WHAKATANE DISTRICT COUNCIL

ENGINEERING CODE OF PRACTICE

ISSUE 8 - APRIL 2008

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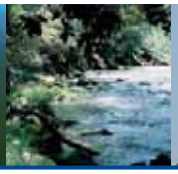


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CHAPTER 1 SUBDIVISION PROCESSES

PART 1 GENERAL REQUIREMENTS

1.1.1. INTRODUCTION

This Manual forms the Whakatane District Council Engineering Code of Practice.

In order to encourage a range of, and flexibility in, subdivision and development design while achieving adequate levels of environmental protection, amenity, safety and infrastructure provision, the Whakatane District Plan adopts a range of subdivision and development standards as performance levels. Various methods may be employed to satisfy these levels. However, compliance with the Council's Engineering Code of Practice on a defined matter is deemed to satisfy the particular performance level applying to that matter.

1.1.2 COMPLIANCE

This Engineering Code of Practice has been developed as a means of compliance with the Performance Standards contained in the Whakatane District Plan.

It is essential that compatibility of design, construction and materials is achieved in order to minimise long term costs and disruption.

While allowing for the implementation or thoroughly researched and investigated innovative ideas, the aim is to ensure that the alteration or extension of infrastructure within the Whakatane District is carried out with minimum long term costs to the community.

1.1.3 DEVELOPERS REPRESENTATIVE

Information for all works and services to which this Code of Practice applies shall be supplied in accordance with the Whakatane District Plan.

The developer or subdivider shall nominate a suitably qualified and experienced representative, (hereinafter referred to in this part as the "Developer's Representative") as defined in Clause 1.1.4.2, and the subdivider or developer shall notify Council of the name of the person so employed before any work commences.

The Developer's Representative shall be responsible for:

- The preparation and submission for approval of engineering plans and specifications in accordance with Council's standards
- Supervision of the works as detailed in the approved plans and specifications
- Certifying to Council upon completion of the works, that the works have been carried out in accordance with the approved documents.

Certification of Compliance is to be in the format as shown in Appendices 1.1, 1.2, 1.3 and 1.4 in Section 1.

The Developer's Representative shall be available for a meeting on the site of the works within eight ordinary working hours of being so requested by the appropriate Council officer.

While each stage of the works must be approved by officers of the Council, they will not undertake day to day supervision and the subdivider's or developer's representative shall be responsible for ensuring that the work complies with all aspects of this standard.

1.1.4 STANDARDS AND DEFINITIONS

1.1.4.1 CODES AND STANDARDS

All Codes and Standards referred to herein are deemed to include any subsequent amendments as well.

1.1.4.2 DEFINITIONS

In this Code, unless inconsistent with the context, the following definitions shall apply:

'Annual Exceedence Probability (AEP) means the chance of a natural hazard event of a given size or larger occurring in any one year. (Usually expressed as a percentage).

'Carriageway' means any portion of a road used by motor vehicles.

'Clean fill' means material consisting of natural components, such as clay, soil and rock and such other materials such as concrete, brick or demolition produces (excluding asphalt), which are free of combustible and organic materials, free of voids and which are not subject to biological or chemical breakdown, and shall not be capable of leaching chemicals or toxins into the environment.

'Cohesionless Soil' means a non-plastic soil (sand, gravel) where the strength is derived primarily from load transfer between the soil particles.

'Council' means the Whakatane District Council.

'Developer's Representative' shall be a Chartered Professional Engineer, or Registered Surveyor, with suitable qualifications and experience, appointed by the applicant to represent him in all technical matters connected with the development or subdivision.

'Drainage' means sanitary drainage and/or stormwater drainage and includes pipes, open drains and sewerage treatment plants, and "drain" has a corresponding meaning.

'Earthworks' means any modification to the shape of the land surface, including removal of soil, excavation, drilling, tunnelling or other disturbance of the land, infilling, recontouring and construction of any road, track, landing or drainage channel, but excludes the disturbance and/or compaction of land caused by stock grazing.

'Engineer' means the Director - Works and Services of the Whakatane District Council or any other officer or person appointed by the Council to control engineering work for the Council.

'Footpath' means so much of any road as is laid out or constructed by authority of the Council primarily for pedestrians; and may include the edging, kerbing and channelling thereof.

'*Freeboard" means the amount to be allowed above the design water level to allow for flood surface undulation, tolerance for flow estimation methods and for possible failure of the primary disposal system. Freeboard for habitable buildings shall be 500mm and for non-habitable buildings shall be 200mm.*

'Ground' means the material in the vicinity of the surface of the earth whether soil or rock.
'Land Drainage System' refers to the flow of surface and ground water but concentrates mainly on peak surface discharges and their regulation under urban conditions.

'Loose Soil' means soil having a Standard Penetration Resistance of less than 10 blows per 300mm. Also refers to uncompacted or poorly compacted fill.

'Owner' in relation to any land or interest therein, is the same as the *'Owner'* as defined by Section 2(1) of the Resource Management Act 1991.

'Post Construction Settlement' means the settlement of the ground surface which takes place after completion of the construction of the earthworks.

'Primary Design Flow' is the estimated stormwater runoff selected to provide a predetermined degree of protection to the surrounding land. In most cases, this flow will be piped or contained within relatively narrow confines under public control and be protected by a reserve or easement.

'Principal Provider' is the party paying for the installation of underground utilities as set out in SNZ HB 2002:2003 – Code of Practice for Working in the Road.

'Private Road' means any roadway, place, or arcade laid out within the district on private land by the owner thereof but intended for the use of the public generally.

'Private Way' means any way or passage whatsoever over private land within the district, the right to use which is confined or intended to be confined to certain persons or classes of persons, and which is not open or intended to be open to the use of the public generally.

'RMA 1991' means Resource Management Act 1991.

'Road' means the whole of any land which is defined as 'Road' by Section 315 of the Local Government Act 1974. It includes carriageways, berms and other grassed areas, footpaths and pedestrian accessways, and is the total area from boundary to boundary, customarily referred to as 'road reserve'.

'Sanitary Drainage' means drainage primarily for the reception and discharge of effluent and wastewater.

'Scheme Plan' means a scheme plan of a proposed subdivision in terms of Section 218 of the Resource Management Act 1991.

'Secondary Flow Path' refers to the path taken by stormwater runoff in excess of the primary design flow and should be capable of producing a reasonable degree of protection to the surrounding buildings.

'Service Lane' means the whole of any land which is defined as 'Service Lane' by Section 315 of the Local Government Act 1974.

'Shall' indicates a requirement that is to be adopted in order to comply with the Standard, while the words *'should'* or *'may'* indicate a recommended practice.

'Soft Soil' means cohesive soil having a low shear strength (less than 25 KPa).

'Soil' means the heterogeneous aggregation of particles comprising either peat, clays, silts, sands, gravels, crushed and re-oriented rock fragments, or a mixture of any of the above. The term excludes rock that is intact and rock masses whether highly jointed or not.

'Soils Engineer' means a person who is currently entitled to practice as a Chartered Professional Engineer and who has pre-qualified with IPENZ with geotechnical accreditation and has experience in the field of soils engineering which is acceptable to Council; or such other person as the Council may specifically approve as being competent.

'Stable Ground' means ground existing in a state which can be shown by a Soils Engineer is unlikely to settle, slip, erode or otherwise move to the detriment of superimposed buildings, services, roads or property generally.

'Stormwater' means water or other runoff resulting from precipitation (rain, hail, snow) and does not include Trade Waste or Domestic Sewage.

'Stormwater Drainage' means a drain primarily for the reception and discharge of stormwater.

'Street' has the same meaning as *'Road'*.

'Street Classifications'

Secondary/District Arterials

Roads which are:

- Of strategic importance
- Links between residential, commercial, industrial, or recreation land use activities
- A significant element in the local economy

Note: *Generally such roads would be within urban areas but in some localities, such roads would provide alternative links between centres of population or be significant for the movement about a district, of goods or produce*

Collector Routes

Routes which are:

- Primarily suited to urban situations, between or within areas of population yet have a place in rural areas. In rural areas, where land use activity is relatively intensive, it is necessary to provide links between local roads and arterials
- Locally preferred between or within areas of population or activities
- Complimentary arterials
- Usually paved and are of road geometry aligned with operational safety standards

Local Roads

- Roads whose primary function is property access
- All other roads servicing land use activity

'Road Opening Notice' means a notice in the form of Appendix 3.1.

'Subdividing Owner' means the owner or owners of the land to be subdivided, until allotments are sold.

'Survey Plan' has the same meaning as in the Resource Management Act 1991.

'Trade Waste Discharge' is any liquid with or without matter in suspension or solution, that is or may be discharged from a trade premises in the course of any trade or industrial process or operation, or in the course of any activity or operation of a like nature, but does not include stormwater or domestic sewage.

'Trench' means any excavation within a road for the purpose of maintaining, locating or installing services, and excavations on grassed berms for the purpose of providing or maintaining services to residential sections except shallow excavations for the purpose of constructing vehicle crossings.

'Trencher' means any person or persons responsible for actually carrying out the trenching or reticulation installation for or on behalf of any Principal Provider

'Wastewater' means water containing waste matter, in solution or suspension, discharged from any premises

PART 2 PLANNING

1.2.1 SUBDIVISION PROCESS

1.2.1.1 GENERAL

All subdivision developments require a Resource Consent as provided for in the Resource Management Act 1991. The consent application will generally be approved provided all requirements set out in the District Plan are met.

Some development works may also require consents from Environment Bay of Plenty.

1.2.2 RESOURCE CONSENT APPLICATION

The following information is required for a subdivision consent application:

- Scheme Plan showing all existing site information and services, the subdivision layout, and identifying roads reserves and lots
- Legal description of land being developed and identification of notes on titles, easements etc.
- Geotechnical report from a geotechnical engineer (where applicable)
- Assessment of environmental effects
- Assessment of serviceability of each lot with all required infrastructure and services
- Assessment of overland flows from upstream catchment [where required]
- Secondary flow paths for 1% AEP storm events
- Previous relevant consents
- Records of discussions with other affected parties
- Completed application form
- Application fee

1.2.3 CONSENT COMMENCMENT

Provided the Consent is granted and the conditions therein are not subject to objection, then the date is recognised as the commencement of the five year time period.

1.2.4 OBJECTIONS

The Consent holder may object to any or all of the conditions set out in the Consent, provided that notification of such action is given within 15 working days from the date of receipt of the Consent.

1.2.5 CONSENTS GRANTED UNDER DELEGATED AUTHORITY

The Manager Development and Compliance, and the Director Environment and Policy, have delegated authority from the Council to grant consent to most subdivision applications. A subdivision comprising more than ten lots must be decided by the Planning Committee of Council

This committee is comprised of elected Councillors who have delegated powers to grant (or refuse) resource consent applications put before them.

Hearings and decisions are held by the Committee if:

- There is no delegation to a staff member, or if the staff member does not wish to exercise delegation
- A pre-hearing meeting has failed to resolve issues
- A Planner's recommendations are challenged
- The applicant does not accept all of the conditions

Refer to Section 357 of the Resource Management Act for further details.

1.2.6 ENVIRONMENT COURT

Under Section 358 of the Resource Management Act, any person who is affected by the decisions of the Hearing procedure can appeal the decision of the Committee to the Environment Court. It is recommended that advice be sought from legal counsel before entering this procedure.

1.2.7 SECTION 223 CERTIFICATION

[Refer to Section 223 of the Resource Management Act 1991]

The developer shall submit a survey plan of the subdivision to Council for approval. The Council will consider this plan and ensure that it complies with the Scheme Plan and the Resource Consent conditions. This plan must be prepared by a registered surveyor. A survey plan must be submitted to Council for approval within five years of the date of commencement of the consent. The Council must process a survey plan under S223 within 10 working days of its receipt.

1.2.8 SECTION 224C CERTIFICATION

[Refer to Section 224C of the Resource Management Act 1991]

The Council will issue the 224C Certificate when it is satisfied that all Resource Consent conditions have been met and that all development contributions have been paid.

The 224C Certificate is provided for under Section 224C of the Resource Management Act 1991 and is required by the District Land Registrar before the issue of titles for the newly created lots can proceed.

1.2.9 REQUIREMENTS FOR 224C APPLICATION

The Developer may apply for a 224C Certificate when;

- All works required to be carried out as conditions of the consent are completed
- All development contributions have been paid
- The Developer has posted a bond to an agreed value to cover the cost of completing the works to the standards set out in the conditions of the consent.

- All of the relevant quality checklists as may be required, complete with all the test certificates, all duly signed by, or on behalf of, the Developer have been submitted and approved
- The as-built plans and data information set out in Clause 1.5.3 of this chapter have been supplied and approved

A bond document is required to be secured by a cash payment or a bank guarantee, generally to a value not exceeding 150% of the value of the work. A legal agreement is entered into between the Developer and the Council to define the work to be completed.

When applying for a 224C Certificate the developer must submit:

1.2.10 PRACTICAL COMPLETION

"Practical Completion" is reached when Council is satisfied that the construction has progressed to a stage where all weather access is available to every lot created and all essential infrastructure services are available to every lot.

Work that may remain to be completed at Practical Completion may include:

- Topsoil and grassing of berms
- Landscaping
- Erection of signs

1.2.11 DEFECTS LIABILITY PERIOD

All works carried out during the subdivision shall be subject to a Defects Liability Period of twelve months. The Defects Liability Period shall commence from the date of issue of the Certificate of Practical Completion.

1.2.12 COMPLETION

"Completion" is when all works are fully complete and all defects that have arisen during the Defects Liability Period have been rectified.

1.2.13 SERVICE EASEMENTS

All public sewer, stormwater and water mains which are laid in private property, are to be protected by easements in favour of Council. The minimum width of the easement shall be half the depth from ground level to the invert of the pipe plus 600 mm, either side of the pipe, or such other width as required, taking into account the soil structure and adjacent local features. The easement shall be of sufficient width to allow practical access for maintenance purposes, and shall be not less than 3 metres wide.

The position of all pipes in easements shall not be more than 500 mm from the location shown on the engineering plans submitted for engineering approval. It shall be the responsibility of the developer to ensure that this condition is complied with.

All easement documents shall be prepared by the Council's solicitor at the expense of the developer.

1.2.14 FENCING

Fencing shall be required at the sides of any road, street, reserve or accessway, if in the opinion of the Council such fencing is necessary to ensure the safety of the public, or to avoid, remedy or mitigate any adverse effect on the environment.

Fences are required on both sides of a pedestrian accessway in accordance with Standard Drawing R 14.

Other fences to be erected will be specified by the Council and must be constructed in accordance with the requirements of the District Plan, Standard Drawing R 14, or as approved by the Engineer.

Temporary fencing shall be erected by the subdivider to protect the general public, particularly children, during the course of construction of the development, from all danger areas in the subdivision. Signs shall be erected warning persons of any dangerous areas. The use of barbed wire is prohibited.

PART 3 ENGINEERING PLANS

1.3.1 DRAWING STANDARDS

All drawings shall be prepared and submitted on sheets of the Standard ISO Type A series. Principal drawings are to be on A1 or A2 sizes as appropriate. Detailed drawings, site plans, etc may be of A3 or A4 sizes.

All draughting shall conform to NZS/AS 1100 : 1992 – Technical Drawing, and NZS 5902 Part 5 : 1981, or other New Zealand Standards where appropriate. In particular, the minimum height of letters is to conform to NZS/AS 1100. Linework must be no finer than 0.18mm and all lines must be of uniform density.

The symbols shown on Standard Drawing G 01 are to be used. Other symbols are to conform to NZS/AS 1100 or the appropriate New Zealand Standard.

1.3.2 DRAWING CONTENT

The following drawings are to be submitted where appropriate, to cover the extent and scope of the proposed development.

a) Locality Plan: Showing information sufficient to locate the subject site relative to existing features such as roads, already developed land, etc

b) Staging Plan: Where the development is likely to be constructed in stages, a plan showing the pattern and chronology of the land development shall be submitted. The staging must be approved as a part of the resource consent decision.

c) Earthworks and Run-off Control: Plan view

d) Roading Plans: Plan View, Long Sections, Cross Sections, Road Marking and Signage, Landscaping, Detail Drawings

e) Stormwater: Plan View, Long Sections

f) Wastewater: Plan View, Long sections, Pump Station Details [Including rising mains if applicable]

g) Water: Plan view

1.3.3 SCALES

The following scales shall be used:

Plan & Long section:	Horizontal	1:500, 1:250
	Vertical	1:100, 1:50
Cross Sections:	Horizontal	1:100
	Vertical	1:100 or 1:50

***Note**: Wherever possible scheme plan scales shall conform to the engineering plan scale.*

1.3.4 ORIENTATION OF PLANS

(a) **Plans and Long-Sections**

The north point shall be to the top of the sheet wherever practicable. All plans and long-sections shall have the lesser distance (m) on the left hand side of the sheet. For drainage and water supply, the lesser distance of a line shall be at the downstream end of the pipe. Long-sections should as far as possible be orientated the same as the plan.

(b) **Cross-Sections**

Cross-sections shall commence at the bottom left hand corner of the sheet and proceed upwards in order of increasing traverse distance. Where the road reserve is 20m wide, it may not be possible to place two columns of sections on one sheet, in which case the sheet may be rotated 90° clockwise and the sections plotted from the "bottom" of the sheet to the "top".

The left and right kerb lines shall be determined by facing in the direction of increasing distance. For open channel flow, left and right banks shall be determined by facing in the direction of flow.

1.3.5 BENCHMARKS AND STANDARD DATUM

All survey drawings and development plans shall be referenced to the New Zealand Map Grid (NZMG).

The standard reference datum for all levels shall be "Moturiki" Datum plus 100 metres and all levels shall be stated in terms of this datum. A statement of compliance with this clause shall be included on all drawings with levels thereon.

The "As Built" plan shall show the position of benchmarks in terms of survey co-ordinates or by accurate survey and the level thereon in terms of Moturiki Datum plus 100 m.

To provide permanent reference levels, suitable benchmarks shall be placed where directed by Council, at not greater than 250m intervals. Wherever possible, benchmarks are to be located at tangent points in positions where they are unlikely to be disturbed during construction or by future maintenance.

If existing benchmarks are disturbed during the course of the work, including the Defects Liability Period, they shall be reinstated and re-levelled at the subdivider's expense.

1.3.6 SUPPORTING DOCUMENTATION

1.3.6.1 Geotechnical Information

Where required by Council, a report from a Soils Engineer on the ground conditions and an opinion as to the suitability of the land for the purpose proposed. [Refer to Appendices 2.1 and 2.2 in Section 2]]

1.3.6.2 Roading

Road pavement design calculations, including the results of all preliminary soil testing.

1.3.6.3 Stormwater Drainage

Detailed catchment runoff calculations showing for each sub-catchment. The formula input factors used in the calculations. Detailed pipeline flow capacity analysis.

1.3.6.4 Wastewater

Wastewater flow estimates for each catchment together with catchment boundaries and areas. Pipe flow calculations showing pipe capacity and flow velocity for average dry weather flow, peak daily flow and peak wet weather flow. Pump station calculations justifying the selection of wet well size, pump selection and rising main hydraulics.

1.3.6.5 Video Inspection Report.

A video inspection report is required where a private drain is to become a part of the public network.

1.3.6.6 Water

Fire flow calculations

1.3.6.7 Structural Information

Calculations and manufacturers specifications as and where required.

PART 4 ENGINEERING WORKS

1.4.1 PLAN ACCEPTANCE

Submitted engineering plans will be audited against the requirements of the Resource Consent engineering conditions, and the standards set out in Section 3 of this Chapter.

1.4.2 FINAL PLANS

After the plans have been accepted, the Developer's Representative shall submit a further two complete sets of plans for stamping and signing on behalf of Council. These copies will be returned to the Developers Representative after signing. One complete copy of the stamped and signed plans shall be available on the site at all times.

1.4.3 CHANGES TO PLANS

The submitted plans may only be amended after satisfactory consultation with the relevant department of Council directly involved with the changes.

In all cases the changes must be documented and the amendments shown on the accepted plans.

1.4.4 COMMENCEMENT OF WORK

No engineering works shall commence on any subdivision or development until all approvals and acceptances [engineering, resource consent and others] have been obtained.

1.4.5 QUALITY OF WORK

The Developer's Representative is responsible for ensuring that the engineering works constructed by contractors are carried out to the requirements shown on the accepted plans and to best work practices.

The Developer's Representative shall be responsible for satisfactory completion of the Quality Checklists. Where the Quality checklists require the presence of a Council representative, then the Developer shall make such arrangements as required.

The Soils Engineer supervising the filling shall supply a certificate that any fill has been carried out in accordance with these requirements except that such certificate shall not be required where exemptions in accordance with Clause 2.3.6 apply.

1.4.6 EMERGENCIES

The Council is to be informed without delay, if, during the course of construction works any situation arises whereby the security of public or private property, or the operation of any public facility is endangered. The Council may instruct the subdivider's representative to carry out such remedial measures as the Council thinks fit to remove the danger. Any work so ordered is to be done at the expense of the subdivider.

If the work is not commenced within eight working hours of the issuing of the instruction, the Council may arrange for the required work to be carried out at the subdivider's expense. Should any emergency requiring immediate attention arise, the Council may carry out the work and recover the costs from the subdivider.

1.4.7 PUBLIC PROTECTION

The developer shall take all reasonable measures to protect the public from the adverse effects of construction works. Particular attention shall be paid to the erection and maintenance of temporary fencing, especially in areas of potential ponding. Signs shall be erected warning of any dangers within the site. These protection measures shall be shown in the approved Health and Safety Plan.

1.4.8 DAMAGE

All damage to existing roads, services or private property, or disturbance of survey boundary marks due to, or caused by, any new works, shall be the liability of the subdivider. The damage must be repaired by the subdivider immediately following identification of the problem or instruction from the Council. If the work is not commenced within sixteen working hours or such other reasonable time as agreed by the Engineer, then the Council may arrange for the necessary work to be carried out and charged to the subdivider. This provision includes removal of mud and debris from existing roads in the vicinity of the subdivision. A daily removal of such debris may be necessary in the interests of traffic safety.

1.4.9 ON-SITE TESTING

Any work that requires testing in the presence of a Council officer shall be pre-tested and proved satisfactory by the Developer’s Representative prior to the witnessed testing.

If the work does not meet the standard, then a fee will be charged for the second and any subsequent visit to remeasure or retest the work.

1.4.10 AUDITING

The consent holder's representative shall notify the Council (telephone 07 306 0500, fax 07 307 0718) by completing an Asset Inspection Memorandum (see Appendix 1.6), when the following phases of work are reached and at such other phases as the Council may determine to enable inspection to be carried out:

- Prepared earthworks and subsoil drainage prior to filling
- Completed earthworks and prepared subgrade
- Commencement of drainage reticulation
- Commencement of water reticulation
- Finished basecourse
- Before the commencement of carriageway surfacing
- Pressure testing of services

Inspection will be carried out within twenty four hours of notification if possible. Work shall not proceed until inspection has been made, or alternatively until authorisation is given to proceed.

1.4.11 PRESERVATION OF ARCHAEOLOGICAL FEATURES

Where an archaeological or historical site is known or is suspected to exist, Council may impose, in granting a Resource Consent, such conditions relating to any modification or disturbance of the affected land as it deems appropriate.

All archaeological sites are protected by the Historic Places Act 1993. The applicant shall cease all operations immediately, should any koiwi or other taonga be discovered within the area of the development. No archaeological sites shall be modified or disturbed in any way unless written authority has been obtained from the New Zealand Historic Places Trust in consultation with the relevant iwi authority.

1.4.12 CONNECTION TO SERVICES

Connection of new stormwater, wastewater and water supply reticulation to existing systems can be carried out by the Developer, but only with specific approval from Council.

The Developer shall apply for approval at least five working days before the connection is to be made. The new services must have been tested and shown to meet all requirements prior to the connection being made.

1.4.13 HEALTH AND SAFETY

All work being carried out either as a direct contract to Council or as part of a subdivision development shall be completed in such a manner that it complies in every respect with the Health & Safety in Employment Act 1992.

Prior to any work commencing, an approved ”Health & Safety Plan” shall be provided.

Where the work extends onto the existing road network, the Contractor shall provide and maintain an approved temporary traffic management plan in accordance with the Transit New Zealand Code of Practice for Temporary Traffic Management.

1.4.14 UTILITY NETWORK SERVICES

Works of any nature may encounter utility network services whether overhead or underground.

The Contractor shall, before starting any excavation work, obtain all necessary consents from the appropriate Principal Providers before excavating in the region of any services.

1.4.15 SERVICE COVERS

During construction no earthmoving or other equipment which may cause damage shall be used over service covers, manholes or other buried equipment.

After construction or rehabilitation of pavements and where alteration to existing ground levels has occurred as part of the development works, all surface covers and manhole lids shall be adjusted in level so as to be generally flush with the surrounding surfaces.

During the course of construction all surface openings of covers to underground services must be maintained clear of spoil so as to be readily accessible at all times.

1.4.16 CESSPITS

Special care shall be taken to prevent cesspits being filled, or cesspit grates being blocked with rubble, spoil or other material during the course of the works. The Contractor shall ensure that the cesspit chambers and grates are kept clear and open at all times, and at the end of the works the Contractor shall clean all new cesspits, and any others which may have been affected.

PART 5 WORKS COMPLETION

1.5.1 WORKS CLEARANCE

The developer shall apply for the 224C Certificate only when he is satisfied that the work is finished to the required standard. This includes the submission of the complete and accurate as-built details. Refer also to Clause 1.2.9 of this Chapter.

1.5.2 QUALITY SYSTEMS

The Quality Assurance checklists (refer Appendices 1.1, 1.2, 1.3 and 1.4) must be completed and submitted at the time of application for works clearance. Works clearance will not be considered until all certifications and quality assurance exercises are complete and as-built plans are received.

1.5.3 "AS-BUILT PLANS"

For subdivisions not exceeding two lots, "As Built" plans, in the form of transparent foils endorsed and certified correct by a registered surveyor (refer Appendix 1.5) are to be submitted by the subdivider.

For subdivisions exceeding two lots, “As Built” plans shall be submitted in an electronic format which is completely compatible with Council’s GIS/CAD system. Digital data will be subjected to a verification procedure to ensure that it complies with the Council’s system and requirements. Any data not meeting the requirements will be returned to the data provider for rectification with a brief outline of the non-compliance.

“As Built” plans shall show the following information:

- Sanitary drainage reticulation, including lid and invert levels of manholes and measured positions of manholes relative to boundary pegs and measurements to house junction, bends, ramps and other fittings, referred to the centre of the downstream manhole cover
- The position of all house connections should also be related to a section boundary peg, and the invert levels of connections given (ground levels can be altered subsequent to utility construction)
- Stormwater drainage reticulation detailed as for (a) above
- Water reticulation including depth and position of mains, location of hydrants, valves and tees relating to the nearest boundary peg
- The position of all service connections is to be related to the nearest section boundary peg
- The type of material and class of all pipes installed for sanitary drainage, stormwater and water supply
- Areas of filling showing the extent and depth of fill over original ground in the form of a six metre grid, or by fill contours showing original ground levels and finished ground levels
- All alterations to the submitted engineering drawings found necessary during construction and approved of in writing by the Engineer
- The correct street names as approved by Council
- All building footprints relative to site boundaries when applicable

- Kerb lines, footpaths, roundabouts, traffic islands, road marking and signage.

1.5.4 ASSET INFORMATION

An Asset Data Sheet and an Asset Data Schedule showing the extent and value of all new infrastructure created by the development shall be submitted on an electronic form which will be supplied by Council.

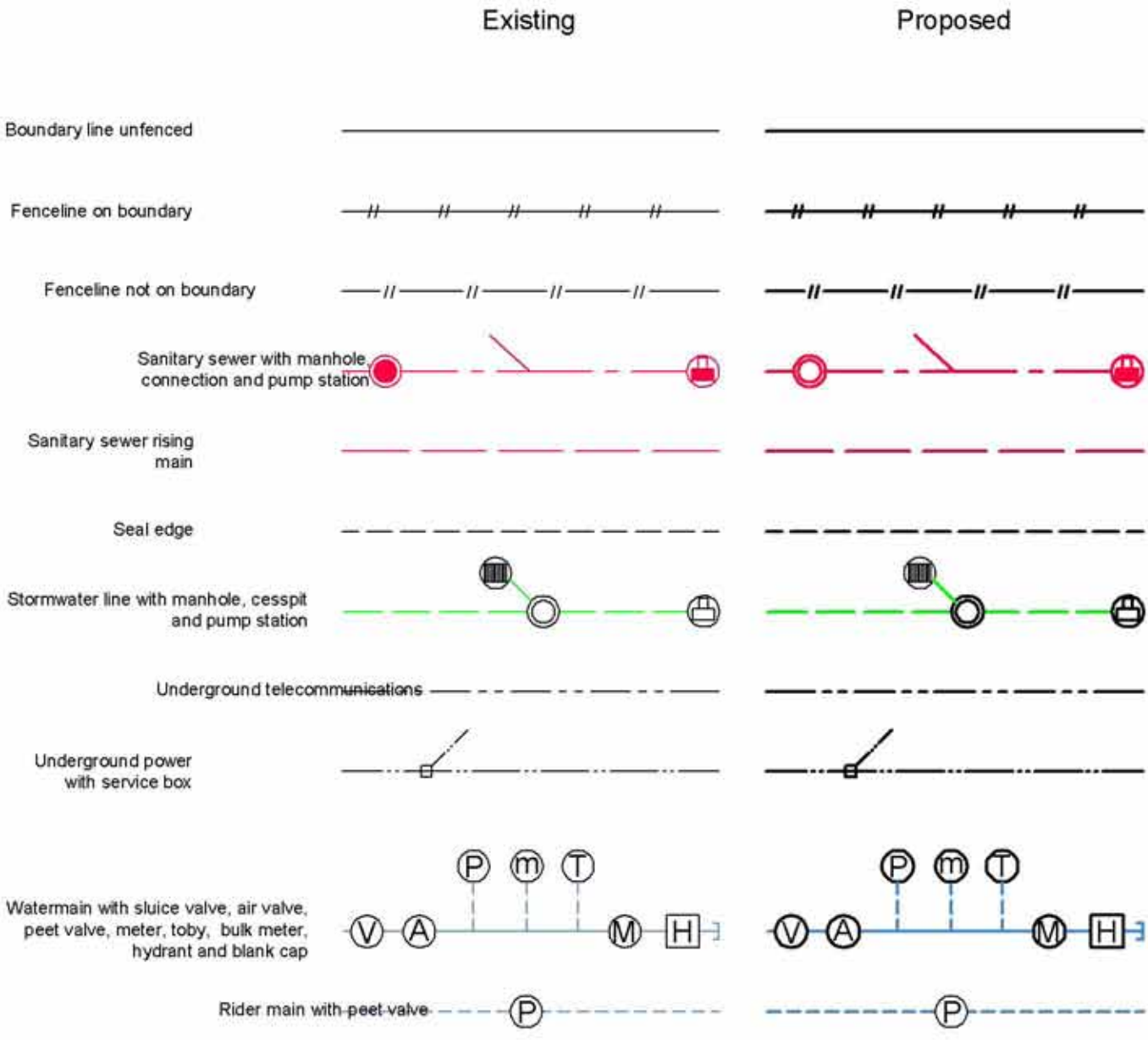
1.5.5 LANDSCAPE WORKS

The Council does not require “As-Builts” of street landscaping. The developer must be satisfied that the street landscaping is in accordance with the design and must include landscaping in the Certificate of Completion.

CHAPTER 1

SUBDIVISION PROCESSES

STANDARD DRAWINGS



NOTE: The line weights for existing services shall be 0.25mm width, and for all proposed services 0.5mm.

WHAKATANE DISTRICT COUNCIL

PREPARED BY OPUS

STANDARD DRAWING

NOT TO SCALE

DRAWING SYMBOLS AND LINE TYPES

G01

ISSUE 7.0
SEPTEMBER 2007

ROAD AND TRAFFIC

CERTIFICATION OF SUBDIVISION CONSTRUCTION

Name of Subdivision:	
Council File No:	
Main Contractor:	
Roading Sub Contractor:	
Engineer Responsible for Supervision:	
Qualifications:	

		Y	N/A	N	Inspection or Test Date	Comments
A	**KERBING AND CHANNELLING**					
	Kerb & channel complete and free of defects					
	Kerb type as per engineer drawings approved by Council					
	Carriageway positions as shown on approved engineering drawings					
	Kerb levels checked and found to be as per approved engineering drawings					
B	**SUBGRADE**					
	Subgrade inspected and approved by supervising engineer prior to metalling					
	Subgrade compaction, strength and uniformity found to be as per documents approved by Council and as necessary for pavement design					
	Subgrade level and smoothness tolerances found to be as per documents approved by Council					
C	**BASECOURSE**					
	Basecourse supplied complies with documents approved by Council					
	Basecourse compacted to the standard given in the documents approved by Council					
	Basecourse depth checked @ 20m crs max and found to be not less than that shown on engineering drawings					
D	**SEALING SURFACE**					
	Sealing surface inspected and approved by supervising engineer prior to sealing					
	Sealing surface true to line and free of bumps					
	Water will not pond on the sealing surface					
	Sealing surface swept clean of loose aggregate, dust and dirt prior to sealing					
	Sealing surface smooth and tightly bonded and presenting a clean stone mosaic free of a skin of fines					
	Sealing surface reasonably dry @ time of sealing					

		Y	N/A	N	Inspection or Test Date	Comments
E	**SEALING/ASPHALTIC CONCRETING**					
	Sealing chips supplied comply with documents approved by Council					
	Sealing chips sufficiently dry and good adherence to binder achieved					
	Bitumen cutback approved by supervising Engineer					
	Application rate approved by supervising Engineer					
	Chip rolled with pneumatic tyred rollers as per documents approved by Council					
	Second coat chip seal applied					
	Surplus chip removed					
	Asphaltic concrete applied in accordance with the documents approved by Council					
F	**MISCELLANEOUS**					
	All shared accesses constructed in accordance with Council's Code of Practice					
	Street lighting completed as per documents approved by Council					
	Materials tested as required by approved specification					
	Street lights activated					
	Footpaths completed					
	All pedestrian accessways constructed in accordance with Councils Code of Practice					
	Berms topsoiled, grass established and mown once					
	Pedestrian accessways fenced					
	Road marking completed as per documents approved by Council					
	Benchmarks placed in kerb @ 250 metres crs max from nearest benchmark					
	Traffic signs erected as per documents approved by Council					
	Street name signs erected as per documents approved by Council					

COMMENTS:

_____

_____

I am experienced in roading construction and, as per clause 1.1.3 of Council's Code of Practice for Development. I have been engaged by the owner to supervise the roading construction for the above subdivision. As per clause 1.5.2, I hereby certify that except as noted above the roading, footpaths, street lighting and signage are now complete and the works have been carried out in accordance with the documents approved by Council and sound engineering practice.

Signed: _____*(Engineer Responsible for Supervision)*

Name: ---------- Date: ----------

STORMWATER RETICULATION

CERTIFICATION OF SUBDIVISION CONSTRUCTION

Name of Subdivision:	
Council File No:	
Main Contractor:	
Stormwater Sub Contractor:	
Engineer Responsible for Supervision:	
Qualifications:	

		Y	N/A	N	Inspection or Test Date	Comments
A	**LINES AND LATERALS**					
	All pipe diameter and classes as per approved engineering drawings					
	Lines laid in the position shown on approved engineering drawings					
	Lines laid to levels given on approved engineering drawings					
	All lines laid in accordance with Manufacturer's instructions and relevant NZ Standards					
	All pipe bedding as per drawings/specifications approved by Council					
	All lines and laterals true to grade					
	All lines and laterals true to line					
	All lines free of faults, debris and obstructions					
	Each lot provided with a stormwater connection					
	The levels of all connections are such that pumping of stormwater by home owners will not be necessary					
	Ends of all connections pegged as per of Council's Code					
B	**MANHOLES**					
	All joints sealed as per manufacturer's instructions					
	All manholes benched and haunched					
	All safety steps installed as per standard drawings					
C	**SUMPS AND STRUCTURES**					
	All sumps cleaned out at completion of roading					
	All inlet and outlet structures as per approved engineering drawings					

COMMENTS: _____

_____

I am experienced in stormwater reticulation and, as per clause 1.1.stormwater construction for the above subdivision. As per clause 1.5.2, I hereby certify that except as noted above the stormwater reticulation system is now complete and the works have been carried out in accordance with the documents approved by Council, and sound engineering practice.

Signed: _____ *(Engineer Responsible for Supervision)*

Name: _____**Date:** _____

WASTEWATER RETICULATION

CERTIFICATION OF SUBDIVISION CONSTRUCTION

Name of Subdivision:	
Council File No:	
Main Contractor:	
Wastewater Sub Contractor:	
Engineer Responsible for Supervision:	
Qualifications:	

		Y	N/A	N	Inspection or Test Date	Comments
A	**LINES AND LATERALS**					
	All pipe diameter and classes as per approved engineering drawings					
	Lines laid in the position shown on approved engineering drawings					
	Lines laid to levels given on approved engineering drawings					
	All lines laid in accordance with Manufacturer's instructions and relevant NZ Standards					
	All pipe bedding as per drawings/specifications approved by Council					
	All trench backfill compacted to specified standard					
	All lines lamped by Engineer after backfilling and found to be satisfactory					
	All lines and laterals true to grade					
	All lines and laterals true to line					
	All lines free of faults, debris and obstructions					
	All lines and laterals satisfactorily tested as per Code of Practice in the presence of the Engineer					
	No infiltration of water into lines visible					
	A sewer connection has been provided for each lot					
	The levels of all connections are such that pumping of sewage by home owners will not be necessary					
	Ends of all connections pegged as per Council's Code					
B	**MANHOLES**					
	All joints sealed as per manufacturer's instructions					
	No infiltration of water visible					
	All haunching level with pipe soffits					
	Benching above soffit at a grade of 3:1 to make MH self cleansing					
	All safety steps installed as per standard drawing					
	All manholes tested as per clause 6.13.6					
C	**RODDING EYES**					
	Rodding eyes identified at surface with approved box with letters RE on lid					

COMMENTS:

_____

_____

_____

I am experienced in the construction of water reticulation and, as per clause 1.1.3 of Council's Code of Practice for Development. I have been engaged by the owner to supervise the water reticulation construction for the above subdivision. As per clause 1.5.2, I hereby certify that except as noted above the water reticulation system is now complete and the works have been carried out in accordance with the documents approved by Council and sound engineering practice.

