Dunedin Code of Subdivision and Development 2010

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DUNEDIN CITY COUNCIL
Kaunihera-a-rohe o Otepoti

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Context

This document is intended to provide specific requirements, guidelines and minimum engineering standards for subdivision and developments within the Dunedin City Council territorial area. Together with the Dunedin City District Plan, it sets out what the Dunedin City Council (the Council) needs from subdividers and developers to address the requirements of both the Resource Management Act and the ongoing management of the City's assets.

The Resource Management Act (RMA) is concerned with promoting the sustainable management of natural and physical resources. Section 11 of the RMA requires local authorities to control subdivision through a district plan. The RMA provides for effects-based considerations which allow for new and innovative development solutions to be undertaken. However, successful adoption of new and innovative designs depends to some degree on certainty in the resource consent process. To date, the Council's response has been mainly through rules and standards defined in the District Plan and through a prescriptive Code of Subdivision.

In addition, the Council has adopted advanced asset management practices for all its works whether undertaken directly or by developers prior to handover of public assets to the Council. Requirements arising from asset management data collection and recording are also presented in this Code and related publications.

The need to provide information for asset management purposes may result from the following activities:

- Creation of Council capital works assets and development works
- New land subdivisions and development works which will be vested in Council for future operation and maintenance
- Replacement, refurbishment or rehabilitation of existing Council assets
- Maintenance of Council assets including repairs operations, routine and reactive maintenance
- Disposal of Council assets (decommissioned, abandoned or sold).

These requirements apply both to the Council and to subdividers and developers.

The Council does not wish to restrict innovation in developments where this provides for best environmental practice in terms of design and provision of services. Thus alternative methods of compliance may be submitted on a case-by-case basis for consideration by the Council.

Although the Council wishes to take an approach that reduces barriers to innovation, it is acknowledged that some developments will be more suited to a more traditional approach with a high level of certainty. The Council has determined that this will be best provided for by using the New Zealand Standard NZS 4404:2004 as the base document for meeting minimum requirements, with a Code that provides specific design information and any Council requirements that differ from those in NZS 4404:2004. Notwithstanding this, the Council will consider a design approach over a traditional codified engineering approach, particularly for larger developments and environmentally sensitive sites. The Council recognises that NZS 4404:2004 has been recently revised, and will review the Code in light of the revised Standard (NZS 4404:2010) once it has had opportunity to assess its implications for Dunedin.

The Council's policies are evolving in response to environmental concerns together with service and infrastructure constraints within the City. These include the provision of adequate potable water supplies, treatment and disposal of wastewater, dealing with stormwater issues and design of roads. These are all relevant to development planning and need to be taken into account in development proposals.

The system now in place seeks to allow the use of alternative designs and technologies in appropriate circumstances, to be sufficiently flexible to allow innovation, but to also provide a degree of certainty for developers. It provides options for alternatives or innovative designs that a developer may wish to propose. Compliance with minimum standards is still available for those situations where alternatives are not desired.

The system also seeks to integrate across departments within the Council and with national directions and legislative changes. Accordingly, the approach to subdivision and development within the Dunedin City Council area has been considered in conjunction with the direction of the Local Government Act 2002 and the implications of community planning on Council activities and subdivision and development in the future. The approach and details of this Code will be subject to ongoing review to ensure the document remains current. Proposed changes will be reported to and considered by the relevant Council committee.

To assess applications a combined interdisciplinary process is used that enables the applicant's representative to meet with Council staff from all relevant teams to examine proposals in an interactive and integrated manner. This Design and Review team is responsible for assessing applications or early design concepts, recognising that compromises may need to be made in some areas for the benefit of others. This is the essence of sustainable management and the process provides for dialogue between Council staff and applicants to ensure an integrated approach to decision-making. To encourage innovative design, developers should discuss their development concepts with the Council at an early stage.

This process requires that sufficient information is provided by the applicants on proposals to address ongoing management, maintenance and asset management considerations. Each application will be assessed against specific criteria which also include guidelines on how to deal with issues such as asset management, private versus public ownership of infrastructure, and future maintenance of components in an alternative design approach. Assessment criteria are located within the District Plan as well as in this document.

The Dunedin City Council has a large number of parks and reserves within the district and these are all managed as reserves under the Reserves Act 1977, including those not yet classified for recreation. As such, the Act requires formal easement agreements for underground services and right of ways. This also applies to any easements being transferred into Council ownership. Subdividers and developers should regard parks and reserves as private land when looking at connecting into existing underground services.

Part 1: General Requirements and Procedures

Developments shall be undertaken in accordance with the requirements of Part 1, General Requirements and Procedures of NZS 4404:2004, except as amended and extended for Dunedin City Council requirements in the clauses below.

The Dunedin City Council has adopted Part 1 of NZS 4404:2004 with the following additions and/or alterations. All clause numbers refer to clauses in NZS 4404:2004.

1.2.2 Statutory requirements – amend clause

Amend reference to "any applicable statutes, regulations and bylaws" to read "any applicable statutes, regulations, bylaws, standards and codes of practice".

Amend reference to the Electricity Act 1992 to read "Electricity Act 1992 and New Zealand Code of Practice for Electrical Safe Distances NZECP 34:2001".

1.5.1.1 Documents to be submitted for design approval – amend clause

Amend the first sentence to read as follows:

Prior to or as a condition of granting a resource consent for subdivision and/or development of land, or as otherwise required by the district plan, or as otherwise considered necessary by the Council when considering applications to carry out such works, the Council requires the documents listed in paragraphs 1.5.1.1 (a) to (d) inclusive to be submitted.

Add to the end of the clause:

Two copies of preliminary drawings, specifications and calculations shall be supplied to the Council. One set will be returned to the applicant when these have been checked by Council staff with any required amendments endorsed on the plans and specifications. These check prints shall be preserved intact and returned to the Council when the required amendments have been completed, along with two copies of the amended set of plans and specifications. Drawings may be provided in electronic format.

1.5.6 Supervision of work – amend clause

Replace paragraph 2 with the following:

The Council requires completion certificates in the form given in schedules 1B and 1C to be submitted upon completion of work.

1.5.9 Maintenance – delete clause and replace with the following

The developer shall maintain the works until they are formally taken over by the Council. Formal takeover is the date when the Council issues the Section 224(c) certificates, or such other earlier date as may be agreed by the Council. For uncompleted works covered by a bond the developer shall maintain the works until a date specified in the bond or, if earlier than such date, the works are completed to the satisfaction of the Council.

Unless stated otherwise in the engineering approval, a defects liability period of twelve (12) months from formal takeover by the Council shall apply. However, the developer shall not be responsible for damage caused by other activities, such as building construction on completed sections, or for fair wear and tear caused by public use of roads.

As-built plans, as detailed in Schedule 1D, shall be provided prior to the Council accepting the works and the issue of Section 224(c) certificates.

1.6.1.3 Uncompleted works bonds – delete clause and replace with the following

The amount of any bond shall be 125% of the estimated value of the uncompleted work.

1.7 Additional requirements – add new clause

Emergency works

If during the course of the development, any situation arises associated with the development whereby, in the opinion of the Council, public safety, the security of public or private property, or the operation of any public facility or ecological site is endangered, the developer shall immediately carry out such remedial measures as the Council requires to remove the danger. Any work so required shall be at the expense of the developer.

If such emergency works are not immediately carried out, the Council may arrange for the necessary remedial work to be carried out and charge the developer the cost for carrying out the works.

Damage to existing roads, services and property

All damage to existing roads, road reserve plantings, services or private property, or any disturbance of survey boundary marks due to or caused by any new works, shall be the liability of the developer. All damage must be repaired by the developer immediately. If such remedial works are not commenced within twenty-four hours after being notified by the Council, the Council may arrange for the necessary work to be carried out and charged to the developer. This provision includes the removal of mud and debris from existing roads in the vicinity of the development. Removal of such debris will be necessary in the interests of traffic safety.

In any situation where the Council considers that damage to existing roads, services or private property constitutes a risk or potential risk to the safety of road users, pedestrians or other persons, the developer shall immediately repair the damage or otherwise abate the hazard or potential hazard.

Schedule 1D As-built plans – add to end of schedule

A PDF file and a DWG file or an equivalent file, approved by the Council, of the linework contained in each as-built in terms of either the local Cadastral Circuit or New Zealand Map Grid Coordinate system shall be supplied.

Part 2: Land Stability, Foundations & Earthworks

Design and construction of infrastructure shall be undertaken in accordance with the requirements of Part 2, Land Stability, Foundations and Earthworks of NZS 4404:2004.

Alternative specific proposals may be submitted with appropriate engineering information that will enable the Council to assess the proposal. An alternative proposal must provide a standard of development equivalent to that provided by systems conforming to NZS 4404:2004.

All earthworks shall also be subject to the controls in Section 17 of the Dunedin City District Plan (Plan Change 11).

Part 3: Roads and Transportation

Design and construction of roading and transportation infrastructure shall be undertaken in accordance with the requirements of Part 3, Roads of NZS 4404:2004, except as amended and extended for Dunedin City Council requirements in the clauses below.

Alternative specific proposals may be submitted with appropriate engineering information that will enable the Council to assess the proposal. An alternative system must provide a standard equivalent to that provided by systems conforming to NZS 4404:2004 and amendments included here.

The Dunedin City Council has adopted Part 3 of NZS 4404:2004 with the following additions and/or alterations. All clause numbers refer to clauses in NZS 4404:2004.

3.2.1 Objective – add to end of clause

Roads and transportation routes are to be established to ensure the movement of vehicles, pedestrians, cyclists and public transport is appropriate, safe and integrated in a manner which supports the surrounding land-use and minimises the impact on the environment.

In addition to being functional and safe, the road design shall aesthetically enhance and complement the land development through landscaping and street furniture.

3.2.3 Roading hierarchy and design – add to end of clause

The street and road network shall provide a high level of internal accessibility and good external connections for all modes of transport. The road network must also provide for convenient movement between local streets and higher order roads.

The road network shall have a clear hierarchy and each road shall be designed to conform to its function in the network, in regards to:

- traffic volumes, vehicle speeds and driver behaviour
- on street parking
- sight distances
- provision for bus routes and stops
- provision for pedestrian and cyclist movements
- provision for waste collection vehicles
- lot access
- convenience
- public safety
- amenity
- the incorporation of public utilities and drainage, and
- streetscaping.

Local streets shall not operate as through routes for externally generated traffic (other than pedestrians, cyclists, and public transport).

The road design shall be clearly appropriate to its intended function within the overall roading network so that traffic is encouraged to use the appropriate routes in the road hierarchy.

The following measures shall be used to achieve a good road network design:

- The driving distance from any dwelling to the nearest collector street or higher order road shall be no more than 500 m (or 2000 m in a rural residential precinct)
- No more than three turning movements at intersections or junctions shall be required in order to travel from any dwelling to a collector street or higher order road
- All residential neighbourhoods of more than 75 lots or dwelling units shall be provided with more than one connection to a collector street or higher order road
- Cul-de-sacs will be acceptable where good road network design is not compromised by their application.

3.2.5 Public transport – amend clause

Add the following after paragraph 1:

Access shall be provided for public transport services. Walking routes shall be provided to enable convenient access to public transport corridors from all locations, within minimum practical walking distances.

For a development that adjoins a current or proposed bus route, the Council may require a bus bay and bus shelter to be provided if the development is of a scale that could lead to a significant increase in use of public transport.

Streets and roads carrying bus routes shall allow for the efficient and unimpeded movement of buses without complicated turning movements and without facilitating high traffic speeds.

Replace (c) with the following:

(c) Not less than 90% of dwelling sites are to be within the following walking distances of a bus stop:

- 500 m – normal conditions
- 400 m – transport disadvantaged areas
- 600 m – low density and outer areas.

These distances are reduced by 25% in higher density or hilly areas.

(Refer to the Otago Regional Passenger Transport Plan for further information).

3.2.6 Classification of urban roads – delete clause and replace with the following

The hierarchy adopted by the Dunedin City Council is not necessarily the same as that adopted for the purposes of road funding and maintenance. It is intended as a mechanism for identifying appropriate locations for access onto roads.

The hierarchy identified for the Dunedin City Council is as follows:

a) National roads (State highways) including limited access roads
b) Regional roads
c) District roads
d) Collector roads
e) Local roads.

National and regional roads provide for the greatest level of movement with a minimum access function. They connect major localities and link with areas beyond the City. Some regional roads serve as bypasses around the city.

District roads provide connections between the regional roads and connect major rural, suburban, commercial and industrial areas.

Collector roads distribute and collect local traffic within and between neighbourhoods and link rural communities. They provide for traffic movement and property access.

The primary function of local roads is to provide access to properties, rather than to act as through-routes.

The District Plan road hierarchy is shown on District Plan Maps 73 and 74.

3.3.1 Minimum requirements –amend clause

Replace reference to Table 3.1 with reference to Table 3.1R: Dunedin City Council Urban Roading Guidelines, attached at the end of Part 3. (Table 3.1 is deleted.)

Add to end of clause:

The road network shall allow for the interaction of all road users and road usages to ensure that safety is maximised. This shall include safe, convenient and efficient property access and intersections, provided for all modes of transport. Designs shall incorporate an adequate system of artificial lighting which is appropriate to its location so as to maintain safety through periods of darkness.

Pedestrian accessways and cycleways may also be required for connectivity purposes and in accordance with the Council's policy on Cycleways, Walkways and Bridlepaths.

Access arrangements to residential, commercial and industrial properties shall be designed so not to affect the function, vehicle speeds, safety, efficiency and capacity of the streets and roads. Emergency services access shall be maintained to all areas. Discrete accessible footpaths shall be provided.

Specifically designed swales may be an acceptable form of side drain for rural roads.

Road design shall provide a level of service which is appropriate to the City in general and the designated standard of the immediate area in particular, but which minimises the overall life-cycle costs. Life cycle costs shall include capital, finance, maintenance and rehabilitation cost. For the purposes of this criterion the life-cycle shall be taken as no less than 25 years. Maintenance through this period shall be those activities involved in a reasonable level of road reinstatement, and not include capital works.

3.3.2 Road geometric design – add before clause 3.3.2.1

For design purposes, eight (8) vehicle movements per day per residential unit on Rural and Rural Residential lots shall be used.

3.3.2.1 Design parameters – amend clause

Amend references to Table 3.1 to Table 3.1R, attached at the end of Part 3.

3.3.3 Pavement structural design – add to end of clause

Pavement depths shall be as established through use of the design documents, but the minimum pavement thickness shall be 200 mm, unless otherwise approved by the Council.

Design standards in Drawing RS-027: Slope Design and Minimum Compaction Standard (Appendix A1) shall be used.

3.3.3.2 CBR tests – add to end of clause

Use of the Scala penetrometer tests to establish subgrade CBR values requires the specific approval of the Council. Correlation of Scala penetrometer results to actual soaked CBR tests will be required.

3.3.6 Parking – add to end of clause

The roading proposal shall provide adequate parking both on and off the carriageway to cater for reasonable levels of residential, commercial and visitor parking, which will be required both as a consequence of land development and of access to other adjacent land areas which are, or might reasonably be expected to be, developed. Parking shall not unreasonably inhibit passage, access, or safety on the road. Parking requirements shall take into account the density of development and its proximity to public transport.

3.3.7 Intersection design – amend clause

Amend references to Figure 3.3 to Drawing RS-024: Minimum Traffic Sight Lines At Non-Signalised Intersections, attached in Appendix A1 to this Code.

Add after paragraph 4:

Design of intersections in rural and rural-residential areas shall be in accordance with Drawing RS-026 (Appendix A1).

3.3.10 Bus bays – replace existing clause with the following

Widening for bus bays will be subject to specific design.

3.3.12 Footpaths, pedestrian accessways, cycleways, berms – add before clause 3.3.12.1

A network of paths and cycleways shall be provided having regard to:

- opportunities to link residents to open space networks and community facilities, including public transport stops, local activity centres and schools

- likely trip purpose
- topography
- pedestrian and cyclist safety
- cost effectiveness
- likely user volumes and types
- convenience, and
- compliance with Crime Prevention Through Environmental Design (CPTED) guidelines and the Council's Pedestrian Strategy.

Pedestrian paths and cycleways shall be well lit, and be located where there is casual surveillance from nearby premises.

A pedestrian accessway shall not be used as a secondary flow path for stormwater without the specific approval of the Council.

3.3.12.1 Footpaths, pedestrian accessways, berms: Urban – amend clause

Add the following to the end of paragraph 2:

A 1 metre permeable strip shall be provided between the footpath and the property boundary except where this is impracticable. This strip shall either be grassed or shall be finished with landscape plantings or permeable materials approved by the Council.

Add the following after paragraph 4:

Footpath crossfall shall not exceed 3%.

Amend the minimum width of pedestrian accessways as follows:

Pedestrian accessways shall have a minimum width of 3 m.

3.3.12.3 Cycleways – add to end of clause

All cycle design shall comply with the Crime Prevention Through Environmental Design (CPTED) Guidelines and the Council's Cycling Strategy.

3.3.12.4 Footpath and cycleway surfacing – add to end of clause

All footpath and cycling surfacing shall be required to have the Council's approval.

3.3.13 Traffic services, signage and road furniture – add to end of clause

All poles, sign posts, power poles, street lights and street furniture set in a grass berm shall be surrounded with a 300 mm wide concrete mowing strip, finished level with the grass berm.

3.3.18 Multi-unit non public accesses (urban and rural) – amend clause

Amend references to Table 3.1 to Table 3.1R, attached at the end of Part 3.

3.3.19 Crossings – add before clause 3.3.19.1

Vehicles shall be able to enter or reverse from a lot or site in a single movement without having to cross the verge area of another property (except where access easements apply) unless Council approval is obtained.

3.3.19.1 Urban (crossings) – add to end of clause

Where traffic volumes exceed 3,000 vpd or design speeds exceed 50 km/h, safe crossings shall be created with the use of pedestrian refuges, geometry or other appropriate mechanisms in accordance with Austroads Guide to Traffic Engineering Practice, Part 13: Pedestrians and Part 14: Bicycles.

3.3.21 Road drainage – add before clause 3.3.21.1

The road design shall include provision for a low maintenance formalized stormwater drainage system which ensures that all trafficable areas, parking areas or pedestrian walkways are kept free of surface water in accordance

with the Stormwater Performance Criteria and maintain a safe operating surface. The drainage system shall include measures to adequately mitigate the effects of stormwater runoff, by controlling peak discharges and providing appropriate stormwater treatment.

3.3.21.4 Kerbs and channels – amend clause

Amend reference to Figure 3.12 to Drawing RS-030: Kerb and Channel Details, attached in Appendix A1.

3.3.21.5 Sumps – add to end of clause

Approved sump details are shown in Drawings RS-028 and RS-029 (Appendix A1). Syphon bends, 225 mm minimum diameter or similar debris and silt separation traps shall be fitted to all outlets connected to a reticulated stormwater disposal system.

3.4.11 Deflection testing prior to surfacing – add to end of clause

The Council will consider alternative means of testing in situations where the Benkelman beam method is not appropriate.

3.5 Additional requirements – add new clause

Traffic signals

Traffic signal equipment installation shall meet the requirements of the National Specification for the Installation and Modification for Traffic Signals.

Work in roads

Work undertaken on Council-owned roads shall be undertaken in accordance with Standards New Zealand Handbook SNZHB 2002:2003 Code of Practice for Working in the Road, except as modified by the schedule titled Dunedin City Council Schedule of Special Conditions to SNZHB 2002:2003 Code of Practice for Working in the Road.

Position of services

See Drawing RS-025: Typical Cross Section Services for recommended position of services within the road reserve (Appendix A1).

Alternative positions may be acceptable if approved by the Council and Utility Companies.

Additional standard drawings

The drawings listed below and attached in Appendix A1 are standard arrangement drawings relating to roading and are additional to those in NZS4404:2004.

Drawing	*Title*
RS-024	Minimum Traffic Sight Lines at Non-signalised Intersections
RS-025	Typical Cross Section Services
RS-026	Rural/Rural Residential Road Intersections
RS-027	Slope Design and Minimum Compaction Standard
RS-028	Stormwater Superpits
RS-029	Catchpit Details
RS-030	Kerb and Channel Details

Road Design Standards - Urban (speed limit ≤ 70 km/h)

Table 3.1R: Dunedin City Council Urban Roading Guidelines

Class	Type	Area served	Traffic volumes (vpd)	Design speed, (km/h)		Road reserve width[1] (m)	Minimum carriageway width (m)				Footpath (m)	Berm (m)	Max/min gradient	Normal camber	Max super-elevation	Notes
				Flat or rolling	Hilly		Parking	Traffic	Cycles	Total						
Local roads	Private Way	1-3 lots 1-6 du	N/A	N/A	N/A	4.5*	none	1 x 3.0	none	3.0*		1.5	16% max ** 0.4% min	3%	NA	Not public street. Long private ways may require passing bays no more than every 60 metres, and turning heads.
	Private Way	4-6 lots 7-12 du	N/A	N/A	N/A	6.5*		1 x 3.5		3.5*		3.0	16% max ** 0.4% min	3%	N/A	Not public street. Long private ways may require passing bays no more than every 60 metres, and turning heads.
	Short cul de sac	<10 du	N/A	N/A	N/A	14.0	***	1 x 6.0		6.0	1 x 2.0	2 x 3.0	16% max **	3%	6%	
	Minor Residential (cul de sac)	<20 du	N/A	N/A	N/A	16.0	***	1 x 6.0		6.0	2 x 2.0	2 x 3.0	16% max ** 0.4% min	3%	6%	
	Residential	<100 du	<850	40	30	16.0	***	1 x 6.0		6.0	2 x 2.0	2 x 3.0	16% max ** 0.4% min	3%	6%	
	Industrial		>300	50	40	20.0	1 x 2.5	2 x 3.5		9.5	2 x 2.0	2 x 3.25	10% max 0.4% min	3%	6%	
	Industrial/ Commercial service lane		N/A	N/A	N/A	8.0		2 x 3.5		7.0		2 x 0.5	10% max 0.4% min	3%	N/A	no parking both sides
Collector roads	Residential	<450 du	<3,000	50	40	20.0	***	2 x 3.0	2 x 2.0	10.0	2 x 2.0	2 X 3.0	12.5% max 0.4% min	3%	8%	
	Industrial/ Commercial		>1,000	50	40	20.0	2 x 2.5	2 x 3.5		12.0	2 x 2.0	2 x 2.0	10% max 0.4% min	3%	6%	
District roads	Residential	>450 du	3,000-7,000	50	50	24.0	2 x 2.5	2 X 3.5	2 x 2.0	16.0	2 x 2.0	2 x 2.0	10% max 0.4% min	3%	8%	Or specific design
Regional	National Road	-	>7,000	70	60	27.0	2 x 3.0	2 x 3.5 1 x 2.0	2 x 2.0	19.0	2 x 2.0	2 x 2.0	10% max 0.4% min	3%	8%	Or specific design

Notes: 1. Total road reserve width = carriageway + footpath/s + berm/s

* where a private way adjoins a collector road or higher, it shall have a 5m traffic width and 6m road reserve width for a minimum of 6m for road boundary.

** gradients > 16%, need specific design and must be concrete

*** parking is indented and provides 1 space per 4 dwelling units (du).

Part 4: Stormwater Drainage

Under normal circumstances design and construction of stormwater systems shall be undertaken in accordance with the requirements of Part 4, Stormwater of NZS 4404:2004, except as amended and extended for Dunedin City Council requirements in the clauses below.

In appropriate circumstances alternative specific proposals may be submitted with appropriate engineering information that will enable the Council to assess the proposal. An alternative system must provide a standard of stormwater system equivalent to that provided by systems conforming to NZS 4404:2004 and amendments included herewith, to ensure personal safety, minimise the risk of surface water flooding to acceptable levels, protect public and private property from inundation, and minimise damage to the environment from the adverse effects of stormwater runoff.

The Dunedin City Council has adopted Part 4 of NZS 4404:2004 with the following additions and/or alterations. All clause numbers refer to clauses in NZS 4404:2004.

4.1 Scope – add to end of clause

The Council will consider the utilisation and enhancement of natural systems for stormwater treatment and integration into the environment through subdivision and development design. When assessing proposals for subdivision and development the Council will look to:

- Encourage stormwater management methods that mimic natural runoff patterns
- Protect and enhance riparian vegetation
- Maintain sufficient water flows for healthy aquatic life
- Restore any degraded or piped channelled streams
- Encourage the use of swales within road reserves
- Promote the use of low impact design for development
- Consider on site disposal where practicable
- Encourage the fencing off of stock from water bodies and their margins
- Promote the use of soft engineering or bioengineering solutions
- Avoid straightening of streams.

Council promotes the efficient use of water resources within subdivision and development through the use of stormwater as a water resource for non-potable uses. When assessing proposals for subdivision and development the Council will look to:

- Promote the use of stormwater methods that minimise, retain, treat and reuse stormwater runoff within the development for non-potable uses such as irrigation, fire fighting, etc
- Ensure that stormwater water quality is of a standard suitable for the proposed use, where it will be used in contact with people
- Ensure that stormwater quality takes into account habitat requirements.

4.2.1 Objectives – add to end of clause

A stormwater drainage system is required that ensures personal safety, minimises the risk of surface water flooding to acceptable levels, protects public and private property from inundation, and minimises damage to the environment from the adverse effects of stormwater runoff.

The Council seeks to have high standard sustainable stormwater systems that minimise the effects of flooding, erosion and water pollution. Use of natural storage and retention of surface water will assist to achieve this, with some flooding of a temporary nature. Careful design of secondary flow paths will reduce potential for damage in flood conditions. Such designs should include provision of measures to restrict damage by flood such as locating dwellings to provide freeboard, prevent restriction of the flow path, creating gradients (where topography allows) which will not induce erosion, and incorporating measures to control erosion.

The New Zealand Building Code Section E1 contains design procedures that may be used in private property situations.

Stormwater systems shall be designed as part of an integrated approach to catchment and runoff management, considering:

- Measures to avoid adverse impacts on the water quality of receiving waters
- Measures to avoid increases in peak and total runoff
- Measures to allow for reuse of stormwater as a water resource taking into account the requirements for a water quality standard suitable for the intended use.

Stormwater systems shall minimise environmental impacts, which includes pollution of waterways, coastal and marine environments, erosion and habitats. The Council will consider alternative stormwater systems, which will have low impact on the receiving environment. This includes reduced pavement areas, permeable pavements, wetlands, ponds, swales, soak pits and attenuating devices in order to minimise environmental concerns and maintenance expenditure.

A stormwater management plan shall be formulated for the development.

The following documents provide best practice guidelines to assist in preparation of stormwater management plans:

- Environment Canterbury, 2007 “Erosion and Sediment Control Guidelines for Small Sites”.
- ARC Technical Publication No. 90 Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region, March 1999.
- Environment Canterbury, 2007 “Erosion and Sediment Control Guidelines for the Canterbury Region” Report No. CRCR06/23.

The stormwater management system shall:

- Prevent, as far as is practicable, the regular flooding of property and the damage which results from such flooding
- Minimise, as far as is practicable, the regular and prolonged flooding of roadways
- Provide a level of service which in no circumstance is less than that provided to the surrounding environment
- Provide for potential upstream development of the stormwater catchment.

Both open and closed stormwater system shall use safe and durable materials and be constructed to minimise the likelihood of leakage and infiltration and to withstand anticipated pressures and loads. Materials used in the stormwater system shall be compatible with the Council’s existing systems and approved Schedule of Materials.

Stormwater systems shall be positioned so as to be easily located, provide reasonable access for maintenance and be constructed in a manner that enables easy isolation and replacement or repair of faults. Where open stormwater systems, including secondary flow paths, are proposed to cross public land, the Council’s Community and Recreation Services department should be consulted.

4.2.3 Local authorities’ requirements – add to end of clause

The Dunedin City District Plan specifies zones in which it is required that all allotments shall have reticulated stormwater available within the allotment or have reticulated stormwater or kerb and channel or watertables available within the road providing access (Rule 18.5.6(c) of the District Plan). In these zones the Council will not grant subdivision approval where this service is not available, unless the consent holder upgrades or extends the service to the Council’s satisfaction or an alternative solution is approved by the Council.

Dunedin City Council and Otago Regional Council hold significant information concerning catchments, flood plains, flood levels, waterways and existing systems. Developers should approach the Councils and obtain any relevant information held that may be relevant to a proposed development.

4.2.8 Catchments and off-site effects – add to end of clause

As far as possible stormwater systems shall provide for source control systems for stormwater runoff such as on-site soakage and detention or other measures to reduce peak flows.

Stormwater systems shall be provided so that any new development results in an insignificant increase of runoff into the receiving body up to the 1 in 10 year event wherever possible, or, if not possible, result in a minimal increase for which adverse effects are no more than minor.

4.3 Design – add before clause 4.3.1

Stormwater systems shall be designed in a way which, while meeting other criteria, minimise the overall life-cycle costs inclusive of capital, maintenance and rehabilitation costs. For the purposes of this criteria, the life-cycle shall be taken as no less than:

- Pipe work, appurtenances, all associated concrete work, tankage and detention structures: 80 years
- Mechanical and electrical plant, with provision made for easy maintenance and replacement: 25 years.

4.3.1.2 Information to be provided – add to end of clause

The information requirements outlined in the first set of sub-paragraphs (a) to (e) and subparagraphs (a), (c) and (d) from the second set are to accompany resource consent applications. The other information requirements are generally required for plan and specification approvals, but may be required for assessment of resource consent applications.

4.3.2.5.1 Design storms – amend clause

Replace the table in clause 4.3.2.5.1 with the following table:

Function	*AEP %*	*Return period*
Primary protection	10	10
Primary protection in areas where secondary flow paths are not available or are through private property	1	100
Secondary protection	1	100

4.3.3.1 Location and alignment of stormwater mains – add to end of clause

In general curved pipelines are not acceptable. However the Council may accept curved alignments for large pipelines and culverts which are able to be traversed by people.

4.3.3.2 Pipe materials – add to end of clause

The following pipe materials are not acceptable:

- Corrugated aluminium pipe
- Corrugated steel pipe.

4.3.3.3 Building over pipelines – add to end of clause

Only in exceptional circumstances will building over pipelines be permitted.

4.3.3.5 Minimum pipe sizes – delete clause and replace with the following

Minimum pipe sizes, unless otherwise specified, shall be as set out in the following table. A pipe size shall be not less than the size of an incoming pipe.

Size (internal diameter)	*Function*
150 mm	Serving up to three properties, but not including sumps of any type.
225 mm	Stormwater mains serving one sump. Single sump outlets.
300 mm	Stormwater mains serving two or more sumps. Double sump outlets. Culverts, including for driveways.

4.3.3.6 Minimum cover – add to end of clause

Minimum cover shall be in accordance with manufacturer's recommendations, but shall be no less than:

- under carriageways – 750 mm below surface level
- in other situations – 750 mm below ground level where subject to vehicle loading, or otherwise 600 mm.

Where this is not possible due to topography, concrete protection shall be provided to the satisfaction of Council.

4.3.3.10 Inlets and outlets – add to end of clause

For pipelines up to 900 mm diameter:

Approved type structures shall be constructed at the inlets and outlets of pipelines. An acceptable type of concrete structure is shown on Drawings 10318 to 10321 (Appendix A1 to this Code). Provision must be made for energy dissipation unless it is demonstrated by the subdividing owner that outlet velocities and soil conditions are such as to make this unnecessary. The design shall ensure non-scouring velocities at the point of discharge.

Headwall heights shall be calculated from the formula:

$$H = 1.5 \times \frac{V2}{19.62} + \frac{d}{2000}$$

where:

H = Headwall height in metres above pipe invert

V = Full pipe velocity in metres per second

d = Pipe diameter in mm

Gratings shall be provided on all intakes in accordance with the details shown on Drawings 10318 to 10321.

For pipelines over 900 mm diameter:

These structures will be the subject of specific design, to be approved by the Council.

4.3.4 Manholes – add before clause 4.3.4.1

In this stormwater drainage section some manhole details are included as particularly relevant to stormwater. However, details of manholes under Part 5: Wastewater, clauses 5.3.6.4.1 to 5.3.6.4.8, together with amendments, shall apply equally to stormwater manholes.

4.3.4.1 Standard manholes – add to end of clause

Drawings 10323, 10329 and 10330 as attached in Appendix A1 may also be utilised for stormwater systems.

4.3.5 Waterways – add before clause 4.3.5.1

Watercourses shall remain in a natural state wherever possible. Channel lining shall only be considered where planned maintenance is not considered appropriate or there is threat to life or property. Any lining shall be carried out in a manner and by a method that is sensitive to the surrounding environment.

Any work in watercourses apart from minor maintenance may be the subject of a separate resource consent from the Otago Regional Council.

Watercourses will not be accepted by Dunedin City Council for vesting as public infrastructure.

An information sheet is available from the Water and Waste Services Department on requirements relating to existing watercourses.

The developer is reminded that no water shall enter any building in a 50 year flood event and if flood levels in watercourses are calculated to be above the top of the bank the minimum floor levels shall be specified and will be recorded by way of a Consent Notice registered on the certificate of title. – Note that the design standard for stormwater pipework is a 1 in 10 year return period and for secondary flow paths a 1 in 100 year return period.

Refer also to Clauses E1-3.1 and E1-3.2 of the New Zealand Building Code 1992 with amendments to 2003.

4.3.6 Water quantity and quality control – add to end of clause

Water quality ponds (wet ponds), wetlands, or other effective treatment facilities shall be constructed for any new development where practical.

Pre-treatment devices may be constructed to prevent floating contaminants and debris entering into the wet ponds or other treatment systems.

The design and construction of any treatment facilities shall be undertaken in such a way that future maintenance can be readily carried out.

4.3.7.1 Individual lots and developments – amend clause

Replace the first sentence with the following:

The connection of individual lots and developments to a stormwater system shall meet the following requirements, unless otherwise approved by the Council:

Add the following to paragraph (a):

The stormwater connection shall generally be to a piped stormwater system but where the topography permits the stormwater may be piped to the road channel.

Replace paragraph (c) with the following:

Each stormwater connection shall be capable of serving the whole building area of the lot, except where the Council agrees this requirement is unreasonable and it can be shown that the proposed connection is adequate for a predetermined building location and floor plan.

Replace paragraph (e) with the following:

The minimum internal diameter of connections shall be:

- 100 mm for domestic lots
- 150 mm for commercial/industrial lots
- 200 mm for connections serving three or more dwellings or premises (unless otherwise approved by Dunedin City Council).

For an impervious area up to 600 m2, where the stormwater service will be provided by the street channel, two 80 mm diameter drain pipes spaced 600 mm apart shall be constructed to within the allotment and will terminate in an inspection opening (details are shown on Drawing 10317 in Appendix A1). For impervious areas larger than 600 m2, specific design details must be approved by the Council.

Replace paragraph (g) with the following:

Where the stormwater pipeline is outside the lot, the connection shall be extended to the boundary of the allotment. The maximum length of that connection shall be 30 m. Where the connection will cross more than one allotment boundary, the prior approval of the Council shall be obtained before the installation is made. Where a stormwater sewer, open or piped watercourse exists within the allotment no connection for the allotment need be provided.

Replace paragraph (h) with the following:

Connection to an alternative stormwater disposal system (such as vegetated swales, soakpits, soakage basins) may be acceptable, provided that the system meets the Council's requirements and any Otago Regional Council requirements.

Refer to clause E1-9.0 of New Zealand Building Code 1992 with amendments to 2003 for soakpit disposal guidelines and typical soakpit construction.

Replace paragraph (i) with the following:

Each connection shall be marked b y a 50 mm x 50 mm timber stake with the top painted green, (H3 treated pine or better) extending from below invert level of the connection to 600 mm above ground level. Location of the connection shall be accurately indicated on the as-built plan.

All connections to reticulation lines shall be sealed either by a factory sealed stopper or a plug fixed with a rubber ring and held with stainless steel wire.

4.3.7.2 Connection of lateral pipelines to mains – add to end of clause

Unless required otherwise by the Council, where a connection is deeper than 1.8 m below ground level a ramped riser shall be constructed to bring the connection to within 1.2 m of ground level subject to the connection providing reasonable service to the site.

Where an extended connection is to be taken from a sewer to the boundary of another allotment, a ramped riser need not be used and the extended connection may be sloped up at a continuous gradient from the sewer terminating just inside the allotment to be served, at sufficient depth to drain the building site.

4.3.8.2 Soak pits – add to end of clause

The use of soakpits for stormwater disposal is subject to the specific approval of the Council.

In areas with satisfactory soakage the Council may require on-site disposal through soakpits.

4.3.9 Easements – delete clause and replace with the following

Easements are required for protection of public stormwater pipelines, subsoil drains, waterways and secondary flow paths, when these are located in private property and parks and reserves.

Easements are also necessary where private pipelines serving one property cross another. Parks and reserves should also be regarded as private land in this respect, and the Reserves Act 1977 requires formal easement agreements for underground services. This also applies to any easements being transferred into Council ownership.

Pipeline easements shall be a minimum of 3 m wide, centred on the as-built pipeline, and must provide unlimited and unrestricted access for the Council to undertake maintenance work. Where pipes are laid to depths of 2 m or more, greater easement widths may be required to facilitate maintenance.

4.3.12.2 Estimation of surface water runoff – add to end of clause

In respect of runoff coefficients from land in the Residential 1 to Residential 4 zones, the coefficients shall be as shown in the chart below.

Zone	*Overall Runoff Coefficient*
Residential 1	45%
Residential 2	65%
Residential 3	70%
Residential 4	75%

Where the subdivision is in the Activity Areas or Industrial Zone the Runoff Coefficient will be determined in consultation with the Council.

4.3.12.2.2 Rainfall intensity and time of concentration – delete clause and replace with the following

Rainfall intensity data shall be taken from the Dunedin City Council Method for Calculating Rainfall Intensity. This is available from the Council's Water and Waste Services Department.

4.4.1 Construction standard specifications – delete clause and replace with the following

Construction specifications shall be subject to approval by the Council. Refer to Standard Drawings 10322, 10324 to 10328, 10334 and 10335 for pipe construction details.

Low impact designs and other alternative specific proposals shall have construction details referenced to an appropriate design guide and/or have full construction details provided, with appropriate supporting engineering information.

4.4.2 Pipeline construction – add to end of clause

No drainage reticulation work shall commence until written approval to proceed has been received from the Council.

4.5 Additional requirements – add new clause

Work in roads

Work undertaken on Council owned roads shall be undertaken in accordance with NZTA Temporary Traffic Management for Local Roads: Supplement to NZTA Code of Practice for Temporary Traffic Management – latest edition. Staff involved shall be suitably qualified in accordance with the above code.

Waterways

Where open watercourses are to form part of the land drainage system this shall be determined at resource consent application approval stage, and the subdividing owner shall submit sufficient engineering design to enable the Council to evaluate the proposals.

Drains in common

Drains in common may be used for subdivisions where:

a) restraints make the provision of separate drains impracticable, or

b) the property boundary is more than 30 m from an available outfall or the building is more than 60 m from an available outfall, or

c) specific approval has been obtained from the Council.

