PART 5

WATER SUPPLY AND OTHER SERVICES

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501 WATER SUPPLY

501.1 General Requirements

501.1.1 Standard of Duty

501.1.1.1 For subdivisions and other urban developments, an urban water supply system shall be installed, adequate for fire fighting purposes and for estimated domestic, commercial and industrial consumption.

501.1.1.2 Isolated small subdivisions and developments in a rural setting may be adequately served by individual privately-owned bores or wells (where an adequate and confined aquifer exists).

501.1.2 Level of Service

501.1.2.1 The water supply reticulation shall meet the requirements of Classification 4, or such higher classification as appropriate, in terms of the NZ Fire Services Code of Practice for Fire Fighting Water Supplies, June 1992.

501.1.2.2 The design of the reticulation shall conform to the NZ Fire Services Code of Practice for Fire Fighting Water Supplies, June 1992, and shall be such that a water supply connection can be readily provided for each allotment.

501.1.2.3 The minimum fire fighting residual running water pressure should be preferably 100 kPa (1 atmosphere, 10m head of water) at any hydrant.

501.1.2.4 The minimum working residual water pressure, in other than fire fighting conditions, should be preferably 300 kPa (3 atmospheres, 30m head of water) at the ground level at the normal house site in each lot, unless some lower pressure is commonly accepted in the District.

501.2 Water Demand and Pressure

501.2.1 Domestic Supply

501.2.1.1 In subdivisions and other developments of an average size, the domestic demand is not critical and the supply of water for fire fighting purposes will generally determine the pipe sizes required. For more extensive areas however, the pipe network shall be designed to provide for annual, seasonal and peak demand utilising the available pressures in the existing mains. The design shall provide for a domestic demand of 200 litre/head/day with a peak flow of five times this amount, or other quantities and peaks derived from records of the present district supply.

501.2.2 Commercial and Industrial Supply

501.2.2.1 The water demand for commercial and industrial areas or for irrigation shall be analysed and specifically allowed for in the design, if relevant.

501.2.3 Fire Fighting Supply

501.2.3.1 The water reticulation shall be designed to comply with the requirements of the NZ Fire Services Code of Practice for Fire Fighting Water Supplies, June 1992 and amendments, and in particular shall meet the code requirements with regard to fire fighting flows, running pressure and the

spacing of hydrants, together with any additional requirements set out herein, including storage where applicable.

501.2.3.2 Unless stated otherwise the fire risk classification shall be as follows:

Detached or semi-detached housing	
in suburban areas	Class E risk
Schools, local suburban shopping areas	
and equivalent development	Class D risk
Suburban industrial areas	Class C risk

501.2.3.3 The minimum standard of water supply for fire fighting shall be as set out in the following table. The required flow is to be from any one hydrant or group of hydrants within 270m of any fire risk with a minimum residual running pressure (at the hydrant) of 100kPa

Risk	Flow - litre/second
Class E	25
Class D	50
Class C	100

With 100 kPa pressure, the flow from a single squat, medium or tall hydrant is of the order of 28, 30.5, and 33 litre/second respectively. A single hydrant therefore would generally be adequate for any Class E risk providing it is sufficiently close to the fire risk. In new industrial areas, it may well be to the advantage of the subdividing owner to have additional capacity built into the water mains in order to provide for sprinkler systems and similar devices and thus improve the marketability of these sites.

501.2.4 Design Basis

501.2.4.1 The Council may provide details of the working pressure or pressures at the point or points of connection to the existing reticulation, in which case these will be used for design purposes. The Council shall have the right to specify the diameters to be used for the principal water mains within the subdivision.

501.2.5 Pipe Working Pressures

Working pressure classes are as follows:

Class of pipe	Maximum working pressure	
	Metre/head	kPa
C	90	900
D	120	1200
E	150	1500

501.3 Reticulation Layout

501.3.1 A water main of not less than 100mm diameter fitted with fire hydrants (hereinafter referred to as the principal main) shall be laid on one side of all through roads and one side of every cul-de-sac, subject to the requirements of 501.9.2 regarding hydrant spacing.

