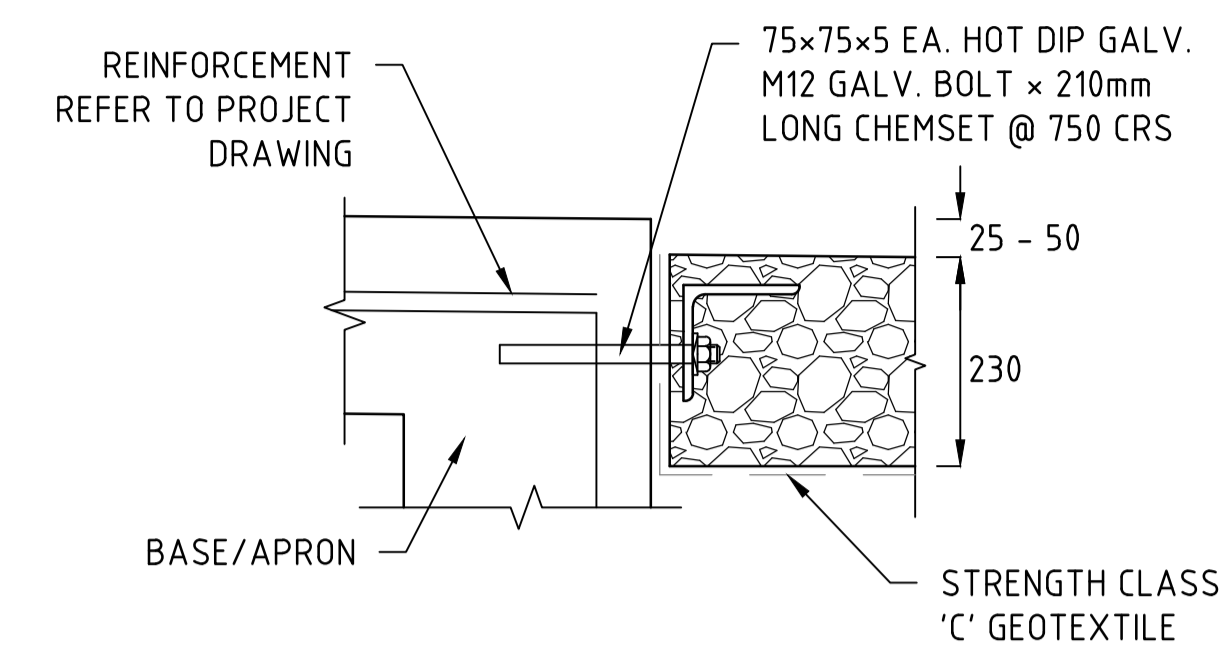
APRON:

- WHERE REINFORCED WINGWALLS ARE USED REFER TO APRON DETAILS ON THIS STANDARD DRAWINGS. PROTECTION WORKS AT OUTLETS AND INLETS ARE TYPICAL AND MAY BE VARIED AS SHOWN IN PROJECT DRAWINGS.

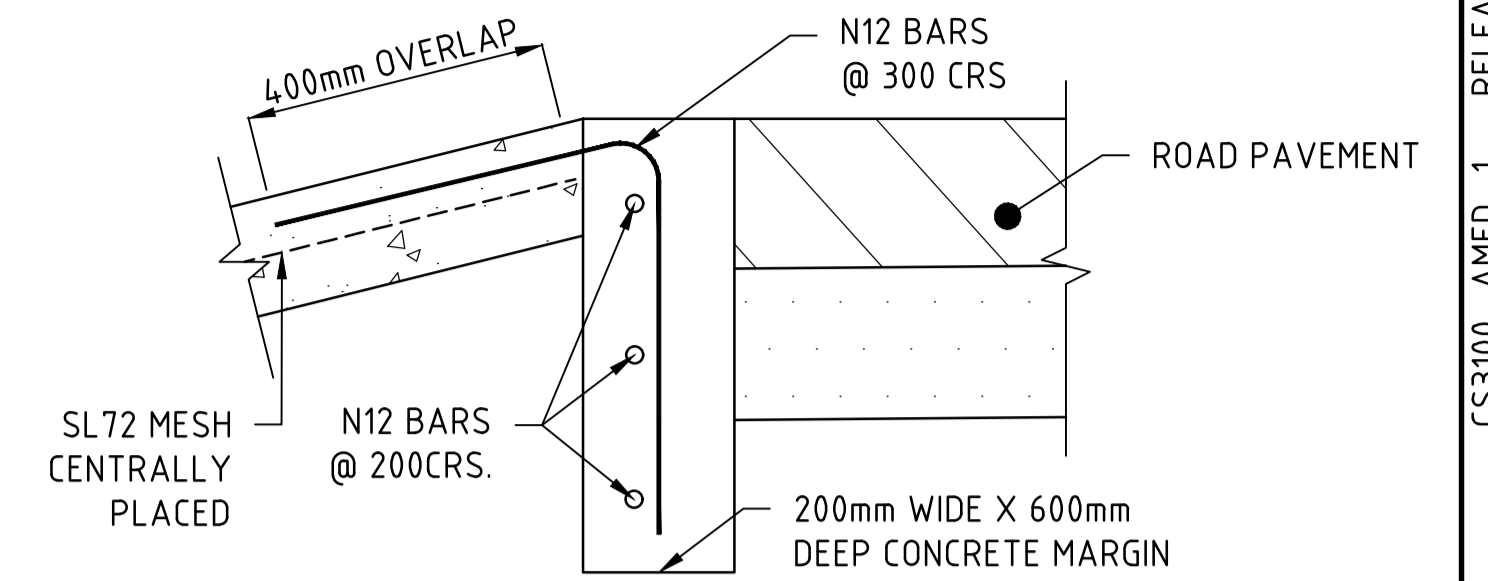
PROTECTION:

- WHERE SPECIFIED, DOWNSTREAM END TO BE PROTECTED BY RENO MATTRESS. REFER TO CULVERT OUTLET PROTECTION DETAILS FOR BOLT CONNECTION DETAILS OF RENO MATTRESS AND CONCRETE.
- WHERE REQUIRED, THE CULVERT WINGWALLS MAY BE MODIFIED AND HAVE A TRAVERSABLE GRATE INSTALLED. FOR GRATE DETAILS & MODIFIED WINGWALL SETOUT, REFER CS3133 - CS3140

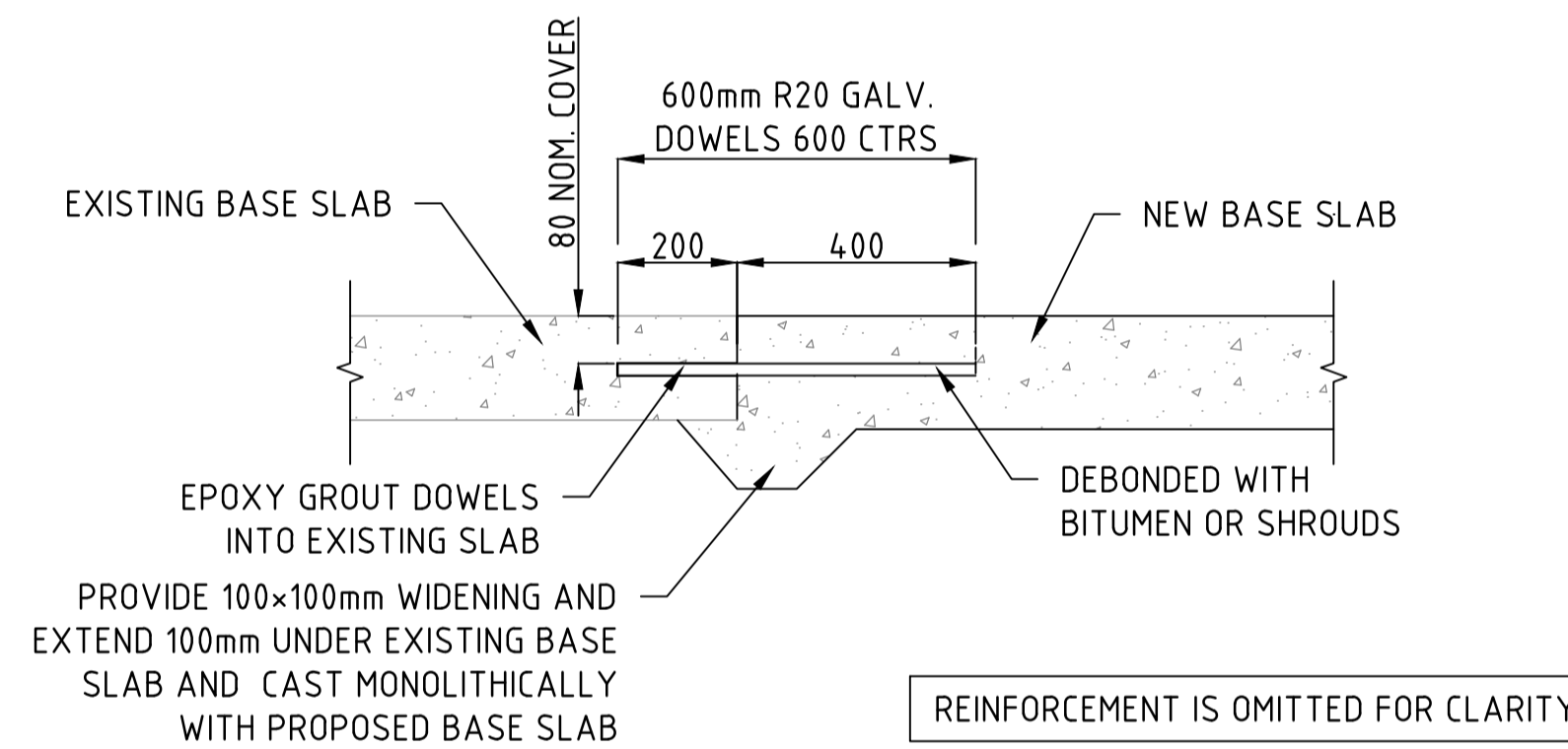
TERMINOLOGY / ABBREVIATIONS / REFERENCES		
DESCRIPTION	SYMBOL	
REINFORCED CONCRETE PIPE	RCP	
REINFORCED CONCRETE BOX CULVERT	RCBC	
SLAB LINK BOX CULVERT	SLBC	
THICKNESS OF LINK SLAB	ts	
INTERNAL DIAMETER OF A PIPE CULVERT OR INTERNAL HEIGHT OF A BOX CULVERT	D	