Drains in common shall comply with the following:

i) The drain shall provide service to no more than three household units or three allotments. No part of the drain in common is to have been laid prior to 1960. Existing drains proposed to be drains in common shall have rubber ring joints. Any part of a proposed drain in common not meeting these requirements shall be upgraded

ii) An inspection chamber shall be provided at each junction of a drain and the drain in common. (Note: An acceptable solution is defined in the Building Code G13 ASI, Inspection Chamber with Open Drain, Fig. 11 and 12)

iii) The responsibilities of landowners who own the drain in common shall be established by a consent notice on the certificates of title.

In creating a drain in common, the following conditions shall apply:

i) Up to but no more than three household units or allotments may combine on a 100 mm drain where grades and alignment permit

ii) Where a subdivider wishes to connect to an existing 100 mm drain, the Technical Support Officer, Building Control must be satisfied that the existing drain is suitable in all respects. All expenses incurred in testing shall be a charge on the subdivider.

Types of drain

Common drain: A common drain is a private drain which serves one lot regardless of the number of dwellings on that lot and regardless of whether it traverses adjacent lots.

Drain in common: Drains with appropriate easements serving more than one lot will be considered drains in common, as will the section of drain within the road reserve between the lots served by it and the pipeline to which it connects.

Public stormwater sewer: Public stormwater sewers include:

- Any stormwater sewer or pipeline which serves more than one lot except where a private drain-in-common situation applies as defined above
- Any drain so declared under Section 462 of the Local Government Act.

Inspection of sewers prior to approval

Prior to acceptance by Council all wastewater sewers and stormwater sewers shall be inspected by CCTV inspection equipment to confirm conformance with construction standards. Inspection is to be carried out in accordance with the NZ Pipe Inspection Manual 3rd Edition. Deliverables are to be a video record in DVD format, and inspection sheets produced by Clearflow or Flexidata.

Additional standard drawings

The drawings listed below and as attached are standard arrangement drawings relating to stormwater and are additional to those in NZS4404:2004.

Drawing	*Title*
10317	Connection of Stormwater Drains to Kerb and Channel
10318	Detail of Intake and Outlet without Vertical Grate and Sill
10319	Detail of Intake and Outlet with Vertical Grate
10320	Detail of Intake and Outlet with Inlet Sill
10321	Detail of Intake and Outlet with Inlet Sill and Vertical Grate
10322	Concrete Haunching for Rubber Ring Jointed Pipes 100 mm-600 mm Pipes
10323	Drop Installation Precast Manhole
10324	Pipe Bedding Detail
10325	Cut-off Walls and Trench Drainage for DN 150 to DN 300 Sewers
10326	Thrust/Anchor Blocks for DN 100 to DN 375 Mains – Sheet 1
10327	Thrust/Anchor Blocks for DN 100 to DN 375 Mains – Sheet 2
10328	Bulkheads and Trench Drainage for DN 150 and DN 300 Sewers
10329	Precast Manhole for uPVC Pipes Granular Bedding and Surround
10330	Precast Manholes with Approved Cover and Frame
10334	Bedding, Backfill and Surface Reinstatement

Part 5: Wastewater

Design and construction of wastewater systems shall be undertaken in accordance with the requirements of Part 5, Wastewater of NZS 4404:2004, except as amended and extended for Dunedin City Council requirements in the clauses below.

Alternative specific proposals may be submitted with appropriate engineering information that will enable the Council to assess the proposal. An alternative system must provide a standard of wastewater system equivalent to that provided by systems conforming to NZS 4404:2004 and amendments included herewith.

The Dunedin City Council has adopted Part 5 of NZS 4404:2004 with the following additions and/or alterations. All clause numbers refer to clauses in NZS 4404:2004.

5.1 Scope – add to end of clause

The Dunedin City District Plan specifies zones in which it is required that all allotments shall have reticulated sewerage infrastructure available within the allotment or within the road providing access (Rule 18.5.6(a) of the District Plan). In these zones the Council will not grant subdivision approval where this service is not available, unless the consent holder upgrades or extends the service to the Council's satisfaction or an alternative solution is approved by the Council.

Alternative designs

In appropriate circumstances the Dunedin City Council is prepared to consider alternative wastewater systems providing they meet overall design principles and performance criteria. A relevant consideration with these alternatives is that they make efficient use of available resources and are sustainable in the longer term.

The focus of the design shall be on providing reliable, affordable and environmentally acceptable wastewater collection, treatment and disposal systems that protect the public health and safety, and the environment and which are adequate to meet present and future needs. The wastewater system proposed shall result in minimal disturbance to the site and natural water systems.

Relevant requirements from this Section shall be applied to alternative supplies, including non-reticulated systems, particularly regarding:

- capacity
- clearances
- design life and durability.

On-site wastewater systems shall be specifically designed.

5.2 General – add before clause 5.2.1

Wastewater systems are required to collect, treat and dispose of wastewater and wastewater products in a manner that minimises adverse effects on the environment and safeguards the population from injury and illness caused by infection or contamination resulting from exposure to wastewater.

The Council is seeking to have reliable, affordable and environmentally acceptable wastewater collection and disposal systems that protect the public health and safety, and the environment and which are adequate to meet present and future needs.

Where the Council's wastewater network is available to service developments then each lot within the development shall be provided with a connection to a piped wastewater system connecting to the Council's system, unless alternatives are approved by the Council, subject to complying with the Council's trade waste bylaws.

The wastewater system shall use safe and durable materials which are compatible with their immediate surroundings, are constructed to eliminate the likelihood of leakage and infiltration and able to withstand anticipated pressures and loads. Materials used in the wastewater system shall be compatible with Council's existing wastewater systems and approved Schedule of Materials.

Wastewater systems shall be positioned so as to be easily located, provide reasonable access for maintenance and be constructed in a manner that enables easy isolation and replacement or repair of faults.

The wastewater system shall have adequate alarms, standby pump capacity, access points or other emergency provisions to minimise the risk and extent of loss of service due to failure, or maintenance requirements.

Private wastewater systems, including septic tanks and privately owned and operated treatment plants, shall be considered on a case by case basis. Secondary treatment systems are the preferred option. Private wastewater systems shall generally only be permitted where they achieve the least adverse effects on the environment (including consideration of economic life-cycle costs) and it can be demonstrated that sustainable management systems are in place for their long term operation and funding.

5.2.1 Objectives – amend clause

Replace

"(a) A single gravity connection for each property"

with the following

"(a) A single connection for each property or an alternative disposal system".

5.2.2 Referenced documents and relevant guidelines – add to end of clause

Nothing shall justify a level of service which is inferior to that provided to existing properties of a comparable use, or is inconsistent with the service levels required for the specific zone. All aspects of wastewater systems within the Dunedin City territorial area shall be undertaken in accordance with the relevant bylaws and all other relevant regulations.

5.3 Design – add to end of clause (before clause 5.3.1)

Underground piped reticulation shall convey wastewater to an approved discharge point, in a manner that ensures good public health and minimises adverse effects on the environment.

The design shall incorporate any downstream improvements required as a result of the works.

Wastewater disposal and treatment systems shall be designed in a way that minimises the overall life-cycle costs inclusive of capital, operating, maintenance and rehabilitation costs. For the purposes of this criterion, the life-cycle of specific components shall be taken as no less than:

- Pipe work, appurtenances, all associated concrete work, tankage and detention structures: 80 years
- Mechanical and electrical plant, with provision made for easy maintenance and replacement: 25 years.

5.3.1.2 Catchment design – add to end of clause

The wastewater system design shall demonstrate that the design has considered, and will allow for adequate capacity to meet reasonable expected future demand.

The wastewater drainage system shall be designed to serve the whole of the natural upstream catchment area. Flows shall be calculated assuming complete development to the extent defined in the current district plan.

The capacity of the existing wastewater system up to the point of connection to existing Council mains shall be checked and assessed on the basis of a fully developed catchment. Where existing mains are required to be upgraded, those mains shall be designed and constructed on the basis of full development of the catchment.

The cost of increased pipe size to service future development will be apportioned between the applicant and the Council, agreed with the Council prior to construction, and applied to development contributions over the area of benefit.

5.3.2.2 Scheme layout – add to end of clause

Pipe locations should be kept within the road reserve or other public open space, except where topography does not practically permit this.

5.3.2.6 Vertical curves – delete clause and replace with the following:

In general vertical curves are not acceptable. However the Council may consider special case situations where normal straight grades are impractical. In these cases specific designs, supported by appropriate information shall be provided to enable the Council to evaluate the proposals.

5.3.4 Easements – delete clause and replace with the following:

Easements are required for protection of public wastewater pipelines that are located in private property and parks and reserves.

Easements are also necessary where private pipelines serving one property cross another. Parks and reserves should be regarded as private land in this respect, and the Reserves Act 1977 requires formal easement agreements for underground services. This also applies to any easements being transferred into Council ownership.

Easements shall be centred on the as-built position of the pipeline. The easement shall be a minimum of 3 m wide and provide unlimited and unrestricted access for the Council to undertake maintenance work. Where pipes are laid to depths of 2 m or more, greater easement widths may be required to facilitate maintenance.

5.3.5.1 Design flow – delete clause and replace with the following

The design flow comprises domestic wastewater, commercial and industrial wastewater, infiltration and direct ingress of stormwater.

The wastewater system shall be capable of carrying and treating the peak flows anticipated during the economic lifecycle of the system, with due allowance for ground and surface water inflow and infiltration. Population density shall be based on proposed use but in no circumstance provide for less than a minimum of 45 persons per hectare or 3 persons per household for the urban area.

Reticulated design flows shall be not less than the following:

(a) Residential flows:

- Average dry weather flow (ADWF) 270 l/head/day
- Dry weather diurnal peaking factor 2
- Wet weather diurnal peaking factor 3
- 3.5 persons per dwelling.

(b) Commercial and light industrial flow:

Where flows from a particular industry or commercial development are known they should be used as the basis of design.

Where there is no specific information available the average dry weather flow shall be as set out in Table 5.2 of NZS 4404:2004. These flows include both sanitary wastewater and trade wastes, and include peaking factors.

5.3.5.5 Minimum grades for self-cleaning – add to end of clause

All wastewater systems shall be designed so that they are self cleansing with current or expected peak dry weather flows.

5.3.5.7 Minimum cover – add to end of clause

Minimum cover requirements shall be in accordance with manufacturer's requirements but shall be no less than:

- Under carriageways – 750 mm below surface level
- In other situations – 750 mm below ground level where subject to vehicle loading, or otherwise 600 mm.

Where this is not possible due to topography, concrete protection shall be provided to the Council's satisfaction.

5.3.6.1 Maintenance structures – General – delete clause and replace with the following

This section describes the requirements for structures which permit access to the wastewater system for maintenance. Only manholes are permitted.

5.3.6.2 Location of maintenance structures – amend clause

Delete Table 5.7 and references to it.

5.3.6.3 Maintenance structure spacing – delete clause and replace with the following

Manholes shall be provided at a spacing not exceeding 100 m. A manhole shall be located as close as practicable to the end of any pipeline.

5.3.6.4 Manholes – add before clause 5.3.6.4.1

Standard manholes

Circular manholes are to have a minimum internal diameter of 1050 mm and are to be used on pipelines up to and including 600 mm diameter and be constructed as detailed on Drawing 10330 (attached in Appendix A1). Refer also to Drawing 10323.

Precast manholes shall consist of centrifugally spun 1050 mm diameter concrete pipes to Class S standard.

The method of joining the precast sections shall be strictly in accordance with the recommendations of the precaster, and when using a proprietary jointing compound or adhesive, in conformity with the manufacturer's instructions, to provide a watertight structure to the Council's satisfaction.

Deep manholes

Where manholes are more than 5 m deep they shall be specifically designed, to the approval of Council.

Shallow manholes

The minimum depth of any manhole is 900mm.

Manholes on larger pipelines

Manholes on wastewater pipelines more than 600 mm diameter will be specifically designed and constructed to details approved by the Council.

For deep special manholes it may be more economical to construct the lower portion to the required larger dimensions with the standard 1050 mm diameter riser supported on a reinforced concrete slab on the lower large diameter chamber.

Curvature on the pipeline may be permitted providing that joint deflections are within the limits of the manufacturer's recommendations. Any pipeline curvature shall be the subject of specific approval by the Council.

Manholes in soft ground

Where a manhole is to be constructed in soft ground, the area under the manhole shall be undercut down to solid and back-filled with suitable hardfill to provide a minimum of 100 KPa bearing strength.

5.3.6.4.7 Covers – add to end of clause

Manhole covers and frames shall be standard Dunedin City Council, Water and Waste Services Department design. Heavy duty and light duty covers are to be manufactured of high quality grey iron, coated with a bituminous protective compound.

Light hinged covers may be used in areas of foot traffic only. In all other circumstances a heavy duty cover will be used.

5.3.6.5 Maintenance shafts (MSs) – delete clause and replace with the following

Maintenance shafts are not permitted.

5.3.6.6 Terminal maintenance shafts (TMSs) – delete clause and replace with the following

Terminal maintenance shafts are not permitted.

5.3.8.1 Pipeline materials – add to end of clause

The designer shall be responsible for selection of appropriate pipe materials from the approved list as below and conforming to the nominated standards:

a) Concrete pipe to NZS 3107
b) Ceramic pipes to NZS 3302
c) HDPE pipes to NZS 7604 or AS 1159
d) uPVC pipes to AS/NZS 1260
e) Glass reinforced plastic pipe to AS 3571
f) MDPE pipes to AS 1159.

Where uPVC pipe is to be used and the constructed pipe is to be taken over as a Council owned asset it shall have a stiffness rating of SN16 as detailed in NZS/AS 1260:1999. In all other situations uPVC pipe will be to the requirements of the New Zealand Building Code Approved Document G13 (Foul Water).

Other pipes may be permitted subject to the specific approval of the Council.

In potentially unstable ground or where special protection is required, the sewer pipelines should be specifically designed.

All pipes shall be jointed with an approved jointing system. On uPVC, ceramic and concrete pipes, this will be rubber ring jointing. On HDPE pipe electrofusion couplings, fusion butt welding or pipe manufacturer's proprietary welding systems are acceptable. Other methods of flexible jointing shall be to the specific approval of the Council.

Concrete haunching is required for rigid and non-rigid pipes on grades of 1:20 or steeper.

5.3.9 Connection – add to end of clause

Where the top of an existing or proposed sewer is more than 3 m deep, connections shall not be made directly to it, but a new shallower branch sewer shall be laid from a manhole on the deep sewer and connections provided to the allotments to be served.

5.3.9.1 General considerations – add to end of clause

The connection provided for each allotment shall be of a type capable of taking an approved drain pipe of 100 mm internal diameter, unless the property is subject to a specific trade waste consent.

Where the foul sewer is outside the allotment, a 100 mm diameter connection shall be extended to the boundary of each residential allotment. Where the connection will cross more than one allotment boundary, the prior approval of the Council should be obtained. If these conditions cannot be met, then a 150 mm diameter branch sewer line will normally be required complete with a terminal manhole.

Each connection shall be marked by a 50 mm x 50 mm timber stake with the top painted red, (H3 treated pine or better) extending from below invert level of the connection to 600 mm above ground level. Location of the connection shall be accurately indicated on the as-built plan.

All connections to reticulation lines shall be sealed either by a factory sealed stopper or ceramic plug, fixed with a rubber ring and held with stainless steel wire.

5.3.10 Pumping stations and pressure mains – amend clause

Replace last sentence with the following:

In general pumping stations are to be constructed in accordance with WSA 04 Sewage Pumping Station Code of Australia. However, applicants should discuss requirements with the Council for particular proposals prior to final design. In general the Council will require:

- Stations to have not less than two pumps
- Above ground control system protected from the weather
- Automatic operation
- SCADA installed
- Soft step start or VSD
- Pumping stations to be located in publicly owned land.

5.4 Construction – add to end of clause

Reference to Clause 4.4.1 is to be read as reference to its replacement included in this Code.

Testing

(i) All wastewater main and branch pipelines of less than 600 mm diameter, including extended connections and manholes shall be able to withstand a pressure equal to a 3 m head of water without sign of leakage. The sewer shall be subject to an air, water, visual or smoke test. For specific test requirements for different pipe materials refer to the latest version of the Dunedin City Council specification for the construction of pipe sewers which is available from Council.

(ii) No visible infiltration into the manhole walls or floors will be permitted. The total infiltration in any portion of a foul sewer system shall not exceed a rate of 600 ml per 25 mm of pipe diameter per 1000 m of pipe in 5 minutes.

5.5 Additional requirements – add new clause

Connection of stormwater drains shall not be made to the wastewater system except under the specific provisions of a trade waste consent. Systems shall be designed to eliminate the risk of inflow and infiltration.

Work in roads

Work undertaken on Council owned roads shall be undertaken in accordance with NZTA Temporary Traffic Management for Local Roads: Supplement to NZTA Code of Practice for Temporary Traffic Management – latest edition. Staff involved shall be suitably qualified in accordance with the above code.

Types of drain

Common drain: A common drain (generally 100 mm diameter) is a private drain which serves one lot regardless of the number of dwellings on that lot and regardless of whether it traverses adjacent lots.

Drain in common: Drains with appropriate easements serving more than one lot will be considered drains in common, as will the section of 100 mm diameter drain within the road reserve between the lots served by it and the pipeline to which it connects.

Public sewer: Public sewers include:

- Any sewer or pipeline of 150 mm diameter or more which serves more than one lot, except where a private drain in common situation applies as defined above
- Any drain so declared under Section 462 of the Local Government Act.

Gully trap level

The requirements of the New Zealand Building Code in regard to gully traps will apply.

On-site wastewater systems

In areas not able to be connected to the Council wastewater system, ecosystem services for treatment and assimilation of wastewater into the environment may be approved as neighbourhood or individual systems subject to Council approval.

Considerations will include the following:

- Involvement of suitably qualified and experienced suppliers
- Extension of supplies service to monitoring and maintenance
- Balance of environmental risk and public health concerns
- Reasonable levels of maintenance and responsibility for future owners
- Prior approval of Dunedin City Council and Otago Regional Council before subdivision application
- A comprehensive report on soil and site evaluation including treatment parameters to be achieved and ground capacity to assimilate effluent.

Once installed, a community based system will not be accepted until presentation of a satisfactory compliance certificate including operating manuals, as-built drawings, monitoring and maintenance requirements and a copy of section 221 notice per the RMA 1991 as amended.

On-site disposal systems shall have minor environmental effects which can be contained within the lot. They shall be designed to minimise maintenance needs. The design shall be based on field testing and any other site investigations needed to demonstrate that the effects on the environment of the system will be minor.

On-site wastewater treatment and disposal systems, where permitted, shall be designed and constructed in accordance with AS/NZS 1547. No wastewater shall be discharged to the environment unless it has first been treated to avoid the likelihood of contamination of soils, groundwater and waterways except as permitted under the Resource Management Act 1991.

The discharge of wastewater is governed by rules in the Otago Regional Water Plan. Applicants should consult with the Otago Regional Council to determine whether or not resource consents are required from that Council for the activities they intend to undertake, and what conditions must be met to comply with permitted activity rules.

Any Otago Regional Council requirements shall be noted in resource consent applications to Dunedin City Council.

Independent community systems

Independent network disposal systems shall have environmental effects equivalent or better in all respects with that achieved by public reticulation and treatment, and shall be such that the effects of disposal remain entirely within the specified disposal area. They shall be designed to minimise maintenance needs. The design shall be based on field testing and any other site investigations needed to demonstrate that the effects on the environment of the system will be minor.

Pumping stations, rising mains and treatment plants

Pumping stations will only be considered and approved by the Council when all other options are impracticable. The Council will take over operation and maintenance of pumping stations, treatment plants and similar providing they are properly designed, constructed to the Council's approval and satisfactorily commissioned.

Design of pumping stations, treatment plants and similar shall be carried out by suitably qualified persons and such persons will need to consult with Council staff at an early stage to establish specification requirements. Note that the Council will be concerned with all aspects of operation, maintenance, access and security of pumping stations and similar facilities. All mechanical and electrical equipment installations are to be compatible with existing Dunedin

City Council installations. Pumping stations and similar will need to be equipped with SCADA systems linked to the Council's monitoring centres.

Attention is drawn to requirements of the Otago Regional Council for protection of receiving waters and standards for treatment plant effluent for which a resource consent will be required.

Where required, pumping stations and similar shall be provided entirely at the expense of the developer and be located in publicly owned land. In addition, a financial contribution will be required based on the net present value of the ongoing operation, maintenance and replacement costs.

Close proximity to buildings

Special design and approval will be required when building over or in close proximity to public drains. This will need to be dealt with in conjunction with any building consent application. In general, the requirements to build near or over any public wastewater drain are as follows:

i) No building will be permitted closer than 1.5 m from the outside of a manhole or the wastewater pipeline.

ii) Council approval will be required for any building work above or within 1.5 m of the wastewater pipeline. Any construction over or within 1.5 m will need to be designed by a structural engineer to bridge the pipeline. The design details, including appropriate calculations, are to be submitted with the building consent application.

iii) CCTV inspections will also be required before and after construction.

iv) When building over or near to wastewater drains, foundations must be taken to 500 mm below the invert of the pipeline and be at least 1.0 m clear of either side of the wastewater pipe.

Additional standard drawings

The drawings listed below and attached in Appendix A1 to this Code are standard arrangement drawings relating to wastewater and are additional to those in NZS4404:2004.

Drawing	*Title*
10322	Concrete Haunching for Rubber Ring Jointed Pipes 100 mm-600 mm Pipes
10323	Drop Installation Precast Manhole
10324	Pipe Bedding Detail
10325	Cut-off Walls and Trench Drainage for DN 150 to DN 300 Sewers
10326	Thrust/Anchor Blocks for DN 100 to DN 375 Mains – Sheet 1
10327	Thrust/Anchor Blocks for DN 100 to DN 375 Mains – Sheet 2
10328	Bulkheads and Trench Drainage for DN 150 and DN 300 Sewers
10329	Precast Manhole for uPVC Pipes Granular Bedding and Surround
10330	Precast Manholes with Approved Cover and Frame
10334	Bedding, Backfill and Surface Reinstatement

Part 6: Water Supply

Design and construction of water supply systems shall be undertaken in accordance with the requirements of Part 6, Water Supply of NZS 4404:2004 except as amended and extended for DCC requirements in the clauses below.

Alternative specific proposals may be submitted with appropriate engineering information that will enable the Council to assess the proposal. An alternative system must provide a standard of supply equivalent to that provided by systems conforming to NZS 4404:2004 and amendments included herein, to ensure a secure and reliable supply of drinking water to protect public health and meet fire fighting requirements, while promoting water conservation, all at the lowest total lifecycle cost.

The Dunedin City Council has adopted Part 6 of NZS 4404:2004 with the following additions and/or alterations. All clause numbers refer to clauses in NZS 4404:2004.

6.1 Scope – add to end of clause

The Dunedin City District Plan specifies zones in which it is required that all allotments shall have reticulated water supply available within the allotment or within the road providing access (Rule 18.5.6(d) of the District Plan). In these zones the Council will not grant subdivision approval where this service is not available, unless the consent holder upgrades or extends the service to the Council's satisfaction or an alternative solution is approved by the Council.

Alternative designs

In appropriate circumstances the Dunedin City Council is prepared to consider alternative water supply arrangements providing they meet overall design principles and performance criteria. A relevant consideration with these alternatives is that they make efficient use of available resources and are sustainable in the longer term.

On-site water supply systems shall be specifically designed. The focus of the design shall be on the efficient and safe use of water resources within a site. The water system proposed shall result in minimal disturbance to the site and natural water systems.

Relevant requirements from this Part shall be applied to alternative supplies, including non-reticulated supplies, particularly regarding:

- water quality
- water quantity
- fire fighting supply
- storage
- design life and durability.

Alternative network water supplies must be registered with Public Health South as they will need to comply with the Health (Drinking Water) Amendment Act 2007.

6.2 General requirements – add before clause 6.2.1

Water supply systems are required to ensure a secure and reliable supply of potable water for consumption and of water for the purposes of fire fighting. The Council seeks to have a reliable water supply to acceptable quality and reasonable quantity standards that will meet the present and future water supply needs of the community in order to protect public health and meet fire fighting requirements, while promoting water conservation. This is to apply equally to existing supply areas and the new areas created by subdivision, all at the lowest total lifecycle cost. In all circumstances the system shall promote public health and well-being, and shall be appropriate to the type of development and use.

The Council is looking to reduce peak consumption to reasonable, sustainable levels using a range of conservation and demand management measures.

Where the Council's potable water supply network is available to service developments then each lot shall be provided with a connection and each development shall be provided a piped water supply system connecting to the Council's system, unless alternatives are approved by the Council.

In areas with inadequate wastewater disposal systems, such as septic tanks, the Council reserves the right to deny a water connection until such time as a satisfactory disposal arrangement is available.

All water supply systems shall use safe and durable materials which are compatible with Council's existing water supply systems and Schedule of Approved Materials. The system shall be constructed to prevent leakage and potable water contamination and to withstand anticipated pressures and loads.

Where alternative designs for pipeline systems are proposed, the Council reserves the right to extend contract maintenance periods for the purpose of proving the reliability of any alternative system accepted.

Water supply systems shall be positioned so as to be easily located, provide reasonable access for maintenance and be constructed in a manner that enables easy isolation and replacement or repair of faults.

The water supply system shall have adequate valves, meters, alarms, looped pipe systems or other emergency provisions to minimise the risk and extent of loss of service, or contamination of supply due to failure, or to maintenance requirements.

The water supply system shall include adequate facilities for monitoring of system operation as part of management of the supply or for measurement of supply for charging. The monitoring system shall be compatible with the Council's preferred current system of monitoring.

Note: Water supplies for agricultural use are outside this Code

6.2.1 Objectives – delete clause and replace with the following

The objectives are to ensure that the water reticulation system is functional, the required quality and quantity of water is supplied to all customers within the Dunedin reticulated supplies and unreticulated areas, and that all other requirements of Dunedin City Council are satisfied.

The design shall ensure an acceptable water supply to each property including fire flows by providing either:

a) A water main allowing an appropriate point of supply to each property, or
b) A service connection from the main for each property, or
c) An alternative supply not from a water main.

The designer shall consider:

- Dunedin City Council policies, customer charters, bylaws and contracts
- The hydraulic adequacy of the system
- The ability of the water system to meet public health criteria and to maintain overall acceptable water quality
- The structural strength of the water system components to resist applied loads
- The requirements of SNZ PAS 4509
- OSH requirements
- Environmental requirements
- The environmental and community impacts of the works
- The "fit-for-purpose" service life for the system
- Optimising the "whole-of-life" cost, and
- Each component's resistance to internal and external corrosion or degradation.

6.2.2 Referenced documents and relevant guidelines – add to end of clause

Nothing shall justify a level of service which is inferior to that provided to existing properties of a comparable use, or is inconsistent with the service levels required for the specific zone. All aspects of domestic water supply within the Dunedin City territorial area shall be undertaken in accordance with the Dunedin City Council Water Bylaw 2008 and all other relevant regulations.

The Council holds significant information concerning the existing systems. Developers should approach the Council and obtain any relevant information held that may be relevant to their proposed development.

6.3.1 Design life – add to end of clause

Water supply systems shall be designed in a way which, while meeting other criteria, minimises the overall life-cycle costs inclusive of capital, operating, maintenance and rehabilitation costs. For the purposes of this criterion, the life-cycle of specific components shall be taken as no less than:

- Pipe work, appurtenances, all associated concrete work, and storage tanks: 80 years
- Mechanical and electrical plant, with provision made for easy maintenance and replacement: 25 years.

6.3.7.1 Sizing of mains – delete clause and replace with the following

Under peak demand conditions, excluding fire fighting, the residual pressure in the water reticulation of residential, commercial and industrial planning zones shall not be less than 300 kPa when measured at ground level at the roadside boundary of lots.

Under fire fighting conditions the pressure at any hydrant shall not be less than 100 kPa. For fire fighting requirements see SNZ PAS 4509.

6.3.7.2 Pipe class – delete clause and replace with the following (retaining subclauses 6.3.7.2.1 to 3)

Pipe class is established on the basis of the design pressure (head) determined for various sections of the reticulation network. For operational reasons the minimum allowable pipe pressure ratings shall be as in the table below.

Table: Minimum allowable pipe pressure ratings

Pipe material	*Authorised sizes – DN**	*Standard minimum*	*Remarks*
CLDI	100–375	PN 35	Rubber ring joints, PE loose sleeve. PN16 fitting unless higher pressure required
MSCL	300–450	To suit application –min steel thickness 4.8 mm	Welded or rubber ring joints, approved tape wrapping or alternative for exterior
PVC-M	100–450	PN 16	Only series 2 pipes with rubber ring joints are approved. For PVC-O, material classes 400 and 500 are acceptable
PVC-U	100–450	PN 16	
PE 80B or PE 100	25–63	PN 12.5	Approved mechanical couplings
	125–400	PN 16	Electrofusion couplers or butt fusion weld**
	>400	As approved	Butt fusion weld**

*PE diameter relates to the pipe OD, others relate to nominal ID of pipe

**Only to be carried out by trained and accredited PE welder

In respect of sub-mains and service pipes the allowable pipe sizes and minimum PN are as follows:

- DN 25 PE 80B PN 12.5
- DN 63 PE 80B PN 12.5
- DN 40 and DN 50 PE 80B (PN 12.5) may be used for service connections with Council approval.

6.3.7.3 Pipe materials – add to end of clause

6.3.7.3.1 PVC systems

PVC pipes shall comply with AS1477 and shall have socket and spigot type joints with Z type rings.

Connections to fittings shall be by flange adapter or by flanged gibault adapter (plain fittings are not to be used).

Bends are required if pipes are to be laid on a curve of radius less than 300 times the nominal diameter of the pipe (45 m radius for 150 mm pipe).

Large radius PVC bends fabricated from PN16 (minimum) pipe shall be permitted for PVC mains up to and including 150 mm diameter. However, flanged ductile iron bends shall be used adjacent to a flanged fitting.

When non-standard bends are required and/or additional strength is necessary, flanged bends shall be fabricated from concrete lined mild steel pipe (CLMS).

6.3.7.3.2 Polyethylene (PE) systems

PE pipes shall comply with AS4130. PE pipes shall be pressure application pipes and shall be blue in colour unless permitted otherwise by the Council for above ground use.

Up to three black longitudinal stripes up to 5 mm in width will be accepted as a trademark.

Jointing shall be carried out in accordance with the manufacturer's recommendations as follows:

i) *Electrofusion:* couplers and fittings shall comply with the international 39.5 volt system. Electrofusion welded tapping bands are not permitted.

ii) *Butt welding:* shall be permitted only when the pipes and spigot fitting are either side of the same dimensional SDR (wall thickness) and are not misaligned. All welding is to be carried out by welding operators certified in accordance with the UNITEC/Australian National Plastics and Rubber Industry Training Council, or similar approved certification. All welds are to be stamped with the identification of the certified welder. The name and number of the certified welder shall be notified in writing for Council approval prior to any welding being done. All welding shall be carried out under controlled conditions, i.e. use of a tent is required. Upon request a welded joint (selected at random) will be provided at no cost to Council for testing. If the test is unsatisfactory, additional joints will be tested and all costs associated with the testing and reinstatement will be met by the developer. Only butt welding equipment capable of providing a printout of individual weld parameters shall be used.

   IMPORTANT NOTE: The maintenance period for all PE electrofusion and butt welded joints shall be five years and any problems with welded joints experienced during this period shall be rectified at no cost to Council.

iii) Mechanical jointing systems (such as System 2000 or Push 10k) are not approved as a pipe jointing system except for PE pipe up to and including 63 mm. However, mechanical jointing systems for end caps and flange adaptors for larger diameter PE pipe are approved for use.

Bends are required if PE pipes are to be laid on a curve of radius less than 22 times the nominal diameter of the pipe.

PE bends (to be butt welded or joined with couplers) and bends with built in electrofusion couplers are approved and must be used to achieve the correct alignment.

6.3.7.3.3 Steel/iron systems

Ductile iron pipes (greater than 150 mm) and steel pipes shall be concrete lined (or with other approved lining such as epoxy) and shall comply with AS2280 and NZS4442 respectively. Steel pipes shall be wrapped in black or blue jacket polyethylene (for in ground use) or epoxy/enamel coated (for out of ground use) or wrapped with the Denso Petrolatum Tape System (or similar approved protection system) should ground conditions require.

All bolted systems and exposed surfaces shall also be wrapped with the Denso Petrolatum Tape System (or similar approved protection system).

6.3.7.3.4 Pipe fittings

All joints, bends, tees, crosses, tapers, risers, connections, blank caps and other fittings shall be manufactured, designed and constructed to withstand 16 bar working pressure.

All ductile iron fittings shall be nylon or epoxy coated.

PE tees and hydrant tees are not permitted, whether these are flanged or plain (welded) type.

Galvanised bolts used with flanged connections must be fully protected using the Denso application specification detailed in SD 6.09 or an equivalent. The use of the primer and the common Denso tape liberally applied is a minimum requirement.

Backing rings associated with PE stub flanges must be nylon or epoxy coated.

Galvanised bolts must not be used in conjunction with tapping bands.

The following fixtures and fittings standards are acceptable:

- PE-AS 4130, WIS 4-32-04, BS 6572, NZS 7610
- Ductile Iron – AS 2280 (protected accordingly)
- Welded Steel – NZS 4442 (protected accordingly)
- Stainless steel (nuts and bolts etc.) grade 316
- Galvanised Mild Steel (nuts and bolts etc.) grade 4.6 (protected accordingly).

Denso tape (or an approved equivalent) must be fully applied to all galvanised bolts and fittings. This includes the entire wrapping of the galvanised backing ring associated with PE stub flange.

6.3.8 Fire flow – amend clause

Replace “water reticulation system” with “water supply system”.

6.3.9.6.1 Design pressures – add to end of clause

The maximum design static pressure should generally not exceed 900 KPa (90 m head).

The minimum pressure under maximum demand conditions (excluding fire flows) shall be 300 kPa as indicated above under clause 6.3.7.1.

6.3.10.1 Layout of water mains: General – add to end of clause

The preferred position for water mains is located in berms or footpaths within the road reserve, and at 1.4 m from boundaries, wherever practicable.

Water mains behind retaining walls shall be installed in ducts.

6.3.10.3 Water mains in easements – add to end of clause

Easements are required for protection of public water supply pipes where these are located in private property and parks and reserves.

Easements are also required where private water supply pipelines serving one property cross another property. Parks and reserves should be regarded as private land in this respect, and the Reserves Act 1977 requires formal easement agreements for underground services. This also applies to any easements being transferred into Council ownership.

Pipeline easements for public water supply pipes shall be a minimum of 3 m wide, centred on the as-built position of the pipeline, and shall provide for unlimited and unrestricted access for the Council to undertake maintenance work. Where pipes are laid to a depth of 2 m or more, or are larger than 600mm dia, a greater easement width may be required to facilitate maintenance. Easements relating to private water supply services shall preferably be a minimum of 2 m wide.

6.3.10.6 Shared trenching – add to end of clause

Council may allow shared trenching for different services but subject to approval on a case by case basis.

6.3.10.11 Location marking of valves and hydrants – add to end of clause

Valve boxes and surrounds shall be in accordance with Drawing 10343 (attached in Appendix A1).

6.3.11.6 Trenchless technology – add to end of clause

Voids greater than 50 mm around horizontally thrust or drilled water mains shall be backfilled and sealed with bentonite grout (or similar approved material). Only PE pipe may be used with trench less laying methods and watermains shall not vary more than 150 mm from the intended horizontal alignment. Watermains at depths greater than 1000 mm cover may be rejected (refer also to Clause 6.3.10.2(8) re minimum cover). PE 63 diameter pipe laid by trenchless methods shall be PE 80B or PE 100 material (Refer to Clause 6.3.11.7.1 regarding the minimum allowable pipe pressure and the provision of detectable warning tape).

6.3.11.7.1 Pipe cover – add to end of clause

The minimum cover to trunk and principal mains shall be 600 mm in non-trafficable areas. The minimum cover to rider mains shall be 450 mm. The minimum cover under roads shall be 750mm. The maximum cover shall not exceed 1000 mm except in exceptional circumstances and with the approval of the Council.

6.3.11.8 Pipeline restraint – add to end of clause

For non-continuous pipelines cast in situ concrete anchor blocks shall be provided at all points where an unbalanced thrust occurs on mains exceeding 50 mm diameter. This shall include all bends, tees, valves, hydrants and at any other position as may be required. Thrust blocks shall be poured against natural ground and the inner face of the block shall not be of a lesser thickness than the diameter of the fittings and shall be so constructed as not to impair access to the bolts on the fittings or access to adjacent joints or fittings. Concrete shall have a minimum compression strength of 17.5 mPa at 28 days.

A protective membrane (such as denso tape) to protect against abrasive damage to the watermain shall be provided between the pipe (irrespective of the pipe material) and the concrete anchor or thrust blocks.

All thrust and anchor blocks shall be left exposed for inspection before backfilling over.

Cast-in-situ anchor blocks are not required where a total PE system has been installed. This only applies where all pipes adjacent to a fitting to be anchored are continuous PE pipes. Precast concrete blocks should be used to support valves and hydrants however. If mechanical PE joint is used at a fitting, then a conventional anchor block must be constructed.

Refer to Drawings 10326, 10327 and 10335 (attached in Appendix A1) for construction details for thrust and anchor blocks.

6.3.12 Reservoirs and pumping stations – delete clause and replace with the following

A development may require the construction of booster pumping stations and/or storage in order to comply with requirements. Where these are required, the DCC shall be consulted on the specific requirements and the pumping stations shall be provided at the entire expense of the developer. If properly designed and constructed to the Council's approval, the Council may take over their future operation and maintenance after they have been commissioned. In some situations a financial contribution to cover future operation, maintenance and replacement costs may be required. Design shall be carried out by a qualified professional engineer.

Pumping stations will be required to meet the design criteria in WSA 03, Water Reticulation Code of Australia, and in general the Council will require:

- Stations to have not less than two pumps
- Above ground control system protected from the weather
- Automatic operation
- SCADA installed
- Soft step start or VSD
- Pumping stations to be located in publicly owned land.

6.3.14 Water quality – add to end of clause

New components connected to the water supply in the urban or non-urban water network must be capable of providing potable water in compliance with the Health (Drinking Water) Amendment Act 2007, to the point of connection for users. For the urban water supply the applicable standard is Grade Ac. Network water supplies to dwellings outside the urban water network shall provide water of quality to Grade Cc or better.

6.4.1 Valves: General – add to end of clause

All valves used on the Dunedin City water supply and reticulation systems shall be as described in the Water and Waste Services department "Approved Manufacturers and Products List" or otherwise specifically approved by Council.

Refer to Drawing 10343 (Appendix A1 to this Code) for typical sluice valve installation details.