501.3.2 A rider main shall be laid to the road frontage of all lots not fronted by a principal main.

501.3.3 Rider mains shall be supplied from a principal main at both ends, except for private ways and minor roads.

501.3.4 In the case of arterial and dual carriageway roads, the Engineer may require principal mains to be laid both sides of the road.

501.3.5 In industrial areas, the pipe sizes shall be adequate for the likely demand. The minimum requirement may be for a 150mm or possibly a 200mm diameter principal main on one side of the road, with another principal main on the other side.

501.4 Alignment of Water Mains

501.4.1 Position in Road

501.4.1.1 The position of water mains in the road shall conform to the established local practice, as agreed between the Council and the various service authorities, and as prescribed by the Council. (See also 503.)

501.4.1.2 In areas of steep terrain, such that the area of the road between the back of the footpath and the boundary is normally too steep for topsoiling and grassing or for any form of vehicular access, the water main would be appropriately laid under the footpath (assuming that in such cases the footpath is next to the kerb) or under the carriageway.

501.4.1.3 If the water main is under the carriageway, it shall be on an alignment at a prescribed distance from the kerb face. In any case, the Engineer shall approve a logical combined layout for all underground services in the road.

If it is unavoidable that one of the underground services go under the carriageway there is a case that it should be the water main, which is normally controlled by the same body as maintains the roads. In private ways the water main should be laid within the grass verge.

501.4.2 Setting Out

501.4.2.1 Where the alignment is governed by relation to the road boundary, the water mains are to be laid with reference to permanent land transfer pegs or temporary boundary marks placed by the registered surveyor responsible for the final land transfer pegging.

501.4.2.2 Laying by reference to the kerbline should only be carried out where the surveyor has confirmed that it is the correct designed distance from the land transfer peg positions.

501.4.2.3 Laying tolerances shall be up to 50mm on straight roads, and up to 100mm on curves. Any problems due to misalignment shall be resolved by the subdividing owner to the satisfaction of the Engineer and other underground service authorities.

501.5 Intersections

501.5.1 At road intersections 90° tees or 90° bends are preferred rather than two 45° bends with a short length of pipe between them. With the kerb to boundary widths and water main alignments given in figure 13 of the Code, 90° tees or bends or both can normally be located between the kerb and boundary.

501.5.2 Where the principal water main is to be laid around the corner, then 45° or similar bends should be used.

501.6 Water Mains with Fire Hydrants (Principal Mains)

501.6.1 General. Principal mains shall not be less than 100mm diameter.

501.6.2 *Pipe Standards*

501.6.2.1 The following pipes may be used for principal mains, providing they comply with the relevant New Zealand Standard:

Steel (arc butt welded)	NZS 4442:1988
UPVC	NZS 7649:19888
Cast iron	NZS 4442

501.6.3 *Pipe Pressure Classes*

501.6.3.1 Pipes for water mains shall normally be a minimum Class C, although a higher class shall be used if necessary to provide for the maximum working pressure in the area in which they are to be laid.

501.6.3.2 UPVC pipes for water mains shall be not less than Class D although a higher class shall be used if necessary to provide for the maximum working pressures in the area in which they are to be laid.

501.6.4 *Joints*

501.6.4.1 Joints for UPVC pipes shall normally be spigot and socket rubber ring type (Z joints), except that solvent cement joints may be permitted where necessary at bends, tees or other fittings.

501.7 Rider Mains

501.7.1 *Pipe Sizes*

501.7.1.1 Rider mains should normally have a minimum diameter of 50mm although with the specific approval of the Engineer, rider mains of 40mm, 32mm, or 25mm diameter may be permitted. Table 3 sets out the desirable maximum number of domestic connections which may be permitted to be served by a rider main. This will depend on the level of service required by the Council, and on Council requirements for service connection diameter.

Table 3

Diameter of rider main	Maximum desirable number of dwelling units (service connections)					
mm	High-pressure areas (1)		Medium pressure areas (2)		Low-pressure areas (3)	
	One-end supply	Two-end supply	One-end supply	Two-end supply	One-end supply	Two-end supply
25	5	10				
32	6	12	5	10		
40	10	20	8	16	4	8
50	20	40	15	30	7	15

NOTE:

(1) High-pressure means normal working pressure in the principal mains (other than when fire fighting) usually not below 600 kPa.

