

TWEED SHIRE COUNCIL

**DEVELOPMENT
CONSTRUCTION
SPECIFICATION**

C223

DRAINAGE STRUCTURES

VERSION 1.2

SPECIFICATION C223 – DRAINAGE STRUCTURES

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DRAINAGE STRUCTURES

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DEVELOPMENT CONSTRUCTION SPECIFICATION C223

DRAINAGE STRUCTURES

GENERAL

C223.01 SCOPE

1. This Specification is for the construction of drainage structures and shall be read in conjunction with the Specification for STORMWATER DRAINAGE - GENERAL and other drainage Specifications as applicable:

C221 - Pipe Drainage
C222 - Precast Box Culverts
C224 - Open Drains, including Kerb and Gutter

Associated Specifications
2. The work to be executed under this Specification consists of the construction of headwalls, wingwalls, pits, gully pits, inspection pits, junction boxes/pits, drop structures, inlet and outlet structures, energy dissipaters, batter drains and other supplementary structures as shown on the design plans.

Extent of Work
3. Requirements for quality control and testing, including maximum lot sizes and minimum test frequencies, are cited in the Specification Part for Quality Requirements.

Quality

C223.02 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) **Council Specifications**
- C213 - Earthworks
C220 - Stormwater Drainage - General
C221 - Pipe Drainage
C222 - Precast Box Culverts
C224 -- Open Drains, including Kerb and Gutter
C271 Minor Concrete Works
- (b) **Australian Standards**
- AS 3996 - Access Covers and Grates
- (c) **Standard Drawings that apply to this Section:**
- S.D.101 - S.D.110 Stormwater Series

CONSTRUCTION**C223.03 GENERAL**

1. Drainage structures shall be constructed in concrete and in accordance with the Specification for MINOR CONCRETE WORKS. **Concrete Work**
2. All structures shall be constructed as soon as practicable and shall be completed not later than 28 days after the construction of the associated culverts, unless otherwise approved by the Certifying Engineer. **Time for Completion**
3. Any drainage structure placed within the maintenance path of a device requiring servicing by heavy vehicles, (i.e. Pollution Control Devices), must be installed with Heavy Duty grates or manhole covers. **Grates or Manhole Covers**

C223.04 ALIGNMENT

1. Unless otherwise shown on the design plans, headwalls and pits shall be constructed parallel to the road centreline and wingwalls at 135° to the headwall.
2. Where the culvert is laid skew to the road, the wingwalls and headwalls shall be splayed so that the front edge of the wing bisects the angle between the centreline of the culvert and the headwall. **Skew Angle**
3. Energy dissipaters shall be constructed in accordance with the design plans and with centreline on the axis of the culvert. **Energy Dissipaters**

C223.05 HEADWALLS AND WINGWALLS

1. The wingwalls shall be constructed to retain the batters effectively. Where the design plans do not satisfy this requirement, the Certifying Engineer shall be notified before the headwalls and wingwalls are constructed. The Certifying Engineer shall direct the Subdivider as to the action to be taken. **Batter Retention**
2. Where rock is encountered at the bottom of excavations for wingwalls and headwalls, and after approval is given by the Certifying Engineer, the depth of cut-off walls in uniform rock over the full width of the foundations may be reduced to less than that shown in the design plans, but must be not less than 150mm into sound rock. **Rock Foundations**

C223.06 PITS

1. All new pits, including access covers, gully grates and frames complying with AS 3996, shall be constructed to the details shown on the design plans. Modification of existing pits is only to be carried out if such is shown on the design plans. **Modification**
2. Where the full depth of the excavation is in sound rock, and the Certifying Engineer approves, part of the concrete lining of gully pits and sumps may be omitted, provided that a neatly formed pit of the required dimensions is constructed. In all such cases the wall of the pit adjacent to and parallel to the road shall be constructed of concrete. **Full Depth Rock Excavation**
3. Step irons shall be installed in accordance with the design plans. **Step Irons**

