

PART A

**CODE OF PRACTICE
FOR
ENGINEERING WORKS**

- 1.0 Preliminary
- 2.0 Engineering Drawing Requirements
- 3.0 Earthworks
- 4.0 Stormwater Drainage
- 5.0 Sanitary Sewerage
- 6.0 Water Supply
- 7.0 Electrical - Telephone Reticulation and Street Lighting
- 8.0 Streetworks and Roothing

SECTION 1.0

PRELIMINARY

INDEX

- 1.1 Introduction
- 1.2 Reference
- 1.3 Statutory Requirements
- 1.4 Interpretation
- 1.5 Related Documents
- 1.6 Resource Management Act and Alternatives
- 1.7 Liaison with Other Authorities

1.0 PRELIMINARY

1.1 Introduction

This Code of Practice is intended to be an outline of the Westland District Council design requirements and standards applicable to the preparation and subsequent approval of engineering plans required as follows:

- (a) As required by a Resource Consent i.e. a Subdivision and/or Land Use Consent.
- (b) As required for other public civil engineering works within the District.

1.2 Reference

The requirements of NZS 4404: are generally applicable and users of this Code are expected to familiarise themselves with this Standard.

1.3 Statutory Requirements

Cl 102.2 of NZS 4404: is replaced by the following list of Statutes which may be applicable along with the provisions of the Operative District Schemes or Plans.

Resource Management Act (the RMA).

The Building Act.

N.B. Where Standards and Statutes are referred to they shall be taken as the current version.

1.4 Interpretation

"Council" or "the Council" shall mean the Westland District Council or its officers.

"Engineer" or "The Engineer" shall mean the Engineering Manager of the Council.

"Approved/Approval" shall mean approved by or to the approval of the Engineer.

"Owner", "Developer" and "Subdividing Owner" shall all have the same meaning and shall mean the owner of the land to be or being subdivided or which is subject to a Land Use Consent, up to the time that works and reserves are vested in Council and sections are sold.

"Consultant" shall generally be a Registered Engineer or Registered Surveyor employed by the Owner to produce the engineering drawings and who is responsible for obtaining the approval of the Engineer. In small one or two lot subdivisions Council may accept other suitably qualified or experienced persons as Consultants.

1.5 Related Documents

All works shown on approved Engineering plans are to be constructed in accordance with those plans and Specifications approved by the Engineer.

Consultants as herein defined shall be required to be engaged by owners to accept managerial and supervisory responsibilities and may be required by the Engineer to certify the works and/or submit appropriate Producer Statements.

1.6 Resource Management Act and Alternatives

This Code is intended to address the principal objectives of the RMA in that it seeks to minimise adverse effects on the environment of civil engineering development, principally for subdivisions.

In general consumption of resources is limited to a reasonable level consistent with achieving a balance between initial capital cost and on-going maintenance costs - the latter being of financial concern to the Council in the majority of cases.

The RMA encourages alternative ways of mitigating effects and this Code is only prescriptive in areas where Council as ultimate owner in most cases sees overall benefits in standardisation in terms of increased certainty as to stores and maintenance implications - in particular requirements for underground services are not overly flexible.

Requirements for streets in particular are to be regarded as a "Means of Compliance" with Consent conditions and nothing precludes alternatives of a higher or equivalent standard. Where the Engineer is satisfied that a relaxation of standards is appropriate a lower standard may be agreed for approval.

1.7 Liaison with Other Authorities

Developers and Consultants are to liaise with other Service Authorities to achieve economical use of road reserve area with due consideration given to ease of maintenance for all services in the road reserve area.

SECTION 2.0
ENGINEERING DRAWING REQUIREMENTS
INDEX

- 2.1 Introduction
- 2.2 Engineering Details Required
- 2.3 Orientation of Plans and Sections
- 2.4 Scales
- 2.5 Special Scales
- 2.6 Neighbours Consent
- 2.7 Plan Approval Procedure
- 2.8 Specifications
- 2.9 "As-Built Drawings"

2.0 ENGINEERING DRAWING REQUIREMENTS

2.1 Introduction

Engineering drawings shall be prepared in accordance with an approved Subdivision or Land Use Consent Plan, any specific engineering conditions imposed as part of the consent and the provisions of this Code of Practice.

All height data must be in terms of DOSLI datum where practicable.

2.2 Engineering Details Required

Plans submitted for approval shall conform with the following:

- (a) Drawn on standard A1 or A2 size sheets with a frame and title block.

Plans are to have a CAD or preprinted title block which clearly allows for the following information to be displayed:

Consultants firm, Job title, location and owner ("What", "Where" and "Who For?"), Scales, Draughtsman's name/date, Consultants signature/date (as evidence of check prior to submission), consultants file number and an update block PLUS provision for the WDC Engineers approval signature and date as well as the WDC reference number. (To be inserted by WDC at post approval indexing stage)

Note that the Consultants signature will be taken as evidence that the plans submitted have been checked as complying with Westland District Council requirements to the best of that professional persons ability and effectively has the same meaning as a design certificate. Unsigned plans will not be accepted for processing as Westland District Council will not provide a first stage draughting checking service.

- (b) All draughting on transparencies shall be clearly reproducible and all lettering shall be stencilled or in freehand micro font or similar approved style that will permit satisfactory microfilm reproduction. Minimum line thickness shall be 0.25 mm with a minimum letter height of 2.5 mm in accordance with NZS/AS 1100.
- (c) The symbols and arrangements shown on Westland District Council Standard Details shall be used.
- (d) A key plan showing the site location, including street and site identification and a North Point.
- (e) A contour plan of the site in terms of DOSLI Datum (if required by the Council).

- (f) Plans of each street showing the survey lots, street numbers, names of new streets and also the location of services including the necessary fittings and manholes etc.
- (g) Separate plans and sections showing:
 - (i) Streets, kerbs and channels and footpaths. Left and right hand top of kerb shall be shown separately unless they are identical, when this shall be stated.

 Longitudinal and cross sections of the existing ground, and the proposed street levels with batters and any adjustment of levels of the lots due to general regarding or landscaping. The levels of the proposed services shall also be shown on sections.

 Longitudinal and cross sections should be drawn at appropriate exaggerated vertical to horizontal scale ratio.
 - (ii) Sanitary sewer, stormwater drains and kerb line. Proposed reticulation shall be shown with dimensions to section boundaries with longitudinal sections of each line. Where proposed drains cross under or over existing or proposed services, these services shall be shown on plan and section with invert levels.

 Drainage drawings submitted for checking shall be accompanied by catchment plans showing all the catchment areas to be served.

 Sewerage and stormwater discharge calculations based on the requirements of this Code.
 - (iii) Watermain and fittings, power cables and substations, telephone cables and kerblines (except that power and telephone services need not be shown where the location of the work will not vest in Council).

 Some relaxation of this separate plan requirement will be accepted for small subdivisions.
- (h) Plans shall also show the location of the services in the existing streets which abut the subdivisions. New services shall be located as shown on WDC Standard Details generally.

2.3 Orientation of Plans and Sections

- (a) Plans should generally be oriented with either north or west to the top of the sheet.
- (b) Plans and Longitudinal Sections shall have the lowest distance generally on the left hand side of the sheet. In drainage longitudinal sections, the lowest end of the drain shall be at the lower distance and the plan should be orientated correspondingly.

- (c) Cross Sections of the street shall commence at the bottom left hand corner of the sheet and proceed upwards where this is possible.

2.4 Scales

The scales to be used for plans and sections are as follows:

- (a) Consent Applications 1:250 or 1:200 (refer also to 2.6)
- (b) Location Plan To be not less than 1:20,000 and not larger than 1:5000
- (c) Site Contour Plans 1:1000 or 1:500 or 1:250 or 1:200
- (d) Street works-plan 1:500 or 1:250 or 1:200
- (e) Longitudinal Sections or channels
 - Horizontal 1:500 or 1:250 or 1:200
 - Vertical 1:50 or 1:25 or 1:20
- (f) Cross Sections
 - Horizontal 1:50
 - Vertical 1:50 or 1:20
- (g) Sanitary sewer and
Stormwater sewer plan 1:500 or 1:250 or 1:200
Longitudinal Section
 - Horizontal 1:500 or 1:250 or 1:200
 - Vertical 1:50 or 1:100
- (h) Details 1:20 or 1:10 or 1:5
- (i) Other Services
 - Plan 1:500 or 1:250 or 1:200
 - Cross Section 1:50
- (j) "As-Built" plans in the scales as set out in items (a) to (i) after completion of work.

These scales are generally applicable to urban subdivisions. Smaller scales may be used as necessary to suit rural situations without prior approval as required by 2.6.

2.5 Special Scales

Special scales for special cases may be approved by the Engineer, but only on application before hand. Plans drawn to scales other than those listed will not be accepted without prior approval.

2.6 Neighbours Consent

Where any construction work is required on another property, the owners consent shall be endorsed on the original transparency in opaque black ink that will permit satisfactory microfilm reproduction. Note that ball point pen will not microfilm satisfactorily.