OVERALL HEADWALL HEIGHT	H	
WINGWALL END HEIGHT	d	
THICKNESS OF WINGWALL / HEADWALL	T	
EXTERNAL DIAMETER OF PIPE CULVERT OR EXTERNAL DEPTH OF BOX CULVERT	ED	
SKEW ANGLE	φ	
WINGWALL ANGLE 1	α	
WINGWALL ANGLE 2	β	
WIDTH DUE TO WINGWALL ANGLE 1	B	
WIDTH DUE TO WINGWALL ANGLE 2	E	
CULVERT APRON LENGTH	A	
BASE SLAB THICKNESS	Bt	
WINGWALL FOOTING WIDTH	Fw	
HEADWALL EXTENSION WIDTH FOR HEADWALL ONLY	F	
APRON END WIDTH/GRATE MAX SPAN	C	



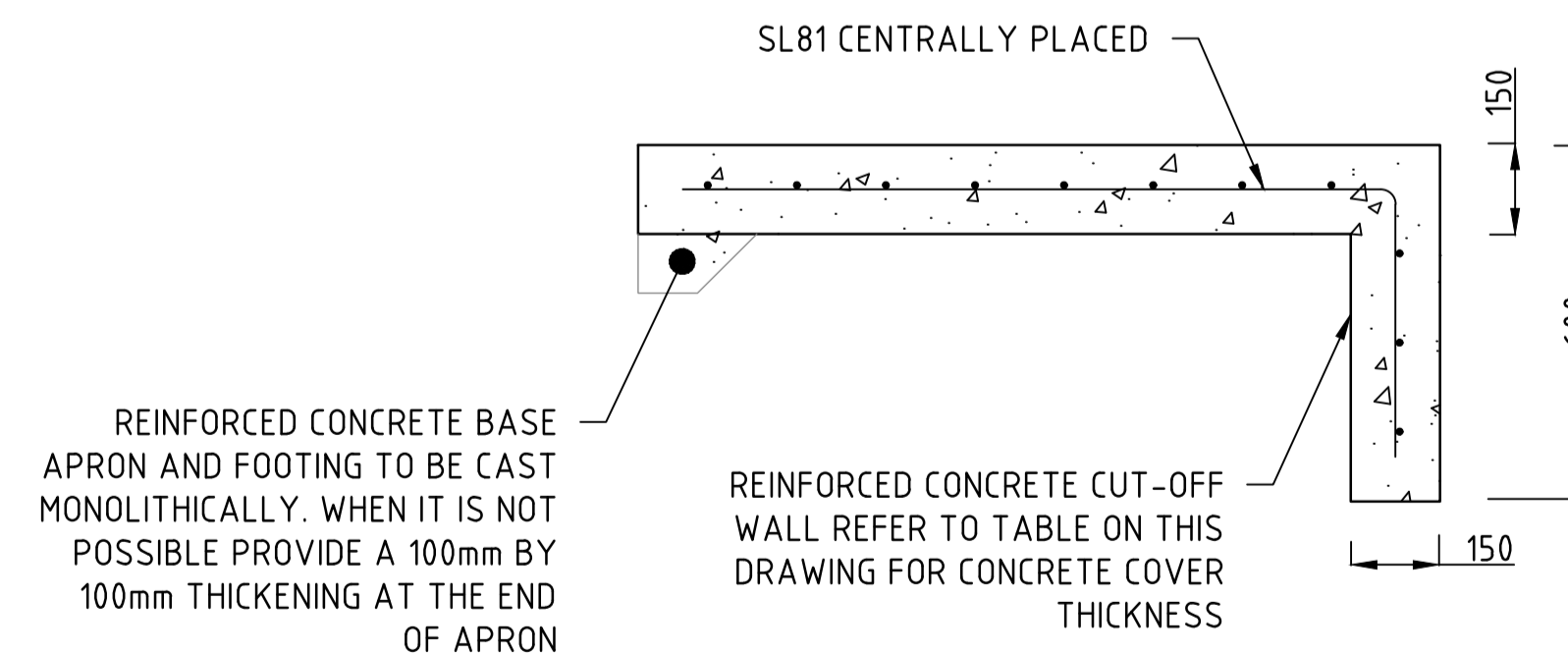
CULVERT OUTLET PROTECTION
CONNECTION BETWEEN CONCRETE BASE/APRON AND RENO MATTRESS
NOT TO SCALE