Signed: _____ *(Engineer Responsible for Supervision)*

Name: _____ **Date:** _____

WATER RETICULATION

CERTIFICATION OF SUBDIVISION CONSTRUCTION

Name of Subdivision:	
Council File No:	
Main Contractor:	
Water Sub Contractor:	
Engineer Responsible for Supervision:	
Qualifications:	

	Y	N/A	N	Inspection or Test Date	Comments
Mains laid in the position shown on engineering drawings approved by Council					
All pipework, valves and fittings inspected by Engineer prior to backfill and found to be satisfactory					
All pipe diameter and classes as per approved Engineering drawings					
All pipe jointing and connecting systems as per Council's Code and documents approved by Council					
All pipes and fittings laid on a uniform fine bedding					
All anchor blocks required are installed					
Separation distance between water mains and other services has been achieved as per standard drawings					
Min cover to mains in 900mm in carriageway, 750mm in berms and footpaths and 180 mm @ tobies					
All trench backfill compacted to required standard					
Fire hydrants and valve boxes installed					
Top of hydrant spindle between 115 and 300mm below finished ground level					
All hydrant and valve markers installed					
All hydrant and valve boxes painted					
All hydrants flow tested and certification provided by independent authority					
After backfilling all mains and connections have been satisfactorily pressured tested in the presence of the Engineer					
Each lot provided with a water connection					
Connections terminate with a gate valve 300mm (min) inside road reserve in meter box					
Connections marked as per Council's Code					
Position of lines, connections, hydrants and valves recorded for as builting.					
The new subdivision reticulation system connected to Council's mains					

COMMENTS:

_____

_____

_____

I am experienced in wastewater reticulation and, as per clause 1.1.3 of Council's Code of Practice for Development. I have been engaged by the owner to supervise the wastewater construction for the above subdivision. As per clause 1.5.2, I hereby certify that except as noted above the wastewater reticulation system is now complete and the works have been carried out in accordance with the documents approved by Council, and sound engineering practice.

Signed: _____ (*Engineer Responsible for Supervision)*

Name: _____**Date:** _____

Appendix 1.5

To: The Engineer
Whakatane District Council
Private Bag 1002
WHAKATANE 3120

CERTIFICATE FOR AS BUILT DRAWINGS

Subdivision:	
Owner/Developer:	
Location:	

I, _____ Chartered Engineer/Registered Surveyor, hereby certify that the manhole positions, invert and lid levels, connection locations and distances between manholes and pipe sizes are correct as shown on Drawings numbered:

_____

_____

_____

Signed: _____ *(Chartered Engineer/Registered Surveyor)*

Name: _____ **Date:** _____

GIS No: _____

ASSET INSPECTION MEMORANDUM

INSTIGATOR:

_____

DEPARTMENT/COMPANY:

_____

DATED RAISED: _____

LOCATION DETAILS:

STREET No: _____ **STREET:**_____

AREA:_____

	Sewer	Water	Stormwater	Other
Asset Type:	☐	☐	☐	☐

Purpose of Inspection:

_____
_____
_____
_____
_____
_____
_____

Inspected by: _____ **Designation:**

_____

Date: _____ **Approved:** **Yes** ☐ **No** ☐

Inspection Comments:

_____

_____

_____

_____

_____

CHAPTER 2

EARTHWORKS AND LAND STABILITY

CHAPTER 2 EARTHWORKS AND LAND STABILITY

PART 1 GENERAL REQUIREMENTS

2.1.1 INTRODUCTION

This chapter sets out the standards that are required to meet the performance criteria set out in the District Plan. It represents a preferred "Means of Compliance" with the District Plan and is the basis for all roading and infrastructure services work undertaken by or for Council.

It is acknowledged that the performance criteria in the District Plan may be achieved by adopting different design philosophies. If a Developer proposes to vary from this Design Guide then it is up to the Developer to prove that the performance criteria are met.

2.1.2 EXISTING SERVICES

The Developer shall arrange for the searching of records to determine the existence and position of pipes, cables and other utilities on or about the site of the proposed works. The position or relocation of such utilities shall be taken into account when designing the works. Utilities shall include any permanent reference marks as defined in the regulations made under the Survey Act 1986 and which at any time have been set in the ground for the purposes of survey.

2.1.3 HEALTH AND SAFETY

The developer shall give consideration during the design phase as to how the project will be constructed, so as to ensure that all aspects of the Health & Safety in Employment Act 1992 are fully complied with. The Developer shall also consider, and include all necessary information on how the work will be carried out in order to minimise the impact on the existing roading infrastructure.

PART 2 DESIGN REQUIREMENTS

2.2.1 INTRODUCTION

This part sets out the basic design requirements for earthworks that are to be carried out as a part of the development. Some construction information is included for completeness. Detailed information on construction standards is set out in Part 3 of this chapter.

2.2.2 STANDARDS

The following NZ Standards shall be read concurrently with and apply to this section.

NZS 4431 : 1989 - "Code of Practice for Earth Fill for Residential Development".

NZS 4402 : 1986 - "Methods of Testing Soils for Residential Development"

2.2.3 SCOPE

The requirements for the design of earthworks, or preparation for foundations, or both, include the following:

- The excavation and filling of land to form new contours
- The assessment and protection of slope stability
- The suitability of both natural and filled ground for the founding of roads, buildings, services and other works.

Because of the wide range of soil types, physical conditions and environmental factors to be found in different areas of the District, is not possible to lay down precise requirements which will be applicable in all cases. The criteria set out in this section will be subject to the judgement of the Developer's Representative, or the Soils Engineer.

2.2.4 TECHNICAL RESPONSIBILITIES

Where any land development involves the carrying out of earthworks which require a Resource Consent, the assessment of slope stability, or the detailed evaluation of the suitability of natural ground for the foundations of buildings, roads, services or other works, then a Soils Engineer shall be appointed to carry out the following functions:

- Prior to detailed planning of any development, to undertake a site inspection and such investigations of sub-surface conditions as may be required
- Before work commences, to review the drawings and specifications defining the earthworks proposed, and submit a written report to the Engineer on foundation and stability aspects and any proposed departure from this Code and associated Standards
- Before work commences and during construction, to determine the extent of further specialist soils engineering services required (including investigation and geological work)
- Before and during construction, to determine the methods and frequency of construction control tests to be carried out, determine the reliability of the testing and to evaluate the significance of test results and field inspection reports in assessing the quality of the finished work

-
- During construction to provide regular inspection (while a daily visit might be regarded as reasonable on earthwork construction on minor projects, inspection on a near full-time basis is often necessary for large projects)
- On completion to submit a written report to the Engineer attending to the compliance of the earthworks with these Standards and as to the suitability of the development for building construction.

The Developer's Representative may undertake the role of the Soils Engineer if he possesses suitable qualifications and experience.

The construction control testing shall be carried out by an organisation (preferably that of the Soils Engineer or under his control) with Telarc Registration in all relevant tests. (Minor testing using Scala Penetrometer or Pilcon Vane may be exempt from this requirement).

2.2.5 PRELIMINARY SITE EVALUATION

Prior to any detailed planning or design, the Soils Engineer, where applicable, should undertake a preliminary evaluation of the general nature and character of the site in sufficient detail to determine the likely requirements for earthworks and/or the need for further investigations into the suitability of foundation conditions, and the stability of the natural ground. The preliminary evaluations should be carried out in the context of the total surroundings of the site and should not be influenced by details of land tenure, political or other boundary considerations. In simple cases, a visual appraisal may be sufficient, but in other cases, depending on the nature of the project, its locality, the scale of development proposed and individual site characteristics, particular attention may need to be given to the following matters.

2.2.6 SLOPE STABILITY

Some natural slopes exist in a state of only marginal stability and relatively minor works such as trenching, excavation for roads or building platforms, removal of scrub and vegetation or the erection of buildings, can lead to failure.

Signs of instability include (but are not limited to) cracked or hummocky surfaces, crescent shaped depressions, crooked fences, trees or power poles leaning uphill or downhill, uneven road surfaces, swamps or wet ground in elevated positions, plants such as rushes growing on a slope and water seeping from the ground.

2.2.7 FOUNDATION STABILITY

A study of the general topography of the site and its surroundings may indicate areas which have previously been built-up as a result of natural ground movement or by the deliberate placing of fill material. Unless such fill has been placed and compacted under proper control, long term differential settlement could occur causing damage to superimposed structures, roads, services or other development works.

2.2.8 SPECIALIST SERVICES

Where a Soils Engineer has been appointed, that person shall submit to Council a written report setting out the particulars of any investigations carried out.

This shall include details of contours, natural features and modifications proposed thereto, and shall furnish to Council a statement of professional opinion as to the suitability of the land for its proposed use or subdivision with details of any special conditions that should be imposed. This statement is to be in the format given in Appendix 2.1 or 2.2.

PART 3 EARTHWORKS CONSTRUCTION

2.3.1 GENERAL

This part covers clearing, excavation, and fill operations, associated with all aspects of earthworks for subdivisions and developments.

2.3.2 STANDARDS

Unless superseded by these specifications, the following standards shall apply:

NZS 4431 : 1989 - "Code of Practice for Earth Fill for Residential Development"
TNZ Specification F/1 :- "Earthworks Construction"

2.3.3 PREPARATION FOR EARTHWORKS

Before any earthworks are commenced, areas of cut and fill should be clearly defined. Where necessary, sufficient fencing or barriers should be provided around trees or other features which are to retained or protected. All site activities including clearing, storage, cutting and filling must be kept away from the root zone of trees (best defined as the extent of the canopy). Adequate provision shall also be made for the control of erosion, surface water run-off and siltation. The following procedures shall be adhered to:

- Stripping shall be carried out as a specific operation with areas being stripped in large enough increments to ensure that there is an adequate margin of stripped ground beyond any current cutting or filling operation
- All stripped material shall be deposited in temporary stockpiles or permanent dumps, in locations where there is no possibility of the material being unintentionally covered by, or incorporated into, structural fills
- Where a fill is to be constructed on sloping ground, benches shall be cut into the ground to prevent the development of a continuous surface of low shear strength
- Pervious drains or similar subsoil seepage control systems shall be installed [where necessary] to lead seepage away from all springs and potential areas of ground water, under or adjacent to fills
- Subsoil drains shall be discharged via flexible jointed pipes to an outlet approved by the Engineer, preferably a stable water course or piped stormwater system
- The stripped ground surface shall be prepared and then inspected by the Soils Engineer before the commencement of fill placement.

2.3.4 FILL CONSTRUCTION

The quality of fill material and the required testing shall be determined and specified before the placing of fill commences. Fill shall placed in a systematic and uniform manner with near horizontal layers of uniform thickness [less than 225mm] of material being deposited and compacted progressively across the fill area.

Before any loose layer of fill is compacted, the water content of the fill should be suitable for the compaction required and as uniform as possible.

Any compacted layer which has deteriorated after an interruption in the earthmoving operation, shall be rectified before further material is placed over it.

Fill batter faces should be compacted as a separate operation, or alternatively, overfilled and cut back.

Where testing shows the compaction achieved in the field to be below the specified minimum, all material represented in the test shall be further compacted or removed as necessary. [Remediation measures specified by a Soils Engineer will be considered as an alternative to this method].

2.3.5 CONSTRUCTION MANAGEMENT PLAN

Seven days prior to earthworks commencing on site, a management plan is to be submitted to the Engineer indicating the measures that will be applied in the event that site and weather conditions give rise to actual or potential adverse effects on adjoining properties brought about by the construction works.

The management plan shall describe the measures to be applied to minimise the effect of dust on adjoining properties, the intended sources of water, and named personnel to be contacted in the event of dust nuisances occurring. Earthworks shall not proceed until the consent holder's ability to control any dust nuisance has been demonstrated.

Due to the increased rate of run-off brought about by the denuding of the ground in mass earthworks, particular care shall be taken to control stormwater and to ensure that it is permitted free entry to stormwater culverts at all times. The developer shall be responsible for ensuring that adequate grids or similar approved traps are constructed and maintained during the construction period of the work, and until such time as the land becomes stabilised, to the satisfaction of the Engineer. Any of Council's stormwater infrastructures blocked or affected by silt shall be thoroughly cleaned by the developer or at the developer's expense.

Erosion and sediment control is to be carried out in accordance with Bay of Plenty Regional Council - Technical Report No 28-"Erosion and Sediment Control Guidelines for Earthworks".

The developer shall ensure that all erosion/sediment/stormwater controls are installed at all times during the works and afterwards where necessary, to the satisfaction of the Engineer. The developer shall carry out maintenance of erosion/sediment/stormwater controls where/when necessary and as directed by the Engineer or other authority.

Developers are also reminded of the requirements of the Regional Council with regard to excavation and the removal of ground cover. All necessary consents must be obtained prior to commencement of works.

2.3.6 INSPECTION AND QUALITY CONTROL

The Soils Engineer shall provide an adequate level of inspection and testing in order to enable a proper evaluation of the general quality of the finished work and the furnishing of a report as to the compliance of the work with the specifications.

Visual inspection shall be made by the Soils Engineer at the following times:

- After any part of the existing ground has been stripped and prepared for the placing of fill
- After any drain has been installed and before the drain is covered by fill
- At such other times as the Soils Engineer considers necessary to enable the general standard of earthworks to be assessed.

During the construction of earth fills some or all of the following control tests should be made on the fill material:

- Tests to determine whether the moisture content is within the range for optimum compaction
- Insitu density tests to determine whether the degree of compaction is up to the specified minimum
- Where appropriate, tests to determine the maximum dry density for the soil tested in each insitu field density test
- Such other tests as may be specified by the Soils Engineer for control testing of fills or particular soil types. Such tests include shear strength tests, cone penetrometer tests and Proctor needle tests.

The locations of tests shall be decided by the Soils Engineer, who shall select them so as to test material likely to be furthest from the specified quality. In addition, a proportion of tests should be taken at random locations to check the average standard being obtained.

All field and laboratory test data should be recorded in a systematic manner that will allow the results to be identified and allow the calculations to be checked at a later date, if necessary. All control test results must have recorded the time, date, location and elevation. Test results relating to areas of fill that have been subsequently removed or reworked should be noted accordingly.

Where the volume of the fill does not exceed 50 cubic metres and the depth does not exceed 450mm, the requirements for testing as set out above will not be enforced.

2.3.7 NOISE CONTROLS

The starting and operation of all earthmoving equipment shall be restricted to between the hours of 7.00 am and 7:00 pm Monday to Friday and 7:00 am to 12.00 am on Saturday. No earthmoving equipment shall be operated on Sundays and Public Holidays unless required for remedial or emergency works.

Construction equipment on the site shall be operated in a manner that ensures that the corrected noise level (based on L_{10} measurements) as measured at the boundary of any adjoining residential property does not exceed the levels as set out in NZS 6803 : 1999 - “Acoustics – Construction Noise”

The noise levels shall be measured and assessed in accordance with the requirements of NZS 6801 : 1991 - “Acoustics – Measurement of Sound”, and NZS 6802 : 1991 - “Acoustics - Assessment of Environmental Sound”.

The noise shall be measured with a sound level meter complying, at least, with IEC 60651 :- 1979 - “Sound Level Meters Type 2”.

More restrictive hours or noise levels may be imposed as a result of the conditions of the Resource Consent.

Appendix 2.1

To: The Engineer
Whakatane District Council
Private Bag 1002
WHAKATANE 3120

STATEMENT OF PROFESSIONAL OPINION AS TO SUITABILITY OF LAND FOR SUBDIVISION

Subdivision:	
Owner/Developer:	
Location:	

I, _____ of _____
(Full name) *(Name of Firm)*
_____
(Address of Firm)
hereby confirm that:

1. I am a Chartered Professional Engineer who has pre-qualified with IPENZ with geotechnical accreditation and am experienced in the field of soils engineering and more particularly, land slope and foundation stability as applicable

2. I was retained by the owner/developer as the Soils Engineer on the above subdivision.

2. Site investigations have been carried out under my direction and are described in my report dated _____

3. I am aware of the details of the proposed scheme of subdivision and of the general nature of proposed engineering works as shown on the following drawings:
_____
(Insert reference to all drawings including dates of latest amendments)

4. In my professional opinion, not to be construed as a guarantee, I certify that the proposed works give due regard to land slope and foundation stability considerations and that the land is suitable for the proposed subdivision, provided that:

   (a) _____
   (b) _____
   (c) _____

5. This professional opinion is furnished to the Council and the owner/developer 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 inspection during the course of the works.

Signed: _____

Date: _____

Appendix 2.2

To: The Engineer
Whakatane District Council
Private Bag 1002
WHAKATANE 3120

STATEMENT OF PROFESSIONAL OPINION AS TO SUITABILITY OF LAND FOR BUILDING DEVELOPMENT

Subdivision:	
Owner/Developer:	
Location:	

I, _____ of _____
(Full name) *(Name of Firm)*

_____
(Address of Firm)

hereby confirm that:

1. I am a Chartered Professional Engineer who has pre-qualified with IPENZ with geotechnical accreditation and am experienced in the field of soils engineering.

2. I was retained by the owner/developer as the Soils Engineer on the above subdivision.

3. The extent of my inspections during construction, and the results of all tests carried out are described in my report dated _____

4. In my professional opinion, not to be construed as a guarantee, I certify that:

   *(a) That earth fills shown on the attached Plan No. _____ have been placed in compliance with the Code of Practice of the Whakatane District Council.

   *(b) The completed works give due regard to land slope and foundation stability considerations.

   *(c) The filled ground is suitable for the erection thereon of residential buildings not requiring specific design in terms of NZ Building Act 1991 and NZ Building Regulations 1992, and related documents providing that:

   (i) _____
   (ii) _____
   (iii) _____

   *(d) The original ground not affected by filling is suitable for the erection thereon of residential buildings not requiring specific design in terms of NZ Building Act 2004 and NZ Building Regulations 1992, and related documents, providing that:

   (i) _____
   (ii) _____
   (iii) _____

5. This professional opinion is furnished to the Council and the owner/developer 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 the normal inspection of foundation conditions at the time of erection of any dwelling.

Signed: _____
Date: _____

CHAPTER 3

ROADING

CHAPTER 3 ROADING

PART 1 DESIGN

3.1.1 INTRODUCTION

This chapter provides standards for one means of compliance for roading works in terms of engineering design and construction.

Other means of compliance will be considered for engineering design but must be supported by detailed design philosophy and calculations.

3.1.2 APPLICATION

The minimum requirements for the various types of streets, service lanes and accessways are set out in the tables below.

Standard Drawing R 02 gives the standard location of services within the berm. Street trees and landscaping requirements are in addition to the area of berm taken up by the service locations. Such requirements are to be provided in areas of road reserve clear of all services.

Arterial, commercial and industrial roads will be subject to specific approval. (Refer to definitions of Streets, (Clause 1.1.4.2).

3.1.2.1 Urban Road Requirements

The minimum standards for urban roads in Residential 1 (Urban Living), Business 1, 2, 3 and 4 and Rural 4 (Settlement) Zones shall be as shown in Table 3.1 below.

Table 3.1 - Urban Road Requirements

Road Characteristics			Road Standards				
Class	**Type**	**Main land Use**	**Road Reserve Width (m)**	**Carriageway Width (m)**	**Berm Width (m)**	**Footpath**	**Streetlight**
Local Road	Cul-de sac Up to 12 lots	Residential Activity	16.5	7.5	4.5 & 4.5	One side	Yes
Local Road	Cul-de sac 13 to 40 lots	Residential Activity	17.5	8.5	4.5 & 4.5	Both sides	Yes
Local Road	Through/Loop Road up to 150 lots	Residential Activity	20.0	8.5	5.75 & 5.75	Both sides	Yes
Local Road	Through/Loop Road 150 -450 lots	Residential Activity	20.0	11.0	4.5 & 4.5	Both sides	Yes
Local Road	All	Business Activity	20.0	11.0	4.5 & 4.5	One side	Yes
Local Road	Cul-de sac	Business Activity	Specific design depending on number of lots				
Local Road	Service Lane	Business Activity	7.0	6.0	1.0	NA	Yes
Collector Road	All	Residential Activity	20.0	11.0	4.5 & 4.5	Both sides	Yes

Note:

1. Arterial roads of all types and all land uses shall be subject to Specific Design
2. Bridges shall have a minimum width of 8 metres between kerbs and shall have a design loading of HN-HO 72.
3. A separate pedestrian footbridge at least 1.4 metres wide, or a footpath constructed as a part of the bridge will be required where pedestrian traffic is expected.
4. All private roads shall be formed to the standards set out above for public roads.

3.1.2.2 Urban Private Accessways

The minimum standards for urban private accessways in Residential 1 (Urban Living), Business 1, 2, 3 and 4 and Rural 4 (Settlement) Zones shall be as shown in Table 3.2 below

Table 3.2 - Urban Private Accessway Requirements

No of Lots or Dwellings Served	Land Use	Min. Width of Access (m)	Max. Length of Access (m)	Min. Width of Carriageway (m)	Berms (m)	Surface Standard
1	Residential activity	3.0	60	2.5	0.5	Table 2 S.D. R 13-
1	Business Activity	6.0	60	5.0	0.5 & 0.5	Specific Design
2 or 3	Residential activity	4.0	60	3.0	0.5 & 0.5	Table 2 S.D. R 13
2 or 3	Business Activity	8.0	120	6.0	0.5 & 1.5	Specific Design
4 - 6	Residential activity	6.0	60	5.0	0.5 & 0.5	Table 2 S.D. R 13
4 – 6	Business Activity	12.0	150	8.0	2.0 & 2.0	Specific Design

Note:

1. For subdivisions of seven or more lots, the road standards as set out in Table 3.1 above, shall apply.
2. Where the subdivision is of seven or more lots, the acceptance of the road as a private way if required by the Developer, shall be at Council's discretion.
3. For subdivisions of up to six lots where the land use is for commercial or industrial activities, the accessway and carriageway widths will be subject to specific approval by the Engineer.
4. Streetlights may be required on private accessways at the discretion of the Engineer, subject to length and layout.
5. Urban private accessways shall be constructed in accordance with the details shown on Standard Drawing R13.
6. Where Option A or B is used for surfacing as set out on Standard Drawing R14, a pavement design in accordance with Austroads may be required depending on the in-situ sub-base material.
7. Bridges shall have a minimum width of 3.5 metres between kerbs and shall have a design loading of 0.85 HN 72.
8. The maximum length of an accessway as set out in Table 3.2 may only be exceeded with the specific approval of Council.
9. Accessway width shall be determined by the greater of the number of lots or the number of dwellings to be served.

3.1.2.3 Rural Roads

The minimum requirements for rural roads shall be as shown in Table 3.3 below.

Note: *Applies to Rural 1, 2 and 3 Zones*

Table 3.3 - Rural Road Requirements

Road Characteristics		Road Standards			
Class	**Type**	**Road Reserve Width (m)**	**Seal Width (m)**	**Carriageway Width (m)**	**Berm Width Minimum (m)**
Local	All	20.0	6.0	6.2	3.0
Collector	All	20.0	7.0	7.2	3.0
District Arterial	All	20.0	8.5	8.7	3.0

Note:

1 Bridges shall have a minimum width of 8 metres between kerbs and shall have a design loading of HN-HO 72

3.1.2.4 Rural Private Accessways

The minimum requirements for rural private accessways shall be as shown in Table 3.4 below.

Note: *Applies to Rural 1, 2 and 3 Zones*

Table 3.4 - Rural Private Access Requirements

No of Lots Served	Land Use	Min. Width of Access (m)	Max. Length of Access (m) *	Min. Width of Carriageway (m)	Surface Standard
1	Residential activity only where area is 1ha or less	5.0	750	3.5	All weather metal.
1	Other activities and in all cases where area > 1ha	8.0	750	3.5	All weather metal.
2 – 4	All	9.0	750	5.0	All weather metal
5 - 8	All	10.0	750	5.0	Seal coat

Note:

1. For subdivisions of nine or more lots, the road standards as set out in Table 3.3 above, shall apply.
*2 Applies in Rural 1 (Plains) Zone only
3. A seal coat is recommended for private access strips serving 2 – 4 lots.
4. Bridges shall have a minimum width of 3.5 metres between kerbs and shall have a design loading of 0.85 HN HO 72

3.1.2.5 Rural Private Accessway Construction

Construction shall be carried out in accordance with Standard Drawing R 26 and the following conditions:

3.1.2.5a **Passing Bays:** Shall be provided outside the minimum carriageway width at not more than 200 metre intervals.
Passing bays shall be large enough to enable a 90 percentile two axled truck to enter, park and exit in one manoeuvre. If all the lots that the access serves are smaller than 1 hectare in size, then the passing bay shall be constructed for the 90 percentile car.

3.1.2.5b **Visibility:** Minimum sight distances for entranceways shall be in accordance with Clause 3.1.3.9.

3.1.2.5c **Dimensions:** Minimum dimensions shall be as shown in Table 3.4. A grassed berm at least 2.5m wide shall be provided on one side of the carriageway for the provision of underground services.

3.1.2.5d **Access and Gradient:** The maximum carriageway gradient shall be 1 in 6 with the first 6 metres from the edge of the road of seal/metal at a gradient of no more than 1 in 12. All lots depending on the access strip shall have a safe and practical access point to the carriageway to meet criteria herein.

3.1.2.5e **Subgrade:** Subgrade shall exclude all organic or wet material and shall be trimmed and compacted. The minimum CBR shall be 7.0, or 33mm per blow with Scala penetrometer.

3.1.2.5f **Basecourse:** Shall be GAP 40 or AP 40 compacted to a dense state, with a Clegg Impact Hammer reading of 33 or better. Minimum compacted thickness shall be 75mm for an unsealed access or 125mm for a sealed access.

3.1.2.5g **Stormwater:** Provision shall be made for the collection and disposal of stormwater. All upstream catchment areas shall be provided for. Consideration shall be given to scour and/or silting. All culverts shall be at least 300mm diameter and installed to the manufacturers recommendations.

3.1.2.5h **Surface Finish:** Shall be 2 coat chip seal with grade 3 first coat and grade 5 second coat. Asphaltic concrete and precast paving will be permitted subject to specific approval of the details by the Engineer.

3.1.2.5i **Curve Dimensions:** The minimum inside radius of all curves shall be nine metres.

3.1.2.5j **Accessway Width:** The legal boundary of the accessway shall include all cut and fill batters and passing bays, and if necessary to accommodate these, the minimum dimensions as required by Table 3.4 shall be increased.

3.1.3 ROADING GEOMETRY

3.1.3.1 Design Criteria

All roads shall be designed in accordance with Austroads “Urban Road Design” - Guide to the Geometric Design of Major Urban Roads and “Rural Road Design” - A Guide to the Geometric Design of Rural Roads.

Off street and on street parking shall be designed in accordance with Austroads “Guide to Traffic Engineering Practice Part II –Parking”

In addition, the requirements as set out in the remainder of this section shall be complied with.

3.1.3.2 Longitudinal Gradients

The choice of a longitudinal gradient will depend principally on the type of terrain.

The volume and extent of earthworks in new subdivisions is influenced by the maximum and minimum gradients adopted. The minimum acceptable gradient will normally be 0.5%, but in exceptional conditions, a flatter minimum gradient may be necessary. Residential street gradients should not be steeper than 12.5%. On all routes likely to carry significant volumes of public transport or heavy vehicles, the maximum gradient should not be more than 8%.

The Engineer may approve gradients which are greater than these maximum values. For cul-de-sacs heads, the maximum longitudinal gradient shall be three percent (3%), to prevent surface run-off water escaping from channels at vehicle crossings.

Where gradients steeper than those recommended above are unavoidable, they should be restricted to those sections of the street where the alignment is straight, and should be kept as short as possible.

3.1.3.3 Carriageway Crossfall

Normal crossfall of three percent (3%) in both directions from the crown shall be developed on all standard carriageways. However, in exceptional circumstances, this may be waived with special approval, but in no case shall be less than two percent (2%) or greater than five percent (5%) from the crown coupled with a lateral shift in the crown of up to one-quarter of the road width.

Where a uniform crossfall is developed from kerb to kerb, this shall not exceed two percent (2%) unless on a curve, where super-elevation may be permitted.

3.1.3.4 Super Elevation

Super-elevation is not necessary in 50 km/h zones, or in areas that in the opinion of the Engineer, are likely to become 50 km/h zones. Super-elevation may however be employed where it suits boundary levels up to the allowable design maximum crossfall. However, certain main routes may in the future, have an increased speed limit. If this development is a possibility, the Engineer may require super-elevation to be constructed to a speed value nominated at the time of the request.

Under any circumstances, the maximum crossfall should not exceed ten percent (10%) where uniform crossfall is developed. Super-elevation shall be calculated from Austroads design guides.

3.1.3.5 Grades at Intersections

Centre line grades at major intersections should be kept below three percent (3%) wherever possible.
At an intersection of two streets of differing classifications, the grade of the street having the higher classification should be carried through the intersection, adjusting the grades of the lower classified street accordingly. Generally with the centre line grade of the lower classified street intersecting the crossfall of the main street, the distances from the main road centre line are as given in Table 3.5 below.

Table 3.5 - Distance from the main road centreline for different width roads

Road Width (m)	Distance from main road centre line (m)
13.0	3.5
11.0	3.0
8.5	2.5

3.1.3.6 Kerb Lines

Generally, kerbs will be at the same level on both sides of the street. However, in special circumstances, the left hand and right hand kerb line may be better graded individually in conjunction with centreline levels, footpath levels and boundary levels. Under such circumstances, at a given cross-section the left hand and right hand kerbs may differ from each other in level provided the following standard design tolerances are not exceeded. The maximum difference in kerb line height from one side of the carriageway to the other is shown in Table 3.6 below.

Table 3.6 - Maximum difference in kerb lines for different widths of carriageways

Width of Carriageway (m)	Maximum Difference in Kerb Line (mm)
7.5	140
8.0	150
8.5	160
11.0	175
13.0	200

3.1.3.7 Horizontal Curves

Curves in 50 km/h areas may be circular with a minimum radius of 50m on the centreline. In areas that may have a higher speed limit in the future, the Engineer may require transition curves with a specified speed value. Transition curves shall be computed in accordance with Austroads Design Tables. Widening is not required on circular curves**.**

3.1.3.8 Vertical Curves

Vertical curves shall be designed as set out in Austroads, for a minimum speed value of 50 km/h, and shall have a minimum sight distance of 60m. In areas that may have a higher speed value in the future, the minimum speed value and sight distance to be used shall be determined by the Engineer.

3.1.3.9 Visibility at Intersections and Vehicle Entrances

Visibility at all urban intersections and at rural intersections and vehicle entrances shall be in accordance with Austroads "Urban Road Design", Clause 8.3.5.3 and Table 8.4.
Adequate sight distance both up and down the major route is to be provided to enable traffic to emerge safely from the side street or vehicle entrance.

Rural vehicle entrances shall be designed in accordance with Standard Drawings R 28, R 29 and R 30, so that a vehicle can be parked in the accessway clear of the road carriageway while the gate to the property is opened.

3.1.3.10 Cul-de Sac Heads

Cul-de-sac heads shall be provided generally in accordance with the alternatives shown on Standard Drawing R 04, except that Type C heads shall only be used where six lots or less are to be serviced, or with the specific approval of the Engineer. A radius of the turning head shall be in accordance with the dimensions shown on Standard Drawing R 04.

The number of parking spaces to be provided within the cul-de-sac head shall be calculated as follows;

Where the number of lots with frontage or access off the cul-de-sac head (ie from the point where the road exceeds the standard width) is equal to or less than ten, four parking spaces shall be provided.

For every additional three lots or part thereof with access from the cul-de-sac head, one extra parking space.

3.1.3.11 Berms

Berms shall accommodate footpath, road lighting, underground services, landscaping and grass areas.

The width of the berm shall be as set out in tables 3.1 and 3.3 of this section.

The normal slope of the grass berm from kerb to boundary shall be four percent (4%). This slope shall not be less than three percent (3%), nor more than ten percent (10%).

Where it becomes necessary to employ a berm steeper than eight percent (8%), it will be necessary to produce design gradients for each individual property access to show that these may be satisfactorily negotiated by a vehicle with clearance at sag or summit crossings, in accordance with Clause 2.5.3 of AS/NZS 2890.1 : 2004 – "Parking Facilities Part 1 – Off Street Car Parking".

3.1.3.12 Batters

Fill batters shall not be steeper than four horizontal to one vertical, except where lesser slopes are specifically approved by the Engineer. Cut batters shall be dependent on the type of soil being cut, and in all cases shall be approved by the Engineer.

The top edge of a fill batter or the toe of a cut batter shall be at least 600mm beyond the street boundary. Where cut and fill affects excessively large areas, or in rural areas, the Engineer may approve steeper cut and fill batters, but these will only be permitted where no other practicable alternative exists.

3.1.3.13 Formation Width

The formation width shall be the full width of the street plus 1.2m and all batters shall be in private property. Where a subdivision abuts an existing street that will require earthworks in the course of future upgrading, then provision must be made in the subdivision for 3m wide batter easements on the new subdivision sections. If a batter is not practicable, then the full cost of a retaining structure, to the approval of the Engineer, shall be met by the Developer.

3.1.4 PAVEMENT DESIGN

3.1.4.1 General Requirements

Secondary and District arterial roads shall be designed in accordance with Austroads-"Pavement Design – A Guide to the Structural Design of Road Pavements", the "New Zealand Supplement to the Pavement Design Guide', and Austroads-" A Guide to the Design of Pavements for Light Traffic", as appropriate.

All other pavements shall be designed for a minimum life of 25 years.

All roads shall comply with the design requirements as set out in Table 3.7 below.

Table 3.7 - Roading Design Requirements

Road type	Min. basecourse Depth mm	Max allowable Deflection mm
Cul-de-sac <150 m long	125	2.0
Cul-de-sac >150 m long	125	1.0
Through Road	150	1.0
Industrial Road	200	0.75
Principal/Arterial Road	Design to Austroads standards	

3.1.4.2 Test and Design Data

The following information shall be submitted for approval:

- The engineering design drawings
- All soil test information obtained to provide a basis for pavement design, with a reference to the origin of the design method
- A copy of the design calculations used to determine pavement thickness

- If a stabilising agent is to be used, the designer shall submit a range of relevant test results, and calculations, including the percentage use of the stabilising agent and an indication of the likely CBR value to be achieved by the stabilisation
- Any additional information that may be needed to evaluate the design.

3.1.4.3 Subgrade

The subgrade shall be constructed in accordance with TNZ Specification F/1.

The subgrade shall be tested for compliance with the CBR and other properties required by the applicable design method. Testing shall be in accordance with the methods described in Part 3 of this Section.

Subgrade compliance shall be subject to approval by Council before construction of the pavement layer.

Where a low bearing value is obtained for the subgrade, it may be advantageous to employ a stabilised sub-base, rather than excavate to a greater depth. Specific design of a stabilised subgrade shall be to the satisfaction of the Engineer.

3.1.4.4 Pavement

The basecourse shall be constructed in accordance with TNZ Specification B/2.

The finished pavement shall be tested as set out in Clause 3.3.2 of this Chapter.

3.1.4.5 Pavement Layer Construction

Pavement construction below the kerb and channel shall extend 500mm behind the kerb face.

3.1.5 SURFACE SEALING

Urban roads may be surfaced with asphaltic concrete, a two stage seal coat, interlocking concrete paving or other surfacing subject to the Engineer's approval.

The following locations shall to be surfaced with asphaltic concrete:

- All roundabouts, including the central circular area and to at least the tangent point in the kerb where it abuts the straight section of carriageway.

- The heads of all cul-de sacs including all manoeuvring areas and to at least the tangent point as for roundabouts above.

The following requirements shall be adhered to when surfacing roads:

a) Asphaltic Concrete

- For normal carriageway sections, a minimum thickness of 25mm of Mix 10.
- For roundabouts and cul-de-sac heads, a minimum thickness of 35mm of Mix15.

All asphaltic concrete shall be applied in accordance with TNZ Specifications M/10 and P/9 (and notes).

b) Chip Seal Coat

A two coat seal system shall be applied comprising a first coat of Grade 3 chip wet locked with a second coat of Grade 5 chip. All chips shall comply with TNZ Specification M/6.

The design of the system shall be in accordance with the TNZ Bituminous Sealing Manual and TNZ Specification P/3.

c) Concrete Block Paving

- The subdivider may surface the road carriageway with interlocking paving blocks subject to specific approval from the Engineer.
- The concrete blocks shall comply with, and laying shall be in accordance with, NZS 3116 : 2002 - "Concrete Segmental Paving".

Pavements as set out in NZS 3116 : 2002 - "Light Vehicular" are not acceptable.

3.1.6 ROAD DRAINAGE

3.1.6.1 Sub Soil Drains

In some cases, where topography dictates or where soils are not free draining it may be necessary to lay a subsoil drainage system of perforated pipes.

In such cases subsoil drains will be required behind the kerb and channel as follows:

- Minimum subsoil pipe size 90mm
- Minimum depth to invert 500mm

3.1.6.2 Batter Drains

Where a road is constructed in a cutting and moisture appears on the face of the cutting, a porous drain shall be constructed at the toe of the batter.

3.1.6.3 Drain Outlet Levels

Subsoil and batter drain outlets shall be connected to the nearest downstream cesspit or manholes.

3.1.6.4 Wet Spots

Any permanent wet spot in the subgrade below the line of the longitudinal porous drains, or any area undercut below the level of the longitudinal drains shall be connected to the nearest enclosed stormwater system by a suitably sized porous drain.

In areas where soils are not free draining, a porous drain shall be constructed under both channels. The invert level of the drain shall be a minimum of 500 mm below subgrade level.

3.1.7 KERB AND CHANNEL

Kerb and channel as shown on Standard Drawing R 11 shall be provided on both sides of the carriageway in all urban subdivisions. In roads with a single crossfall, kerb and channel on one side and a concrete edging strip on the other side will be permitted.

Mountable kerbing, as detailed on Standard Drawing R 11, shall be used on street islands, and may be used on private accessways or where specifically approved by the Engineer.

3.1.8 DISH CHANNEL

Refer to profile on Standard Drawing R 11.

3.1.9 CESSPITS

Cesspits shall be provided in the following locations:

- At intervals of all channels in such a position that the maximum "run" of water in any channel is 100m for single carriageways and 60m for dual carriageways
- A intersections, located at the uphill kerb line tangent points
- At any low spot in a channel
- At changes of gradients and/or direction in the channel where there could be a tendency for water to leave the channel in the absence of a cesspit
- Where it is necessary to prevent water discharging across a berm, eg from a kerbed and sealed right of way, accessway, or private driveway.