2.7 Plan Approval Procedure

Engineering plans and specifications shall be submitted in duplicate. The Engineer shall check them and within a period not exceeding 20 working days, shall notify the consultant of any amendments, variations or clarification required. These shall be attended to by the Consultant, who shall then submit amended prints for checking against the retained copy. Upon notification from the Engineer the consultant shall then submit the tracings of the Engineering plans for the approval and signature of the Engineer.

A minimum of two copies of final plans and specifications shall then be forwarded to the Council for their use.

Where the work is considered by the Engineer to be outside the scope of the Consultants experience the Engineer may require that the services of a Consultant experienced in the type of work being dealt with be retained.

2.8 Specifications

The Consultant shall forward for approval, copies of the contract specification for the work inclusive of schedules, Special Conditions of Contract, and Special Provisions of Contract.

2.9 "As-Built Drawings"

"As-Built" drawings shall be provided and approved before the final plan of subdivision is approved, or the 224 certificate issued and shall show the following details:

- (a) Sanitary Drainage Reticulation including manhole and lamp hole cleaning eye (LHCE) positions and house connections.
- (b) Stormwater Drainage Reticulation including manhole and LHCE positions, sumps, house connections and stormwater intake structures.

- (c) "As-Built" drainage drawings shall include amended longitudinal sections.
- (d) Water Reticulation, including valves, hydrants and meter boxes.
- (e) Streetworks.
- (f) Any other changes from the approved drawings.

The heads of all sewer and stormwater connections, manhole tops, LHCE, waterworks valves, hydrants and meter boxes, as laid during construction shall be detailed on the "As-Built" drawings by either triangulation from two boundary pegs or by boundary dimension and offset.

Triangulation shall define the service's position by distances from two section boundary pegs so that arcs scribed from each peg clearly intercept over the pipe or fitting.

Alternatively a measurement along the boundary and a square offset distance off the boundary shall define the position of the pipe or fitting.

Care shall be taken to ensure that the measurements taken to locate services are such that they will not be obstructed by future building or development on the site.

At the head of each sewer and stormwater connection, the depth of the top of the pipe below finished ground level shall be recorded.

Services information is to include types and classes of material used.

As-Built plans shall not be endorsed with disclaimers as to the responsibility for the accuracy of information thereon. Any such endorsements will render the plans unacceptable to Council.

As-Built information relating to public roads and services should be sufficiently accurate to permit it to be used in subsequent design. Information relating to private connections shall be sufficiently accurate to assist future location and shall generally be accurate to ± 500 mm in plan and ± 100 mm in level.

SECTION 3.0
EARTHWORKS
INDEX

- 3.1 Introduction
- 3.2 References and Standards
- 3.3 Environmental and Planning Requirements
- 3.4 Technical Responsibility
- 3.5 Site Preparation

3.0 EARTHWORKS

3.1 Introduction

This section sets out the requirements for the design and control of earthworks within subdivisions.

3.2 References and Standards

Part 2 of NZS 4404: is to be taken as the guiding document for the planning design and construction of earthworks within areas to be subdivided.

3.3 Environmental and Planning Requirements

Land disturbance and earthworks activities are the subject of objective policies and rules set out in the appropriate Resource Management Plans prepared and operative under the RMA.

At the outset of any development, Developers and Consultants should clarify with the Council what rules apply and whether Resource Consents will be required.

Conditions may be imposed on Subdivision Consents and other Resource Consents, and physical work shall not start until all required Resource Consents have been obtained.

3.4 Technical Responsibility

In accordance with Cl.203.1 of NZS 4404: subdivision requiring bulk earthworks may only be undertaken if the subdivider retains a "soils engineer".

Council will usually require that the "soils engineer" be a Registered Engineer experienced in the design and construction management of civil engineering earthworks. Any such engineer may be required to satisfy the Council's Engineering Manager as to his suitability to assume responsibility for the work.

In areas where Council have reservations about existing slope or foundation stability or the appropriateness of the earthworks proposed, the Council's Engineering Manager may require that the subdivider retain as "soils engineer" a Registered Engineer employed by a consultancy with specialist expertise in geotechnical engineering.

Delete from clause 203.3 of NZS 4404 all the words from and including "and with Testing..." and replace with "approved by the Engineer and utilising appropriately calibrated equipment".

In all cases involving bulk earthworks and/or slopes of doubtful stability the certification requirements of NZS 4404: must be met at both the approval and as-built stages.

Certification as per NZS 4404 shall be amended to conclude as follows:

This professional opinion is furnished to the Westland District Council and the subdividing owner for their purposes alone, on the express condition that it will not be relied upon by any other person and does not remove the necessity for further investigation and/or inspection during subsequent works. However it is acknowledged that Council is entitled to provide information contained in this certificate pursuant to section 31 of the Building Act 1992 and Section 44A of the Local Government Official Information and Meetings Act 1987.

For the purposes of determining the requirement for a "soils engineer" bulk earthworks shall be taken to be cuts and fills in excess of 1.2 m within road reserves or buildable areas of sections.

3.5 Site Preparation

Before any earthworks are commenced, areas of cut and fill should be clearly defined.

The site is to be adequately fenced/barricaded to safeguard other persons and private (or public) property both above or below the site.

Adequate fencing or barriers should also be provided around trees or other features that are to be protected.

Adequate provision should also be made for the control of erosion, surface water runoff and siltation.

All rubbish, vegetation, debris etc., should be removed from earthwork areas prior to commencement of topsoil stripping. All earthwork areas should be stripped of all topsoil and any soft or organic material. Special care should be taken to ensure that organic materials and areas of old uncompacted filling are not overlooked through being overlain by other soils.

All stripped material should be deposited in temporary stockpiles or permanent dumps, in locations where there is no possibility of these materials being unintentionally covered over or incorporated into structural fills.

SECTION 4.0
STORMWATER DRAINAGE
INDEX

- 4.1 Introduction
- 4.2 References and Standards
- 4.3 Stormwater Policy
- 4.4 Design Criteria
- 4.5 Road Drainage
- 4.6 Surface Openings and Manholes
- 4.7 Layout and Detailing Requirements
- 4.8 Other Design Considerations
- 4.9 Pipe Size not to be Reduced
- 4.10 Junctions not requiring Manholes
- 4.11 Subsoil Drains
- 4.12 Cover
- 4.13 Pipe Soffits to be Aligned

4.0 STORMWATER DRAINAGE

4.1 Introduction

This section sets out the requirements for the design and detailing of stormwater drainage provisions on engineering plans.

4.2 References and Standards

Stormwater systems shall be designed and detailed in accordance with the following unless specifically required otherwise by the provisions of this section.

- A- NZIE Auckland Branch "A Guideline and Procedure for Hydrological Design of Urban Stormwater Systems".

This publication gives a clear overview of the philosophy and design method for producing well designed stormwater systems.

- B- NZS 4404: Part 4
- C- Building Industry Authority - Approved Document E1 Surface Water
- D- M.W.D. Culvert Manual CDP 706/A.

4.3 Stormwater Policy

The stormwater responsibilities of subdividers are set out as follows:

- 4.3.1 Subdividers are totally responsible for the protection of the land under subdivision against flooding; not only the provision for runoff arising from the subdivision area but also the provision for design flows (as established from application of this Code) arising from the existing upstream land use (ie, from the current land use rather than the current zoned use, where they differ).
- 4.3.2 Subdividers are to extend stormwater systems to the upstream limit of their subdivision as necessary to cater for existing upstream flows.
- 4.3.3 Generally drainage requiring waterways in excess of those requiring a 900 mm pipe will be catered for by means of an open channel improved as necessary in terms of Cl 401.4 of NZS 4404 which states:

“The extent of stream improvement work shall be agreed with the Engineer in order to achieve a satisfactory compromise between the retention of the natural topography and vegetation, and maintenance, hydraulic and safety considerations, including the downstream effects of the work.”

- 4.3.4** Where a drain is to be left open the subdivider shall upgrade the drain as required and vest the land occupied by the drain (plus sufficient land alongside the drain to allow maintenance access) in council at no cost. Such land shall not be considered as part of land vested for reserves.
- 4.3.5** Subdividers are required to extend their stormwater system downstream of their subdivision to link with a recognised drainage system.

Any negotiations for access for such purposes, to land owned by others, and the cost of pipes installation on such land, will be the responsibility of the subdivider.

- 4.3.6** Generally stormwater shall be catered for within the catchment in which it arises.
- 4.3.7** Council prefers concrete pipes in street reserves but will consider alternative materials when satisfied that all flows will be substantially free of abrasive material. In particular use of PVC pipe is permitted in private right of ways and for private connections.

Metal pipes will only be permitted where Council is satisfied that chemical corrosion will not limit pipe life.

Where pipe gradients exceed 1 in 3, the Consultant will be required to consider and seek the engineers approval for, the use of special pipe materials, anchorages for pipe, cutoffs in trenches, and other specific protection.

