

Part 8 Standards for Construction of Stormwater Drainage Works

Division 1 General

8.1.1 General

- (1) All work is to be supervised by a Registered Professional Engineer (Qld) competent in stormwater drainage works.
- (2) The works are to be undertaken by a nominated principal contractor experienced in the construction of Public (Municipal) Works.
- (3) The Local Government may request evidence of the principal contractors competency in the construction of stormwater drainage works.
- (4) On the completion of the works a certificate is to be submitted to the Local Government from the Consultant to the effect that the works have been completed in accordance with the approved plans and specifications.
- (5) Certification is to include the submission of "as constructed" information and copies of all relevant test results.
- (6) Removal of all sand, silt and debris in the pipelines is the responsibility of the Contractor and all sand, silt and debris is to be removed before the works will be accepted on and off maintenance.
- (7) All stormwater drainage works are to be in accordance with the Ipswich City Council Standard Drawings, and this Planning Scheme Policy.

Division 2 Construction Requirements

8.2.1 Pipework

- (1) Pipes are to conform in all respects to Australian Standard AS. 4058.
- (2) Reinforced concrete pipes are to be subjected to the Load and Absorption Test as specified in Australian Standard AS 3725, with the load being the three edge bearing method.
- (3) Other flexible or semi-rigid pipework may be used where approved and included in **Council's Product Manual**.
- (4) With the exception of inter-allotment drainage systems, the minimum pipe size is 375mm diameter.
- (5) Pipes up to and including 600mm diameter are to be rubber ring jointed.
- (6) Pipes larger than 600mm diameter are to be internal flush jointed with pipe manufacturers proprietary external bands.
- (7) The class of pipe is to be as specified or as shown on the engineering drawings in accordance with the strength requirements to accommodate construction loads, also to accommodate loads when placed in roadways, or in deep trenches or under fills.
- (8) Where the class of pipe is not specified it is to be a minimum of Class 3.
- (8) Pipes are to be rejected where:
 - a. damaged as an apparent result of handling and cracked in one or more places so as to show clearly visible cracks (exceeding 0.10 millimetres) inside or outside; or
 - b. showing clearly visible shrinkage cracks inside or outside with openings more than 1.25 millimetres for a length of 300 millimetres or more on either inside or outside

Pipes showing only internal cracks or only external cracks may be accepted, provided such cracks do not visibly penetrate full thickness or do not exceed 0.10 millimetres opening for 300 millimetres or more of length.

8.2.2 Pipe Laying

- (1) Pipes are to be laid true to line, grade and level to the following tolerances and are to be free draining and firmly bedded:
 - a. invert levels +50 mm, - 50 mm; and
 - b. structure locations within 1.0m of the approved engineering design
- (2) Pipes are to be laid from the discharge end upstream.
- (3) Circular pipes with elliptical reinforcement (which are supplied marked "TOP" and "BOTTOM" to indicate the correct position when laid) are to be laid correctly according to the marking.
- (4) Pipes are to be bedded as shown on Standard Drawing No. SD.11 (Type 3 Roadworks, Type 2 Elsewhere) on course clean sharp river sand, or other bedding material approved by Council prior to the material being brought to site.
- (5) Minimum bed depth is to be 100mm.
- (6) Minimum clear cover is to be 600mm.
- (7) The minimum vertical and horizontal clearance between a stormwater pipe and any other pipe or service conduit is to be 300mm.
- (8) Pipe laying is to be in accordance with the recommended pipe laying practice as set out in the current Australian Standard Specification.
- (9) All pipework (including inter allotment drainage) is to be inspected immediately prior to the on maintenance inspection using CCTV. Additionally the same pipework is to be inspected by CCTV prior to the off maintenance inspection.
- (10) CCTV operations and equipment must give accurate chainage, pipe grade and permit site locations and comments to be recorded.