A double cesspit must be provided in the following locations:

- At low points to minimise the risk of ponding due to the grating of a single cesspit becoming blocked
- At the ends of cul-de-sacs
- In all channels where the gradient is steeper than five percent (5%)

Cesspits shall be connected to a stormwater manhole by a 225mm diameter pipe for single cesspits with leads less than 15m in length, otherwise the pipe size shall be 300mm diameter.

For double cesspits, the pipe size shall be 375mm diameter, unless specifically designed for the pipe flows, and shall be connected directly into a manhole.

3.1.10 FOOTPATHS

All urban roads shall have footpaths to the extent shown in Table 3.1

Footpaths shall be 1.4m wide. Where, under special circumstances, the footpath is located adjacent to the kerb, the width of the footpath shall be 1.4m measured from the back of the kerb. In shopping areas, the footpath width may be increased as required by the Engineer.

Crossfall on footpaths shall not vary outside the limits of two percent (2%) to four percent (4%).

3.1.11 PRAM CROSSINGS

A pram crossing as detailed on Standard Drawing R 07 shall be provided in the kerb line at all road intersections.

Preferably the pram crossing should be located immediately "downstream" of a cesspit or at the high spot in the kerb and channel so that there is a minimum flow of water in the channel past the crossing.

3.1.12 VEHICLE CROSSINGS

There shall be three types of crossings; residential, commercial/industrial and rural.

As a part of the development, the appropriate crossing as detailed on the Standard Drawings shall be provided at the entrance to all accessways to rear lots, private accessways and service lanes, heavy vehicle entrances and all frequently used entrances.

For front lots, where the location of the crossing cannot be determined reasonably from the contour of the section and the proposed siting of the building, the crossing shall be installed at the time of the erection of the building on the lot, in accordance with the Council By-Laws.

3.1.12.1 Vehicle Crossings for Residential Vehicles

A residential crossing serving one lot shall be 115mm thick unreinforced 17.5 MPa concrete on a compacted subgrade in accordance with Standard Drawing R 08. Where an existing concrete footpath is in position, the section of footpath shall be saw cut and removed, and the new concrete crossing shall be poured from the kerb line to the boundary, except where the retention of the existing footpath has been approved by the Engineer.

Where an existing vehicle crossing is required to be widened to meet a standard access width, then the whole of the existing crossing shall be removed and replaced to the correct width and standard.

A residential crossing serving more than one lot shall comply with the conditions set out above, but shall be 150mm thick and shall be reinforced with HRC 665 mesh.

No residential crossing shall be located closer than 15 metres from the intersection of the two kerb lines at any adjacent intersection, unless specific approval is granted by the Engineer. In all cases, adequate visibility must be provided in accordance with Clause 3.1.3.9.

3.1.12.2 Vehicle Crossings for Industrial/Commercial Vehicles

Crossings to all industrial and commercial lots, and to all private ways and service lanes serving more than two lots, shall be of minimum 150mm thick, 20 MPa concrete. The crossing and the kerb and channel shall be reinforced as shown on Standard Drawing R 09. Any existing footpath and kerb and channel is to be replaced and recast as part of the new crossing.

No commercial or industrial crossing shall be located closer than 30 metres from the intersection of the two kerb lines at any adjacent intersection unless specific approval is granted by the Engineer. In all cases, adequate visibility must be provided in accordance with Clause 3.1.3.9.

3.1.12.3 Rural Vehicle Crossings

Rural crossings shall be surfaced with a two coat seal on a compacted basecourse on subgrade, all as for normal carriageway construction, in accordance with Standard Drawings R 28, R29 and R 30.

The primary purpose of rural crossings is to protect the edge of the existing seal. The crossing must therefore be formed to cover the anticipated or (in the case of existing unsealed crossings) the existing vehicle swept path area, with the full area of the vehicle exit and entry from the carriageway to the legal boundary being covered. In situations where the legal boundary is either very close to, or a considerable distance away from the edge of the carriageway, the minimum length of the crossing from the edge of the carriageway shall be 7.0m.

Rural crossings shall be culverted as necessary to allow the passage of water in any roadside drain or swale.

No rural crossing shall be located closer than 50 metres from the intersection of the two carriageway edgelines at any adjacent intersection unless specific approval is granted by the Engineer. In all cases, adequate visibility must be provided in accordance with Clause 3.1.3.9.

3.1.13 STREET LIGHTING

Street lighting shall be installed in all new subdivisions and developments.

The Developer shall design and submit a street lighting proposal to the Engineer for approval.

The design shall be in accordance AS/NZS 1158.3.1 : 2005 - “Performance and Installation Design Requirements”.

Street lights are generally to be located at the joint property boundary position on the street frontage.

Where it is deemed by the Engineer that the proposed light pole or fitting is not a common type to the district, it will be necessary for the subdivider to show to the Council that replacement lights and poles are readily available in the event of failure or damage occurring. The type of pole and fitting to be installed shall be subject to specific approval by the Engineer.

3.1.14 SIGNS AND ROAD MARKING

Street name signs shall be supplied and erected in accordance with Standard Drawing R 12.

Where a subdivider requires an alternative name plaque or subdivisional entrance feature to be installed, this shall be subject to specific approval, and notwithstanding this approval the standard sign shall also be erected.

Where road marking and signs are required as an integral part of the roading function, it is the developer's responsibility to provide these facilities at his cost. All road marking and signage installation shall be in accordance with the requirements of the TNZ Manual of Road Signs and Markings. In all cases edgelines shall be 100mm wide and all paint used shall be reflectorised waterborne paint complying with TNZ Specification M/7.

As part of the engineering plan approval, satisfactory design drawings of signs and road marking are to be prepared.

3.1.15 SERVICE LANES

Where required and dimensioned by the resource consent, the subdivider shall provide and form a service lane to facilitate delivery of supplies.

The service lane shall have a commercial/industrial vehicle crossing in accordance with Standard Drawing R 09 at the entrance, and must have adequate stormwater disposal. The service lane shall be kerbed on both sides, or shall have concrete edging strips and a central dish channel, or a single crossfall to a kerb, with a concrete edging strip on the high side. Surfacing to all service lanes shall be asphaltic concrete.

Layout, pavement design and surfacing will be subject to the approval of the Engineer.

Where the service lane crosses an existing footpath, a commercial/industrial crossing shall be installed at the Developer's expense.

3.1.16 PRIVATE ACCESSWAYS

Private accessways shall be formed to the dimensions and specification as shown on Standard Drawings R 13 and R 26.

The following clauses shall apply to urban private accessways.

3.1.16.1 **Gradient:** The maximum carriageway gradient shall be 1 in 5.

3.1.16.2 **Stormwater Drainage:** Stormwater drainage shall be provided so that the maximum "run of water" does not exceed 60m, with all stormwater shall be collected and discharged to an approved system. Stormwater shall be controlled so that it does not run over the street berm or vehicle crossing, in accordance with Clause 3.1.9.

3.1.16.3 **Surfacing:** An accessway serving a single lot shall be surfaced with roading metal to ensure all weather access. Accessways serving more than one lot shall have a concrete, interlocking paver or asphaltic concrete surface provided on the accessway and to all designated car parking areas in accordance with Standard Drawing R 13.

3.1.16.4 **Vehicular Access*:*** Where vehicular access is across any berm on the legal road reserve, a vehicular crossing shall be provided at the Developer's expense in accordance with Standard Drawing R 08 or R 10

3.1.16.5 **Lighting:** Where required by Table 3.1, or where an accessway serves more than three lots, a street light in accordance with Clause 3.1.13 shall be placed opposite the new accessway in a position approved by the Engineer.

3.1.16.6 **Private Services***:* Utility services for each individual dwelling shall be installed in the accessway, of sufficient length and capacity to serve all building sites utilising the accessway for frontage to the public road.

3.1.17 PARKING BAYS

All parking spaces, where required, shall be designed in accordance with the requirements of the Austroads "Guide to Traffic Engineering Practice, Part 11 – Parking". On-road parking bays where required, shall be constructed to the same standard as the adjoining road and shall continue the road crossfall.

Where required, provision shall be made for parking and access for disabled persons in accordance with the requirements of NZS 4121: 2001 – Design for Access and Mobility: Buildings and Associated Facilities.

3.1.18 FENCING

Fencing will be required at the sides of any road, street, reserve or accessway, if in the opinion of the Council such fencing is necessary to ensure the safety of the public, or to avoid, remedy or mitigate any adverse effect on the environment.

Fences shall be required on both sides of a pedestrian accessway in accordance with Standard Drawing R 14.

Other fences to be erected will be specified by the Council and must be constructed in accordance with Standard Drawing R 14 or as approved by the Engineer.

Temporary fencing shall be erected by the subdivider to protect the general public, particularly children, from all danger areas in the subdivision during the construction of the works. Signs shall be erected warning persons of the dangerous areas. The use of barbed wire is prohibited.

Fencing covenants in favour of Council will be required over all lots fronting land, other than roads, vested in Council. Covenants shall be prepared by the Council's solicitor at the expense of the Developer.

3.1.19 TRAFFIC CALMING

3.1.19.1 General

This clause sets out recommended standards for traffic calming features relating to local streets. These standards are referenced from *"The Street Where You Live"* by M L Gladd 1995.
Traffic calming is a shorter and more descriptive term than Local Area Traffic Management (or LATM) as it is known and is the introduction of changes to the street to slow down and reduce the flow of traffic and/or to divert heavy and large vehicles to roads designed to take them.

Developers are encouraged to provide these features to enhance the local environment of the streetscape.

Traffic calming has the following advantages:

- Speed reduction
- Reduction in accidents
- Streetscape improved by increasing planting areas
- Noise - reduced due to slower speed
- Quality of life - reduced noise and stress and increased streetscaping (cobbles, shrubs, trees and grass, etc), results in a better quality environment and this can be reflected in the status of the area and property values.

3.1.19.2 Traffic Calming Devices and Uses

There is a wide choice of traffic calming devices for residential streets from very mild to severe, including outright closure. Some common types are listed in Table 3.8 below.

Table 3.8 - Types of Devices for Residential Street Traffic Calming

Degree of Severity	Threshold or Peripheral	En Route Changes
1. Mild Restraints	1.1 Threshold Type B	1.4 Change of alignment
	1.2 Threshold Type C	1.5 Traffic islands in street
	1.3 Splitter islands ("fish tail" or short median)	
2. Moderate Restraints	2.1 Threshold Type A	2.2 Two lane angled slow point (with divider)
		2.3 Two lane speed hump
		2.4 Cushion (hump) to only affect narrow vehicles
		2.5 Platform, minor intersection.
		2.6 Roundabout, minor intersection.
3. Strong Restraint		3.1 Single lane slow point.
		3.2 Single lane speed hump
		3.3 Combined slow point with hump.
4. Very Strong Restraints		4.1 Diagonal closure of intersection
		4.2 Complete closure of road (at end or en route)
		4.3 Meandering restraint zone or "Woonerf" (usually with supplementary devices)

How "tough" a measure is needed depends on the severity of the problem, the target maximum traffic flow or speed, the needs to reduce the use of the road by through traffic and heavy vehicles, and the type of property served.

Materials and landscaping should enhance the streetscape and be both durable and easy to maintain. In general, where there is a vertical action (eg a "platform" type of restraint) and the area is reasonably large, coloured interlocking paving blocks are the preferred material. Planting of grass, shrubs and larger trees can usually be achieved on areas of road removed from the trafficable area.

3.1.19.3 Design

The Standard Drawings R 19, R 20, R 21 and R 22 indicate various traffic calming devices. All designs will be subject to final approval by the Engineer.

3.1.19.4 Construction

All costs associated with the construction of traffic calming devices shall be borne by the subdivider.

PART 2 MATERIALS

3.2.1 GENERAL

The following specifications or requirements apply to materials to be incorporated into the works.

3.2.2 SUB BASE METAL

Sub base metal shall be GAP 65 complying with TNZ Specification M/4.

3.2.3 BASECOURSE METAL

Basecourse metal shall be AP40 complying with TNZ Specification M/4

3.2.4 CEMENT

Cement shall comply with NZS 3122 : 1995 - “Specification for Portland and Blended Cements”

3.2.5 SEALING CHIPS

Sealing chips shall conform to TNZ Specification M/6 for all applications in the works.

3.2.6 ASPHALTIC BITUMEN

Asphaltic bitumen in pavement tack coats and sealing shall conform to TNZ Specification M/1 and shall generally be 180/200 penetration grade.

3.2.7 ASPHALTIC CONCRETE

Asphaltic concrete shall conform to TNZ specification M/10 –Specification for Asphaltic Concrete.

3.2.8 CONCRETE

Cement, aggregates and water shall be of the qualities specified in NZS 3109 : 1997 - “Concrete Construction”.

The following specification shall apply to the production of the concrete:

NZS 3104 : 1991 - “Specification for Concrete Production-High Grade and Special Grade”.

3.2.9 TOPSOIL

Topsoil for berms and gardens shall be of a suitable medium for growing the ordinary range of cultivated trees, shrubs, grasses and herbaceous plants under satisfactory conditions of management.

It shall be free from the following:

- Persistent weed and plant pests
- Roots in excess of 25mm in diameter or 300mm long
- Clay lumps
- Brick, concrete or other building materials
- Any contamination which in the opinion of the Engineer, may be detrimental to plant growth
- Turf sods of a size which interfere with subsequent cultivation or use.

The Developer shall inform the Engineer of the intended source of all topsoil to be brought on to the site and shall provide a reasonable sample for approval before commencing topsoiling operations.

3.2.10 GRASS SEED

The seed mixture shall be certified free of all pests and diseases. The seed mixture and proportions of each variety to be used is as follows:

- Turf type – Perennial Rye Grass (Drought tolerant)
- The total sowing rate shall be 350kg/hectare or 35gm/m^2

At the time of sowing, a compound pre-emergence fertiliser such as 4:12:15 NPK shall be applied on to the topsoil at a rate of 100kg/ha.

3.2.11 TIMBER

Timber for all edging and pegs shall be H4 treated timber. Timber for fencing shall be H4 treated for posts or any members in contact with the ground, and shall be H3 treated for all other components.

3.2.12 CONCRETE BLOCK PAVING

Concrete blocks shall comply with NZS 3116 : 2002 - “Concrete Segmental Paving”.

3.2.13 REINFORCING

Reinforcing bars shall comply with AS/NZS 4671 : 2001 - “Steel Reinforcing Materials”

3.2.14 ROAD MARKING PAINT

Road marking paint shall comply with TNZ Specification M/7 - “Specification for Road Marking Paints”.

3.2.15 SIGNS

Signs shall comply with NZS 5414 : 1977 - “Specification for the Construction of Traffic Signs” and the current TNZ “Manual of Traffic Signs and Marking”. The sign font shall be as noted on Standard Drawing R 12.

PART 3 TESTING

3.3.1 SCALA PENETROMETER

The Scala Penetrometer shall only be used where a significant part of the subgrade passes a 9.5mm sieve.

On carriageways Scala tests shall be taken at the following locations and frequency:

Carriageway 4.0m wide and less	Along centreline
Carriageway between 4.0m and 8.0m	Along kerbside wheel tracks
Carriageway 8.0m and wider	Along centreline and kerbside wheel tracks.

The test sites are to be at a maximum of 15m centres for each line, or where 2 or 3 lines are required these may be staggered at 10m intervals, giving a spacing of 20m or 30m for each line.

3.3.2 BENKLEMAN BEAM

The Contactor shall test the surface to be sealed with a standard Benkleman Beam test apparatus. This shall be carried out immediately prior to surfacing and shall be witnessed by Council.

The beam test shall be as per TNZ Specification T/1.

The test axle shall be a dual tyred single axle of 8.2 tonnes. Readings shall be taken at the kerbside wheel track on both sides of the carriageway at a maximum interval of 15m on each side. Where the carriageway is 8.0m or wider, tests at 15m intervals shall also be taken on the centreline.

A section of road shall be accepted as complying with the deflection requirements based on the following criteria:

- not more than 5% of the tests shall exceed the maximum as set out in Table 3.7
- no single result shall exceed the maximum allowable by more than 50%
- any area of excessive deflection shall not exceed 5m^2.

If the section of road fails to achieve the above required standard of deflection, the subdivider shall carry out additional tests on the sub-base and basecourse and confirm that:

- the actual thickness of pavement agrees with the design thickness as determined by the CBR tests
- the grading and quality parameters of metal conforms to requirements
- the pavement is of suitable density.

Any subsequent beam or laboratory tests shall be arranged and paid for by the subdivider.

If beam readings are within 25% of design criteria and all the requirements above have been met, Council may permit the subdivider to surface the road provided that agreement has first been reached on a suitable bond, pending final acceptance.

PART 4 CONSTRUCTION

3.4.1 GENERAL

This part covers new road pavement and includes all pavement layers between the finished natural subgrade level up to and including the finished basecourse.

3.4.2 IMPORTED SUBGRADE LAYER

Any imported subgrade material for the pavement shall be “run of pit” sand, unless otherwise specified or approved by the Engineer. The suitability of alternatives will need to be demonstrated.

The material shall be placed in layers not exceeding 150mm [compacted thickness] and at optimum moisture content.

The material shall be compacted to the specified California Bearing Ratio [CBR]. The standard of compaction shall be not less than 95% of the optimum dry density of the material as specified in Test 4.1.1 of NZS 4402 : 1986 - ”New Zealand Standard Compaction Test“, or Test 4.1.3 ”New Zealand Vibrating Hammer Compaction Test”.

Scala Penetrometer tests shall be carried out as detailed in Section 3 “Testing”.

3.4.3 SUB-BASE LAYER

Material contained in this layer shall be GAP65 unless otherwise specified.

No sub-base layer material shall be placed until the subgrade has been satisfactorily completed and approved by the Engineer.

The sub-base layer shall be compacted in accordance with TNZ Specification B/2.

Compaction of the subgrade shall be tested according to Section 3 - “Testing” in this chapter and shall comply with the specified criteria.

3.4.4 BASECOURSE LAYER

Material contained in this layer shall consist of AP40, to TNZ M/4.

No basecourse layer material shall be placed until all previous pavement layers have been satisfactorily completed and approved.

The basecourse layer shall be compacted in accordance with TNZ Specification B/2.

In addition to the requirements of TNZ Specification B/2 and any preceding requirements of this specification, approval of the basecourse and the pavement as a whole shall be subject to testing with a Benkleman beam, as set out in Section 3 - “Testing” in this Chapter.

3.4.5 CONCRETE WORK

3.4.5.1 General

This specification covers all concrete work for footpaths, vehicle crossings, kerb and channel and other works. These shall be formed to the dimensions shown in the Standard Drawings and to the details shown on the plans.

The strength of concrete shall be as shown on the Standard Drawings.

3.4.5.2 Formwork

Formwork shall comply with the requirements of NZS 3109 : 1977.-."Concrete Construction"

3.4.5.3 Concrete Mix

Concrete shall be either ordinary grade, high grade or special grade as defined in NZS 3109 : 1977 - "Concrete Construction".

Concrete production shall be in accordance with the following standards:

NZS 3104 : 1991 - "Specification for Concrete Production-High Grade and Special Grade"
NZS 3108 : 1983 - "Specification for Concrete Production-Ordinary Grade".

3.4.5.4 Concrete Placing

Concrete shall not be placed in any unfavourable conditions which may be detrimental to its quality and finish. Unfavourable conditions shall include low temperatures, excessively hot dry conditions, excessively wet conditions or any situations where it becomes impractical to work and finish the concrete adequately.

3.4.5.5 Reinforcement

All reinforcement other than ties and stirrups shall be deformed unless otherwise detailed.

At the time concrete is placed the reinforcement shall be free from loose flaky rust, mud, oil or other coatings which will destroy or reduce the bond.

Reinforcement shall be accurately placed, adequately supported and secured against displacement prior to or during concrete placement.

The minimum cover to all main reinforcing bars shall be 50mm unless otherwise specified.

3.4.5.6 Curing

Strict attention shall be paid to adequate curing of the placed concrete.

From immediately after placement, concrete shall be protected from premature drying, excessively hot or cold temperatures and mechanical injury.

It shall be maintained with minimal moisture loss for the period necessary for hydration of the cement and hardening of the concrete.

In cold or wet weather, concrete shall be protected from the elements by suitable coverings during the curing period.

3.4.6 KERB AND CHANNEL

3.4.6.1 Construction

All kerbing and channelling shall be constructed using an approved slip form or machine extruded method. Cast in situ methods against static form work shall be subject to specific approval by the Engineer.

"No Slump" concrete for machine placed kerb and channel shall have a minimum cement content of 240kg/m³.

Precast kerbing blocks shall not be used except with the specific approval of the Engineer.

3.4.6.2 Subgrade Under Kerbing

The subgrade under kerbing and channelling shall be equivalent to the road subgrade. A minimum depth of 50mm of compacted basecourse shall be placed beneath the kerb and channel. Where the subgrade strength is less than CBR 7, a designed, compacted basecourse bedding shall be placed beneath the kerb and channel. The basecourse layer beneath the kerb and channel shall extend at least 200mm past the rear of the kerb. After the kerb is poured and before any road metal is placed on the channel (road) side, suitable filling shall be placed behind the kerb and channel. This shall not be done until the concrete has reached sufficient strength to accept the compactive efforts applied to the roading basecourse.

3.4.6.3 Kerbing Standard and Tolerances

The line of the kerb shall be perfectly straight between tangent points and on curves shall sweep round without kinks, flats or angles in a true arc to the radius shown or directed. The levels shown on the approved drawings shall be strictly adhered to except at intersections where slight adjustments will be made, if necessary, to give perfect lines throughout. Where the kerb finishes against other structures, this shall be done in a neat and tradesman like manner to the approval of the Engineer.

Table 3.9 - Kerbing Finishes and Tolerances.

Tolerances	Horizontal straight sections	± 3mm over 5m straight edge ± 5mm from true radius line
	Vertical curved sections	± 5mm from design levels with no section holding water
Finishes	No visual blemishes or changes in surface texture	

3.4.6.4 Construction Machine Damage

The greatest care shall be exercised when rolling or grading adjacent to the kerb and channel and in particular, a grader blade must not be used to remove road metal from the channel.

No kerbing length shall have more than five percent (5%) in number of chips or otherwise this section of kerbing shall be removed and entirely repoured, eg 100m length of kerbing can only have up to 5 chips in its entire length.

All chips in channels and kerbs shall be repaired using an approved epoxy mortar system.

3.4.6.5 Contraction Joints

Contraction joints shall be cut by guillotine and spaced at not more than 4m centres. Cold joints in concrete more than two hours old shall be cut with a saw to provide a proper face on which to restart the extrusion.

Where kerbing and channelling is interrupted by precast elements, eg kerb returns, cesspits etc, the machine laid kerbing and concrete shall be sawn to a square face unless the precast elements have been set in place before the kerb laying commences.

3.4.6.6. Testing

Prior to final acceptance by Council, the effectiveness of the channels and cesspits is to be tested by flooding the channel from a fire hydrant or tanker. Any ponding of water in the channel shall render the work unacceptable.

3.4.7 SUBGRADE DRAINAGE

Subsoil drains shall comply with TNZ Specification F/2 “Pipe Subsoil Drain Construction”.

Drainage pipes shall be perforated pipe with a minimum internal diameter of 100mm. Pipes shall be laid in a trench backfilled with an approved filter material at least 100mm thick on all sides of the pipe. The backfill material shall be brought up to subgrade level in all cases.

Backfill material shall consist of clean drainage metal graded between 20mm and 5mm.

The pipe shall have a minimum gradient of 1 in 200 to discharge into a cesspit or manhole.

The invert of subsoil drains at the cesspit or manhole shall be not less than 100mm above the invert of the receiving chamber.

3.4.8 FOOTPATHS

3.4.8.1 Construction

Footpaths shall be of concrete with a minimum 28 day strength of 20 MPa.

The following nominal thicknesses shall apply:

- In conjunction with vertical kerb and channel, 75mm
- In conjunction with mountable kerb and channel, 115mm
- In conjunction with turning circles of cu-de-sacs on all kerb types: 100mm reinforced with HRC 665 mesh
- In industrial and commercial subdivisions on all kerb types: 150 mm reinforced with HRC 665 mesh.

The footpath shall be constructed on subgrade with a minimum strength of CBR 7 and a compacted sub-base of at least 50mm of GAP20 basecourse.

The subgrade preparation for the footpath shall extend at least 100mm beyond the finished edges of the footpath.

3.4.8.2 Tolerances and Finishes

The tolerances and standards of finish as shown in Table 3.10 below shall apply to all footpaths.

Table 3.10 - Footpath Tolerances and Finishes.

Tolerances	Horizontal straight sections Curved sections	± 5mm over 3m straight edge ± 10mm from true radius line
Finishes	No visual blemishes or changes in surface texture. No cracks in surface. Minor hairline cracking associated with curing will be subject to specific inspection and approval by the Engineer. No visible signs of damage or vandalism. Surface finish shall be Class U5 (Shallow Textured by Bass broom) to NZS 3114 : 1987.	

3.4.9 BERMS

3.4.9.1 Topsoiling

After the formation, footpath and kerb and channel works have been completed, the berms shall be spread with a 75mm loose depth (65mm depth after rolling) of topsoil. The topsoil shall be graded to the kerb top and footpath edges.

Finished berm tolerances shall be ±20mm when checked with a 3m straightedge, and no areas shall hold water.

3.4.9.2 Cultivation

Before sowing areas of ground and lots disturbed by earthworks, the whole area shall be broken up and thoroughly cultivated to a depth of 150mm, then harrowed or raked to produce a firm seed bed with a fine tilth of 30mm deep for seeding. All rubbish, perennial weeds and stones greater in any dimension than 20mm arising from this work shall be collected and removed off-site.

Berms shall have the topsoil broken up to an even depth of 30mm and shall have all rubbish removed as for earthworks areas above.

3.4.9.3 Grassing

The Developer shall be responsible for establishing grass on all berms, and on all areas of ground disturbed by, or subjected to earthworks.

If necessary, sprinkler systems may be required to establish a take of grass and/or prevent topsoil being blown away by wind. The cost of sprinkler set-up and of moving sprinklers shall be borne by the Developer.

3.4.9.4 Seed Sowing

Grass seed shall be sown in all cultivated areas and berms at a rate of 350kg/hectare or 35g/m^2. At the time of sowing fertiliser shall be applied to the topsoil at the rate of 100kg/hectare or 10g/m^2

3.4.9.5 Failure to Establish Grass

Where, in the opinion of the Engineer, the failure to establish a successful cover of grass is due to the developer's negligence or the condition of the seed, the developer will be required to make good the sown areas to an acceptable standard before the work will be approved.

Grass areas will only be certified as being acceptable when germination is shown to be satisfactory, all weeds have been removed and the grass has been mown at least once.

3.4.10 ROAD SURFACING

3.4.10.1 General

TNZ Specification P/3 - "Specification for First Coat Sealing", TNZ Specification P/4 - "Specification for Resealing" and TNZ Specification M/6 - "Specification for Sealing Chips" shall be deemed to be part of this Specification except that :

All reference to the basis of payment contained within these TNZ Specifications is deleted
Reference to the Contractors obligations with respect to the foreshortening of the maintenance requirements of the seal coat is deleted.

3.4.10.2 Two-Coat Seal

A two coat seal shall be applied to the prepared basecourse surface.

The first layer shall consist of the supply and spraying of TNZ P/3 180/200 penetration grade bitumen cut back to suit, plus 1 part per hundred [pph] adhesion agent, at a rate of 1.2 litres/m^2 residual [measured at 15ºC], and the supply, spreading and rolling of TNZ M/6 Grade 3 chip at a spread rate of 75 m^2/m^3

The second layer shall consist of the supply and spraying of TNZ P/3 180/200 penetration grade bitumen cut back to suit, plus I pph adhesion agent, at a rate of 0.8 litres/m^2 residual [measured at 15ºC] and the supply, spreading and rolling of TNZ M/6 grade 5 chip at a spread rate of 150m^2/m^3.

Note that the finished basecourse level is to be flush with the channel for a chipseal surface.

3.4.10.3 Asphaltic Concrete Paving

The first layer shall consist of a waterproofing membrane seal composed of bituminous emulsion spread at a rate of 0.8 litres per m^2, and the supply and spreading of TNZ M/6 Grade 5 or other chip as approved by the Engineer, at a spread rate of $100m^2/m^3$

The second layer shall be applied immediately after the completion of the first layer and shall consist of the supply, spreading and compaction of the specified compacted thickness of asphaltic concrete laid in accordance with the relevant clauses contained within TNZ Specification P/9 - "Specification for the Construction of Asphaltic Concrete Paving".

Note that the basecourse surface shall be constructed to such a level that the finished surface of the asphaltic concrete will be 10mm above the adjoining channel level..

3.4.10.4 Concrete Block Paving

Road carriageways may be surfaced with concrete block pavers subject to the specific approval of the Engineer.

All bedding courses for block paving shall be laid in accordance with NZS 3116 : 2002 - "Concrete Segmental Paving".

All paving blocks shall be laid in accordance with NZS 3116 : 2002 - "Concrete Segmental Paving".

The type of paver to be used, the laying pattern and the types of edge restraint to be used are to be shown on the submitted drawings.

3.4.11 ROAD SIGNS

All signs are to constructed and installed in accordance with the following Standards:

- The latest version of the appropriate Transit NZ Specifications covering sign formats, in particular
- TNZ "Manual for Traffic Signs & Markings Part 1"
- TNZ C/20 -"Standard for Manufacture & Maintenance of Traffic Signs, Posts and Fittings"
- NZS 5414 : 1977 - "Specification for the Construction of Traffic Signs"
- Road Sign Manufacturers Association - "Compliance Standard for Traffic Signs".

WDC specification or individual requirements where required will supersede standards set out in the above documents.

- The size of signs and the font to be used are shown on Standard Drawing R 12.
- The face of the name plate blade is to be coloured High Density green with High Density white lettering. The backs of all signs are to be coloured "Aircraft Grey No 693" as referred to in NZS 7702 : 1989, or similar, with a semi-gloss finish, unless otherwise stated.

- All signs except “Rebound” plastic RG17s are to have an aluminium substrate.
- All Stop [RG5], Give Way [RG6], Keep Left [RG17] and street name plates are to be Class 1 Wide Observation Angle [VIP or similar] reflectorised sheeting.
- All other regulatory, warning and information signs are to be Class 1 High Intensity grade reflectorised sheeting.
- All parking signs are to be non reflective.
- All sign poles shall be fabricated from 50mm nominal bore medium galvanised tube and shall be powder coated white. Tops shall be capped with white powder coated end caps. Sign poles shall be set in a socket footing surrounded by a concrete mowing strip at least 100mm wide around the pole base.

3.4.12 TRENCH REINSTATEMENT

3.4.12.1 INTRODUCTION

Roads and streets in the Whakatane District are vested in the Whakatane District Council.

Before any trench or excavation is opened up on any road or street including the berm, in the Whakatane District, advice must be given to the Council as to the arrangements which have been made to maintain the trench or excavation in a safe condition, to backfill the trench or excavation and reinstate the surface.

Specific criteria will apply to proposed work in the Central Business District and urban shopping centres.

The carrying out of all work and the reinstatement of roadways and berms shall be carried out strictly in accordance with the requirements of SNZ HB 2002:2003 – "Code of Practice for Working in the Road", except where that code is modified by this specification.

Principal Providers, including Government departments, ad hoc utility corporations, Council departments and statutory corporations, or other organisations with statutory authority to place or maintain services in roads or streets will be required to submit a road opening notice to the Whakatane District Council.

The acceptance of a road opening notice by the Whakatane District Council does not confer any approval to work on Council utility assets.

3.4.12.2 ROAD OPENING NOTICE

A "Road Opening Notice" in the form of Appendix 3.1 is required to be lodged at the office of the Whakatane District Council for each separate job or section of a continuing job which involves excavation or the lifting of the road pavement or footpath surfacing or berm, on a road or street in the Whakatane District.

A minimum of seven (7) days notice is to be given for planned excavations. Where emergency maintenance work is necessary, the notice is to be lodged by fax as soon as practicable but no later than the next working day.

If the road or street involved is a State Highway, the notice will require that Transit New Zealand has been notified and any conditions imposed by that body have been received.

3.4.12.3 WORKS COMPLETION NOTICE

A "Works Completion Notice" in the form of Appendix 3.2 is required to be lodged at the office of the Whakatane District Council within one week of the completion of every job for which a Road Opening Notice has been lodged.

3.4.12.4 SURFACE REINSTATEMENT

No permanent surface reinstatement shall be carried out until the Engineer is satisfied that the backfilling procedures have been satisfactorily completed.

Reinstatement works are to be carried out in accordance with the requirements of Clause 4.7.2 of the Code and Standard Drawing R 31.

The surfaces detailed below shall be reinstated in accordance with the following requirements:

(a) ***Asphaltic Concrete, or Slurry Sealed Surfaces***

- Shall be reinstated using asphaltic concrete on a waterproofing primer coat of emulsified bitumen
- Thin asphaltic surfacings shall be 35 mm of mix 15 AC
- Structural asphaltic surfacings shall be a minimum of 50 mm of mix 20 AC.

(b) Chip Sealed Surfaces

(i) ***Transverse Trenches***

25mm of Mix 10 asphaltic concrete

(ii) ***Longitudinal and Isolated Repairs outside Traffic Lanes***

Two coat grade 3/5 bitumen seal coat.

Note - *In roads identified for resealing, method (ii) above will apply.*

(b) Concrete Footpaths

Where existing concrete footpaths are damaged or have sections removed during trenching works, they shall be reinstated in accordance with the following requirements:

- The minimum dimension of any reinstated portion of the footpath shall be not less than 1.0m.
- The footpath shall be reinstated across its full width
- Both sides of the section removed shall be saw cut the full depth of the existing concrete
- Where the section removed is less than 1.0m from a construction or shrinkage control joint, the reinstatement shall be made to the line of the joint

3.4.12.5 RESPONSE TIMES

Resurfacing must be completed within the following time periods:

(a) ***Arterial Roads*** 2 days

(b) ***Collector Roads*** 4 days

(c) ***Local Roads*** 7 days

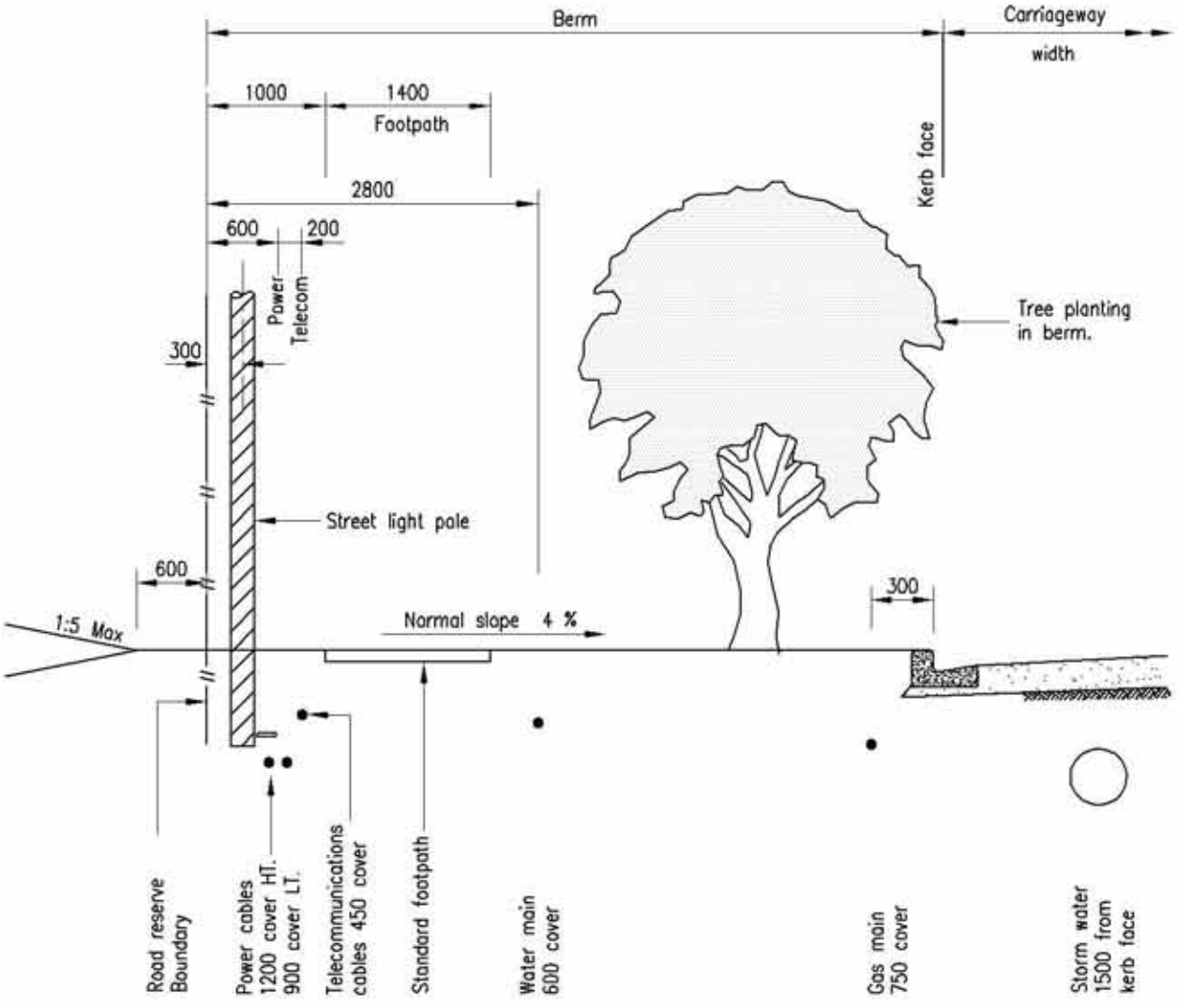
Where work is continuous, a sacrificial emulsion sealing coat shall be used to meet the response times with permanent sealing at the completion of the works.