4.4 Design Criteria

4.4.1 Runoff Calculation

For the majority of cases peak stormwater flows shall be calculated using the "Rational Method". Flow assessment for very large or unusual catchments shall be done in consultation with the Westland District Council Engineering Department, and if required, the West Coast Regional Council.

4.4.2 Rainfall Intensity

Design rainfall intensity shall be based on the most applicable NZ Meteorological Service records as published in:

- (a) "The Frequency of High Intensity Rainfalls in New Zealand Part I 1980" (Water and Soil Technical Publication No.19) or

- (b) "HIRDS" - (High Intensity Rainfall Design System) computer system software, issued by NIWAR.

Design rainfall intensity graphs based on the above reference (b) are attached as Diagram C202 in Part C.

4.4.3 Design Storm Frequency

Stormwater runoff shall be based on the following:

- (a) Flat Catchment up to 500 ha:
The current practice is to design primary stormwater systems for a 5 year storm. A return period of 10 years or more may be warranted if special circumstances such as natural basins, would result in flooding causing excessive damage.

- (b) Hill Catchments up to 500 ha:
A 20 year storm should normally be used for hillside drains. This less frequent storm is to be used because overflow from hill drains can cause serious damage through scouring. However, when a drain on the flat serves a catchment which is partly on hills, it would normally only be necessary to allow for the effect of a 5 year storm on the catchment to that point.

Care should be taken in choosing the point where the 20 year capacity of a conduit is reduced to the 5 year capacity so that the resulting concentrated secondary flow can escape down a safe path without causing serious damage.

- (c) Catchment greater than 500 ha:
Most works serving larger catchments are in the nature of open channels, culverts or bridges. Overloading of major drains can have serious consequences and it is bad economy to have short restrictions such as bridges and culverts in open channels which usually have good overload characteristics.

The following storm return periods should normally be used:

Area (ha)	On flat	On hills
500 to 800	10	20
800 to 1500	20	50
Over 1500	50	50

- (d) In all catchments the effects of a 50 year return period shall be considered to ensure that overall drainage provision is such that a 50 year storm flow cannot enter buildings.

- (e) For rural flows into an urban area advice on design storm flows shall be obtained from the Engineer.

4.4.4 Runoff Coefficients

Designers are encouraged to derive their own runoff coefficients in accordance with:

- (a) The criteria and notes set out in Reference C (see 4.2).
- (b) An assessment of the maximum development in the catchment in terms of runoff implications.
- (c) The probability that catchments in the district are more likely than in some other parts of the country, to be saturated at the time of a storm event.

For preliminary work and/or small catchments the following composite runoff coefficients may be used:

Commercial and Industrial	.8
Residential	.5
Undeveloped Land	.3

However in the absence of supporting analysis for the composite coefficients used the Engineer may require that the above coefficients be varied to best reflect the particular circumstances at hand.

Time of Concentration

Time of concentration for the estimation of flow at any point in a stormwater system shall be estimated in accordance with the criteria and method set out in Reference C.

4.5 Road Drainage

Roads shall be drained by sumps which are in accordance with Standard Details. Sumps shall be located as follows:

At all locations where the absence of a sump would cause water to leave the gutter (tangent points to curves, low points, changes in grade etc) and at intervals not greater than 100 m. Sumps at low points should drain a maximum of 100 m gutter.

Sumps shall be Standard Double Sumps unless shown otherwise on the drawings.

The use of Standard Back Entry Sumps may be required on steep gradients or where the consequence of a grate blocking warrants added certainty of operation.

The use of yard sumps will be approved in private Rights of Way where the tributary area is small.

Sumps shall discharge via leads of 200 mm minimum diameter although sumps on rights of way may be connected by 150 mm pipes.

Sumps shall be clear of crossings and shall be located to prevent substantial gutter flows at pram and pedestrian kerb ramps.

4.6 Surface Openings and Manholes

4.6.1 Surface openings shall generally consist of manholes to be located as follows:

- At changes of direction
- At changes of grade
- At changes of pipe diameter
- At intervals of not greater than 100 m
- At the ends of public stormwater drains except as set out below
- At pipe intersections where:
 - (i) Both pipes are the same diameter and that diameter is 200 mm or over.
 - (ii) The minor pipe is 150 mm diameter or over and is more than half the diameter of the major pipe, unless an approved factory-made junction pipe is used.
 - (iii) More than one tributary pipe joins a main.
- As required to limit the angle of deviation to a maximum of 90 degrees.

4.6.2 Cleaning eyes may be used in place of manholes under the following circumstances:

- At the end of a 150 mm diameter public stormwater drain in private property.
- Where the next downstream surface opening is no further than 50 m distant.
- One private stormwater connection will be permitted upstream of the cleaning eye.

4.6.3 In-line sumps can be used in lieu of manholes when:

- The depth to invert is less than 1.2 m.
- A sump is required at the location in any event and the expense of a manhole and sump close together is unjustifiable in the opinion of the Engineer.

- 4.6.4 All surface openings are to be protected by an approved inlet structure and grille. Silt traps and special debris racks may be required in some locations.

4.7 **Layout and Detailing Requirements**

Stormwater drains are to go the full length of each new street unless approved otherwise by the Engineer. For standard locations see Standard Details.

Where subdivisions are in steeply sloping country, approved cutoff ditches must be provided parallel and adjacent to, and within, the uphill boundaries of the high level sections. These ditches must be led away so as not to discharge onto cut or fill batter slopes.

Where there is a natural watercourse into which the street water could be directed or which naturally traverses the area being subdivided the engineer may require that it be piped.

All systems shall be designed to accept the flow from upstream of the subdivision or area under consideration and shall be of sufficient capacity to provide for maximum flow from possible future development above.

In all new subdivisions, subdividers are to provide a stormwater drain to the boundary of every section in the subdivision. In general these drains are to be connected to a piped drainage system but a limited number of kerb entries will be permitted in certain circumstances by the Engineer. P.V.C. kerb entry adaptors shall be used in these cases.

- 4.7.1 Each connection shall generally be capable of serving the entire building area of the section by gravity. However, some relaxation of this requirement will be allowed where topographic constraints are severe.
- 4.7.2 Where reticulation lines are sited in properties they shall be placed within the yard areas so as to be clear of the permissible building "envelope" and where possible shall be parallel and adjacent to the boundaries.

Consideration shall be given to the effects of stormwater overflows on the sanitary sewer system to minimise the possibility of sewer flooding.

- 4.7.3 Manholes are to conform to the Standard Details on Diagram 10, and are to be precast 1050 mm diameter for pipe sizes up to 450 mm diameter. For pipe diameters above 450 mm the manhole diameters shall be as scheduled on the standard drawing or cast-in-situ. Cast-in-situ designs shall be submitted for approval. The radius to the centre line of all bends and sweeps within the manhole should not be less than three times the pipe diameter.

Benching shall be carried out up to soffit level and sloped at 1:12 minimum 1:8 maximum.

- 4.7.4 Cleaning eyes are to conform to the Standard Details on Diagram C303, unless other detail drawings are approved by the Engineer.
- 4.7.5 Where site conditions require close spacings of manholes, consideration will be given to the use of some manholes of less than 1050 mm diameter.
- 4.7.6 In lieu of manholes on larger pipelines consideration will be given to the use of manhole risers of minimum 600 mm diameter which shall be epoxy mortared to the main pipe.

4.8 Other Design Considerations

4.8.1 Secondary Flow Paths

Provision shall be made for the conveyance of runoff in excess of design flows in a rational manner. In general secondary flow paths shall be located so that flows do not flood buildings or create other significant hazards and such paths are unlikely to be adversely affected by on-going private development.

4.8.2 Detention Areas

Areas proposed for short term detention of infrequent flood peaks shall remain in Council's ownership. Provision shall be made for overtopping of detention areas in a safe manner. Care shall be taken to ensure that maximum detention levels are below possible building levels on adjacent land.

4.8.3 Culverts

Culverts shall be a minimum of 300 mm diameter and shall have purpose designed inlet and outlet structures as per Standard Details on Diagram C211. Culverts shall be designed for flows assessed in accordance with Clause 4.3 and shall have similar provisions for secondary flow paths and detention storage. Culverts may be designed in accordance with the provisions of the MWD Culvert Manual for the calculated design flow.

4.8.4 Structural Design of Pipes

All pipe installation shall be designed in accordance with NZS/AS 3725 to resist imposed vertical loading.

4.9 Pipe Size not to be Reduced

In general pipes are not to be smaller than tributary pipes. However, in special circumstances where the downstream grade is much steeper a reduction in size may be acceptable provided the Engineer is satisfied and the pipeline is adequately protected from entry of debris.

