

CAPRICORN MUNICIPAL DEVELOPMENT GUIDELINES

STORMWATER DRAINAGE GENERAL

C220

CONSTRUCTION SPECIFICATION

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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

C220.01.01 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.

C220.01.02 Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in Annexure C220A.

Quality

C220.01.03 The following order of priority for interpretation of documents will apply: (Please note that reference to a Guideline or Standard, is reference to the latest version of the relevant document, unless specifically a version number is specifically stated)

- (a) CMDG D5 Stormwater Drainage Design
- (b) CMDG C220 Stormwater Drainage Construction Specification
- (c) CMDG Standard Drawings
- (d) Australian Standards

**Order of
Priority**

C220.02 REFERENCE DOCUMENTS

C220.02.01 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) CMDG Specifications

- C211 - Control of Erosion and Sedimentation
- C213 - Earthworks
- C221 - Pipe Drainage
- 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 PREPARATION FOR STORMWATER DRAINAGE CONSTRUCTION

- | | | |
|------------|---|---|
| C220.03.01 | It shall be the Contractors responsibility to contact all public utility authorities to ascertain the location of services prior to commencing the work under the contract. In carrying out the Works the Contractor shall be responsible for all damage caused to any gas or water main, Telstra, or electric power cable or conduit or any other public utility. | <i>Contractor's Responsibility</i> |
| C220.03.02 | Before undertaking any work which may interfere with any drain, public utility, railway, road, watercourse or tidal waters or with any structure, the Contractor shall give the required notice in writing to the Department or Authority concerned. The Contractor shall not commence the work until it has received the necessary permits and it shall carry out the work in accordance with the conditions set out in these permits. | <i>Approval by Public Utility Authorities/ Corporation</i> |
| C220.03.03 | If the Contractor damages any existing services it shall arrange for the relevant public utility authority to make good such damage and the cost thereof shall be borne by the Contractor. | <i>Damage</i> |
| C220.03.04 | Where the design of the Works requires alterations to existing services and such alterations are to be organised by the Contractor then the Contractor shall liaise and arrange with the relevant Department or Authority to effect such alterations and the Contractor shall pay all costs, fees, and charges of the Department or Authority. | |

C220.04 TEMPORARY DRAINAGE DURING CONSTRUCTION

- | | | |
|------------|--|---|
| C220.04.01 | All drainage works carried out by the Contractor shall comply with the Specification for CONTROL OF EROSION AND SEDIMENTATION C211. | <i>Control</i> |
| C220.04.02 | 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. | <i>Contractor's Responsibility</i> |
| C220.04.03 | 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. | <i>Limitations</i> |
| C220.04.04 | 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. | <i>Location of Equipment</i> |

C220.05 SITING OF PIPES, PIPE ARCHES AND BOX CULVERTS

- C220.05.01 Before commencing construction of any pipes, pipe arches and box culverts, the Contractor shall set out on site the pipes, pipe arches and box culverts 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**
- C220.05.02 The inlet or outlet locations or designed levels or the pipes, pipe arches and box culverts length are to be considered as suitable for actual site conditions after consultation with the design engineer and Local Government. **Amendments to planned work**

C220.06 EXCAVATION

- C220.06.01 Before undertaking stormwater drainage excavation, topsoil shall be removed in accordance with the Specification for EARTHWORKS C213. **Topsoil**
- C220.06.02 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**
- C220.06.03 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**
- C220.06.04 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**
- C220.06.05 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**
- C220.06.06 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**
- C220.06.07 The excavated material shall be used in the construction of embankments backfilling or spoiled in accordance with the Specification for EARTHWORKS C213. **Spoil**

C220.07 BACKFILLING

C220.07.01 Backfilling shall be carried out in accordance with the requirements of the relevant culverts or drainage structures Specifications, in accordance with the specification for PIPE DRAINAGE C221 and to the compaction requirements specified below.

C220.08 COMPACTION

C220.08.01 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 PVC pipes are set out in the specification for PIPE DRAINAGE C221.

C220.08.02 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**

C220.08.03 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**

C220.08.04 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**

C220.09 CONCRETE WORK

C220.09.01 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**

C220.10 SPRAYED CONCRETE

C220.10.01 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

C220.11 SUMMARY OF LIMITS AND TOLERANCES

C220.11.01 The limits and tolerances applicable to the various clauses in this Specification are summarised in **Table C220. 11.1** below:

Table C220. 11.1 - 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% | C220.08 |
| | (b) Material replacing unsuitable material | 95% | C220.08 |
| | (c) Bedding material | 95% | C220.08 |
| | (d) Selected backfill and ordinary backfill material: | | C220.08 |
| | • below 1.5m of finished surface | 95% | |
| | • within 1.5m of finished surface | 100% | |
| | (e) Backfill material within the selected material zone | 100% | C220.08 |
| 2. | Backfill | | |
| | (a) Layers | ≤ 150mm | C220.08 |
| | (b) Moisture Content | >60%, <95% | C220.08 |

ANNEXURE C220A

C220.12 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 | AS 1012.4 AS 1912,8 AS 1012.14 |
| 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 * | AS 1289.5.4.1 |
| Material surrounding Steel Structures | Material Quality - pH/Electrical Resistivity | 1 drainage line/structure | 1 per material type | AS 1289.4.3.1 AS 1289.4.4.1 |
| Bedding | Material Quality - Particle Size Distribution | 1 contract | 1 per 200m ³ * | AS 1141.11 |
| | Compaction/Moisture Content | 1 drainage line/structure | 1 per layer, per 20 lin m | AS 1289.5.7.1, AS 1289.5.4.1 |
| 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 * | AS 1289.3.3.1 |
| | Compaction/Moisture Content | 1 drainage line/structure | 1 per 2 layers per 50m ² | AS 1289.5.7.1, AS 1289.5.4.1 |
| Rock Fill for Gabions/ | Material Quality: | | | |

STORMWATER DRAINAGE

| ACTIVITY | KEY QUALITY VERIFICATION REQUIREMENTS | MAXIMUM LOT SIZE | MINIMUM TEST FREQUENCY | TEST METHOD |
|-----------------|---------------------------------------|------------------|------------------------|-------------|
| Wire Mattresses | - Wet Strength | 1 contract | 1 per contract | AS 1141.22 |
| | - Wet/Dry Strength Variation | 1 contract | 1 per contract | AS 1141.22 |

Note: or part thereof, per lot.