6.4.2.1 Gate valves – add to end of clause

15 mm-50 mm valves

All valves shall be clockwise closing. Ball valves are not permitted. Gate valves on rider mains shall be resilient seated (Hawle or equivalent) and shall be installed in accordance with Drawing No 10340 (Ali-Bronze or LG2 50 mm valves are not permitted). Markings (and posts, if required) shall be provided for 50 mm valves in accordance with Drawing WS-006 in NZS 4404:2004. Boxes and surrounds shall be provided.

6.4.2.2 Butterfly valves – delete clause and replace with the following

Butterfly valves are not acceptable in the reticulation, but subject to specific approval of Dunedin City Council may be acceptable in some situations.

6.4.2.3.1 Stop valves – locations and arrangements – add before clause 64.2.3.1.1

A valve shall be placed on each branch of each tee such that no more than 3 valves need to be closed to isolate any part of the reticulation system. A valve is required on each road crossing. Valves shall be installed at connecting points and elsewhere as necessary to separate the principal main or rider main into sections supplying not more than 25 customers for sluice valves on principal mains, or 12 customers for gate valves on rider mains.

6.4.2.5.2 Air valve locations – add to end of clause

Air valves shall generally be provided by locating a fire hydrant at either the most elevated position or the lowest point of mains on roads with significant gradients. Where the Council confirms that scouring is likely to be a frequent operation, a connection to the stormwater system shall be provided from scour points. Automatic air release valves shall be provided when required and positioned so that ground water cannot enter the main at negative pressure.

Refer to Drawing 10345 (Appendix A1) for typical installation requirements. Generally double orifice air release valves will be required.

6.4.2.7 Sluice valves – add new clause

Sluice valves on principal and trunk mains shall be Class 1 resilient seal, epoxy or nylon coated to AS/NZS 4158:1996 and 16 bar pressure rated to NZS/BS5163:86 and shall be anti-clockwise closing. All sluice valves shall be flanged to BS10 Table D. Markings (and posts, if required) shall be provided in accordance with Drawing 10337 (Appendix A1). Boxes and surrounds shall be provided.

6.5.1 Hydrants general – add to end of clause

All hydrants for installation in the Dunedin City Council territorial area shall conform with the Water and Waste Services department "Approved Manufacturers and Products List", being of the medium pattern screw down type. All hydrants shall be provided with a bronze tapered frost plug fitted on the outlet side of the valve.

6.5.2 Hydrants for fire fighting – add to end of clause

All principal mains shall be provided with fire hydrants. Trunk mains shall be provided with fire hydrants as advised by the Council. Hydrants shall be spaced at intervals not exceeding 90 m in commercial and industrial areas and 135 m in urban areas.

Furthermore, a hydrant must be provided within 90 m for lots within an industrial or commercial area, or within 135 m of the furthermost portion of any lot in an urban area. The distance to the furthermost portion of any lot may exclude the bush-protected area of the land. Where there are four or more lots serviced by a right-of way then a hydrant must be provided at the entrance to the right-of-way.

Fire coverage outside of the urban fire district shall be as advised by the Council. In cul-de-sac or other terminal streets the last hydrant shall be not more than 85 m from the end of the street.

Note:

The New Zealand Fire Service Fire Fighting Water Supply Code of Practice SNZ PAS 4509:2008 allows for the use of sprinkler systems (domestic included) in determining fire fighting requirements from the public water supply. In addition, storage of water can be provided in lieu of fire hydrant supply.

In rural areas and in large lot or right-of-way properties the use of a sprinkler system in conjunction with domestic on-site storage is an option for meeting fire-fighting requirements. Refer to the Fire Service Code of Practice requirements for methods of meeting the code requirement for residential property. If on-site storage tanks for fire fighting is to be provided, the necessary hard standing area and fire service connection will be required.

The designer of any proposed domestic fire sprinkler system shall identify the static water pressure at the nearest water reticulation main and shall design the diameter of the service pipe accordingly. The average value of the static water pressure shall be obtained from the Council.

Where domestic sprinkler systems are to be installed in lieu of fire hydrants, a Consent Notice will be required on the title of the property informing owners of the requirement to install and maintain a sprinkler system. All legal costs associated with Consent Notices are to be met by the developer. The information will also be registered on Council's Hazard Register and be listed on LIM enquiries.

Hydrants must be readily accessible for fire appliances and should generally be positioned near street intersections and not less than 6m from any building.

6.5.3 Hydrant installation – add to end of clause

Where hydrant tees are installed next to other cast iron fittings they shall be flanged. Otherwise flexible joints (gibault or rubber ring) are permitted.

For deep water mains, hydrant risers shall be installed as necessary to ensure that the top of operating spindle is between 175 and 250 mm below finished surface level.

Typical hydrant installations are provided on Drawings 10337 and 10339 which are attached in Appendix A1.

All hydrant installations whether in road, footpath or grass verges, shall be in heavy duty cast iron boxes as described in the Water and Waste Services Department "Approved Manufacturers and Products List". Hydrant boxes shall be seated on 50 mm thick two-piece precast concrete slabs.

Where hydrants are in grassed areas, gravel carriageways or footpaths, Council may require concrete of 150 x 150 mm cross section surrounding the hydrant box or alternatively asphaltic concrete of 300 x 80 mm where more appropriate. The hydrant boxes shall not transfer any traffic loading to the water main below.

In all locations, including sealed carriageways, footpaths, gravel shoulders and grass verges lids of hydrant boxes shall be painted yellow. In addition, on sealed carriageways road markings in accordance with NZS 4501 shall also be painted on the road.

In addition, a concrete indicator post shall be installed, painted yellow and marked in black with the diameter in millimetres of the water main on which the hydrant is located and the letter "H" to identify a hydrant. The indicator post shall be set vertically in the ground within 250 mm of the lot boundary and immediately opposite the hydrant which it indicates. In addition a blue reflector shall be glued to the centreline of sealed roadways directly opposite the hydrant location.

When indicator posts cannot be used, hydrant indicator plates to BS 3251 are required.

Hydrants shall be nylon or epoxy coated in accordance with AS/NZS 4158:1996.

Hydrants must be supported to prevent any sideways movement on the line of the main. Hydrants shall be mounted on an approved type of hydrant tee with hydrant risers, if necessary, so that the top of the hydrant spindle is within the range of 175mm to 250mm of the finished surface level. The hydrant tee shall be supported by the concrete anchor block sufficient in size to take all the hydraulic thrust exerted when the hydrant is in operation. Z ring hydrant tees are permitted on 150mm PVC mains. All other hydrant tees shall be flanged steel or DI. Hydrants must be placed within 5° of vertical.

Each hydrant shall be covered with an approved type hydrant box and lid, the final visible surface of which shall be painted with road marking paint. The approved colour of hydrant markings is TNZ M/07 (NZTA M07) road marking yellow. Each hydrant is also to be marked with a blue RPM at the centre line of the carriageway. Markings (and posts, if required) shall be provided in accordance with Council requirements.

6.6.2 Property service connections – delete clause and replace with the following

Each residential unit in a subdivision shall have a separate 20 mm ID water service incorporating a manifold box. The material shall be Class D Medium Density Polyethylene (MDPE) pipe coloured blue and shall be as described in the Dunedin City Council Water and Waste Services Department "Approved Manufacturers and Products List". Where the service connection exceeds 100 m from the roadside property boundary, as for a rear lot, a larger pipe may be needed.

The point of supply shall be at the roadside property boundary of the lot or the roadside property boundary of the right of way serving the lot, as described in detail in clause 7.2 of Dunedin City Council Water Bylaw 2008 and summarised below.

All front lots including those in a unit title subdivision or a cross lease subdivision are to have a service connection from the street main directly to the roadside property boundary.

For rear lots in a unit title or cross lease subdivision, they may be serviced by a rider main having a gate valve at the roadside property boundary at the point of supply or by single 20 mm ID pipes each having manifold boxes at the roadside property boundary.

Where supply of rear units is by a rider main in private rights of way, the individual manifold boxes are to be located in the right of way near the residential units being served and in a readily accessible location.

Where a water supply pipe serving one or more properties passes through another property, park or reserve, it shall be protected by an appropriate easement and maintenance agreement(s) registered on the titles of affected properties. The easement(s) may be registered before the pipe is laid.

For standard plans for private property connections, see the following drawings in Appendix A1 to this Code:

- 10338, 10342, 10344, 10346, and 10352.

Each service connection to a principal or rider main shall be by means of a tapping band and a ferrule with flow of water controlled by a screwed brass plug.

Tapping bands and ferrules shall conform to the Water and Waste Services Department "Approved Manufacturers and Products List".

Each allotment shall be provided with an individual service connection.

A standard service connection shall consist of:

a) a tapping band and ferrule on the principal or rider main;

b) a 20 mm ID PE service pipe from the ferrule to a point 250 mm inside the private property boundary, and

c) a terminating 15 mm female/female valve in accordance with Drawing 10342 using approved fittings and materials.

NOTE:

Case 1 – Right-of-way lots with no rider main

For lots accessed by a right-of-way where a rider main has not been provided (refer Clause 6.3.3(c)), a 25 mm ID PE service connection shall be provided at the road reserve boundary for each lot, as this is where the water meters are to be located. Private water lines, typically 25 PE pipe are also to be laid by the subdivider from the proposed meter location (with a 50 mm overlap) to a point 300 mm into the body of each lot. These private water lines shall not be connected to the service connection, but shall be installed as future private water lines, to be connected by the person activating a building consent on the lot, in conjunction with a water connection application.

Where re-subdivision of a right-of-way (with no rider main) occurs, the subdivider is to provide a private water line as outlined above, with the meter to be located at the road reserve boundary at a later date. The service connection will be installed by Council at the time the water meter is installed. This work will occur generally when a building consent is activated for the lot at which time a water connection application is received and payment of fees made.

Case 2 – Right-of-way lots with a public rider main or fire main

For lots accessed by a right-of-way where a rider main has been provided (refer Clause 6.3.3(c)), a 20 mm ID PE service connection shall be provided 300 mm into the body of each lot as this is where the water meters are to be located. If the length of the service line is more than 5 m, then 25 PE is to be used.

Where re-subdivision of a right-of-way lot (with rider main or fire main) occurs, the subdivider is to provide a new service connection for each new lot. This new service connection is to be installed by the subdivider under Council supervision. Where the distance from the public main to a point 300 mm into the body of the lot exceeds 5 m, the developer shall install a 25 PE service connection up to 5 metres in length (to allow for a meter to be installed within 5 m of the tapping band) and also a private water line (generally 25 PE) from the proposed meter location into the body of the lot. A meter will be installed by Council at a later date when a water connection application is received and fee payment made.

Under the Health Act 1956, the Health (Drinking Water) Amendment Act 2007 and the Building Act 2004 subdividers and developers are responsible, as agents for water supply customers, for the provision of backflow prevention devices. Details of the Dunedin City Council requirements are contained in section 7.9 of the Dunedin City Council Water Bylaw 2008.

For details of on-demand water supply meters where required refer to section 7.11 of the Dunedin City Council Water Bylaw 2008. Typical construction details are shown in the attached Drawings 10344 and 10346 (Appendix A1).

6.9 System review – add to end of clause

The system design and review shall identify and incorporate improvements required to the existing network as a result of the proposed works. If demand on the system requires use of the Council's water reticulation model to ascertain effects, then this will be at the cost of the applicant.

6.10.2 Bedding – delete clause and replace with the following

Pipes and fittings shall be surrounded with a suitable bedding material as indicated in Drawing 10324 and 10334 as attached in Appendix A1.

All principal mains and rider mains shall have a blue metallicised plastic signal strip installed in the backfilling above the pipe bedding material as shown on Drawing 10334.

All principal mains, rider mains and service laterals shall have 'live strand' electric fence tape spirally wound around uPVC and HDPE pipes and such tape shall be firmly fixed at ends by tying to metal valves and fittings.

Small diameter service pipes from 20 mm to 50 mm nominal bore shall be laid in uPVC ducts when installed in sealed roads and driveways.

6.10.3.3 Detector tape – add to end of clause

An approved 'detectable' warning tape shall be installed with all water main pipe, whether installed by open cut or trenchless technology. (Boddington Waverlay detectable 50 mm wide blue with stainless steel wire available from Apex Safety products, Wavewater Detectable Tape a similar product supplied by Humes)

6.10.4 Pressure testing of water mains – add to end of clause

All aspects of pressure testing of different pipeline materials shall be in accordance with the provisions of NZS4404:2004, Appendix B, except that the test pressure shall be 1600 kPa or 1.5 times the working pressure, whichever is the greater.

6.11.3 Allowable operating pressures (heads) – delete clause, including Table 6.5, and replace with the following

The water supply shall have the capacity to service the anticipated demand at adequate flow and pressure. For a reticulated supply the operating pressures (see 6.3.9.6) shall be as per table 6.5.

Table 6.5 – Operating pressure limits

Allowable operating pressure (Head)	*Residential pressure (Head)*	*Industrial/commercial pressure (Head)*
Maximum	900 kPa (90 m)	900 kPa (90 m)
Minimum	300 kPa (30 m)	300 kPa (30 m)

The minimum pressures shall be measured at the building platform.

Under fire fighting flows the minimum working pressure shall be 100 kPa (10 m head).

6.11.5 Minimum water demand – delete clause and replace with the following

The minimum peak domestic demand shall be based on:

- daily consumption of 250 l/person/day
- peak factor of 5.

The population served shall be based on not less than 3 persons per dwelling. Where dwelling unit density is not known, population may be based on 60 persons per hectare.

Industrial and commercial demands shall be specifically analysed for known or potential usage.

6.11.7 Reticulation layout – delete clause and replace with the following

A water main of not less than 150 mm diameter, the principal main, fitted with fire hydrants shall be laid on one side of all public roads and cul-de-sacs to within 65 m of the end, for every residential development. For industrial or commercial areas, dual and external streets, principal mains may be required by Council on both sides of the street.

A DN 50 rider main shall be laid along the road frontage of all lots not fronted by the principal main. A DN 50 rider main shall also be provided for service connections where the principal main is DN 250 or larger. The principal main serving industrial and commercial areas shall be at least DN 150 laid on both sides of the street. This requirement may be relaxed in short cul-de-sacs as long as adequate fire fighting coverage is available.

Rider mains shall be linked to principal mains by DN 50 pipe at not greater than 400 m intervals and in cul-de-sacs the rider mains shall link to the principal main at both ends. For private rights of way, a rider main may be supplied from one end.

Responsibility for service pipes and rider mains on private property lie with private owners as Council responsibility ends at the road boundary to lots or rights of way.

Refer to Drawings 10347-10351 as attached in Appendix A1 for standard details.

Where possible, water mains and rider mains shall be laid in footpaths or grass verges with pipe centre 1400 mm offset from the roadside property boundary. Where steep side slopes prevent the standard offset from boundaries, the pipeline should be laid under the footpath or under the road carriageway parallel to the kerb face and offset by a distance agreed with the Council.

During construction, water mains are to be laid with reference to permanent land transfer pegs or temporary boundary marks placed by the registered surveyor responsible for subdivision boundary pegging.

On straight roads the pipe laying tolerance shall be ϒ50 mm and on curved roads ϒ100 mm of agreed alignment. Any misalignment shall be resolved by the subdivider or developer to the satisfaction of the Council or other underground service authority.

At street intersections 90° bends or tees are preferred to multiple bends to maintain standard alignments.

6.12 Additional requirements – add new clause

Rural land with existing water supply

For land zoned Rural and outside a rural water supply area, some existing houses may receive water from Council pipeline under an extraordinary supply arrangement. Where such land is further subdivided, existing household water services will be permitted to remain as an existing domestic use. For new lots without existing houses or where existing houses are not connected to the Council supply pipeline, any existing stock water supplies shall be cut off as a condition of subdivision. Refer to Condition (a) of the Operational Standard in the Council Strategic Statement and Dunedin City Council Water Bylaw 2008.

Storage

The water supply system shall have adequate storage capacity to allow for consumption as well as fire fighting purposes, and to provide reserve supply for the calculated requirements of users. This shall allow for two days storage at average daily flow, plus fire fighting storage to NZS PAS4509.

Where on-site storage is required this shall be a minimum of 25,000 litres, unless otherwise approved by the Council, but 50,000 litres is recommended. The Council may require minimum storage of a greater volume.

Dunedin pipe fitting requirements

All pipe and fittings used for supply mains, reticulation or service pipes shall be from the “Approved Manufacturers and Products List – Water” obtainable from the Water and Waste Services Department.

For the Dunedin City Council policy on pipe materials, including plastic pipes, refer to the report on "Selection of Water Supply Pipe Materials" August 2006 and "Summary of DCC Policy on Pipe Materials" incorporating Figure 1 – "Water Main Pipe/Materials Selection Flowchart" included in this Code as Part 6A.

All metal fittings such as tees, hydrant tees, crosses, tapers, hydrant risers, blank caps, plugs and bends shall be cast from high quality grey iron or ductile iron coated with a proven corrosion prevention compound.

Flanges shall be drilled in accordance with AS4087:1996 and associated gaskets shall be of approved rubber compound. All bolts, nuts and washers shall be hot dip galvanised mild steel or grade 316 stainless steel.

After installation, galvanised nuts and bolts in pipe flanges and fittings shall be coated with Denso paste and wrapped in denso tape in accordance with manufacturer's recommendations and as illustrated in Drawing 10336 as attached in Appendix A1.

Working on Council roads

Work undertaken on Council owned roads shall be undertaken in accordance with NZTA Temporary Traffic Management for Local Roads: Supplement to NZTA Code of Practice for Temporary Traffic Management – latest edition. Staff involved shall be suitably qualified in accordance with the above code.

Additional standard drawings

The drawings listed below and attached in Appendix A1 are standard arrangement drawings relating to water supply and are additional to those in NZS4404:2004.

Drawing	*Title*
10324	Pipe Bedding Detail
10326	Thrust/Anchor Blocks for DN 100 to DN 375 Mains – Sheet 1
10327	Thrust/Anchor Blocks for DN 100 to DN 375 Mains – Sheet 2
10334	Bedding, Backfill and Surface Reinstatement
10336	Joint Wrapping Details
10337	Typical Sluice Valve and Fire Hydrant Installation at Intersection
10338	Detail for Double Service Connection
10339	Typical Fire Hydrant Installation
10340	Mid Line Connection Detail
10341	End Connection of Rider Main to Principal Main
10342	Typical 20 mm ID Household Service Connection
10343	Typical Water Main Sluice Valve Installation
10344	Typical 20 mm ID Household or Commercial Meter Installation for Pedestrian Only Areas
10345	Typical Air Valve Installation
10346	Typical 20 mm ID Household or Commercial Meter Installation Used for Vehicle Accessways
10347	Typical Rider Main in Private Right of Way
10348	Typical Rider Main on Short Cul-de-sac Less than 65 m Long
10349	Typical Rider Main on Long Cul-de-sac More than 65 m Long
10350	Typical Water Supply to a Rear Lot Over Right of Way
10351	Typical Water Supply to a Single Lot with Several Residential Lots
10352	Typical Water Service Laid in Common Trench with Another Service

Part 6A: Summary of Dunedin City Council Policy on Pipe Materials

Allowable reticulation main pipe materials, PN ratings and sizes

Pipe materials

a) Ductile iron, PN 35 to AS/NZS 2280, cement mortar lined and with Blue Boss PE sleeving or other approved external corrosion protection system. (Tyton-loc seal rings shall be used where required for special applications). For pipes that are exposed above ground, e.g. pipe bridges, the pipe exterior shall be sandblasted and a zinc metal spray applied and sealed with a vinyl or epoxy coating to comply with AS/NZS 2312:1994 to a minimum DFT of 250 µm. Note that PN 20 DI pipe is not acceptable.

b) Spiral welded steel pipe to NZS 4442, cement mortar lined with an approved external corrosion protection system and with approved welded or ring seal joints as required for special applications. For pipes that are exposed above ground, e.g. pipe bridges, the pipe exterior shall be sandblasted and a zinc metal spray applied and sealed with a vinyl or epoxy coating to comply with AS/NZS 2312:1994 to a minimum DFT of 250 µm.

c) PE pipe (either PE 80B or PE 100) to AS/NZS 4130, de-rated as detailed in the Dunedin City Council Pipe Materials Selection Report (minimum PN 12.5). The approved applications for PE pipe are; service and supply pipes, sub-mains, directional drilling, thrust boring, pipe cracking and for steep or unstable ground conditions, with Water and Waste Services Department approval.

d) Series 2 PVC-U or PVC-M to AS/NZS 1477 or AS/NZS 4765, de-rated as detailed in this document and used only with Water and Waste Services Department approval (minimum PN16). PVC-O pipe to AS 4441, de-rated as detailed in this document may be considered with Water and Waste Services Department approval.

e) Stainless steel pipe to ASTM A 312 of grade T316L in schedule 10 or 40, as appropriate for the application are acceptable. The acceptable diameters are 4" (with special approval), 6", 8", 10" and 12". Note that stainless steel pipes are most likely to be used for exposed pipes e.g. aerial crossings, etc

Pipe sizes

Allowable pipe sizes shall are DN 150, DN 200, DN 250, DN 300 and DN 375. Pipelines larger than DN 450 and larger and the design should be based on hydraulic and pressure requirements with pipe diameters matched to pipe manufactures standard production schedules).

DN 100 is only to be used in special circumstances with Water and Waste Services Department approval.

Where PE pipes are selected for specific projects the acceptable pipe diameters shall be as shown in Table 6A.1. Note that the DN of PE pipes relates to the pipe OD, whereas the DN of the other pipe materials relates to the nominal ID.

Table 6A.1: PE pipe equivalent sizes

Nominal Pipe Size	*PE Pipe Equivalent*	*PE ID (For SDR 11)*
DN 100	DN 125 (125 mm OD)	101.5 mm
DN 150	DN 180 (180 mm OD)	145.7 mm
DN 200	DN 250 (250 mm OD)	203.3 mm
DN 250	DN 315 (315 mm OD)	256.2 mm
DN 300	DN 400 (400 mm OD)	325.4 mm
For PE pipelines larger than DN 400, the sizes chosen shall be made from the following standard sizes: DN 450, DN 500, DN 560. For DN >560, note that SDR 11 is not available.		

PN Rating

The minimum allowable PN rating of the various pipe materials is shown in Table 6A.2 below.

Table 6A.2: Minimum allowable pipe pressure ratings

Pipe Material	*Authorised sizes – DN**	*Standard Minimum*	*Remarks*
CLDI	100 – 375	PN 35	Rubber ring joint. PE loose sleeving. PN 16 fittings unless higher pressure required.
MSCL	300 – 450	To suit application, min. steel thickness 4.8 mm	Welded or rubber ring joints, approved tape wrapping or alternative for exterior.
PVC-M	100 – 450	PN 16	Only Series 2 pipes with rubber ring joints are approved. For PVC-O, Material Classes 400 and 500 are acceptable.
PVC-U	100 – 450	PN 16	
PE 80B or PE 100	25 – 63	PN 12.5	Approved mechanical couplings
	125 – 400	PN 16	Electrofusion couplers or butt fusion weld**
	>400	As approved	Butt fusion weld**

* PE diameters relate to the pipe OD, others relate to nominal ID of the pipe.

** Only to be carried out by trained and accredited PE welders.

Allowable pipe sizes, PN and materials for sub-mains and service pipes

The pipe PN shall be de-rated as per Table 6A.3. All water pipes must be at least PN 12.5 (SDR 11) under all circumstances. The allowable pipe sizes (actual OD in mm) are:

- DN 25 PE 80B
- DN 63 PE 80B
- DN 40 and DN 50 PE 80B may be used for service pipes with Water and Waste Services Department approval.

Table 6A.3: Service de-rating factors for plastics pipes

Condition	*Service de-rating Factor*				*Index*
	PVC-U	*PVC-M*	*PVC-O*	*PE 80B & PE 100*	
1. Installation and handling damage and adjustment of SF[50]	0.95	0.8	0.85	0.85	F_1
2. Temperature considerations: Up to 20°C Up to 25°C Up to 30°C For higher temperatures, consult pipe manufacturer and use engineering judgement	 1.0 0.95 0.85	 1.0 0.95 0.85	 1.0 0.95 0.85	 1.0 0.95 0.85	F_2
3. Open field or road shoulder Minor Road (light traffic) Major Road (Heavy traffic) Central Business District	1.0 0.95 0.85 0.70	1.0 0.95 0.85 0.70	1.0 0.95 0.90 0.80	1.0 0.95 0.90 0.80	F_3
4. Installation method: Conventional trenching Directional drilling Pipe cracking	 1.0 N/A N/A	 1.0 N/A N/A	 1.0 N/A N/A	 1.0 0.85 0.85	F_4
5. Fatigue de-rating	Refer to Selection of Water Supply Pipe Materials Appendix B. Note that if PVC-M is de-rated at F_1 above, treat as for PVC-U				

The overall de-rating factor to be applied to the PN rating of plastics pipe is calculated:

Overall PN de-rating factor (F_O)= F_1 x F_2 x F_3 x F_4

Example 1: A PVC-M water main is to be installed under a major road and to operate at a maximum pressure of 8.0 bar (80 m head) and maximum temperature of 18°C. What pipe PN rating is required?

Overall de-rating factor (F_O) = 0.8 x 1.0 x 0.85 x 1.0 = 0.68

Minimum PN of pipe required = 8.0/0.68 = 11.8 therefore, use *PN 12 pipe.*

Note that if there is a possibility of raising the operating pressure in the future, increase the PN rating of the pipe. A PN 15 pipe will allow for an increase in pressure to 10.2 bar without any compromise to the pipe lifetime (PN 15 x 0.68 = 10.2).

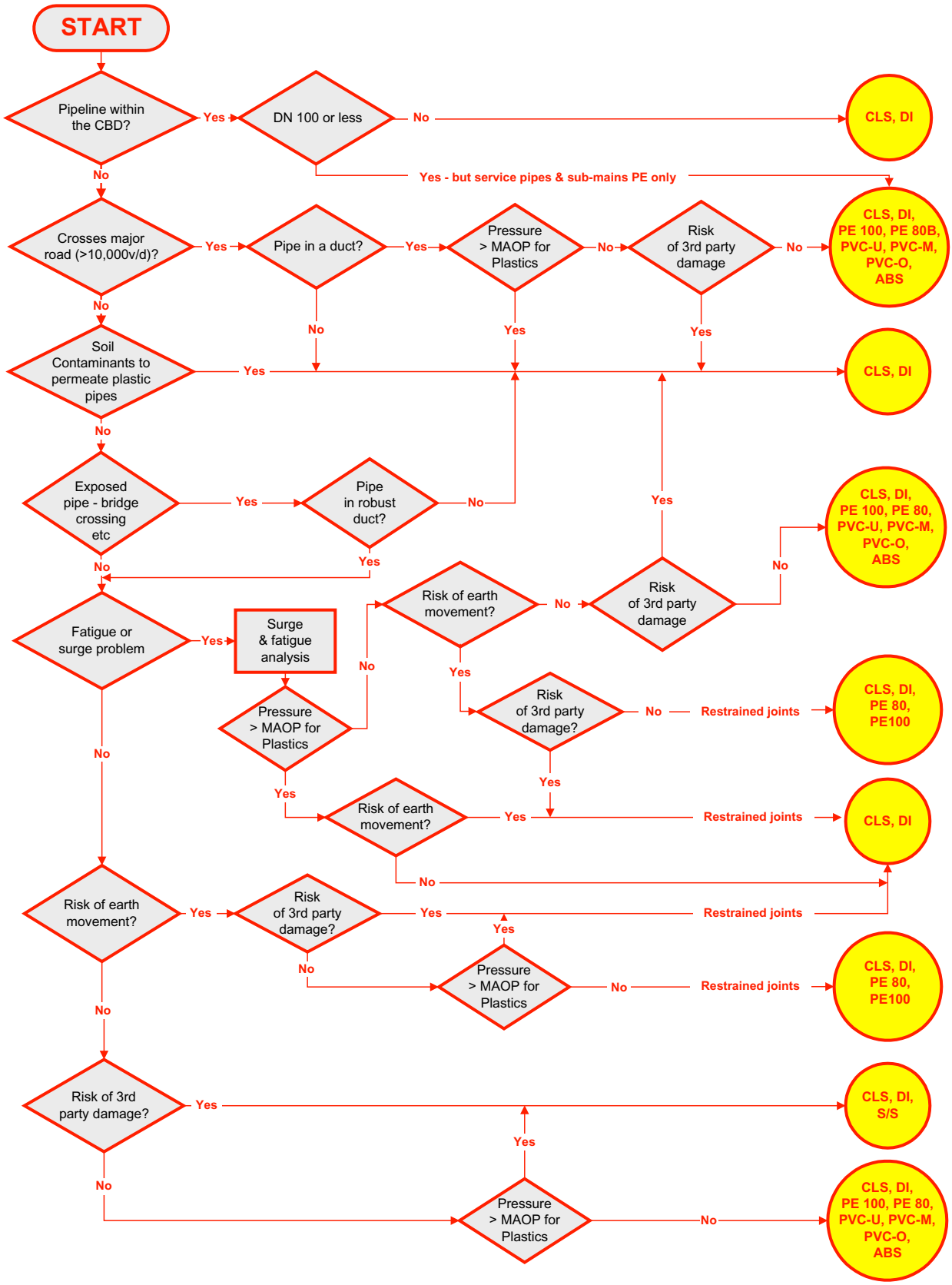
How to determine pipe material?

There are two key main requirements for determining appropriate pipe materials for a particular application. These are:

1. Follow the Water Main Pipe Materials Selection Flow Chart (Figure 6A.1) with consideration given to location (CBD or otherwise), traffic loading, soil contamination, pipe exposure, fatigue or surge issues, pressure requirements, earth movement and risk of third party damage.

2. Calculate the pressure rating for the pipe by first determining the maximum operating pressure for the pipe and then de-rating this figure with consideration given to surge pressures, fatigue effects, environmental considerations (temperature, traffic loadings etc), handling and installation damage and installation conditions. De-rating is only required for plastic pipes and can be calculated using Table 6A.3.

Figure 6A.1: Water Main Pipe Materials Selection Flow Chart



Part 7: Landscape Design and Practice

Design and construction of landscaping shall be undertaken in accordance with the requirements of Part 7, Landscape Design and Practice of NZS 4404:2004 except as amended and extended for Dunedin City Council requirements in the clauses below.

Alternative specific proposals may be submitted with appropriate engineering information that will enable the Council to assess the proposal. Alternatives must provide a standard of development equivalent to that provided by conforming to NZS 4404:2004 and amendments included herein.

The Dunedin City Council has adopted Part 7 of NZS 4404:2004 with the following additions and/or alterations. All clause numbers refer to clauses in NZS 4404:2004.

7.1 Scope – add to end of clause

The objective of landscape design should be to impart character and identity to urban areas through appropriate and compatible landscaping.

Consultation should be undertaken with the Council's Community and Recreation Services department on all landscaping issues prior to the design phase and development plan approvals. This includes what development contributions will cover.

7.2.2 Compatibility with engineering design – add to end of clause

Landscaping shall not cause, or potentially cause, interference or damage to roadways and utility services, or increase the costs of maintenance of those services; or create adverse effects on the flow of surface water or increase flood risk.

7.2.4 Recreation reserves – add to end of clause

Public land for reserves shall only be created where there is an identified need. This should be determined by consultation with the Community and Recreation Services department at the initial concept stage.

7.3 Design – add before clause 7.3.1.1

Planting and other landscaping shall be appropriate to and compatible with the local environment. Species selection shall be based on consideration of the following:

- ability to survive on the site
- sympathetic to the scale of the section and berm sizes
- consistent with neighbouring landscape features
- provide for long-term sustainable management.

Planting and other landscaping features shall be easily maintained and minimize overall life cycle costs inclusive of establishment, maintenance and replacement. In a traffic island, the subgrade shall be removed to the required depth.

7.3.1.1 Location – add to end of clause

All trees and vegetation planted near the high voltage transmission lines must comply (including when maturity is reached) with the Electrical (Hazards from Trees) Regulations 2003.

7.3.2.1 Tree/plant size – add to end of clause

The type, height and placement of planting in public areas should be such that it minimises opportunity for concealment, restriction of vehicle operators' vision, reduction in sunlight penetration or other adverse effects on the use of adjacent land. No planting or landscape feature shall obstruct traffic, pedestrian movement or traffic visibility.

7.4.1 Construction introduction – add to end of clause

Appropriate maintenance and plant replacement shall be undertaken until final inspection and sign-off for practical completion is obtained from the Council's Community and Recreation Services Manager at the end of the maintenance period.

7.4.1.2 Construction introduction – amend clause

Amend clause 7.4.1.2 by deleting "18 months" and replacing with "12 months".

7.4.5.4 Juvenile tree planting – amend clause

Amend (b) and (e) to read:

(b) Ground shall be cultivated to a minimum depth of 2.5 times the size of the plant container width to break up any compaction and fracture subsoil and afford drainage to hard rock areas.

(e) Each tree shall be fertilised with a minimum of 15 g of slow release fertilizer.

7.4.5.5 Juvenile tree planting – amend clause

Replace "18 months" with "12 months".

Part 8: Reserves

Development of reserves shall be undertaken in accordance with the requirements of Part 8, Reserves of NZS 4404:2004 except as amended and extended for Dunedin City Council requirements in the clauses below.

Alternative specific proposals may be submitted with appropriate engineering information that will enable the Council to assess the proposal. Alternatives must provide a standard of development equivalent to that provided by conforming to NZS 4404:2004 and amendments included herein.

The Dunedin City Council has adopted Part 8 of NZS 4404:2004 with the following additions and/or alterations. All clause numbers refer to clauses in NZS 4404:2004.

8.1 Scope – add to end of clause

The Council's requirements for new reserve provisions should be determined prior to the initial design stage through consultation with the Community and Recreation Services department.

When assessing reserve provision and development proposals the Council will look to:

- Filling existing gaps in reserve provisions
- Encouraging development or expansion of existing reserves
- Development designs and construction that are sympathetic to the location
- Preserving existing lookout and observation viewing points
- Securing reserve provision in the final stage of any subdivision.

Any additional reserve proposals that extend beyond the Council's current level of service, or esplanade reserve requirements under the District Plan should include recreation, cultural, ecological or biodiversity assessments.

A full 20 m esplanade reserve as defined by the District Plan shall be provided as a minimum requirement along the coastline for coastal protection and public access to be vested in Council. Developers may be required to define the mean high water spring (MHWS) at the date of the subdivision application.

8.2 General – add before clause 8.2.1

All reserve provision and development proposals should be approved by the Council's Community and Recreation Services department prior to any public consultation.

8.2.1 General – replace clause

All soft landscape planting, including reserve specimen trees, will be carried out by the Council and funded by development contributions; or where separately agreed, landscape planting is to be carried out in accordance with Part 7 of this Code.

8.2.2 General – add to end of clause

No work is to be carried out until development contributions have been calculated and agreed.

8.2.3 General – add to end of clause

There shall be appropriate retaining treatments used to keep mulch within landscaped areas where separately agreed.

8.2.4 General – add to end of clause

Fencing shall have a consistent boundary treatment. Open fence designs will be considered where the development plan can clearly identify alternative boundary definitions. Post and chain treatments may be required adjacent to street frontages.

8.3.1 Activity – amend clause part (a)

Add "including removal of any trees".

8.3.3 Stormwater drainage for reserves –add to end of clause

Any stormwater retention or wetland proposal for reserves should not cover more than 30% of the defined reserve unless other design features are provided for to allow recreation use during wet periods.

8.3.5 Park furniture/structure – amend clause

Replace the last sentence of the second paragraph with the following:

The design of any landscape features must be considered as an integral part of the reserve and should be designed in accordance with 'Crime Prevention Through Environmental Design (CPTED)' principles.

8.3.6 Pedestrian accessways – add to end of clause

Any pedestrian accessway that provides direct access to an existing or proposed new reserve should provide the shortest possible length of access and comply with clause 3.3.12 (Part 3 of this Code) for width and fencing requirements. Alternative surface treatment will be considered where it is in keeping with the adjoining reserve with a maximum finished gradient of 1 vertical to 4 horizontal and agreed to as part of the reserve development plan proposal specified in clause 8.2.2.

Where it is proposed to incorporate stormwater secondary flow management in any pedestrian accessways between streets, surface treatment and planting options should be discussed with the Community and Recreation Services department at the initial concept stage.

8.3.7 Presentation of reserves – amend clause

Amend (d) as follows:

- Replace "pegged" with "identified".

Amend (f) as follows:

- Add "when specified" after "landscape planting".

Part 9: Power, Telecommunications, Gas

Design and construction of Power, Telecommunications and Gas shall be undertaken in accordance with the requirements of Part 9, Power, Telecommunications, Gas of NZS 4404:2004, except as amended and extended for Dunedin City Council requirements in the clauses below.

Alternative specific proposals may be submitted with appropriate engineering information that will enable the Council to assess the proposal.

The Dunedin City Council has adopted Part 9 of NZS 4404:2004 with the following additions and/or alterations. All clause numbers refer to clauses in NZS 4404:2004.

9.1 Scope – add to end of clause

Design and construction of gas, telephone and electricity facilities shall be to the requirements and approval of the respective network utility operators. Design and construction shall recognise the operating access and service requirements of other adjacent utilities.

Infrastructure shall be compatible with network requirements and to the safety and service standards adopted by the network utility operator without adversely affecting the level of service provided by other network utility operators.

The Dunedin City District Plan specifies zones in which it is required that all allotments shall have reticulated power and telephone services available within the allotment or within the road providing access (Rule 18.5.6(b) of the District Plan). In these zones the Council will not grant subdivision approval where this service is not available, unless the consent holder upgrades or extends the service to the Council's satisfaction or an alternative solution is approved by the Council.

9.2 General – amend clause

Add the following to the end of (c):

Where a new gas supply is being proposed to service a subdivision, appropriate land to install and service an underground tank should be provided for within the proposed subdivision.

Add after (c):

(d) Alternative energy supply systems. Alternative energy supply systems such as small scale wind, solar and hydroelectric systems may be considered on a case by case basis by the Council. A consent notice under Sec 221 of the Resource Management Act 1991 shall be registered on all titles likely to be used for residential purposes and not connected to the National Grid. The notice shall state that a reticulated electricity supply is not readily available and that the Council has approved the creation of the allotment on the basis that the owner will be responsible for providing their own supply of electrical energy.

9.3.2 Utilities above ground – add to end of clause

All services in urban areas shall be underground unless otherwise authorised by the Council.

In some rural areas the Council may require services to be underground; otherwise overhead reticulation is acceptable.

9.5 Additional requirements – add new clause

Compliance certificate

A compliance certificate shall be provided from the relevant network utility operator, stating that the design and construction of gas, telephone or electricity facilities is satisfactory in standard and level of service and that the network utility operator has undertaken to take over operation and maintenance of the facilities at no cost to the Council.

Alternative means of supply

Proposals for alternative means of providing electrical and telecommunications services may be considered, particularly in rural areas, where it is demonstrated that this is the best practicable option and that the alternative means of supply is sustainable as a permanent supply.