4.10 Junctions not requiring Manholes

Where under Clause 4.5.1 a manhole is not required at the junction of a pipe with a larger diameter pipe, the connection shall be made in accordance with the Standard Details

4.11 Subsoil Drains

Subsoil drains are to terminate at a sump or manhole. They are not to be considered as part of the surface water drainage system. Subsoil drains shall not discharge to the kerb and channel if an alternative receiving drain exists.

4.12 Cover

All pipelines shall be designed to ensure the following minimum cover over the barrel of the pipe.

(a) Concrete

- (i) Areas subject to traffic loading - 600 mm.
- (ii) Berms or Rights of Way - 450 mm.
- (iii) Areas not subject to traffic - 300 mm.

(b) P.V.C. or Subsoil Drains

- (i) Roads ;and streets - 750 mm.
- (ii) Berms or Rights of Way - 600 mm.
- (iii) Areas not subject to traffic loading - 450 mm.

Where standard cover cannot be achieved full concrete encasement or other approved structurally designed protection is required.

4.13 Pipe Soffits to be Aligned

Unless special circumstances dictate, changes of pipe size along a line are to be detailed with the pipe soffits aligned.

SECTION 5.0
SANITARY SEWERAGE
INDEX

- 5.1 Introduction
- 5.2 General
- 5.3 Relevant Standards
- 5.4 Calculation of Flows
- 5.5 Sewer Policy
- 5.6 Hydraulic Design of Pipes
- 5.7 Pipes
- 5.8 Sewer Layout
- 5.9 Surface Openings
- 5.10 Cover
- 5.11 Structural Design
- 5.12 Connections
- 5.13 Pumping Stations
- 5.14 Independent Reticulation

5.0 SANITARY SEWERAGE

5.1 Introduction

This section sets out the requirements for the design and detailing of sanitary sewerage on engineering plans.

5.2 General

Sanitary sewage disposal shall be provided to every section in a subdivision by means of a connection to a reticulated sewerage system wherever possible. On-site sewage disposal may be permitted in rural-residential or rural situations subject to it being to the Engineer's approval and to the obtaining by the developer of the necessary Resource Consents from the West Coast Regional Council.

5.3 Relevant Standards

NZS 4404 Code of Practice for Urban Land Subdivision and related documents.

NZS 4610 Specification for Household Septic Tank Systems.

NZ Building Authority Approved Document G13 Foul Water.

5.4 Calculation of Flows

Flows shall be calculated in accordance with NZS 4404. In the majority of cases 150 mm reticulation sewers may be provided without calculation provided the Engineer can be satisfied that not more than 250 sections will be sewered by this reticulation. (Refer to section 402.4 of NZS 4404). Sewer connections shall extend to each new allotment using 100 mm pipe.

5.5 Sewer Policy

The Council reserves the right to specify trunk sewer sizes within a subdivision to suit overall reticulation requirements.

5.6 Hydraulic Design of Pipes

Hydraulic design of sewers shall be in accordance with NZS 4404:1981 and the following:

- Reticulation sewers shall be a minimum of 150 mm diameter but 100 mm diameter may be approved if special circumstances exist.
- The size of reticulation sewers shall not be less than that required by the NZBIA approved document G13 for the potential number of discharge units that could be connected.

5.7 Pipes

Sewer pipe and fittings shall generally be pvc pipe to NZS 7649.

5.8 Sewer Layout

5.8.1 Drains in Streets

Main drains shall be aligned within public areas such as roads wherever possible.

Drains in roads shall be aligned parallel to kerb lines within the carriageway to ensure that they do not clash with other services or occupy the full carriageway width. Adequate clearance from other services and kerb lines shall be maintained to allow for:

- (a) excavation of existing services
- (b) the future relaying of drains
- (c) the provision of additional future services.

In curved roads, drains shall generally follow the road alignment in straight lines between manholes on such alignment that they do not occupy the full carriageway width.

5.8.2 Drains through Private Property

The catchment area to be served by main drains aligned through private property shall be kept to a minimum.

In planning the layout of drains through private property consideration shall be given to preserving access to drains for:

- (a) Maintenance purposes.
- (b) Preserving the route for relaying the drains in the future.
- (c) Avoiding likely positions for buildings, garages, carports and retaining walls.

The preferred alignments of drains on private property shall be:

- (a) Within R.O.W.s or driveways.
- (b) Outside possible buildings envelopes.
- (c) Clear of fencelines and kerblines.
- (d) Adjacent to boundaries.
- (e) Parallel to boundaries.

Where main drains must be aligned through private property, easements in favour of the Council shall be required.

5.8.3 Crossing Other Services

Diagonal crossings of other services including kerb lines and boundaries or fencelines at acute angles less than 45 degrees shall be avoided wherever possible.

5.8.4 Services in Sewer Trenches

The laying of other services in the same trenches as sewer lines, public or private, will not generally be permitted. Permission to do this must be obtained from the Engineer.

5.8.5 Sewer Flooding

Sewers shall be laid out to ensure that the possibility of stormwater overflows entering the sanitary sewerage through surface openings is minimised.

5.8.6 Sewers under Buildings

Sewers will only be permitted under buildings in special circumstances. The Engineer's prior approval is required and construction shall be to details approved by him/her. Permission to do this must be obtained from the council.

5.8.7 Sewer Gradients

Notwithstanding the flatter gradient allowed by the Building Act for 100 mm dia private connections every endeavour is to be made to provide a 1 in 60 fall from likely building drain points to the public sewer.

5.9 Surface Openings

5.9.1 Manholes

Manholes shall be located as required by NZS 4404. That is manholes shall normally be provided at each change of direction or gradient, and at each branching sewer, and at a spacing of not more than 100m. Additionally at the ends of public sewer mains and as required to limit the angle of deviation to a maximum of 90 degrees.

The fall through manholes shall be as follows:

Angles (up to 90 degrees): gradient as for the downstream pipe gradient, plus an extra 12 mm per 30 degrees of change of direction.

Manholes are to conform to Standard Details (Mini manholes may be approved under some circumstances where the depth is less than 1.2 m). Factory precast manholes with integral bases are preferred.

5.9.2 Cleaning Eyes

Cleaning Eyes may be used in place of manholes only under the following circumstances:

- At the end of a 150 mm diameter public sewer drain on private property.
- On the ends of short drainage runs.
- Where the next downstream surface opening is no further than 50 m away.

N.B. Pipe gradient to the next downstream opening is to be no flatter than 1 in 50 for 100 mm diameter or 1 in 100 for 150 mm diameter.

- At the top of steep banks where a standard manhole would be impractical.

Cleaning eyes are to conform to Standard Detail.

5.9.3 Inspection Chambers

Inspection chambers are to conform to Standard Detail.

5.10 Cover

5.10.1 Pipe systems are to be designed to ensure the following minimum cover over the barrel of the pipe:

- Roads and Street - 750 mm
- Driveways and other areas subject to traffic loading - 600 mm
- Areas not subject to traffic loading - 450 mm.

Where standard cover cannot be achieved full concrete encasement or other approved structurally designed protection is required.

5.11 Structural Design

5.11.1 Trench conditions and maximum depth of cover will generally be in accordance with the manufacturers standard recommendations. If these conditions cannot be met, specific design and calculations based on NZS/AS 3725 must be supplied.

5.11.2 Where heavy machinery will be operating over new or existing drains and at possibly new or reduced depth of cover or there is increased depth of cover (e.g. roadworks mass earthworks, retaining walls), the drain design must be checked according to NZS/AS 3725 and calculations and design details supplied to the Engineer.

5.12 Connections

Where the reticulation main is outside the Lot to be served a 100 mm diameter connection shall be extended to 1 metre inside the boundary of the Lot.

Where connections will cross more than one Lot boundary the prior approval of the Engineer shall be obtained before the installation is made.

5.13 Pumping Stations

5.13.1 General

In the design of pumping stations early consultation with the Engineer is essential. Pumping stations shall generally be of the wet well type, fitted with approved types of submersible pumps.

5.13.2 Design Requirements

In all pumping stations the following requirements apply:

- Sufficient duty pumping capacity is installed to handle the design peak flow rate.
- A minimum of two pumps shall be installed, with one acting as duty pump and the other on automatic stand-by. The duty sequence is to be interchangeable. The stand-by pump shall be equal in capacity to the duty pump.
- The wet well shall be of sufficient minimum volume and shape so as to limit the frequency of pump starts and minimise potential odours. The capacity of the wet well shall be designed to such dimensions that under maximum flow conditions the number of starts for the pumps shall not exceed the pump manufacturers recommendations.
- Wet wells and, when approved, dry wells shall be provided with proper ventilation.
- Ground floor levels and slab levels of underground structures shall be at least 150 mm above finished ground levels in order to exclude surface water.
- A stainless steel cabinet built to specifications approved by the Engineer required to house electrical equipment.