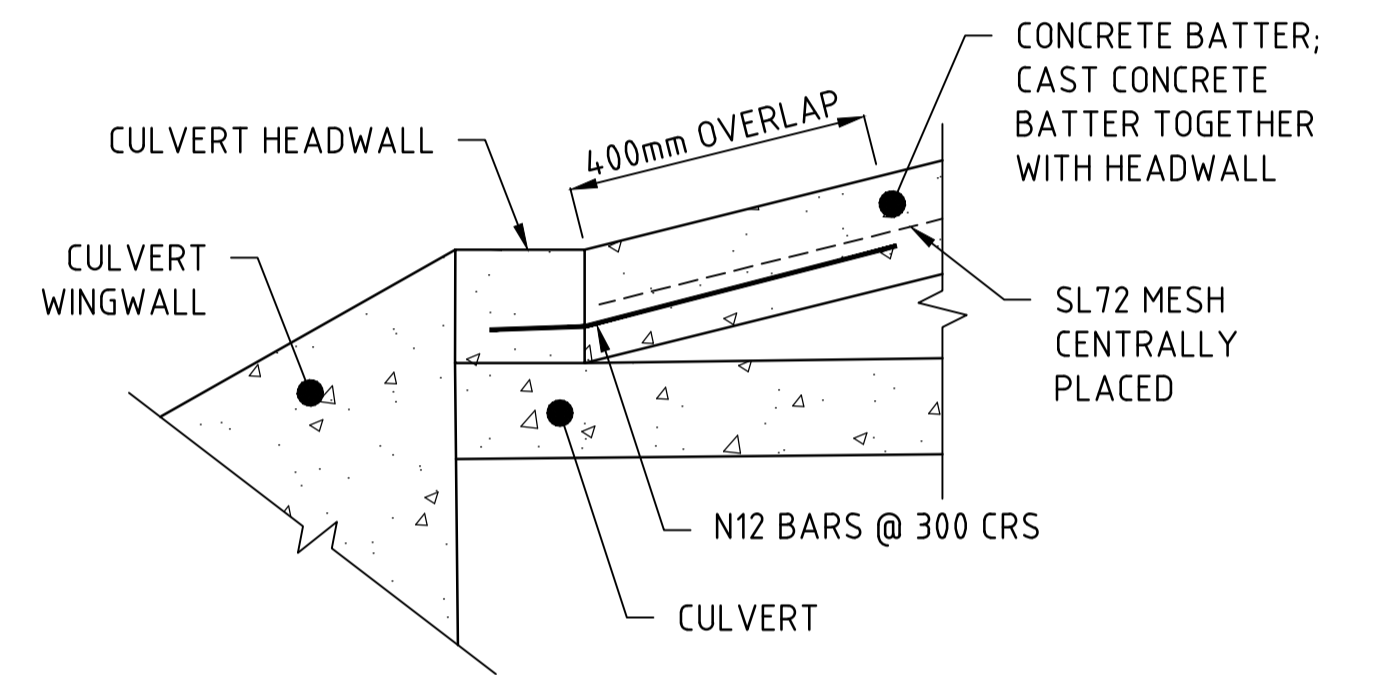
DETAIL 1
CONCRETE APRON/ BATTER PROTECTION TIE INTO ROAD WAY MARGIN
N.T.S.



