56.09 DRAINAGE SYSTEMS

19/01/2006
VC37

56.09-1 Minor drainage layout objectives

19/01/2006
VC37

To prevent stormwater damage to property.

To provide a stormwater system that can be maintained economically.

To minimise the occurrence of traffic accidents during minor storm events.

To minimise increases in stormwater run-off and protect the environmental values and physical characteristics of receiving watercourses from degradation by urban run-off.

Standard C31

The design of drainage systems should use recognised hydrologic, hydraulic and residential parameters and design methodology.

The minor drainage system must ensure that any overflow is directed to the major drainage system without causing damage to property or affecting the safety of people.

The minor drainage system should be designed to ensure that existing downstream flows are restricted to pre-development levels unless otherwise agreed to by the responsible drainage authority.

The minor drainage system must enable the safe passage of vehicles at reduced speeds on streets that have been affected by run-off from an Annual Exceedance Probability (AEP) of 50 per cent.

The drainage network should be accessible and designed for easy maintenance.

Drainage networks should minimise the potential for accumulation of silt and debris, and provide for collection and removal at accessible locations.

Drainage networks must ensure that there are no hidden flow paths that could reduce the effectiveness and operation of failsafe mechanisms.

Where a portion of the drainage system lies within a lot, access must be available for maintenance.

56.09-2 Minor drainage design objectives

19/01/2006
VC37

To prevent stormwater damage to property.

To contain nuisance flows to a level that is acceptable to the community.

Standard C32

Materials used in drainage networks must be durable, maintainable and cost effective to the community.

The design of the minor drainage system:

- Should be based on Australian Rainfall and Run-off - A guide to flood estimation, Australian Institute of Engineers, 1987 and cited references.
- Should be based on a coefficient of run-off for impervious areas of 0.9, and for pervious areas, a coefficient derived from Australian Rainfall and Run-off - A guide to flood estimation, Australian Institute of Engineers, 1987 or from locally based research.
- Should have the capacity to control stormwater flows under normal operating conditions for an AEP of 50 per cent, except where overland flows exceed 0.4 square metres per second in this case piping to 20 per cent AEP should be provided. In this

standard control means the management of the flows to ensure the system will act in a predetermined manner under a specific rainfall event.

- Should be based on a rainfall intensity based on the AEP as follows:
  - For suburban residential areas, an AEP of 50 per cent, except where the gap flows create a situation where the mean flow depth (d_a) multiplied by the mean flow velocity (V_{ave}) exceeds 0.4 square metres per second.
  - For residential lots with gross densities less than 20 lots per hectare, an AEP of 20 per cent.
  - For residential lots with gross densities greater than 20 lots per hectare, an AEP of 10 per cent.

The minor drainage system should prevent ponding for a prolonged period from a stormwater flow of an AEP of 50 per cent, which is ponding for longer than 1 hour after cessation of rainfall.

Swale drains on access places or access streets should be designed so that:

- Ponding for greater than 1 hour after cessation of rainfall is unlikely,
- Operating flow velocities are less than 1.5 metres per second, and
- The turf used is resistant at operating flow velocities to scour and erosion and tolerant of submersion.

56.09-3 Minor drainage discharge objective

19/01/2006
VC37

To prevent stormwater damage to property.

Standard C33

Dwelling drainage should be directed to the front of the lot and discharged into the street gutter or legal point of discharge unless the topography of the lot makes it necessary to do otherwise.

Where soil permeability is adequate for on-site filtration, a soak pit may be provided.

Where the topography of the lot makes it necessary to discharge to the rear of the lot, inter-lot drainage designed to accept the run-off from impervious areas should be provided.

56.09-4 Drainage pits objective

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VC37

To protect the environmental values and physical characteristics of receiving watercourses from degradation by urban run-off.

Standard C34

Drainage pits should be spaced at intervals of no greater than 90 metres, to assist maintenance programs.

Drains should be placed so that the minimum depth below the top of the kerb is 0.75 metres to top of pipe, and in lots the minimum depth is 0.3 metres from top of pipe to the finished surface (except where plastic pipes are used, when the minimum depth is 0.45 metres).

Drainage pits should be designed for the collection and retrieval of silt, debris and litter provided at locations nominated by the responsible drainage authority.

Culverts and piped drains should operate with flow velocities between 0.6 and 8 metres per second under normal conditions providing that it can be demonstrated that the culvert or drain will remain serviceable at high velocities.

Culverts and piped drains should operate under head during a designed flow, providing that a detailed hydraulic grade line analysis demonstrates that no section of the drainage network is surcharged to the extent that stormwater will leave the piped drainage system and discharge overland except by design.

Culverts and pipes should comply with the appropriate Australian Standard for their manufacture and installation.

56.09-5 Major drainage system objectives

19/01/2006
VC37

To prevent flood damage to the built and natural environment and prevent both short term and long term inundation of dwellings.

To contain nuisance flows to a level that is acceptable to the community.

To ensure the street system operates adequately during and after major storm events.

To provide a stormwater system that minimises erosion and utilises open space in a manner that does not detract from its principal function.

To protect the environmental values and physical characteristics of receiving watercourses.

Standard C35

The drainage system should be designed in accordance with the requirements of the responsible drainage authority.

The major drainage network should have the capacity to control stormwater flows under normal and minor system blockage conditions for an AEP of 1 per cent.

All dwellings must be protected from inundation during a flood of 1 per cent AEP.

The drainage system should be designed to ensure that flows downstream of the site are restricted to pre-development levels unless increased flows are approved by the responsible drainage authority.

The built environment downstream of the proposed residential development should not be degraded by major drainage flows or floodwaters.

The street system should retain access to lots and minimise the occurrence of traffic accidents during and after major storm events.

The drainage system should be designed to ensure that the land form of watercourses is stabilised and that erosion is minimised.

Floodways must be restricted to areas where no damage to property can occur and must discharge all gap flows. Roadways may be used as floodways provided the flow depths and velocities do not create hazards for motorists.

Flow depths on streets should not exceed 50 millimetres above the top of the kerb (or where there is no kerb, above the top of theoretical kerb). Flows should be contained in the street reserve.

Flows within the street should be limited in depth and velocity by the formula:

- $d_a V_{ave} < 0.4$ square metres per second,

where,

- d_a = kerb side flow depth in metres, and
- V_{ave} = flow mean velocity in metres per second.