- Overflow facilities are to be provided in case of mechanical or electrical failure, or blockage of pumps or rising mains. The overflow must be located to the satisfaction of the Engineer.
- A high pressure water supply must be provided to the immediate vicinity of the pump station. Supply shall be fitted with a backflow preventer and a water meter as approved.
- Pumping stations shall be sited on a separate Lot with all weather access to facilitate maintenance of the station equipment. The Lot is to be vested in Council.
- A means of lifting pumps and other heavy equipment, or alternatively access to enable mobile plant to perform this task to be provided.
- Stainless steel rungs or attached vertical ladders are to be provided to within 1 m of the bottom of the wet well.
- Any other facilities required as conditions of Resource Consents necessary for the construction or operation of the station (eg. Minimum storage for power outages, high liquid level alarm).

5.13.3 Electrical Equipment

All electrical switch gear is to be located above ground level to the satisfaction of the Engineer. The electrical control system of the pumping system must include hour meters and start counters for the pumps and all necessary instrumentation for the efficient operation of the station. All equipment must comply with the requirements of the Network utility Operator (power). Suitable alarm interrogation, and transmitting facilities shall be provided to enable the pumping stations to be connected to Council's remote warning system.

Single phase protection to all pump motors is to be provided.

Automatic control of pump operation, together with a manual override facility is to be provided.

5.13.4 Private Sewage Pumps

Private sewage pumping will only be permitted in special circumstances where the Engineer is satisfied that sewage is cleared to the public system prior to it becoming septic.

Private sewage pumping shall generally be limited to regularly maintained commercial and industrial sites or in residential or other situations where the main service is gravity (second toilet/bathroom in basement etc).

5.14 Independent Reticulation

Where sewerage is proposed that cannot readily be connected to existing systems it may discharge to a specifically approved treatment plant or disposal area. Early consultation with the Engineer is essential for any such proposals.

SECTION 6.0
WATER SUPPLY
INDEX

- 6.1 Introduction
- 6.2 General
- 6.3 Water Demand and Pressure
- 6.4 Pipe Working Pressures
- 6.5 Reticulation Layout
- 6.6 Watermain Materials
- 6.7 Rider Mains
- 6.8 Connection for Rider Main to Principal Main
- 6.9 Service Pipes
- 6.10 Hydrant Layout
- 6.11 Valve Layout
- 6.12 Anchor Blocks
- 6.13 Depths of Mains

6.0 WATER SUPPLY

6.1 Introduction

This section sets out the requirements for the design and detailing of water reticulation on engineering plans.

6.2 General

For new urban subdivisions and other urban developments, an urban water supply system shall be designed to ensure adequate water pressure for fire fighting purposes and estimated domestic, commercial, and industrial consumption.

For rural and rural-residential types of subdivision and for urban type subdivision remote from an urban water supply one of the following options shall be adopted.

- (a) A communal supply from an adequate confined aquifer to a storage tank at or above the highest point in the subdivision and reticulation as in (a).
- (b) Individual bores or rainwater collection systems on each Lot and possibly provision of approved firewells.

In all such non-urban cases early discussion with the Engineer is advisable.

6.3 Water Demand and Pressure

6.3.1 Domestic Supply

In normal urban residential subdivisions, the domestic demand is usually not the critical design criterion and the supply of water for fire-fighting purposes will generally determine the pipe sizes required.

6.3.2 Commercial and Industrial Supply

The water demand for commercial and industrial areas shall be analysed and specifically allowed for in the design.

6.3.3 Firefighting Supply

The water reticulation shall be designed to comply with the requirements of the New Zealand Fire Service Code of Practice for Firefighting Water Supplies 1992.

Fire risk classifications shall be as follows:

Business, industrial and commercial areas of Hokitika, High Schools and Hospitals	-	Class D Risk
All other areas with a reticulated water supply.	-	Class E Risk

6.3.4 Domestic Supply Standard

In addition to meeting Fire Fighting Supply requirements the reticulation shall be designed to ensure:

- (a) There is a water service pipe to each Lot such that:
- A minimum working pressure of 300 kPa is available at ground level at the normal house site on each Lot in other than fire fighting conditions.
 - A domestic peak flow of 3500 litres/day/dwelling unit can be delivered.

6.3.5 Design Basis

The Council will provide details of the working pressure(s) at the point(s) of connection to the existing reticulation, and these will be used for design purposes. However, the Council reserves the right to specify the diameters to be used for the principal watermains within the subdivision in order to fit overall network requirements.

6.4 Pipe Working Pressures

Working pressures for pipe classes shall be as follows:

Class of Pipe	m/head	Max Working Pres kPa
C	90	900
D	120	1200
E	150	1500

6.5 Reticulation Layout

Watermains of not less than 100 mm diameter fitted with fire hydrants (called the principal main) shall be laid on one side of all through streets and one side of every cul-de-sac.

Rider mains are to be laid to the road frontage or lots not fronted by principal mains.

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

In cul-de-sacs the rider mains will continue from the principal main around the cul-de-sac and continue to the next street intersection. If this should involve an unreasonable length of "dead" main it may be reconnected to the main with the approval of the Engineer.

Where streets are to be constructed in stages the principal main shall be laid to a point just beyond the end of each stage constructed.

The positioning of mains shall be in accordance with the Standard Details C400 and C500.

Maximum length of 100 mm diameter main shall be:

- (a) Supplied one end only - 200 m
- (b) Supplied both ends - 400 m.

6.6 Watermain Materials

Watermains of 50 mm dia and above shall be PVC pressure pipe to NZS 7648.

Rider mains and services pipes of less than 50 mm dia shall be high density polyethylene (HDPE) with R/X type fittings.

Special circumstances may require alternative materials.

6.7 Rider Mains

Rider mains and service pipes shall be sized in accordance with the following table:

Size of Rider Main	Max No of domestic Service Connections (Home Units NOT Lots)	
	Connected to larger main at one end	Connected to larger main at both ends
12mm	1	N.A.
20mm	2 - 4	3 - 7
25mm	5 - 9	8 - 16
40mm	10 - 19	17 - 31
50mm	20	32

6.8 Connection for Rider Main to Principal Main

Rider main connections to principal mains shall be in accordance with details on Standard Details.

6.9 Service Pipes

- 6.9.1 Every Lot in urban subdivisions shall be provided with one service pipe. The service pipe shall be laid to the Lot boundary and shall consist of a stop ferrule at the main and upper piping to the boundary terminating in a stop valve.
- 6.9.2 Service pipes shall not be located on land over which the Lot served has no right of access.
- 6.9.3 Where an existing supply pipe passes through a newly created Lot on a subdivision it may be used for that Lot, but a separate supply pipe must be provided to serve the original Lot. On application to the Council a new service will be provided from the main to the street boundary. The cost of this will be to the applicant.
- 6.9.4 Service pipe sizes shall be limited by the following table for screwed ferrules into mains:

Diameter of Main	Max Size of Ferrule
38 mm	12 mm
50 mm	19 mm
100 mm	25 mm
150 mm	32 mm
200 - 450 mm	to be determined

If the required service is larger than shown in the table the mains connection shall be a tee or a tapped elongated joint having a vertical connected ferrule.

6.10 Hydrant Layout

- 6.10.1 Hydrants shall be spaced in accordance with the NZ Fire Service Code of Practice for Fire Fighting Water Supplies : 1992.
- 6.10.2 Additional requirements for hydrant locations are:
- Where a street is to be extended a hydrant shall be provided at the end of the principal main such that it is clear of the future construction.
 - Hydrants may be placed at high and low level points. Refer to clause 6.11.1.

6.11 Valve Layout

6.11.1 Air Release Valves and Scour Valves

These shall be either a hydrant or a 20 mm diameter ferrule. A permanent cover is required for the latter. In locations where the scouring of mains will be needed as a 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 them at negative pressure.

6.11.2 Positioning of Valves

Valves shall be placed on all legs leading from each intersection. Refer to Diagram C400.

6.12 Anchor Blocks

All valves, bends, tees and crosses shall be provided with adequate concrete anchors or thrust blocks to prevent horizontal displacement, with clear access left to bolts and fittings. This shall apply to all points where it is likely that unbalanced thrust will occur on mains exceeding 50 mm in diameter.

Note that the sizing of anchor blocks may be controlled by test pressures or water hammer pressures, rather than normal working pressures.

The design of anchor and thrust blocks shall be based on the bearing value of site soil conditions, except that the maximum value used shall be 100 kPa. The inner face of the block shall not be of a lesser thickness than the diameter of the fittings.

6.13 Depths of Mains

Minimum cover to mains and rider mains shall be:

	All Mains
Under grass berms and footpaths	600 mm
Under carriageways	750 mm

SECTION 7.0

ELECTRICAL AND TELEPHONE RETICULATION AND STREET LIGHTING

INDEX

- 7.1 Introduction
- 7.2 Definition of Terms
- 7.3 Electrical Reticulation - Policy
- 7.4 Electrical Reticulation Design - General
- 7.5 Electrical Reticulation Design - Specific Installation Requirements
- 7.6 Electrical Reticulation - Physical Location
- 7.7 Rural Subdivisions
- 7.8 Street Lighting
- 7.9 Telephone Reticulation

7.0 ELECTRICAL AND TELEPHONE RETICULATION AND STREET LIGHTING

7.1 Introduction

This section sets out the requirements for the design and detailing of electrical and telephone reticulation and street lighting on engineering plans.