Where a community-based system is used, a compliance certificate shall be provided by a suitably qualified and experienced person, certifying that the design and construction of the system is adequate for its purpose and meets all relevant standards. This shall also contain: system details and performance, operation and maintenance requirements, as built drawings, monitoring and reporting requirements.

Easements

Easements are necessary where underground services for one property cross another. Parks and reserves should also be regarded as private land in this respect, and the Reserves Act 1977 requires formal easement agreements for underground services. This also applies to any easements being transferred into Council ownership.

Appendix A1: Standard Drawings

This Appendix contains Dunedin City Council standard arrangement drawings to be used in addition to those in NZS 4404:2004.

Roading

RS-024 Minimum Traffic Sight Lines at Non-signalised Intersections

RS-025 Typical Cross Section Services

RS-026 Rural/Rural Residential Road Intersections

RS-027 Slope Design and Minimum Compaction Standard

RS-028 Stormwater Superpits

RS-029 Catchpit Details

RS-030 Kerb and Channel Details

Water and Waste Services

10317 Connection of Stormwater Drains to Kerb and Channel

10318 Detail of Intake and Outlet without Vertical Grate and Sill

10319 Detail of Intake and Outlet with Vertical Grate

10320 Detail of Intake and Outlet with Inlet Sill

10321 Detail of Intake and Outlet with Inlet Sill and Vertical Grate

10322 Concrete Haunching for Rubber Ring Jointed Pipes 100 mm-600 mm Pipes

10323 Drop Installation Precast Manhole

10324 Pipe Bedding Detail

10325 Cut-off Walls and Trench Drainage for DN 150 to DN 300 Sewers

10326 Thrust/Anchor Blocks for DN 100 to DN 375 Mains – Sheet 1

10327 Thrust/Anchor Blocks for DN 100 to DN 375 Mains – Sheet 2

10328 Bulkheads and Trench Drainage for DN 150 and DN 300 Sewers

10329 Precast Manhole for uPVC Pipes Granular Bedding and Surround

10330 Precast Manholes with Approved Cover and Frame

10334 Bedding, Backfill and Surface Reinstatement

10336 Joint Wrapping Details

10337 Typical Sluice Valve and Fire Hydrant Installation at Intersection

10338 Detail for Double Service Connection

10339 Typical Fire Hydrant Installation

10340 Mid Line Connection Detail

10341 End Connection of Rider Main to Principal Main

10342 Typical 20 mm ID Household Service Connection

10343 Typical Water Main Sluice Valve Installation

10344 Typical 20 mm ID Household or Commercial Meter Installation for Pedestrian Only Areas

10345 Typical Air Valve Installation

10346 Typical 20 mm ID Household or Commercial Meter Installation Used for Vehicle Accessways

Water and Waste Services Continued

10347 Typical Rider Main in Private Right of Way

10348 Typical Rider Main on Short Cul-de-sac Less than 65 m Long

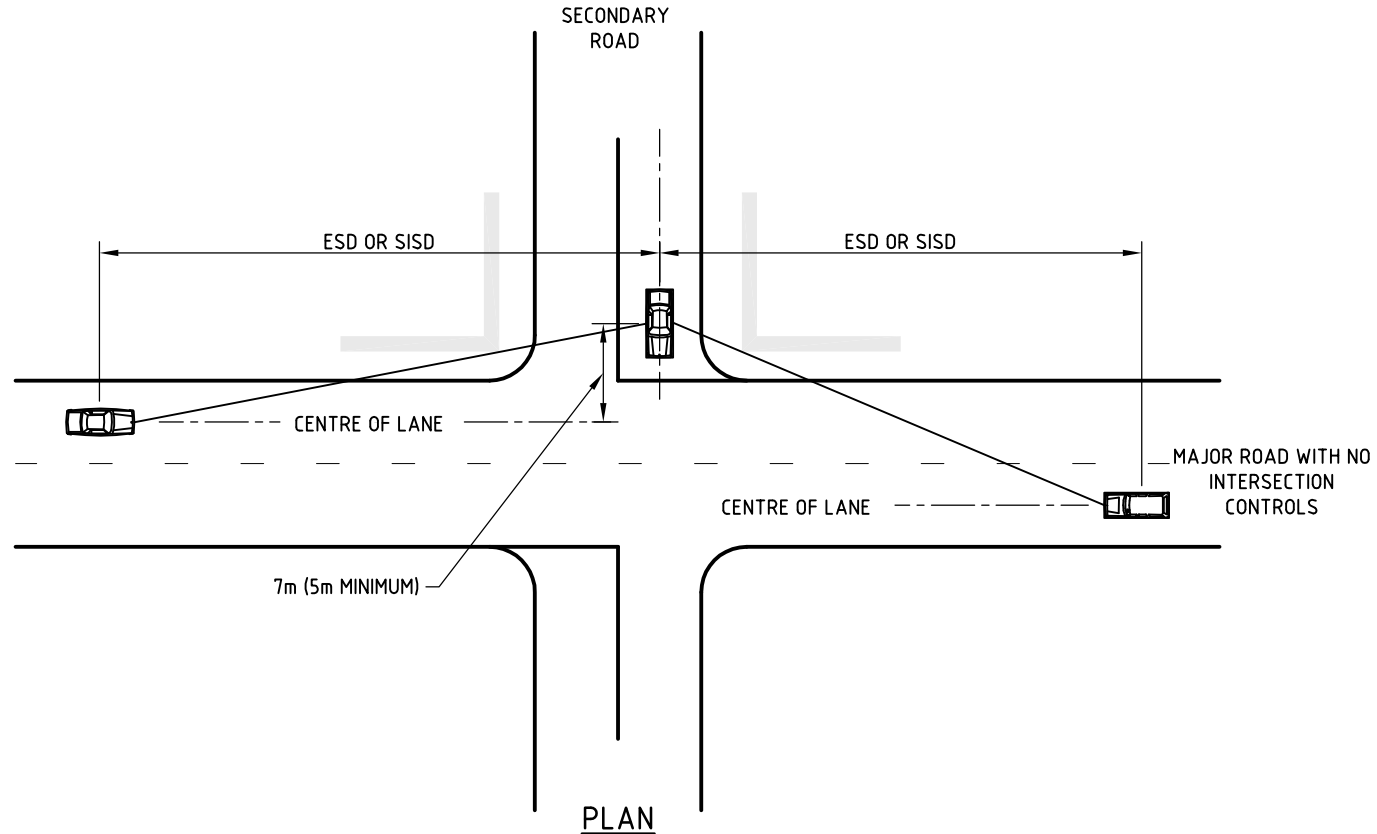
10349 Typical Rider Main on Long Cul-de-sac More than 65 m Long

10350 Typical Water Supply to a Rear Lot Over Right of Way

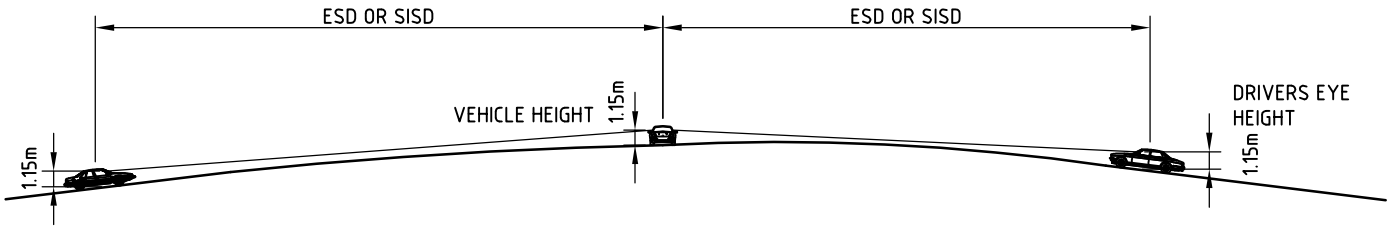
10351 Typical Water Supply to a Single Lot with Several Residential Lots

10352 Typical Water Service Laid in Common Trench with Another Service

SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



PLAN



LONGITUNDINAL SECTION

DESIGN SPEED (km/hr)	ENTERING SIGHT DISTANCE (m)	SAFE INTERSECTION SIGHT DISTANCE	
		RURAL (m)	URBAN (m)
40	100	70	60
50	125	90	80
60	160	115	105
70	220	140	130
80	305	175	165
90	400	210	
100	500	250	
110	500	290	
120	500	330	

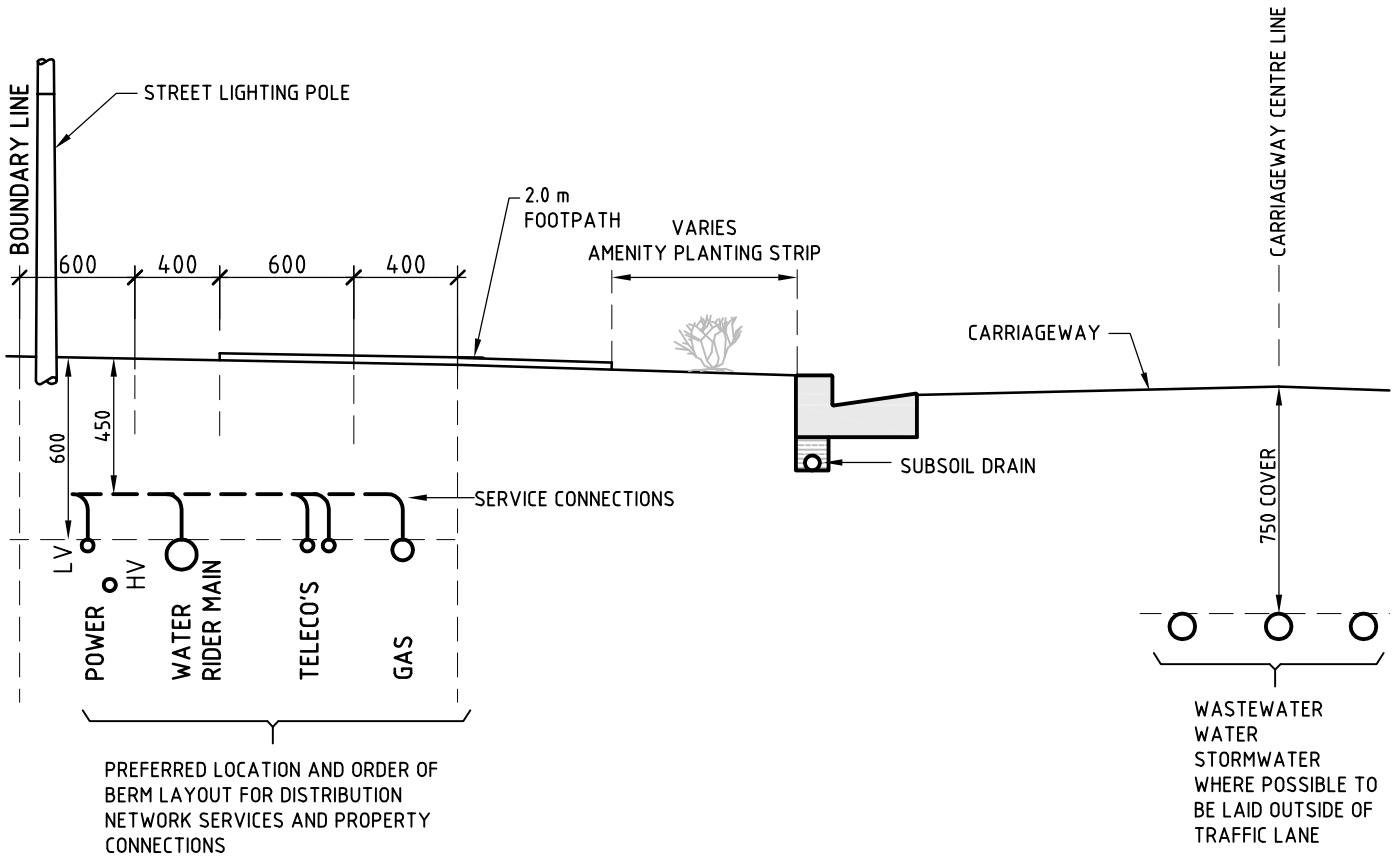
MINIMUM TRAFFIC SIGHT LINES AT NON SIGNALISED INTERSECTIONS

REV A JUNE 2009

Drawing No. RS-024

S:\CAD\CLIENT\DCC\STANDARD DETAILS\ROADING

SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



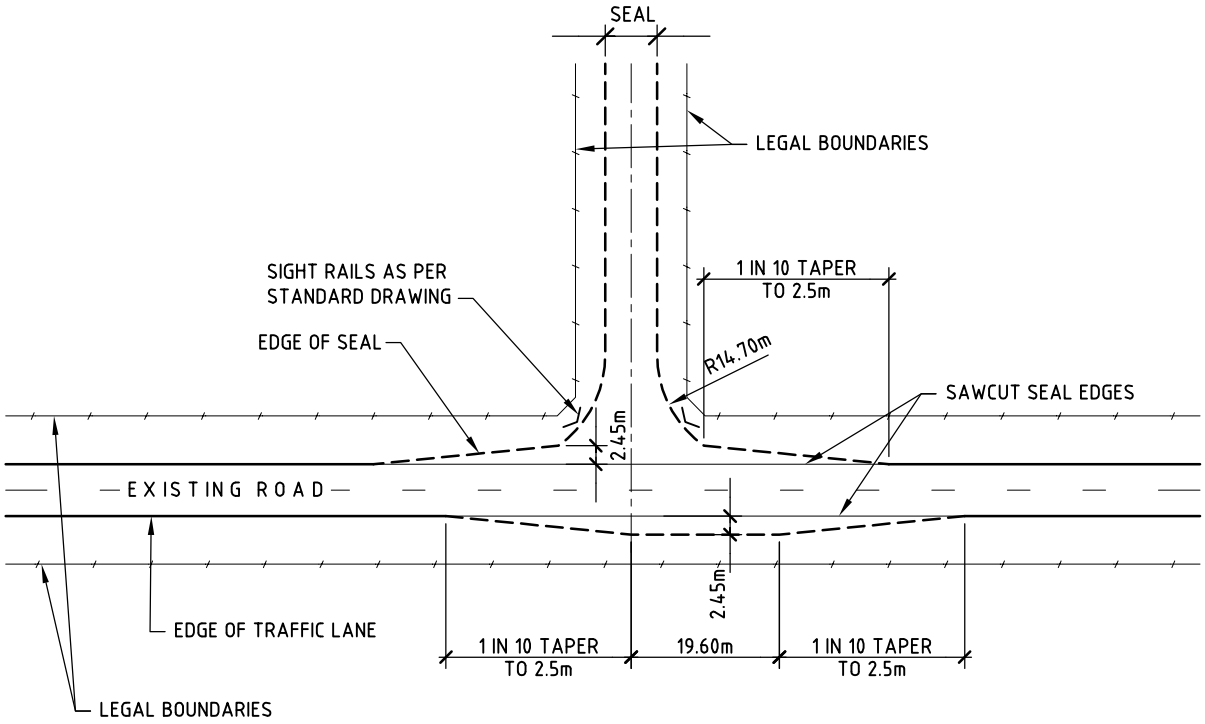
TYPICAL CROSS SECTION SERVICES

REV C AUGUST 2010

Drawing No. RS-025

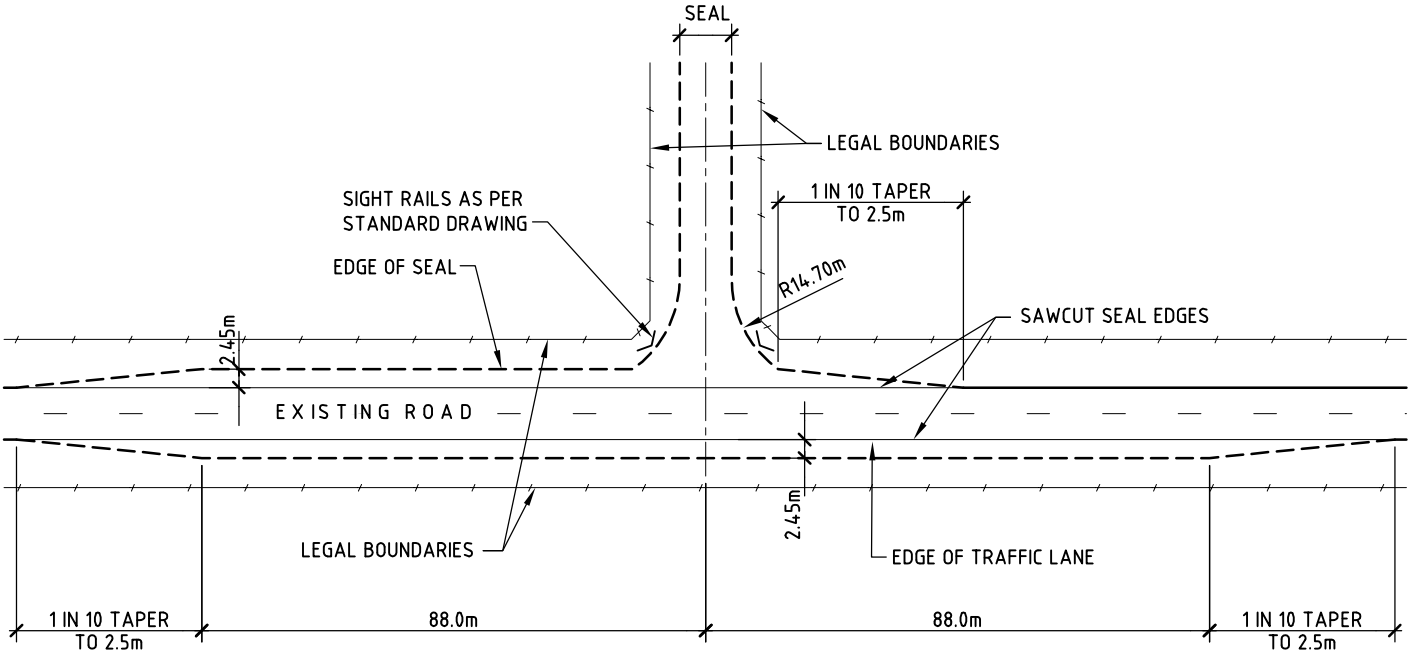
S:\CAD\CLIENT\DCC\STANDARD DETAILS\ROADING

SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



JUNCTION WITH LOCAL ROADS

N.T.S.



JUNCTION WITH COLLECTOR, ARTERIAL & STRATEGIC ROADS

N.T.S.

SEAL WIDENING AND ACCESS SEALING

CHEVRON BOARDS TO TNZ SIGNS MANUAL STANDARD MAY BE REQUIRED ON OPPOSITE SIDE OF ROAD

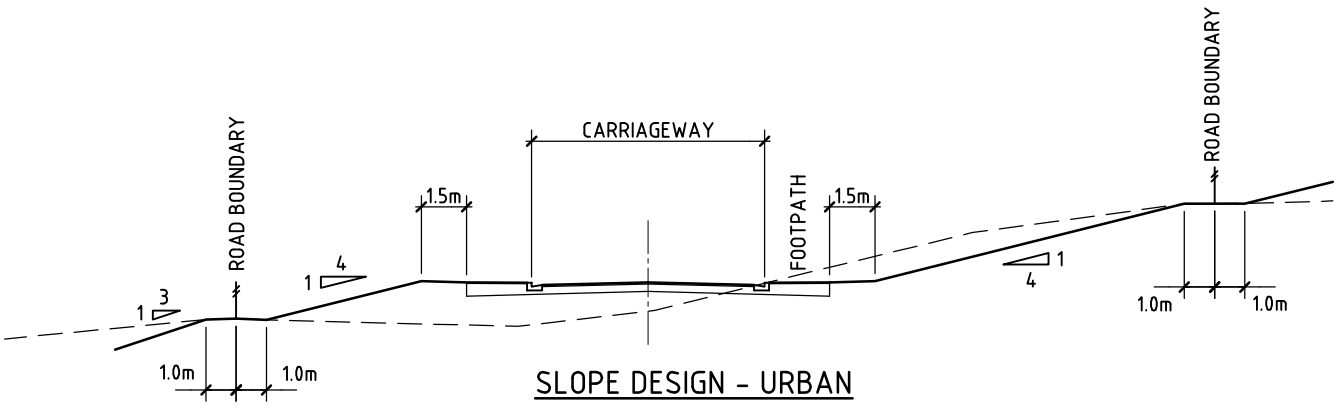
RURAL / RURAL RESIDENTIAL ROAD INTERSECTIONS

REV A JUNE 2009

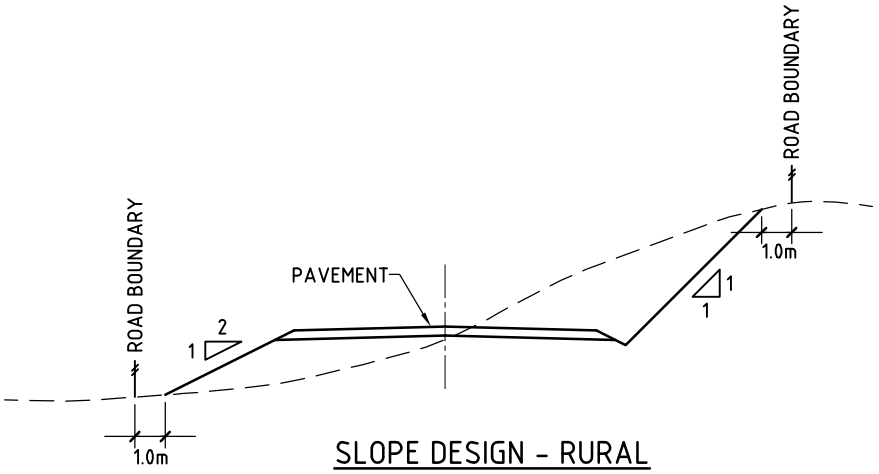
Drawing No. RS-026

S:\CAD\CLIENT\DCC\STANDARD DETAILS\ROADING

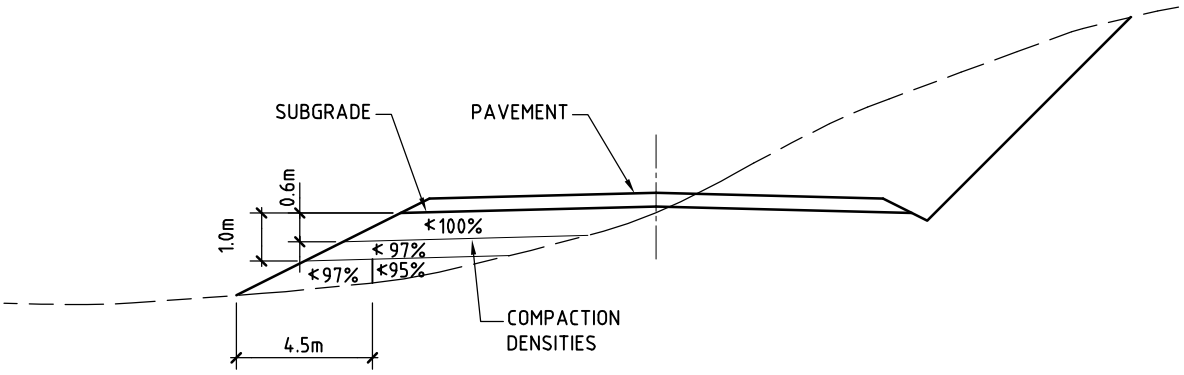
SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



SLOPE DESIGN - URBAN



SLOPE DESIGN - RURAL



MINIMUM COMPACTION

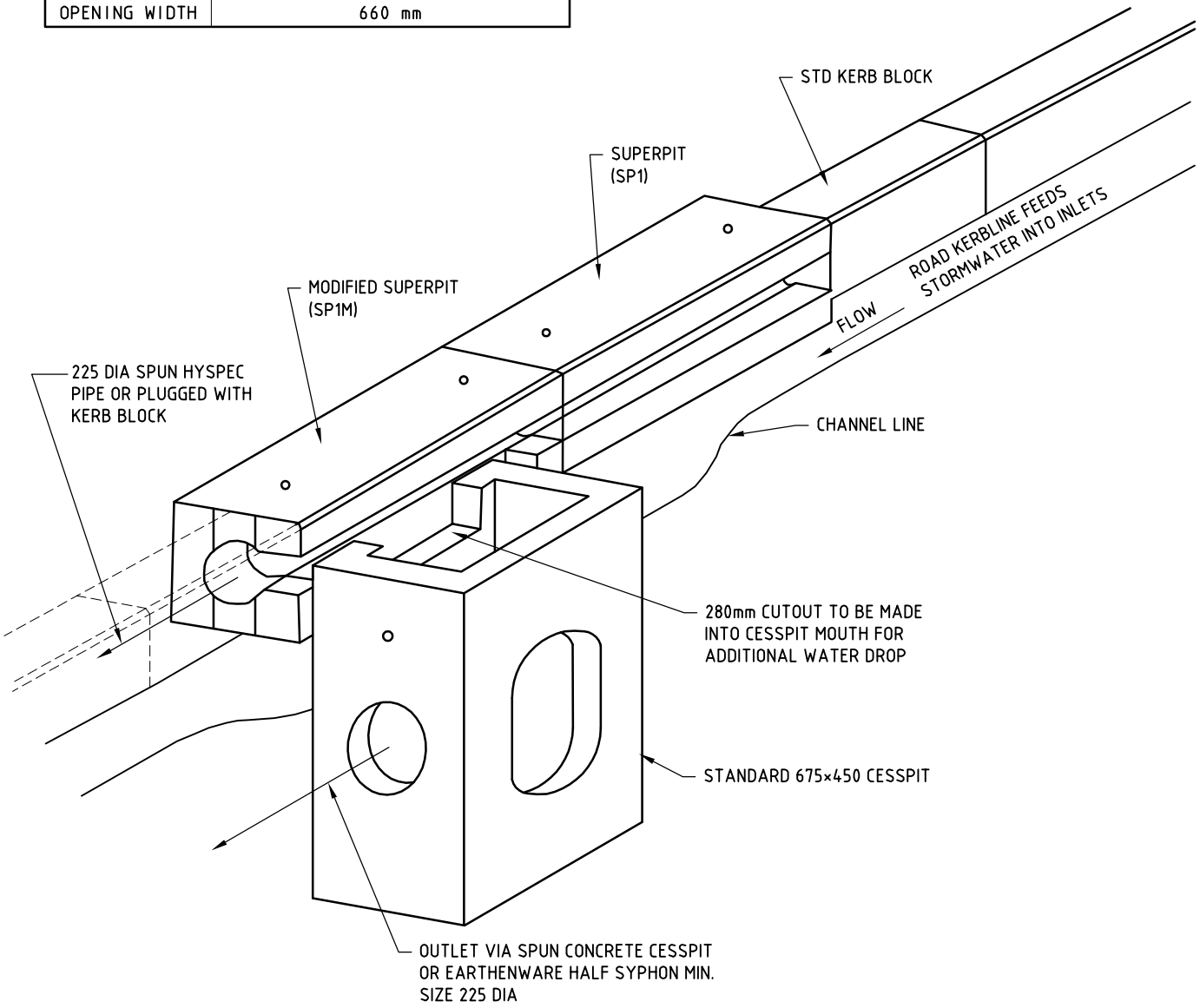
NOTE:
COMPACTION DENSITIES ARE INDICATED IN TERMS OF A PERCENTAGE OF THAT GIVEN BY NZS 4402: 1986 FOR STANDARD COMPACTION TEST 4.1.1

SLOPE DESIGN AND MINIMUM COMPACTION STANDARD

REV A JUNE 2009

Drawing No. RS-027

SUPERPIT TYPE	STANDARD SUPERPIT	MODIFIED SUPERPIT
SUPPLY CODE	SP1	SP1M
PRODUCT WEIGHT	517 kg	452 kg
EXTERNAL LENGTH	1200 mm	
EXTERNAL WIDTH	500 mm	
EXTERNAL HEIGHT	455 mm	
OPENING WIDTH	660 mm	



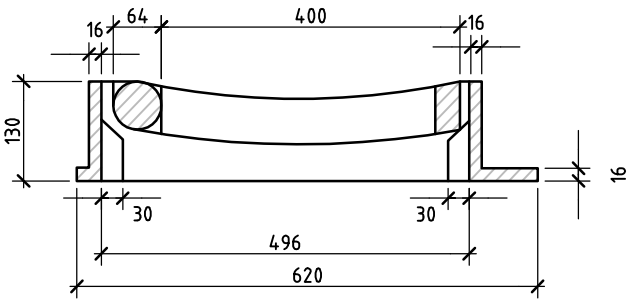
NOTE:
FOR STEEP ROAD GRADIENTS RAMPED KERBLINES LEADING
INTO THE INLET IS REQUIRED

STORMWATER SUPERPITS

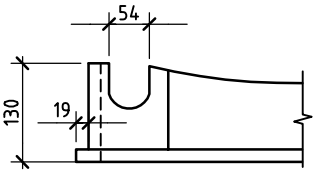
REV A JUNE 2009

Drawing No.RS-028

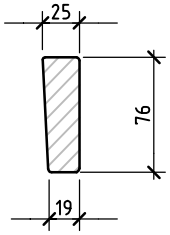
SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



SECTION
SCALE 1 : 10

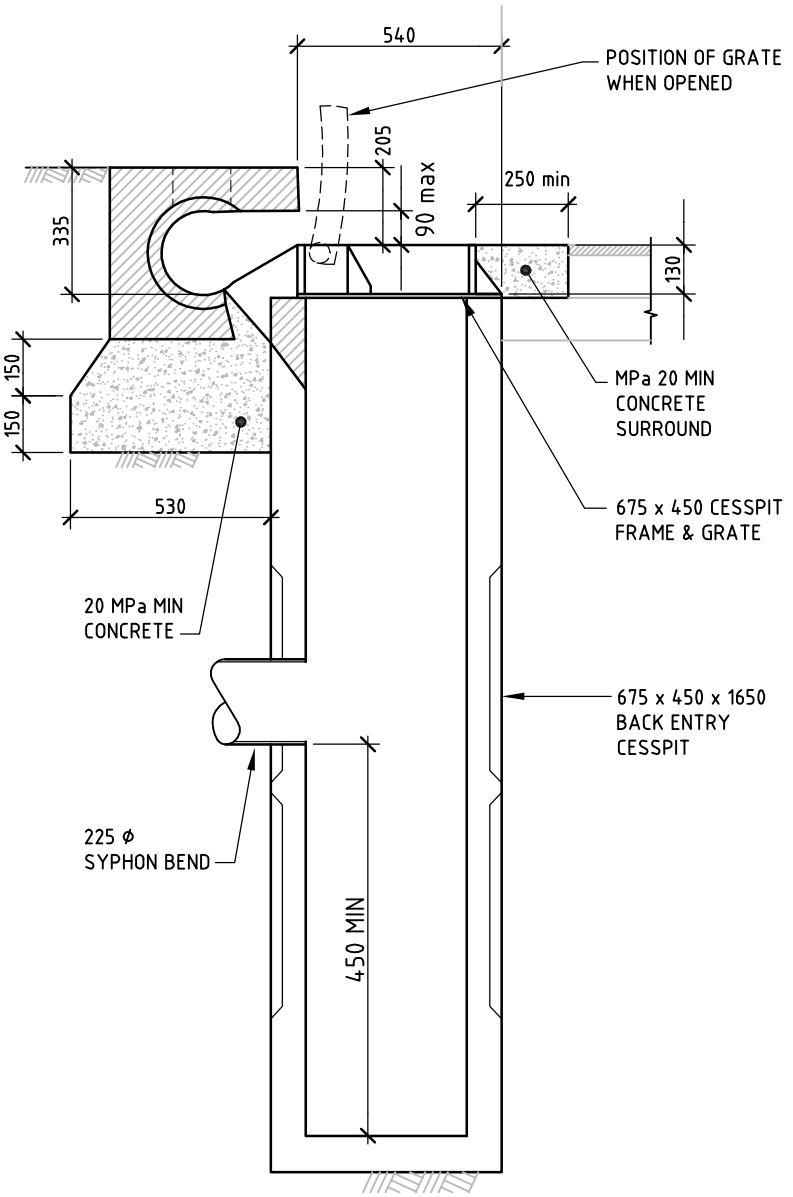


PART END ELEVATION
SCALE 1 : 10

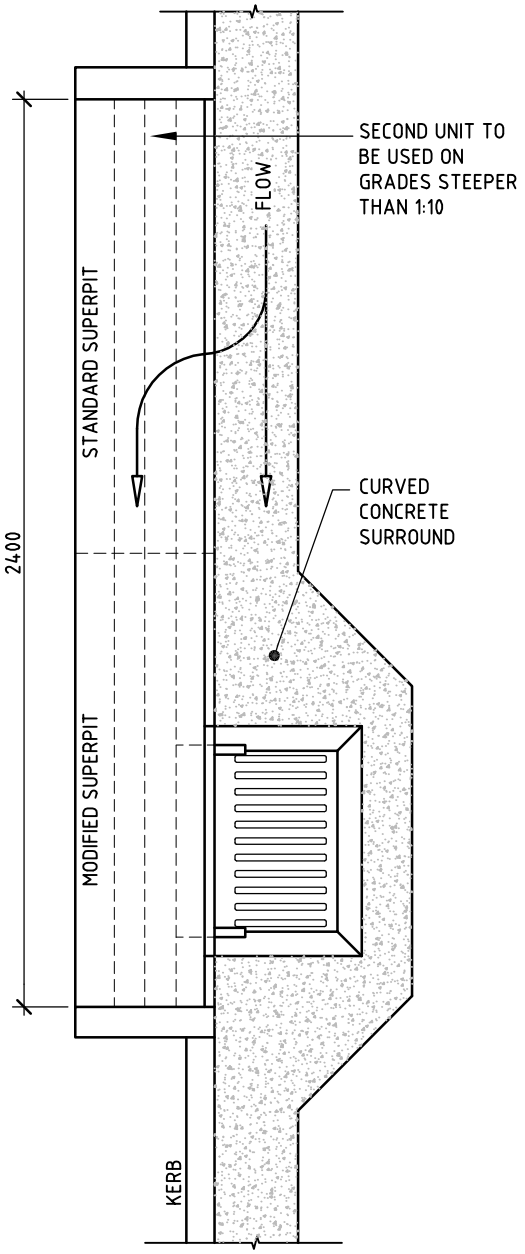


SECTION OF RIB
SCALE 1 : 5

GRATING DETAIL



SECTION
NTS

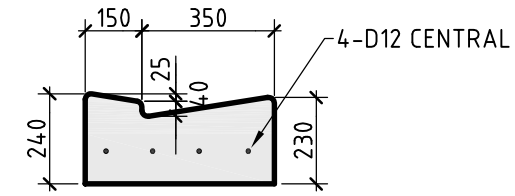


PLAN
NTS

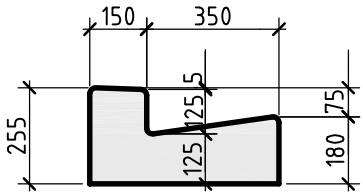
CATCHPIT DETAILS

REV B MARCH 2010

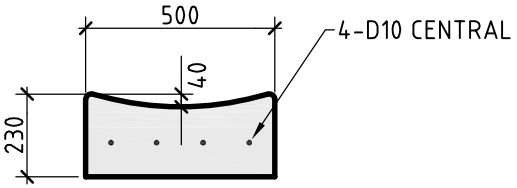
Drawing No. RS-029



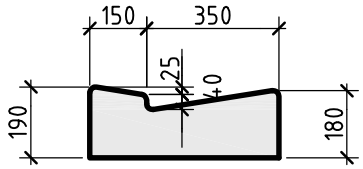
HEAVY DUTY VEHICLE CROSSING



KERB & CHANNEL

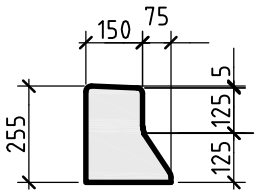


HEAVY DUTY DISH CHANNEL



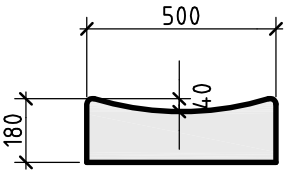
VEHICLE DROP CROSSING

NOTE: A) CONSTRUCTION JOINT AT 10M CRS (REINF. CONTINUOUS)
B) EXPANSION JOINT AT 40M CRS (REINF. & CONC. STOP)