Note: *The contractor shall be responsible for the maintenance of the road surface for the duration of the project.*

CHAPTER 3

ROADING

STANDARD DRAWINGS



WHAKATANE DISTRICT COUNCIL

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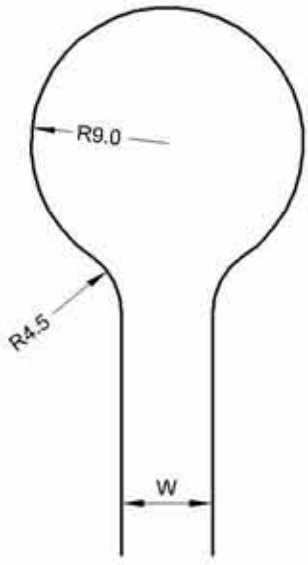
STANDARD DRAWING

NOT TO SCALE

STANDARD BERM

R 02

ISSUE 7.0
SEPTEMBER 2007



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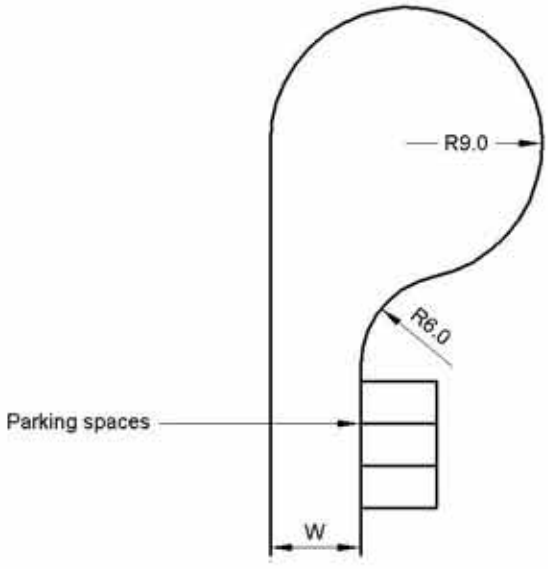

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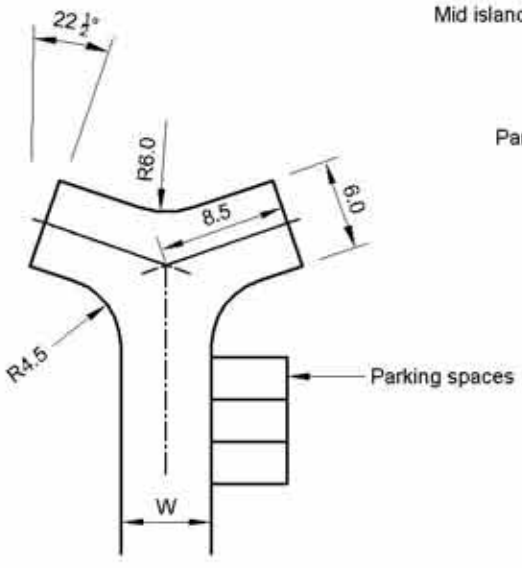

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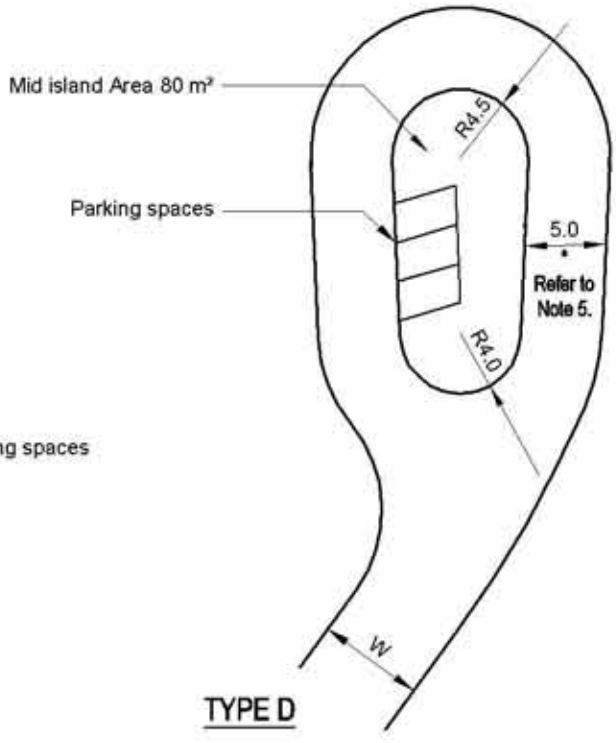

TYPE D

NOTES:

1. If 15 lots or less are serviced from the Cul de Sac and the Cul de Sac is less than 150m long the turning head radius shall be a minimum of 9.0m and the width 'W' shall be 6.0m.
2. If more than 15 lots are serviced from the Cul de Sac or the Cul de Sac is more than 150m long, the turning head radius shall be a minimum of 12.0m and the width 'W' shall be 7.0m or more.
3. A 'type C' Cul de Sac head may only be used where the Cul de Sac serves 15 lots or less and where the Cul de Sac is less than 150m long.
4. The width 'W' for a 'type D' Cul de Sac shall be a minimum of 7.0m.
5. The width of the traffic lane around the Cul de Sac head 'type D' may be reduced to 4.0m in isolated short lengths clear of the proposed driveways but must be wide enough to ensure that a 90 percentile 12.5m single unit truck can still negotiate the turning head without riding onto the kerbs.

WHAKATANE DISTRICT COUNCIL

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STANDARD DRAWING

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CUL DE SAC HEADS DESIGN EXAMPLES

R 04

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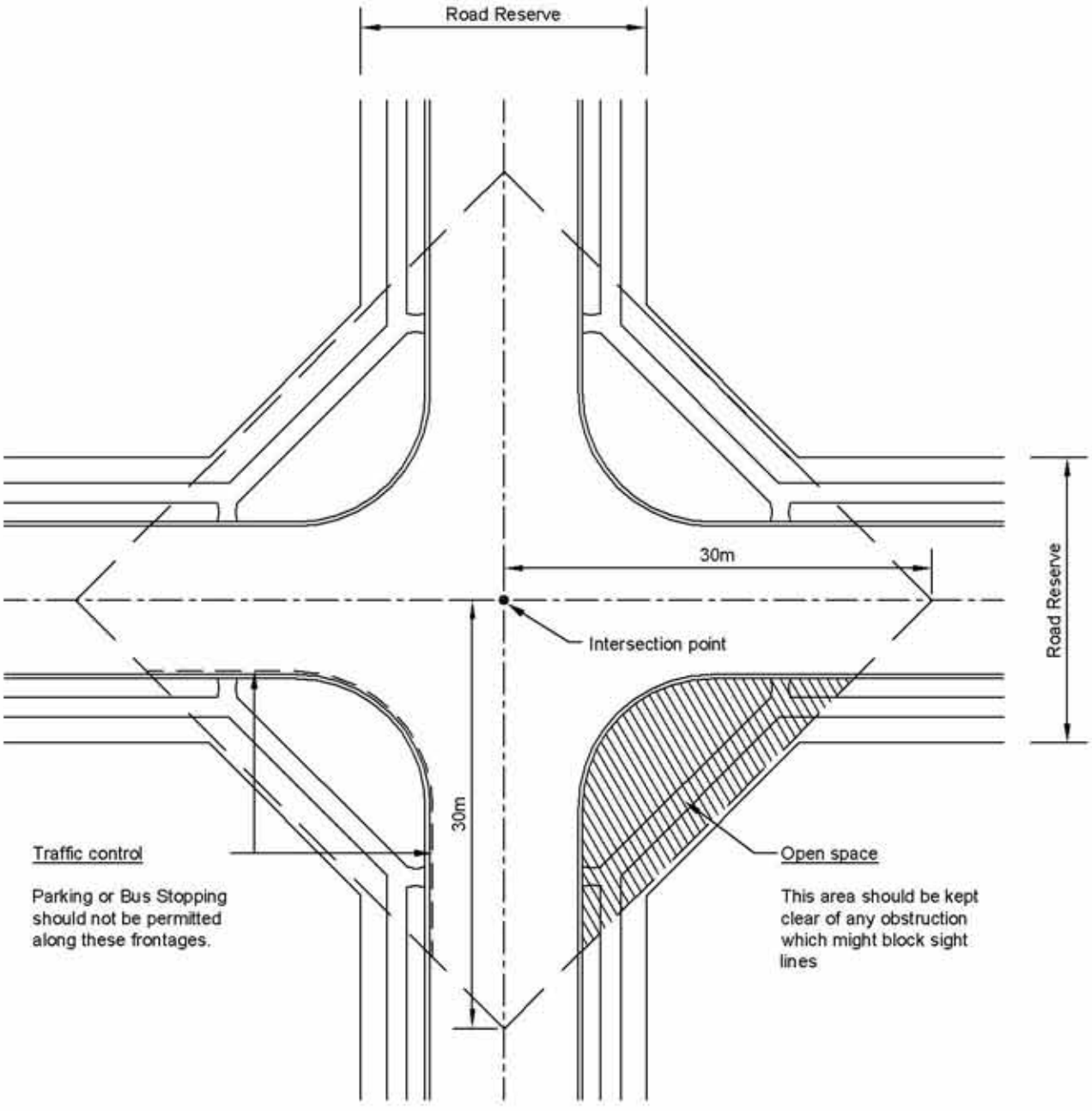

Note:

All standards of design illustrated hereon are jointly applicable to all corners of the intersection.

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TRAFFIC SIGHT LINES AT INTERSECTIONS

R 05

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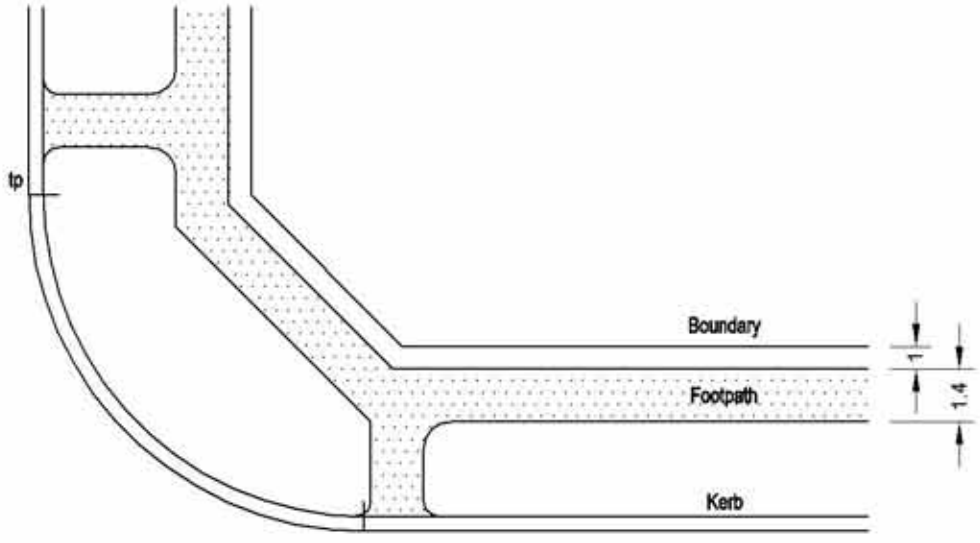

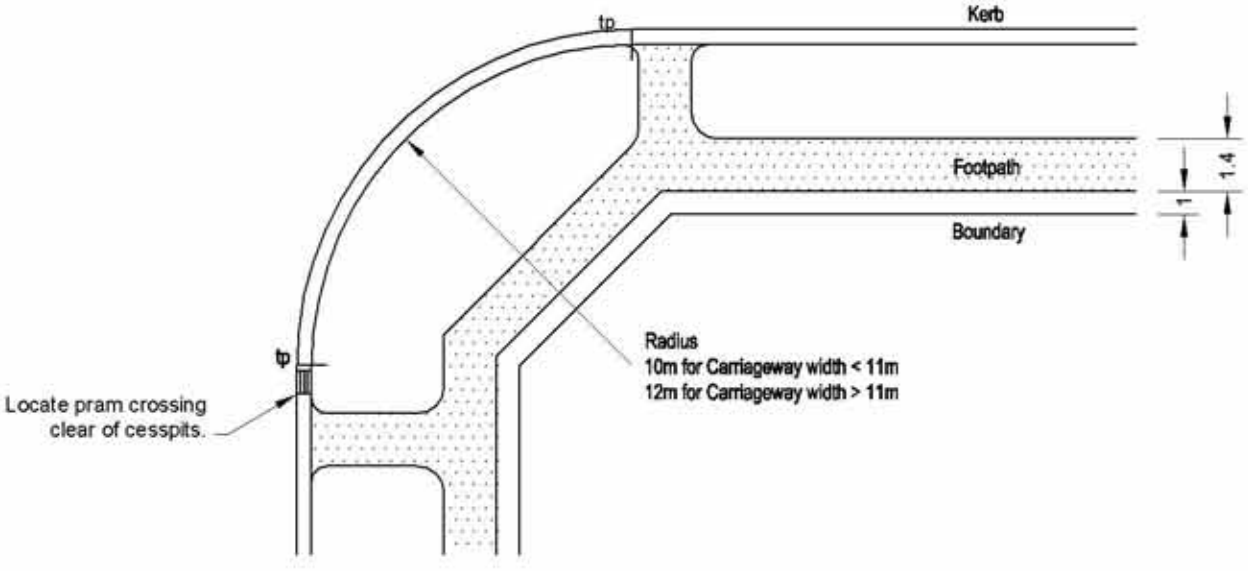

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NOT TO SCALE

TYPICAL INTERSECTION LAYOUT

R 06

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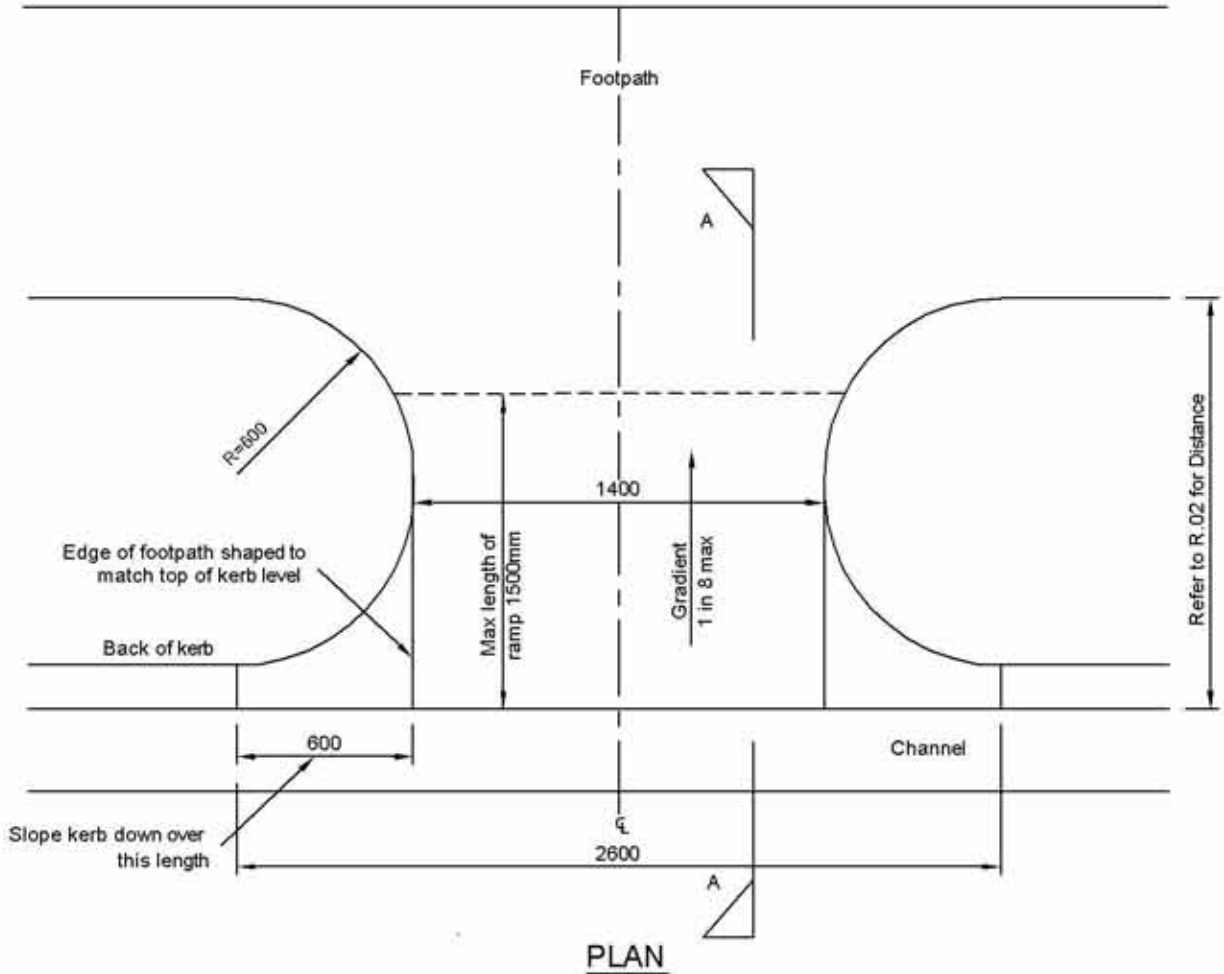
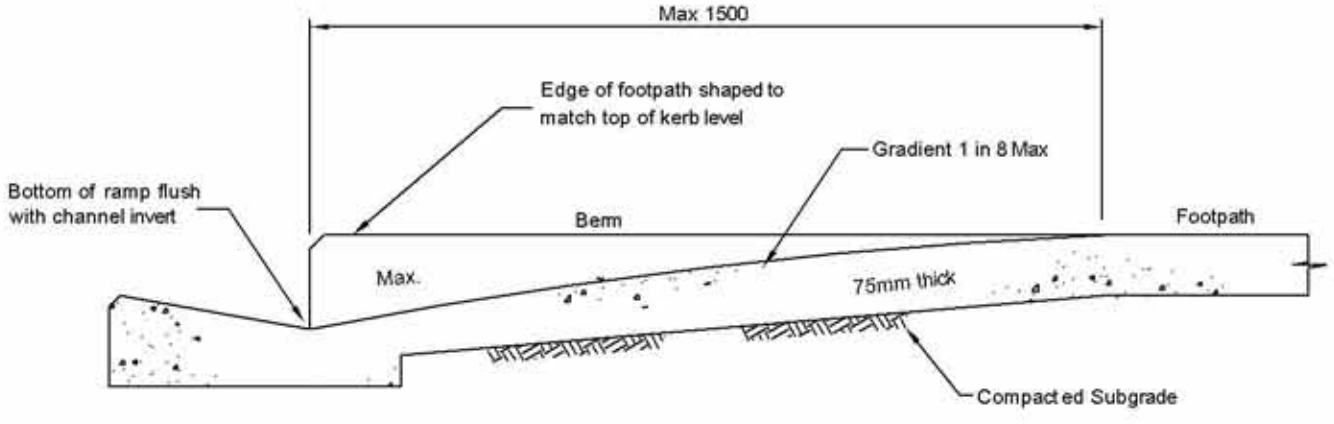


PLAN



SECTION AT A-A

WHAKATANE DISTRICT COUNCIL

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NOT TO SCALE

PRAM CROSSING

R 07

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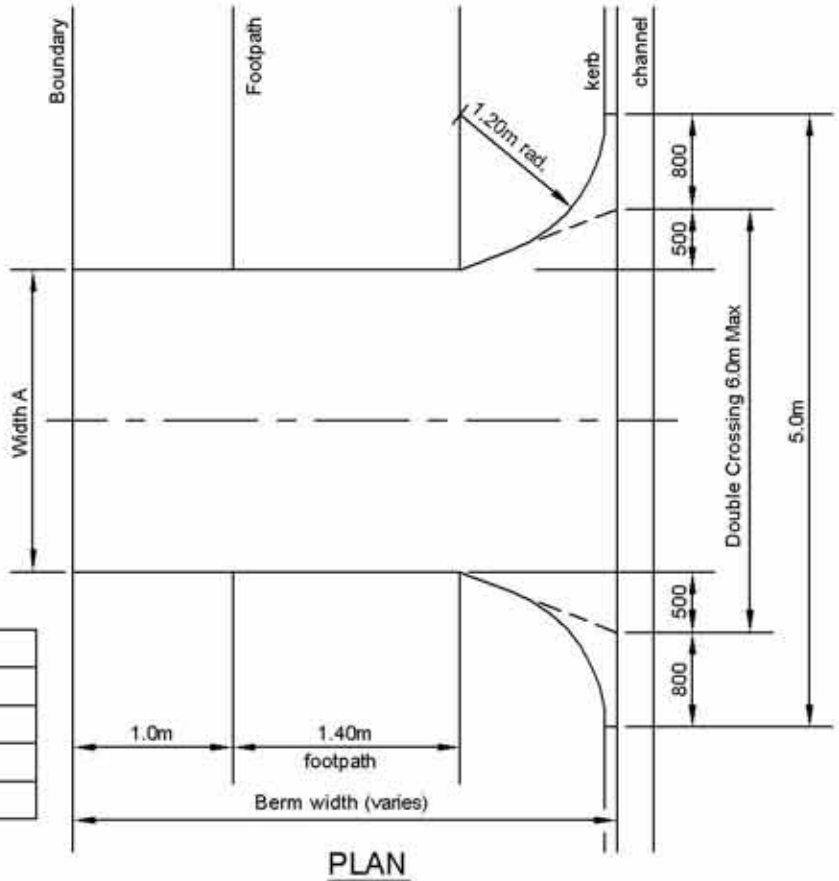
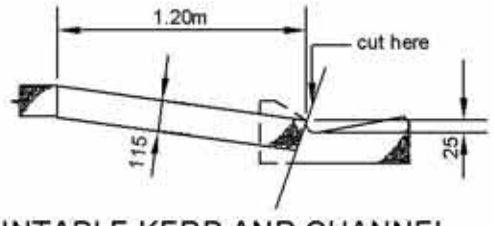
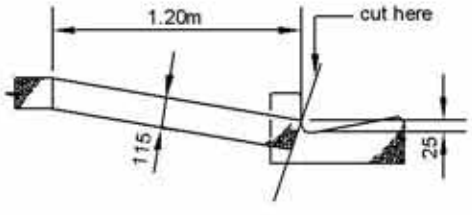


Crossing Dimensions	
No of Lots	Width 'A'
1	2.50m
2-3	3.00m
4-6	5.00m

PLAN



MOUNTABLE KERB AND CHANNEL



VERTICAL KERB AND CHANNEL

NOTES

1. The concrete shall be 115 mm thick.
2. All concrete shall have a minimum crushing strength of 20 MPa at 28 days and shall comply with NZS 3124:1987
3. If there is no existing footpath the Council will provide level pegs to ensure that the work ties in with future footpath development.
4. The work shall be carried out in such a manner as to ensure the safety of road and footpath users.
5. Vehicle crossing to be l ocated a minimum of 0.5m clear of cesspits, power poles or other similar obstructions.
6. A vehicle crossing serving 2 lots shall be reinforced with HRC 665 mesh placed centrally.
7. Crossing s serving more than 2 lots shall be 150mm thick and reinforced with HRC 665 mesh placed centrally .
8. The footpath is to be replaced unless specifically exempted by the Engineer and the crossing shall run continuously between the kerb and the property boundary.
9. Where there is an existing kerb and channel in satisfactory condition the kerb shall be removed by saw cutting at the back edge of the channel as shown above.

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STANDARD DRAWING

NOT TO SCALE

VEHICLE CROSSING RESIDENTIAL

R 08

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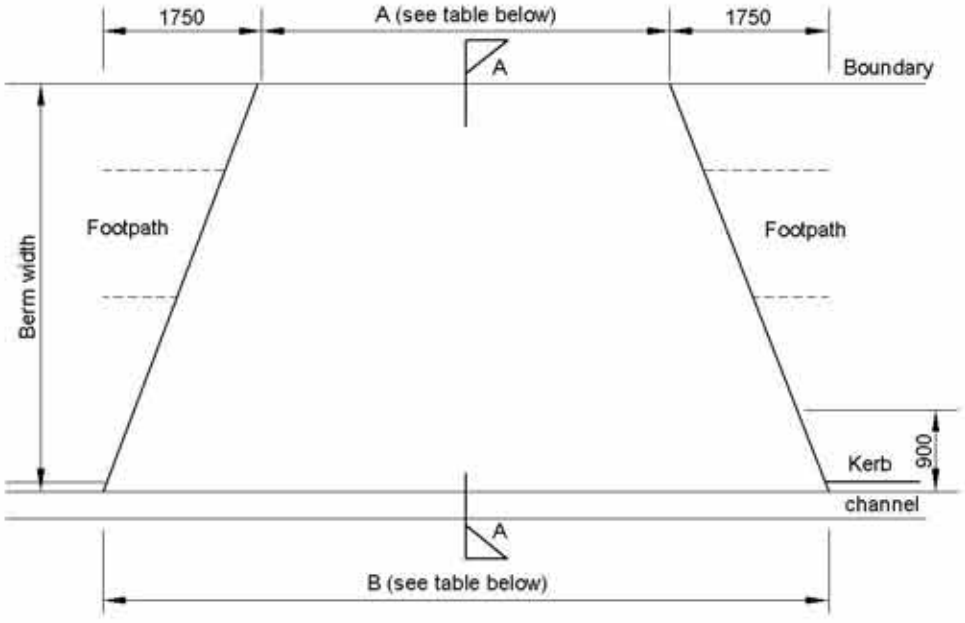
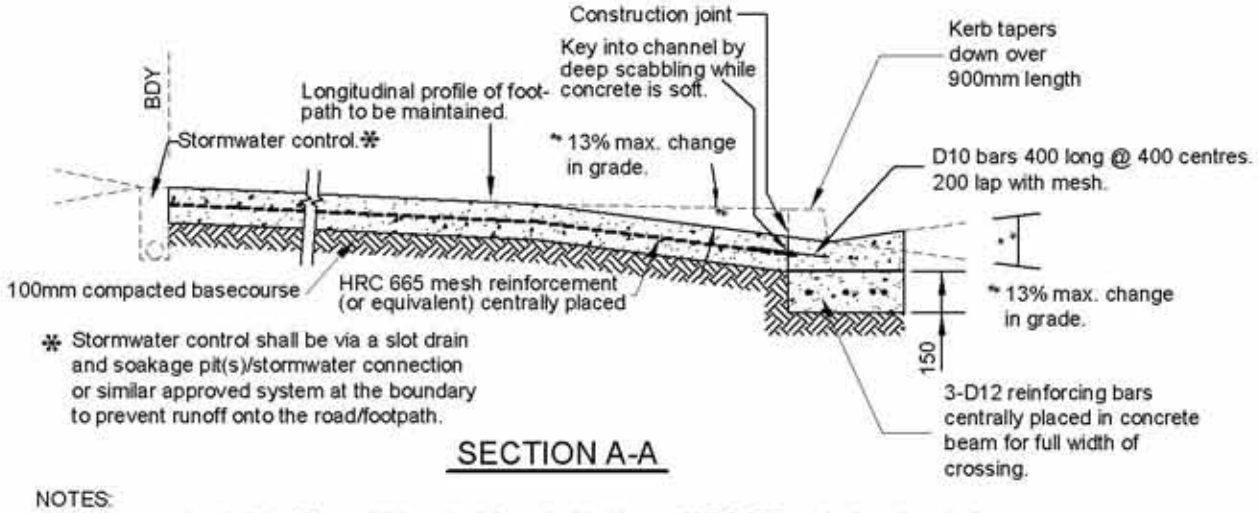


PLAN



* Stormwater control shall be via a slot drain and soakage pit(s)/stormwater connection or similar approved system at the boundary to prevent runoff onto the road/footpath.

SECTION A-A

NOTES:

1. The concrete shall be 150mm thick and reinforced with 1 layer of HRC 665 mesh placed centrally.
2. The concrete shall have a minimum crushing strength of 20 MPa at 28 days and and shall comply with NZS 3124:1987.
3. The crossing shall run continuously between the kerb and the property boundary. All existing footpath, kerb and channel are to be replaced.
4. If there is no existing footpath the Council will provide level pegs to ensure that the work ties in with future footpath development.
5. The work shall be carried out in such a manner as to ensure the safety of road and footpath users.
6. Locate crossing a minimum of 0.5m clear of cesspits, power poles or other similar obstructions.

	HEAVY INDUSTRIAL (Double lane)	HEAVY INDUSTRIAL (single lane only)	LIGHT INDUSTRIAL (single lane)	LIGHT INDUSTRIAL (double lane)
A	7000	4500	3500	6000
B	10 500	8000	7000	9500

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VEHICLE CROSSING INDUSTRIAL/ COMMERCIAL

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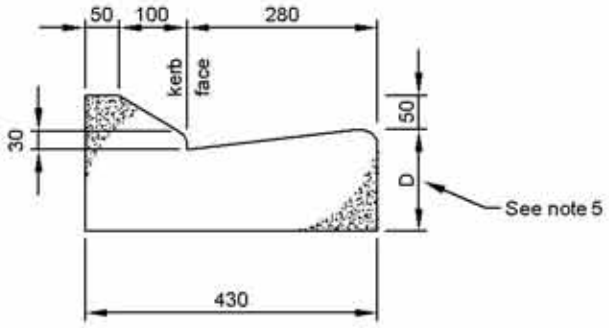
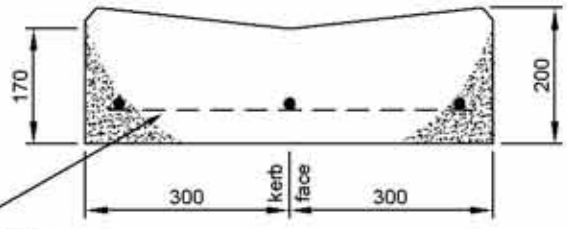
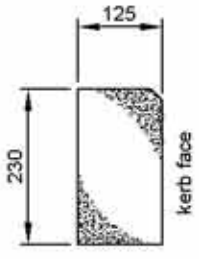


MOUNTABLE KERB AND CHANNEL



Reinforce with one layer of HRC 665 mesh with 50mm cover from the bottom or 3 x D16 reinforcing bars.

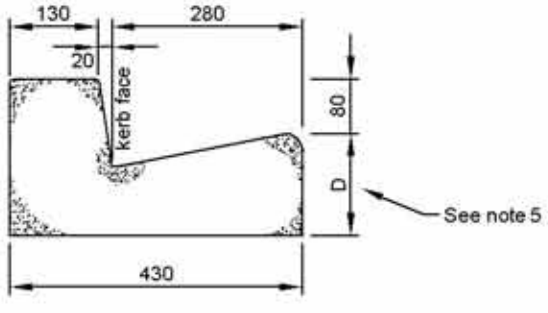
DISHED CHANNEL



NIB KERB

Note:

1. All chamfers shall be 25mm.
2. 'No slump' concrete shall have a minimum cement content of 240kg/m ^{3}.
3. All dimensions are in millimetres.
4. Mountable kerb shall only be permitted where the Engineer is satisfied that berms will not be at risk as a result of indiscriminate access or continuous parking.
5. Depth 'D' as shown on kerb and channel detail is defined as follows:
   Residential - 150mm
   Industrial / Commercial - 230mm
6. Subgrade beneath kerbs and channels shall have a CBR of no less than 7.



VERTICAL KERB AND CHANNEL

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KERB AND CHANNEL PROFILES

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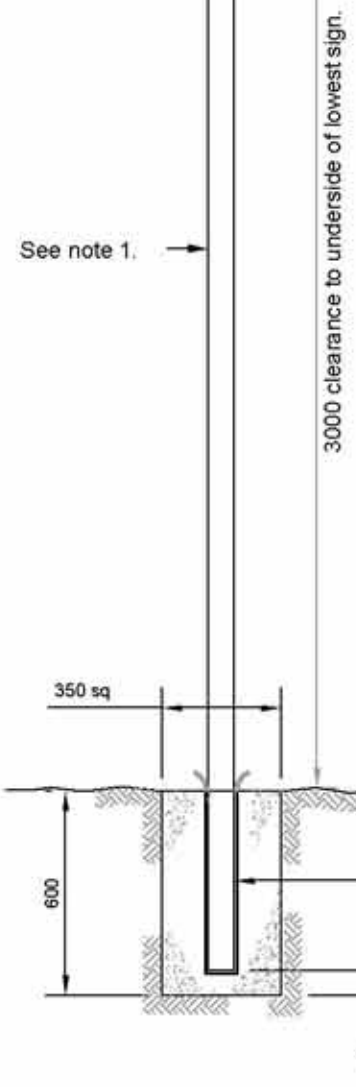
NOTE:
Street names may be erected on existing poles where approved.



NOTES:-

1. Posts and supports to consist of:-

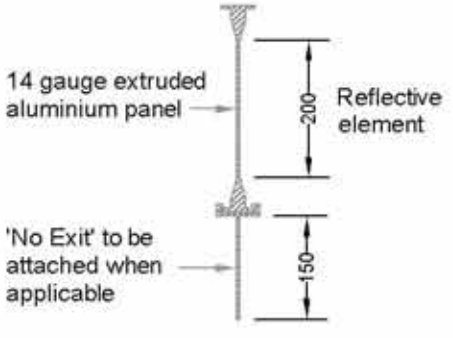
   a) Rural area: 100mm x 100mm timber, clean building grade or No. 1 framing grade, treated H4, primed and finished with high gloss white paint above ground level.
   b) Urban area - 50mm ID galvanised mild steel or aluminimum pipe, powder coated white located using galvanised or aluminium sockets in concrete footings with mowing strips.

2. Signage to be in accordance with Transit New Zealand "Manual of Traffic Signs and Markings-Part 1: Traffic Signs". To have WHITE retroflective symbols and lettering on GREEN background. Signs to be shaped to a point to indicate direction.

3. Lettering to be upper and lower case to the weight detailed in table 4 below.

4. SIGN BLADE DETAILS

Primary Blade Size	Supplementary Blade Size	Letter Height	Supplementary Letter Height
200mm	150mm	150mm Series D	100mm Series D



POST DETAIL

TYPICAL BLADE SECTION

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STREET SIGNS

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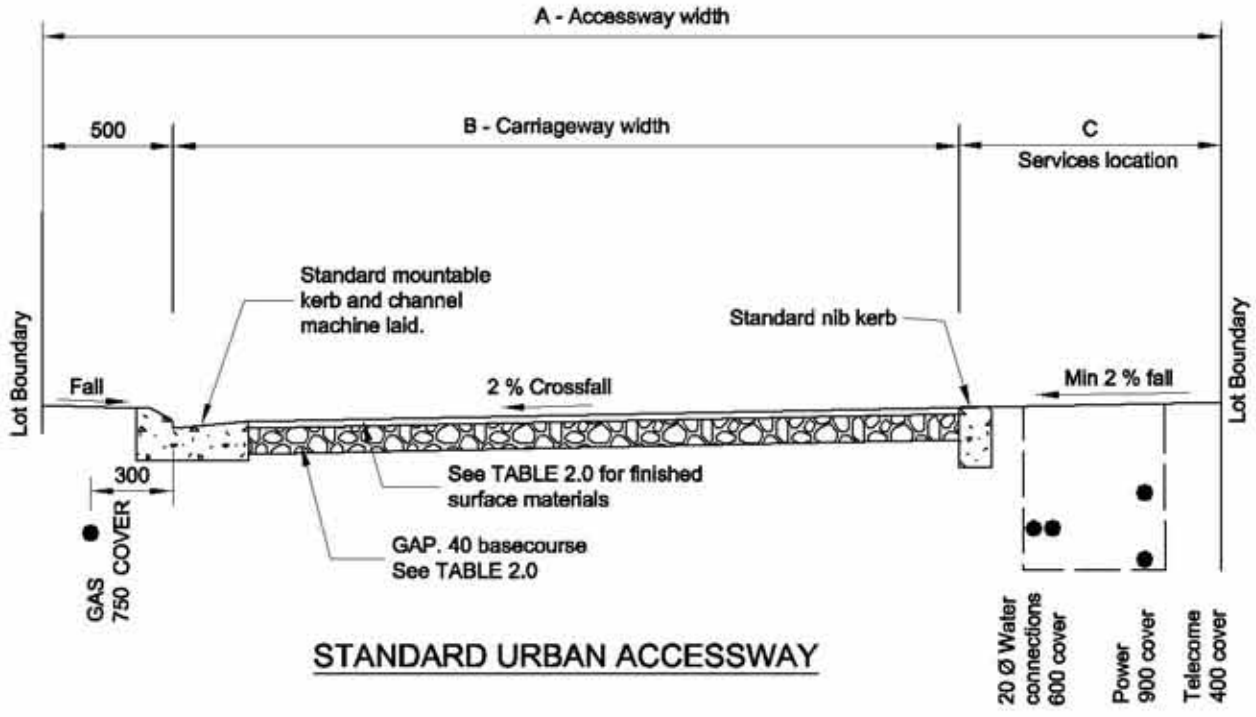

STANDARD URBAN ACCESSWAY

TABLE 1	ACCESS WIDTHS		
NO. OF LOTS	DIMENSIONS		
	A	B	C
1	3.00	2.00	0.5
2-3	4.00	3.00	0.5
4-6	6.0	5.00	0.5

TABLE 2	SURFACING OPTIONS
OPTION A	60mm COBBLESTONES 20mm SAND 100mm BASECOURSE
OPTION B	25mm ASPHALTIC CONCRETE 125mm (MIN) BASECOURSE
OPTION C	100 mm CONCRETE WITH 665 MESH REINFORCING

NOTES
1. Maximum Length of Accessway is 60 metres.
2. All concrete should be 20 MPa
3. Maximum number of allotments served shall be 6
4. Where concrete is used nib kerb can be deleted.
5. Chip sealing is not permitted

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STANDARD URBAN ACCESSWAY CONSTRUCTION DETAILS

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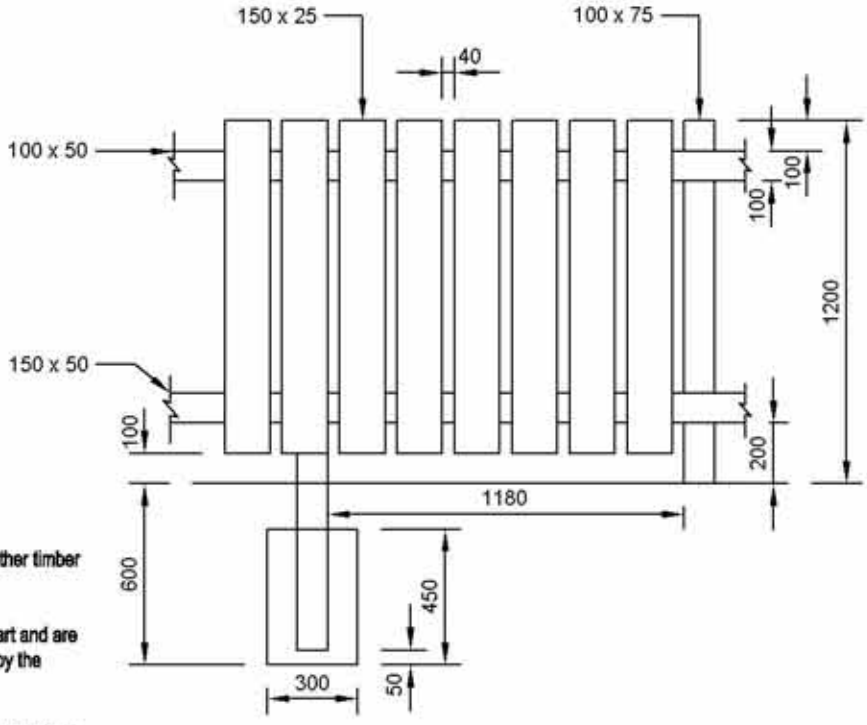
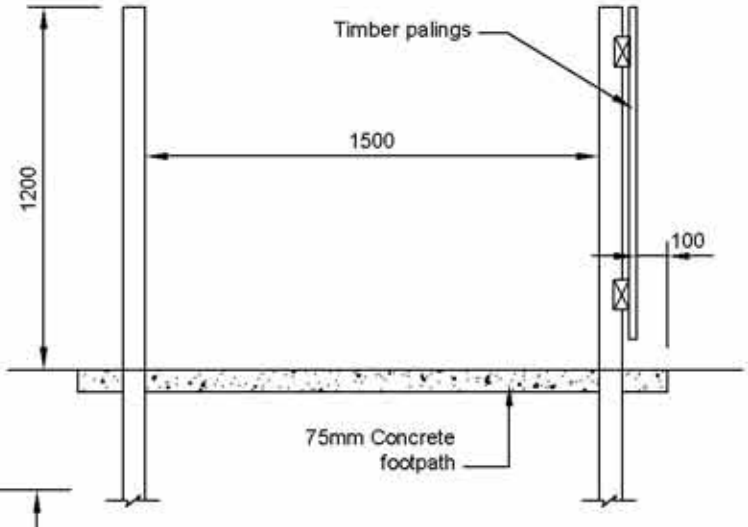
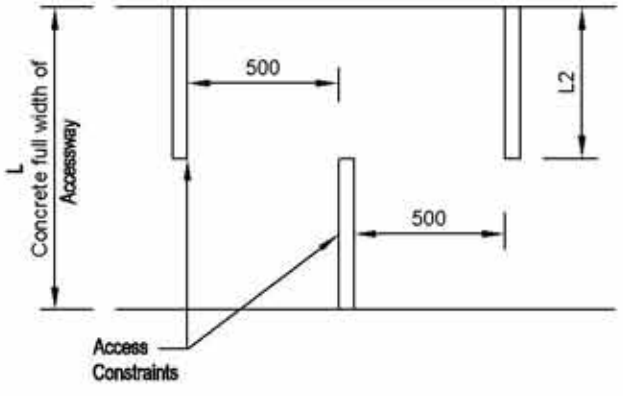


NOTES

1. Timber to be ground treated H4. All other timber H3 to be treated.
2. Posts not to be greater than 1.8m apart and are to be set in concrete or as approved by the manager of parks.
3. All joins are to be by way of galvanised bolts or nails and are finnly secured.
4. All construction to be in accordance with recognised tradesman practice.
5. All timber unstained and unpainted.