(2) Medium-pressure means normal principal main working pressure usually 600 kPa to 400 kPa.

Low-pressure means normal principal main working pressure which may be below 400 kPa.

501.7.2 *Pipe Materials*

501.7.2.1 Pipes for rider main construction may normally be UPVC to NZS 7648. Other pipes, such as polyethylene or galvanised steel, may be permitted or required by the Engineer.

501.7.2.2 Joints for 50mm diameter UPVC pipes should be spigot and socket rubber ring type (Z joints) except that solvent joints may be permitted where necessary at bends, tees and other fittings. Solvent cement may be used as the method of jointing 40mm and 32mm diameter pipes.

501.8 Connection of Rider Main to Principal Main

501.8.1 Where a rider main is to be extended at right angles to a principal main, this shall normally be connected with a cast iron tee with a female threaded branch (or an elongated gibault joint, tapped) and with a UPVC valve socket, as shown in fig. WS-003 NZS 4404:2004.

501.8.2 Where a rider main is to be extended along the same alignment, beyond the end of the principal main, it shall normally be connected with a similar cast iron tee (or elongated gibault joint) with an anchored blank end plate, and with a vertical UPVC valve socket and right angle brass or PVC bend.

501.8.3 In very soft ground, an additional length of asbestos cement pipe of the principal main diameter, filled with concrete, may be laid beyond the last cast iron tee. This pipe should be well anchored by compaction along its length, and terminated with a blank-end gibault and an adequate concrete anchor block.

501.8.4 Taper reducers shall be used only in firm ground where the taper can be adequately anchored to the sides of the trench, and with the specific approval or requirement of the Engineer.

501.8.5 The method of jointing shall be to the approval of the Engineer.

501.9 Hydrants

501.9.1 *Hydrant Type*

501.9.1.1 Hydrants should be screw-down type, to BS 750. Normally the medium or tall pattern shall be used, except where the Engineer may approve or require the short pattern.

501.9.1.2 In areas of significant frost, a drain hole shall be provided to drain the casting on the outlet side of the valve.

501.9.2 Hydrant Spacing

501.9.2.1 Hydrants shall be located within the berms in the middle third of sections, and should be located at each road intersection, and high/low points in the fire main reticulation.

501.9.2.2 Hydrants shall be spaced at intervals not exceeding the following:

Residential areas	135m
Commercial & industrial areas	90m

501.9.2.3 In cul-de-sac or other terminal roads the last hydrant shall be not more than 65m from the end of the road.

501.9.2.4 Where houses or residential units are situated on a private way, there shall be a hydrant within 135m of any house or unit.

501.9.2.5 Where a residential private way is more than 65m long a hydrant shall be sited at the road end of the private way or on the other side of the road immediately opposite the entrance.

501.9.2.6 If necessary a 100mm diameter principal main shall be constructed and a hydrant placed within the private way in order to ensure each house or unit is within 135m of a hydrant.

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

501.9.3 Hydrant Installation

501.9.3.1 Hydrant tees shall be flanged if laid next to other cast iron fittings. Otherwise flexible joints are permitted (gibault or supertite).

501.9.3.2 Hydrant risers shall be used, or the water main laid deeper, where necessary, in order to ensure that the top of the spindle is between 175mm and 250mm below finished surface level.

501.9.4 Hydrant Boxes

501.9.4.1 The manufacture and installation of hydrant boxes shall be to NZS 2237, or to such local variant as may be permitted or required by the Engineer.

There is a wide variety at present prescribed by various councils, and few simply adopt NZS 2237. Choice is evenly divided as to whether a light pattern box and cover may be allowed in footpaths and grass berms, or whether all boxes should be to the heavy (carriageway) standard.

501.9.4.2 Where hydrants or valve boxes or both are installed in grassed areas, and where the grass in the district typically grows long (either due to natural causes, or the attainable standard of road maintenance) the Engineer may require cast in situ flush concrete edging of typically 150mm x 150mm cross-section around all cast iron or precast concrete surface boxes. Surface boxes set in bitumen or concrete surfaces (carriageway or actual footpaths) and shall be surrounded by such edging, and with the immediately adjacent concrete set within a square boxed-out construction joint if required.