8.2.3 Jointing Pipes

- (1) Spigot and socket pipes are to be joined by rubber ring joints.
- (2) Rubber joint rings are to be in accordance with AS1646.
- (3) When flush jointed pipes are used, the first pipe (downstream) is to be bedded to establish line and grade with the groove upstream.
- (4) The external band is to be installed after the joint is made, in accordance with manufacturers recommendations.

8.2.4 Laying and Jointing of Box Culverts

- (1) Box culverts are to conform to AS1597.
- (2) All precast box culverts are to consist of a separate invert slab and a single invert u-shaped section forming the deck and the two walls.
- (3) The base of the box culvert is to be laid true to line and grade to the tolerances specified in section 8.2.2(1) and free draining before the upper portion of the box culvert is laid.
- (4) The top of the culvert shall be joined to the base with cement mortar.
- (5) Joints between lengths of box culverts, tops and sides are to be covered outside by a mortar band not less than 150 mm in width and a minimum of 20 mm thickness.
- (6) Mortar bands are to be reinforced with chicken wire for a minimum width of 130 mm.

Note: Approved jointing tape, applied in accordance with the manufacturer's instructions, may be substituted for mortar bands.

8.2.5 Backfilling

- (1) Backfill is not to be placed until the pipe drain or box culvert has been inspected and approved by the Local Government.
- (2) All backfilling is to be spread in 150mm layers and compacted as follows:
 - a. Under Proposed Pavements:
 - i. The backfill material used for backfilling to a point 300mm above the crown of the pipe or culvert is to be the approved bedding material; and
 - ii. The trench above the approved bedding material to subgrade level is to be backfilled with approved subgrade replacement material with a minimum of CBR15, placed in layers not exceeding 250mm loose and compacted until the dry density is not less than 95% Modified Maximum Dry Density (refer to Standard Drawing No. SD.11).
 - b. Under Existing Pavements:
 - i. The edges of the trench are to be cut with a clean, straight line prior to excavation;
 - ii. The trench is to be backfilled to a level 350mm below finished pavement level with the approved bedding material;
 - iii. The trench above the bedding material is to be backfilled with 300mm of lean mix concrete;
 - iv. The top 50mm of the trench is to be filled with asphaltic concrete; and
 - v. The surface is to be restored to a condition at least equal to that of the original pavement.
 - c. Under Footpaths and Allotments:
 - i. Backfilling is to be carried out using selected material from excavations; and
 - ii. The material is to be placed in layers not exceeding 250mm loose in depth and is to be compacted to a minimum consolidation of 95% Standard Compaction.

8.2.6 Drainage Structures

Access Chambers and Inlet Pits

- (1) Inlet pits and access chambers are to be constructed to the form and dimensions shown on the approved plans or Standard Drawings.
- (2) The thickness of walls of inlet pits and manholes shown on the approved plan or on the Standard Drawings is to be the minimum adopted when inner and outer forms are used.

Note: Where the ground is solid, the Local Government may permit the use of only the inner forms in the construction of unreinforced access chambers and pits (the concrete being placed against the earth) provided that the thickness of the wall of such inlet pit or manhole is increased by 75mm to provide an absolute minimum 50 mm extra cover for reinforcing steel.

- (3) Formwork is to be substantially constructed and braced to ensure that there is no visible deflection of the formwork and that the concrete can finish accurately to the dimensions shown on the approved plans or Standard Drawings.

Note: Formwork shall remain in position for at least twenty-four (24) hours prior to stripping.

- (4) Provision is to be made in the walls of pits and access chambers for weep holes to drain the pipe bedding and surrounds.
- (5) Provision is to be made where required in the walls of manholes and pits for the entry of sub-soil drainage lines.
- (6) Concrete in manholes and inlet pits is to be placed continuously without any construction joints other than the base and the top of the walls.
- (7) At any construction joints, the concrete is to be well roughened to ensure a good bond.