7.2 Definition of Terms

7.2.1 *Line Owner* means a person or company that owns electrical reticulation (works) that are used or intended to be used for the conveyance of electricity. Typically, but not exclusively, Westpower.

7.2.2 *Electrical Reticulation* means all 'Electric Lines' that are owned by the 'Line Owner' and form part of the Line Owner's Electrical Reticulation System or 'Network'.

7.2.3 *Service* or *Service Main* is the term for the cable (fitting), owned by the owner of a premises and connecting a premises to an agreed point of supply to the Electrical Reticulation.

7.3 Electrical Reticulation - Policy

7.3.1 All new electrical reticulation and service mains shall be by underground cabling in urban areas.

Reinforcement or replacement of existing overhead electrical reticulation shall be by underground cabling apart from specific exemption from Council.

Specific guidelines are given in clause 7.7.1 for overhead high voltage electrical reticulation in the rural sector.

7.3.2 New allotments are to be serviced with electricity to the boundary of each Lot as required in clause 7.5.1.

Exceptions are catered for where it is impractical to position a supply at a boundary.

7.3.3 Existing overhead 400/230v electrical reticulation or service mains on new subdivisions shall be placed underground.

7.3.4 High voltage power lines (6.6 kv and greater) on new subdivisions shall be relocated clear of the subdivision or placed underground with the agreement of the Line Owner. Dispensation may be granted by Council where it is demonstrated to be impractical to achieve this requirement.

7.3.5 In remote area rural subdivisions where it is demonstrated that subdivision is intended for uses that are not for habitable dwellings or buildings ancillary to the use of the land, Council may waive the requirement for the supply of electrical reticulation to the boundary and may further require this waiver to be endorsed on the new certificate of title.

7.4 **Electrical Reticulation Design - General**

7.4.1 The design of the electrical reticulation shall, as a minimum requirement, comply with the "Electricity Regulations 1993" (and subsequent amendments or superseding documents) and the requirements and standards of the "Line Owner" with whom the reticulation is to be vested upon livening.

7.4.2 The design of the electrical reticulation shall give consideration to the likely electrical demand requirements per lot and allow for this in the initial design. Refer to clause 7.5.2 a) and c).

7.4.3 The minimum electrical demand design criteria per lot and allowable "after diversity maximum demand factor" shall be to the requirements of the "Line Owner" with whom the reticulation is to be vested.

7.4.4 Provision shall be made by developers for the continuation of appropriate cabling along road frontages to facilitate the electrical reticulation of adjoining future development. This may be achieved by the installation of cable ducting systems.

Council may waive this requirement where it is demonstrated that adjacent subdivisible land may be reticulated from another suitable route.

7.4.5 Consideration shall be given to the future extension or reinforcement of the electrical reticulation system without necessitating major road reserve disturbance to achieve such expansion or reinforcement.

7.4.6 An electrical supply shall be provided to the boundary of each lot within the criteria set out in Clause 7.5.

7.4.7 Road crossings for power cables shall be kept to a minimum and where necessary, shall be at right angles to the carriageway.

7.5 **Electrical Reticulation Design - Specific Installation Requirements**

7.5.1 **Service Boxes and Service Cable Ducting**

(a) Access to a 3 phase power supply shall be provided at each lot of an industrial, commercial or residential subdivision.

In the rural sector, a single or two phase supply will be accepted for residential and general farming purposes where it is demonstrated that three phase power is not likely to be required for the management of the land (eg irrigation).

- (b) Subdivisions containing single rear lots shall have individual service duct systems (50 mm minimum diameter PVC) installed to a service box on the road frontage.
- (c) Subdivisions containing rights of way to 2 or more rear lots shall be supplied from a service box within the "main body" of the rear allotments. Individual service ducts (50 mm diameter PVC) shall be installed to the service box.

An easement shall be provided by the developer for all Electrical Reticulation cables through private property including rights of way.

- (d) Where multiple driveways on lot boundaries make it impractical to position a service box at a common boundary between lots or, where a narrow road frontage width of a lot makes the location of a service box vulnerable to damage, it is permissible to install a 50 mm minimum diameter service main duct in the road reserve from a service box offset no more than 10 m from the affected lot and ending at the frontage of the affected lot.

Where such service mains ducts extend to rear allotment frontages, the ducts shall be extended to the main body of the lot(s) in accordance with clause (b) and (c) above.

- (e) For the purpose of "infilling" development, the 10 m maximum referred to in d) above may be extended to the point of connection to the electrical reticulation from which the existing building is supplied. Refer to clause (f) below for recording requirements.
- (f) Any ducting systems installed in the road reserve area shall be considered as part of the electrical reticulation system for the purpose of "As Built" records.
- (g) All ducting used for electrical reticulation or service mains shall be orange in colour.
- (h) For infill subdivisions in a urban area with existing overhead reticulation. Services across a road may remain overhead but both created and residual Lots shall be provided with underground service from the nearest pole on the same side of the street.

7.5.2 Electrical Reticulation Cabling

- (a) Voltage drop shall be no greater than permitted under clause 7.4.1.
- (b) Current rating shall be in accordance with current NZ Electrical Codes of Practice NZECP 28 and manufacturers design parameters.
- (c) The design shall take into account the requirements of Section 7.4.2 and 7.4.3 with specific attention given to the following details relating to likely electrical loads:
 - Lot size in relation to permissible coverage.

- Anticipated usage of the lot (eg multiple dwellings, cross lease and potential subdivision permitted within the zoning).
 - An appropriate "After Diversity Maximum Demand Factor".
 - A minimum electrical demand capacity of 15 kVA to each lot (before diversity considerations for the electrical reticulation cable design).
 - Future load growth and electrical reticulation expansion or reinforcement.
- (d) Existing overhead electrical cabling shall be dealt with in accordance with clause 7.3.3 and 7.3.4.

7.5.3 Substations

- (a) Substations shall be of adequate design capability to supply the anticipated "After Diversity Maximum Demand" with due consideration to clause 7.4.2 and 7.4.3 and 7.5.2c.

- (b) "Ground mounted" substations will be permitted within new residential, commercial and industrial subdivisions.

Substations will also be permitted within purpose built buildings within commercial and industrial subdivisions.

- (c) Pole mounted substations may be permitted in rural subdivisions refer to clause 7.7.

- (d) Pole mounted substations will be allowed in existing overhead electrical reticulation.

Attention should be paid to seismic design of equipment supports including the securing of equipment to its supports.

7.6 Electrical Reticulation - Physical Location

7.6.1 Service Boxes

- (a) Service boxes shall be set back as close as possible (refer to (b)) to section boundaries and are to be clear of designated vehicular access and pedestrian ways.
- (b) The minimum spacing of any service box from any boundary line or survey peg shall be 150 mm so as to enable future fencing construction.

7.6.2 Cables

- (a) Cable and duct locations in the road reserve area shall be in general accordance with Standard Details being 600 mm from section boundaries at a nominal laying depth of 750 mm with provision for shared trenching with communication services.

- (b) Cable and duct locations down rights of way shall, where possible be located 600 mm from a boundary in a berm area where provided. Otherwise, the centre of the right of way is the preferred location. The standard cable depth shall be 600 mm and may be in a common trench with water and communication services as shown in the Standard Details.
- (c) Any underground or overhead electrical reticulation cable installed on private property including right of way, shall be secured by way of an easement or other appropriate legal means in favour of the "Line Owner".
- (d) Appropriate mechanical protection shall be provided for any underground electrical reticulation in accordance with NZECP 28 (1993).

In addition, where electrical distribution cables are on private property (excluding rights of way), cable marker signal strip shall be installed above the cables at half the cable setting depth and visible "above ground" warning markers shall be placed along the cable route at not less than 10 m spacing in all but rural areas where the minimum spacing shall not be less than 25 m.

- (e) Road crossings for electrical reticulation cables shall be orange ducts of soil pipe strength PVC pipes of 80 mm minimum diameter with a minimum cover of 900 mm.

7.6.3 Substations

- (a) Substations shall be located in the berm, clear of designated vehicular access ways and as close as possible to a section frontage or, in a recess into a lot or a public reserve, secured either by easement or designated as "Road Reserve".
- (b) Adequate public protection shall be provided at all substation sites, giving consideration to:
 - Earthing (NZECP 35).
 - Physical location to minimise the risk of damage by vehicles.
 - Security to protect against public access to electrical contents.

7.7 Rural Subdivisions

- 7.7.1 (a) Recognising the extent of 11,000 volt reticulation in the rural sector together with the difficulty and high cost of providing underground 11,000 volt cabling, Council may, at its discretion and in agreement with the Line Owner, allow overhead 11,000 volt reticulation and associated substations in the rural sector.
- (b) Easements are to be provided by the developer, in favour of the Line Owner, for all electrical reticulation over private property.