501.9.5 Location Marking of Fire Hydrants

501.9.5.1 The location of marking of fire hydrants shall be to NZS 4501, with such variations as may be required by the Engineer in terms of established local practice.

501.9.5.2 The Engineer may require indicator plates to BS 3251, or concrete posts as described in 501.9.5.3.

501.9.5.3 Concrete indicator posts, if required, shall be of an approved type, set vertically in the ground within 230mm of the lot boundary and immediately opposite the hydrant which it indicates. Each post shall be firmly set to a depth below ground level of at least one third of its overall height, and shall bear the inscribed letter 'H'. Hydrant indicator posts shall be painted yellow.

501.10 Valves

501.10.1 Sluice Valves

501.10.1.1 The valves on the principal main shall be Class 1 to BS 5163 but shall be anticlockwise closing, except where clockwise closing is established local practice and required by the Engineer.

Valves are not currently manufactured to BS 5163 in New Zealand.

501.10.1.2 Valves shall be flanged when laid next to another cast iron fitting or when required by the engineer. 'On line' valves may be spigotted to take flexible joints, (gibault or supertite).

501.10.2 Gate valves (also known as peet valves)

501.10.2.1 Gate valves shall be to BS 5154.

501.10.3 Air Release Valves and Scour Valves

501.10.3.1 These shall be either a hydrant or a 20mm diameter ferrule. A permanent cover is required for the latter. In districts where the scouring of mains is needed as frequent operation, a connection to the stormwater system shall be provided from scour points. Automatic air release valves shall be provided where required by the Engineer, and positioned so that ground water cannot enter the main at negative pressure.

501.10.4 Positioning of Valves

501.10.4.1 Valves shall generally be placed on two of the three legs leading from each tee intersection. Where required by the Engineer, valves shall be placed on all three legs if this is necessary in order to limit the number of houses without water in the event of a shutdown

501.10.4.2 Each valve shall be located in the berm clear of the carriageway and covered with a 200mm diameter riser pipe with a valve box flush with the surface.

501.10.5 Valve Boxes

501.10.5.1 Valve boxes shall be as in fig. WS-002 NZS 4404:2004, or to such other established local practice as may be permitted or required by the Engineer.

501.10.5.2 Where circular or square boxes are used, the rim should be clearly notched at two opposite points, and these notches aligned with the direct of water main; Where oblong boxes are used, they should be aligned with the water main.

501.10.6 Valve Indicator Posts

501.10.6.1 Except where some other established local practice is required by the Engineer, the position of all valves on fire mains and rider mains shall be indicated by means of reinforced concrete indicator posts, as described in 501.9.5.3. except that the pots shall bear the inscribed letters 'SV' or 'PV' to indicate either sluice valves or 'peet' (gate) valves. Valve indicator posts shall be painted white.

501.10.7 Butterfly Valves

501.10.7.1 Butterfly valves shall be used only with the specific approval of the Engineer, in areas where the water quality is such that the periodic passing of swabs to clean the water mains is not required.

501.10.7.2 The operators should be specifically instructed on the method of operation as being different from ordinary valve operation, so that the butterfly valves are not damaged by too much force.

501.10.7.3 Butterfly valves shall be fitted with a special type of spindle or cap dolly, which can be operated only with a special type of valve key, which differs from those for sluice valves.

501.11 Depth of Water Mains

501.11.1 Both principal mains and rider mains shall have the following minimum cover, except in circumstances requiring special protection. Greater depth shall be provided if required by the Engineer:

(i) Under grass berms and footpaths: top of pipe 600mm below finished surface.

(ii) Under carriageways: top of pipe 900m m below finished surface level at the lower point over the pipe.

501.11.2 Service connection pipes shall have minimum cover of 350mm. The sections of main adjacent to a carriageway crossing shall be gradually deepened, to allow the required cover under the carriageway without the provision of vertical bends. Similar provision shall be made to give the necessary cover over valve and hydrant spindles.

501.12 Pipe Bedding

501.12.1 Water main pipes shall be bedded on suitable fine granular material, either natural (for example fine damp clay chippings) or imported. All water mains under carriageway shall have sand or fine granular bedding and surround. The requirement for bedding and surrounding of UPVC pipe is set out in NZS 7643.

