## SPECIFICATION C223 – DRAINAGE STRUCTURES

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CITATION
This document is named "Tweed Shire Council, Development Construction Specification C223 - Drainage Structures".

ORIGIN OF DOCUMENT, COPYRIGHT
This document was originally based on AUS-SPEC - Development Construction Specification C223 - Drainage Structures, April 2000 (Copyright SWR-TM). Substantial parts of the original AUS-SPEC document have been deleted and replaced in the production of this Tweed Shire Council Development Specification. The parts of the AUS-SPEC document that remain are still subject to the original copyright.

VERSIONS, C223 DRAINAGE STRUCTURES

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<tr>
<th>VERSION</th>
<th>AMENDMENT DETAILS</th>
<th>CLAUSES AMENDED</th>
<th>DATE ISSUED</th>
<th>Authorised by</th>
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<tr>
<td>1.1</td>
<td>Original Version</td>
<td></td>
<td>1 July 2003</td>
<td>by the Director of Engineering</td>
</tr>
<tr>
<td>1.2</td>
<td>Replace all references to SWAC with &quot;Certifying Engineer&quot;</td>
<td>Various</td>
<td>5 February 2016</td>
<td>Services</td>
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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

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.

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

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.

   (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.  
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.  
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.

Concrete Work  
Time for Completion  
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

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

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

Full Depth Rock Excavation

Step Irons

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.

3. Step irons shall be installed in accordance with the design plans.
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.

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.

6. Inlet and outlet pipes shall be integrally cast into the pit at the time of pouring the concrete for the pit walls.

7. A subsoil drain shall be installed into the pit or headwall in accordance with the general requirements in the Specification for PIPE DRAINAGE.

C223.07 PRECAST UNITS

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.

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.

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.

C223.08 JOINTING

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.

C223.09 MASS CONCRETE BEDDING

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.

2. Unreinforced concrete bases may be cast on earth or rock foundations without the mass concrete bedding.

C223.10 BACKFILL

1. Backfilling shall not commence until the compressive strength of concrete has reached at least 15MPa unless otherwise approved by the Certifying Engineer.

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.
3. Selected backfill shall consist of a granular material in accordance with the requirements in the Specification for EARTHWORKS.

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.

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.

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:

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<th>Activity</th>
<th>Limits/Tolerances</th>
<th>Spec Clause</th>
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<tr>
<td>1.</td>
<td>Cut-off Walls</td>
<td>Depth into sound rock</td>
<td>&gt;150mm</td>
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<tr>
<td>2.</td>
<td>Mass Concrete Bedding</td>
<td></td>
<td>&gt;50mm</td>
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Table C223.1 - Summary of Limits and Tolerances