- (c) Substations may be located on lot boundaries or within the lots subdivided to enable an adequate electrical supply to specified or potential building sites on the allotments.
- (d) 400/230v electrical reticulation and "service mains" to individual premises shall be by underground cable unless precluded by ground profiles or other impediments in which case, Council may grant dispensation for an overhead cable to traverse the area concerned.
- (e) Where specified or potential building sites are more than 200 m from electrical reticulation to the boundary of an allotment, it is recognised that an 11Kv extension may be necessary in which case, a means of providing the necessary reticulation to the boundary together with the transformer (installed or otherwise) shall be negotiated between the future Line Owner and the subdivider to the satisfaction of Council.
- (f) Where for expediency it is not practical to install a transformer prior to a building site being confirmed by a future property owner, the developer shall make arrangements with the future line owner for the provision of the transformer (15Kva capacity) at no cost to the future property owner at the time of installation. The future property owner should only have to pay for the future 11Kv lines and service mains on the property.

7.8 Street Lighting

- 7.8.1 Street lighting shall be installed in public roadways and access ways in all residential, commercial and industrial subdivisions to the satisfaction of Council. Street lighting (poles and lanterns) on public land shall vest in Council.
- 7.8.2 The lighting of private rights of way is not a requirement. Should a developer wish to include private right of way lighting, the future operating and maintenance costs of such lighting shall be charged by the Line Owner to the property owners benefiting from the lighting.
- 7.8.3 Street lighting in rural subdivisions shall only be required as a specified condition by Council.
- 7.8.4 Street lighting shall be provided in pedestrian ways greater than 50 m in length.
- 7.8.5 The minimum design shall be to NZS 6701.
- 7.8.6 The design shall give consideration to minimising future operating and maintenance costs.
- 7.8.7 The preferred location of street light columns shall be on lot boundaries or, where abnormally wide berms or side slopes are encountered, the street light columns should be set back as far as practicable from the kerb edge.
- 7.8.8 Street light columns shall be kept clear of any designated vehicular access or pedestrian way.

7.8.9 Street light cabling shall comply in all respects to the relevant requirements set down for electrical reticulation design and cabling.

7.8.10 Road crossing ducts shall be not less than 30 mm diameter PVC soil pipe strength pipe (orange).

7.8.11 The on/off control of street lights may be by photo electric cell or pilot cable.

7.8.12 General Standards

For subdivisions 8.6 m Oclyte poles with 70 watt high pressure sodium vapour lanterns are the preferred option for street lighting.

Outreach arm lengths specified are preferred and intended for standard subdivision design. Variation may be necessary to accommodate columns located either close to the edge of roads or pedestrian ways or for columns set back on wide berms.

Alternative lanterns and columns may be approved by Council subject to submitted evidence concerning standards, location and nature of lighting.

7.8.13 Specific Standards

APPROVED STREET LIGHTING LANTERNS AND COLUMNS			
Lanterns			
70 watt high pressure sodium	Gough GL500	Sylvania B2222	GEC OPA70
110 watt high pressure sodium	Gough GL500	Sylvania B2222	GEC OPA100
150 watt high pressure sodium	Gough GL5/6/700	Sylvania B3000	GEC OPN150
250 watt high pressure sodium	Gough GL6/700	Sylvania B3000	GEC OPN1250
400 watt high pressure sodium	Gough GL700		
70 watt high pressure sodium POST TOP LANTERN Gough PT1000			

COLUMN TYPES			
State Highway & Arterials	Spunlite Highway Poles	S434 outreach arm	1.5 outreach 11.0 m mounting height
Collectors & Other Street	Spunlite Promenade Poles	S79 outreach arm	800 mm outreach 5.5 m mounting height
Private R.O.W. Walkways	Spunlite Promenade Poles	S79 outreach arm	800 mm outreach 5.5 m mounting height
Industrial	As for State Highway and Arterials		

All Steel ground planted columns listed are to be painted to 100 mm above ground and 300 mm below ground level to the following specification.

Etch primer	-	Carboline 1037WP (or similar)	13 micron
Epoxy top coat	-	Carboline 890/24 (or similar)	100 micron

Modular galvanised steel columns are to be of not less than 2 mm wall thickness.

NZS 3404 shall apply to column design and NZS/AS 1650 to hotdip galvanising.

In general street lighting shall be provided by means of 70 watt SON GL500 luminaries by Gough Manufacturing or approved equivalent at 8.5 m mounting height on Oclyte poles with integral outreach arms. The Engineer may reduce the standard mounting height to 6 m in special circumstances where a reduced illuminated area is desirable (walkways). In access places or other special situations the Engineer may approve the use of other pole types and luminaries provided he considers there to be special circumstances which warrant a change from the standard and can be satisfied as to the ongoing availability of spares for the particular installation.

7.9 Telephone Reticulation

7.9.1 All new urban residential sections are to be reticulated underground for telephone by Telecom (or other approved network utility operator). Telecom will provide a reticulation design upon payment of a design fee. It is suggested that Consultants detail water and electrical utilities and provide prints for Telecom to mark their design on so the consultant's tracing can show all three utilities in relation to each other. The Telecom design is to be shown on the water and utility plan in sufficient detail to ensure that:

- (a) There is adequate cover to cables.
- (b) Cables are in standard positions wherever possible.
- (c) Adequate separation from other utilities is provided for - refer to Standard Details.
- (d) Space is provided as necessary for special equipment within road reserves.

7.9.2 Telecom ducting (green) is to be provided for all road crossings and for any likely future upgrades of the reticulation.

SECTION 8.0
STREET WORKS AND ROADING
INDEX

- 8.1 Introduction
- 8.2 References and Standards
- 8.3 Street Planning Policy Matters
- 8.4 Street Classification
- 8.5 Street Planning
- 8.6 Geometric Design
- 8.7 Pavement Design
- 8.8 Kerb and Channel
- 8.9 Alternative Road Surfaces
- 8.10 Footpaths
- 8.11 Crossings
- 8.12 Right of Ways
- 8.13 Street Name Signs
- 8.14 Rural Residential
- 8.15 Rural

8.0 STREET WORKS AND ROADING

8.1 Introduction

This section sets out the requirements for the design and detailing of streetworks and roading on engineering plans.

8.2 References and Standards

Streets and roading shall be designed, wherever practicable, in accordance with the philosophy expressed in Section 301 of NZS 4404:1981 except as modified by the requirements of this section.

Users of this Code are expected to familiarise themselves with NZS 4404:1981.

8.3 Street Planning Policy Matters

8.3.1 Provision for Future Extensions

The provision of streets in each subdivision shall be considered in relation to eventual subdivision of adjacent land and streets and shall extended to the boundaries of adjacent land as judged to be necessary by Council with any such extensions being at the subdividers expense. The subdivider shall also provide roads of sufficient width within his subdivision as is appropriate for each road when it is eventually linked to future development.

8.3.2 Provision for Batters

Road reserve widths shall be such as to accommodate all cut and fill batters associated with earthworks necessary to form the streetworks. However in cases where the road and section earthworks can provide "rolled" batters no steeper than 1 in 3, no provision for batters need be made within the road reserve.

8.3.3 Frontage to Existing Formed Streets

Where a new subdivision has sections fronting on to existing formed roads the subdivider shall be responsible for developing the frontage to the same standard of kerb and channelling, berm, footpath, crossings and street lighting as is applicable to internal streets in that or similar subdivisions. Any such frontage development shall be to road widths advised by Council.

8.3.4 Frontage onto Paper Roads

Subdivision in rural areas shall not as of right be permitted to consider unformed paper roads as constituting legal access. Council will assess physical requirements, cost sharing and maintenance responsibility on a case by case basis.

8.3.5 Comprehensive Developments

Where there is some continuity of control through the subdivisional process and the development of housing, council will consider developments that while not in general compliance with the requirements of this section, do reflect the thinking expressed in “New Zealand Housing Initiative” or similar publications. This provision is intended as a guide to mews court types of housing development which are otherwise not dealt with herein. To gain approval Council must be satisfied that there is an integrated streetworks and housing development concept that will be followed through.

8.4 Street Classification

Streets vary in function from wholly traffic carriers to wholly access providers to private property. In recognition of this a roading or street hierarchy is defined as follows:

- **State Highways** - these are roads and streets which form part of the State Highway network
- **Arterial Roads or Streets** - these are roads and streets which form main traffic routes other than State Highways.
- **Collectors** - these are the secondary framework of roads and streets which carry traffic to and from the State Highways and Arterials.
- **Other Streets** - these are generally street with connections at each end but mostly used for access to properties along the street.

These also include streets used wholly for access, serving a limited number of dwellings and offering no through traffic function.

Table 1 shows the width requirement for each street type in urban areas.

Table 2 shows the width requirement for each road type in rural areas.