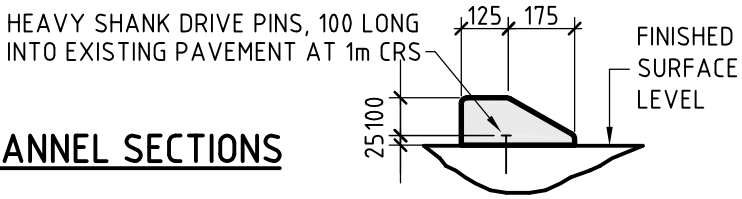


KERB ONLY

NOTE:
RADIUS EDGES OF CONCRETE AS FOLLOWS:
CHANNEL LIP AND INVERT – 25MM RADIUS
TOP OF KERB – 5mm RADIUS



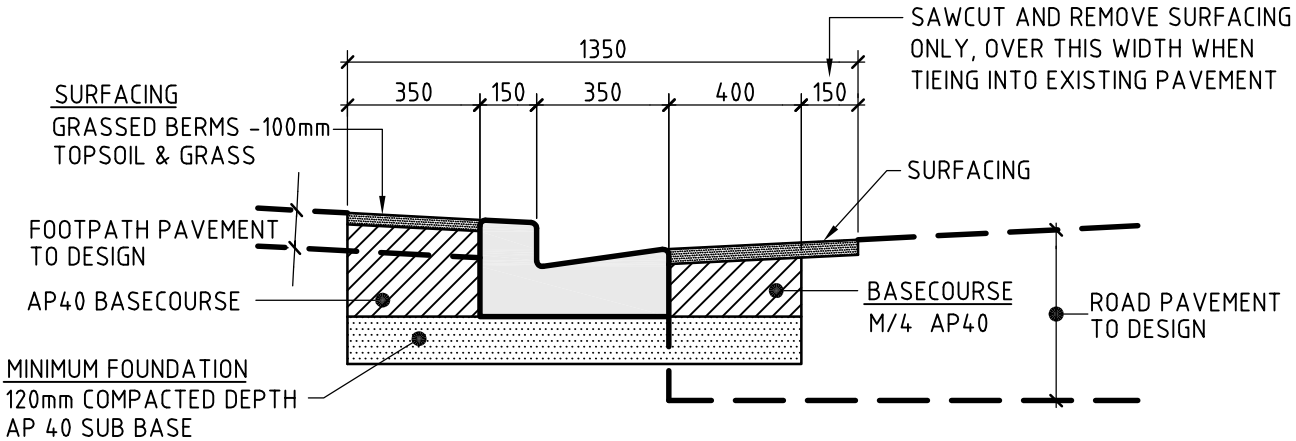
DISH CHANNEL



MOUNTABLE KERB

TYPICAL KERB AND CHANNEL SECTIONS

1 : 20



TYPICAL KERB AND CHANNEL CONSTRUCTION CROSS SECTION

1 : 20

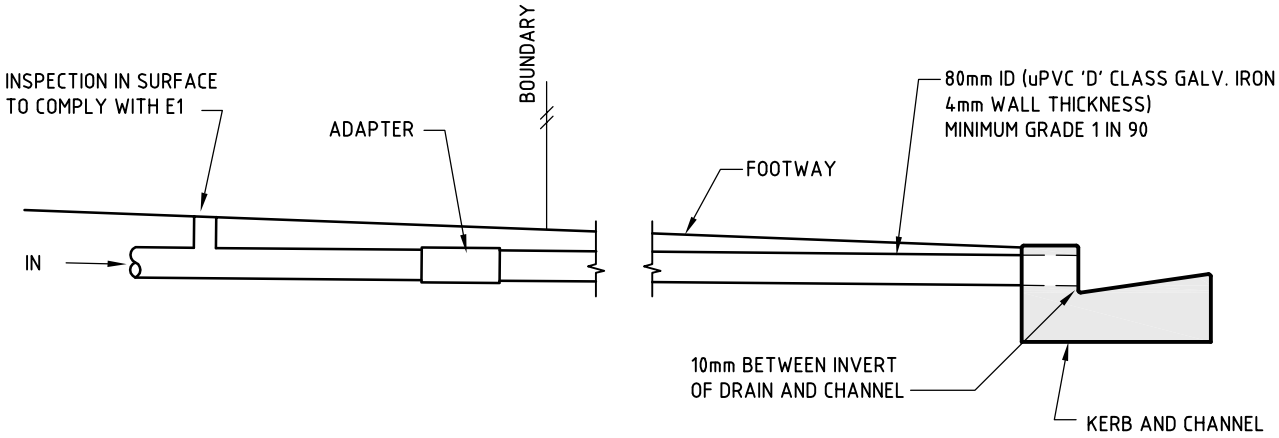
SCALE 1:20

KERB AND CHANNEL DETAILS

REV B MARCH 2010

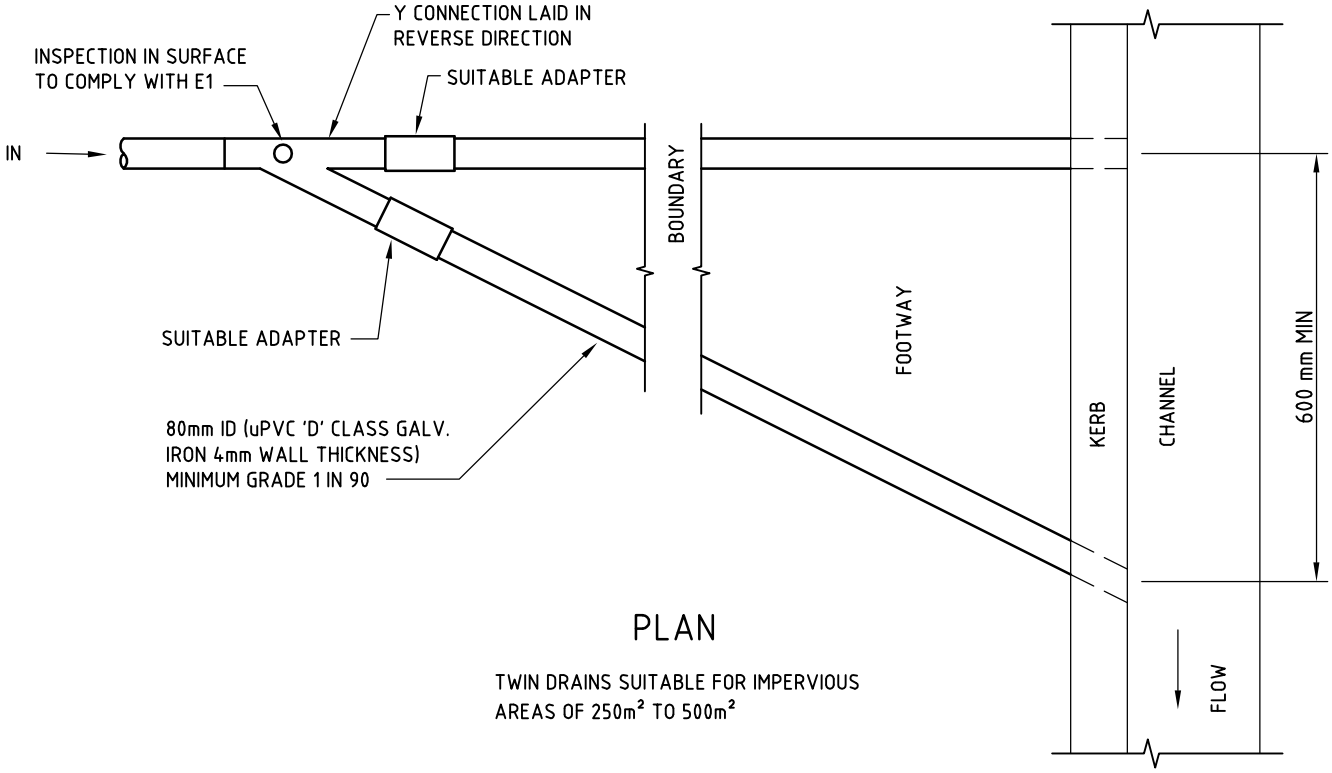
Drawing No. RS-030

SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



SECTION

SINGLE DRAIN SUITABLE FOR IMPERVIOUS AREAS OF UP TO 250m²



PLAN

TWIN DRAINS SUITABLE FOR IMPERVIOUS AREAS OF 250m² TO 500m²

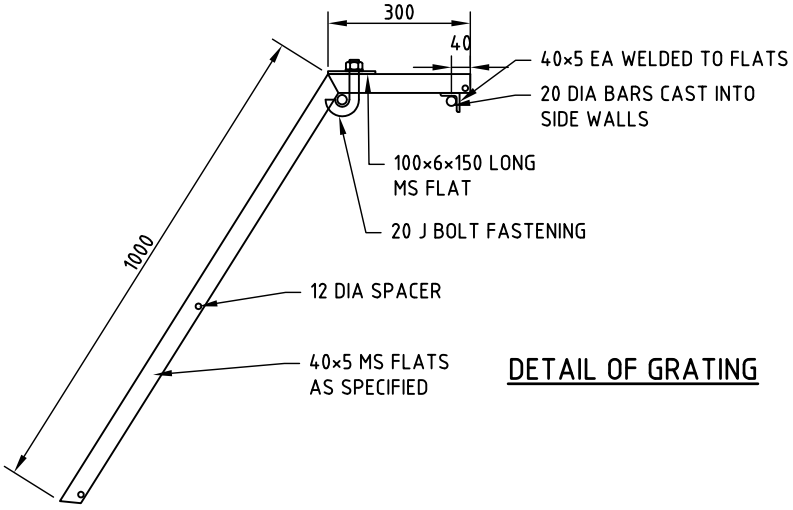
BASED ON DRAWING F1074

CONNECTION OF STORMWATER DRAINS TO KERB AND CHANNEL

REV A MAY 2009

Drawing No. 10317

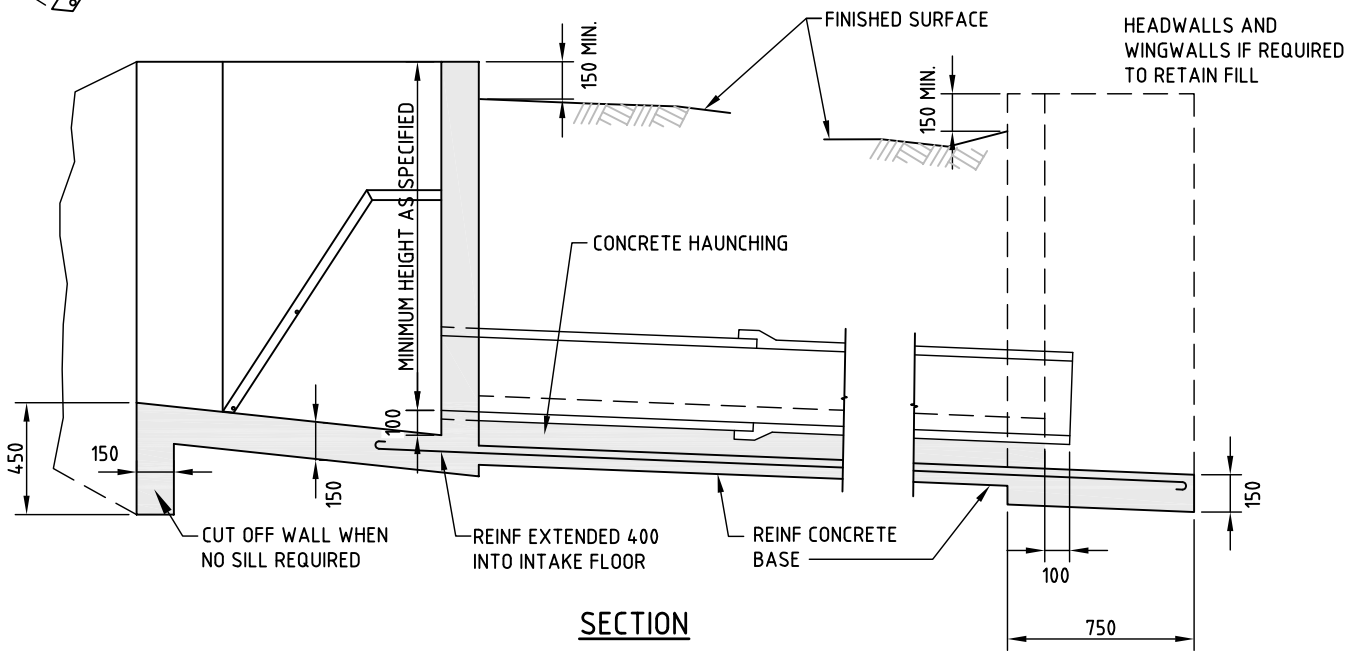
SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



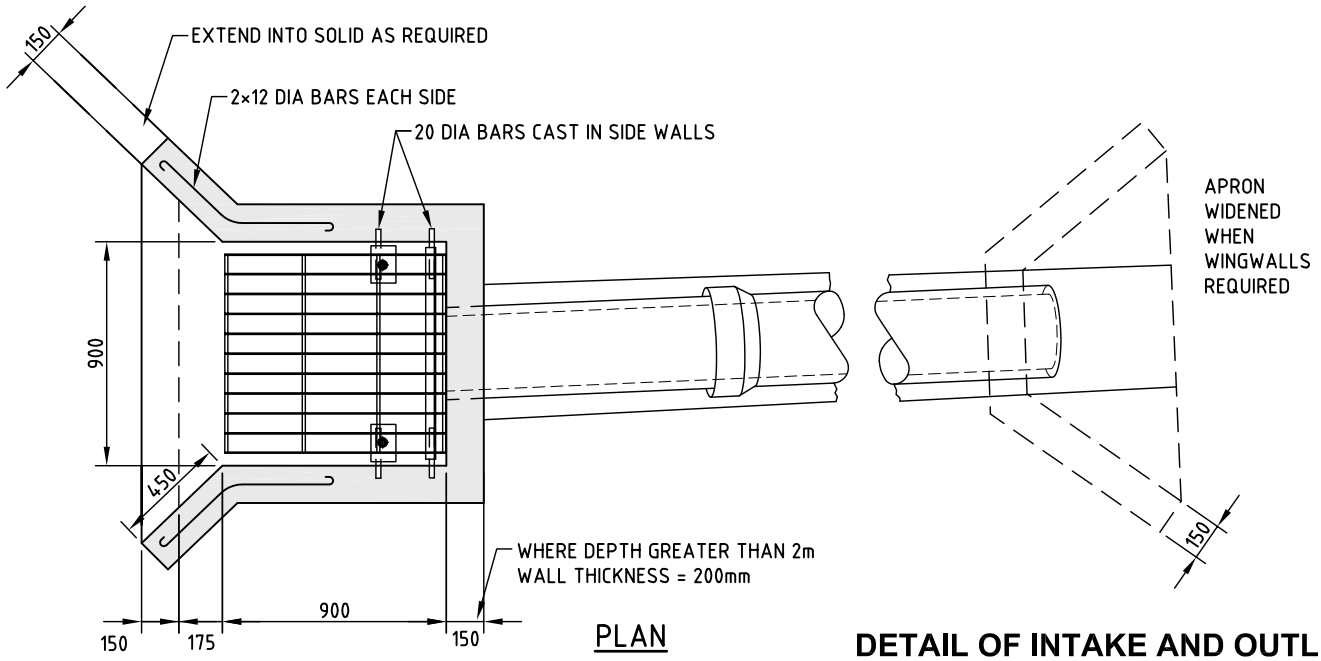
DETAIL OF GRATING

NOTE - BAR SPACING FOR GRATING

75mm - UP TO 350 DIA PIPE
100mm - 375 TO 525 DIA PIPE
150mm - 600 AND LARGER DIA PIPE



SECTION



PLAN

DETAIL OF INTAKE AND OUTLET WITHOUT VERTICAL GRATE AND SILL

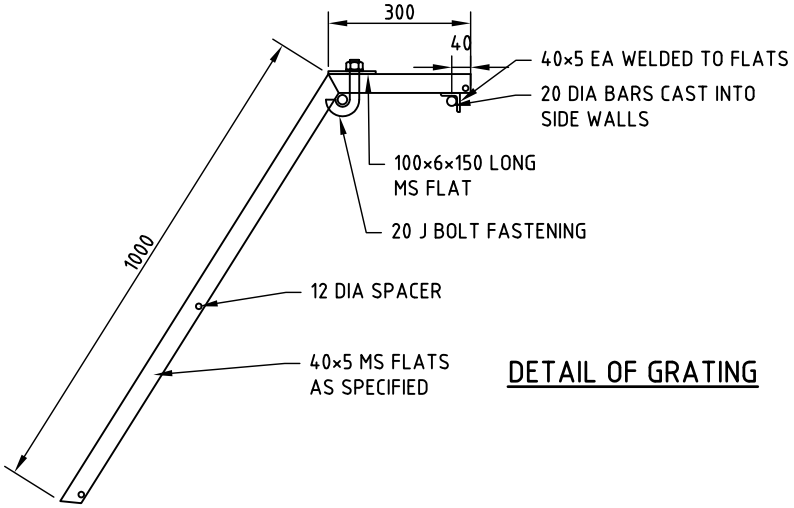
BASED ON DRAWING F123a

REV A MAY 2009

Drawing No. 10318

S:\CAD\CLIENT\DCC\STANDARD DETAILS\WATER & WASTE SERVICES

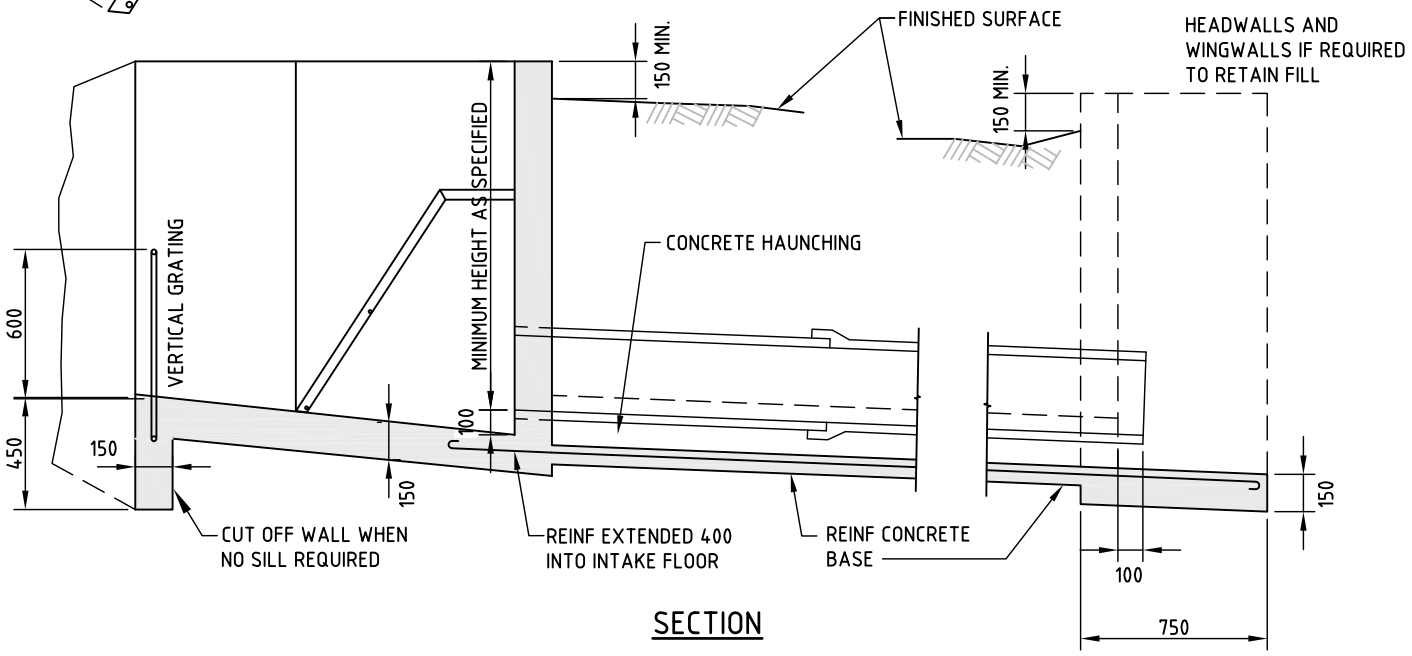
SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



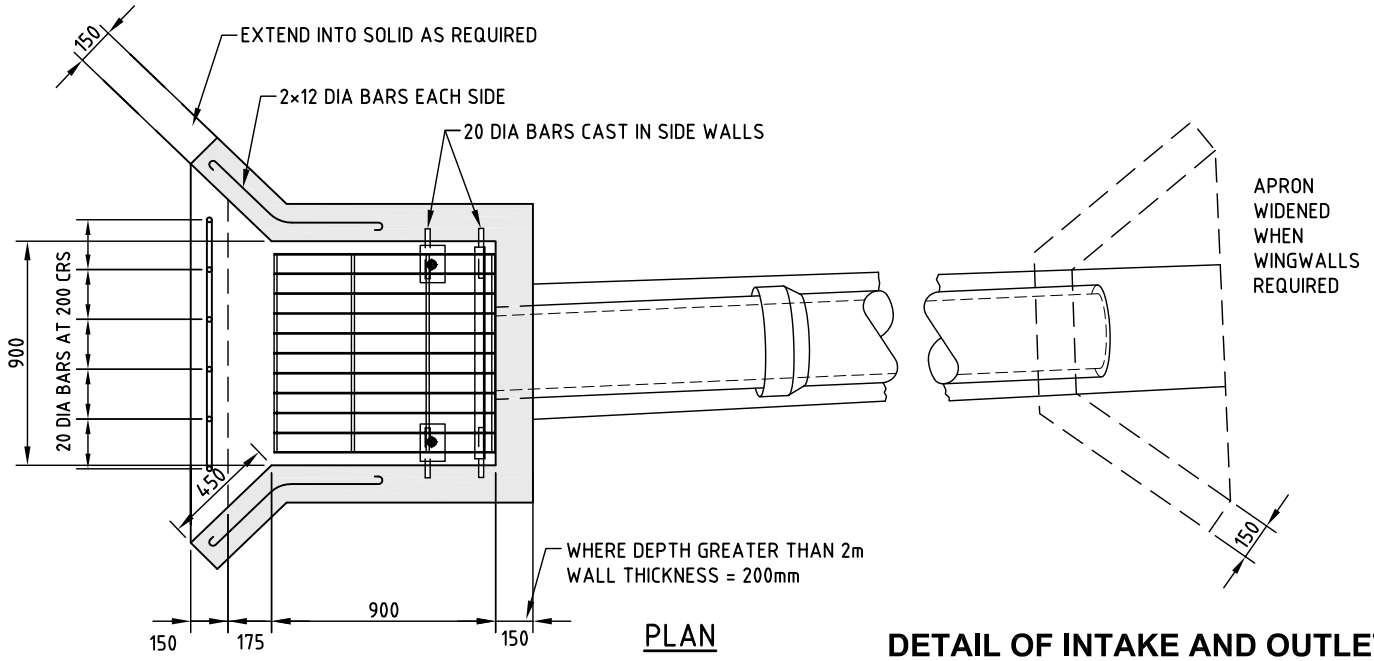
DETAIL OF GRATING

NOTE - BAR SPACING FOR GRATING

75mm - UP TO 350 DIA PIPE
100mm - 375 TO 525 DIA PIPE
150mm - 600 AND LARGER DIA PIPE



SECTION



PLAN

DETAIL OF INTAKE AND OUTLET WITH VERTICAL GRATE

BASED ON DRAWING F123b

REV A MAY 2009

Drawing No. 10319

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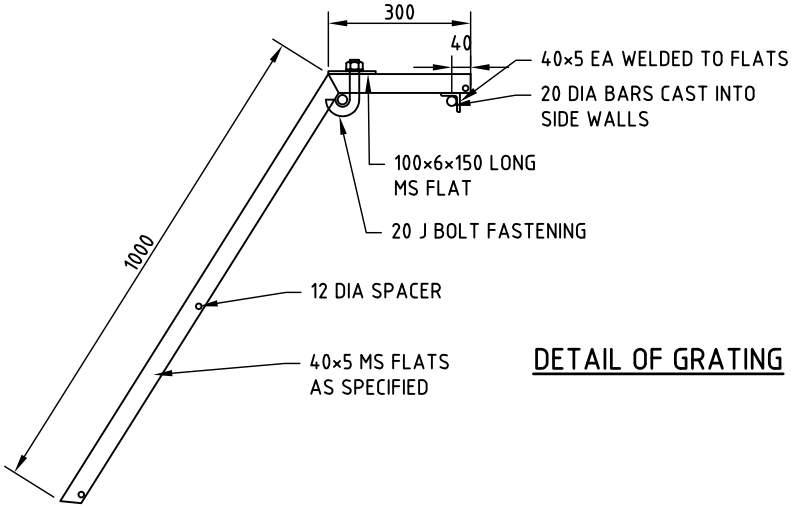
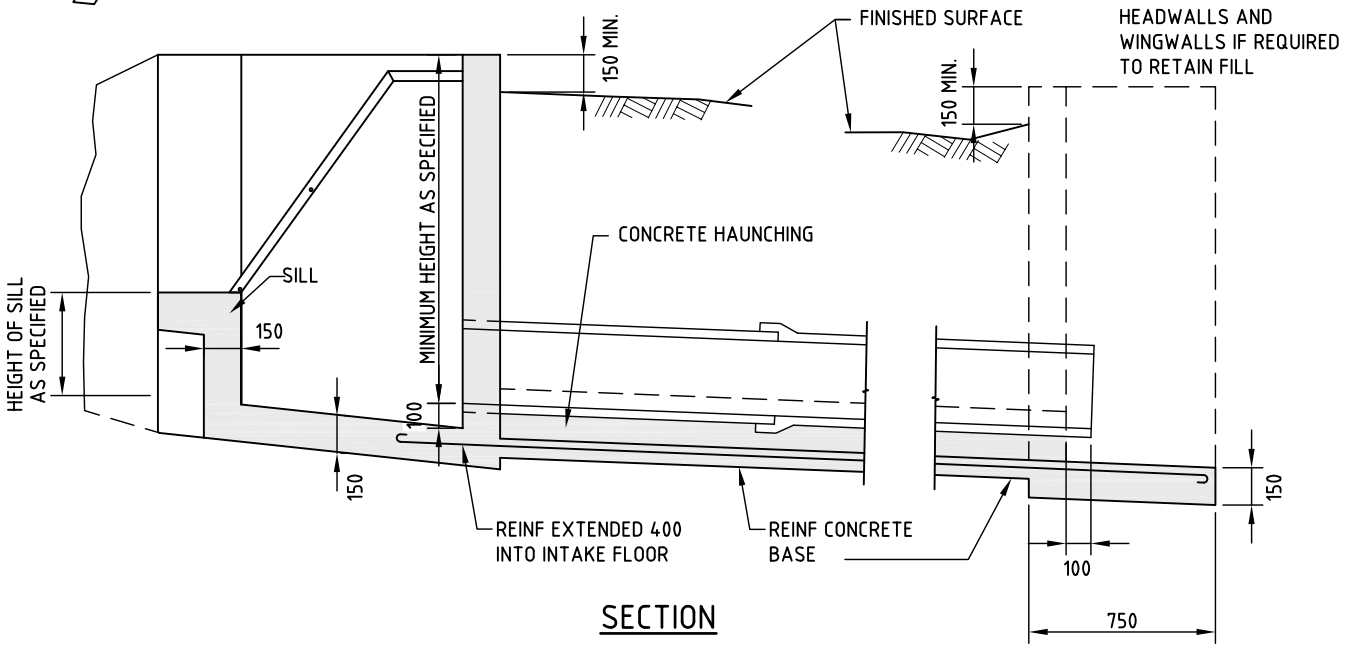
SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



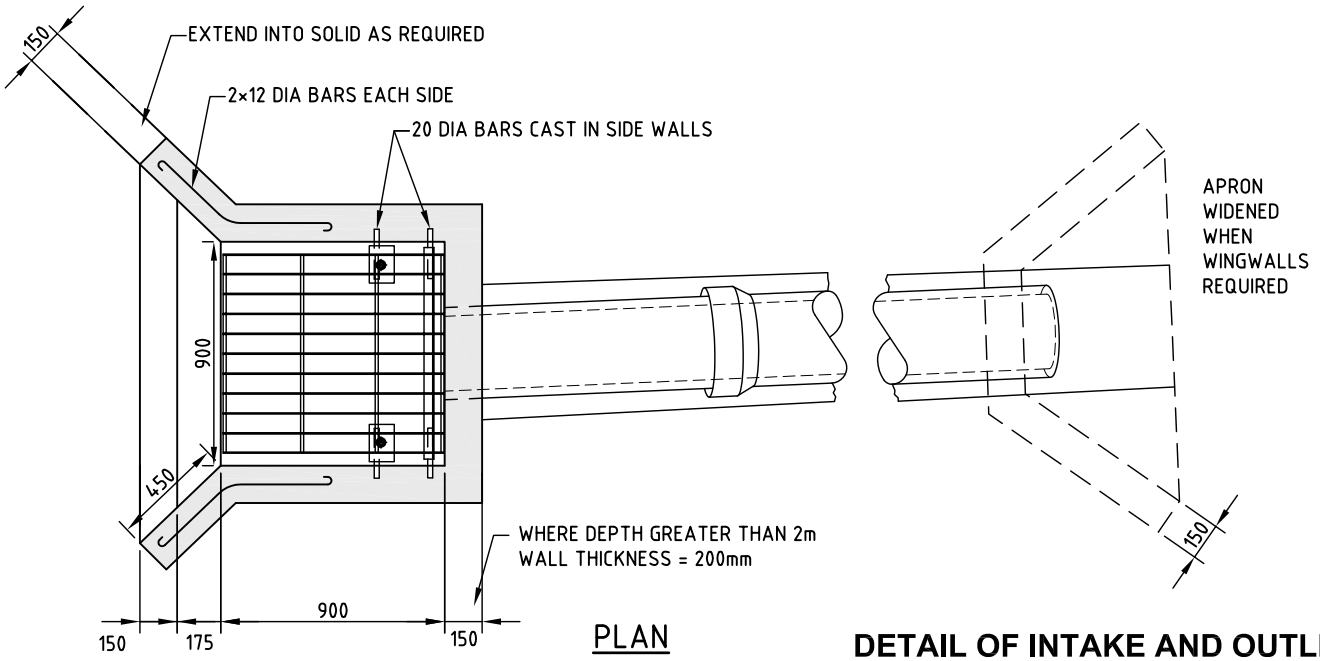
NOTE - BAR SPACING FOR GRATING

75mm - UP TO 350 DIA PIPE
100mm - 375 TO 525 DIA PIPE
150mm - 600 AND LARGER DIA PIPE

DETAIL OF GRATING



SECTION



PLAN

DETAIL OF INTAKE AND OUTLET WITH INLET SILL

BASED ON DRAWING F123c

REV A MAY 2009

Drawing No. 10320

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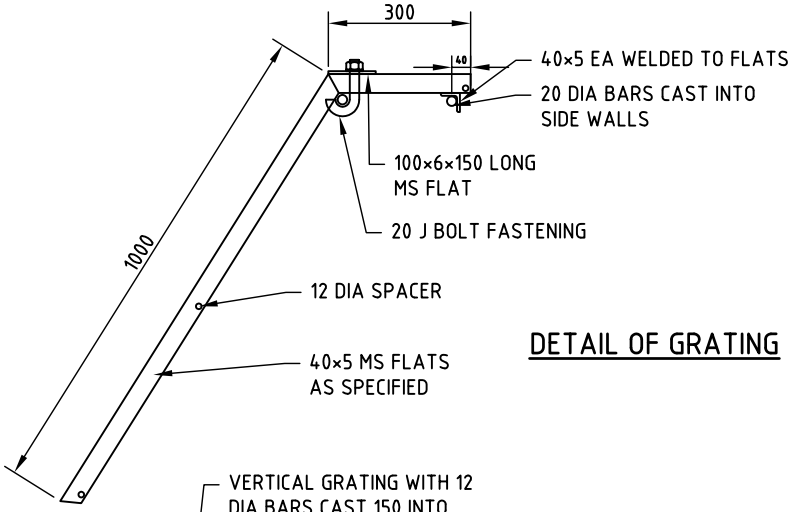
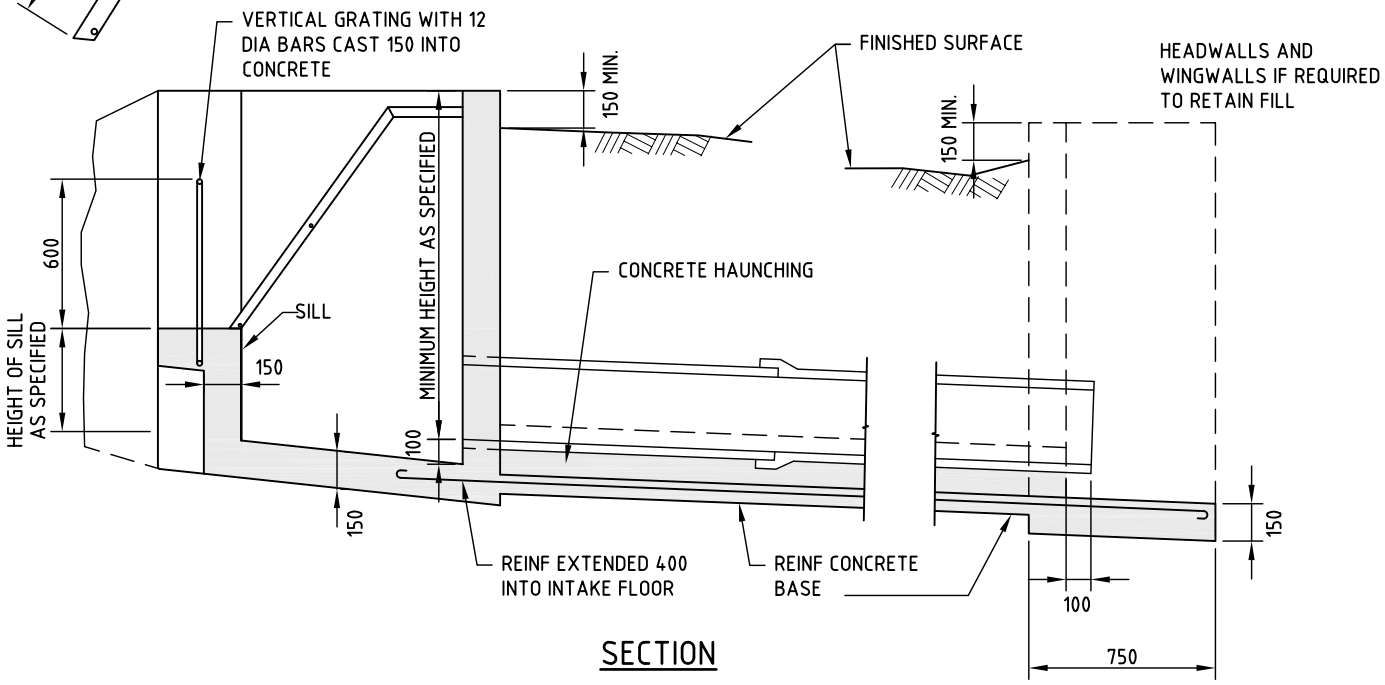
SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



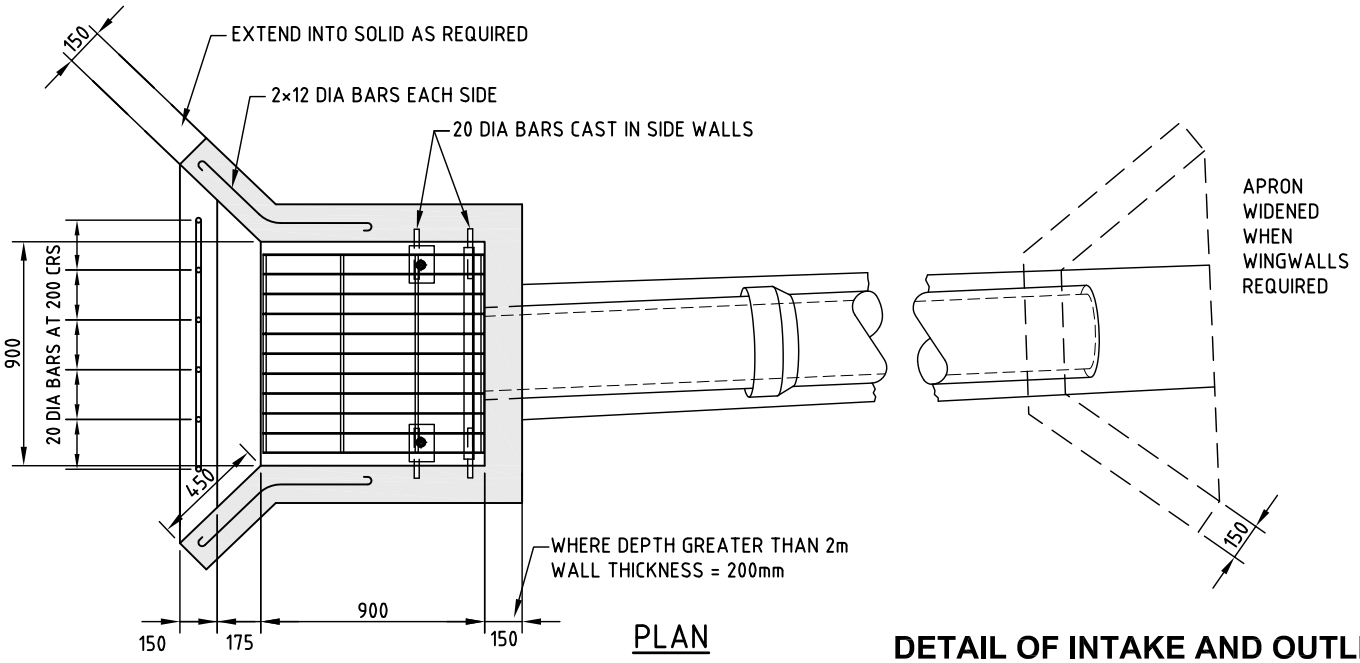
NOTE - BAR SPACING FOR GRATING

75mm - UP TO 350 DIA PIPE
100mm - 375 TO 525 DIA PIPE
150mm - 600 AND LARGER DIA PIPE

DETAIL OF GRATING



SECTION



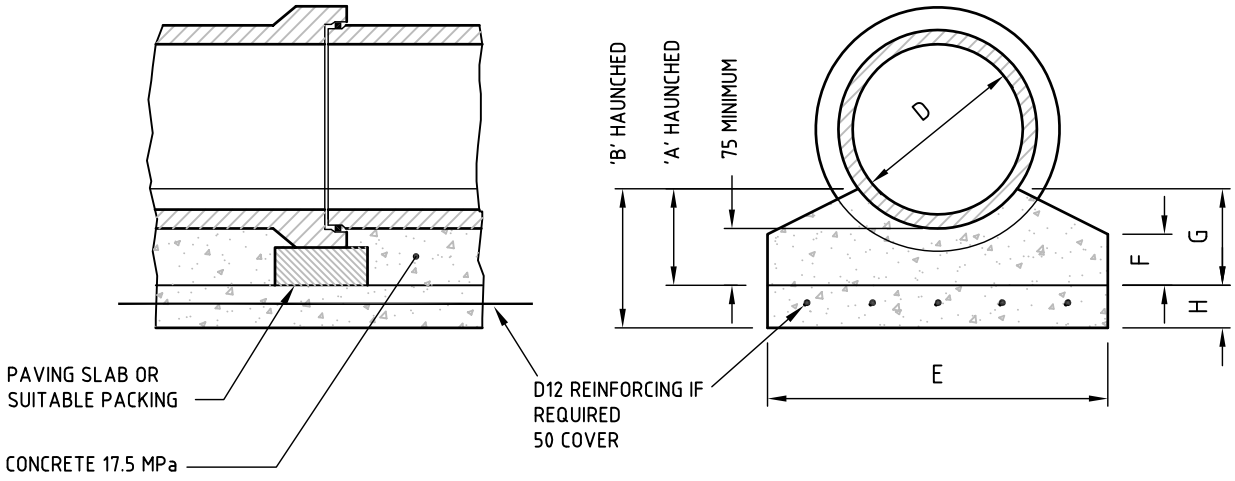
PLAN

DETAIL OF INTAKE AND OUTLET WITH INLET SILL & VERTICAL GRATE

BASED ON DRAWING F123d

REV A MAY 2009

Drawing No. 10321



DIMENSIONS AND QUANTITIES OF HAUNCHING								
PIPE DIAMETER D	100	150	225	300	375	450	525	600
DIMENSION E	300	375	500	600	675	750	850	900
DIMENSION F	70	80	80	90	110	130	140	170
DIMENSION G	120	140	150	170	190	210	230	250
DIMENSION H	75	75	75	75	75	75	100	100
'A' HAUNCHING Vol in m^3/m run	0.028	0.040	0.053	0.070	0.087	0.103	0.122	0.138
'B' HAUNCHING Vol in m^3/m run	0.051	0.068	0.091	0.115	0.138	0.159	0.207	0.228
REINFORCING IF SPECIFIED								
NUMBER OF BARS	2	3	3	4	4	4	5	5
SPACING CENTRE TO CENTRE	150	125	160	150	175	200	160	190

