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Process Step	Reference documents	Criteria/Test Method/Spec	Record for conformity/ Inspected by	Type of Record	Responsible Position	Acceptance/Comments ☐Completed ☐Not completed
Manufacture drainage products						
1. Precast concrete drainage pipes	R11.2.1 R11.2.6	• The manufacturer must implement and maintain a Quality Management System in accordance with AS/NZS ISO 9001 as a means of ensuring that the manufactured precast concrete pipes conform to the requirements of the Specification. • Precast reinforced concrete pipes must comply with AS 4058 and the requirements in R11.2.1 (I to 11)	Submit Certificate of conformity at least 7-day prior works commencement to PV	HP	Project Engineer (PE)/PV	
2. Design of “Other Drainage Products	R11.2.4.1 R11.4.7	• The design must be in accordance with the Standards shown in Table R11.1 for the structure or component • Design and development must also comply with TfNSW Q. • Supply of precast concrete members subject to traffic and/or earth pressure loading, and water retaining structures with capacity greater than 25,000 litres. • For all pits, such as junction box, gully pit, drop structure, etc, which are deeper than 600 mm, install an individual-rung ladder (step irons) in accordance with AS 1657 on one internal wall for the full depth of the structure.	At least 7 days prior to the date of delivery, submit the documents specified in Clause 2.4.1 to the PV.	HP	PV/PE	

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3. Precast Concrete Pits, Access Covers and Grates, Ladders,	R11.2.4.3 R11.2.4.4 R11.2.4.5	• If precast units are proposed for use to construct drainage pits, the base units (or any other riser units to which incoming drainage pipes will be joined) must be manufactured specifically to suit the design configuration of the particular pit with pre-formed knockouts only in the walls that require them. • Metal access covers, grates and frames must comply with AS 3996. • Ladders, including individual-rung (step-iron) ladders, must comply with AS 1657	Submit Certificate of conformity at least 7-day prior works commencement to PV		PV/PE	
4. Marking on precast units	R11.2.5	Markings on the inside of pipes must, as a minimum, include the following: (a) manufacturer's name or registered mark. (b) date of manufacture. (c) pipe load class. and may be painted on if located on the obvert of the pipe. Markings for other precast units must include, in addition to items (a) and (b) above, the following: (i) location of manufacture. (ii) maximum mass of unit in kilograms (iii) any other identification necessary to directly relate the unit to tested samples, e.g. batch number; (iv) inspection status	Visual inspection	IP	PE	
Bedding and support fill materials						

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5. Type BH Select Fill	R11.3.1.1	• a particle size distribution, determined by Test Method TfNSW T201, within the limits set out in Table 6 in AS 3725 (or Table 5.1 in AS 1597.2); and • a Plasticity Index, determined by Test Method TfNSW T109, of not more than 6.	Test report (NATA)	AP	PE	
6. Type SO Select Fill	R11.3.1.2	• a maximum particle dimension of 53 mm; and • a Plasticity Index, as determined by Test Method TfNSW T109, of between 2 and 12.	Test report (NATA)	AP	PE	
7. FILL MATERIAL FOR EMBANKMENTS IN OPEN DRAINS	R11.3.3	• a particle size distribution, determined by Test Method TfNSW T107, such that between 20% and 60% inclusive by mass of material passes the 425-micron sieve; and • a Plasticity Index, as determined by Test Method TfNSW T109, of between 15 and 30	Test report (NATA)	AP	PE	
CONSTRUCTION						
8. Setting Out	R11.4.1.1	Set out of drainage system.	PV to Visually inspect set out for drainage system and propose changes if necessary	HP	PV/PE	
9. Excavation of Open Drains	R11.4.2.1	Construction of open drains with grade less than 0.5%.	PV to consider the matter and direct contractor further before release HP	HP	PV/PE	

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10. EXCAVATION FOR DRAINAGE STRUCTURES	R11.4.3	Excavation for pipe installation and other drainage structures (Pits)	Notify PV not later than 24 hours but not earlier than 5 working days,	WP	PE	
11. Inadequate Foundation Material	R11.4.3.3	• Replacement of inadequate foundation material • Notification that inadequate foundation material has been excavated to the extent directed.	Notify PV to inspect the excavation and may direct further excavation	HP	PE	
12. Install Pipe Support Type and concrete pipes	R11.4.4.1 R11.4.4.2	• Provide pipe support of Type HS3 complying with AS 3725 and Standard Drawing R0240 - 01. • Handle, store and install the concrete pipes in accordance with the manufacturer's recommended practice.	Visual inspection	IP	PE	
13. Anchor Blocks, Sealing of Lifting Holes, Joints,	R11.4.4.3 R11.4.4.4	• Provide anchor blocks at a maximum spacing of 3 m and at bends or junctions for all stormwater pipes laid on a grade exceeding 20% and where shown on the Drawings. • Seal all lifting holes in the pipes, and all flush or butt joints used to extend existing pipes, to prevent the ingress of materials.	Visual inspection	IP	PE	