Note:

- a. A coat of mortar is to be spread over the contact surfaces after which the concrete is to be put in position and well rammed and worked so as to make a thoroughly bonded and water tight joint.
- b. Concrete is to be well rodded and sliced or vibrated to ensure maximum density and good surface finish.
- c. No foreign material is to enter the forms during placing of concrete, and concrete is not to be placed unless the excavation has been properly cleaned out and dewatered.
- d. Concrete surfaces are to be protected from drying out for at least seven (7) days after placing.
- (8) Step irons are to be installed in all access chambers and gully pits in accordance with Standard Drawing No. SD.10 and shall be down one continuous structural face.
- (9) The concrete used in the construction of the floors and walls of the unreinforced access chambers and inlet pits

is to be grade N25 in accordance with AS 1379 and AS 3600.

- (10) The concrete used in the construction of reinforced access chambers and inlet pits is to be as shown on the Standard Drawings or as detailed on the approved engineering drawings.
- (11) Cement rendering is to be undertaken on all construction joints and rough surfaces.
- (12) The bottoms of inlet pits and access chambers to at least the height of the half diameter of the highest pipe connecting thereto and such other concrete surfaces as shown on the plans are to be benched with cement mortar.
- (13) Special benching may need to be undertaken using N20 concrete in large access chambers and at angle junctions in pipe lines.

Access Chamber Covers and Frames

- (14) Cast iron access chamber covers and frames are to be of the best quality cast iron, free from cracks, flaws and porous spots.

Note: The access chamber covers are to be approved by the Local Government before placing.

- (15) All cast iron surfaces are to be coated with hot bitumen before being placed in the works.
- (16) Covers and frames are to comply with the details shown on the Standard Drawings.
- (17) The initials SW are to be clearly visible on all access chamber covers.
- (18) The covers are to be cast iron where access chambers are situated within the road boundaries or other trafficable areas and concrete infilled elsewhere.
- (19) Frames are to be cast in the reinforced concrete access chamber topslabs.
- (20) The topslabs are to be bedded on a maximum of 12 mm cement mortar on top of the concrete collar of the manhole so that the top of the cover is flush with the finished pavement or ground surface.
- (21) The concrete used in the construction of the access chamber lid is to be grade N32/10 in accordance with AS 1379 and AS 3600.

Inlet Pit Grates and Backstone

- (22) The grate and frame for the standard inlet pit is to be Class D to AS3996 and is to be hot dip galvanised to AS1650.
- (23) The precast backstone is to be of an approved type as shown on the Standard Drawings or approved Engineering Plans.

Inlet and Outlet Structures

- (24) Headwalls and embankment walls and aprons are to be constructed in accordance with the relevant DTMR Standard Drawing for reinforced concrete headwalls, walls and aprons.
- (25) The inlet and outlet headwalls, embankment walls and aprons are to be constructed to produce a smooth transition of stormwater flowing in the open drain into the pipe and culvert inlet or out of the pipe or culvert into the open drain in order to reduce energy loss and reduce upstream backwater.
- (26) Energy dissipaters and scour protection, where required, are to be constructed in the locations as shown on the approved Engineering Plans.

Note: The final form of all inlet and outlet structures is to be subject to on-site determinations with the Local Government and in accordance with any Water Quality Management Plan.

- (27) Precast headwalls may be used provided they are constructed to the following criteria—
 - a. Precast headwalls are to be laid on a clean stable foundation and bedded in a minimum 200 mm deep layer

of grade N25 concrete which is to be sluiced, pumped or vibrated in place to ensure no voids are present in the completed work.

- b. Apron cut-off walls extend below the edge of the apron by a minimum of 600 mm and are constructed of minimum grade N25 concrete.
- c. The headwalls are backfilled with approved free draining material.
- d. Weepholes are provided to drain the bedding material.

Note:

- a. All headwalls are to be constructed with adequate protection so as to prevent scouring occurring behind or around the headwall.
- b. "Stone pitching" or the use of "no-fines" concrete, where used, is to be a minimum depth of 150 mm.