APPLICABLE FOR SW & WW

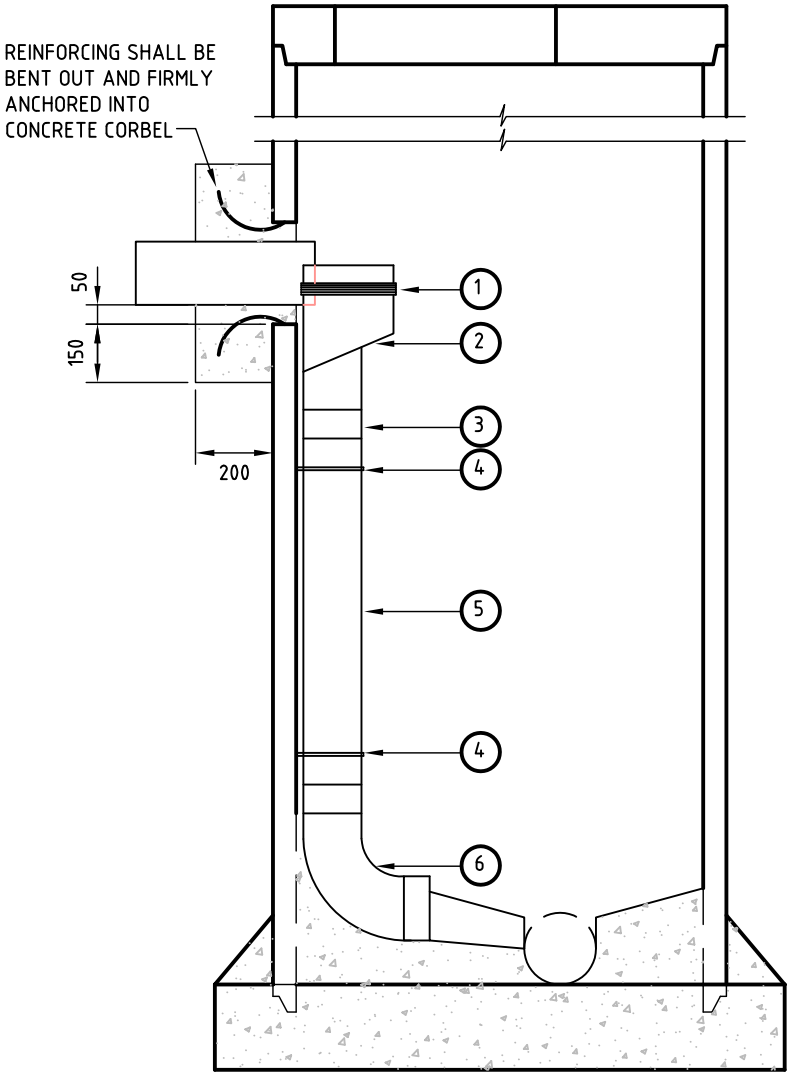
BASED ON DRAWING F470

CONCRETE HAUNCHING FOR RUBBER RING JOINTED PIPES 100mm - 600mm PIPES

REV A MAY 2009

Drawing No. 10322

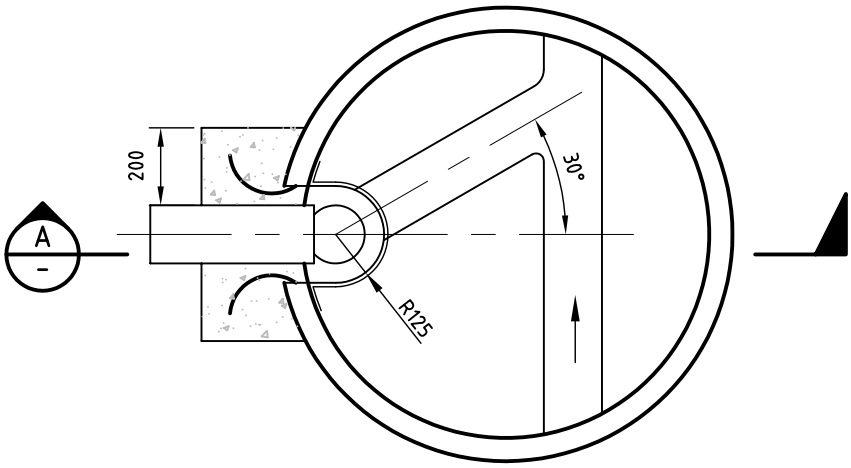
SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



SECTION A-A

PARTS LIST

1. 80mm WIDE 125mm RADIUS 2.6mm (12g) 316 STAINLESS STEEL STRAP FIXED TO MANHOLE WALL WITH 4 MASONRY ANCHORS
2. FABRICATED UPVC BASIN
3. 150ø uPVC LOOSE COUPLING
4. 150ø uPVC SN16 PIPE CLIP FIXED TO MANHOLE WALL WITH 2 MASONRY ANCHORS
5. 150ø uPVC SEWER PIPE
6. 150ø uPVC 90° PLAIN BEND SOLVENT JOINTED



PLAN

APPLICABLE FOR SW & WW

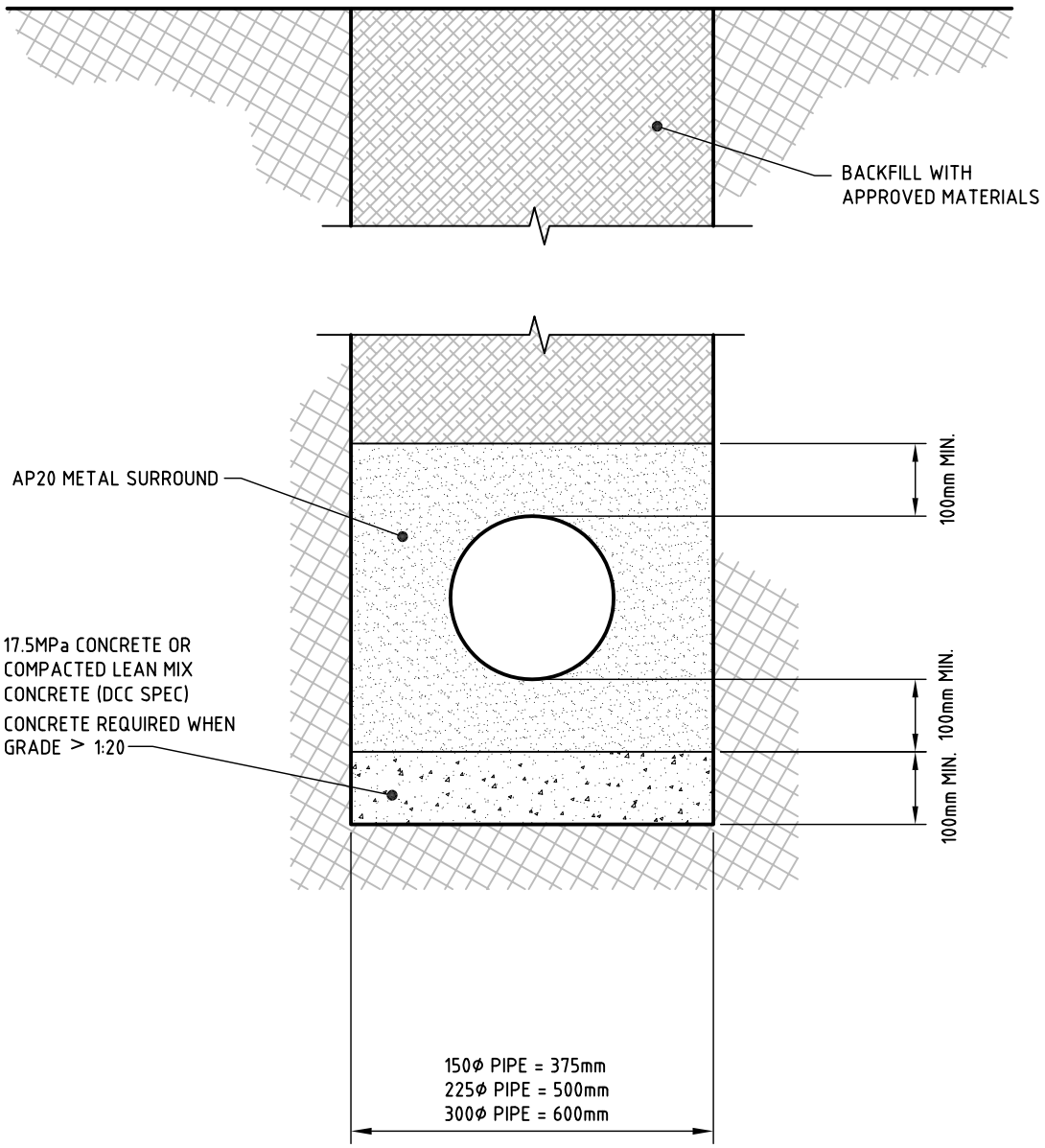
BASED ON DRAWING F750

DROP INSTALLATION PRECAST MANHOLE

REV A MAY 2009

Drawing No. 10323

S:\CAD\CLIENT\DCC\STANDARD DETAILS\WATER & WASTE SERVICES



NOTE : THE ABOVE BEDDING IS FOR PVC / PE PIPES ONLY.
(REPLACES CONCRETE 'A' HAUNCHING)

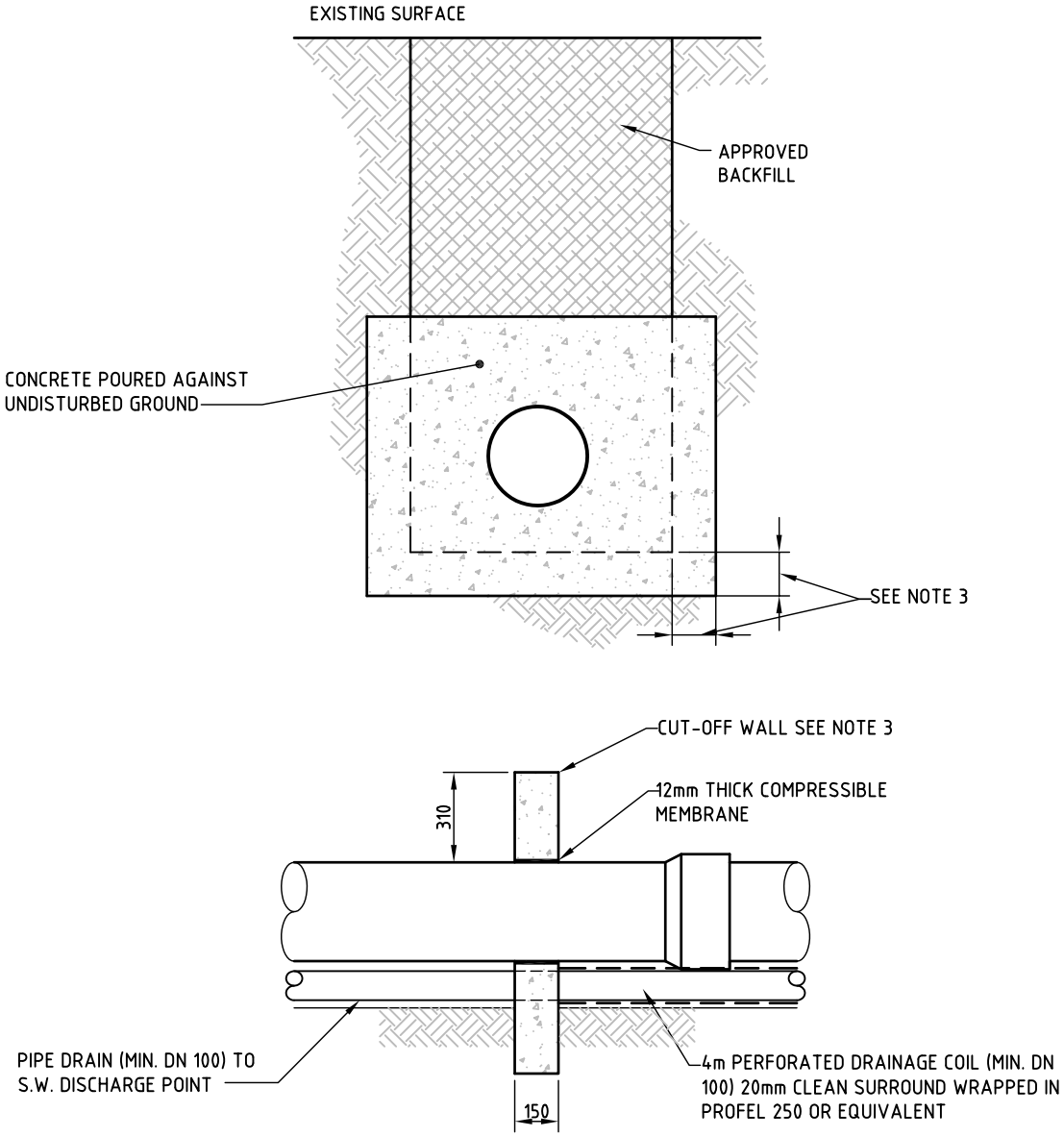
APPLICABLE FOR SW & WW

BASED ON DRAWING 10028/1

PIPE BEDDING DETAIL

REV A MAY 2010

Drawing No. 10324



NOTES

1 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED
2 CUT-OFF WALLS SHALL BE CONSTRUCTED WHERE REQUIRED BY THE ENGINEER AND IN ACCORDANCE WITH THE DRAWINGS AND SPECIFICATION.
3 CONCRETE BULKHEAD SHALL BE KEYED INTO THE SIDES AND BOTTOM OF TRENCH
   - 75mm MIN. IN ROCK
   - 150mm MIN. IN SOIL
4 CUT-OFF WALLS SHALL BE INSTALLED AT A SPACING OF 50M OR AS SHOWN ON THE CONSTRUCTION DRAWINGS
5 CONCRETE SHALL BE 17.5 mPa.
6 DIRECTION OF DISCHARGE PIPE SHALL BE AS SHOWN ON DESIGN PLANS

APPLICABLE FOR SW & WW

BASED ON DRAWING F119

CUT-OFF WALLS AND TRENCH DRAINAGE FOR DN 150 TO DN 300 SEWERS

REV A MAY 2009

Drawing No. 10325

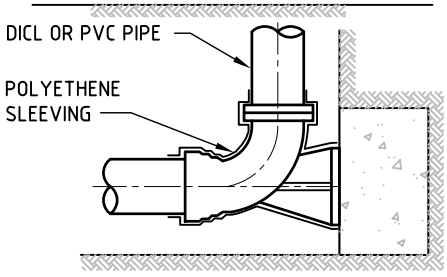
Water and Waste Services

SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1

90° (1/4) BENDS							45° (1/8) BENDS						
NOMINAL SIZE DN mm	LOAD T kN	STRATA	MINIMUM REQUIRED BEARING AREA m^2	LENGTH L mm	HEIGHT H mm	G mm	NOMINAL SIZE DN mm	LOAD T kN	STRATA	MINIMUM REQUIRED BEARING AREA m^2	LENGTH L mm	HEIGHT H mm	G mm
100	19.7	SOIL	0.36	900	400		100	10.7	SOIL	0.19	600	310	
		ROCK	0.05	200	250				ROCK	0.01	150	150	
150	41.8	SOIL	0.76	1400	460	90	150	22.6	SOIL	0.41	750	550	
		ROCK	0.10	270	360				ROCK	0.05	160	330	
200	71.7	SOIL	1.30	1500	600	270	200	38.8	SOIL	0.71	1200	600	
		ROCK	0.17	430	390				ROCK	0.09	240	380	
250	108.7	SOIL	1.98	×	×		250	58.8	SOIL	1.07	1410	640	120
		ROCK	0.25	570	440				ROCK	0.14	310	440	
300	158.6	SOIL	2.88	×	×		300	85.8	SOIL	1.56	1650	700	250
		ROCK	0.37	720	510				ROCK	0.20	400	490	
375	241.5	SOIL	4.39	×	×		375	130.7	SOIL	2.38	×	×	
		ROCK	0.56	960	590				ROCK	0.30	520	580	

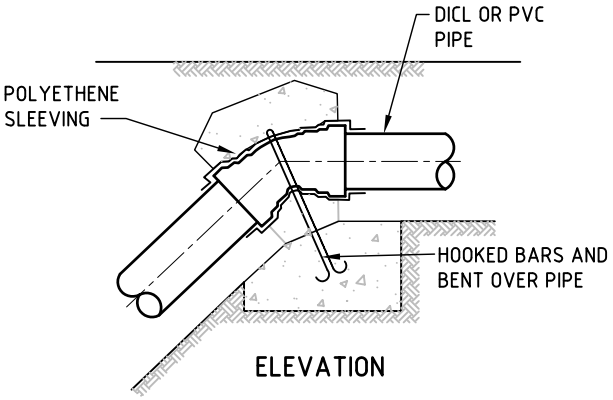
MINIMUM DIMENSIONS FOR THRUST/ANCHOR BLOCKS

× See Notes 2 & 3



ELEVATION

FLUSHING BEND THRUST/ANCHOR
(FOR HORIZONTAL THRUST)
(MIN. REQUIRED BEARING AREA AS PER 90° BEND)



ELEVATION

VERTICAL BEND ANCHOR
(FOR UPWARD THRUST)
(TO BE DESIGNED TO SUIT SITE CONDITIONS)

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. MINIMUM DIMENSIONS OF THRUST/ANCHOR BLOCKS SHOWN ARE CALCULATED FOR A 122M SAFE HEAD. ASSUMED ALLOWABLE SAFE BEARING PRESSURES ARE SOIL: 55 KPA, ROCK : 430 KPA.
3. DETAILS AND DIMENSIONS OF ANCHOR BLOCKS SHALL BE AS SHOWN IN THE DESIGN PLANS
4. IN BAD GROUND CONDITIONS (E.G. SWAMP OR WET SAND) WHERE BEARING CAPACITY IS LESS THAN 55KPA ADDITIONAL ANCHORAGE SHALL BE AS SPECIFIED IN THE DESIGN PLANS.
5. CONCRETE SHALL BE 17.5 MPA.
6. THRUST/ANCHOR BLOCKS SHALL BE POURED AGAINST UNDISTURBED GROUND.
7. CONCRETE THRUST/ANCHOR BLOCKS SHALL BE CURED FOR A MINIMUM OF SEVEN (7) DAYS BEFORE BEING SUBJECTED TO ANY THRUST LOAD.
8. WHERE CONCRETE THRUST/ANCHOR BLOCK INTERFERES WITH TRENCH DRAINAGE PIPE DRAINS WITH FILTER (MIN. DN 100) SHALL BE INSTALLED

APPLICABLE FOR SW & WW

BASED ON DRAWING F1120

THRUST / ANCHOR BLOCKS FOR DN 100 TO DN 375 MAINS SHEET 1 OF 2

REV A MAY 2009

Drawing No. 10326

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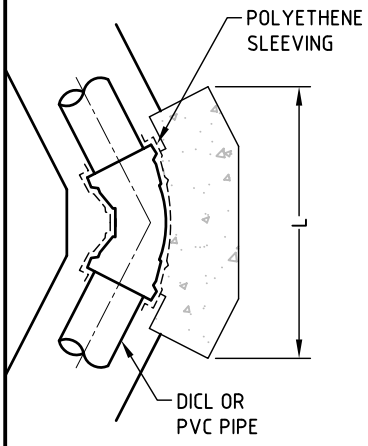
Water and Waste Services

SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1

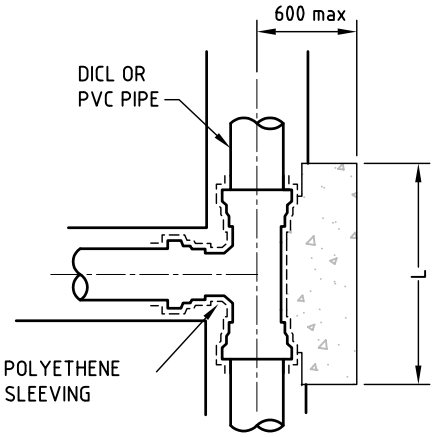
22° (1/16) & 11° (1/32) BENDS							TEES						
NOMINAL SIZE DN mm	LOAD T kN	STRATA	MINIMUM REQUIRED BEARING AREA m^2	LENGTH L mm	HEIGHT H mm	G mm	NOMINAL SIZE DN mm	LOAD T kN	STRATA	MINIMUM REQUIRED BEARING AREA m^2	LENGTH L mm	HEIGHT H mm	G mm
100	5.5	SOIL	0.10	500	220		100	14.0	SOIL	0.25	650	320	100
		ROCK	0.01	NOT REQUIRED					ROCK	0.03	130	270	
150	11.5	SOIL	0.21	600	360		150	29.5	SOIL	0.54	960	520	40
		ROCK	0.03	170	180				ROCK	0.07	220	330	
200	19.8	SOIL	0.36	700	510		200	50.6	SOIL	0.92	1060	600	270
		ROCK	0.05	200	230				ROCK	0.12	320	380	
250	30.0	SOIL	0.55	820	670		250	76.8	SOIL	1.40	×	×	
		ROCK	0.80	240	280				ROCK	0.18	400	440	
300	43.8	SOIL	0.80	1250	640		300	112.0	SOIL	2.04	×	×	
		ROCK	0.10	300	350				ROCK	0.26	520	500	
375	66.7	SOIL	1.21	1500	720		375	170.7	SOIL	3.10	×	×	
		ROCK	0.16	350	450				ROCK	0.40	670	590	

MINIMUM DIMENSIONS FOR THRUST BLOCKS

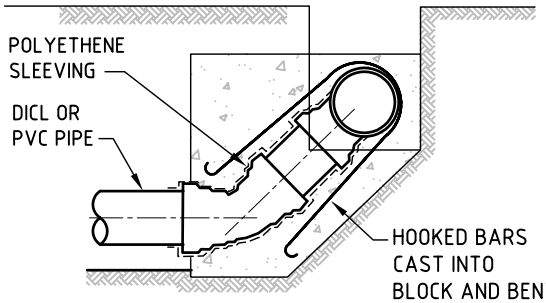
× See Notes 2 & 3 (DRAWING No. 10326)



PLAN

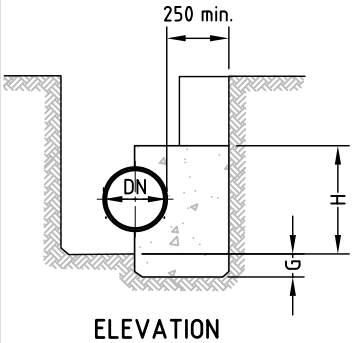


PLAN



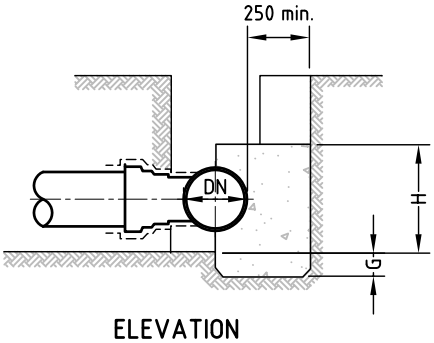
ELEVATION

SLOPED TEE ANCHOR
(FOR UPWARD THRUST)
(TO BE DESIGNED TO SUIT SITE CONDITIONS)



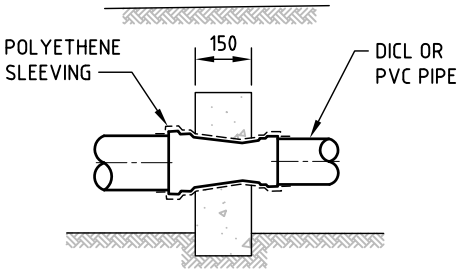
ELEVATION

THRUST BLOCK FOR BENDS
(FOR HORIZONTAL THRUST)



ELEVATION

THRUST BLOCK FOR TEES
(FOR HORIZONTAL THRUST)



ELEVATION

TAPER THRUST BLOCK
(FOR HORIZONTAL THRUST)

APPLICABLE FOR SW & WW

BASED ON DRAWING F1120

THRUST / ANCHOR BLOCKS FOR DN 100 TO DN 375 MAINS SHEET 2 OF 2

REV A MAY 2009

Drawing No. 10327

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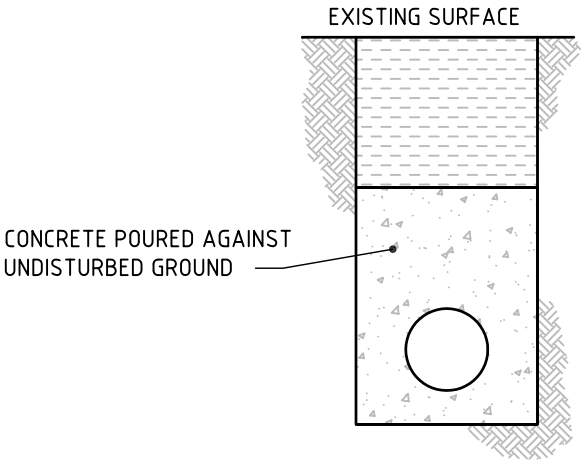
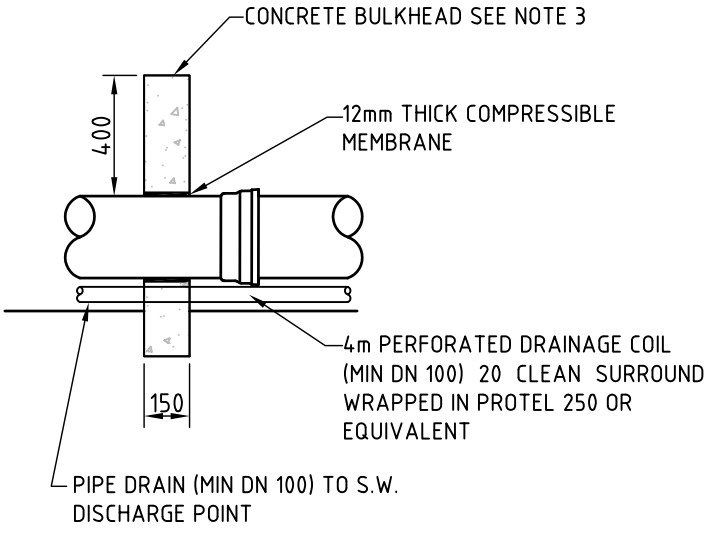
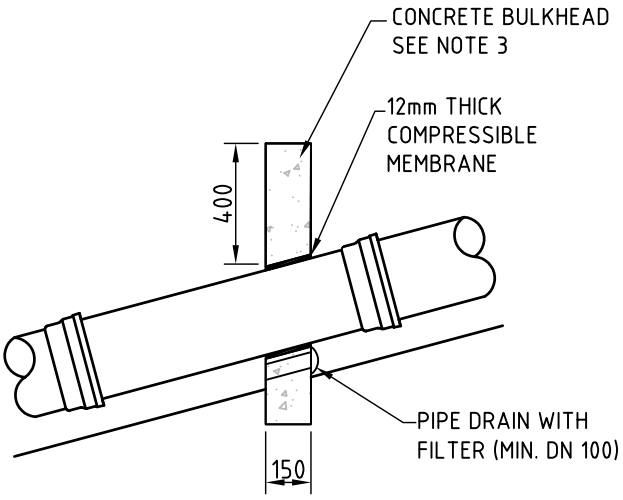
SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



GRADE	HORIZONTAL SPACING OF BULKHEADS (m)
16%	6 x DEPTH TO INVERT
20%	5 x DEPTH TO INVERT
25%	4 x DEPTH TO INVERT
33%	3 x DEPTH TO INVERT
50%	2 x DEPTH TO INVERT





NOTES

1 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE NOTED.
2 CONCRETE BULKHEADS SHALL BE CONSTRUCTED IN THE FOLLOWING CASES:
(I) WHERE A PIPELINE IS INSTALLED AT A GRADE OF 16% OR STEEPER, TO PREVENT SCOURING OF PIPE INBEDMENT AND TRENCH FILL THROUGH TRENCH DRAINAGE AND CONSEQUENT TRENCH COLLAPSE.
3 CONCRETE BULKHEAD SHALL BE KEYED INTO THE SIDES AND BOTTOM OF TRENCH
- 75MM MIN. IN ROCK
- 150MM MIN. IN SOIL
4 AN ALTERNATIVE TO CONCRETE BULKHEADS WHERE A PIPELINE IS INSTALLED AT A GRADE OF 16% OR STEEPER, IS TO ENCASE THE MAIN IN A SAND CEMENT MIXTURE OF 25 : 1 ALONG THE ENTIRE LENGTH OF THE PIPELINE THAT IS ON THAT GRADE.
5 CONCRETE SHALL BE 20MPA.
6 A CONTINUOUS DRAINAGE PATH SHALL BE PROVIDED:
- THROUGH BULKHEADS
- AROUND ACCESS CHAMBERS
- IN TRENCH EXCAVATIONS ACROSS ROADWAYS
- AROUND SEWER CONNECTIONS AND SIDELINES IN DEEP TRENCHES
7 DIRECTION OF DISCHARGE PIPE SHALL BE AS SHOWN ON DESIGN PLANS.

APPLICABLE FOR SW & WW

BASED ON DRAWING F2000

BULKHEADS AND TRENCH DRAINAGE FOR DN 150 AND DN 300 SEWERS

REV A MAY 2009

Drawing No. 10328

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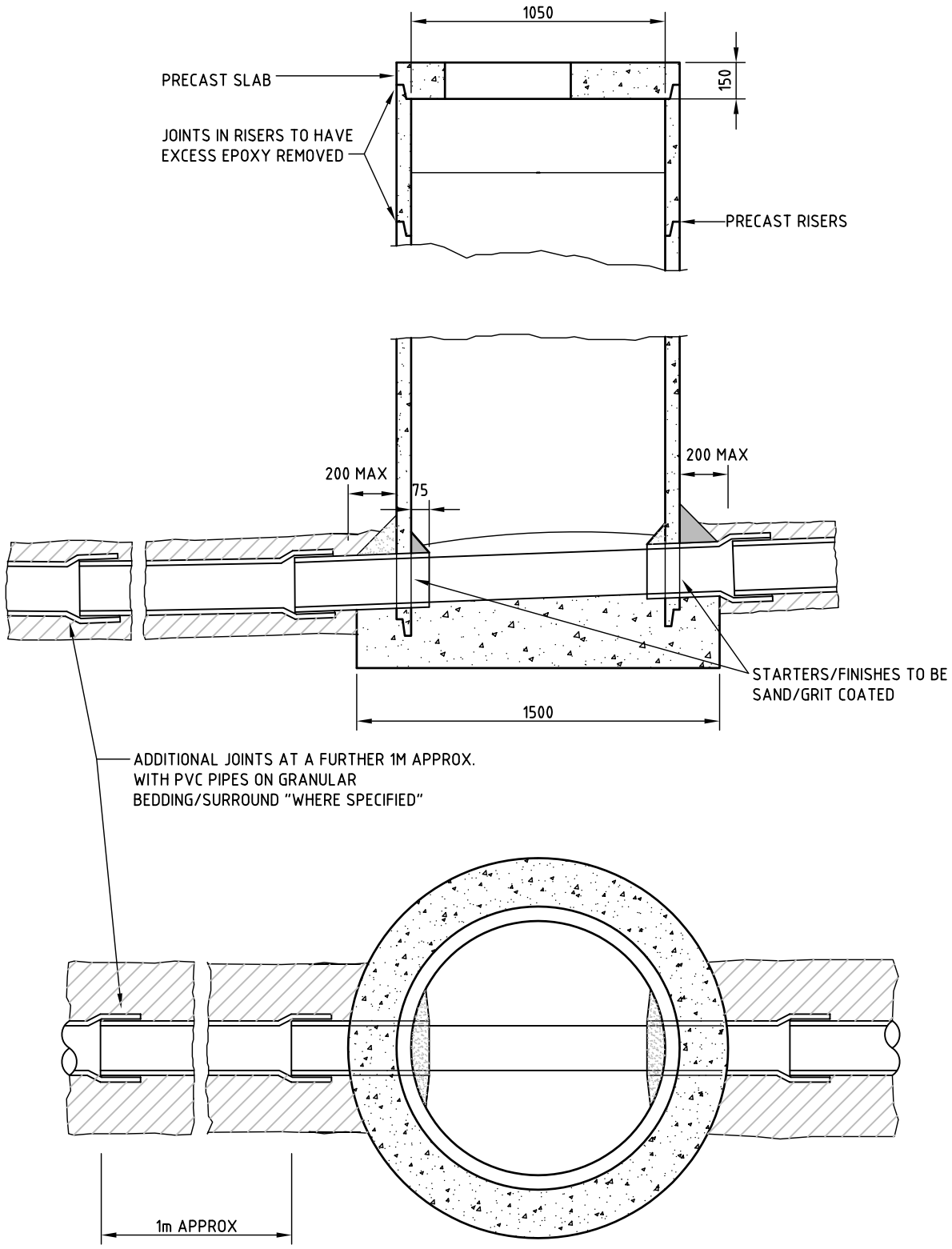
SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



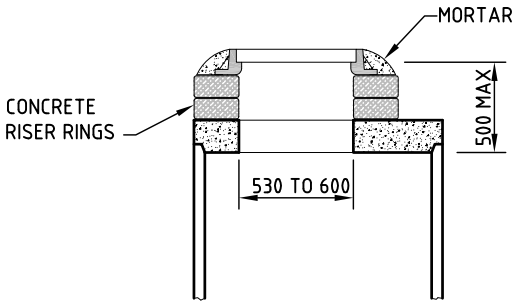
APPICABLE FOR SW & WW

BASED ON DRAWING F744

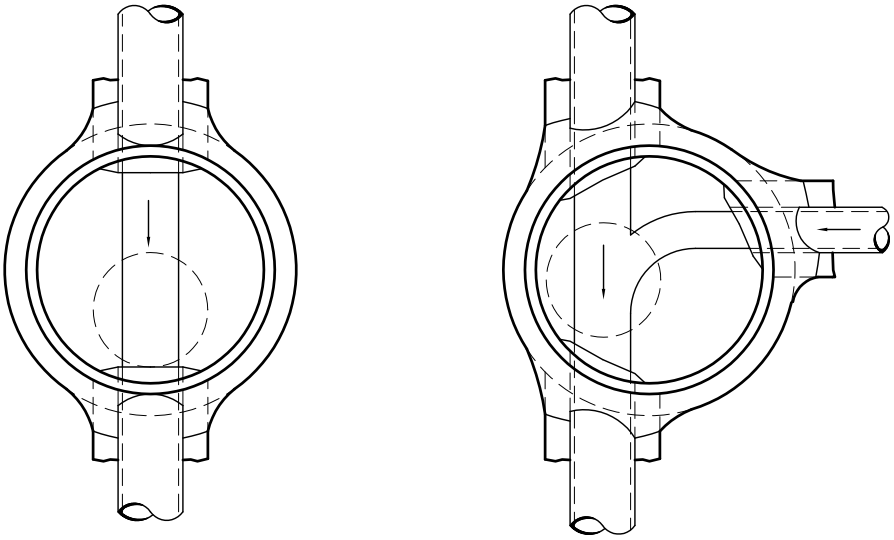
PRECAST MANHOLE FOR uPVC PIPES GRANULAR BEDDING AND SURROUND

REV A MAY 2009

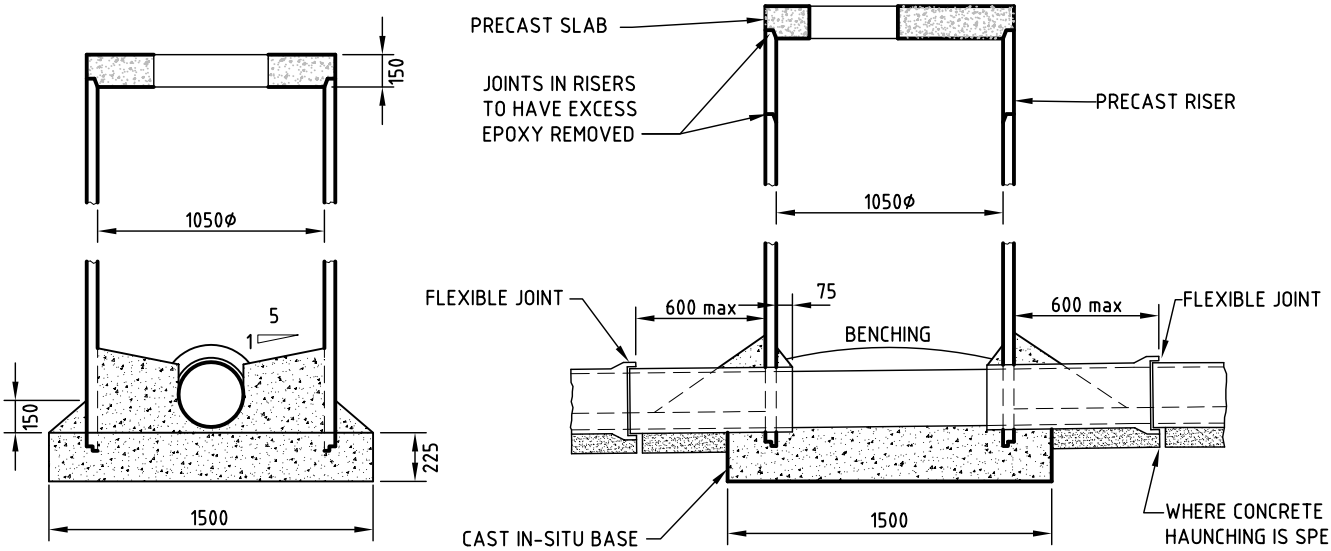
Drawing No. 10329



MANHOLE NECK



INVERT PLANS



M.H. SECTIONS

APPLICABLE FOR SW & WW

BASED ON DRAWING F589

PRECAST MANHOLES
WITH APPROVED COVER AND FRAME

REV A MAY 2009

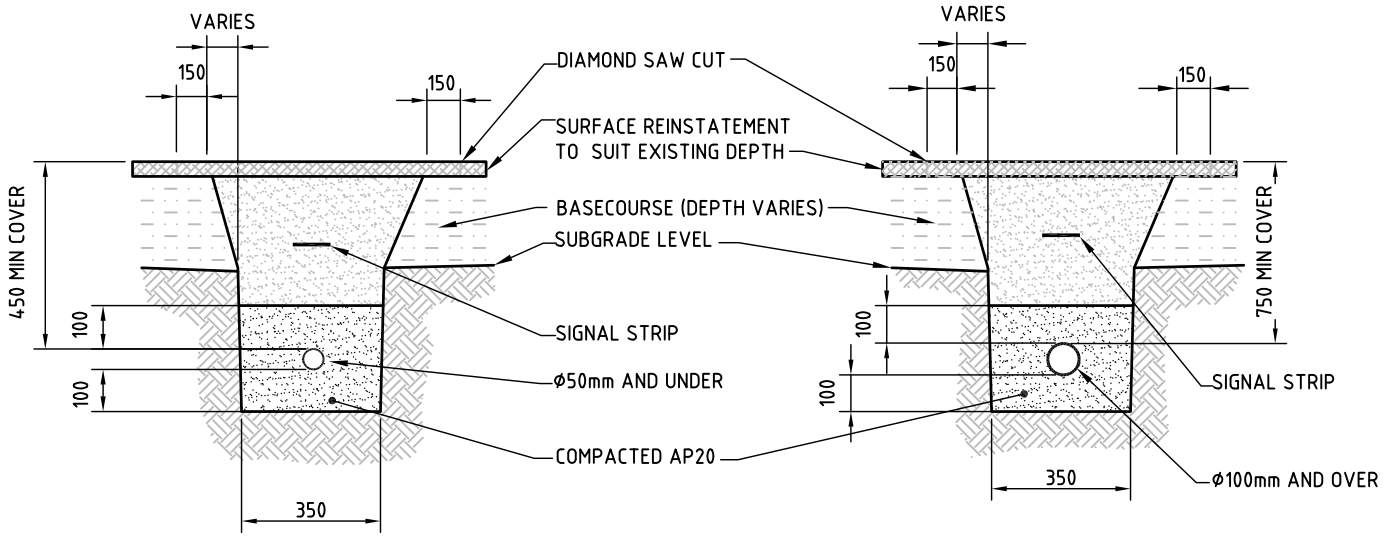
Drawing No. 10330

SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1

TRENCH DIMENSIONS FOR WATERMAINS AND RIDERMAINS			
PIPE DIAMETER	MINIMUM WIDTH	MINIMUM COVER UNDER CARRIAGEWAYS	MINIMUM COVER UNDER GRASS BERMS/FOOTPATHS
15-50mm	350	600	450
100-150mm	450	750	600
150-200mm	550	750	600

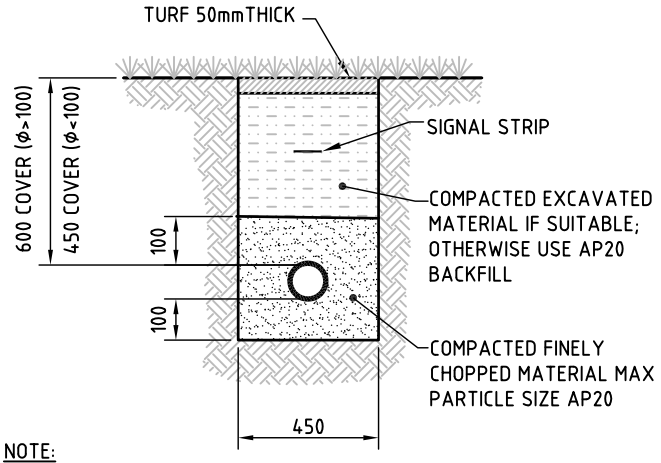
NOTE:
COVER OVER SERVICE PIPES VARIES FROM 750mm AT THE MAIN TO 300mm AT THE STOPCOCK. ALL DIMENSIONS IN MILLIMETRES.