501.12.2 The same bedding and surround shall also be used in rock country or where the trenching has brought out hard lumpy clay. There shall be no sharp stones or large clay lumps in the bedding or surround. Each pipe shall be laid so that the barrel of the pipe is supported for 60 to 90° of its

circumference along its entire length. The bottom of the trench shall be cut out to sufficient size to permit jointing of the pipes, and all pipes shall be supported upon their barrels only.

501.13 Pipe Fittings

501.13.1 Pipe fittings such as tees, hydrant tees, crosses, tapers, hydrant risers, blank caps, plugs, bends of various degrees, and surface boxes (where applicable) shall be of cast iron, or other metallic material and manufacture approved by the Engineer.

501.13.2 Cast iron fittings shall be cast from high quality grey iron coated with a proven corrosion preventative compound after adequate preparation.

501.13.3 Flanges shall be to Table E of NZS 8. Fittings laid adjacent to other fittings shall have flanged joints, or flexible joints where permitted (gibault or supertite).

501.13.4 All bolts and nuts shall be galvanised.

501.13.5 Gaskets for flanged joints shall be to BS 5292.

501.14 Anchor or Thrust Blocks

501.14.1 Cast in situ concrete anchor blocks shall be provided at all points where an unbalanced thrust occurs on mains exceeding 50mm diameter.

501.14.2 The design of anchor blocks shall be based on the bearing value of the site soil conditions, except that the maximum value used shall be 75 kPa. 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. Concrete shall have a minimum compressive strength of 17.5 MPa at 28 days.

A protective membrane to protect abrasive damage to the water main should be provided between the pipe (irrespective of the pipe material) and the concrete anchor and thrust blocks.

501.15 Connections to Private Property

501.15.1 A service connection of 20mm minimum diameter shall be provided to each allotment or dwelling unit with individual road frontage. In the case of rear allotments the service connection shall be laid along the right-of-way to where it joins the section proper.

The point of supply to the consumer will be determined by the Council in accordance with Council's Bylaw on metering of supply, and on water mains in private property. Unless required otherwise by the Engineer, the following practice shall be followed:

(i) In areas where the water supply is not metered to the consumer, the service connection shall terminate with a female gate valve under a toby box 300mm short of the boundary.

(ii) Where the water supply is metered, the service connection shall terminate with a female gate valve housed in a standard meter box 300mm short of the boundary.

501.16 Testing

501.16.1 Before joints are covered, but after anchor blocks are completed, each section of the reticulation, together with all specials and fittings connected thereto shall be tested by the subdividing or owner or developer in the presence of the Engineer or his representative. The test shall be carried out, and all necessary apparatus supplied, by the subdividing owner or developer. The reticulation shall withstand a pressure of 1400 kPa measured at the lowest point of the section under test, or 1.5 times the working pressure at any point in the system, whichever is the greater. The pressure shall be maintained for a period of 15 min, and during the period of the test, the leakage shall not exceed one litre per ten millimetres of pipe diameter per kilometre length of pipeline per hour. Before arranging connection to the existing reticulation, the Engineer may require a similar test after completion of backfilling and any other adjoining works which may affect the water reticulation.

501.17 Backfilling and Reinstatement

501.17.1 Carriageways

501.17.1.1 All pipe trenches under carriageways shall be backfilled using an approved hardfill placed immediately above the pipe surround and compacted in layers not exceeding 250mm in depth.

501.17.1.2 On existing roads the top section of the trench shall be backfilled using N.R.B. basecourse, and sealed. The depth of basecourse and type of seal shall conform to the standard of the existing road construction and to the Engineer's requirements.

501.17.2 Berms

501.17.2.1 Pipe trenches under grass berms and footpaths shall be backfilled in accordance with the requirements 12.5 to 12.9 of NZS 4452.

501.18 Disinfecting

501.18.1 After backfilling and before being put into service, all pipes, valves, house connections and other fittings shall be disinfected.

501.18.2 The method to be adopted shall be as approved by the Engineer, or alternatively, Council may carry out the work and charge the cost to the subdividing owner.