Division 3 Kerb and Channel Construction

8.3.1 Kerb and Channel Foundation

- (1) The foundation is to comply with the requirements of the approved Engineering Plans.
- (2) Where no requirements are set out in the approved Engineering Plans, the depth of approved foundation material will be at least 100 mm thickness of material with a minimum soaked CBR of 45% which is to be compacted by watering and rolling or tamping until 95% of the maximum dry density (as determined by the modified A.A.S.H.O. test method) has been obtained.
- (3) The foundation is to extend at least 150 mm behind the back of the kerb.

Note: No concrete is to be placed until the foundations have been approved by the Local Government.

8.3.2 Concrete Works

- (1) The concrete used in kerb and channelling work and vehicle crossings is to be Grade N25 concrete and conform in all respects with the Standard Drawings and approved Engineering Plans.
- (2) Concrete is to be placed true to line and grade to the depths, thicknesses and dimensions as shown on the Engineering Plans and Standard Drawings.
- (3) Any kerb and channel not true to line or with noticeable kinks, bends or other faults or not of the required dimensions is to be condemned and is to be broken out and removed from the site.
- (4) The channel is to be shaped in true conformity with the Standard Drawings.
- (5) The invert of the channelling is to be finished in true grade and alignment.

Note:

- a. No channelling will be accepted by the Local Government in which water is found to pond.
- b. Channelling that ponds water and surfaces that are chipped, cracked or otherwise damaged are to be cut away to a clear surface and rendered 12mm minimum thickness.
- (6) The concrete kerbing and channelling is to join neatly and transition smoothly with existing kerb and channel or be finished so that it will join neatly with channelling to be constructed.
- (7) Where kerbing and channelling joins inlet pits, the width of channel is to be uniformly widened as shown on the Standard Drawings to join neatly with the pit.
- (8) Kerb Ramps are to be constructed at all street intersections as shown on Standard Drawing No. SR.18 and as required to connect cycleways and footpaths.

8.3.3 Kerb and Channelling Forming

Hand Formed and Finished

- (1) Forms are to conform to the profile specified in the Standard Drawings and be rigid, true to line and grade and well braced.
- (2) Back forms are to be used on the footpath side of the full depth of the kerb back.

Note:

- a. In the carrying out of this work, the whole of the water channel is to be cast simultaneously.
- b. The casting of invert and kerb at different times is not acceptable to the Local Government.

- (3) Concrete is to be well rodded and sliced or vibrated during placing to ensure maximum density and a dense surface finish.
- (4) Immediately following the casting of the kerb and channel, the top of the kerb and channel is to be finished with an approved steel finishing tool.
- (5) The arris and invert are to be formed with approved steel finishing tools.
- (6) The front board of the kerb is to be stripped within twenty-four (24) hours of casting and the kerb face immediately bagged using a damp hessian bag and cement mortar.
- (7) The concrete kerb and channel is to be placed in 3 metre sections and provision made at the joints to prevent the binding of the concrete at the joint.
- (8) Joints are to be finished square and at right angles to the section of the water channel and show a neat joint line on the kerb face and top truly at right angles to the length.

Machine Formed and Finished

- (9) Kerb and channelling may be cast by approved machines provided that the kerb and channelling conforms to the profile specified in the Standard Drawings and the following additional requirements:
 - a. The minimum slump is to be 12 mm;
 - b. Concrete is to be thoroughly compacted;
 - c. Exposed faces and edges of kerbs are to be finished with a steel tool to the true shape of the kerb;
 - d. Grooves are to be cut with a suitable grooving tool to a depth of at least 100 mm in the channels and inverts at equal intervals of 3 metres;
 - e. Grooves are to be at right angles to the length and perpendicular;
 - f. Adjacent concrete is to be finished to a smooth, level surface; and
 - g. Concrete is to be supplied ready-mixed and placed within 30 minutes of delivery on site.

