

CAPRICORN MUNICIPAL DEVELOPMENT GUIDELINES

STORMWATER DRAINAGE GENERAL

C220

CONSTRUCTION SPECIFICATION

TABLE OF CONTENTS

CLAUSE	CONTENTS	PAGE
GENERAL		2
C220.01	SCOPE	2
C220.02	REFERENCE DOCUMENTS	2
CONSTRUCTION		2
C220.03	TEMPORARY DRAINAGE DURING CONSTRUCTION	2
C220.04	SITING OF CULVERTS	3
C220.05	EXCAVATION	3
C220.06	BACKFILLING	3
C220.07	COMPACTION	4
C220.08	CONCRETE WORK	4
C220.09	SPRAYED CONCRETE	4
LIMITS AND TOLERANCES		5
C220.10	SUMMARY OF LIMITS AND TOLERANCES	5
ANNEXURE		6
C220A	QUALITY CONTROL AND TESTING - STORMWATER DRAINAGE	6

Keeping the Capricorn Municipal Development Guidelines up-to-date

The Capricorn Municipal Development Guidelines are living documents which reflect progress of municipal works in the Capricorn Region. To maintain a high level of currency that reflects the current municipal environment, all guidelines are periodically reviewed with new editions published and the possibility of some editions to be removed. Between the publishing of these editions, amendments may be issued. It is important that readers assure themselves they are using current guideline, which should include any amendments which may have been published since the guideline was printed. A guideline will be deemed current at the date of development approval for construction works.

GENERAL

C220.01 SCOPE

1. The work to be executed under this Specification consists of:
 - (a) preparation for stormwater drainage construction,
 - (b) temporary drainage during construction,
 - (c) siting of pipes, pipe arches and box culverts.
 - (d) all activities and quality requirements associated with excavation and backfilling,
 - (e) all concrete work associated with stormwater drainage.

2. Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in Annexure C220A.

Quality

C220.02 REFERENCE DOCUMENTS

1. Documents referenced in this specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated.

**Documents
Standards Test
Methods**

(a) Other Council Specifications

- C211 - Control of Erosion and Sedimentation
- C213 - Earthworks
- C271 - Minor Concrete Works

(b) Australian Standards

- AS 1289.5.4.1 - Compaction control test - Dry density ratio, moisture variation and moisture ratio
- AS 1289.5.7.1 - Compaction control test (Rapid Method)

CONSTRUCTION

C220.03 TEMPORARY DRAINAGE DURING CONSTRUCTION

1. All drainage works carried out by the Contractor shall comply with the Specification for CONTROL OF EROSION AND SEDIMENTATION C211.

2. The Contractor shall make adequate provision for runoff flows at drainage works under construction to avoid damage or nuisance due to scour, sedimentation, soil erosion, flooding, diversion of flow, damming, undermining, seepage, slumping or other adverse effects to the Works or surrounding areas and structures as a result of the Contractor's activities.

3. The Contractor shall not implement any proposals to dam up or divert existing watercourses (either temporarily or permanently) without the prior approval of Local Government by way of approved Drawings or written instruction.

Control

**Contractor's
Responsibility**

Limitations

4. The Contractor's material and equipment shall be located clear of watercourses or secured so that they will not cause danger or damage in the event of large runoff flows. **Location of Equipment**

C220.04 SITING OF CULVERTS

1. Before commencing construction of any culvert, the Contractor shall set out on site the culvert inlet and outlet positions to the location and levels shown on the Drawings, and shall present this set-out for inspection by Local Government. **Set-out**
2. The inlet or outlet locations or designed levels or the culvert length are to be considered as suitable for actual site conditions after consultation with the design engineer and Local Government. **Amendments to planned work**

C220.05 EXCAVATION

1. Before undertaking stormwater drainage excavation, topsoil shall be removed in accordance with the Specification for EARTHWORKS C213. **Topsoil**
2. In undertaking trench excavation, the Contractor shall provide any shoring, sheet piling or other stabilisation of the sides necessary to comply with statutory requirements. **Safety**
3. Where public utilities exist in the vicinity of stormwater drainage works the Contractor shall obtain the approval of the relevant authority/corporation to the method of excavation before commencing excavation. **Approval by Public Utility Authorities/ Corporation**
4. Excavation by blasting, if permitted by the Department of Natural Resources and Water and Local Government, shall comply with the requirements concerning blasting operations in the Specification for EARTHWORKS C213. **Blasting Operation**
5. Trench or foundation excavation for stormwater drainage works shall be undertaken to the planned level for the bottom of the specified bedding or foundation level. All loose material shall be removed by the Contractor. **Excavation Level**
6. Any material at the bottom of the trench or at foundation level which the Superintendent deems to be unsuitable shall be removed and disposed in accordance with the Specification for EARTHWORKS C213 by the Contractor and replaced with backfill material in accordance with the requirements of this Specification and the Specifications for particular culvert types. The bottom of the excavated trench or foundation, after any unsuitable material has been removed and replaced, shall be parallel with the specified level and slope of the culvert. **Unsuitable Material**
7. The excavated material shall be used in the construction of embankments backfilling or spoiled in accordance with the Specification for EARTHWORKS C213. **Spoil**

C220.06 BACKFILLING

1. Backfilling shall be carried out in accordance with the requirements of the relevant culverts or drainage structures Specifications and to the compaction requirements specified below.