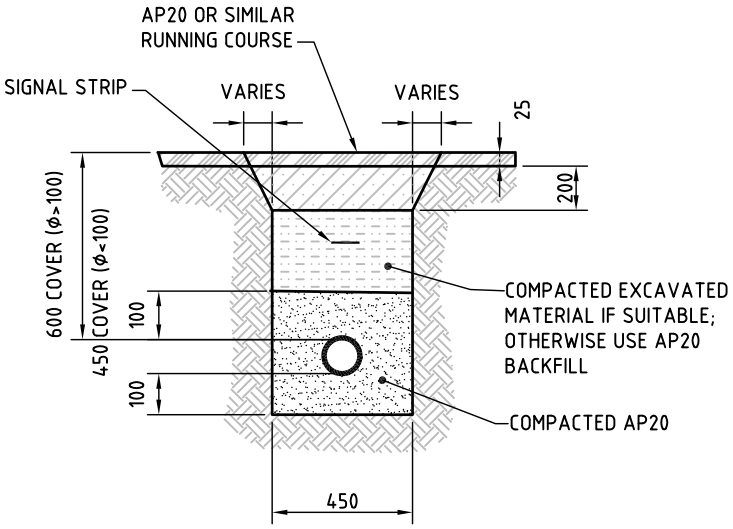
BEDDING, BACKFILLING AND SURFACE REINSTATEMENT



SEALED CARRIAGEWAYS AND FOOTPATHS
(RIDERMAIN)

SEALED CARRIAGEWAYS





UNSEALED ROAD

NOTE:
CUT TURF 50mm THICK FILL TRENCH TO TOP WITH COMPACTED MATERIAL. LAY TURF ON TOP OF TRENCH AND ROLL AND WATER UNTIL A LEVEL GROUND SURFACE IS ACHIEVED.

MOWN VERGES

NOTE:
ALL uPVC AND POLYETHYLENE (PE) PIPES ARE TO BE SPIRALLY WOUND WITH LIVESTRAND ELECTRIC FENCING TAPE TIED TO METAL VALVES OR FITTINGS AT ENDS.

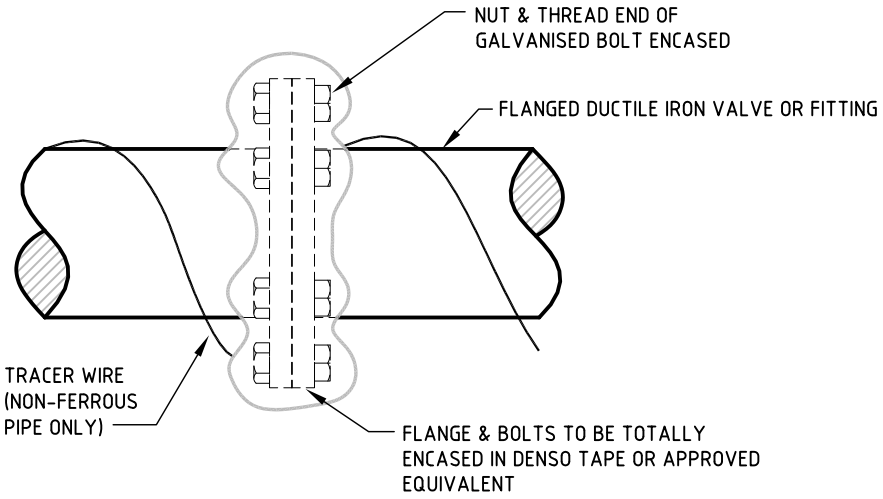
APPICABLE FOR WATERMAINS

BASED ON DRAWING F2000

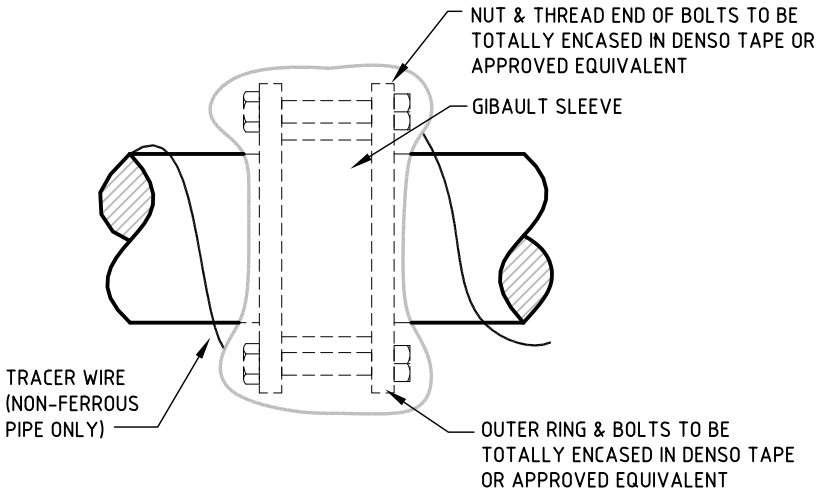
BEDDING, BACKFILL AND SURFACE REINSTATEMENT

REV A MAY 2009

Drawing No. 10334



FLANGED JOINT WRAPPING



GIBAULT JOINT WRAPPING

NOTE

DENSO TAPE OR APPROVED EQUIVALENT IS TO BE APPLIED STRICTLY IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.

APPLICABLE FOR WATERMAINS

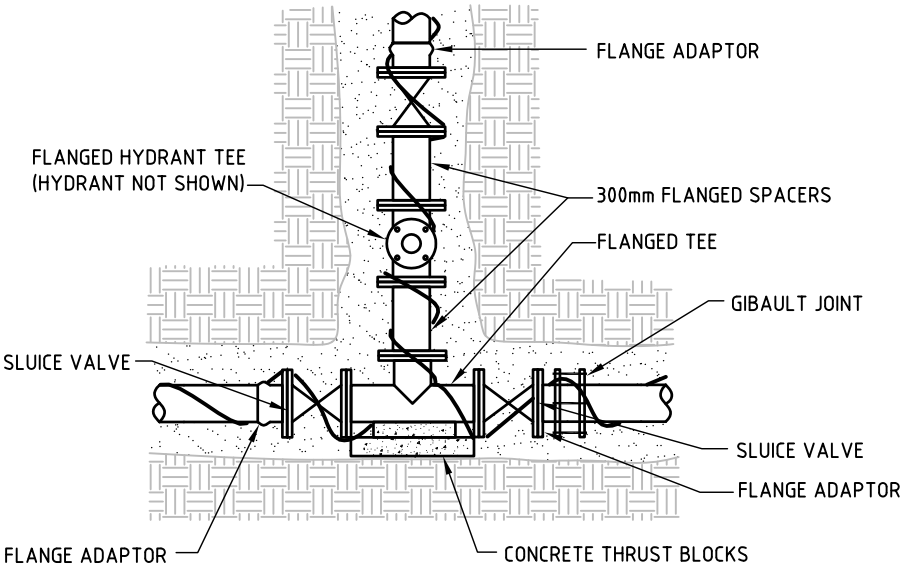
BASED ON DRAWING 45/103/3

JOINT WRAPPING DETAILS

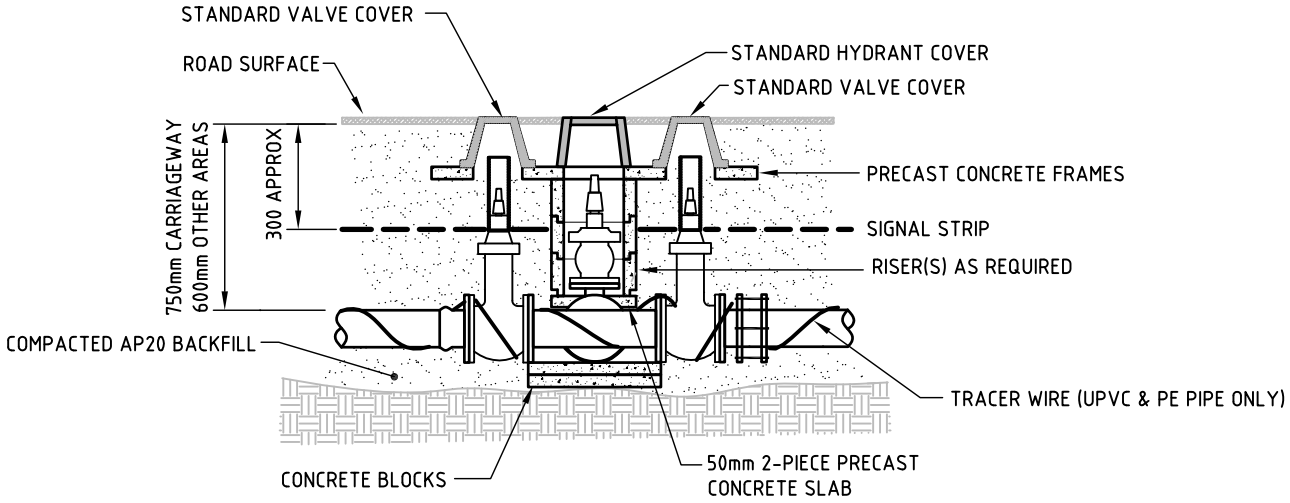
REV A MAY 2010

Drawing No. 10336

SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



PLAN



ELEVATION

NOTES

1. ALL BOLTS AND NUTS TO BE TOTALLY ENCASED IN DENSO TAPE OR APPROVED EQUIVALENT
2. THE FIRE HYDRANT IS INSTALLED BETWEEN THE VALVES TO ALLOW MAINTENANCE SWABBING OF THE MAINS
3. TRACER WIRE IS TO BE SECURELY TIED TO THE VALVES, WITH THE TRACER WIRE VISIBLE FROM THE WELL.

TYPICAL SLUICE VALVE AND FIRE HYDRANT INSTALLATION AT INTERSECTION

BASED ON DRAWING 45/103/4

REV A MAY 2010

Drawing No. 10337

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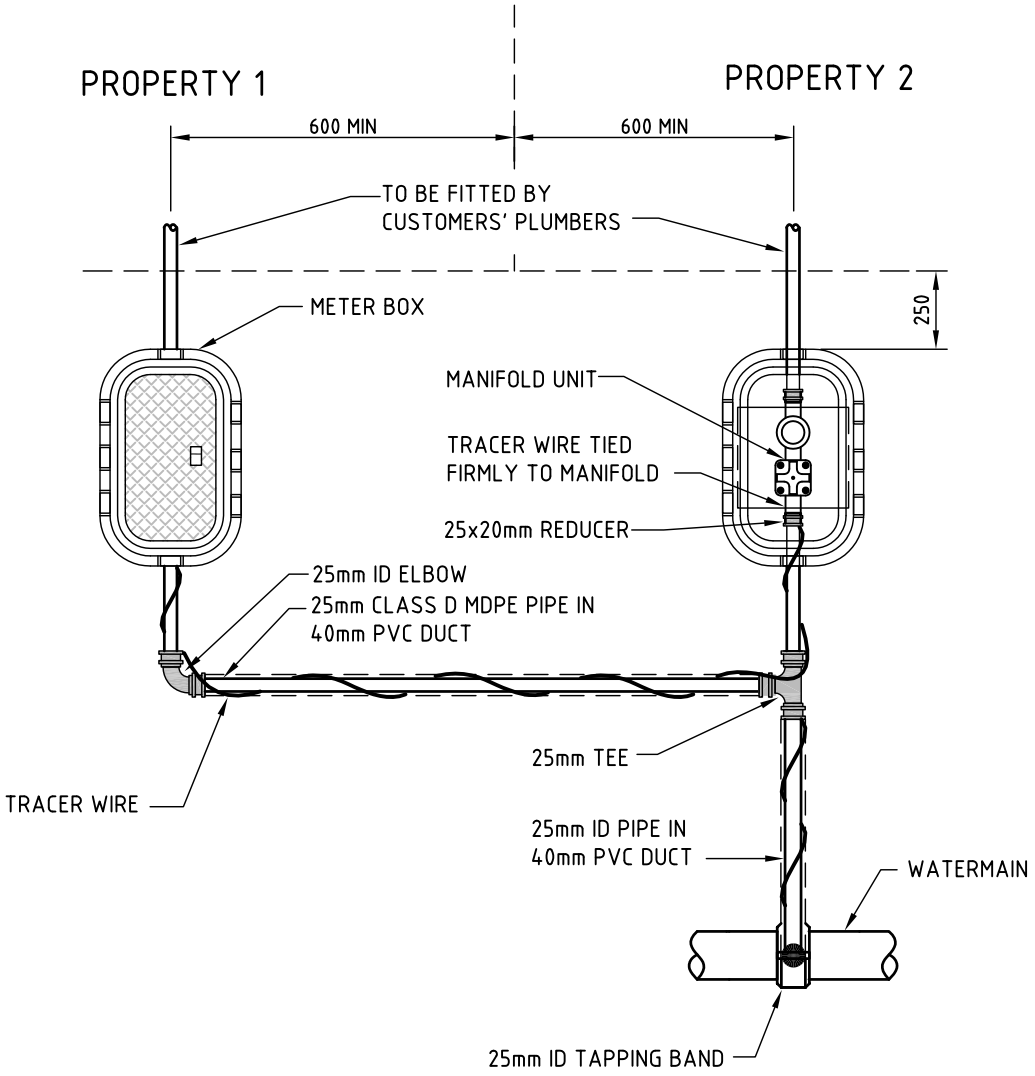


NOTES

1. SEE SHEET 10344 – TYPICAL SERVICE INSTALLATION MANIFOLD BOXES TO BE 300mm CLEAR OF ELECTRICAL BOUNDARY TERMINAL BOXES
2. ALL MATERIALS FROM DCC APPROVED PRODUCTS LIST

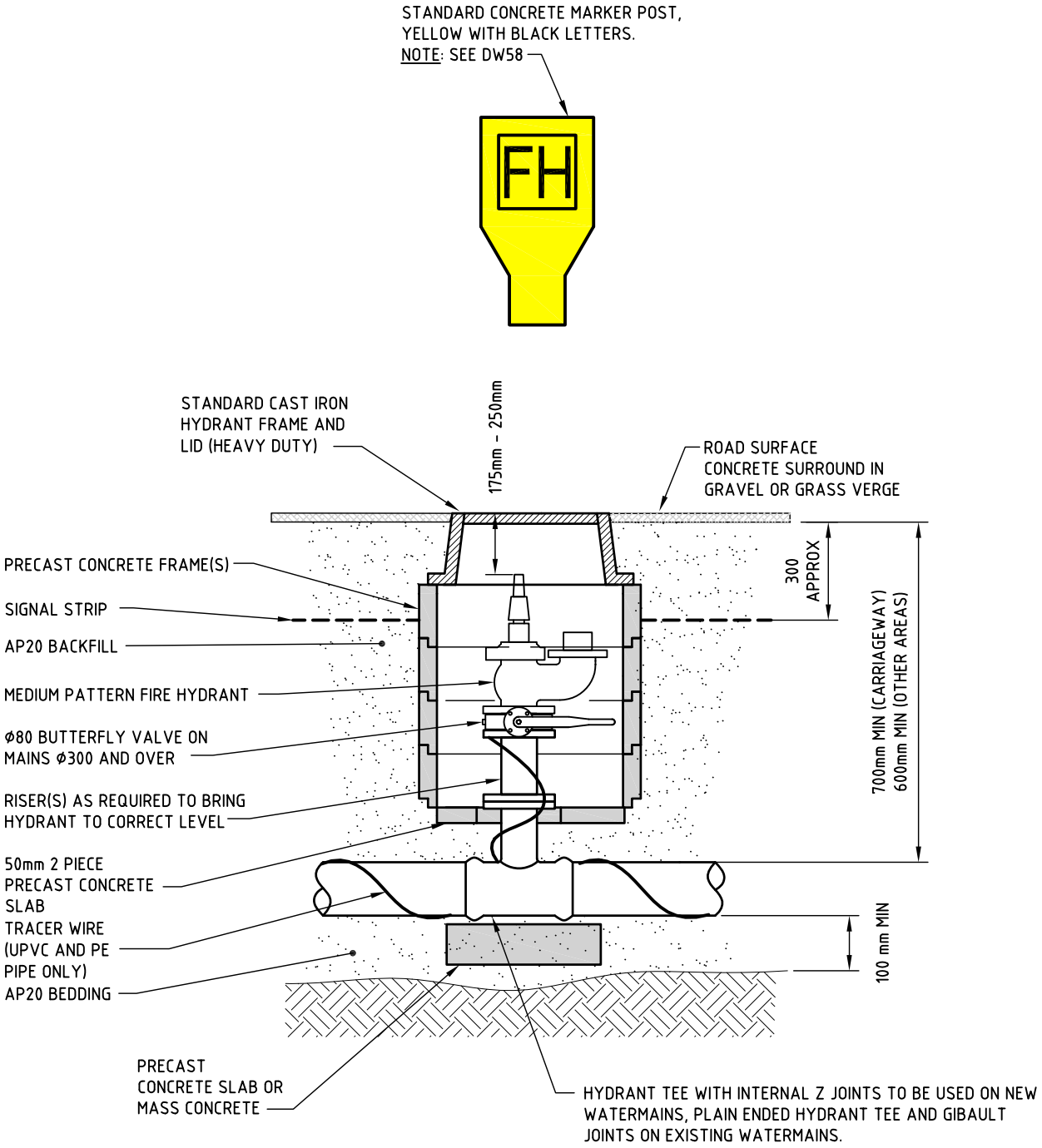
DETAIL FOR DOUBLE SERVICE CONNECTION

BASED ON DRAWING 45/103/5

REV A MAY 2009

Drawing No. 10338

SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1



NOTES:

PRECAST FRAME(S) TO BE INSTALLED WITH BASE OF LOWER FRAME BELOW TOP FLANGE OF HYDRANT RISER. 50MM PRECAST CONCRETE SLAB FITTING SNUGLY TO RISER TO PREVENT BEDDING WASHING INTO HYDRANT WELL.

HYDRANT LID TO BE PAINTED YELLOW IN UNSEALED STREETS OR FOOTPATHS. YELLOW ROAD MARKINGS IN ACCORDANCE WITH NZS4509 TO BE PROVIDED FOR HYDRANTS IN SEALED STREETS OR FOOTPATHS.

ALL NUTS AND BOLTS TO BE TOTALLY ENCASED IN DENSO TAPE OR APPROVED EQUIVALENT

BASED ON DRAWING 45/103/6

TYPICAL FIRE HYDRANT INSTALLATION

REV A MAY 2009

Drawing No. 10339

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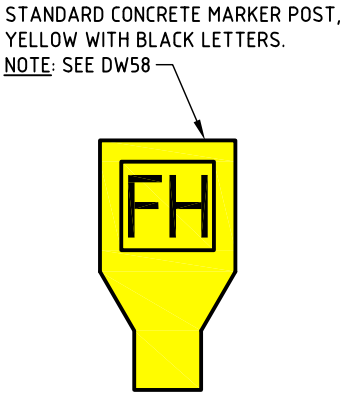
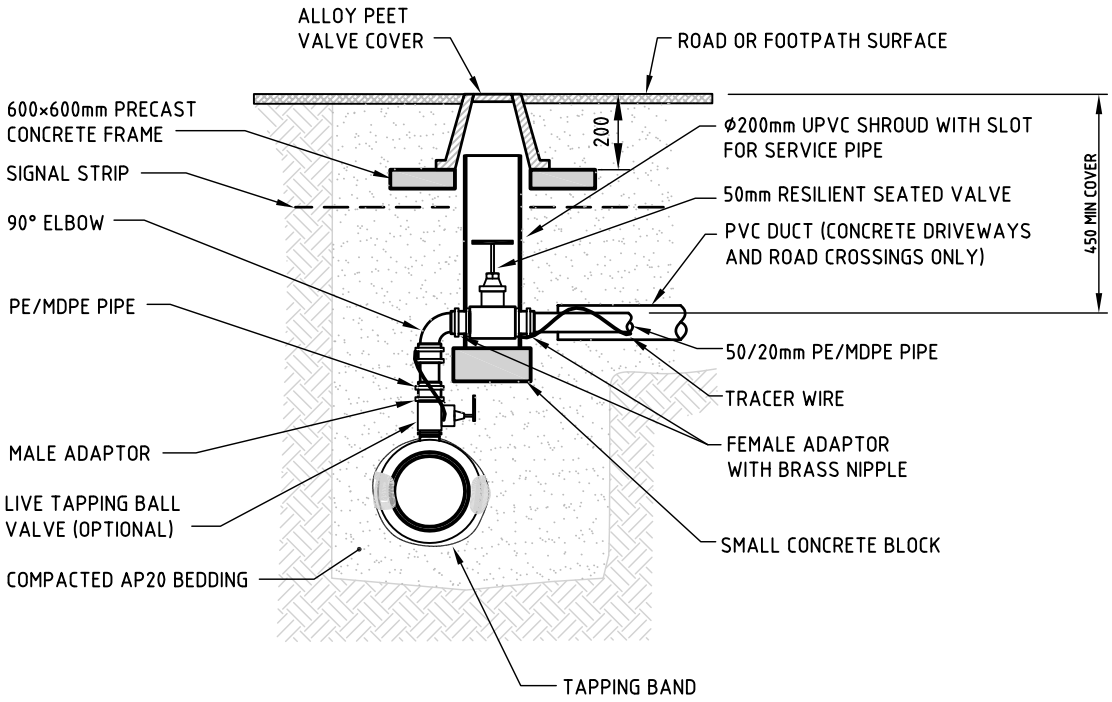




NOTE:

NUTS AND BOLTS TO BE TOTALLY
ENCASED IN DENSO TAPE OR
EQUIVALENT APPROVED

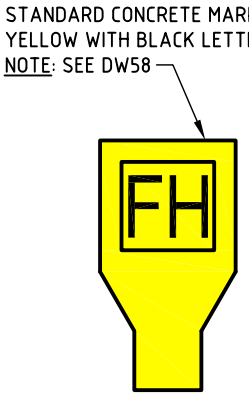
BASED ON DRAWING 45/103/7

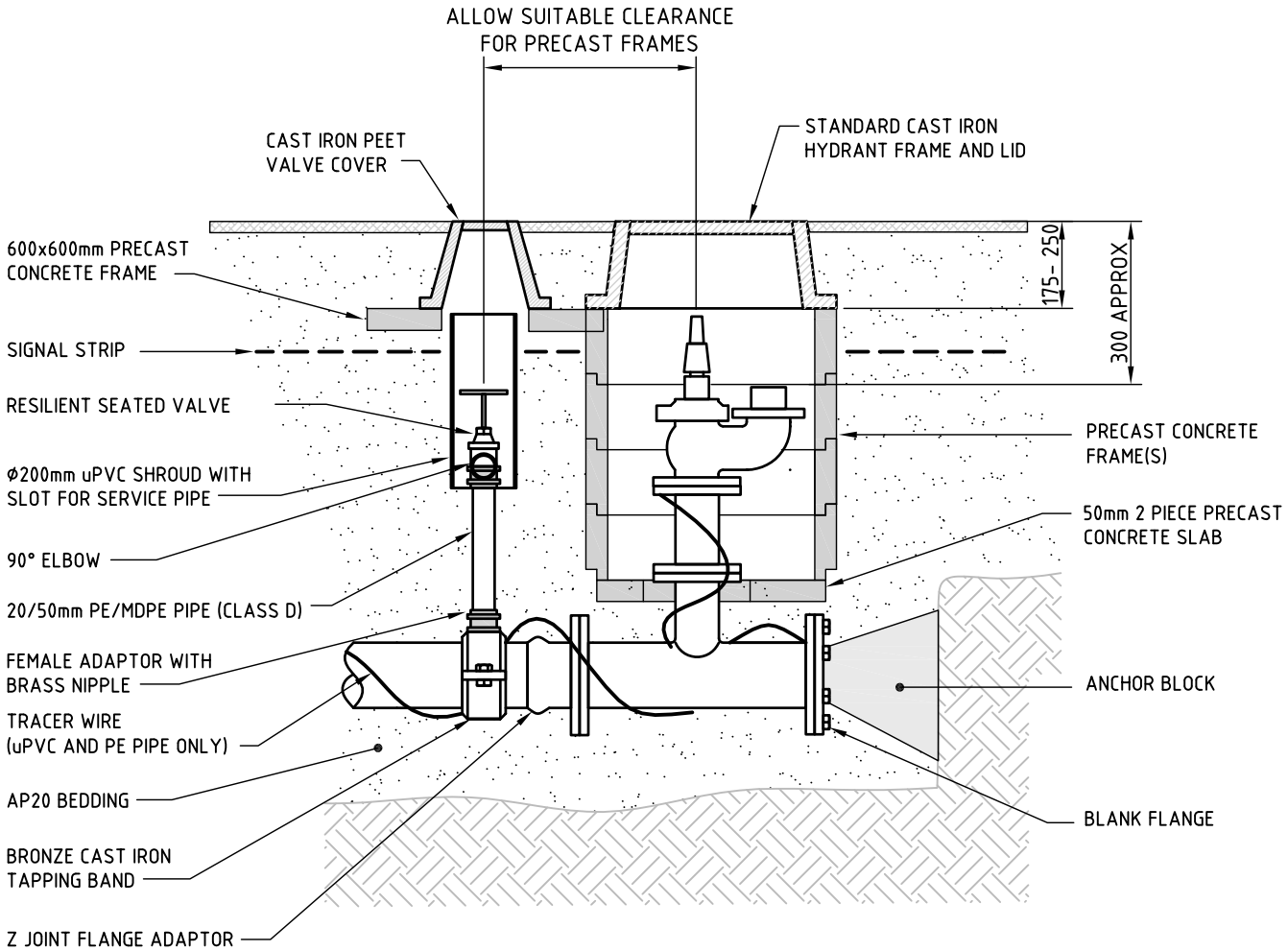
MID LINE CONNECTION DETAIL

REV A MAY 2009

Drawing No. 10340

SUBDIVISION AND DEVELOPMENT CODE - APPENDIX A1





NOTE:

ALL NUTS AND BOLTS TO BE TOTALLY ENCASED IN
DENSO PASTE AND TAPE OR APPROVED EQUIVALENT

BASED ON DRAWING 45/103/8

END CONNECTION OF RIDER MAIN TO PRINCIPAL MAIN

REV A MAY 2009

Drawing No. 10341

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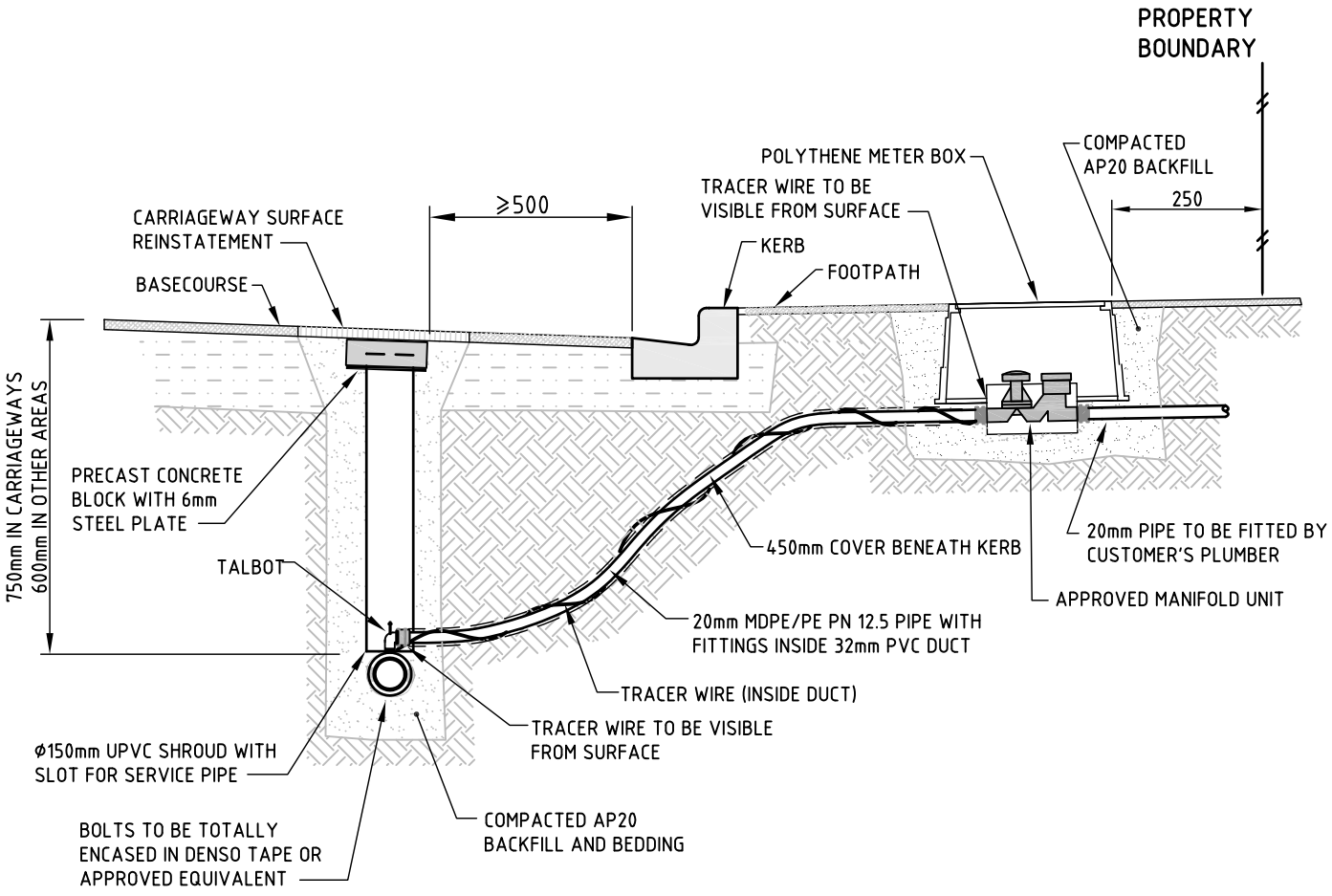


NOTES

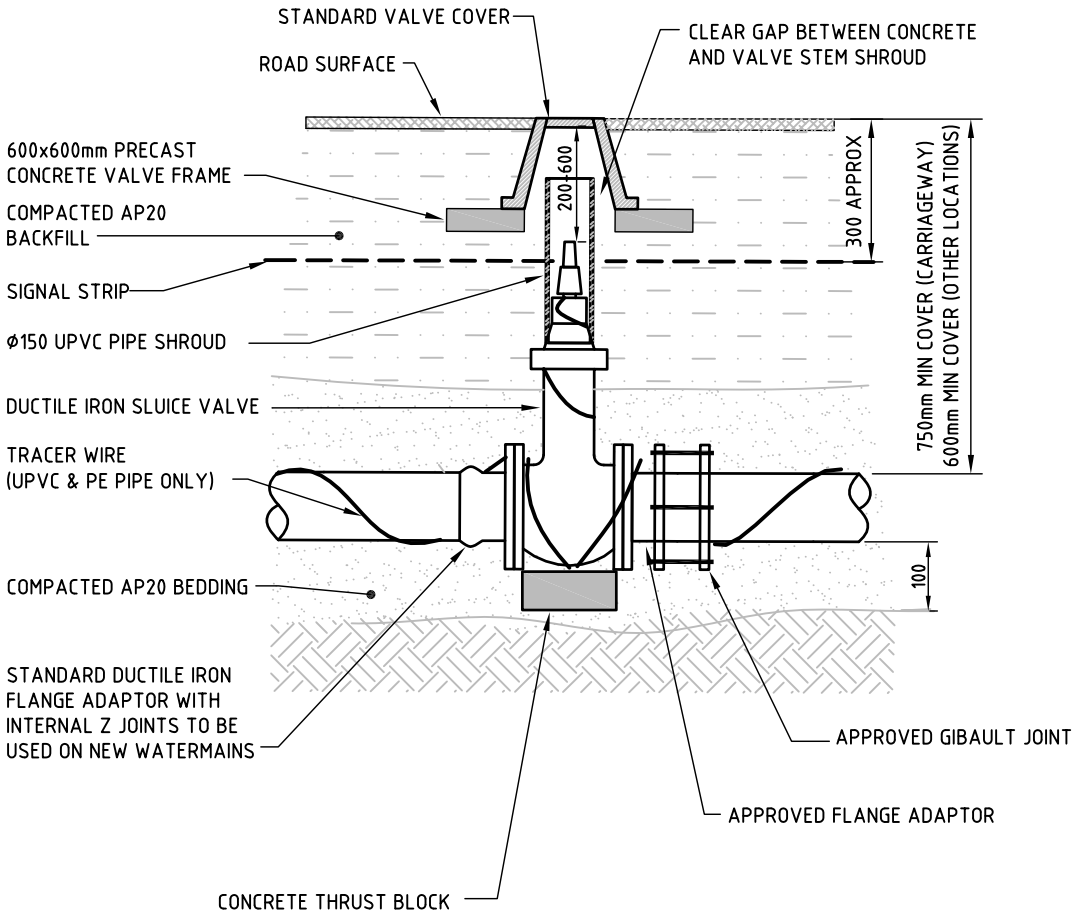
SEE SHEET 10344 FOR STOPCOCK DETAIL AND INSTALLATION.
IF POSSIBLE MANIFOLD BOXES SHOULD NOT BE LAID IN CONCRETE DRIVEWAYS.

TYPICAL 20mm ID HOUSEHOLD SERVICE CONNECTION

BASED ON DRAWING 45/103/9

REV B MARCH 2010

Drawing No. 10342



NOTE:

ALL BOLTS AND NUTS TO BE TOTALLY ENCASED IN DENSO TAPE OR APPROVED EQUIVALENT.
THE TRACER WIRE IS TO BE SECURELY TIED TO THE VALVE, WITH THE TRACER WIRE VISIBLE FROM THE TOP OF THE UPVC SHROUD.