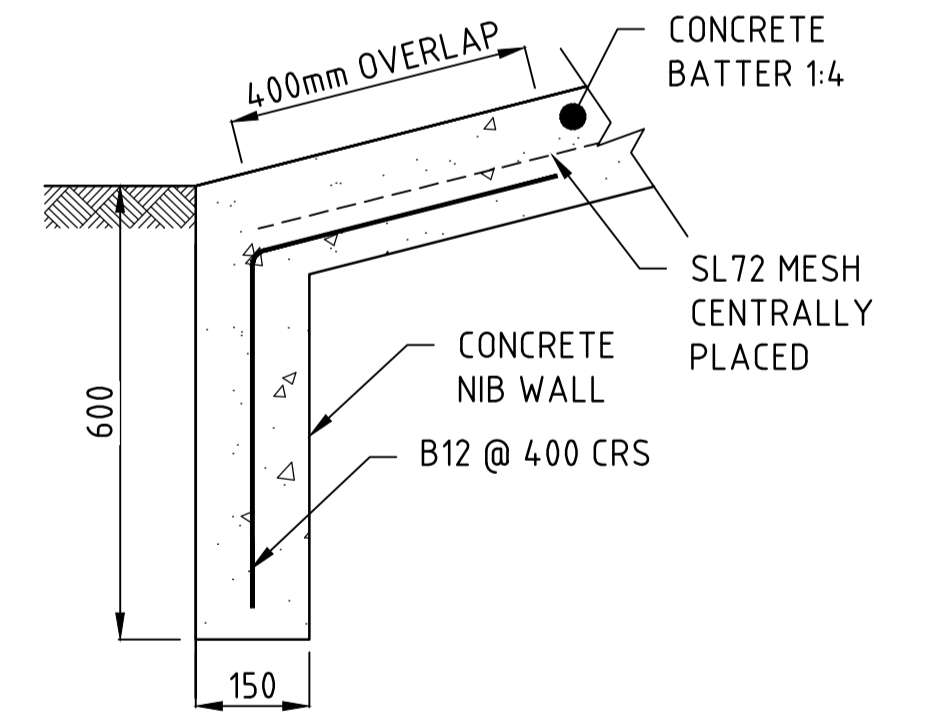
BASE SLAB EXTENSION DETAILS
NOT TO SCALE



REINFORCED CONCRETE APRON
NOT TO SCALE



DETAIL 2
CONCRETE BATTER PROTECTION TIE INTO CULVERT HEADWALL
N.T.S.



DETAIL 3
CONCRETE APRON/BATTER PROTECTION TOE DETAIL
N.T.S.

CONCRETE BATTER DETAILS

WARNING
BEWARE OF UNDERGROUND SERVICES. THE LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE ONLY AND THEIR EXACT POSITION SHOULD BE PROVEN ON SITE. NO GUARANTEE IS GIVEN THAT ALL EXISTING SERVICES ARE SHOWN.

DRAWN	A.R	CHECKED	L.Mc
DATE	DEC 2012	DATE	DEC 2012
DESIGNED	QLD	CHECKED	QLD
DATE		DATE	
DESIGN LEADER	S.HATZI	DESIGN DIRECTOR	S.JACKSON
DATE	1/09/2017	DATE	1/09/2017



STANDARD DRAWINGS
DRAINAGE
GENERAL DRAINAGE NOTES
AND BASE SLAB EXTENSION & APRON DETAILS

FILE No.	ASSET No.	SHEET No.	DRAWING No.	AMEND.	SHEET SIZE
-	-	1 OF 1	CS3100	1	A1

No.	DESCRIPTION	DATE	NAME	DEPT./COMPANY
1	NOTES & DESIGN DETAILS AMENDED	APR 2023	J. COOK	TCS / DIPL
0	ISSUED AS A STANDARD DRAWING	SEPT 2017	J.LEESON	EES/DIPL
AMENDMENTS				