C220.07 COMPACTION

1. Foundations, bedding (other than for pipe drainage) and backfilling shall be compacted to the following requirements when tested in accordance with AS 1289.5.4.1 for standard compactive effort.

	Relative Compaction
Foundations or trench base to a depth of 150mm below foundation levels	95%
Material replacing unsuitable material	95%
Bedding material (other than for pipe drainage)	95%
Selected backfill and ordinary backfill material	
• below 1.5m of finished surface	95%
• within 1.5m of finished surface	100%
Backfill material within the selected material zone	100%

Compaction requirements adjacent to pipe drainage for concrete, steel or UPVC pipes are set out in the specification for PIPE DRAINAGE C221.

2. All material shall be compacted in layers not exceeding a 150mm compacted thickness. Each layer shall be compacted to the relative compaction specified before the next layer is commenced.

Layers

3. At the time of compaction, the moisture content of the material shall be adjusted so as to permit the specified compaction to be attained at a moisture content which, unless otherwise approved, is neither less than 60 per cent nor more than 95 per cent of the apparent optimum moisture content, as determined by AS 1289.5.7.1 (standard compaction).

**Moisture
Content**

4. When compacting adjacent to culverts or drainage structures, the Contractor shall adopt compaction methods which will not cause damage or misalignment to any culvert or drainage structure. Any damage caused shall be rectified, and all costs of such rectification shall be borne by the Contractor.

**Precautions
Contractor's
Cost**

C220.08 CONCRETE WORK

1. For all concrete work, the Contractor shall comply with the Specification for MINOR CONCRETE WORKS C271 in relation to the supply and placement of normal class concrete and steel reinforcement, formwork, tolerances, construction joints, curing and protection.

Specification

C220.09 SPRAYED CONCRETE

1. If sprayed concrete has been specified, or shown on the Drawings, it shall comply with requirements in the Specification for MINOR CONCRETE WORKS C271.

Standard

LIMITS AND TOLERANCES

C220.10 SUMMARY OF LIMITS AND TOLERANCES

1. The limits and tolerances applicable to the various clauses in this Specification are summarised in Table 220.10.1 below:

Table 220.10.1 - Summary of Limits and Tolerances

Item	Activity	Limits/Tolerances	Spec Clause
1.	Relative Compaction (Standard)		
	(a) Foundations or trench base to a depth of 150mm below foundation levels	95%	C220.07
	(b) Material replacing unsuitable material	95%	C220.07
	(c) Bedding material	95%	C220.07
	(d) Selected backfill and ordinary backfill material:		C220.07
	• below 1.5m of finished surface	95%	
	• within 1.5m of finished surface	100%	
	(e) Backfill material within the selected material zone	100%	C220.07
2.	Backfill		
	(a) Layers	≤ 150mm	C220.07
	(b) Moisture Content	>60%, <95%	C220.07

ANNEXURE

**C220A QUALITY CONTROL AND TESTING - STORMWATER DRAINAGE
(Specifications C220, C221, C222, C223, C224)**

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
MANDATORY TESTING				
Kerb and Gutter	Vertical and horizontal Geometry Visual inspection may be required		1 per 10m 1 per 25m for flat sites	Survey and 3m Straight Edge Water Test for 0.5% grade or below
Concrete	Compressive Strength Refer Specification for Minor Concrete Works	15m ³	1 pair per 15m ³	AS1012.4 AS1912,8 AS1012.14
AUDIT TESTING – IF ORDERED BY COUNCIL				
Supply of Precast Units	Precast Quality - Suppliers documentary evidence and certification	1 batch	1 per type/size/ class per batch	
Siting and Excavation	Geometry	1 drainage line/structure	1 per drainage line/structure	Survey
Foundation	Compaction	1 drainage line/structure	1 per 20 lin m *	AS1289.5.4.1
Material surrounding Steel Structures	Material Quality - pH/Electrical Resistivity	1 drainage line/structure	1 per material type	AS1289.4.3.1 AS1289.4.4.1
Bedding	Material Quality - Particle Size Distribution	1 contract	1 per 200m ³ *	AS1141.11
	Compaction/Moisture Content	1 drainage line/structure	1 per layer, per 20 lin m	AS1289.5.7.1, AS1289.5.4.1
Concrete Bedding or Lining	Geometry		1 Cross Section per 25m	Survey and 3m Straight Edge
Installation of Precast Units	Geometry	1 drainage line/structure	1 per drainage line/structure	Survey
Selected Backfill	Material Quality - Maximum Particle Size	1 contract	1 per 100m ³ *	
	- Plasticity Index	1 contract	1 per 100m ³ *	AS1289.3.3.1
	Compaction/Moisture Content	1 drainage line/structure	1 per 2 layers per 50m ²	AS1289.5.7.1, AS1289.5.4.1

ACTIVITY	KEY QUALITY VERIFICATION REQUIREMENTS	MAXIMUM LOT SIZE	MINIMUM TEST FREQUENCY	TEST METHOD
Rock Fill for Gabions/ Wire Mattresses	Material Quality:			
	- Wet Strength	1 contract	1 per contract	AS1141.22
	- Wet/Dry Strength Variation	1 contract	1 per contract	AS1141.22

Note: or part thereof, per lot.