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| 4. | Step irons shall be either fixed firmly in the formwork prior to pouring the concrete for the pit walls or by using block-out formers to make recesses in the concrete to receive the arms of the step irons, or alternatively installed at a later date by drilling the pit wall. Holes may only be drilled using a rotary masonry bit or similar. Percussion tools shall not be used to form the hole for the step iron. | <i>Fixing Methods</i> |
| 5. | Where the step irons are installed in recesses or drill holes after the concrete wall is poured, the step irons shall be fixed in position by using an epoxy resin in accordance with the step iron and epoxy resin manufacturers' instructions and specifications. The Subdivider shall ensure that no movement of the step irons occurs until the epoxy resin has reached the specified strength. | <i>Epoxy Fixing</i> |
| 6. | Inlet and outlet pipes shall be integrally cast into the pit at the time of pouring the concrete for the pit walls. | <i>Casting Pipes</i> |
| 7. | A subsoil drain shall be installed into the pit or headwall in accordance with the general requirements in the Specification for PIPE DRAINAGE. | <i>Subsoil Drain</i> |

C223.07 PRECAST UNITS

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| 1. | Where precast units including kerb and inlet lintels are provided in the design, they shall be handled and installed in accordance with the manufacturer's instructions. | <i>Manufacturer's Instructions</i> |
| 2. | If the Subdivider proposes to use precast units, detailed design plans and complete details of installation procedures shall be submitted for the approval of the Certifying Engineer. | <i>Subdivider's Responsibility</i> |
| 3. | Unless otherwise approved by the Certifying Engineer, precast units shall not be delivered to the site before satisfactory documentary evidence has been submitted to the Certifying Engineer that quality tests have been carried out. | <i>Delivery</i> |

C223.08 JOINTING

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| 1. | Where drainage structures abut concrete paving, kerb and gutter or other concrete structures, a 10mm wide joint shall be provided between the structure and paving, or kerb and gutter or other concrete structures. The joint shall consist of preformed jointing material of bituminous fibreboard. | <i>Preformed Jointing Material</i> |
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C223.09 MASS CONCRETE BEDDING

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| 1. | Mass concrete bedding for reinforced concrete bases shall not be placed on earth or rock foundations until the foundations have been inspected and approved by the Certifying Engineer. Following such approval, the surface of the foundation shall be dampened and a layer of concrete not less than 50mm thick shall be placed over the excavated surface and shall be finished to a smooth even surface. | <i>Mass Concrete Base Foundation Inspection</i> |
| 2. | Unreinforced concrete bases may be cast on earth or rock foundations without the mass concrete bedding. | <i>Unreinforced Concrete Base</i> |

C223.10 BACKFILL

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| 1. | Backfilling shall not commence until the compressive strength of concrete has reached at least 15MPa unless otherwise approved by the Certifying Engineer. | <i>Commencement</i> |
| 2. | Selected backfill shall be placed against the full height of the vertical faces of structures for a horizontal distance equal to one-third the height of the structure. | <i>Selected Backfill</i> |

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| 3. | Selected backfill shall consist of a granular material in accordance with the requirements in the Specification for EARTHWORKS. | <i>Composition</i> |
| 4. | Special care shall be exercised to prevent wedge action against vertical surfaces during the backfilling. Where the sides of the excavation are steeper than 4 horizontally to 1 vertically they shall be cut in the form of successive horizontal terraces at least 600mm in width, as the backfill is placed. | <i>Horizontal
Terraces</i> |
| 5. | Backfill on both sides of the structure shall be carried up to level alternately in layers so as to avoid wedge action or excessive horizontal forces. Backfilling and compaction shall commence at the wall. Compaction shall be in accordance with the Specification for STORMWATER DRAINAGE - GENERAL. | <i>Procedure</i> |

SPECIAL REQUIREMENTS

C223.11 RESERVED

C223.12 RESERVED

C223.13 RESERVED

LIMITS AND TOLERANCES

C223.14 SUMMARY OF LIMITS AND TOLERANCES

1. The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C223.1 below:

Item	Activity	Limits/Tolerances	Spec Clause
1.	Cut-off Walls Depth into sound rock	>150mm	C223.05
2.	Mass Concrete Bedding	>50mm	C223.09

Table C223.1 - Summary of Limits and Tolerances