NOTES:

1. Fence shown represents minimum standard required. Alternatives may be agreed with the manager of parks.
2. Access constraints: U shaped 50mm Ø Galvanised pipe 900mm high above the ground.

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FENCING PEDESTRIAN ACCESSWAYS

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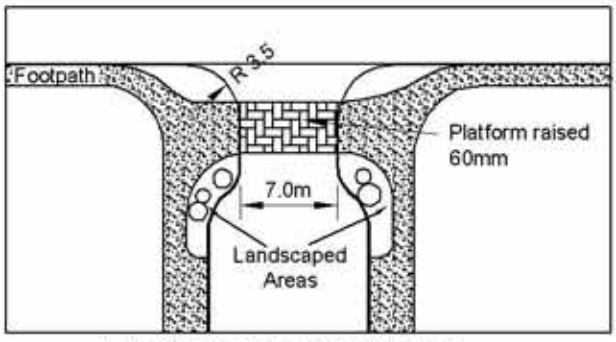
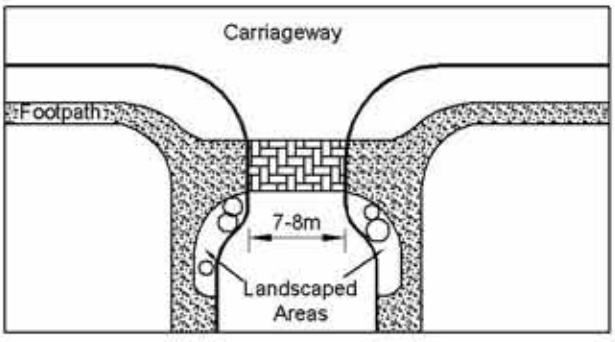
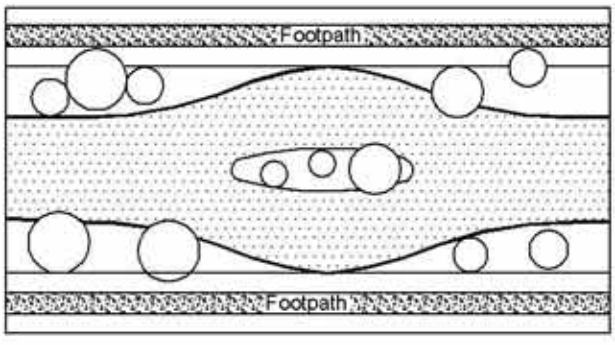


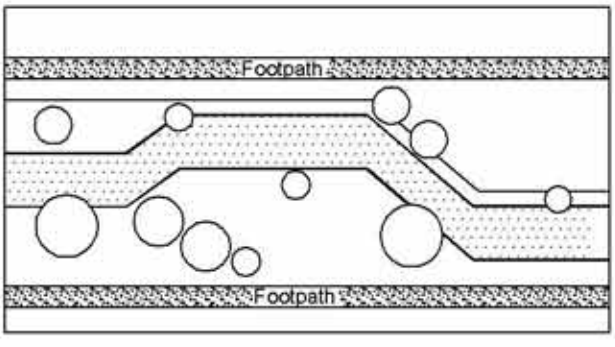
1.1 THRESHOLD TYPE B



1.2 THRESHOLD TYPE C



1.3 TRAFFIC ISLANDS IN THE STREET



1.4 CHANGE OF ALIGNMENT

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TRAFFIC CALMING DEVICES
MILD RESTRAINTS

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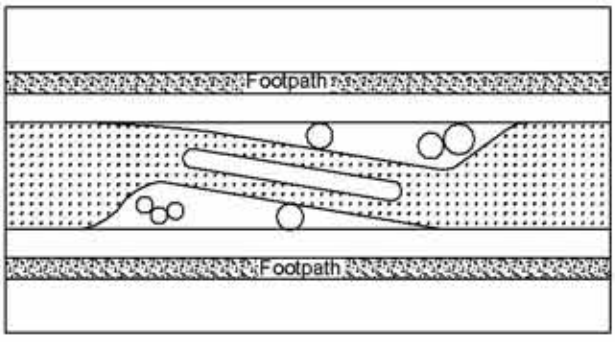
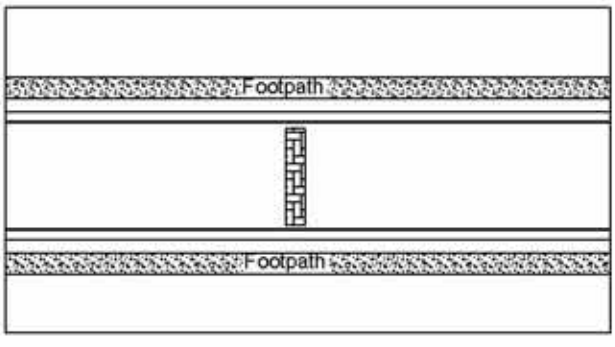


2.1 TWO LANE ANGLED SLOW POINT



2.2 TWO LANE HUMP

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TRAFFIC CALMING DEVICES MODERATE RESTRAINTS

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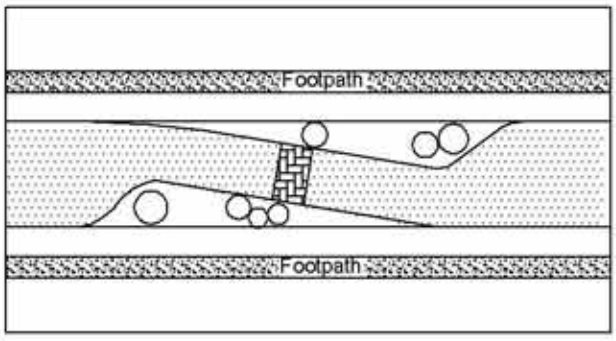
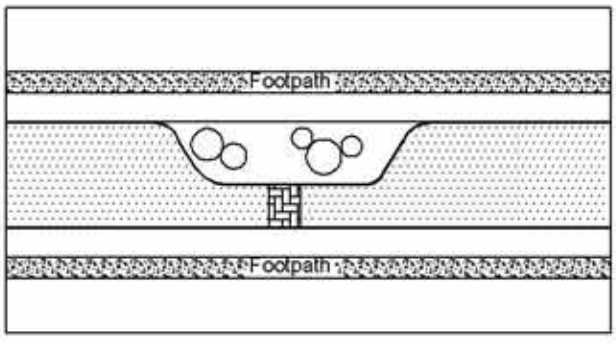
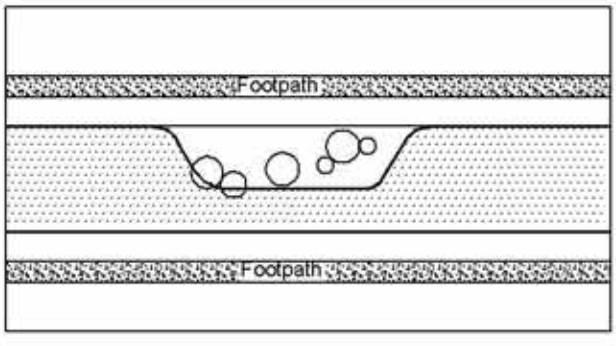


3.3 COMBINED SLOW POINT WITH SPEED HUMP



3.2 SINGLE LANE SPEED HUMP



3.1 SINGLE LANE SLOW POINT

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TRAFFIC CALMING DEVICES STRONG RESTRAINTS

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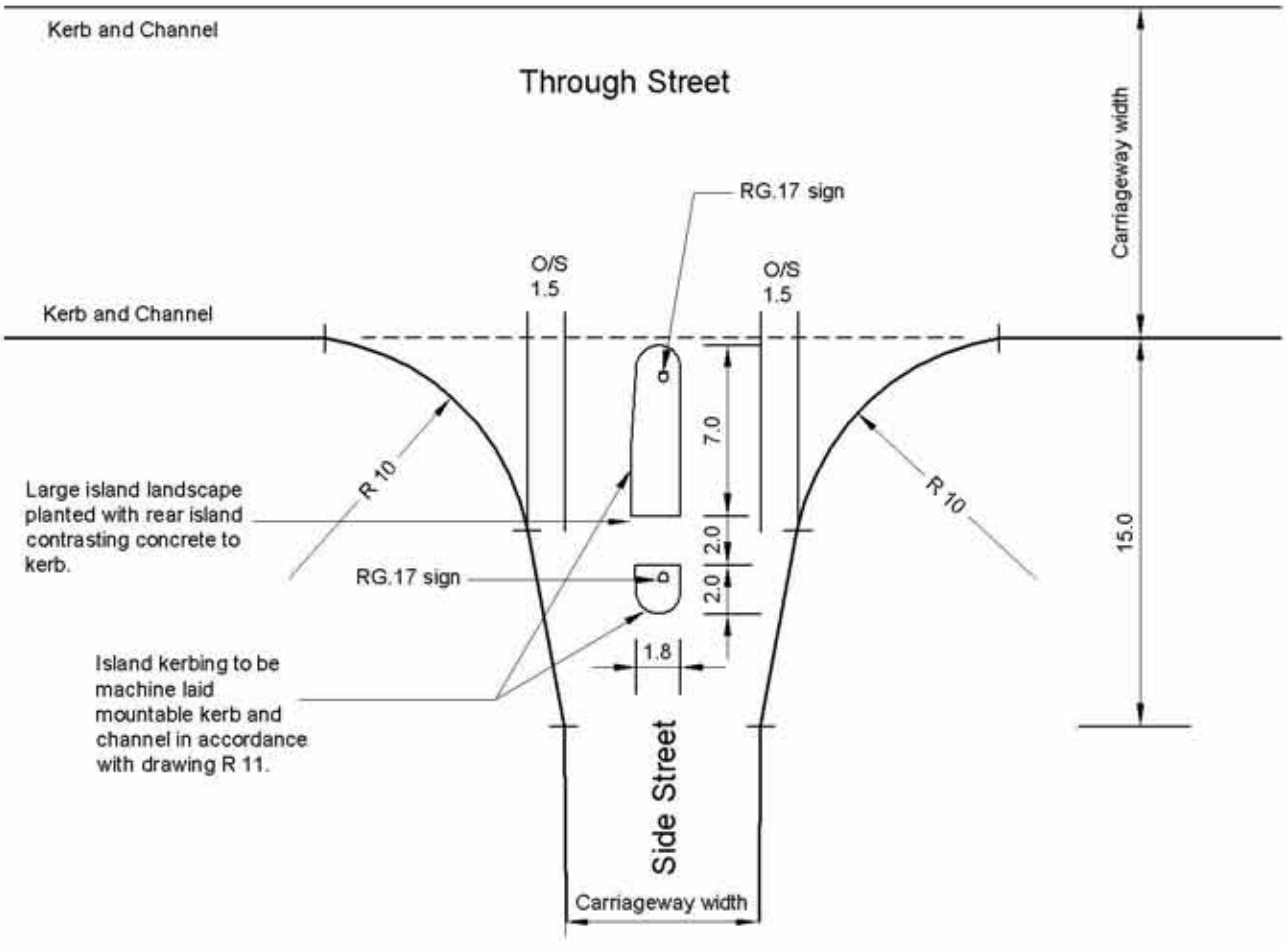

NOTES:

1. Where the through street is wider than 8.0m both tangents at the corner radius shall be flared 1.5 metres.
2. Suitable for 90 percentile single axle trucks.

INTERSECTION LAYOUT

WHAKATANE DISTRICT COUNCIL

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TRAFFIC CALMING DEVICES TYPICAL TEE INTERSECTIONS

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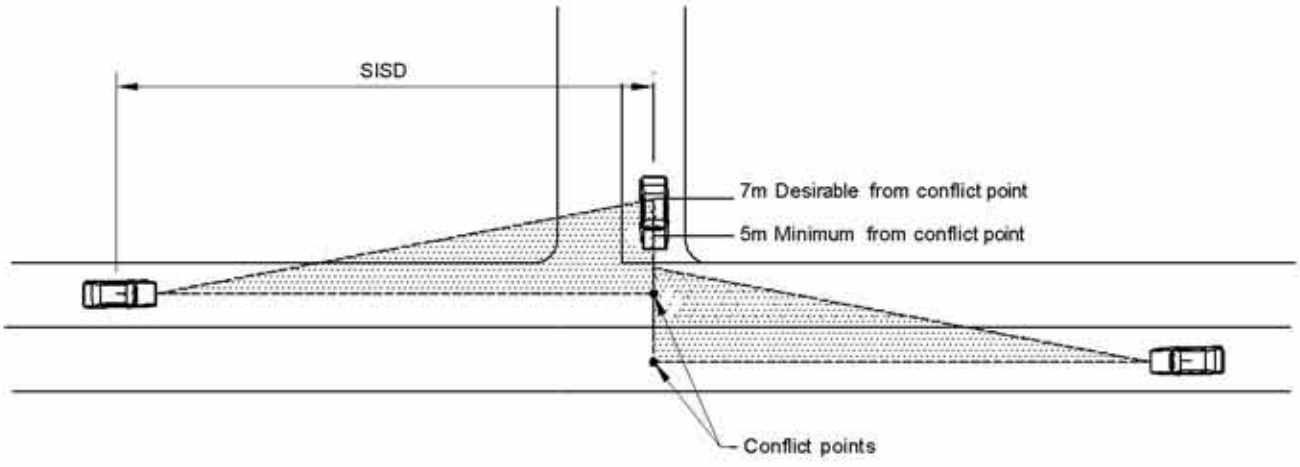

Safe Intersection Stopping Distance (SISD)	Vehicle Operating Speed (km/h)							
	40	50	60	70	80	90	100	110
Desirable minimum (m)	39	54	71	91	114	140	170	205
Absolute minimum (m)	33	47	63	82	103	128	157	190

NOTE:

The table above is a guide only based on Austroads Geometric Design Guidelines for urban roads and rural roads. For further details regarding sight distance criteria and design both of these guides should be consulted.

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SIGHT DISTANCES FOR VEHICLE ENTRANCES

R 25

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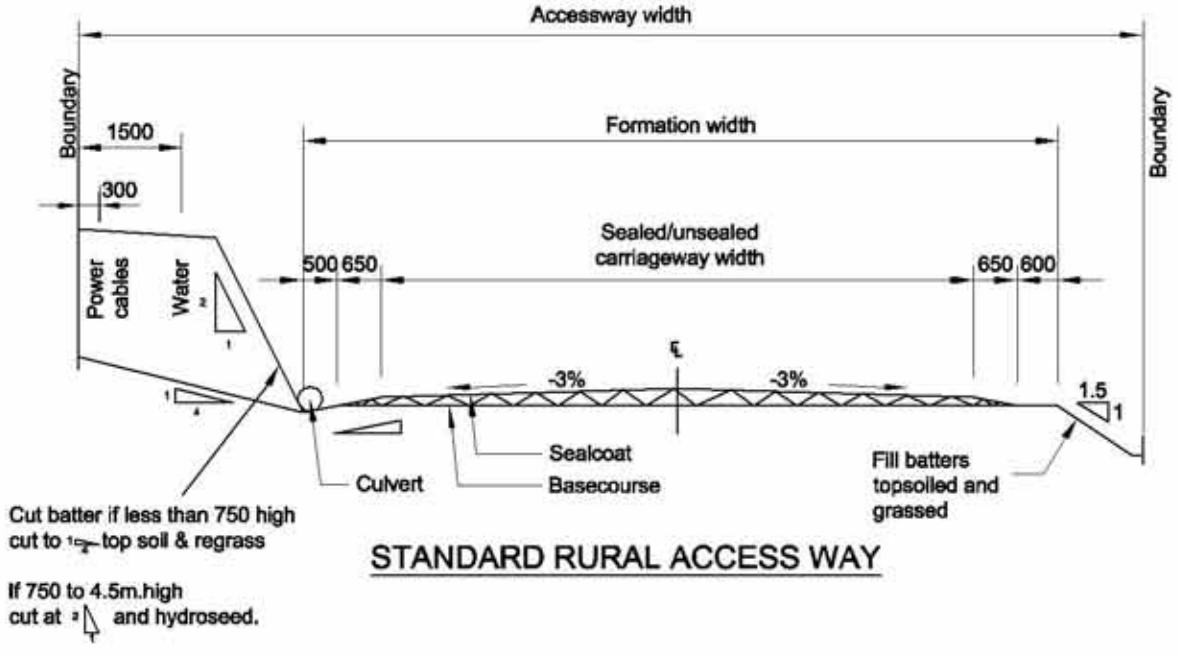

STANDARD RURAL ACCESS WAY

Geometric design shall be in accordance with "Austroads: A Guide to Geometric Design of Rural Roads"

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STANDARD RURAL ACCESSWAY

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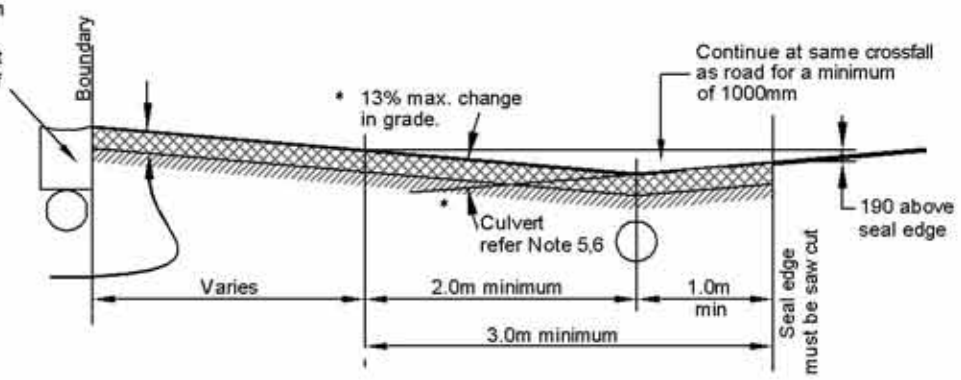
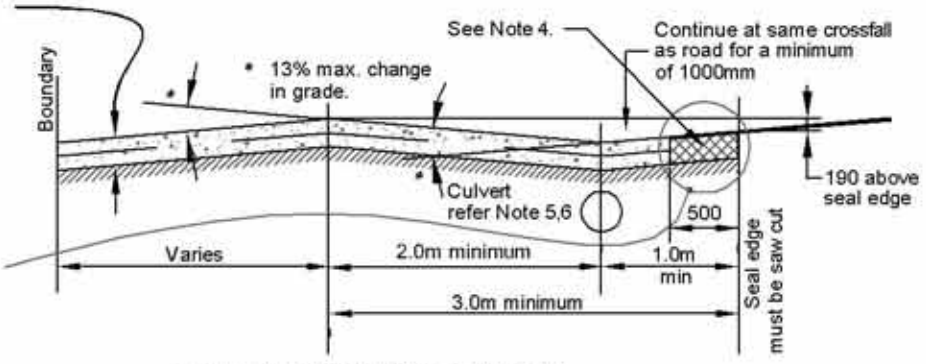
Notes:

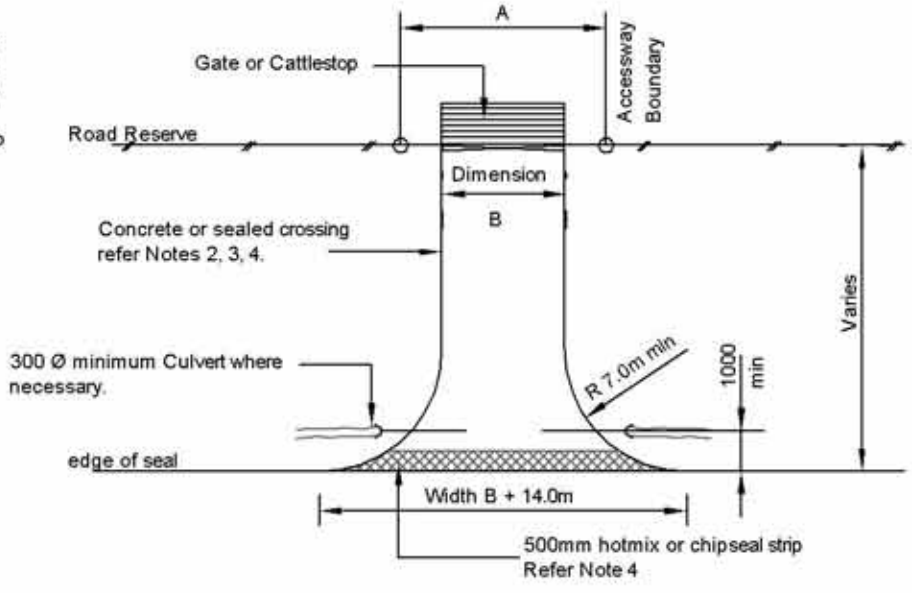
1. Stormwater control via slot drain and soakage pits, (or similar approved stormwater control) at the boundary, to prevent run-off on to the road
2. If the adjoining road is unsealed and the access serves only 1 lot an all weather metal formation of 125mm compacted basecourse will be acceptable.
3. Where the adjoining road is sealed and/or the access serves more than 1 lot the entrance shall be constructed using a 2 coat seal or 20mm hotmix over a 125mm thick basecourse or 125mm thick 20MPa reinforced concrete (665 HRC centrally located) on a prepared consolidated subgrade. Dimensional details are the same for both sealed or concrete crossing. The area to be sealed shall also cover the anticipated or existing swept vehicle area .
4. 500 min wide hotmix or chipseal strip to edge of concrete crossing on prepared consolidated 125mm thick basecourse.
5. Culverts and headwalls to be designed and installed to the approval of the Engineer. All culverts shall be 300mm minimum diameter installed to the manufacturers recommendations.
6. Water table to each side of culvert shall be aligned to prevent erosion
7. Entrance to be l ocated a minimum of 0.5m clear of cesspits, hydrants, power poles or other similar services.
8. Sight distances to comply with Standard Drawing R25.
9. Maximum gradient shall be 1 in 12 for first 6 metres after road edge line.
10. All work shall be carried out in such a manner as to ensure the safety of all road user s.



WHERE THE PROPERTY IS HIGHER THAN THE ROAD



WHERE THE PROPERTY IS LEVEL WITH OR LOWER THAN THE ROAD



NUMBER OF POTENTIAL LOTS	DIMENSION B (m)	DIMENSION A (m)
1	3.50	5.0 if lot size < 1ha 8.0 if lot size > 1ha
2-4	5.00	9.0

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RURAL VEHICLE ENTRANCE 1 TO 4 LOTS

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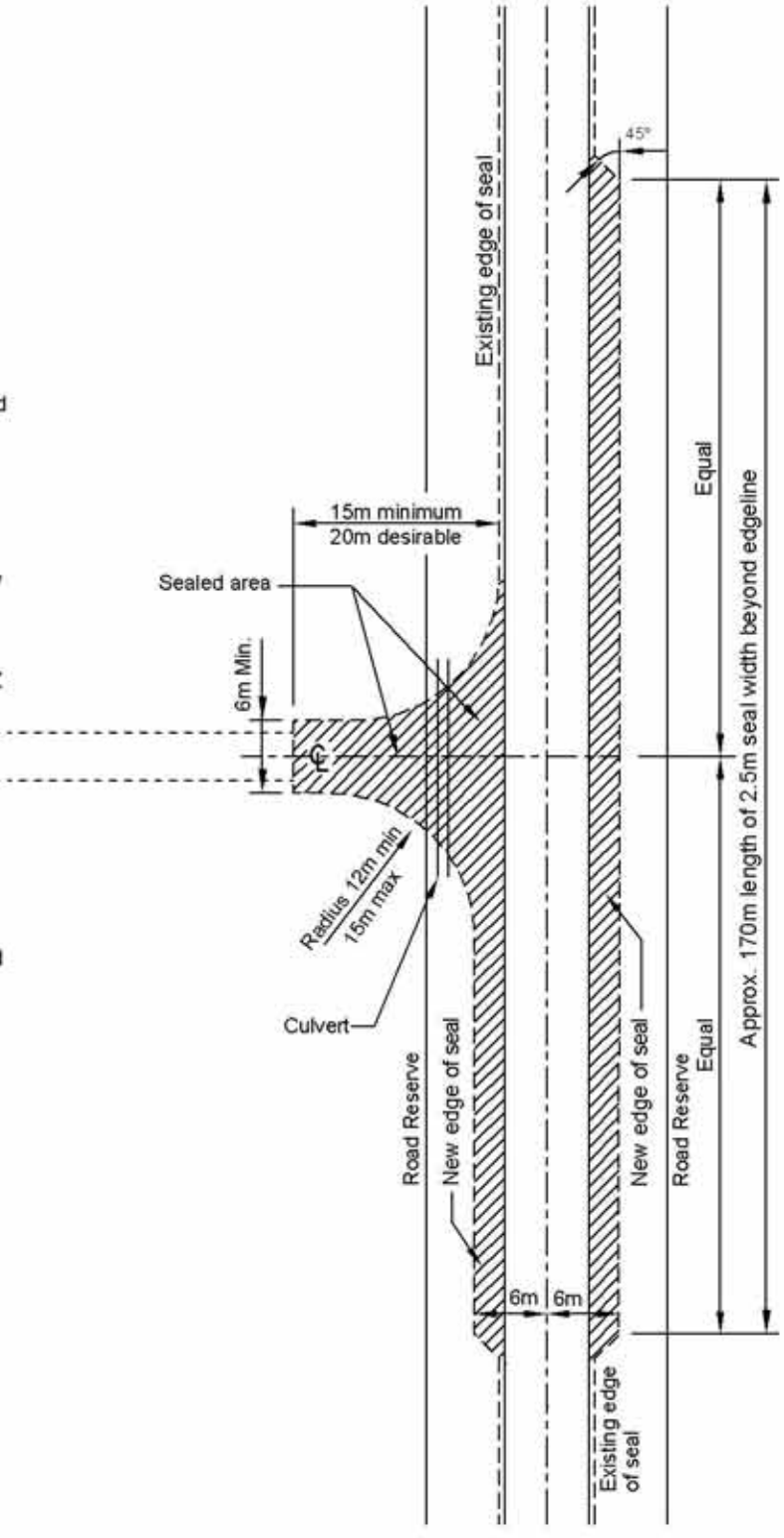
NOTES:

1. The vehicle entrance and widening shall consist of a 2 coat seal over 150mm minimum thickness basecourse on a prepared and consolidated subgrade. Required basecourse thickness to be determined using the Austroads Pavement Design Guide.
2. All areas shown hatched shall be sealed except that the sealing of the area on the side of the road opposite the entranceway shall be required only when vehicles movements along the road exceed 500 vehicles per day.
3. All markings shall comply with the TNZ Manual of Traffic Signs and Markings.
4. The sealed area is to be shaped such that storm water or loose metal does not migrate on to the carriageway.
5. If existing lanes are less than 3.5m wide then widening will be more than 2.5m.
6. Culverts and headwalls to be designed and installed to the approval of the Engineer. All culverts shall be 300mm minimum diameter installed to the manufacturers recommendations.
7. Sight distances to comply with Standard Drawing R 25.
8. Maximum gradient shall be 1 in 12 for first 6 metres after road edge line.
9. All work shall be carried out in such a manner as to ensure the safety of all road users.



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RURAL VEHICLE ENTRANCE 5 OR MORE LOTS

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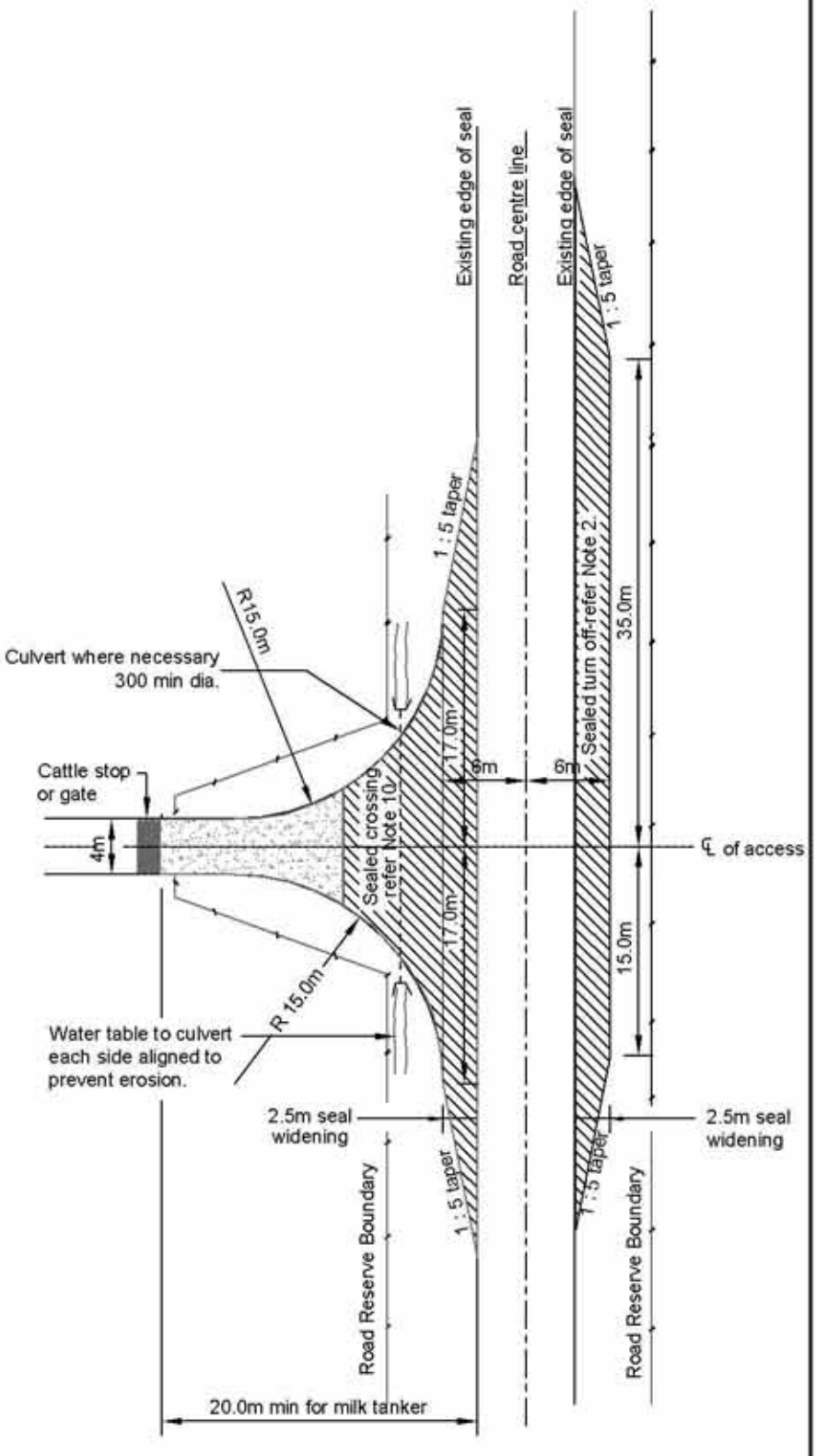
NOTES:

1. The vehicle entrance and widening shall consist of a 2 coat seal over 150mm minimum thickness basecourse on a prepared and consolidated subgrade. Required basecourse thickness to be determined using the Austroads Pavement Design Guide.
2. All areas shown hatched shall be sealed except that the sealing of the area on the side of the road opposite the entranceway shall be required only when vehicles movements along the road exceed 500 vehicles per day.
3. All markings to comply with the TNZ Manual of Traffic Signs and Markings.
4. The sealed area is to be shaped such that storm water or loose metal does not migrate on to the carriageway.
5. If existing lanes are less than 3.5m wide then widening will be more than 2.5m.
6. Culverts and headwalls to be designed and installed to the approval of the Engineer. All culverts shall be 300mm minimum diameter installed to the manufacturers recommendations.
7. Sight distances to comply with Standard Drawing R 25.
8. Maximum gradient shall be 1 in 12 for first 6 metres after road edge line.
9. All work shall be carried out in such a manner as to ensure the safety of all road users.
10. The crossing is required to be sealed for a minimum of 10 metres from the existing road edge.
11. Gate or cattle stop shall be set back to allow vehicles to be parked off carriageway while opening and closing gates (20m min for milk tanker).



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RURAL VEHICLE ENTRANCES HEAVY COMMERCIAL/TANKER

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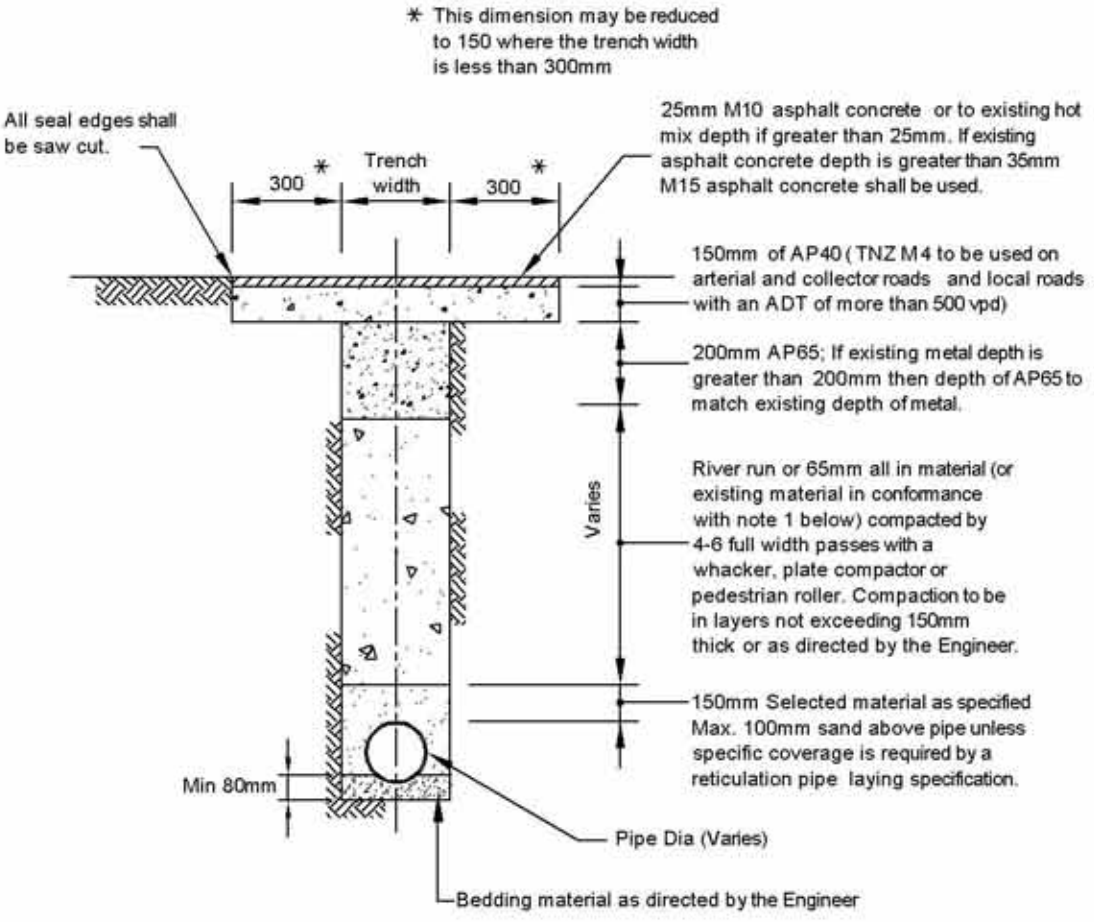


NOTES

1. Where the CBR of the existing material with its natural water content is greater than 10% measured in place by use of Clegg Hammer, Scala Penetrometer 2 blows per 25mm or Nuclear Densometer, that material may be used to backfill the trench up to 300mm from the top surface level of the trench.