Note: Any concrete not placed within this time is to be removed from the site.

8.3.4 Curing of Concrete

- (1) Concrete kerbing and channelling, vehicle crossings and other concrete work is to be cured by the use of a curing compound consisting of waxy constituents cut back with a volatile solvent, resulting after application in a film of microcrystalline petroleum wax.

Note: Curing compounds comprising a bituminous emulsion base or a varnish or other resinous base are not to be used and plastic (p.v.a.) based compounds used only if approved by the Local Government.

- (2) The curing compound is to be pigmented white.

Note: Other pigment colours are acceptable provided they disintegrate or leach off the surface within a reasonable time.

- (3) The curing compound is to be applied evenly, at the rate recommended by the manufacturer, over all exposed surfaces immediately on completion by either spraying or brushing and is to be protected from mechanical damage for at least seventy-two (72) hours.

Note: If it becomes necessary to carry out repairs and add render to surfaces to which a curing compound has been applied, such surfaces are to be scabbled back at least 25 mm.

Division 4 Roofwater and Interallotment Drainage Systems

8.4.1 Pipe Size

- (1) The minimum pipe size is to be 225mm diameter, and the maximum pipe size is to be 375 mm diameter.

8.4.2 Pipe Types

- (1) The following pipe types are to be used:
 - a. uPVC, sewer Class SN6 Solvent Welded AS 1260; or
 - b. RC, Class 2 Rubber ring jointed AS 4139; or
 - c. RC Class 2 Rubber ring jointed AS 1342.
- (2) Standard manufacturers fittings are to be used in all cases.

Note: Site fitted saddles are not acceptable to the Local Government.

8.4.3 Flexible Joints

- (1) Flexible joints in the form of a short pipe 600 mm maximum at the junction of all stormwater drainage structures are to be provided.
- (2) For uPVC systems:
 - a. flexible joints are not necessary however rubber ring jointed connections are to be provided at all drainage structures to accommodate expansion or contraction; and
 - b. all pipes are to have sanded ends suitable for bonding to concrete.

8.4.4 Access Chambers

- (1) Access chambers are to be Type 1 - Cast Insitu in accordance with Standard Drawing No. SD.12.
- (2) Access chamber dimensions are to be as follows:
 - a. 600mm diameter pit for a maximum depth to 750mm; or
 - b. 900mm diameter pit for a depth ranging between 750mm and 1500mm; or
 - c. 1050mm diameter manhole where depths exceed 1500mm.
- (3) Access chambers are to be provided at the following locations:
 - a. change of grade;
 - b. change of pipe size;
 - c. change of direction; and
 - d. end of line.
- (4) Covers to cast-in-situ access chambers:
 - a. are to be a standard concrete infilled access chamber cover and frame;
 - b. are to be embossed roofwater;
 - c. are to have infill concrete at grade N25; and
 - d. are to match the finished surface ground slope and sit 50mm proud.

Note: Grate installations may be permissible in certain instances where surface flows are to be directed into the system and the system has been designed for these additional flows.

- (5) Access chambers are to be benched in a similar manner to that required for sewer installations.

8.4.5 Branch Connections

- (1) At least one connection point is to be provided on the main line for each property.
- (2) The connection is to be in the form of a Slope Junction installed in the line or a connection from the access chamber within the property, with the property branch line diameter being a minimum of 100mm (I.D.)
- (3) An inspection opening is to be located at the end of the property branch line similar to a sewer house connection branch.
- (4) The connection point is to terminate 0.5 metres past any adjacent sewer.
- (5) Stormwater marking tape is to be tied to the cap of the inspection opening and extend vertically to be tied to a wooden peg at finished surface level.

8.4.6 Outlets

- (1)
 - a. All interallotment roofwater drainage systems are to discharge into a suitably located lawful point of discharge;

- b. where the approved Engineering Plan permits discharge into the kerb and channel, such discharge is to be not less than two galvanised steel rectangular hollow sections (75mm maximum height) exiting from an access chamber located 0.5m inside the property across the footpath into the kerb and channel; and
- c. the rectangular hollow sections are to have adaptors and kerb adaptors installed in accordance with Standard Drawing SR.17.