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14. Subsurface Drainage Pipe at Discharge End of Pipes	R11.4.4.5	• Install a subsurface drainage pipe, complying with Specification TfNSW 3552, at the discharge end of pipes at gully pits, junction boxes and headwalls unless the Drawings specifically direct the subsurface drainage be omitted. • Unless shown otherwise on the Drawings, the subsurface drainage pipe must be a 3 m length of 100 mm diameter subsoil pipe laid beside, and 100 mm above the invert level of the drainage pipe discharging through the wall of the pit or headwall.	Visual inspection	IP	PE	
CONSTRUCTION OF "OTHER DRAINAGE STRUCTURES" include gully pits, junction boxes, drop structures, inlet and outlet structures, and energy dissipators.						
15. Foundations for "Other Drainage Structures	R11.4.7.2	For precast pits, install the precast pit on top of a minimum 50 mm thick Class 2 DGB bedding material, complying with Specification TfNSW 3051, or controlled low strength flowable fill material complying with Appendix A in AS 3725, to support the precast pit uniformly	Notify PV for inspection	WP	PV/PE	
16. Precast Headwalls	R11.4.7.3	For precast headwalls for pipes of 300 mm to 1200 mm diameter, provide a curtain wall at the outer edge of the apron in accordance with the TfNSW (RMS) Standard Drawings. Do not use precast headwalls for pipes greater than 1200 mm diameter unless approved otherwise by the Principal	Visual inspection	IP	PE	
BACKFILLING, COMPACTION AND DISPOSAL OF SURPLUS EXCAVATED MATERIAL						

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17. Backfilling	R11.4.9.1	• Backfill the Side and Overlay zones of box culverts with Type SO Select Fill. Refer to Figure 1.1 of AS 1597.2 for schematic details of these zones. • For pipes and box culverts located within a rock fill embankment, provide a minimum thickness of 1000 mm of Type SO Select Fill within the Side and Overlay zones, separated from the surrounding rock fill by a geotextile complying with Specification TfNSW R63. • Unless otherwise specified or directed by the Principal, place fill material for the foundations, bedding, support and general backfill in layers not exceeding 150 mm compacted thickness. Compact the fill material to the requirements of Clause 4.9.2 of this Specification. • Do not carry out backfilling against cast-in-place box culverts until the compressive strength of the concrete has reached at least 75% of the specified 28 day strength, and against other concrete drainage structures until at least 7 days has elapsed after placing the last concrete in the structure, unless authorised otherwise by the Principal. • When backfilling against box culverts, the difference in level of the backfill on opposing sides of the culvert must not exceed 500 mm	Visual inspection	IP	PE	

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18. Compaction	R11.4.9.2	• Compact the foundations and fill material placed to achieve the minimum characteristic value of relative compaction for the particular type of material, as shown in Table R11.2. • Select Fill in the Side and Overlay zones of box culverts (compaction 98%) • Backfill material within the Selected Material Zone of the adjoining earthworks (refer Specification TfNSW R44) (102%) • All other embankment (compaction is 95%)	NATA report	AP	PE	
19. Construction traffic	R11.4.10	• Moving heavy construction plant or vehicles over pipe or box culvert structures. • Where you propose to move heavy construction plant and vehicles over pipe or box culvert structures, design and provide protective measures for each crossing in accordance with Specification TfNSW G2.	Notify PV	HP	PV/PE	

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20. Survey check and tolerances	R11.5.1	• Concrete pipes, box culverts, headwalls and wingwalls, energy dissipators, inlet and outlet structures (location within 200 mm of the plan position shown on the Drawings) (invert level within 20 mm of the design level at any point) • Gully pits and junction boxes (location Within 200 mm longitudinally and 20 mm laterally of the plan position, with reference to the control line for the road shown on the Drawings) (invert level Within 20 mm of the invert level shown on the Drawings) • Precast concrete box culvert units (On the internal faces of the walls and roof, no step between adjacent units must exceed 20 mm. Steps between 10 mm and 20 mm must be smoothed to a standard of durability equal to the rest of the culvert) • Open drains (location as per R44) (level Within 50 mm of the design level at any point provided that there is a continuous downgrade in the direction of flow not less than 0.5% at any point) (Waterway area Not less than 95% of the design cross sectional area at any point)				

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21. Inspection and CCTV test	R11.5.2	• Carry out closed-circuit television (CCTV) inspections of all pipe and box culverts with dimensions that restrict human access, to verify that the works have been constructed within the specified tolerances • for visible signs of defects, at the following times:(a) on completion of the subject drainage structure and prior to commencement of the overlying pavement, and (b) no more than 14 days prior to Completion	Submit report results to PV	AP	PE	

REVIEW BY PROJECT MANAGER

Have tests passed?	YES/NO	Test Report No: _____	
Is all testing as per specified frequency?	YES/NO		
Are earthworks within location and level tolerances?	YES/NO		
Have all RMS Hold Points been released?	YES/NO		
Any nonconformances?	YES/NO	Sign: _____	For Closed Out: YES/NO
All work has been satisfactorily completed.	YES/NO		

_____ Project Manager _____ Date

Prepared By: **Mohammed Almalome** **Approved By:** _____ **Date Approved** _____

HP: Hold Point
AP: Approval Point
IP: Inspection point
TP: Test Point

CLEARY BROS