2. Bedding and backfilling is to be in accordance with the appropriate N.Z. Standard and the pipe or cable manufacturer's recommendations, or as directed by the Engineer. In all cases backfilling of the trench with either natural or imported material shall be compacted to achieve a Clegg Hammer value greater than 30, or a Scala Penetrometer reading greater than 6 blows per 25mm.
   Where the trench is under a footpath, the CBR of the natural material for it to be used as backfill shall be greater than 10% and shall be compacted to achieve a Clegg Hammer value greater than 8, or a Scala Penetrometer reading greater than 1 blow per 25mm.
   Where the trench is under a grassed berm, natural material may be used as backfill and shall be compacted to an equivalent density to the surrounding ground. The area is to have 75mm of compacted topsoil and grass sown and established by the service authority.

3. All asphalt concrete to be laid in accordance with TNZ P/9.

WHAKATANE DISTRICT COUNCIL

PREPARED BY OPUS

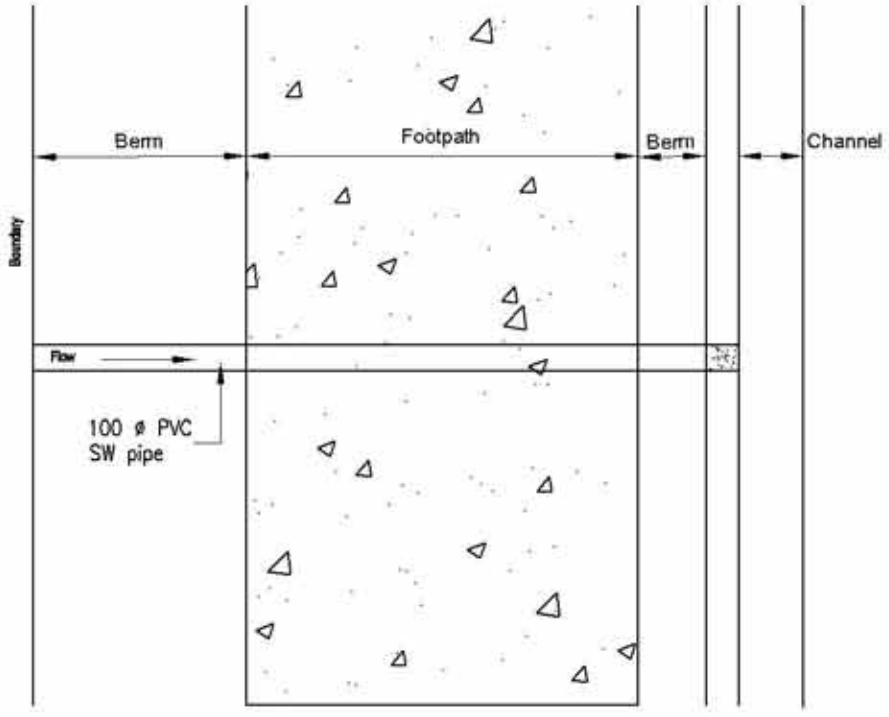
STANDARD DRAWING

NOT TO SCALE

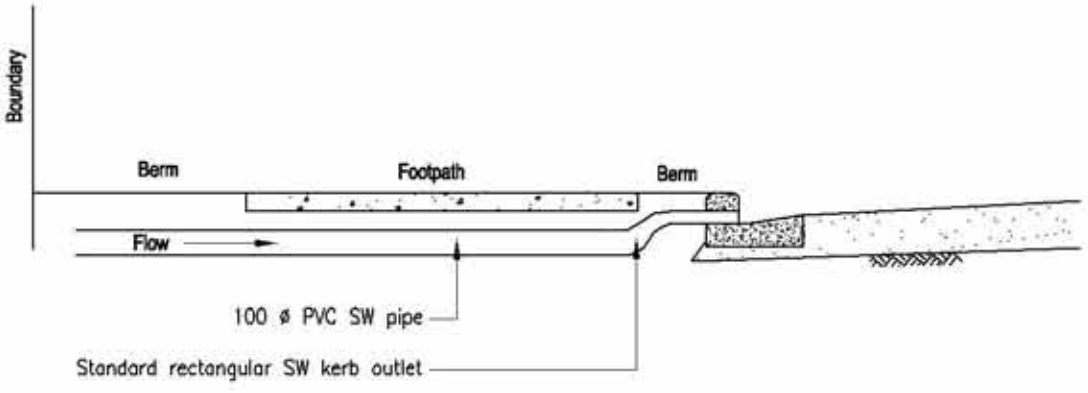
TRENCH REINSTATEMENT CARRIAGEWAY AND FOOTPATH

R 31

ISSUE 7.0
SEPTEMBER 2007



PLAN



ELEVATION

NOTE:

1. Kerb outlets are to be cast into the kerb at the time the kerb is formed. If installing into existing kerb, kerb outlets shall be inserted by saw-cutting and removing the existing kerb a minimum of 500mm wide and installed a new rectangular kerb outlet.
2. Round kerb outlets will not be acceptable.

WHAKATANE DISTRICT COUNCIL

PREPARED BY OPUS

STANDARD DRAWING

NOT TO SCALE

STORMWATER CONNECTION TO KERB AND CHANNEL

R32

ISSUE 7.0
SEPTEMBER 2007

ROAD OPENING NOTICE

RON No:	

I *(name),* _____
as agent for the principal provider detailed below, hereby notify the Whakatane District Council of our intention to undertake the following work:

TYPE OF WORK			
☐ Project (>28 days)	☐ Major (>20 metres)	☐ Minor (≤ 20 metres)	☐ Emergency

PRINCIPAL DETAILS							
Company:				Contact person:			
Telephone	Day:		A/H:		Mobile:		Fax:

DETAILS OF PROPOSED WORK *(indicate all aspects)*		
☐ Open trenching	☐ Trenchless construction	☐ installing cabinet/s
☐ Installing pedestal/s	☐ Installing chamber/s	☐ Removing pole/cabinet/pedestal/structure/s
☐ Installing pole/s	☐ Full road closure required	☐ installing other structure *(specify below)*

DESCRIPTION OF WORK			
Estimated Start Date:		Duration *(hours/days/weeks):*	
Road Name *(closest):*		Address *(house number)*	
Location (RAMM): Start km:		End km:	
If more than one road is affected, please provide a map.			

ROLE IN WORK TO BE UNDERTAKEN			
☐ Principal	☐ Consultant	☐ Contractor	☐ Other

Company:		Contact person *(for all notifications)*	
Postal address:			

Telephone	Day:		A/H:		Mobile:		Fax:

ATTACHMENTS— *Please indicate which of the following documents are attached to the Road Opening Notice:*	
☐ Plan of proposed works	☐ Traffic Management Plan
☐ Copy of letters/notices advising residents of proposed work	☐ Work schedule

ACCEPTANCE BY PRINCIPAL PROVIDER

We hereby agree for or on behalf of the principal provider to comply in full with the requirements of the Transit New Zealand "Code of Practice for Temporary Traffic Management", and any other reasonable conditions required by the Whakatane District Council and to keep this notice on site while work is in progress. This consent is valid for three months from date of issue.

Note: All work must comply with Health and Safety Act 1991 or any amendments thereto.

Signature:		**Date:**	
Print Name:			

WORKS COMPLETION NOTICE

To: *(The road controlling authority)*				
From: *(The principal provider or their consultant)*				
Date:				
This is to advise that work **IS NOW COMPLETE** on RON No:				
On: *(street name)*				
Please find attached:				
☐ Amendments to information provided on the RON as follows:				
Type of work:	☐ Project	☐ Major	☐ Minor	☐ Emergency
DETAILS OF PROPOSED WORK				
Description of work:				
Address:				
Location in road:				
Estimated start time:		Duration:		
CONTRACTOR DETAILS				
Role in work to be undertaken:	☐ Principal	☐ Consultant	☐ Contractor	☐ Other
Company Name:		Contact person:		
Postal address:				
Telephone number:	(Day)		Telephone number	(A/H)
Mobile number:		Fax number:		
☐ A copy of the compaction tests				
☐ An as-built sketch or plan showing the extent and location of the work carried out				
☐				
☐ Details of work for the RCA to complete as follows:				
Works meet required standards	Date:			
Accepted by RCA	Date:		Print name:	
Works comply and 12 month maintenance commences	Date:		Print name:	

CHAPTER 4

STORMWATER

CHAPTER 4 STORMWATER

PART 1 DESIGN

4.1.1 INTRODUCTION

This part sets out the basic design principles for stormwater reticulation. While some construction information is included for completeness, detailed information on construction standards can be found in Part 2 of this chapter.

4.1.2 GENERAL

The stormwater system shall provide for the collection, control and safe discharge of all stormwater within the land being developed together with drainage from the entire catchment upstream of the proposed system. The design of the stormwater system must also take into account the effects of the proposed subdivision or development on downstream systems including both reticulation and pumping.

For on-site disposal, specific design and disposal details are required to ensure that satisfactory collection and disposal is possible.

Where a subdivision or development results in an increased rate of runoff due to the increase in sealed surfaces or other reasons, the Engineer may require the Developer to provide on-site storage to restrict the discharge to the pre-development flow, until the peak storm flow has passed. Any storage system which is installed as part of a development must have in place a maintenance regime that will ensure it will continue to operate correctly in the long term.

4.1.3 STANDARDS

The stormwater disposal system shall comply with the requirements of the following standards:

NZS/AS 2033 : 1980 - “Installation of Polyethylene Pipe Systems”
NZS/AS 3725 : 1989 - “Loads on Buried Concrete Pipes”
AS/NZS 2566.1 : 1998 - “Buried Flexible Pipelines – Structural Design’
AS/NZS 2566. 2 : 2002 - “Buried Flexible Pipelines Part 2 – Installation”

4.1.4 PROTECTION FROM FLOODING

Compliance with the performance standards shall be achieved by evaluating the potential flooding risk and providing the necessary surface water control measures to satisfy the requirements.

4.1.4.1 Risk Assessment

Flood risk assessment shall take account of the characteristics of the total catchment. A search shall also be undertaken to find any relevant historical information on flooding. This could

include reviewing records held by relevant bodies, discussions with the local residents or appropriate field tests.

4.1.4.2 Evaluation

Evaluation shall address the following:

- The proximity and nature of any river, stream or water-course, and associated flood plains
- The capacity of culverts or water-courses downstream of the site and the likelihood of upstream ponding resulting from under capacity, or from blockage by debris or slips
- The upstream culvert and water-course conditions, and the location of the secondary flow path for flood waters in the event of blockage or under capacity.

4.1.4.3 Runoff

Calculations based on reasonable judgement taking account of the overall site conditions, details of the drainage system, and the probable impediments to free flow, (both upstream and downstream) shall determine the expected runoff 'Q', and show that the design flood levels at the site satisfy these Performance Standards.

4.1.4.4 Covenants

Council may consider that land and structures are unlikely to be subject to material damage, or are adequately protected from inundation if subject to drainage easements or restrictive covenants, (building line and level) covering possible inundated and 'at risk' areas. The drafting and registration of all covenant and easement documents shall be carried out by the Council's solicitors, and the cost of such will be borne by the Developer.

Developments on any such properties may, however, be subject to Sections 71-74 of the Building Act 2004.

4.1.4.5 Secondary Flow Paths

Secondary flow paths shall be identified and where appropriate, catered for by specific design, taking account of:

- The capacity of the downstream surface water system, and the risk of blockage at its intake
- The necessity for a secondary intake structure and the relative flow distribution between primary and secondary intakes for the likely degree of blockage

4.1.5 RESOURCE CONSENTS

Where the discharge of stormwater to surface water, or to land where the discharge enters surface water, is a permitted activity under the Environment Bay of Plenty Regional Water and Land Plan, the discharged water shall comply with the requirements of that plan.

Where the discharge of stormwater into the marine coastal environment is a permitted activity under the Environment Bay of Plenty Regional Coastal Environmental Plan, or is in an area included in a Comprehensive Stormwater Consent, the discharged water shall comply with the requirements of that plan or consent.

Resource Consents for stormwater discharge are not required for developments providing that discharged water meets the requirements as set out above.

Developers undertaking development works within the Whakatane District shall provide evidence that the Environment Bay of Plenty discharge conditions will be met.

For discharges which do not comply with the above conditions, Resource Consents will be required from Environment Bay of Plenty, and a copy of that Consent shall accompany the engineering drawings for approval.

The works shall be designed, constructed and maintained in such a manner so as not to cause erosion or flooding or to adversely affect any land or property owned or occupied by another person. Also refer to clause 2.3.5 of Chapter 2 – Construction Management Plan.

Council may impose such controls as it sees necessary to minimise the effects on the water and soil environment caused by the development.

4.1.6 CATCHMENT MANAGEMENT

Council has or is developing Catchment Management Plans for stormwater discharges from urban areas. These plans incorporate numerical catchment models. Where a proposed subdivision will discharge stormwater to an existing reticulated system, the Developer shall submit details to Council for approval. All discharges to a catchment shall comply with the provisions of the relevant Catchment Management Plan. Where the additional quantities involved, combined with the existing flows exceed the capacity of the existing system, Council may require the Developer to fund part or all of the cost of upgrading the existing system, in accordance with the Council financial contributions policy. Other stormwater discharges that cannot be reasonably include under an existing stormwater Catchment Management Plan will need separate Catchment Management Plans, computer models and Resource Consents. The Developer shall be responsible for obtaining these. Council will provide templates of existing Catchment Management Plans and will advise on the appropriate format for the catchment model.

Where further subdivision, upstream of the one under consideration is provided for in any district or regional plan, the Council will require stormwater pipelines to be constructed to the upper limits of the subdivision.

4.1.7 PERFORMANCE STANDARDS

In accordance with Section 106 of the Resource Management Act 1991 and Sections 71-74 of the Building Act 2004, Council shall not grant subdivision or building consents if land or buildings are subject to inundation or other hazards, unless satisfactory means of avoidance, remedy or mitigation are carried out.

Low lying areas prone to inundation by a 1% AEP storm must be identified and restricted from being built upon.

The following requirements must be met:

- The subdivider shall provide a stormwater disposal system that is adequate to safeguard people from injury or illness and to protect property from damage caused by surface water
- A primary system capable of disposal of surface water resulting from a 10% AEP storm shall be constructed
- A secondary flow system capable of carrying surface water resulting from a 1% AEP storm shall be constructed to ensure that such surface water shall not enter buildings
- Secondary flow paths shall be shown on the design plans
- All stormwater secondary flow paths shall be protected by an easement. The easement shall cover the full width of extent of the secondary flow path and shall be not less than 1.5m wide. The easement shall have the effect of preventing alteration to the ground surface and shall prohibit location of structures that may impede flow of water across the land. The easement shall be in favour of the Council and shall be duly granted, reserved and shown on the survey plan
- The Developer shall provide a stormwater reticulation system for the collection and disposal of stormwater runoff from all impermeable surfaces
- Surface flows on carriageways are to be controlled in order to enable safe and comfortable vehicle and pedestrian access across and along road reserves
- The primary disposal system for all residential developments shall be in accordance with clause 4.1.10
- All stormwater reticulation and disposal systems are to be constructed to convey surface water to an appropriate outfall using gravity flow where possible, and in a manner which avoids the likelihood of blockages, leakage, penetration by roots, or the entry of groundwater where pipes or lined channels are used, and avoids the likelihood of damage from superimposed loads or normal ground movements
- Where due to the topography of the land being developed, there is no overland secondary flow path available, the Engineer may require the installation of a pumped disposal system to provide for the 1% AEP storm event
- Accessible inspection chambers shall be provided at all changes of grade, direction and pipe size
- Self-cleansing velocities shall be maintained within reticulation systems
- The reticulation and disposal system shall be designed and constructed for a function design life of 50 years
- Damage to the environment both during and after the development construction phase shall be minimised or avoided
- A stormwater system shall be provided which can be economically maintained.
- Where a detention structure is required in accordance with Clause 4.1.2, it shall be designed to retain the runoff resulting from a 10% AEP storm, with a ten minute duration.

4.1.8 FLOOR LEVELS

A Minimum Floor Level Plan has been prepared by Council indicating minimum floor heights for buildings in various parts of the Whakatane District. The minimum applicable floor level required for a proposed development may be obtained by application to the Council.

All developments shall comply with the minimum levels stated, but notwithstanding the above, they may be subject to additional requirements as deemed necessary by the Council.
Coastal properties vulnerable to wave action may require specific design to protect them from inundation.

Building floor levels must have 500mm freeboard above the 1% AEP flood levels, must satisfy the provisions of the New Zealand Building Code, or must be in accordance with the minimum levels as defined on the Council Minimum Floor Level Plan.

Where approved by the Engineer the floor level of non-habitable and minor buildings may have the freeboard reduced to 200mm above the 1% AEP flood level.

4.1.9 STORMWATER DISPOSAL

The volume of residential roof stormwater to be disposed of shall be calculated as the run-off resulting from a 10% AEP storm, with a duration of ten minutes, using the rainfall intensity obtained as set out in Clause 4.1.11.1 and a run-off coefficient C of 0.9.

For all new “Greenfields’ developments, all lots shall have a piped stormwater disposal system discharging to an approved stormwater soakage area or watercourse. For “infill” developments within existing urban areas, the disposal of all roof stormwater shall be to an existing piped reticulation system if this is accessible, or shall comply with the conditions set out in Clause 4.1.10 below.

All stormwater discharges to open water courses into Ohiwa Harbour or on to Ohope Beach shall be subject to specific treatment and design, in accordance with Environment Bay of Plenty Guideline No. 2001/03 – “Erosion and Sediment Control guidelines for Land Disturbing Activities”. All discharges will be required to have a detention time before discharge to the waterway.

For runoff from residential lots or road reserves where discharge to a watercourse is not possible, soakage pits or swales may be permitted as a primary method of stormwater disposal, subject to satisfactory geotechnical analysis and the Council’s approval. All such soakage areas and swales shall be within dedicated drainage reserves located outside the normal road reserve. Such drainage reserves may form part of a coastal reserve or recreational reserve, subject to compliance with the affected reserves management plan and subject to the land owner’s approval.

4.1.10 STORMWATER DISPOSAL – INFILL DEVELOPMENTS

Note: *While in most cases the Developer will not be carrying out building on the new allotments, the responsibility will lie with the Developer to determine which system the site falls*

into (as outlined in Clauses 4.1.10.1 to 4.1.10.4), and provide a report to the Engineer for approval.

All residential roof stormwater shall be disposed of in the following manner:

4.1.10.1 Allotments with Free Draining Soils

(Percolation rates greater than 1000 mm per hour)

Properties with good free draining soils shall have porous soakage pits within the boundaries of the lot, to dispose of all roof stormwater, equating to the total run-off volume as calculated in accordance with Clause 4.1.9.

Discharge to the Council stormwater reticulation system will not be permitted.

A plan has been prepared indicating where ground soakage conditions which can be expected to comply with the requirements of this clause are generally found in the Whakatane urban area (See Appendix 4.2). Developers shall confirm that these site conditions are applicable to the proposed development.

4.1.10.2 Allotments with Moderate Draining Soils

(Percolation rates 100 mm to 1000 mm per hour)

Properties with moderate draining soils shall have porous soak pits with a capacity designed in accordance with Clause 4.1.9. In addition, in urban areas, the soak pits shall be provided with a 100mm diameter high level overflow pipe to a Council stormwater reticulation system, or where this is not possible, be connected to the street kerb with an approved kerb connection. Where a gravity discharge to the stormwater reticulation system is not feasible, it will be necessary to install a pumped discharge. In rural areas the overflow shall be to a natural watercourse or to “soakage” as defined in the NZ Building Code.

4.1.10.3 Allotments with Poor Draining Soil

(Percolation rates less than 100mm per hour, **OR** sloping sites, steeper than 15%; **OR** sites of known or possible instability).

Properties with these conditions shall be provided with on-site storage capacity equivalent to the volume calculated in accordance with Clause 4.1.9. In urban areas the storage container shall have a 25mm diameter outlet at the base and a 100mm diameter sealed piped overflow system connected to the Council stormwater reticulation, or where this is not possible, it shall be connected to the street kerb with an approved kerb connection. Where a gravity discharge to the stormwater reticulation system is not feasible, it will be necessary to install a pumped discharge. In rural areas the overflow shall be to a natural watercourse or to “soakage” as defined in the NZ Building Code.

All systems in this category will be subject to the final approval of the Engineer.

4.1.10.4 Non-Complying Allotments

Those properties which, due to their topography and poor draining soils, cannot comply with the stormwater requirements set out above shall be subject to specific design and approval from the Engineer.

***Note**: For all systems it will be the Developers responsibility to assess the potential for instability and or other drainage problems caused by the proposed stormwater system and if necessary seek professional geotechnical advice on which system is appropriate for the site.*

4.1.10.5 Soak Pits

Where the collected surface water is to be discharged to a soak pit, the suitability of the natural ground to receive the water shall be determined.

This evaluation may involve field testing of ground soakage and discussion or direction from suitably qualified soils or geotechnical engineers.

Field testing of soakage may be carried out as follows:

- Bore test holes of 100mm to 150mm diameter to the depth of the proposed soakhole and record the ground profile as excavation proceeds
- Fill the hole with water and maintain full for at least four hours (unless the soakage is so great that the hole completely drains in a short time)
- Fill the hole with water to within 750mm of ground level, and record the drop in water level against time until the hole is almost empty, or over four hours, whichever is the shortest
- Plot the drop in water level against time on a graph, and the soakage rate in mm/hr is determined from the minimum slope of the curve. If there is a marked decrease in soakage rate as the hole becomes nearly empty, the lower rates may be discarded and the value closer to the average can be adopted.

Standard precast soakrings shall be installed for all ground soakage systems.

The size and capacity of soak rings is shown in Table 4.1 below

Table 4.1 - Standard Precast Soak Rings

Size: Inside Diam. x Depth (mm)	Volume (m^3)
570 ID x 760 deep	0.194
765 ID x 457 deep	0.210
1070 ID x 305 deep	0.274

4.1.11 CALCULATION OF SURFACE WATER RUNOFF

Runoff may be determined by using any recognised method that achieves reasonable results. Appendix 4.1 shows details of the “Rational Method”.

4.1.11.1 Rainfall Intensity

The rainfall intensity shall be that for a storm having a duration equal to the time of concentration and a probability of occurrence as appropriate.

Note: For the Whakatane and Ohope urban areas the rainfall intensities in Table 4.2 below shall be used to calculate the runoff. For other areas, rainfall figures shall be determined from the High Intensity Rainfall Design System (HIRDS).

If reliable current data is not available from HIRDS, a rainfall intensity of 115mm per hour as required by the Building Act shall be used.

The HIRDS information system is available from the National Institute of Water and Atmospheric Research Ltd (NIWA).

Table 4.2- Rainfall Intensities – Whakatane and Ohope Urban Areas - Millimetres

Return Period (years)	Duration (Time in minutes/hours)							
	10 Min	20 Min	30 Min	1 Hour	2 Hour	6 Hour	12 Hour	24 Hour
2	11	14	21	31	41	69	88	109
5	12	19	27	38	50	84	107	147
10	16	23	32	45	58	95	122	177
20	18	26	37	51	64	108	137	206
50	20	30	44	59	73	123	156	244
100	23	32	47	63	81	134	170	272

4.1.12 HYDRAULIC DESIGN OF PIPELINES

4.1.12.1 Minimum Sizes of Drains

The hydraulic capacity of stormwater pipes shall be sufficient to convey the design flow as determined by the procedure in Clause 4.1.11 above. The capacity and velocity of flow shall be determined by using a design method which achieves reasonable and practical results. Alternatively a computerised design tool may be used subject to the approval of the Engineer.

To avoid blockages, public surface water drains shall have an internal diameter of no less than:

- 200mm diam. for main pipes
- 225mm diam. for cesspit leads less than 15m long
- 300mm diam. for cesspit leads greater than 15m long
- 375mm diam. for cesspit leads for double sumps
- 100mm diam. for residential property connections
- 150mm diam for Industrial/Commercial property connections

In general, the internal diameter of a drain shall not decrease in size in the direction of flow, but may be approved by the Engineer where it is justified by a large increase in the pipe gradient.

4.1.12.2 Minimum and Maximum Velocity

A drain flowing full shall have a minimum velocity of 0.7m/second.

No limitation on maximum velocity is practical, however pipes must be laid within the limitations set by their manufacturers.

4.1.12.3 Energy Loss through Manholes

Hydraulic design shall make the appropriate allowance for energy losses at manholes. These losses are generally associated with a change in direction of the flow, or an increase in pipe size. As an access chamber is normally required at such changes, an additional fall can be provided through the access chamber to allow for the losses.

This fall H_L is in addition to the fall produced by the gradient of the pipeline, and can be calculated by:

$$H_L = \frac{Kv^2}{2g}$$

where

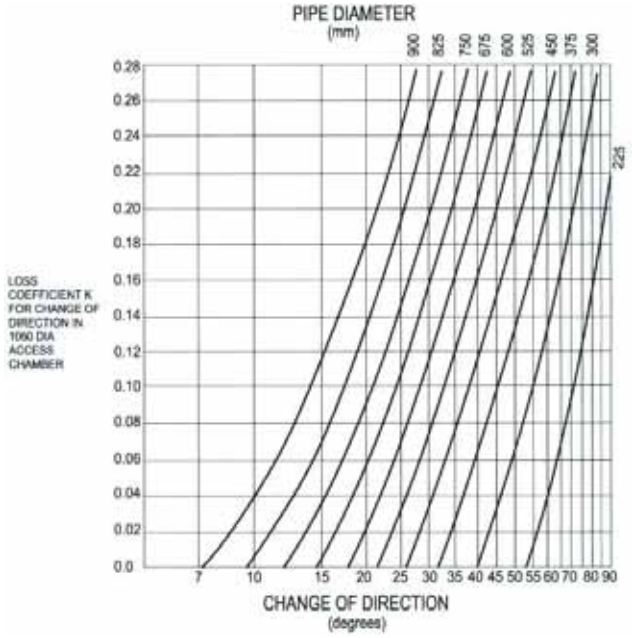
K	=	loss co-efficient for change in direction and can be determined from Figure 4.3.
V	=	velocity in the pipeline

Where there is an increase in pipe size at the access chamber, the hydraulic design shall ensure gravity flow with no surcharging for a 10% AEP storm event.

Note: *This is normally achieved by maintaining the same soffit level for both drains at the access chamber.*

In cases where a reduction in drain size is justified, an additional head loss of $0.5v_e^2/2g$ is to be allowed for. (v_e = exit velocity).

Figure 4.3 - Energy Loss Coefficient



4.1.12.4 Energy Dissipation Structures

Where the hydraulic analysis demonstrates that a significant turbulence or energy dissipation will occur, control structures shall be provided for energy dissipation to prevent damage to the drainage system, its outfall and the surrounding environment.

4.1.12.5 Inlet and Outlet Structures

Approved structures shall be constructed at the inlets and outlets of pipelines. Acceptable types of concrete structures are available from most drainage equipment manufacturers.

Provision must be made for energy dissipation unless it is demonstrated that outlet velocities and soil conditions are such as to make this unnecessary. The design shall ensure non-scouring velocities at the point of discharge.

4.1.13 OPEN WATER COURSES

4.1.13.1 Piping

In general, all open water-courses are to be piped. Council may approve unlined drains or concrete lined channels where the natural topography lends itself to this, or where the flow exceeds the capacity of a 1200mm diameter pipe.

4.1.13.2 Watercourse Improvements

Where the use of an open water-course is permitted under Clause 4.1.13.1, the extent of 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 the maintenance, hydraulic and safety considerations, including the downstream effects of the work.

4.1.13.3 Watercourse Easements

Open water-courses where permitted shall generally be located in a drainage reserve or easement vested in Council to enable maintenance to be carried out. The cross-section and erosion protection for the open water-course shall be specifically designed and to the approval of the Engineer.

4.1.14 DRAINAGE LOCATIONS

4.1.14.1 Pipelines

Stormwater drainage pipelines shall generally be aligned parallel with the street network. However their alignment may deviate from the standard parallel alignment provided there is no interference with other services and the pipes are located in the road reserve. Alternatively, stormwater drainage pipelines may be located in areas which will not reduce the building area available on the lot.

4.1.14.2 Manholes

Manhole structures shall be located at least 1.0 metre clear of all boundary lines.

4.1.14.3 Easements

Where a stormwater drain or structure is laid within private property, it shall be protected by an easement in favour of Council and be of sufficient width to allow practical access for maintenance.

Where the diameter of the stormwater pipe is 300mm or less, the easement shall be at least 3.0m wide and the pipe shall be located in the centre. Where the diameter of the stormwater pipe is greater than 300mm, or the depth of the pipe is greater than 2.5m, the easement width may be required to be greater than 3.0m. The actual width will depend on the location of the pipe, and shall allow for a 12 tonne excavator and a truck to gain access for maintenance or replacement of the pipe.

4.1.15 PIPES

Pipes acceptable for use in stormwater and wastewater drainage work in Whakatane District are shown in Clause 4.2.3 of this Chapter.

4.1.16 JOINTS

All joints in drains shall be watertight and prevent the infiltration of groundwater and the intrusion of tree roots. Pipes shall be rubber ring jointed or flanged unless specifically required to be flush jointed or solvent cemented by the Engineer.

Where a drain consists of concrete, or other rigid material, a flexible joint shall be installed within 750mm of the outside wall of any manhole, but outside the line of the base and on each pipeline which connects to the manhole.

Note: *This allows for differential settlement between the manhole and the pipeline while minimising damage to the pipeline.*

4.1.17 PIPE DESIGN AND LAYING

Pipes shall be installed in accordance with the requirements of AS/NZS 3725 : 2007 - "Design for Installation of Buried Concrete Pipes".

The class of pipe to be adopted shall be in accordance with AS/NZS 3725 Supplement 1 : 2007 "Design for Installation of Buried Concrete Pipes Commentary".

Bedding of pipes shall be "Type H2 "bedding in accordance with AS/NZS 3725: 2007, or in accordance with NZS 7643 : 1979, unless specifically approved by the Engineer.

4.1.18 TRENCH SLOPE

Where the slope of the trench is 1 in 8 or greater, anti-scour blocks shall be provided. These anti-scour blocks shall be:

- Constructed from 150mm thick concrete up to pipe diameters of 300mm and 230mm thick concrete for diameters greater than 300mm
- Keyed into solid ground to the sides and floor of the trench by 150mm
- Extended to 300mm above the drain, or to ground level where the drain cover is less than 300mm, and spaced at:
  (i) 7.5m centres for trench slopes between 1 in 8 and 1 in 5, or
  (ii) 5.0m centres for trench slopes greater than 1 in 5.

Note*: The anti-scour blocks partition off the trench and prevent ground or surface water running along the trench and causing scouring.*

4.1.19 MINIMUM COVER

4.1.19.1. General

All pipelines shall be specifically designed to support the likely loadings in relation to the minimum cover to be provided in accordance with the terms of AS/NZS 3725. Generally, the minimum cover for all types of pipes under all conditions shall be 600mm except as otherwise specified in Section 4.1.19.2 below.

4.1.19.2 Private Property

The minimum cover over pipelines in private properties shall be 500mm. Where this cover cannot be provided, specific design and approval will be required by Council.

4.1.20 MANHOLES

4.1.20.1 General

Manholes shall normally be provided at each change of direction or gradient, at each branching line, and at a spacing of not more than 100m. Manholes may either cast in-situ or of precast concrete in accordance with Clause 4.2.14 of this Section.

4.1.20.2 Standard Manholes

Manholes shall be circular with a minimum internal diameter of 1050mm and may be used in situations where the largest inlet pipe does not exceed 600mm in diameter. In a situation where there are multiple entries into a manhole, or it has an inlet pipe of 600mm diameter or greater, a larger diameter manhole may be required.

Outlet pipes from manholes should always be of not less a diameter than the largest size pipe leading into the manhole. The Engineer may however give dispensation from this requirement in certain cases.

In environments where the Engineer considers that detritus is likely to find its way into stormwater systems, silt traps and/or special purpose screens may be required to be installed at intervals within the systems.

4.1.20.3 Deep Manholes

Where manholes are more than 5.0m deep, they shall be specifically designed and shall incorporate intermediate landing platforms or grilles in order to prevent a free fall of more than 3.0m.

4.1.20.4 Shallow Manholes

Where the depth to invert of a manhole is less than 1.0m, and it is serving no more than four houses, a shallow manhole may be constructed with a minimum diameter of 600mm, or a minimum width in the case of a rectangular shallow manhole of 450mm. In all cases, shallow manholes shall be of sufficient diameter to allow full benching and reasonable access to the pipes.

4.1.20.5 Manholes on Large Pipes

Manholes on stormwater pipelines more than 600mm diameter, and on smaller pipelines where the use of standard manholes is not suitable, shall be specifically designed, and will require the Engineer's approval. The minimum diameter of the manhole shall be equal to the largest pipe size plus 450mm.

4.1.20.6 Manhole Covers

Manhole covers shall be constructed and fitted in accordance with Clause 4.2.14.5 of this Chapter.

4.1.20.7 Junctions

Cesspit leads not more than 300mm in diameter and not more than 20m in length may be saddled on to pipes 600mm in diameter and larger, without a manhole being required.

Branch lines should normally be connected to a manhole. However branch lines 300mm diameter and smaller may be saddled on to pipelines 600mm diameter or larger, provided a manhole is supplied on the branching line within 40m of the main line. Proprietary 'Wye' connections shall be used where possible.

4.1.20.8 Step Irons

All manholes exceeding one metre in depth, shall be provided with approved step irons, steps or ladders in order to give reasonable access.

Step irons shall be in accordance with Clause 4.2.14.9 of this Chapter.

Where the smallest pipe entering a manhole is 600mm or greater, recessed steps shall be provided in the haunching within the manhole such that a person standing in the invert of the manhole may easily reach the lowest rung of the manhole steps or ladder.

4.1.20.9 Drop Connections

Drop connections on stormwater manholes may be avoided by allowing pipes up to and including 300mm diameter to have an open "cascade" inside the manhole, provided the steps are clear of any cascade. Otherwise a short ramped section must be provided on the connecting line.

4.1.21 ALLOTMENT CONNECTIONS

Connections shall be capable of taking the full design flow from the area to be serviced by the connection as calculated in Clause 4.1.2. Connections for commercial and industrial lots shall not be less than 150mm diameter.

4.1.22 RAMPED RISERS

Ramped risers shall be designed in accordance with good drain laying practice. A typical example is shown in Drawing SS 01.

4.1.23 CONNECTIONS TO DEEP PIPELINES

Where an existing or proposed stormwater pipeline is more than 5m deep to the top of the pipe, connections to the lots served, shall be provided from a shallower branch pipeline connected to the deep stormwater line at a manhole.

This method may also be used where ground conditions preclude direct connection to pipelines less than 5m deep.

4.1.24 CESSPITS

Details of cesspits are shown on Standard Drawings SW 01 and SW 02. Design requirements for cesspits are included in Clause 3.1.9 of Chapter 3, “Roading.”

PART 2 CONSTRUCTION

4.2.1 GENERAL

All work shall be carried out in strict accordance with the methods and standards outlined in this section.

4.2.2 MATERIALS

The material or product is required to conform to an Australian, New Zealand, or combined standard and also be licensed to that standard. Where there is no standard, the specification of the material or product must be provided in detail for acceptance.

4.2.3 PIPES

Pipes shall be of the type and class shown on the drawings and shall conform to the following specifications:

a) **Stormwater Pipes.**

AS/NZS 4058 : 2007 – "Precast Concrete Pipes (Pressure and Non Pressure)"
AS/NZS 1254 : 2002 – "PVC Pipes and Fittings for Stormwater and Surface Water Applications" Class SN8

b) **Wastewater Pipes.**

AS/NZS 1254 : 2002 – "PVC Pipes and Fittings for Stormwater and Surface Water Applications"
AS/NZS 1260 : 2000 – "PVC-U Pipes and Fittings for Drain, Waste and Vent Applications". Class SN16.
AS/NZS 4130 : 2003 -.Polyethylene (PE) Pipes for Pressure Applications

4.2.4 JOINTS

Jointing methods shall conform to the following specification:

- Heat welded or flange joints for HDPE pipes - NZS/AS 2033 : 1980

4.2.5 CONCRETE

All materials, manufacture and procedures shall conform with NZS 3109 : 1997 - "Concrete Construction".

All concrete shall have a minimum crushing strength of 20MPa at 28 days unless otherwise specified or detailed.

4.2.6 ROADING MATERIALS

Roading materials, chips etc shall comply with the requirements set out in Part 4 of Chapter 3 of this Manual.

4.2.7 STORAGE

Materials shall be stored on site and elsewhere in such a manner that will ensure the preservation of the quality and the fitness for the work. They shall be so located and disposed that prompt and proper inspection may be made.

4.2.8 STREET OPENING

All excavations in road reserves shall comply with the requirements of Clause 3.4.12 of Chapter 3 of this Manual and will require a street opening permit in accordance with Clause 3.4.12.1.

4.2.9 EXISTING UTILITY SERVICES

Before commencing any excavation, all utility service providers shall be contacted and any approvals necessary for excavation in the region of their services shall be obtained. Any special restraints imposed by the utility provider in regards to working in the vicinity of their services must be strictly adhered to by the developer. All information supplied by the Council should be checked on-site for correctness as far as possible, prior to commencing excavation.

4.2.10 EXCAVATION

4.2.10.1 General

All working methods adopted shall be subject to the conditions of the “Health and Safety in Employment Act 1992” and any amendments and regulations in force. Where required by the Act, the Occupational Safety and Health Inspector of the Department of labour shall be notified and any work required by the Inspector shall be carried out.

4.2.10.2 Standards

The construction of all underground pipelines must conform to the requirements of AS/NZS 2566.2 : 1998 - “Buried Flexible Pipelines : Part 2 - Installation” and NZS 7643 : 1979 - “Code of Practice for the Installation of Unplasticised PVC Pipe Systems” and the requirements of these standards, which will take precedence

4.2.10.3 Trench Protection

All work shall be undertaken in such a manner that the safety of all existing buildings, structures and property is not compromised. Particular attention shall be paid to the maintenance of access for pedestrian and vehicular traffic. Where required to carry out the work in a safe manner in compliance with the regulations, timbering or other suitable trench shoring methods shall be used.

All timber used in trench shoring shall be removed before backfilling.

4.2.10.4 Subsoil Water

Should water appear in excavations, it shall be kept down below the level of the joints and bedding by the appropriate means of either, a side channel and pumping, or by well pointing.

All wells or sumps shall be sunk and pumps fixed so as not to interfere with the work of bedding, laying and jointing of the pipe.

Should the subdivider fail to take adequate steps to keep the subsoil water down, or should the Engineer consider the methods adopted by the subdivider are endangering or damaging the bedding or pipe, the Engineer shall advise the subdivider and may require pipes and bedding to be relaid when methods acceptable to the Engineer are in place.