501.19 Water Mains to be Kept Charged

501.19.1 After any water main has been laid and tested and disinfected, it shall be kept continually charged with water, and under pressure. If the permanent connection to the existing reticulation is delayed, a temporary small diameter connection shall be made from the existing reticulation. The pressure must be maintained while electric power and other underground services are being laid in the vicinity of the main.

501.20 Connection to Existing Water Reticulation

501.20.1 The physical work of connecting to the existing reticulation will be arranged by the Council after the new reticulation has been tested and

passed as satisfactory. The cost of this shall be met by the subdividing owner or as otherwise appropriate in special cases.

501.21 Special Measures in Corrosive Soils

501.21.1 Acid Soils

There have been cases of severe electrolytic corrosion of tapping bands of cast iron, malleable iron, and aluminium iron due to acid soil.

501.21.1.1 In areas of acid soil, tapping bands should not be used with new water mains. At the position for each service connection, a barrel nipple should be tapped directly into the pipe collar.

501.21.1.2 Where a new service connection is required on an existing asbestos cement water main, an aluminium bronze tapping band shall be used, with approved insulation between any brass and the aluminium alloy.

501.21.1.3 On UPVC rider mains, either a reducing tee or an aluminium-bronze tapping band shall be used for each service connection.

501.21.1.4 No galvanised or mild steel or brass fittings or bolts and nuts shall be used, with the exception of those bolts and nuts which are an integral part of assembled tarcoated valves and hydrants. All other bolts, nuts, and washers shall be of aluminium-bronze, and fittings shall be of gun-metal.

In some districts there is an indication of some corrosion of bolts on cast iron tapping bands, and special measures may be necessary regarding bolts, or tapping bands of other materials may be required (for example, aluminium-bronze tapping bands and bolts). Coated aluminium capping bands may be inadequate in acid soils such as peat, and other materials may be required.

501.21.2 Geothermal Districts

501.21.2.1 In geothermal districts reference shall be made to the Engineer for his requirements.

There are geothermal districts at Okoroire and Whakamaru.

501.22 Special Measures for Pumping or Storage or Both

501.22.1 The provision of service storage or reticulation pumping installations or both together will normally be the responsibility of the Council, except in special cases where established practice may require the cost to be apportioned between the interested parties. Technical requirements will vary with the district concerned, or the Council may do the work itself, with a contribution in terms of the District Plan from the subdividing owner or developer.

502 POWER, TELEPHONE AND GAS

502.1 General Requirements

502.1.1 The subdivider or developer where considered appropriate by Council, shall make all arrangements with the appropriate Authorities for the supply and installation of electrical power, telecommunications and, where applicable, gas reticulation. The subdivider shall provide approved copies

of the engineering drawings to the relevant Authorities at the earliest opportunity to avoid delay in providing for installation of services. This may involve arrangements for cable to be installed at a later date.

502.1.2 Electrical Power. The supply of electrical power in the urban area but not generally in the rural area shall generally be made by means of an underground system subject to any technical constraints. Ducts shall be installed at the time of road construction to the requirements of the electricity operator. Sites for transformers and switching stations shall be provided as and where required. All costs of placing electricity services underground shall be borne by the developer.

502.1.2.1 The supply of power shall generally be by means of an underground system. All work shall be carried out in accordance with the requirements of the owner of the electricity network.

Adequate provision shall be made for road lighting to all roads within the subdivision or development (as appropriate).

Access to power line support structures is necessary for maintenance purposes and is provided for by the Electricity Act 1992. Because this access may require the use of heavy vehicles, subdivision plans should be discussed at an early stage with the electrical authority concerned. Consultation should also be sought on the likely effect of power conductors above future buildings.

502.1.3 Telephone. Arrangements should be made with any telecommunication company for the telecommunication reticulation. Where only part of this reticulation is being supplied initially the arrangements shall include the requisite space being maintained for the installation of the remainder of the reticulation at a later date. Ducts will be supplied by the utility operator to the subdividing owner or developer at the time of road construction for installation in the carriageway formation at locations where cables may be required at a later date.

502.1.3.1 The supply of telephone services shall generally be by means of an underground system. All work shall be carried out in accordance with the requirements of the telecommunication company.

502.1.4 Gas. Where an existing gas supply is available or likely to be available to serve a subdivision, the subdividing owner may make appropriate arrangements with the gas supply authority, and at the time of road construction, shall install such duct pipes as may be required.

