DEPARTMENT *of* INFRASTRUCTURE, ENERGY *and* RESOURCES, TASMANIA

ROADWORKS SPECIFICATION

R31 - OPEN DRAINS AND CHANNELS **June 2004**

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R31.1 SCOPE

This specification sets out the requirements for the construction of open drains associated with road works and stormwater facilities in permanent materials, and of open channels for permanent stream diversions.

R31.2 DEFINITIONS

For the purposes of this specification,

Open drains shall be defined as those lined or unlined drains with cross sectional area less than 1.5 m^2.

Open channels shall comprise drains of larger cross section.

Rock shall comprise hard, solid beds or masses that cannot be removed without blasting or use of pneumatic picks, hammers or wedges.

R31.3 OPEN DRAINS

R31.3.1 Surface Drains

These shall comprise all open drains outside the toe of embankments or top of cuttings.

i) Location

Surface drains shall be constructed where shown on the Drawings.

The alignment of all surface drains not shown on the Drawings shall be pegged for approval by the Superintendent before the drains are excavated.

Surface drains shall generally have a minimum clear separation of 2 metres from the edges of batters, and from fence lines.

ii) Dimensions

Unless shown otherwise on the Drawings, surface drains shall have a finished effective depth of at least 300 mm and a minimum cross sectional area when full of water of 0.3 square metres. They shall have side slopes not steeper than 3 to 1 and gradients not less than 1 percent. Drains flatter than 1% gradient shall be subject to the approval and/or variation in cross-section, as determined or approved by the Superintendent.

iii) Mounding

This method shall be used where rock occurs along the line of the proposed drain.

Material may be placed and compacted on the lower sides of surface drains to form banks and so achieve the necessary cross section. The bank shall be at least 300 mm wide at the top, with side slopes not steeper than 3:1.

iv) Accesses

At side roads and vehicular entrances, surface drains shall be diverted to table drains or other drainage systems.

v) Outflow

Surface drains shall be provided at outlets of other drains and other points of water concentration to lead water to culverts, drainage pits or natural streams. As far as practicable, the drains shall follow existing watercourses and depressions unless indicated otherwise on the Drawings.

R31.3.2 Table Drains and Median Drains

Construction of these drains shall be included as part of the earthworks.

R31.3.3 Batter Drains ♦

Batter drains shall be constructed of the type and at the locations shown on the Drawings, to the details shown on the Standard Drawings.

Where batter drains do not end in a pit or pipe and endwall, an anchorage block with splash apron, as shown on the Drawings, shall be provided by the Contractor.

The inlet end of the batter drain shall be provided with a concrete cut off extending below the invert of the drain as shown on the Drawings.

R31.4 OPEN CHANNELS

R31.4.1 Culvert Inlet and Outlet Channels

These channels shall be constructed in conjunction with the installation of culverts. The channels shall be excavated to sufficient area to facilitate the flow of water into and out of the culvert in an efficient manner.

They shall generally match into existing streams or channels.

R31.4.2 Open Channels for Stream Diversions

Open channels for permanent stream diversions or new watercourses shall be constructed according to the dimensions and locations shown on the Drawings.

R31.4.3 Excavation

Open channels shall be of a regular shape.

Over excavation shall be reinstated in the same manner as over excavation of embankments as defined in Specification R22.

There shall be no payment for over excavation or for its reinstatement.

R31.5 LINING OF DRAINS AND CHANNELS ♦

Where indicated on the Drawings open drains and channels shall be lined with either reinforced grass, rock or concrete.

Where drains and channels are lined, the cross-sectional dimensions required for them shall be achieved after the lining has been completed.

R31.5.1 Rock Lining

Unless indicated otherwise, the rock lining shall consist of suitably hard angular rock of nominal dimensions as shown below

Open drains	100 to 150 mm
Open channels	200 to 300 mm

In each case, at least 80% of the rocks shall have a major dimension of at least the nominal dimension. The rock shall be placed in a layer of thickness $1^{1}/2$ times the nominal rock dimension so that at least 95% of the surface area to be lined is covered by the rock.

The rock shall be placed on a Class B geotextile satisfying the requirements of Specification R24.

The rock lining shall be constructed with a uniform appearance, and the faces shall not deviate from the design faces by more than 75 mm.

Proprietary precast revetment slabs may be used in place of the rock.

R31.5.2 Concrete Lining of Open Drains

Concrete lining where required, shall be carried out in accordance with Specification R81, and the Standard Drawing.

Contraction joints shall be provided at a maximum spacing of 3 metres. Joints shall be formed or cut through the full cross-section of the drain lining using an approved template and the edges finished with a suitable grooving tool.

Expansion joints shall be provided at maximum 20 metre intervals throughout, be 15 mm wide and filled with a pre-moulded filler extending over the full cross-section of the drain. The filler shall be placed in position before adjoining concrete is poured and shall be firmly held in position during construction.

The concrete lining shall be constructed with a smooth, uniform appearance and the faces shall not deviate from the design surfaces by more than $\pm$ 20 mm.

The Contractor shall adjust the batter for a distance of 1 metre above the lip of the lined table drain by trimming or by placing fill so that the batter face matches the line and level of the top inside edge of the lined table drain.

R31.6 PAYMENT

R31.6.1 Surface Drains

Payment for surface drains shall be based on the rate per linear metre quoted in the Schedule of Rates.

The rate for surface drains shall include the cost of excavation, construction of any banks associated with the drains, removal of excavated material for use in embankment construction or to disposal, shaping and trimming. The cost of any clearing and grubbing necessary for the construction of all surface drains shall be deemed to be included in the scheduled rate for surface drains.

The cost of any temporary run off drains to drain the works area and the cost of any clearing and grubbing necessary for the construction of those drains shall be deemed to have been included in the scheduled rates for excavation or embankment construction.

Payment for excavation of rock shall be based on the rate per cubic metre of solid material excavated.

R31.6.2 Batter Drains

Payment for batter drains shall be based on the rate quoted in the Schedule of Rates. The unit of measurement shall be linear metres, measured along the slope of the drain.

Where batter drains are multi-channelled constructions, payment shall be made for the actual total length of completed drain, measured along the slope, and not for the combined total lengths of the separate drains.

The rate for construction of batter drains shall include the cost of all necessary works, and materials, including excavation, supply and placement of all materials, connection to kerb scuppers and pits or anchorage and splash aprons in open drains, and disposal of surplus excavated materials.

R31.6.3 Open Channels

Payment for open channels shall be based on the rate per cubic metre of solid material excavated from the channels, quoted in the schedule of rates. Over excavation from the channel cross-section shall not be paid for.

Measurement of material excavated from inlet and outlet channels shall commence from as follows:

(i) The endwall of pipes of diameter less than 600 mm.

(ii) The limits of the wingwalls of pipes of diameter 600 mm and greater.

(iii) Twice the pipe diameter beyond the limits of the wingwalls on drop outlets.

(iv) Three times the pipe diameter beyond the endwall on rock dispersing aprons.

(v) Twice the pipe diameter beyond the limits of the apron on dissipators.

The rate for excavation of open channels shall include disposal of the excavated material.

Payment for excavation of rock shall be based on the rate per cubic metre of solid material excavated.

R31.6.4 Lining of Drains and Channel

Payment for lining shall be based on the rate per square metre quoted in the Schedule of Rates. The area measured for payment shall be the face area of the lining.

The rate for lining shall include the cost of additional excavation to achieve the required cross-section, removal of excavated material for use in embankment construction or to disposal and the supply and placing of lining material including geotextile.