All care shall be taken to ensure that no completed lines are subject to floating. Any pipelines which float are to be relaid. The cost of relaying shall be borne by the subdivider.

Where the bedding material is soft, wet, or spongy and in the opinion of the Engineer, is not satisfactory for the laying of pipes, the subdivider shall supply approved free draining material (eg basecourse) to stabilise the bedding.

In the event of infiltration being detected after laying pipes through subsoil water areas, the subdivider shall locate and repair the defects causing the infiltration.

4.2.10.5 Trench Excavation

All excavation shall be carried out to the grades and levels shown on the drawings. The width of the trench shall be no greater than is needed to permit all operations necessary for the jointing of pipes, placing of concrete, compaction of backfill and inspection to be carried out efficiently. The width of the trench measured at the elevation of the top of the pipe shall not exceed the minimum for H2 bedding as defined in AS/NZS 3725 : 2007 – “Design for Installation of Buried Concrete Pipes.

Excavation for manholes shall be of sufficient size to leave adequate space for construction. The length of trench or area of opening to be made at anytime shall be kept to a minimum which recognises the reasonable requirements of pedestrians and wheeled traffic.

4.2.10.6 Extra Excavation

Where in the opinion of the Engineer, the ground below the specified bedding level is not suitable, it shall be excavated to a depth as directed by the Engineer and backfilled with free draining granular material approved by the Engineer, and compacted in layers not exceeding 300mm by mechanical means.

4.2.11 PIPE LAYING

4.2.11.1 General

All drain laying work shall be under the direct control of persons holding a current drain layers licence as provided in the Plumbers, Gasfitters and Drainlayers Act 1976

No bedding shall be placed before the bottom of the trench has been inspected and approved by the Engineer.

4.2.11.2 Bedding

An evenly compacted bed of free draining granular material (graded chip or pea metal all passing 9.5mm sieve and all retained on 4.75mm sieve) in accordance with NZS/AS 3725 shall be laid on the bottom across the full width of the trench, to give continuous full support to the barrel of the pipes.

Bedding shall be laid over the full width of the trench to a minimum depth of 100mm and compacted by rolling and/or vibration to 90% of maximum dry density as ascertained by the New Zealand Standard Compaction Test. The Contractor shall carry out a plateau test on the first section of bedding, by counting the number of passes required by the compactor to achieve the desired compaction as determined by a nuclear densometer test. This number shall then be the minimum required by the compactor in the remaining sections. Care shall be taken to avoid over compaction causing fine grained materials underneath to pump. The cost of all testing, both laboratory and on site, shall be borne by the Developer.

Care shall be taken to ensure that no cavities are left under the pipe barrel and that the bedding is not disturbed when trench timbering or construction shields (if required) are removed. Socket holes shall be formed to allow the pipe barrel to rest firmly on the bedding over its entire length.

Where the bottom of the trench will not provide adequate support for the pipe, the Engineer may order the use of additional granular bedding material as specified in NZS/AS 3725, or NZS 7643 : 1979, for such depths as are necessary.

Where the ground slope is steeper than ten percent or where in the opinion of the Engineer ground conditions merit the need, sufficient cement shall be added to the granular bedding material to provide a weak concrete with a strength of not less than 7 MPa.

4.2.11.3 Laying

No pipe laying shall be commenced until the foundation of the trench has been inspected and passed by the Engineer.

Pipes shall be laid accurately to the lines, levels and gradients shown on the drawings.

The variation between specified invert level and invert level as laid shall not exceed 5mm.

Every pipe shall be examined immediately prior to being laid and the interior and jointing surfaces shall be cleared of all rough projection and debris.

Rubber ring joints shall be installed strictly in accordance with the manufacturer's instructions. Care shall be taken to ensure that the rubber rings are located evenly around the joint without any twists in them. The pipes shall be laid with the female ends uphill, and shall be pushed up tight to the joints.

4.2.12 BACKFILLING

4.2.12.1 General

Where the Engineer requires, unsuitable excavated material shall be replaced by approved material. No backfilling shall be done until the laying, jointing and haunching of the pipeline has been approved for backfilling by the Engineer. All material for backfilling shall be approved by the Engineer.
Backfilling shall be carried out as soon as possible after the pipeline has been approved for backfilling. Material shall be carefully placed and not dropped and shall be well compacted in layers by approved mechanical means.

4.2.11.2 Haunching

The maximum particle size shall generally not exceed 10mm. The presence of an occasional particle between 20mm and 40mm is acceptable provided that the total quantity of such particles is less than five percent (5%) of the whole. If particles over 40mm are present, the material shall be rejected. The excavated material, if free from rock and well broken up by the trencher, may provide a suitable bedding material.

Haunching of the surround to half barrel height shall be carried out after the pipe has been laid on the bedding and inspected and approved by the Engineer. The bedding material, except when otherwise directed, shall be used for the haunching, which shall be well compacted by hand tamping in layers not exceeding 150mm. Material at the sides of the pipes shall be compacted to 80% of the optimum density before placing excavated or imported materials over the pipe.

4.2.12.3 Initial Backfilling

The initial backfilling will be carried out over the haunching to a maximum height of 150mm above the top of the pipe, using selected fill approved by the Engineer and this shall be compacted in layers not exceeding 150mm. The initial backfilling and haunching shall be by the same method regardless of the location of the pipe, ie whether under road reserves or in lawns, gardens, etc.

4.2.12.4 Final Backfilling

Final backfilling shall be carried out above the initial backfilling with excavated or other approved material. Layers shall not exceed 150mm in road reserve or private driveways nor exceed 500mm in lawns, gardens, etc, and shall be compacted mechanically. Mechanical compaction shall be used until the pipe is covered by the pipe manufacturer's recommended depth of material.

4.2.12.5 Compaction Requirements

In all cases, compaction shall be carried out in accordance with Standard Drawing R 31.

4.2.13 TRENCH REINSTATEMENT

For trench reinstatement in roadways see Clause 3.4.12 of Chapter 3 of this manual.

4.2.14 MANHOLES

4.2.14.1 Cast In-Situ Bases

Cast in-situ bases for manholes shall be a minimum 150mm thickness, constructed from 20MPa concrete and shall extend at least 150mm radially outside the outer dimension of the manhole section.

The base concrete shall be brought up to the top or over the connecting pipes before the first riser section is placed. If required, the riser section may be recessed to fit over the connecting sewer pipe. The riser section may be placed before the base concrete has taken initial set and then carefully adjusted to alignment. A minimum 25mm gap between the connecting pipe and manhole riser shall be maintained to ensure no direct load is on the connecting pipe. The base concrete is to extend 150mm up the outside of the riser section.

4.2.14.2 Precast Bases

Shall comply with Standard Drawing SS 05 in all respects and shall be carefully placed on the prepared bedding so as to be fully and uniformly supported in true alignment. The openings for incoming or outgoing pipes shall be neatly cut out using a concrete saw. Pipes shall be cast into the wall using an approved epoxy mortar to provide a firm water tight joint. Refer to clause 4.1.16 for pipes through walls.

4.2.14.3 Risers

Precast manholes components shall consist of centrifugally spun concrete pipes to Class X standard, and shall comply in all respects to the details specified hereafter and the details shown on Standard Drawing SS 05.

Precast concrete riser sections shall be manufactured to the requirements of NZS 3107 : 1978 - “Specification for Precast Concrete Drainage and Pressure Pipes”. The standard precast risers shall consist of circular sections with nominal internal diameter of 1050mm and wall thickness shall be in accordance with NZS 3107 : 1978, Class X pipes unless otherwise specified. Risers shall have holes case in the side for step irons.

The method of joining the precast sections shall be strictly in accordance with the recommendations of the manufacturer. This shall be a proprietary jointing compound or adhesive, such as Ëxpandite BM100 ”Sëalastrip” or an approved equivalent.

Cast in-situ manholes shall be constructed using ordinary grade concrete (20 MPa) vibrated to give maximum density and watertight construction.

4.2.14.4 Benching

Benching in manholes shall be concrete rendered and trowelled smooth with a steel tool and neat cement. Inverts to manholes shall be made smooth and true to grade with flow channels neatly curved at changes in direction of the pipelines or at junctions. The practice of utilising a half round pipe to form the channel is permitted on manholes without any change of direction only.
All channels shall be true to grade, properly shaped and constructed in accordance to Standard Drawing SW 03. All connections to manholes shall enter by way of properly formed channels through the benching. All branch connections shall be curved in the direction of the flow and set to discharge above the invert of the main channel.

4.2.14.5 Manhole Lids and Covers

Standard precast reinforced flat lids of a minimum 150mm thickness shall be used. The opening shall be located as shown on Standard Drawing SS 05.

For manholes of 1050mm diameter, lids shall be reinforced with D12 bars at not more than 150mm centres in two directions. For manholes of greater diameter, the lids shall be specifically designed to the approval of the Engineer.

Covers shall be heavy duty cast iron covers in accordance with the details shown on Standard Drawing SS 06.

The use of lid rings to raise the covers to the correct level shall be limited to a maximum height of 200mm

4.2.14.6. Finishes to Manholes

The internal walls of the manholes shall be made smooth and free from joint gaps, to the satisfaction of the Engineer.

All joints that will allow grout to take hold, shall be filled and made smooth. In particular, between risers, manhole top collar (lid rings) and frame, and manhole top and risers.

In addition, all internal, rough or protruding material, left over from the casting process shall be removed by suitable means and made smooth to the satisfaction of the Engineer.

4.2.14.7 Backfilling around Manholes

Backfilling around manholes in road reserves and private driveways shall be carried out with selected fill or other approved material.

This material shall be compacted in layers not exceeding 150mm, but in lawns, gardens, etc, the layers may be no greater than 500mm.

4.2.14.8 Flexible Connections

Where pipes pass through the walls of manholes, the joints shall be watertight. Extreme care

shall be taken that the pipe is free of all dirt and grease. All pipes through manhole walls shall conform to Standard Drawing SS 05.

All uPVC sewer pipes shall be connected to concrete structures via a proprietary uPVC manhole connector supplied by the pipe manufacturer. In addition, the main shall be connected to the manhole connector using a rubber ring flexible collar.

4.2.14.9 Step Irons

Where manhole depths exceed one metre, step rungs shall be provided to conform with Standard Drawing SS 07. The step irons shall be of the “dropper” or “safety” type constructed from 20mm diameter mild steel, hot dipped galvanised, with a coating of not less than 400 grams per square metre.

4.2.14.10 Connection Markers

After installation, all stormwater and sewer connections shall be marked by a 50mm x 50mm timber stake (H3 treated or better) extending to 300mm above ground level.
The top of the stake shall be painted blue. This marker post shall be placed alongside a timber marker installed at the time of pipe laying and extending from the connection to 150mm below finished ground level. The lower end of the marker post shall be adjacent to, and not touching the connection. Connections shall be accurately indicated on the "As Built" plans.

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

4.2.15 SOAK PITS

Porous soak rings for the discharge of stormwater shall be installed with a suitable filter cloth entirely surrounding the outside of the rings to prevent silt and fine material clogging the walls of the ring. After installation of the rings and the filter material the soak pit shall be surrounded with a minimum of 200mm of clean no-fines drainage metal before the pit is backfilled.

4.2.15 TESTING

4.2.15.1 General

All stormwater and wastewater pipelines shall be visually inspected for joints and bedding at the "as laid" condition. No joints may be covered until the pipe line has been approved by the Engineer. Open trench testing may be used for the interim acceptance of a pipe line, but shall not be used as a basis for final acceptance.

The tests shall be carried out in the presence of the Engineer upon receipt of 24 hours notice from the subdivider.

4.2.15.2 Infiltration Test

If the groundwater level is above the buried pipe line, a test of infiltration will be carried out in accordance with Clause 402.15.2 of NZS 4404 : 1981.-."Code of Practice for Urban Land Subdivision", ie, the total infiltration in any portion of a wastewater pipeline shall not exceed a rate of 600ml per 25mm of pipe diameter per 1000m of pipe in five minutes.

The source of any observed infiltration shall be investigated and every defect made good.
Where infiltration is observed into stormwater pipelines the following test shall apply:

A vee notch weir shall be installed at the downstream manhole and the water level behind the weir given sufficient time to reach equilibrium level. The flow shall then be measured and this flow shall not exceed 1.25 litres per 10mm diameter per 100m pipeline tested per hour. Should the infiltration exceed this figure, the installer shall find the cause and rectify it, after which a further test shall be carried out.

4.2.15.3 Lamping/Inspection

All pipelines shall be lamped to check trueness of alignment and grade and that they are free from obstructions and joint defects. Final acceptance will be based on the above tests carried out after all backfilling has been completed.

4.2.15.4 Leakage Testing

For RCRRJ pipes 450mm diameter and above, the inspections as set out in Clause 4.2.15.1 to 4.2.15.3 above shall be carried out and during construction and any leakage occurring shall be immediately rectified.

For all RRJ pipes below 450mm diameter, each section of constructed as part of the works shall pass one of the three leakage tests set down in the Building Industry Authority Verification Method E1, VM1 section 8.0 (as quoted below)

The materials and workmanship used in surface water drains shall pass one of the following tests:

a) Water test (preferred for plastic pipe materials. Not recommended for concrete pipes due to water adsorption into the pipe wall).

b) Low pressure air test (preferred for concrete pipes)

c) High pressure air test (considered too hazardous for general use).

All tests require the pipeline to be sealed with suitably restrained plugs at both ends and at branch connections. Because porous pipes such as those of concrete materials absorb water and can transmit air through their walls, they would have the voids filled by soaking prior to testing.

4.2.15.5 Water Test

a) Fill the pipe with water, ensuring that all air is expelled
b) If pipe material absorbs water, leave for 24 hours
c) Top up water to test head levels. The minimum head should be 1.5m above the top of the pipe or ground water level, whichever is the higher. The maximum head at the lower end of the pipeline should not exceed 6.0m.
d) Leave for 30minutes then measure water loss.
e) The pipeline is acceptable if water loss does not exceed 2ml per hour per mm of internal diameter, per metre of pipeline length.

Note. *Care should be taken when conducting water testing of pipes on steep grades to ensure that excessive hydraulic pressures are not applied to the pipe.*

4.2.15.6 Low Pressure Air Test

a) Introduce air into the pipeline until a pressure of 300mm of water is reached. (This may be measured by a manometer such as a 'U' tube, connected to the system).
b) Wait until the air temperature is uniform. (Indicated by the pressure remaining steady).
c) Disconnect air supply.
d) Measure pressure drop after 5 minutes.
e) The pipeline is acceptable if the pressure drop does not exceed 50mm.

Note. *The low pressure air test is highly susceptible to temperature fluctuations during the test period. A 1ºC change during the 5 minute test period will cause a pressure change of 30mm water gauge or 60% of the permitted change.*

4.2.15.7 High Pressure Air Test

a) Pressurise the pipeline to 25kpa.
b) Wait at least 2 minutes to ensure temperature stabilisation.
c) Disconnect air supply
d) Measure the time taken (minutes) for the pressure to drop to 17kpa.
e) The pipeline is acceptable if the time does not exceed that given for the appropriate pipe size in Table 4.4 below.

Table 4.4 - Time for Pressure Drop Versus Internal Pipe Diameter

Internal Pipe Diameter (mm)	Time for Permissible Pressure Drop (Minutes)
90	3
100	3
150	4
225	6

4.2.15.8 Testing of Rising Mains

All rising/pumping mains shall be tested in accordance with the procedure below.

The subdivider shall be responsible for testing all lines and fittings and for providing all the necessary equipment, water and materials for such testing.

All pipes and fittings shall be subjected to a pressure test after laying, jointing and covering with backfill. The section to be tested shall be capped or flanged off at either end.

The blanked off ends and all bends, tees, etc, shall be securely strutted or otherwise prevented from movement before applying any pressure. The subdivider shall provide means of bleeding air from both ends of the pipeline where directed by the Engineer. Pipes shall be slowly filled with water allowing all air to escape and left for 24 hours to allow any take-up. The pressure shall then be slowly raised by means of a pump to the test pressures indicated below.
The test pressure shall be measured at the lowest point of the line under test and for steel pipe lines, shall be maintained for a period of 30 minutes during which time the leakage shall not exceed 750ml per 100mm of pipe diameter per kilometre of pipe.

Testing of uPVC pipe shall be in accordance with the requirements of Section 9 Procedure B of NZS 7643 : 1979, except for pipes of diameter less than 100mm NB which shall be tested in accordance with Procedure A. Test pressures shall be as Table 4.5 below:

Table 4.5 - Test Pressures for Pressure Lines

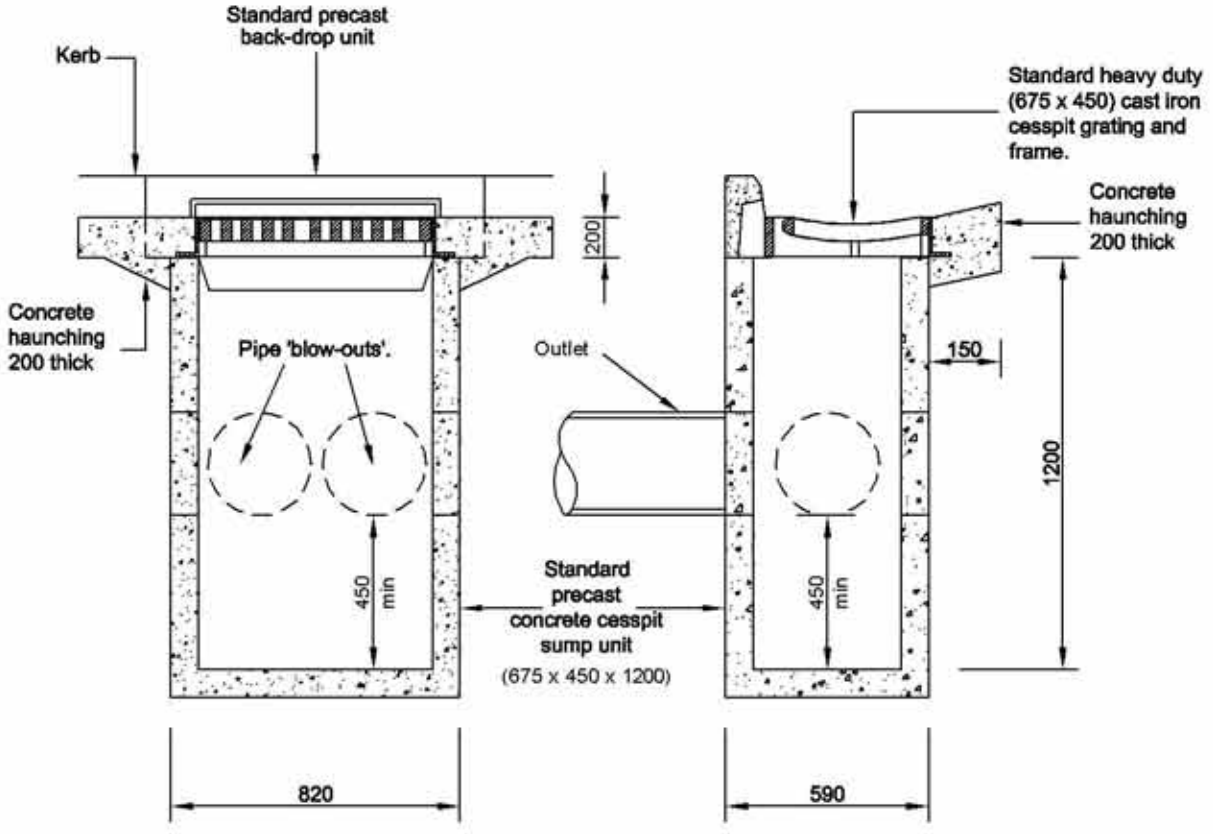
Class of Pipe	Test Pressure	
	Meter Head	kPa
Class B uPVC	90	900
Class C uPVC	135	1350
Class D uPVC	180	1800

Any faulty pipes, joints or fittings shall be replaced by the subdivider and the line retested. All pipes are to be tested so that the specified test pressures are achieved but not exceeded in such lengths of pipe as may be approved by the Engineer. All pipes shall be pre-tested by the subdivider before testing in the presence of the Engineer. Should any section of pipe fail this latter test, the cost of attendance by the Engineer at the subsequent test or tests shall be charged at cost. Test sections shall not be longer than 1000 metres.

CHAPTER 4

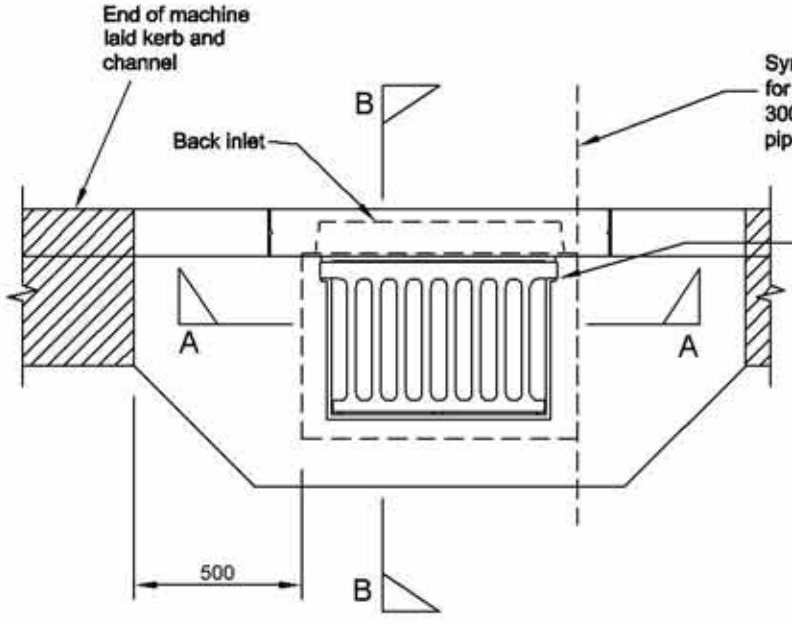
STORMWATER

STANDARD DRAWINGS



SECTION A-A

SECTION B-B



PLAN

NOTES:

1. All concrete to be Ordinary Grade 20 MPa at 28 days.
2. All pipes to be finished flush with inside of cesspit and plaster finished.
3. All cut concrete pipes to have exposed reinforcing plastered over.

WHAKATANE DISTRICT COUNCIL

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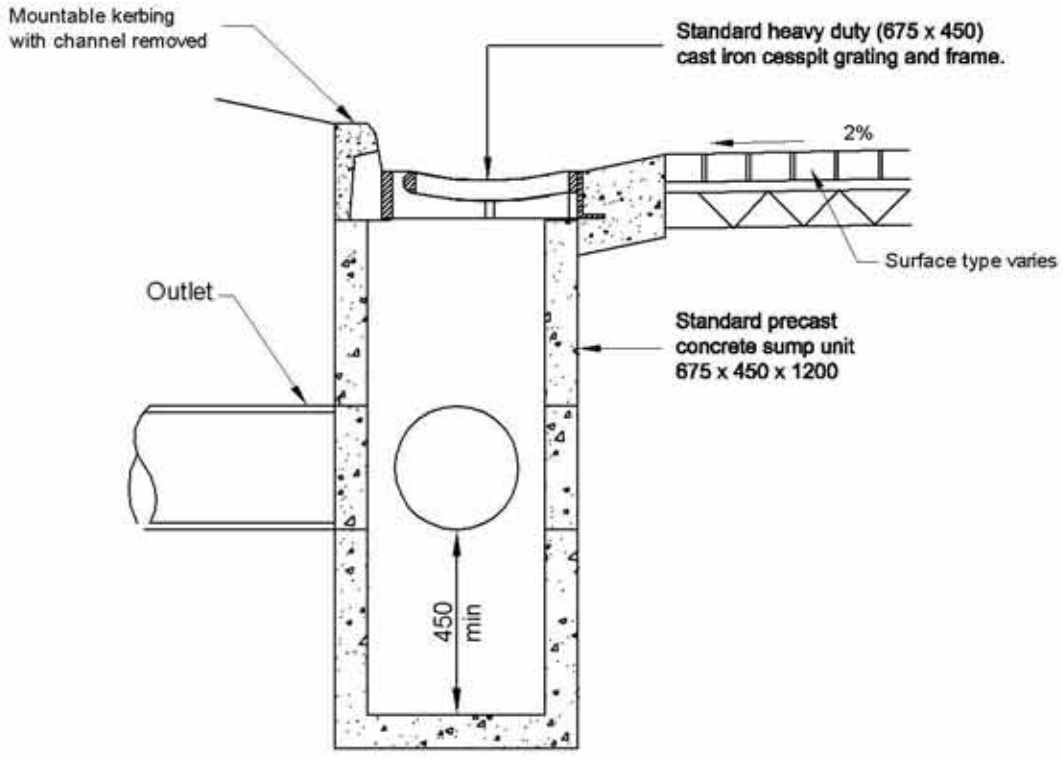
STANDARD DRAWING

NOT TO SCALE

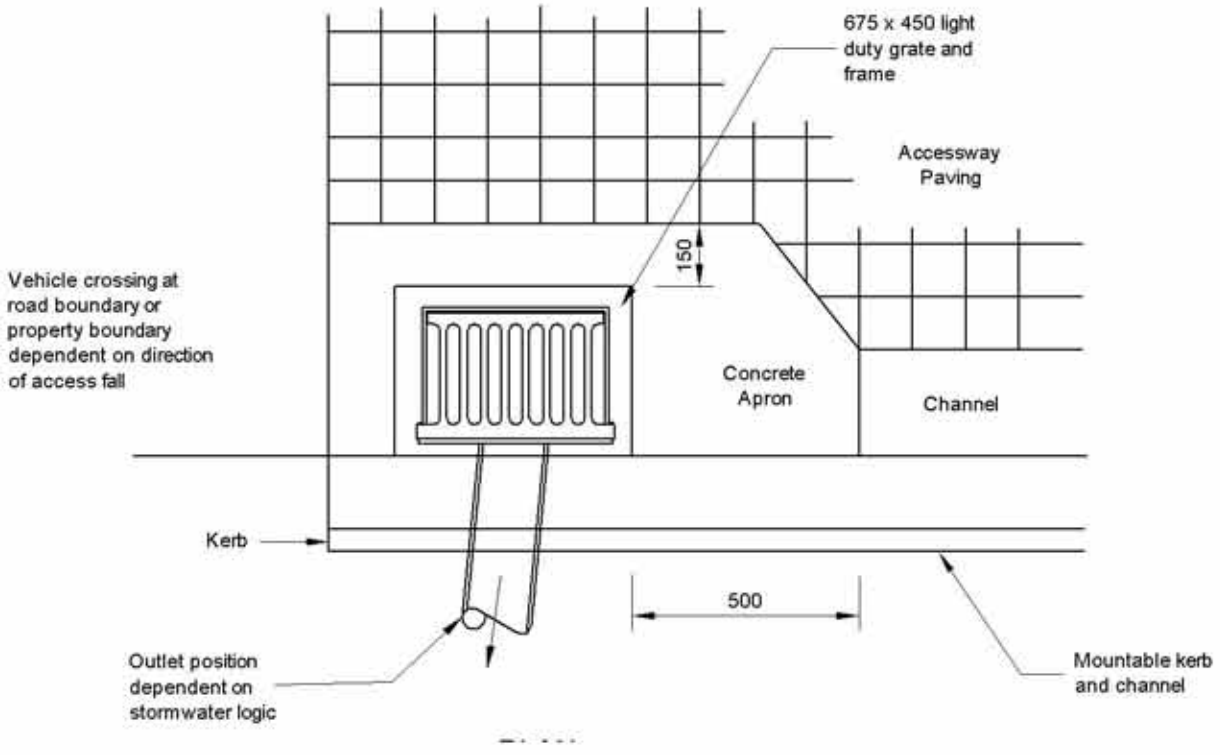
STANDARD CESSPIT

SW 01

ISSUE 7.0
SEPTEMBER 2007



SECTION



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PRIVATE ACCESS CESSPIT

SW 02

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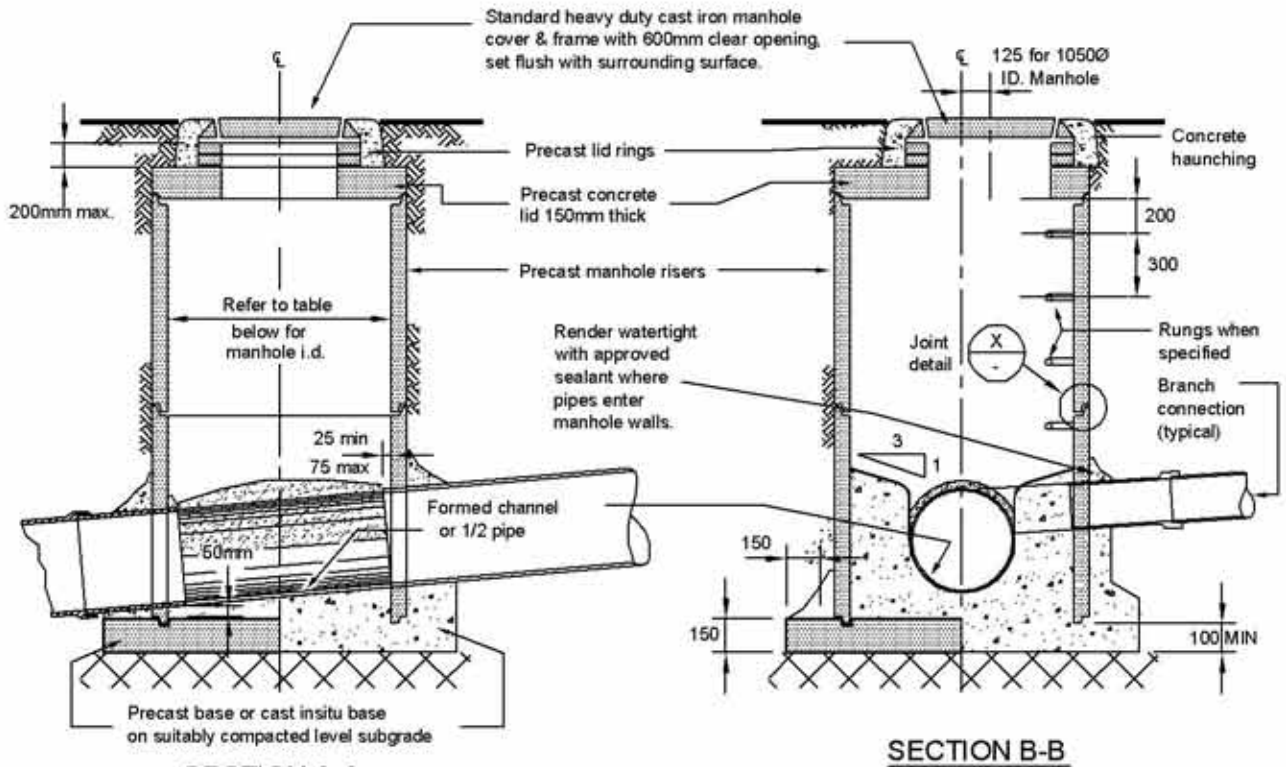
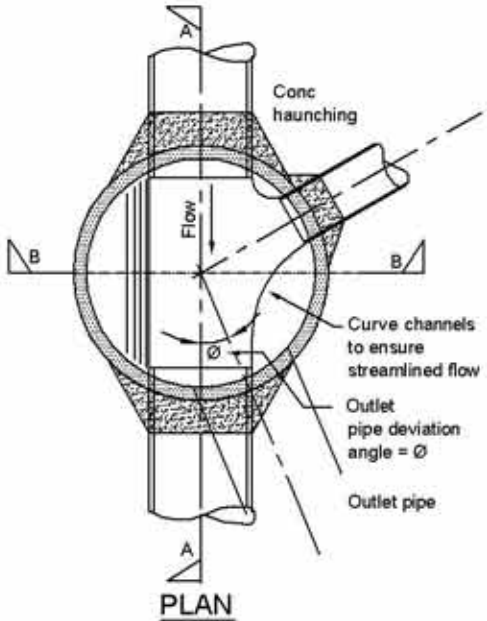


SECTION A-A

SECTION B-B

	MINIMUM MANHOLE INSIDE DIAMETER*			
OUTLET PIPE DIA. (mm)	PIPELINE DEVIATION ANGLE (Ø)			
	0°-15°	16°-45°	46°-75°	76°-90°
UP to 300	1050	1050	1050	1050
375 to 575	1050	1050	1050	1050
600 to 750	1200	1200	1500	1500
825 to 900	1500	1500	1800	1800

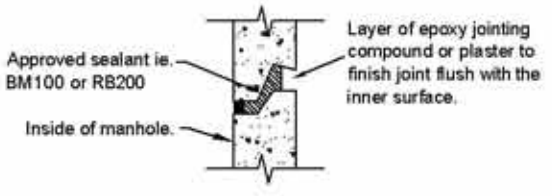
* To be used as guide only.
* Larger diameters may be required where more than one inlet pipe is to be constructed.



PLAN

NOTES:

1. All insitu concrete other than site concrete shall have a minimum compressive strength of 20 M Pa @ 28 days.
2. All manhole precast units (shaded) are standard manufactured concrete units from a certified precast supplier.
3. Allowance to be made for the provision of basecourse to depth between manhole lid and cast iron cover where manhole is located within carriageway.
4. All cut concrete pipes to have exposed reinforcement, plastered over.
5. Manhole sizes are subject to specific design where pipes are larger than 900mm diameter.
6. All figured dimensions are in millimetres.



X JOINT DETAIL

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STANDARD DRAWING

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STANDARD MANHOLE CONSTRUCTION DETAILS

SW 03

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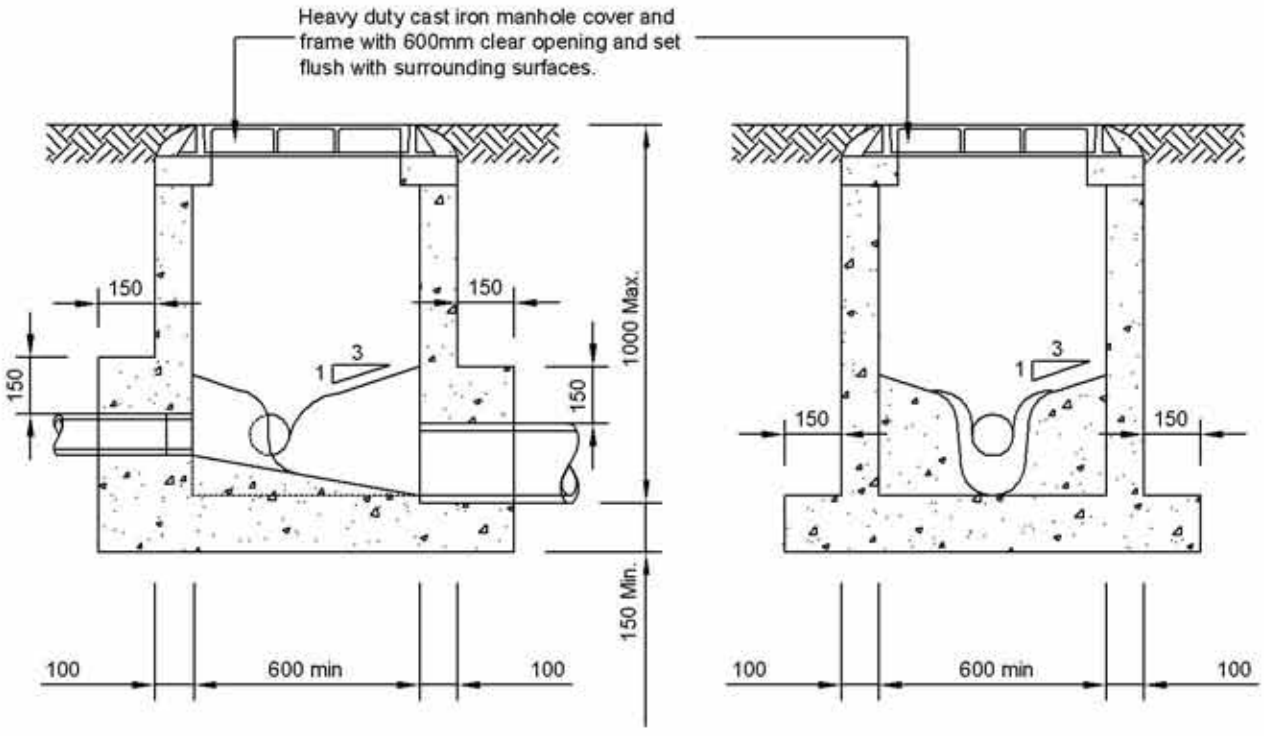
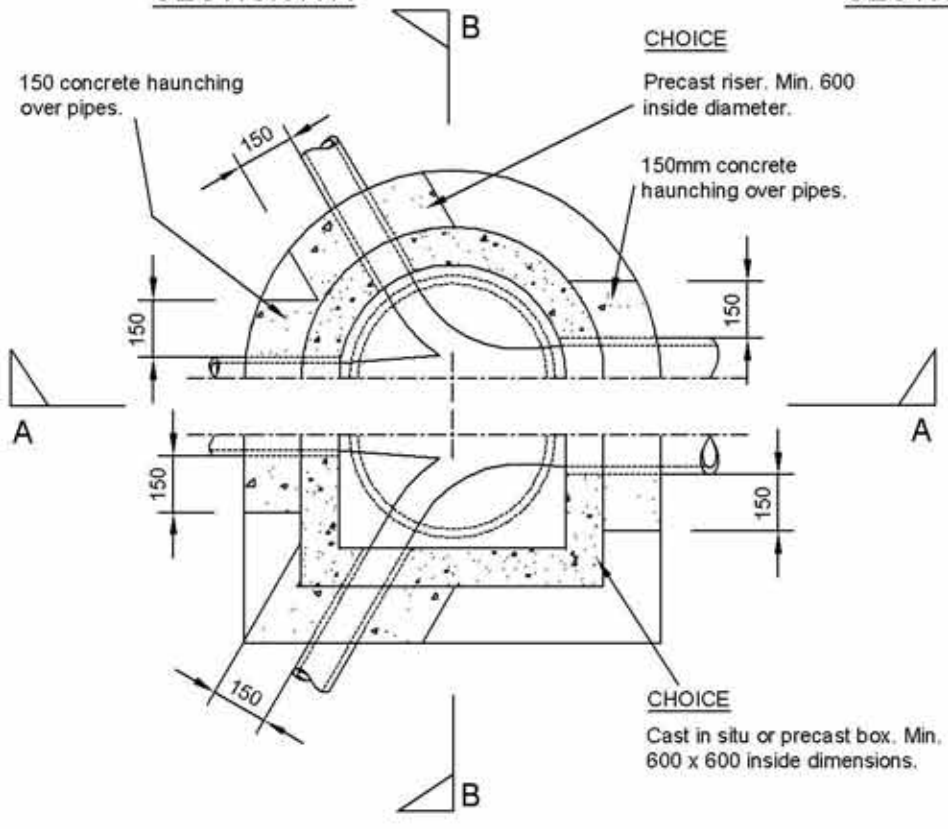


SECTION A-A

SECTION B-B



PLAN

NOTES

1. Install flexible joints in accordance with standad drawing SS05.
2. All concrete to have a minimum compressive strength of 20 MPa at 28 days.
3. Chambers must be large enough to allow full bending of prodding rods and full benching.
4. All cut pipes to have exposed reinforcement plastered over.