502.1.5 *Drawings*

502.1.5.1 "As-built" drawings of the installed services shall be submitted to both the Council and the Service Authority.

502.2 Underground Cabling

502.2.1 Where the supply is by underground means, the cable laying shall be facilitated by the installation of pipe ducts. These are to be installed by the subdividing owner at road crossings in the positions required by the owner of the utility network. Duct pipes in the line of a proposed cable may also be required under paved drives, private ways, and accessways if the paving cannot be deferred until after the installation of the cables.

Materials for ducting and the sizes of ducts shall comply with the requirements of the owner of the utility network.

Where a water or gas main is on the kerb side of a proposed cable, delaying the installation of service connection pipes will facilitate laying of the cable. Any stormwater connections from the boundary to the road channel should also be deferred until cables are laid.

502.2.2 Copies of the scheme plan of the subdivision shall be forwarded by the subdividing owner to the supply authorities at an early date to facilitate the design of the reticulation.

502.2.3 It is important that the supply authorities be advised by the subdividing owner of any amendments to the scheme plan. Information when available on the type of dwellings and likelihood of more than one dwelling on any lot, will be valuable for design purposes.

502.2.4 In preparing the engineering plans due regard shall be given to the requirements of the supply authorities as to:

(i) Minimum cover to cables.

(ii) The owner of the utility network's desired position for the cable within the road berm.

(iii) The minimum separation distances between power or telephone cables, and gas or water mains.

(iv) The width of berm which must be clear of other services and obstructions to enable efficient cable laying operations.

502.2.5 Reference should be made to each owner of the utility network for their specific requirements.

502.3 Power Transformers and Switching Stations

502.3.1 These should be sited on land which will legally become part of the road but which is set back outside the normal road line. Alternatively separate lots (Local Purpose Reserve - public utility) or easements over private property may be used.

502.4 Road Lighting

502.4.1 Road lighting proposals will be shown on the reticulation plans prepared by the owner of the power utility network and suitable sites in the road berm for the installation of poles shall be provided.

502.4.2 Road lighting should be provided in all roads of a subdivision or development where appropriate, and in all areas set aside for frequent public use such as car parks.

502.4.3 The provision of road lighting is covered in AS/NZS 1158:2005. This document describes the design philosophies and the means of obtaining road lighting specified, namely the lighting of main routes and of all other roads.

502.5 Conversion to Underground on Existing Roads

502.5.1 Where a proposed subdivision or development fronts on to an existing road, the conversion of overhead reticulation to underground will in some instances be desirable. Agreement on the feasibility and benefit will first be agreed between the owner of the electrical utility network, telecommunication company and the Council.

502.6 Industrial and Commercial Subdivisions and Developments

502.6.1 The servicing requirements for industrial and commercial areas are often indeterminate. Close liaison between the subdividing owner or developer and the owner of the utility network is advisable, particularly immediately before cabling is installed so that changes can be incorporated to accommodate extra sites or the requirements of a particular industry.

502.7 Telecommunication Reticulation

Telecommunication reticulation consists of a number of elements and a brief description of the principle elements and their inter-relationship follows for the information of subdividers and developers.

Telecommunication reticulation splits into two functions: feeder and distribution. Feeders are normally located on one side of the main traffic-carrying road or roads through the subdivision or development, whereas distribution reticulation is normally located on both sides of each road and provides a connection for each section back to a feeder.

Feeders may take the form of one or a combination of the following:

(a) A duct line consisting of manholes, typically spaced at 200m intervals, usually located at or near road intersections, and joined together with a bed of four or six (placed vertically or in a two-wide formation) 100mm UPVC pipes.

The manholes would have external dimensions typically 2.7m long and x 1.4m wide x 1.4m deep and be constructed in situ of concrete or concrete blocks. Special precast concrete manholes or manholes prefabricated from standard concrete pipe or culvert sections may be used in some areas.

(b) A pipe system consisting of one or two 100m UPVC pipes (placed horizontally or vertically) with or without small joint boxes. The joint boxes would have external dimensions typically 2.0m long x 0.7m wide x 0.4m deep and would be precast in glass reinforced resin or glass reinforced cement.

