

DEVELOPMENT  
CONSTRUCTION  
SPECIFICATION

C223

**DRAINAGE STRUCTURES**



### Amendment Record for this Specification Part

This Specification is Council's edition of the AUS-SPEC generic specification part and includes Council's primary amendments.

Details are provided below outlining the clauses amended from the Council edition of this AUS-SPEC Specification Part. The clause numbering and context of each clause are preserved. New clauses are added towards the rear of the specification part as special requirements clauses. Project specific additional script is shown in the specification as italic font.

The amendment code indicated below is 'A' for additional script 'M' for modification to script and 'O' for omission of script. An additional code 'P' is included when the amendment is project specific.

Amendment Sequence No.	Key Topic addressed in amendment	Clause No.	Amendment Code	Author Initials	Amendment Date
<i>Original</i>	<i>Northern Rivers - Local Government Version</i>	<i>All</i>	<i>Original Edition</i>	<i>LCC</i>	<i>January 1999</i>
1	All modifications up to and including Release 12	various	AMOP	SPM	June 2003
2	Composition of Backfill	C223.10.3	M	SPM	September 03
3	Skew angled culvert	223.04	M	SPM	March 04
4	Step Irons	223.06	M	SPM	March 04
5	Jointing, Headwalls & Wingwalls	C223.08, C223.05	A	MK	March 18



## SPECIFICATION C223 : DRAINAGE STRUCTURES

### GENERAL

#### C223.01 SCOPE

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

***Associated Specifications***

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 dissipators, batter drains and other supplementary structures as shown on the Drawings.

***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	-	Metal access covers, road grates and frames
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### 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 Superintendent.

***Time for Completion***

**C223.04 ALIGNMENT**

1. Unless otherwise shown on the Drawings, headwalls and pits shall be constructed parallel to the road centreline and wingwalls in accordance with council's standard drawings.

2. Where the culvert is laid skew to the road, the wingwalls shall be extended beyond the headwalls to a sufficient distance to ensure protection of bank from scour and erosion.

***Skew Angle***

3. Energy dissipators shall be constructed in accordance with the Drawings and with centreline on the axis of the culvert.

***Energy Dissipators*****C223.05 HEADWALLS AND WINGWALLS**

1. The wingwalls shall be constructed to retain the batters effectively. Where the dimensioned drawings do not satisfy this requirement the Superintendent shall be notified before the headwalls and wingwalls are constructed. The Superintendent shall direct the Contractor 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 superintendent, 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 Drawings, but must be not less than 150mm into sound rock.

***Rock Foundations***

3. Precast concrete is the preferred construction material for headwalls. Alternative materials may be used subject to approval from Council.

**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 Drawings. Modification of existing pits is only to be carried out if such is shown on the Drawings.

***Modification***

2. Where the full depth of the excavation is in sound rock, and the Superintendent 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. Where pits and drop structures are deeper than 1.2m, the contractor shall install suitable galvanised step irons at a vertical spacing of 300mm in one wall of the pit, for the full depth of the pit.

***Step Irons***

4. Step irons shall be either fixed firmly in the formwork prior to pouring the concrete for the pit walls or by using blockout 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.

***Fixing Methods***

5. Where the step irons are installed in recesses or drillholes 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 Contractor shall ensure that no movement of the step iron occurs until the epoxy resin has reached the specified strength.

***Epoxy Fixing***

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

***Casting-in Pipes***

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| <p>7. A subsoil drain shall be installed into the pit or headwall in accordance with the general requirements in the Specification for PIPE DRAINAGE.</p>  | <b><i>Subsoil Drain</i></b>                            |
| <b>C223.07 PRECAST UNITS</b>   |  |
| <p>1. Where precast units, including kerb lintels, are provided in the design they shall be handled and installed in accordance with the manufacturer's instructions.</p>  | <b><i>Manufacturer's Instructions</i></b>              |
| <p>2. If the Contractor proposes to use precast units, detailed drawings and complete details of installation procedures shall be submitted for the approval of the Superintendent.</p>  | <b><i>Contractor's Responsibility</i></b>              |
| <p>3. Unless otherwise approved by the Superintendent, precast units shall not be delivered to the site before satisfactory documentary evidence has been submitted to the Superintendent that quality tests have been carried out.</p>  | <b><i>Delivery</i></b>                                 |
| <b>C223.08 JOINTING</b>  |  |
| <p>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 or "Abelflex" with joint sealant, installed as per the manufacturers specifications</p>                 | <b><i>Preformed Jointing Material</i></b>              |
| <b>C223.09 MASS CONCRETE BEDDING</b>   |  |
| <p>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 Superintendent. 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.</p> | <b><i>Mass Concrete Base Foundation Inspection</i></b> |
| <p>2. Unreinforced concrete bases may be cast on earth or rock foundations without the mass concrete bedding.</p>  | <b><i>Unreinforced Concrete Base</i></b>               |
| <b>C223.10 BACKFILL</b>  |  |
| <p>1. Backfilling shall not commence until the compressive strength of concrete has reached at least 15MPa unless otherwise approved by the Superintendent.</p>  | <b><i>Commencement</i></b>                             |
| <p>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.</p>  | <b><i>Selected Backfill</i></b>                        |
| <p>3. Selected material shall consist of a granular material in accordance with the bedding requirements in the Specification for PIPE DRAINAGE.</p>   | <b><i>Composition</i></b>                              |
| <p>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.</p>  | <b><i>Horizontal Terraces</i></b>                      |
| <p>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.</p>  | <b><i>Procedure</i></b>                                |

**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:

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

**Table C223.1 - Table of Limits and Tolerances**



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