The widths shown in Tables 1 & 2 are minimums which may be increased as necessary to provide widening on curves, passing/parking bays on access collectors and access streets as required and space for cut and fill batters where these cannot reasonably be incorporated into abutting lots.

Table 1

Urban Street	Design Speed KPH	Legal Width Minimum ¹	Carriageway Kerb to Kerb ^{2,3}	Footpath
State Highway & Arterial	60	20 m	11 m	2 @ 1.4 m
Collector 500-2000 vpd	60	20 m	8.5 m	2 @ 1.4 m
Other < 500 vpd	30	20 m	8.0 m	1 @ 1.4 m
Private R.O.W.	10	5	4.5 m ⁴	-
Industrial	60	20	11	2 @ 1.4 m

1. Additional reserve may be required for earthworks.
2. Carriageway widening may be required on bends.
3. Kerb to kerb means inside face of kerb to inside face of kerb.
4. Kerb and channel on one side only, concrete edge on other side.

Table 2

Rural Road Classification	Design Speed KPH	Legal Width Minimum ¹	Seal Width ²
State Highway	100	20	7.3 m
Arterial	100	20	7.0 m
Collector	100	20	6.0 m
Other	80	15	5.0 m

1. Additional reserve may be required for earthworks.
2. Seal widening will be needed on bends.

8.5 Street Planning

Streets may incorporate features which control vehicle speeds to the appropriate design speed. Speed control measures may include:

- (i) Limitation of street length or distance between junctions.
- (ii) Introduction of bends

- (iii) Introduction of slow points or "chokes", adjacent to intersections and/or at other positions.

8.6 Geometric Design

8.6.1 Reference

Street geometrics shall generally be in accordance with cl 302.1 of NZS 4404 which refers as necessary to the NRB Code of Practice - Design of Urban Streets. Alternatively current TNZ approved documents may be used.

8.6.2 Safe Stopping Distance

All street designs (vertical and horizontal alignment, intersection view lines, parking bays, speed control points and landscaping) shall be checked to see that sufficient sight distance is provided to allow safe stopping of vehicles travelling at the design speed of the street. The following stopping distances shall be used:

20 km/hr - 20 m
30 km/hr - 30 m
40 km/hr - 45 m
50 km/hr - 60 m
60 km/hr - 80 m

8.6.3 Kerb Radii at Junctions

The use of 4 m kerb radii shall be restricted to entry to access streets/places. Elsewhere a minimum radius of 6 m shall be used and this shall be increased to 10 m at junctions with distributor and arterial streets.

8.6.4 Cul-De-Sac Heads

The provisions of NZS4404:1981 are applicable except that kerbside parking in turning circles shall be prohibited and the turning circle radius shall be a minimum of 7m in accordance with Approved Document D1: Access Routes, of the NZ Building Authority approved documents. Refer to Diagram C501.

8.7 Pavement Design

Streets shall generally have pavement designed as flexible pavements with thin surfacings. Earthworks for streets is covered in more detail in Section 3 and all street subgrades are required to be compacted, shaped and drained as necessary to ensure the long term performance of the pavements.

Pavement design shall be in accordance with the procedures set out in the Transit New Zealand State Highway Pavement Design and Rehabilitation Manual and more particularly as follows:

- (a) Arterial and distributor street shall have premium flexible pavements with a 20 year design life. Traffic loading (E.D.A.) shall be estimated from a specific assessment of heavy vehicle use and any likely growth.
- (b) The lower street classifications shall have lower grade flexible pavements with a 20 year design life. Traffic loading shall be taken as an EDA of 10,000 80kN axles unless there are unusual circumstances where the Engineer may require a more rigorous estimate as the basis for the design.
- (c) Subgrade strength is to be the lesser of soaked CBR values for samples obtained from the subgrade material compacted to 95% of Standard Density and half the representative in-situ value obtained by tests (In-situ testing may be by Scala Penetrometer and a recognised correlation curve).
- (d) The minimum acceptable subgrade CBR shall be 10 and it may be necessary to undercut and recompact, stabilise or construct a sub-base layer to achieve this.
- (e) The primary basecourse layer is to be a minimum thickness of 150 mm.

8.8 Kerb and Channel

Kerbing of some type is required on both sides of every urban street. The approved range of kerb and channel profiles are shown in the details on Diagram C504. Standard profile (300 mm channel - 150 mm high kerb) shall be used in most cases to assist in traffic and drainage control. Alternative treatments will be considered in access streets/places and these may include layback or mountable kerbs to avoid crossing provision. In general, all streets shall be crowned to shed stormwater to both sides.

8.9 Alternative Road Surfaces

The preferred surface is two coat chip seal or thin asphaltic concrete. However contrasting surfacings will be accepted for purposes such as delineating slow points, entries to residential precincts, pedestrian crossings, on-street parking bays etc. In access streets/places the general use of inter-locking concrete or brick pavers can be considered. In-situ concrete pavements are considered inappropriate for reasons relating to subsequent access to services and general repair.

8.10 Footpaths

Footpaths shall be 1.4 m wide and shall be provided on both sides of an urban street except as follows:

- (a) On steeper hillsides the topside footpath may be omitted.

- (b) In commercial areas wider footpaths may be required.

Footpaths may be either concrete or asphalt.

Footpath crossfall shall be 3%.

Footpaths adjacent to mountable kerbs shall be designed to be of similar strength to the road pavement.

8.11 Vehicle Crossings (to properties)

No part of a crossing shall be closer than 6m to a street corner.

Where the footpath is adjacent to the kerb and crossings are within 4 m, the vehicle crossings shall be continuous to avoid "hump" effects in the footpath.

(a) Residential Areas

For standard kerb and channel, one vehicle crossing in accordance with Diagram C506, Part C shall be provided to all Lots in residential areas. Where approved by the Council wider crossings of up to a maximum of 6 metres may be provided. Continuous crossings may be used round the ends of cul-de-sacs provided the footpath for the corresponding length is constructed to take the same traffic loadings as the carriageway and provision is made for the disposal of stormwater.

(b) Commercial Areas/Industrial Areas

Excluding service stations and where verandas are required, the following general requirements shall apply.

- (i) One crossing with a maximum length of 5.0 metres on any one frontage.
- (ii) Two 5.0 metre crossings may be permitted provided the following points are complied with:

They are separated by at least 7.5 metres.

They are marked "in and out" and result in a continuous undisturbed one way route through the area.

- (iii) In the case of adjacent property owners wishing to have a mutual crossing at their shared boundary, the maximum permitted total length is 8.0 metres.

A wider crossing may be permitted at the discretion of the Council.

Industrial crossings shall be designed to carry the same vehicle loading as the carriageway having regard to the foundation conditions of the site. The footpath crossings associated with them shall also be designed to carry the same loading as the carriageway.

- (iv) Where "B trains" will be using a vehicle entrance on a regular basis a crossing width of 9.0 m may be permitted on specific application to the Council

Some commercial/industrial areas and uses may require prior discussion with and approval from the Engineer as to the appropriate provisions.

(c) Rural Areas

One vehicle crossing shall be provided for each allotment. Construction shall be as for roading and formation shall be in accordance with Diagram C522 with the width at the narrowest point being a minimum of 3.5 m and a maximum 6.0 m. The final formation shall be in conformity with the road surface that the access serves.

8.12 Rights of Way and Access Lots

Front and rear sections may be accessed off common Rights of Way or access lots which shall be constructed to the width standards shown on Table 1.

Rights of Way shall be shaped to fall to the kerb on the low side and all drainage shall be captured within the right of way formation. High sides of rights of way shall have a concrete edge restraint. In this clause "rights of way" shall also mean "access lots".

8.13 Street Name Signs

The subdividing owner shall submit to Council prior to submission of Title Plans a list of 3 proposed street names in order of preference. When approved, the subdividing owner shall erect nameplates as approved by the Engineer or meet the costs thereof at all street intersections, visible from all approaches.

Posts shall be 100 mm x 75 mm H5 treated timber or galvanised 50 mm diameter posts painted white. Nameplates shall be mounted 2.5 m above ground.

The owner will also be responsible for the provision of signs to walkways and private ways if named to a similar standard subject to Council approval.

8.14 Rural/Residential

Roading standards will be relaxed to some extent for rural/residential development - defined as subdivision with 5000 m² minimum lot size. However, road reserve widths must be provided to the same standard as if the area was fully subdivided.

Full subdivision for traffic assessment purposes shall be taken as being 12 household units per hectare.

Road and right of way widths may be as per Table 1 for the traffic implicit in the rural residential development and kerb and channel may be replaced by an appropriately designed stormwater control system provided the sealed road formation has a flush permanent edge restraint.

8.15 Rural

Minor rural road cross-sections shall be to the details shown on Diagram C520, Unsealed, and Diagram C521 Sealed roads. For other than minor roads, the requirements shall be discussed and agreed with the Engineer. The TNZ/NZ Counties Association document Guide to Design of Rural roads will be used as a basis for design.