(c) A direct buried cable or cables.

Distribution reticulation normally consists of a direct buried cable in the berm with loops to access pillars sited at every second section boundary. Siting of access pillar distribution points (dps), is desirably on alternate boundaries to electric power pillars. Where there is difficulty in siting distribution points at the section boundary, for example, where a footpath and berm is provided on one side of the carriageway, only, then a PVC pipe is sometimes installed from the section boundary concerned back to a satisfactorily sited distribution point.

An above ground cubicle (cross-connection cabinet) is often provided as an interface between feeder and distribution reticulation. This is located on the road reserve at a section boundary. Often there is an associated jointbox. A typical cubicle would be 1.0m wide x 0.3m deep x 1.2m high with a 75mm thick concrete surround approximately 1.5m wide x 1.0m deep.

Public telephone boxes (PCS's) may be required in some areas. These would generally be installed close to the kerb on a concrete base approximately 1.2m x 1.0m x 01.m thick. Underground telephone and power leads would be installed. Where the PCS is installed on a grass berm a concrete surround and path to the footway would be provided.

502.8 ***Gas Reticulation***

Where necessary the pipe laying shall be facilitated by the installation of pipe ducts. These are to be installed by the subdividing owner at road crossings in positions required by the owner of the utility network. Duct pipes may also be required under paved drives, private ways and accessways if the paving cannot be deferred until after the installation of the pipes. It may be necessary for system operation to have a district regulator station within the development and these should preferably be sited within the road berm or land which will legally become part of the road but which is set outside the normal road line. Alternatively separate lots (Local Purpose Reserve - public utility) or easements over private property may be used.

503 LOCATION OF SERVICES

503.1 The position of services in the road shall conform to the established local practice, as agreed between the Council and the various service authorities, and as prescribed by the Council.

It is common practice that electricity, gas, water, telephone services and poles be located in the berm and footpath between road kerb and boundary.

While it may be desirable that other services such as the stormwater and sewer drains required for the subdivision be in the same area, it is usually necessary because of space limitations to locate drainage services elsewhere. The location of each particular service is not of any great importance but it is important that a consistent pattern be adopted and used. There are some minor reasons why individual services should be in particular positions, but nevertheless there do not appear to be any factors which require a particular service to be in a unique location.

It is good practice to place cable services such as electricity and telephone adjoining the footpath (where the footpath is of lesser width than the total berm width) to enable the cable to be diverted slightly to junction box positions under the footpath itself. Electric power and telephone junction boxes tend to be very large and form appreciable obstructions to other services if constructed on the line of the cable. The practice of diverting cables slightly around poles is not a good one because in the event of pole replacement it is usual to place a new pole 1 or 2m further along the road. The digging of a post hole in the same relationship to the kerb as the existing post hole can have disastrous consequences if a minor diversion of cable has been made around the original hole.

503.2 Fig. 16 of the Code shows a rational system which is recommended for all extensive new subdivisions and developments. This provides for the electrical reticulation to be closest to the boundary, and next to the water main or rider main (laid by the subdividing owner or developer, usually before the electrical cables). The gas and telephone then follow in sequence from the boundary, in the order in which they are usually laid in the district. The service connections from each form of reticulation are laid to the boundary, crossing over the other reticulation. With this system, where the road contains extended grassed areas wider than the normal width, the water mains should generally be laid at the

standard distance from the boundary (and not parallel to the kerb) provided the road boundary is a more or less continuous line without sharp embankments.

503.3 Attention is also drawn to Appendix E of the NRB Code of Practice - Design for urban roads indicating an alternative suggested distribution of services.

503.4 It is essential that all services be laid to predictable lines if there is to be a reasonable opportunity of laying new services within existing systems. Service location shall therefore be recorded to a tolerance of ± 100mm.

503.5 ***Trenches:***

(i) When new subdivision or development work is undertaken, the problems of opening and backfilling trenches is not very serious. Adequate compaction of trenches to a state of stability consistent with the future of the surface concerned is virtually all that needs special attention.

(ii) Where underground services are laid after the initial engineering work of the subdivision or development or where they are extended out of an existing area into a new one, special attention needs to be given to the opening and reinstatement of trenches.