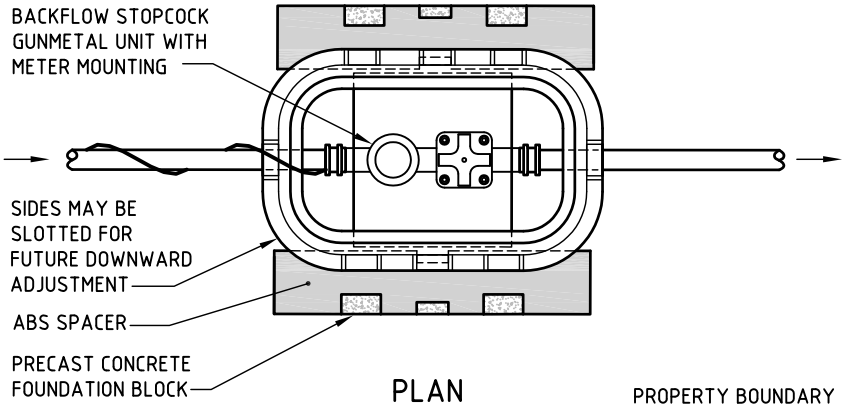
BASED ON DRAWING 45/103/10

TYPICAL WATERMAIN SLUICE VALVE INSTALLATION

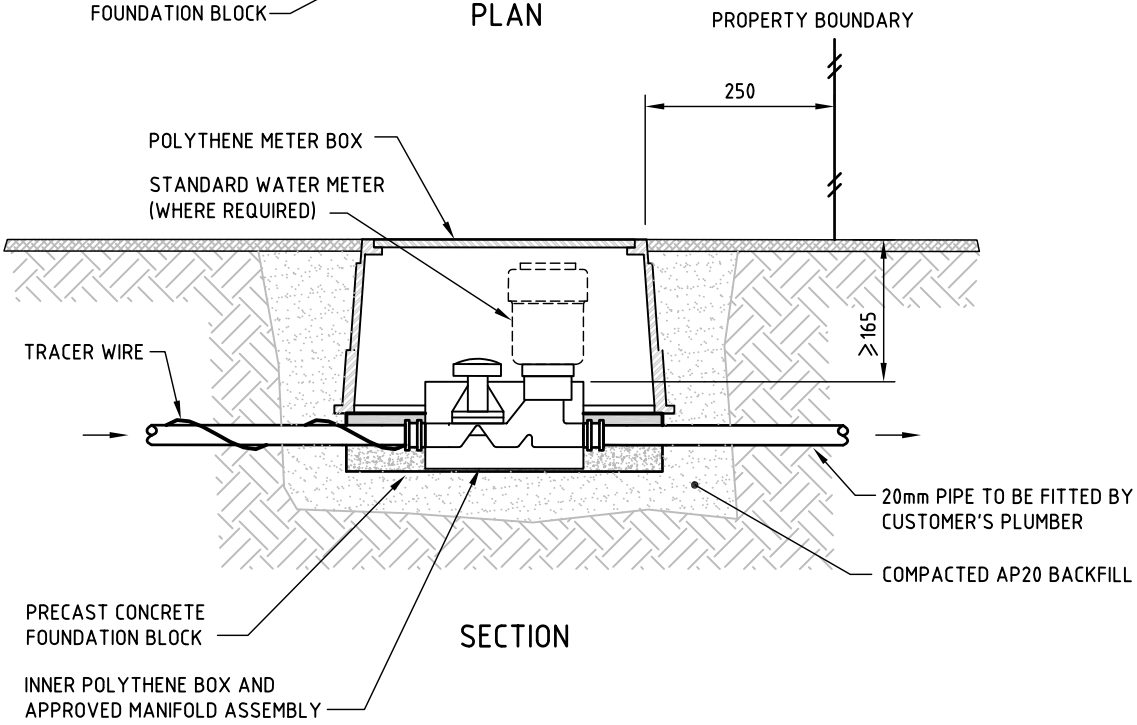
REV A MAY 2010

Drawing No. 10343

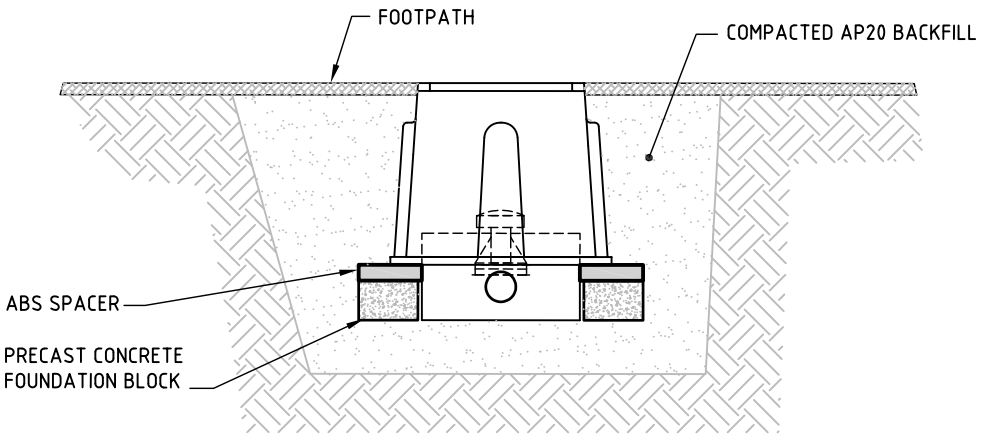
SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



PLAN



SECTION



END ELEVATION

TYPICAL 20mm ID HOUSEHOLD OR COMMERCIAL METER INSTALLATION FOR PEDESTRIAN ONLY AREAS

BASED ON DRAWING 45/103/11

REV A MAY 2009

Drawing No. 10344

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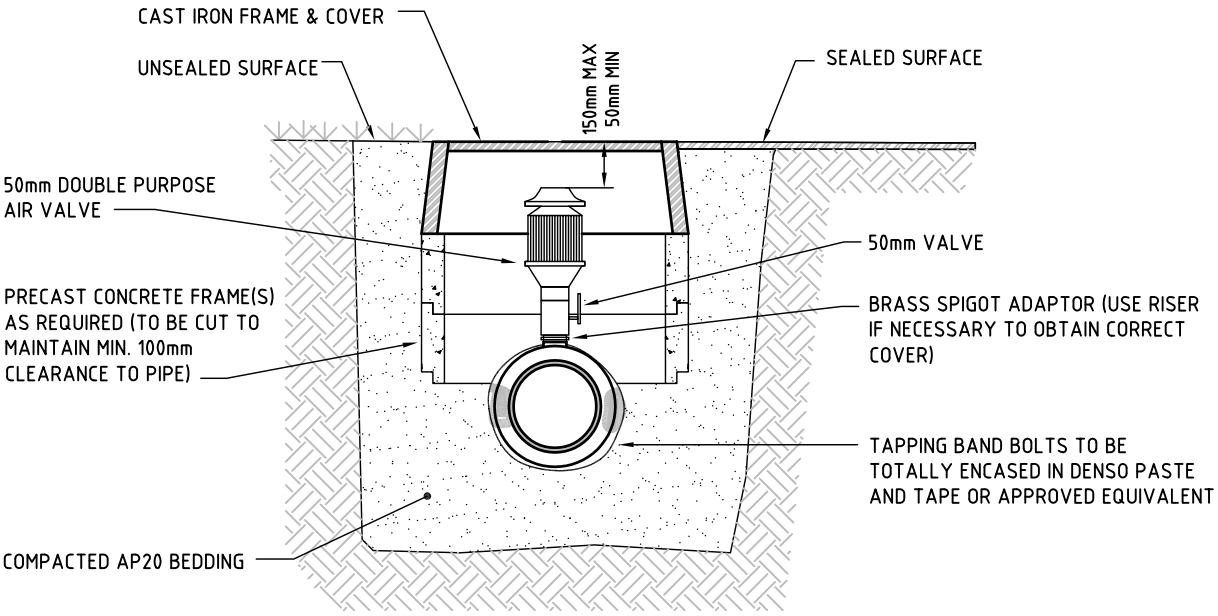

BASED ON DRAWING 45/103/12

TYPICAL AIR VALVE INSTALLATION

REV A MAY 2009

Drawing No. 10345

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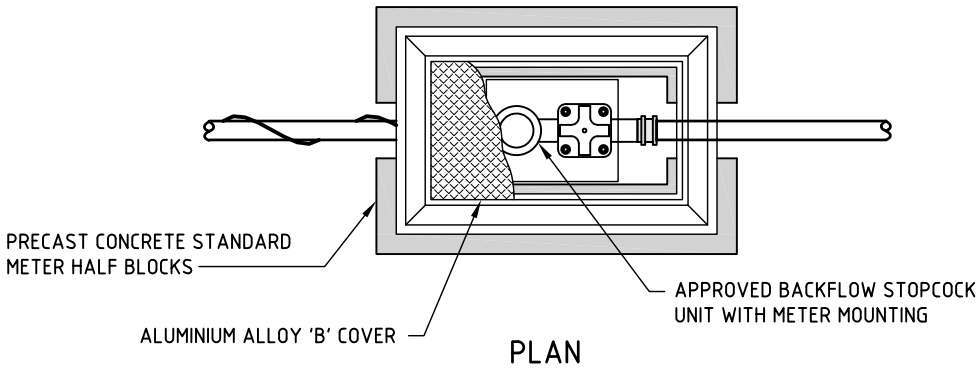
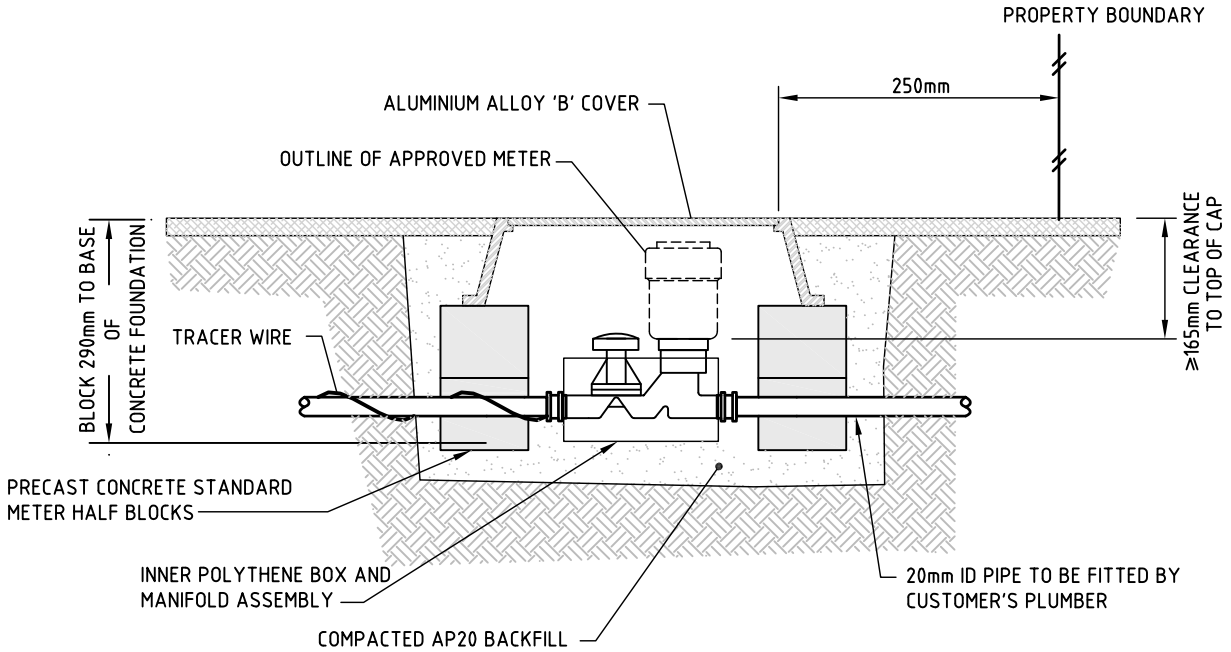
SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



PLAN



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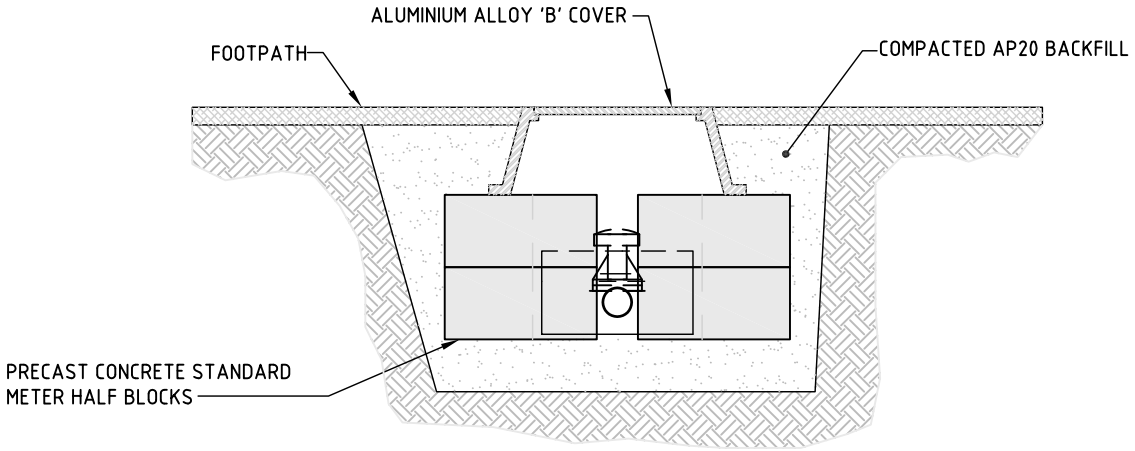

END ELEVATION

TYPICAL 20mm ID HOUSEHOLD OR COMMERCIAL METER INSTALLATION USED FOR VEHICLE ACCESS WAYS

BASED ON DRAWING 45/103/13

REV A MAY 2010

Drawing No. 10346

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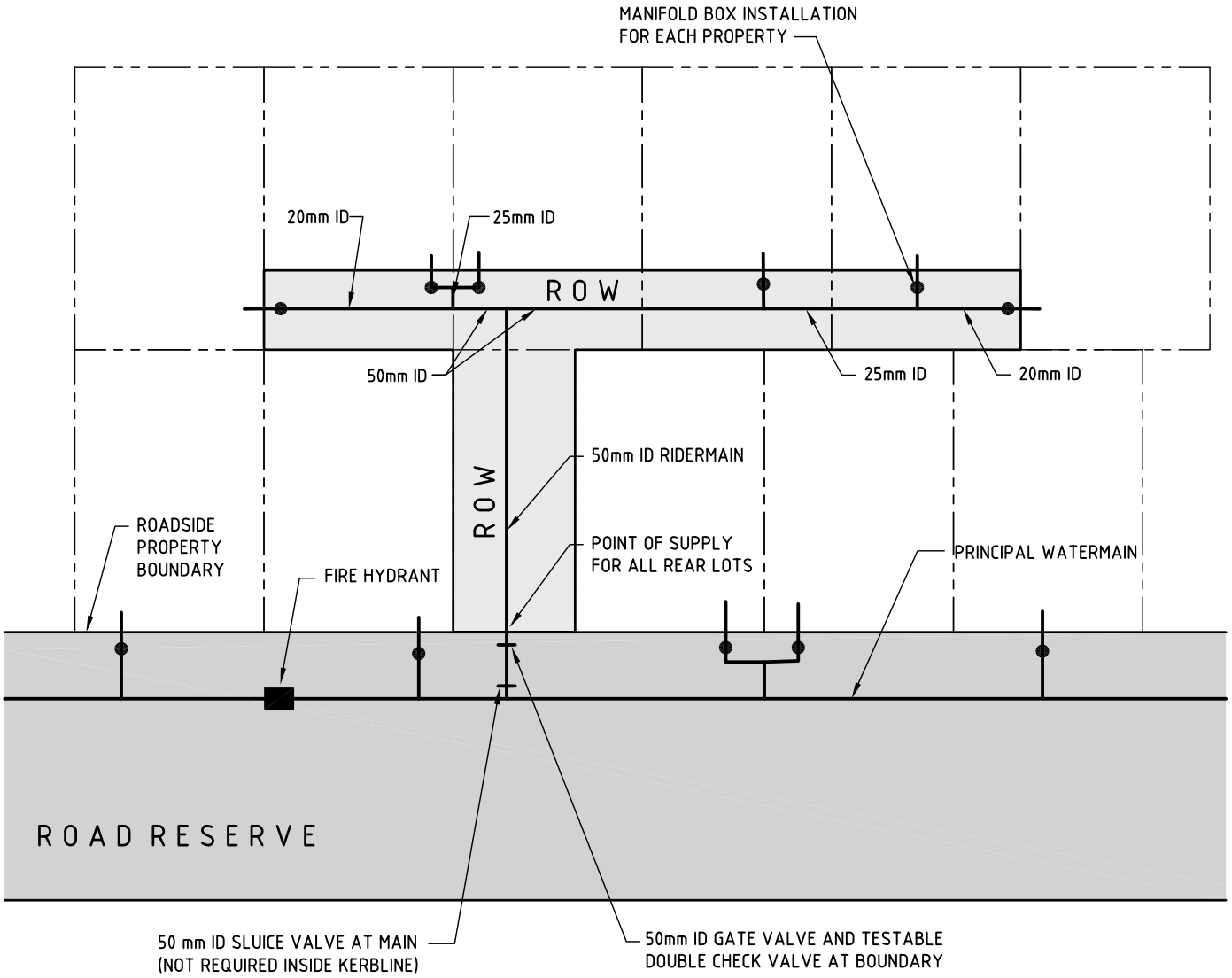
Water and Waste Services

SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



NOTES

ALL PIPES ON PRIVATE PROPERTY TO BE PROTECTED BY EASEMENTS AND MAINTENANCE AGREEMENTS REGISTERED ON THE CERTIFICATES OF TITLE FOR REAR LOTS.
THE POINT OF SUPPLY FOR ALL LOTS IS THE ROADSIDE PROPERTY BOUNDARY

BASED ON DRAWING 45/103/14

TYPICAL RIDERMAIN IN PRIVATE RIGHT OF WAY

REV A MAY 2009

Drawing No. 10347

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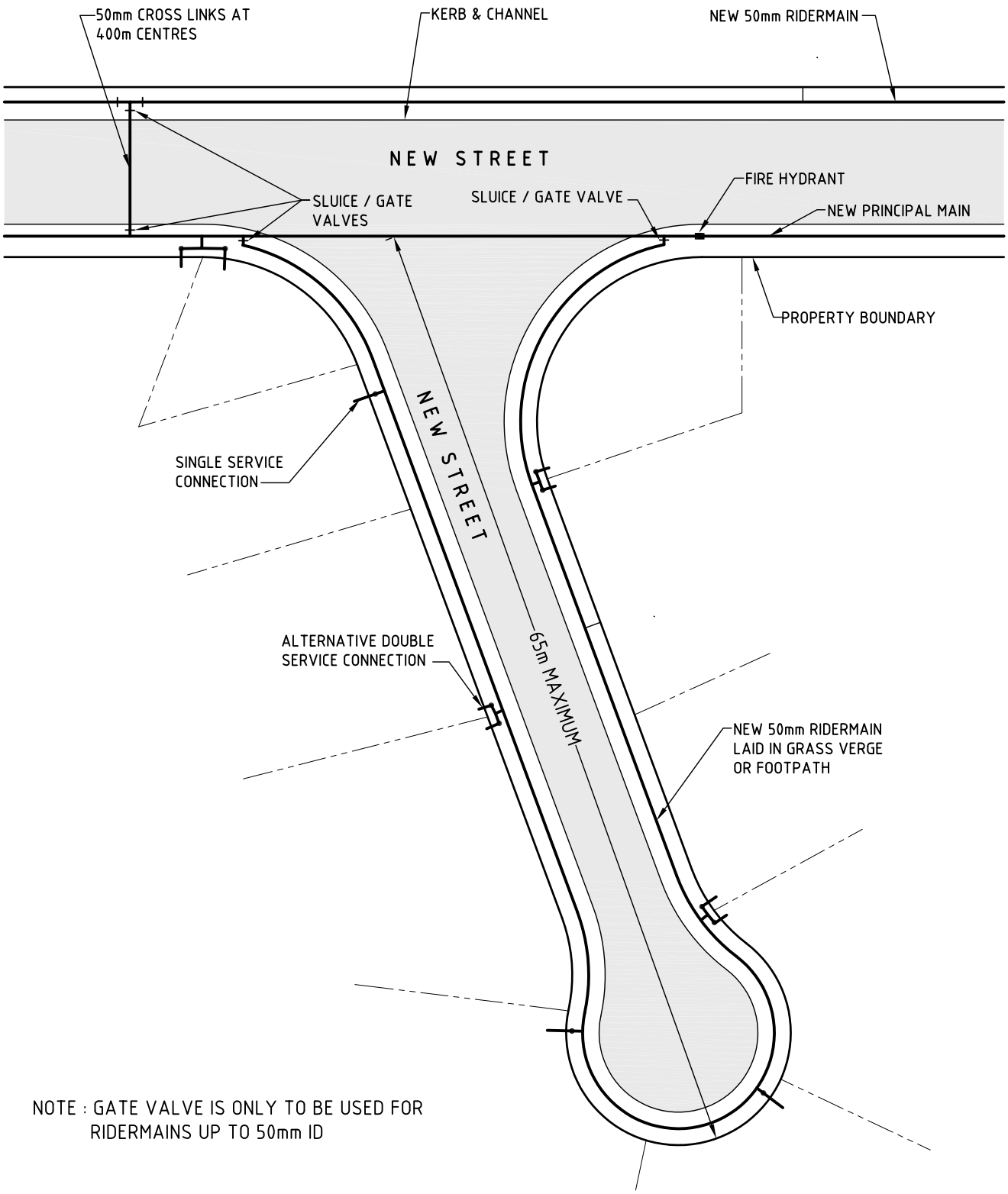
Water and Waste Services

SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



TYPICAL RIDERMAIN ON SHORT CUL-DE-SAC LESS THAN 65m LONG

BASED ON DRAWING 45/103/15

REV A MAY 2010

Drawing No. 10348

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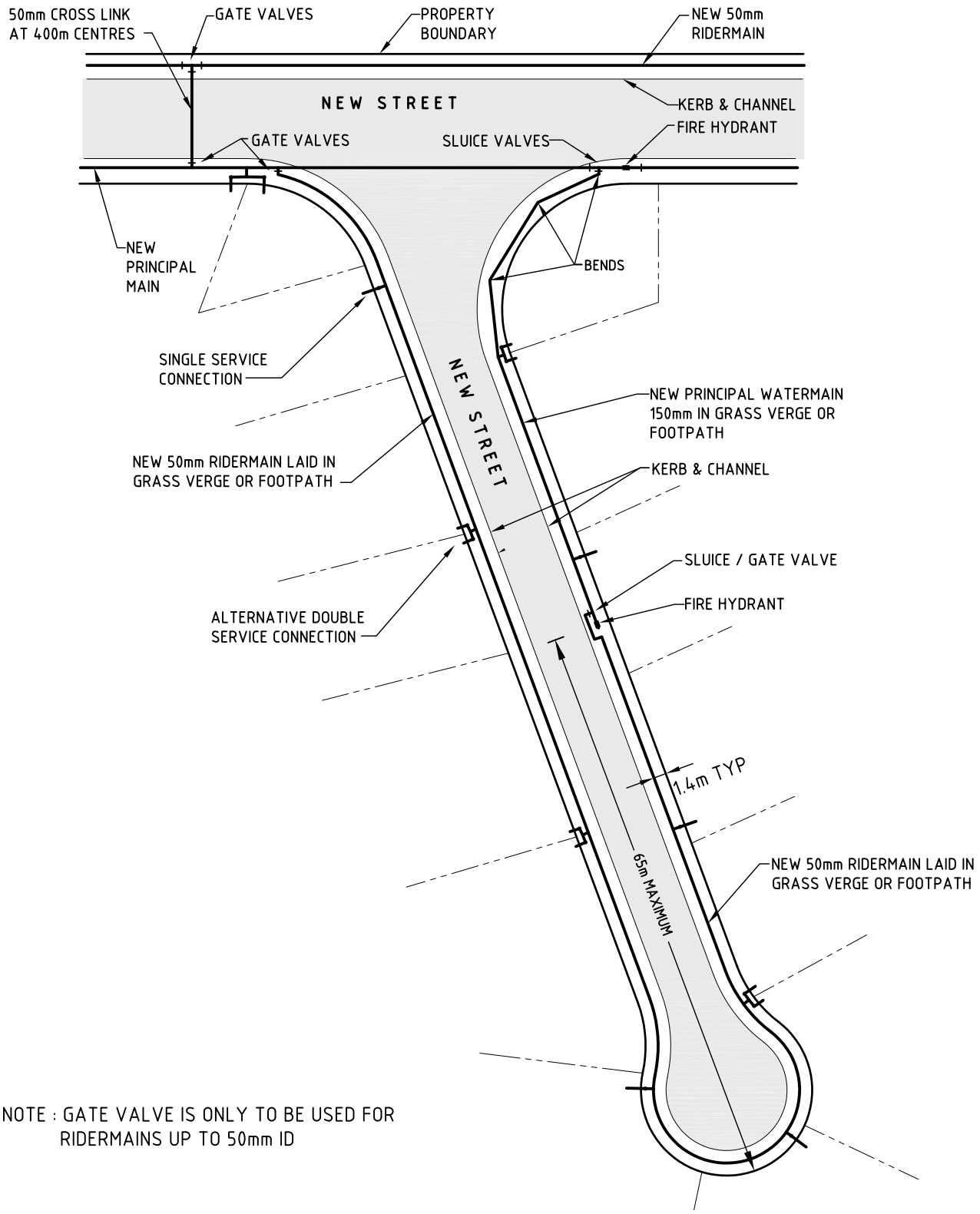
SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



NOTE : GATE VALVE IS ONLY TO BE USED FOR RIDERMAINS UP TO 50mm ID

TYPICAL RIDERMAIN ON LONG CUL-DE-SAC MORE THAN 65m LONG

BASED ON DRAWING 45/103/16

REV A MAY 2010

Drawing No. 10349

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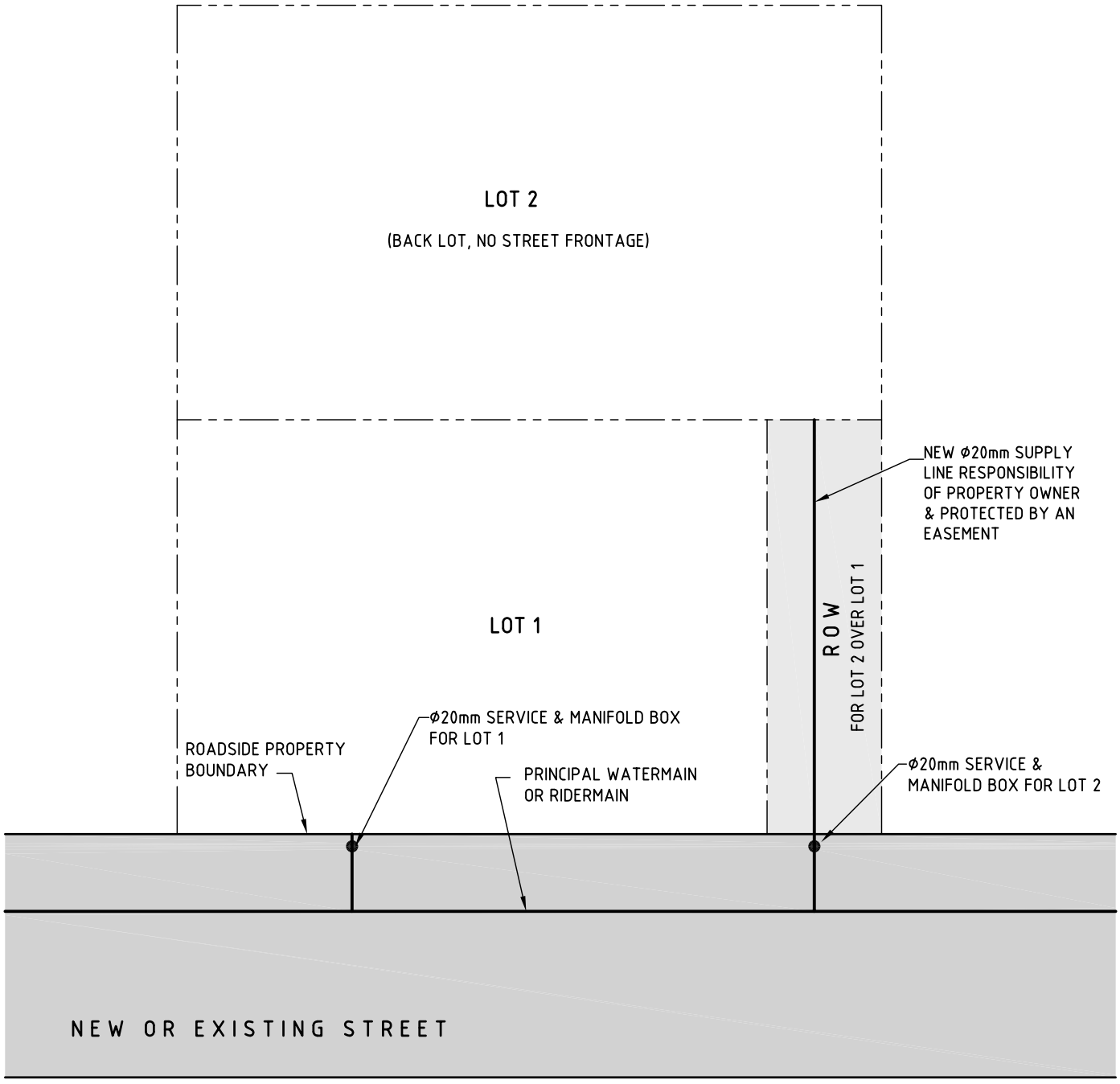
Water and Waste Services

SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



NOTES:

MANIFOLD BOXES LOCATED IN FOOTPATH OR GRASS VERGE 250mm FROM THE ROADSIDE PROPERTY BOUNDARY.
THE POINT OF SUPPLY IS THE ROADSIDE PROPERTY BOUNDARY

TYPICAL WATER SUPPLY TO A REAR LOT OVER RIGHT OF WAY

BASED ON DRAWING 45/103/17

REV A MAY 2009

Drawing No. 10350

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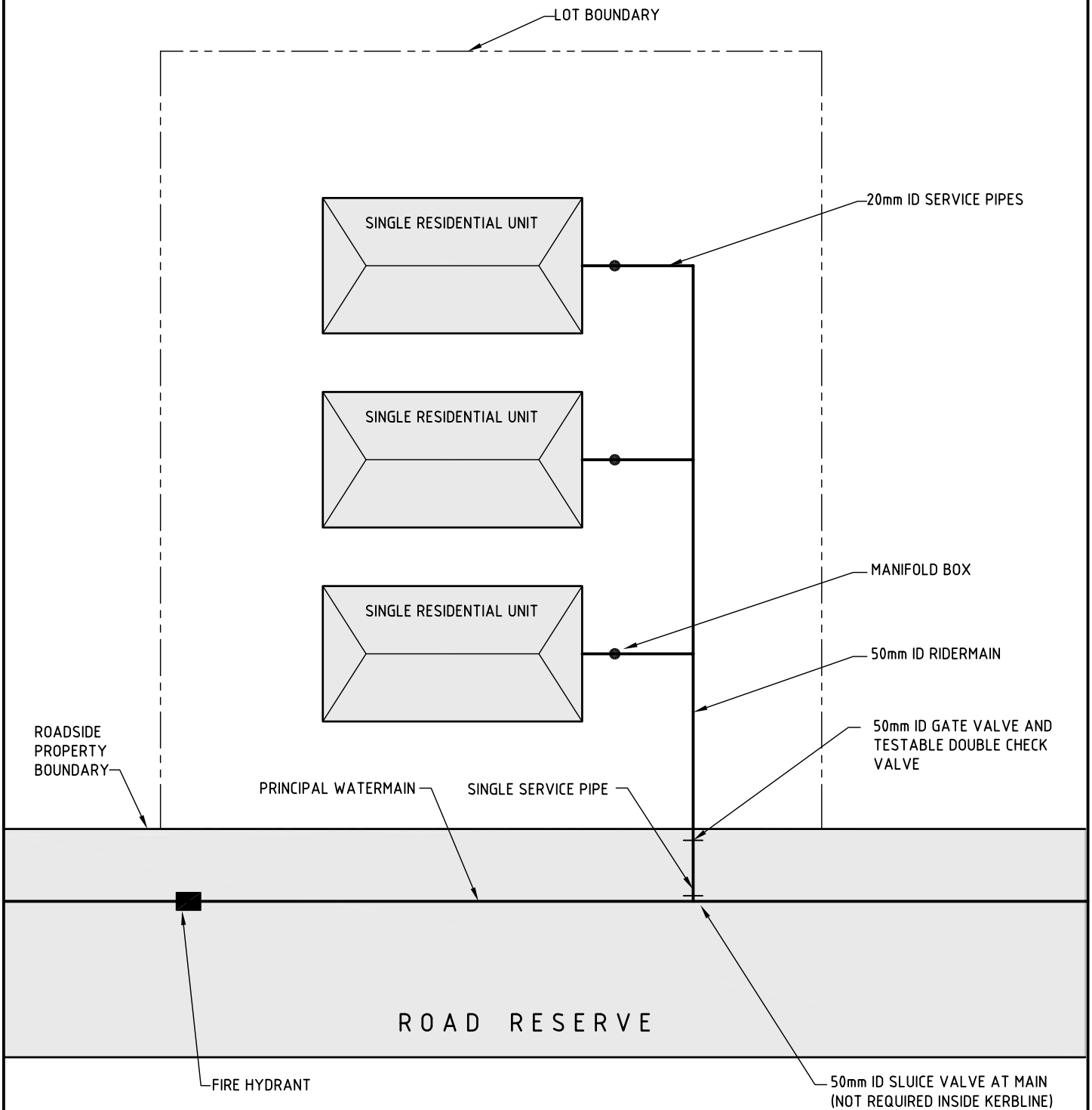
Water and Waste Services

SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1



NOTES:

THE SERVICE PIPE IS TO BE SIZED BY THE DCC TO SUIT MAINS PRESSURE AND THE NUMBER OF RESIDENTIAL UNITS.
THE SERVICE PIPE TO THE PROPERTY BOUNDARY IS TO BE INSTALLED BY THE DCC
ALL WATER PIPEWORK INSIDE THE LOT BOUNDARIES IS TO BE INSTALLED BY THE PROPERTY OWNER.

TYPICAL WATER SUPPLY TO A SINGLE LOT WITH SEVERAL RESIDENTAL UNITS

BASED ON DRAWING 45/103/18

REV A MAY 2009

Drawing No. 10351

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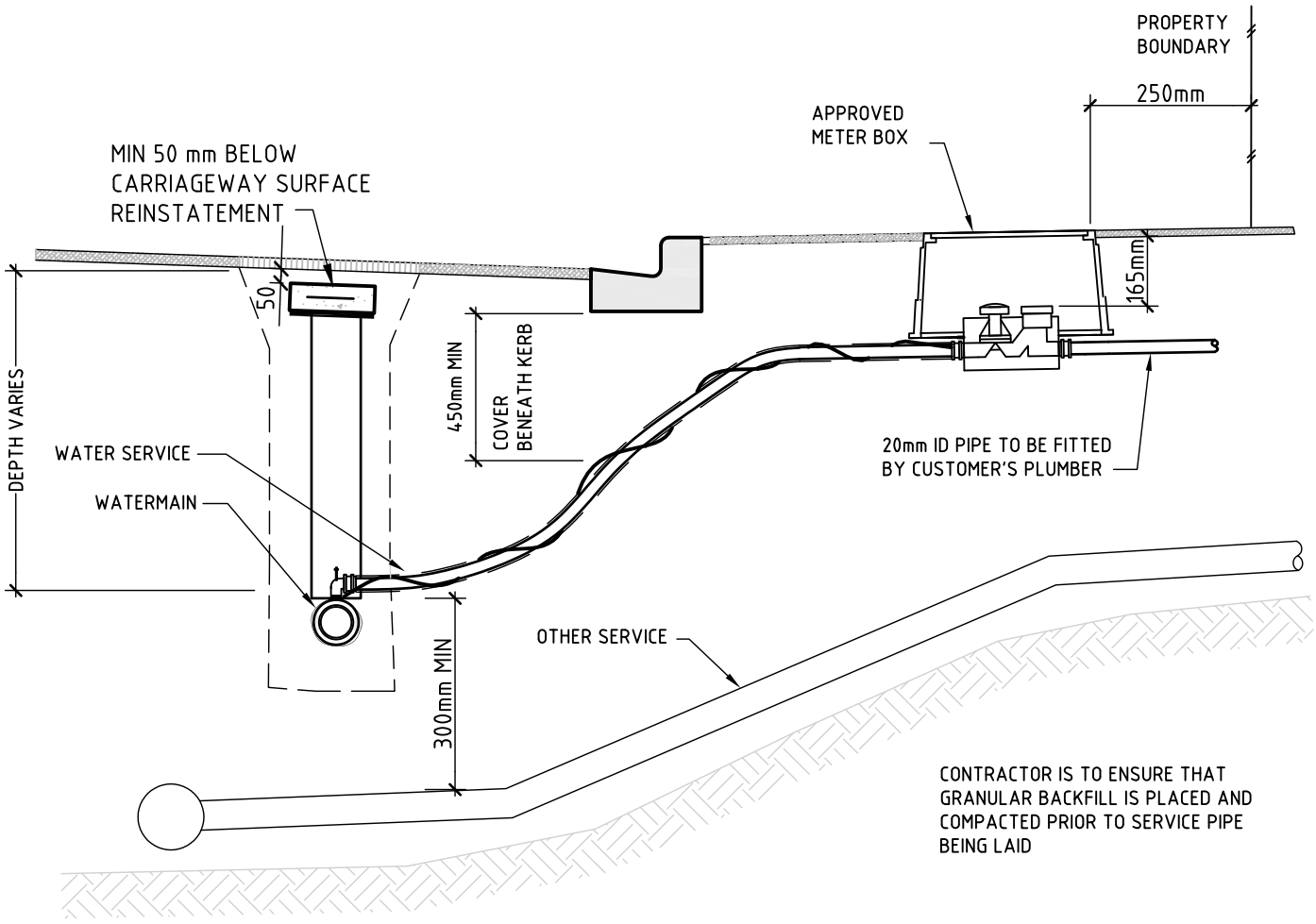
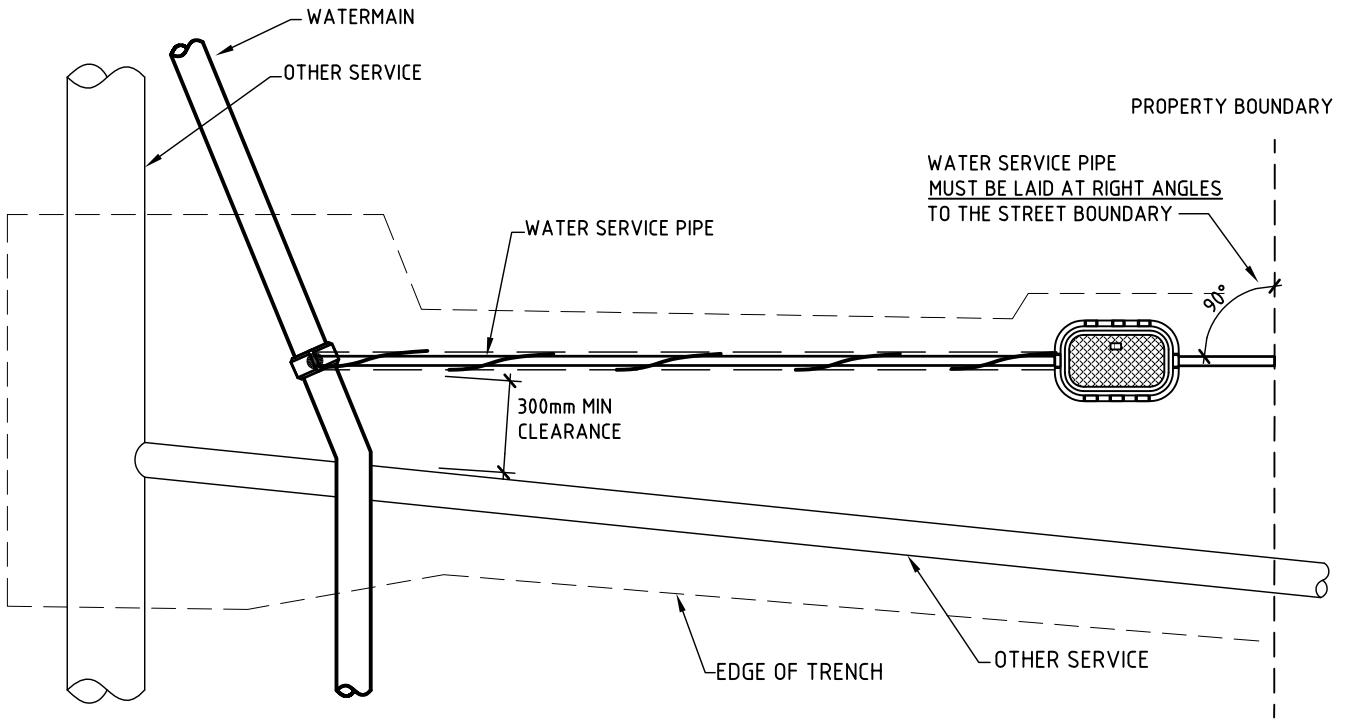
Water and Waste Services

SUBDIVISION AND DEVELOPMENT CODE – APPENDIX A1





TYPICAL WATER SERVICE LAID IN COMMON TRENCH WITH ANOTHER SERVICE

BASED ON DRAWING 45/103/19

REV A MAY 2010

Drawing No. 10352

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