- (2) A minimum of two roofwater kerb adaptors shall be provided for each allotment that drains predominately to street drainage.
- (3) A kerb adaptor shall be located:
 - i. 0.5m from the property side boundary; or
 - ii. if the allotment drains predominately to one side boundary, then locate both kerb adaptors (0.5m apart) 0.5m in from the lower side boundary.

8.4.7 Minimum Cover and Easement

- (1) In private property the minimum cover is to be 450mm.
- (2) Where discharge into kerb and channel is allowed, it may be necessary to vary this requirement over the last section (i.e. from the last access chamber to the property boundary).
- (3) In private property where the stormwater drainage pipe size is above 225mm, an access and maintenance easement (in accordance with Part 2 - Standards for Design of Stormwater Drainage Works 2.1.5 Easements, Table 2.1 is to be provided and centrally aligned wherever possible.

8.4.8 Where Concrete Footpaths are Provided

- (1) For lots discharging to kerb and channel where a concrete footpath/cycleway is provided in the verge, a roofwater drainage connection point is to be provided at the lowest corner of the lot, i.e. a minimum of 2 x 100mØ CHS (or equivalent sized RHS) lines discharging to kerb and channel via approved kerb adaptors.

Division 5 Erosion and Sediment Control

8.5.1 Permanent Methods of Erosion and Sediment Control

- (1) The construction of permanent erosion and sediment control structures is to be in accordance with QUDM and Best Practice Erosion and Sediment Control, International Erosion Control Association for Queensland Construction sites (IECA 2008 - Appendix B (June 2018 revision)).

Where necessary, development must provide sediment control devices such as Type F/D and High Efficiency Sediment Basins designed and sized sufficiently to achieve treatment of 80% of the average annual rainfall runoff volume to a concentration lower than 50mg/L Total Suspended Solids, in accordance with the State Planning Policy - Water Quality requirements.

8.5.2 Temporary Methods of Erosion and Sediment Control

- (1) Temporary erosion control devices (excluding devices which divert or concentrate runoff) are to be constructed in accordance with the Best Practice Erosion and Sediment Control, International Erosion and Sediment Control Association, for Queensland Construction Sites IECA 2008 - Appendix B June 2018 revision.

Where necessary, development must provide sediment control devices such as Type F/D and High Efficiency Sediment Basins designed and sized sufficiently to achieve treatment of 80% of the average annual rainfall runoff volume to a concentration lower than 50mg/L Total Suspended Solids, in accordance with the State Planning Policy - Water Quality requirements.

Note:

- a. The Contractor is to maintain all sediment control measures outlined on the approved erosion and sediment control plan.
- b. It is emphasised that no matter which measures are selected and implemented they are to be properly maintained by the Contractor to ensure that they adequately fulfill their function.
- c. Where the development involves trenching or other ground disturbance within 10 metres of existing downstream or downhill properties, turfing of the disturbed areas is required for protection of the downstream properties.
- d. Gully inlet protection works are to be maintained until contributing catchments have stabilised or until the municipal infrastructure has been accepted on maintenance.
- e. Construction works should, wherever possible, be programmed to minimise the areas exposed to erosion at any one time and to stabilise the disturbed areas before moving to fresh areas.

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- f. To stabilise batters, drains and swales, vegetative treatments may be used.
 - g. Maintenance is to include inspection after any storm event to:
 - i. repair breaches; and
 - ii. remove accumulated silt/debris when 50% of the design capacity of the measures is lost.
 - h. The removal of the sediment is to be done in such a manner so as not to damage the sedimentation structure.
 - i. Any damage to either permanent or temporary stormwater quality control structures or devices is to be immediately rectified at the contractor's expense.

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