WHAKATANE DISTRICT COUNCIL

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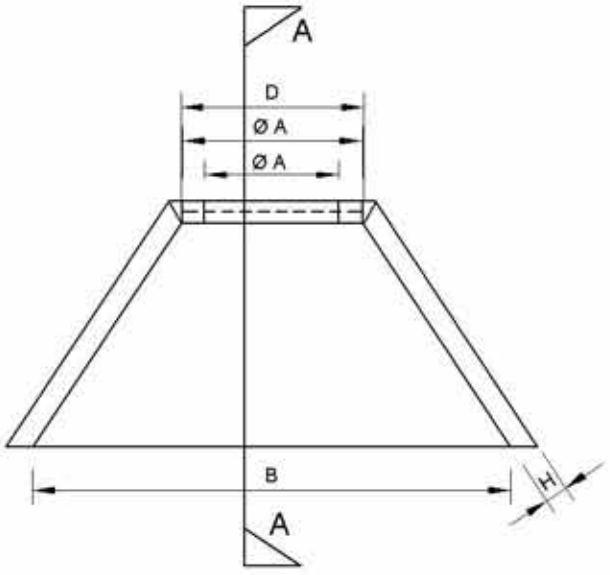
STANDARD DRAWING

NOT TO SCALE

SHALLOW MANHOLE DETAILS CONSTRUCTION DETAILS

SW 04

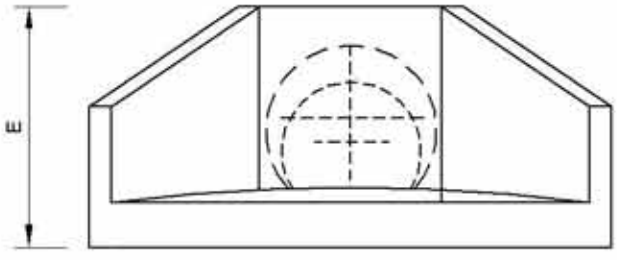
ISSUE 7.0
SEPTEMBER 2007



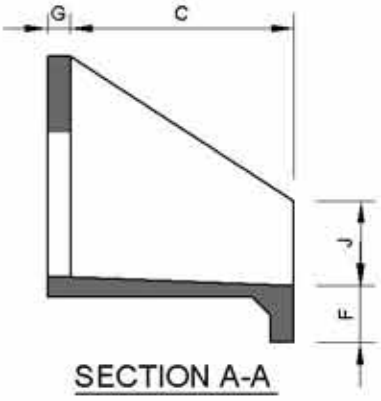
PLAN

NOTES:

1. Concrete strength and reinforcement to be designed by precaster
2. Allow to bed wingwall unit on 300mm min depth of drainage metal.
3. Allow to provide scour protection where outlet velocities and soft soil conditions dictate.
4. Allow to provide to the satisfaction of the Engineer a galvanised screen over the end of the pipe in residential zones to prevent children entering the pipe.
5. For outfalls with floodgates confirm hole position with the Engineer prior to fabrication.



ELEVATION



SECTION A-A

WING WALL DIMENSIONS										
PIPE DIAMETER	APPROX MASS KG	A		B	C	D	E	F	H	J
		O/D.SOFT SPOT	HOLE TO SUIT							
100-300	205	190	390	1000	600	460	520	200	60	160
300-675	755	390	790	2150	745	810	1000	250	90	390
300-600	925	370	700	1950	1100	750	900	280	80	500
600-1050	1800	1225	3000	1000	1270	1675	345	345	100	600
1200-1350	5610	1380	1540	4100	2400	1600	1975	425	125	750
Dimension A is either a soft spot or a hole only						All dimensions are in millimeters				

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STANDARD OUTLET DETAILS

SW 05

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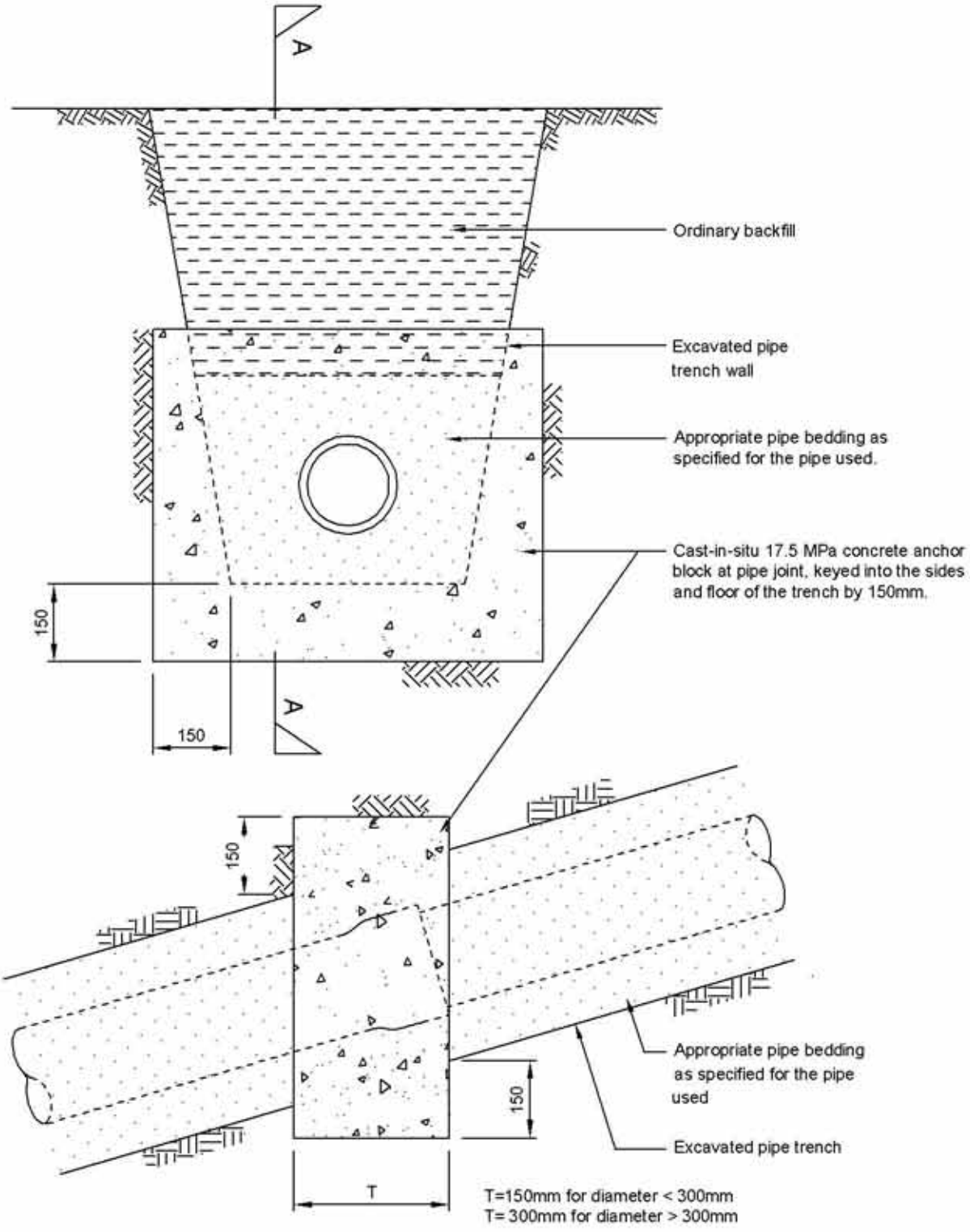

SECTION A-A

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STANDARD DRAWING

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ANTI-SCOUR BLOCK DETAIL

SW 06

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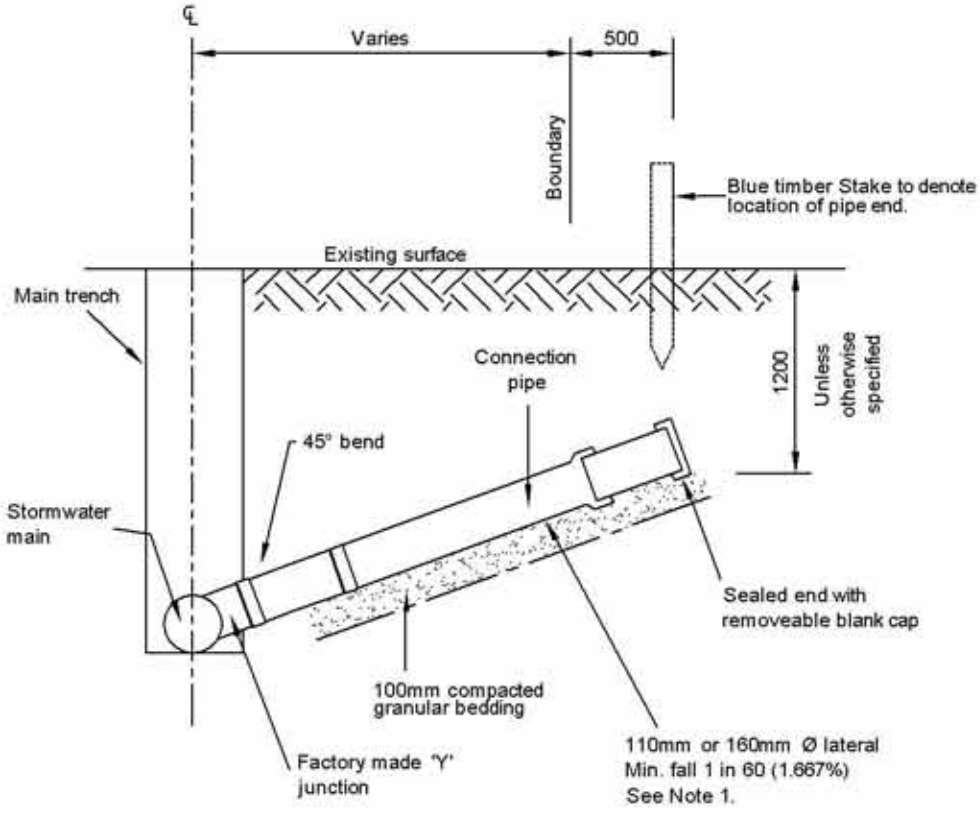
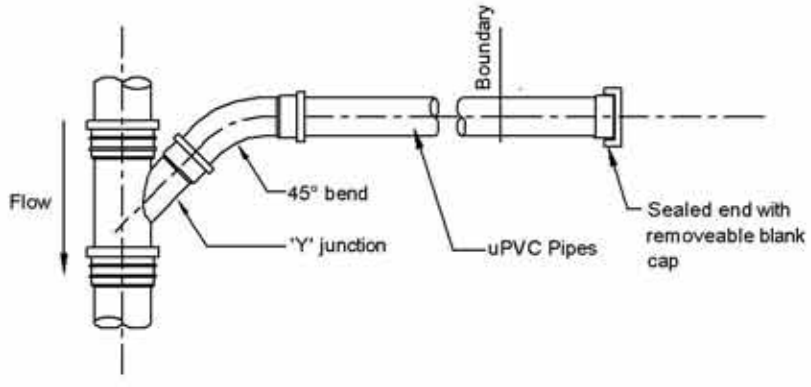


ELEVATION



PLAN

NOTES:

1. Pipe sizes shall match design flows from property served. Minimum size:
   Industrial/Commercial - 160mm Ø
   Residential - 110mm Ø

2. For larger diameter pipes where factory junctions are not available, saddle connections may be subject to the approval of the Engineer. When connecting to concrete pipes, hole openings shall be saw cut into the stormwater main.

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STANDARD DRAWING

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STANDARD STORMWATER CONNECTION

SW 07

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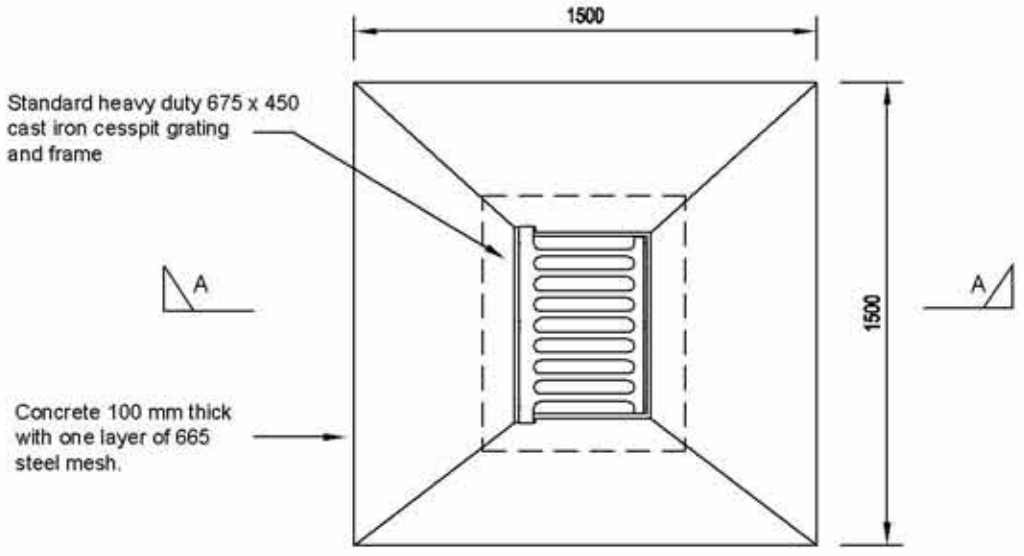
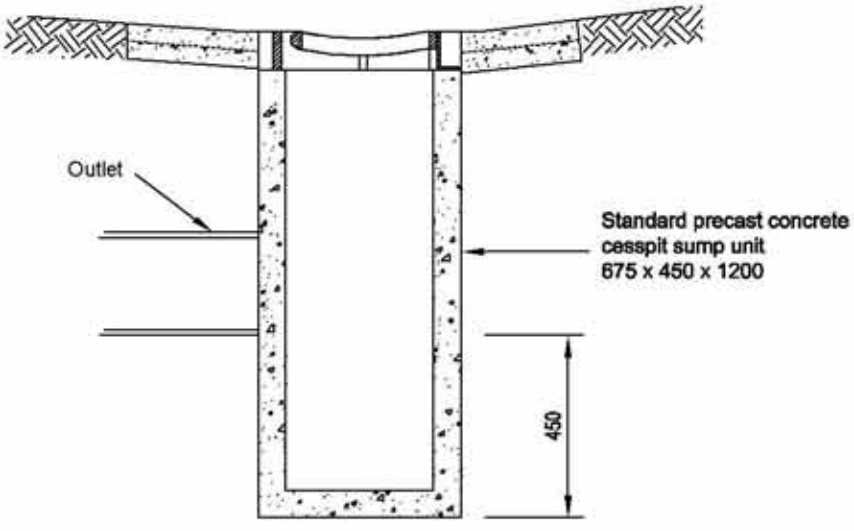


PLAN



SECTION A-A

NOTES:

1. All concrete to be Ordinary Grade 20 MPa at 28 days.
2. All pipes to be finished flush with inside of cesspit and plaster finished.
3. All cut concrete pipes to have exposed reinforcement plastered over.

WHAKATANE DISTRICT COUNCIL

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STANDARD DRAWING

NOT TO SCALE

BERM CESSPIT

SW 08

ISSUE 7.0
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Appendix 4.1

CALCULATION OF RUNOFF

Runoff may be calculated using the "Rational Method" which is based on the formula:

$$Q = \frac{CIA}{3600}$$

Q = runoff in litres per second (l/s)
C = runoff co-efficient (see Table 4.3)
I = rainfall intensity in millimetres per hour
A = area of catchment above the point being considered in square metres

Runoff Coefficients

The runoff coefficients shown below are to be used for the various land use types and are provided as a guide for the initial calculation of system requirements.

More accurate investigations into the appropriate return periods and runoff coefficients will be necessary for detailed design.

Detailed design should involve calculating a weighted average runoff coefficient by averaging the value for individual parts of the catchment. This may be done for a representative sample area or the whole catchment. The formula for this calculation is shown in Clause 2.1, Verification Method of the "NZ Building Code - Clause E1 Surface Water"

In refining the estimate of run-off coefficient, the coefficients provided in the NZ Building Code E1 table 2 shall be used. The following coefficients are provided as a guide.

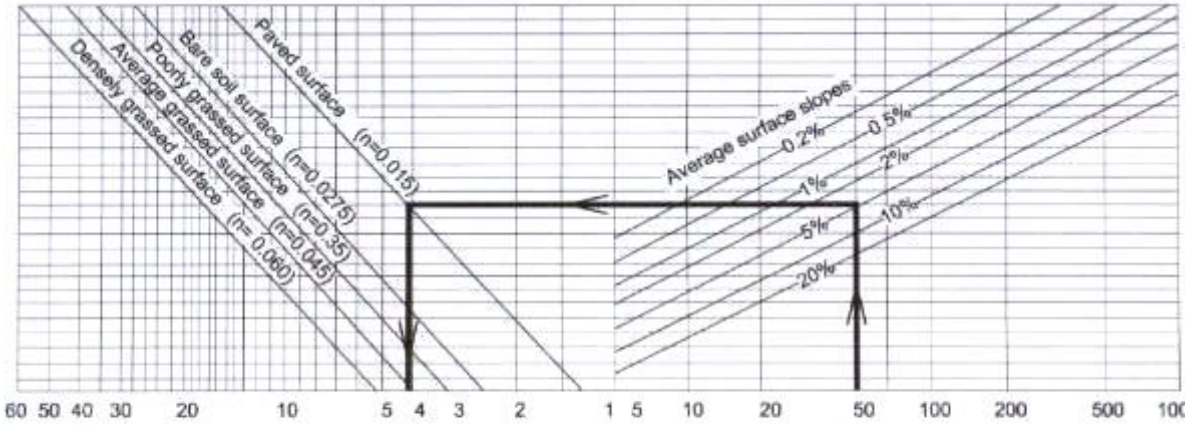
(i)	Roofs	C = 0.95
(ii)	Asphaltic and concrete Areas	C = 0.90
(iii)	Uncultivated ground, lawns and playing fields	C = 0.30
(iv)	Cultivated ground and dairy farmland	C = 0.20

Time of Concentration

The Time of Concentration shall be determined as the "time of entry" plus the "time of flow" from the furthest point of the catchment to the point of discharge. The minimum Time of Concentration to be used is 10 minutes.

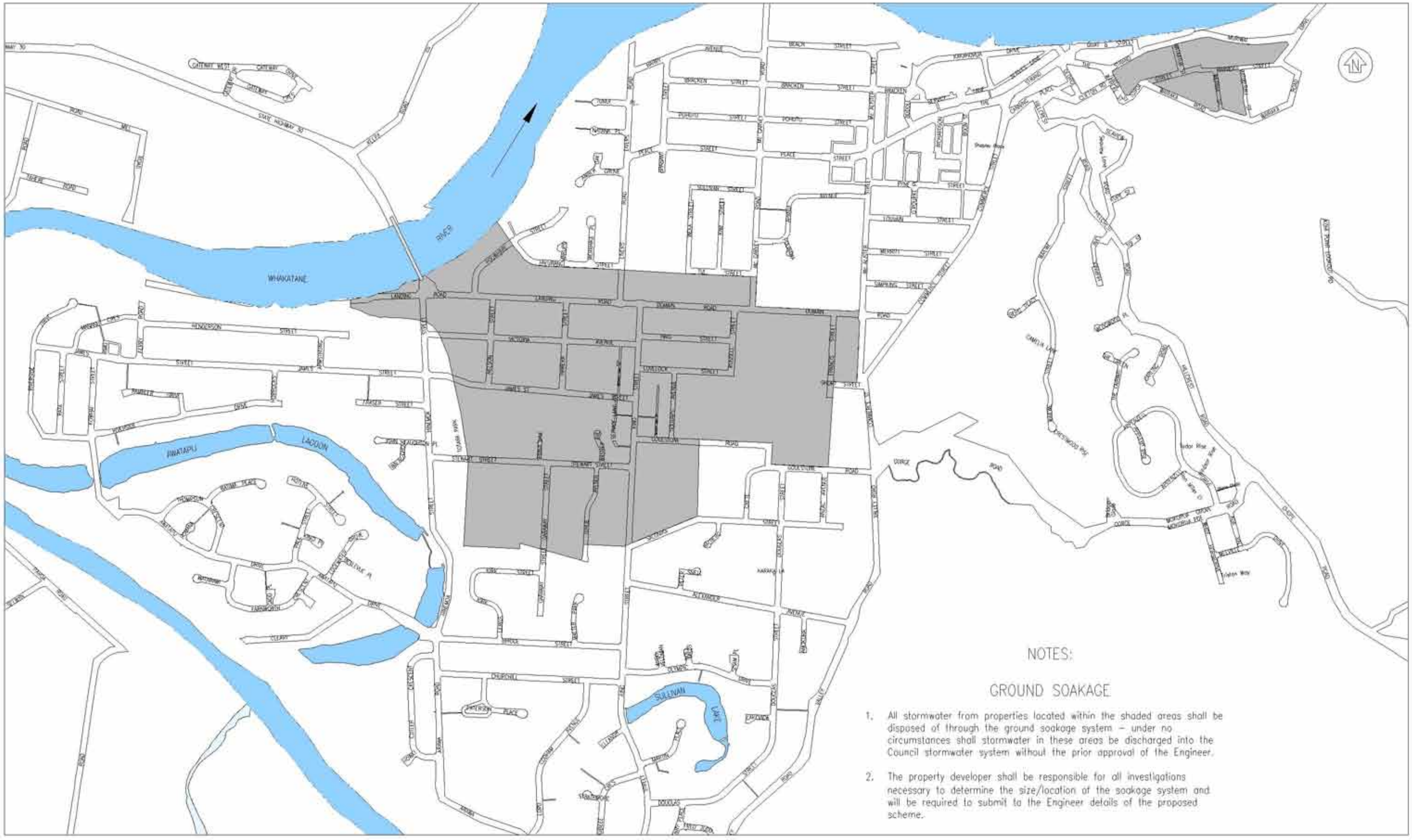
Time of Entry to the system shall be calculated from the Overland Flow graph in Clause 4.1.12.3 below or an equivalent published graph and the formula from which it was derived.

Overland Flow Graph



TIME OF TRAVEL OVER SURFACE - minutes LENGTH OF OVERLAND FLOW - metres

Example: for surface water flowing 50m over a paved surface at a slope of 5%, the time of travel is 4.1 minutes



WHAKATANE DISTRICT COUNCIL

STANDARD DRAWING

NOT TO SCALE

WHAKATANE URBAN AREA GROUND SOAKAGE

APPENDIX 4.2
ISSUE 7.0
SEPTEMBER 200

CHAPTER 5

WASTEWATER

CHAPTER 5 WASTEWATER

PART 1 DESIGN

5.1.1 INTRODUCTION

This part sets out the basic design principles for the drainage of wastewater. While some construction information is included for completeness, detailed information on construction will be found in Part 2 "Construction" in Chapter 4 of this manual. Generally, the construction and testing of waste water reticulation mains and structures will be in accordance with the requirements for stormwater detailed in Chapter 4.

5.1.2 GENERAL

All lots within 200m of the boundary of an existing wastewater drainage system shall be provided with a connection to that system.

Where the existing lot being subdivided is within 200m of the boundary of an existing wastewater drainage system and is presently being serviced with a septic tank, then the existing lot and all new lots shall be connected to the drainage system as a condition of the development.

All wastewater drainage systems shall be capable of serving the entire natural catchment upstream of the actual system. The flow from the upper section of the catchment shall generally be calculated assuming complete urbanisation of the area or the inclusion of such other specific uses as the Engineer may require.

Provision may be required for the design to allow for the flow from a pumping station outside the natural catchment, the details being supplied by the Engineer. A contribution towards the additional cost of the gravity system will be considered by Council where allowance for a pumping station flow is required.

Where a proposed Development which will discharge to the existing reticulation system is determined by the Engineer to be "high density" eg multi-storey residential apartments, the Developer may be required to meet all or part of the costs of a catchment analysis to establish the capacity of the existing sewage system to cope with the increased flow.

No person, other than the authorised agents of Council, shall make connections to the waste water drainage system without the approval of the Engineer.

No surface water run-off shall be connected to any waste water drainage system.

No waste water drainage line shall be connected to a storm water pipe.

Where required by the nature of the business or commercial activity to be carried out on any lot, provision may need to be made for the pre-treatment of the discharged waste, or for the installation of an on-site grease trap in accordance with the provisions of the Trade Waste Bylaw.

5.1.2.1 Provision for Future Development

The Council may require the Developer to install a reticulation system with a greater capacity than that required for the development in order to service future developments, or to upgrade the present level of service.

Consideration in the design of the reticulation system should be given to the potential for the change of use of the lots being created, especially in commercial and industrial subdivisions. In such cases, the Council may by agreement negotiate with the Developer and make a financial contribution to the additional costs that may be incurred. Such an agreement shall be made in writing with the Council, preferably before the issue of a Resource Consent, and before the commencement of construction.

5.1.3 STANDARDS

The list of Standards specified in Chapter 4, Clause 4.1.3 shall also be applicable to this section of this Manual.

5.1.4 CALCULATION OF FLOWS

Flow requirements shall be calculated from the District Plan zoning for the subdivision for the greatest flow possible from the catchment in question, and shall be to the Engineer's approval. Specific calculations are to be carried out using the following data.

5.1.4.1 Domestic Flow

Average sewage flow = 200 litres per head per day
Peak & dilution flow factor = 5 times daily average sewage flow
Minimum velocity = 0.75 metres per second

Note: *Velocities shall be calculated with due allowance for the proportional depth of flow in the sewer.*

5.1.4.2 Industrial Flow

Specific design will be required within each industrial subdivision and to assess the future upstream flow.

The following maybe used as a preliminary design basis:

Industry Type (water usage**)**	**Minimum design flow** (litres/second/hectare**)**
Light	0.4
Medium	0.7
Heavy	1.3

The above design flows include both normal sanitary sewage and trade wastes.

5.1.5 LOCATION OF PIPELINES

All wastewater sewers shall be located inside the road reserve boundary unless it is not technically possible to do otherwise, but shall be located in such a manner as not to reduce the building area available on the lots.

Every effort shall be made to eliminate surface water infiltration of the waste water system. Manholes shall not be located adjacent to road kerbs and channels or at low points in the finished ground surface, or in secondary storm water flow paths.

Waste water lines in roads shall generally be aligned parallel to the kerb lines within the carriageway and shall be installed with adequate clearance from other services so as to allow for the maintenance of those services, and for the provision of additional future services.

5.1.5.1 Public Sewers in Private Property

When planning sewers in private properties, consideration should be given to maintenance requirements and likely future developments within the property boundaries.

Where, as a result of a subdivision or development, an existing or a proposed public sewer will be within a private property, the pipeline shall be protected by an easement in favour of Council. The easement shall be a minimum width of 3.0m and at least 1.5m on either side of the pipeline.

5.1.5.2 Structures Over or Adjacent to Public Sewers

Building over or adjacent to public waste water lines is not a permitted activity.

Rising mains and waste water falling mains shall not be sited under buildings, and the centre line of the pipe shall not be closer to a building than the greater of:

a) 1.5m or
b) Half the depth to the invert of the waste water line, plus 0.6m, subject to compliance with Clause 3.1 of NZS 3604.

Where (a) and (b) above cannot be complied with, and the building cannot be sited elsewhere on the property or modified to conform with the above conditions, and it is essential for the proposed building to be sited on that part of the property, approval may be granted for non-residential ancillary buildings over the waste water line subject to the following conditions and with the approval of the Engineer.

- Compliance with Clause 7.6.2 of the Whakatane District Council Consolidated Bylaw 1997
- There are no changes in direction or junctions in the portion of line to be built over.

5.1.6 PIPE SIZES

In no case shall a public sanitary sewer line be less than 150mm internal diameter.

5.1.7 GRADIENTS

Pipe gradients shall be determined using the Colebrook White formula. Specific approval of the Engineer is required and shall be obtained prior to the submission of detailed design if the minimum gradients shown in Table 5.1 cannot be achieved. The pipeline design shall take the following factors into account:

- The pipe roughness coefficient *ks,* used in the design shall be that nominated by or agreed upon with the Engineer on the basis of commonly adopted modern engineering design practice. For preliminary design purposes, it is recommended that *ks* be assumed 1.5mm as an overall coefficient allowing for joints and so on
- The desirable flow velocity in 150mm diameter pipes when full shall normally be not less than 0.65 metre/second (minimum gradient 0.55%), but 0.75 metre/second (minimum gradient 0.72%) shall be the desirable minimum velocity for the upper portions of sanitary sewer systems
- Gradients flatter than 0.55% for 150mm diameter pipes may be permitted in special cases where pumping would otherwise be required
- A 150mm diameter pipeline at a gradient of 0.75% has 14 litre/second capacity (equivalent to 300 houses or 1,200 people)
- A 150mm diameter pipeline at a gradient of 0.55% has 12 litre/second capacity (equivalent to 257 houses or 1,030 people)
- In practical terms, unless the catchment exceeds 250 houses, dwelling units, or their equivalent, and where no flow from a pumping station is involved, 150mm diameter pipes laid within the above limits will be adequate without specific hydraulic design
- In flat or rolling country every effort should be made in the design to have the sewers as steep as reasonably possible.

Table 5.1 - Minimum Pipe Gradients

Table 5 1: Minimum Pipe Gradient for Different Pipe Diameters	
Pipe Diameter (mm)	**Minimum Gradient (%)**
150	0.55
200	0.37
225	0.34
300	0.30

These gradients shall be subject to clause 5.1.7 above and are for full pipes.

Where the velocity and gradient limits cannot possibly be complied with, the Engineer may require certain additional works to ensure satisfactory operation of the system.

5.1.8 PIPES

Pipe products that may be used for wastewater pipeline work are shown in Clause 4.2.3 in Section 2 of Chapter 4.

Concrete lined steel pipes may be used where additional strength is required eg on steep gradients or at shallow depths under carriageways.

Where concrete-lined steel pipes are included in the design, these shall be as specified in Clause 4.2.3.

Generally, sewers shall be PVC plain solid wall, rubber ring jointed pipes and fittings complying with AS/NZS 1260 ; 2002 Class SN 16.

Where the depth of the sewer is greater than 6m, or wheel traffic loads exceed 96 kN, specific design of the pipeline using AS/NZS 2566 design method will be required.

PE pipes complying with AS/NZS 4130 may be used in specific circumstances (e.g. for sleeving) with the approval of the Engineer.

5.1.9 JOINTS

All joints shall comply with the following requirements:

- All pipes shall have flexible joints of an approved type such as rubber rings
- Steel pipes shall have flexible joints
- Solvent cement joints shall only be used for PVC pipes where specifically approved by the Engineer
- Joints shall be provided adjacent to manholes to the requirements of NZS/AS 2566 : 1988 with the exception of PVC, where proprietary connections may be used.

5.1.10 PIPE BEDDING

Pipe bedding shall be designed to meet the requirements of the class of pipe used, under the design loading conditions set out in the manufacturer's specifications.

Generally, pipe bedding aggregate shall consist of graded chip or pea metal, all passing a 9.5mm sieve and retained on a 4.75mm sieve, placed and compacted in accordance with Clause 4.2.11.2 of Section 4.

5.1.11 PIPELINE CONSTRUCTION

The construction of all pipelines shall be carried out in accordance with the requirements of Section 2 of Chapter 4 of this Manual.

5.1.12 MINIMUM COVER AND MAXIMUM DEPTH

All pipelines other than those in private property shall be specifically designed to support the likely loading in relation to the minimum cover to be provided in accordance with requirements of NZS/AS 3725 : 1989 Generally, the minimum cover for all types of pipes [other than those in private property] under all conditions shall be 600mm.

The minimum cover over pipes in private property shall be 500mm. Where, due to the topography, this cover cannot be provided, the pipeline shall be protected. Specific design information will be required in these circumstances.

Where pipes are designed below carriageways, they shall be specifically designed to support the pavement design loading appropriate to the minimum cover to be provided at both subgrade and finished level.

Generally, waste water lines deeper than 2.5m should be avoided, and approval for such installations will be given only under special circumstances.

5.1.13 MANHOLES

5.1.13.1 Manhole Locations

Manholes shall be provided at every change of direction, at every main junction, at every change of gradient or change of pipe size, at distances apart not exceeding 100 metres and at the end of every line, except where otherwise approved by the Engineer. A manhole will be required at the termination of all pipelines greater than 35 metres in length.

5.1.13.2 Standard Manholes

Where the depth to invert exceeds one metre a manhole is to be constructed in accordance with Standard Drawing SS 05.

Precast manholes shall be a minimum of 1050mm in diameter.

Manhole steps shall be provided in accordance with Clause 4.2.13.9.

5.1.13.3 Shallow Manholes

Where the depth to invert of the manhole is less than one metre and it is serving less than four houses, a shallow type manhole may be constructed with a minimum diameter of 600mm. In all cases, shallow manholes shall be of sufficient dimension to allow full benching.

Refer to Standard Drawing SW 04.

5.1.13.4 Fall through Manholes

Where there is a change of direction in a manhole, the loss of velocity at the change of direction must be compensated for by a drop of 10mm plus 3mm for every 15° of change of direction. This applies for velocities up to 1.2 metres per second.

For higher velocities:

$$\text{Drop} = 10\text{mm} + \left(\frac{\text{Angle of Deviation} \times V^2\text{mm}}{7.5}\right)$$

The minimum fall allowable is 15mm.

Where an increase in pipe size occurs, the soffit(s) of the inlet(s) shall not be lower than the soffit of the outlet. This will also apply to multiple inlets subject always to the requirement for minimum fall through the manhole in respect of each pipe.

5.1.13.5 Unsuitable Ground

Where a manhole is to be constructed on unsuitable foundation conditions, the area under the manhole shall be undercut down to solid ground or until suitable conditions are reached and backfilled up to the underside of the manhole base with compacted hardfill.

5.1.14 CONNECTIONS

5.1.14.1 General

All individual dwellings, lots or titles shall be provided with a connection to the wastewater main in accordance with the following requirements:

- The connection provided for each lot shall be of a type capable of taking an approved drain pipe of 100mm internal diameter, unless a larger size is required by design
- Where the sanitary sewer main is outside the lot to be served, the connection shall extend to at least 500mm within the boundary of the lot
- Where the connection will cross more than one lot boundary, then specific approval of the Engineer will be required
- If the above conditions cannot be met, then a 150mm diameter branch sewer line shall be constructed complete with a terminal manhole, or with a cleaning eye in accordance with clause 5.1.15

Where it is proposed to utilise an existing connection as a part of a development the following conditions shall be complied with:

- The existing connection shall be inspected with a video camera to establish its condition
- Where the connection passes the inspection, the new lateral may be connected to the existing connection by installing a manhole at the property boundary as shown on Standard Drawing SS 10
- It the lateral does not pass the inspection it shall be upgraded to meet the current standards required for all new installations
- All costs associated with inspection and upgrading shall be borne by the Developer

5.1.14.2 Sealing

All connections, whether into reticulation lines or into manholes shall be sealed at the end by a factory manufactured removable blank cap fitted with a rubber ring. Connections shall conform to the details in Standard Drawing SS 01.

5.1.14.3 Connections to Pipelines

Connections and junctions to the main shall be accomplished as detailed in Standard Drawing SS 01. The level of the connection shall be constructed to terminate at the level appropriate to service the building site but shall be not less than 1.2 m deep.

5.1.14.4 Saddling

Saddling of pipes for connections will not be permitted unless specifically approved by the Engineer.

5.1.14.5 Marker Posts

The termination of a house connection shall be marked by a 50mm x 50mm H4 treated timber marker post painted red in accordance with Clause 4.2.14.10.

5.1.14.6 Branch Connections

Where lengths of 100mm diameter branch connections are provided to service individual lots, these shall be constructed of uPVC pipes.

All specification clauses above relating to pipes, trenching, excavation, pipe laying, backfilling, etc, as detailed for main reticulation lines, shall apply to the construction of these connections.

5.1.14.7 Drop Connections

Where the fall in a manhole exceeds 500mm, a drop connection is required in accordance with Standard Drawings SS 02 and SS 03. Where the fall is less than 500mm but greater than 200mm, falls shall be constructed as ramps from the incoming pipe to the channel invert.

External drops shall be used on 150mm or greater diameter lines unless otherwise agreed to by the Engineer.

5.1.14.8 Connections to Drop Manholes

Where an existing or proposed sewer is more than 5m deep to the invert, or where required by ground conditions, the connection shall be designed as a manhole constructed on the deep line and a shallower branch line shall be laid from the manhole.

5.1.15 CLEANING EYES

Cleaning eyes may be constructed, after obtaining prior approval in writing from the Engineer. They shall be constructed in accordance with the Standard Drawing SS 04. All connections must be provided downstream of the cleaning eye. A cleaning eye may only be placed on a terminating 150mm diameter line less than 35m long.

5.1.16 TESTING

5.1.16.1 Pipe Testing

All wastewater mains and branch lines, including extended connections shall be pretested during construction, before testing in the presence of the Engineer, which shall be carried out at the completion of all other engineering works in the subdivision. The subdivider shall supply all equipment required to carry out the tests. Test requirements are set out in Clause 4.2.15.

5.1.16.2 Manhole Testing

Manholes will be tested for water tightness by filling for 30 minutes. The allowable loss shall not exceed 1 litre per metre of depth. Care must be taken that undue pressure is not put on any of the downstream sewer pipes while this test is taking place.

5.1.17 PIPELINE TRACING

The location of all pumping mains and gravity pressure mains (swallows) shall be marked with a foil tape or wire trace buried in the trench.

5.1.17.1 Tracer Tape

Tracer tape shall be 50mm wide, woven reinforced, manufactured from acid and alkali resistant polythene plastic, with a solid aluminium core which shall be visible from both sides. The foil shall be continuously printed with "CAUTION SEWER MAIN BURIED BELOW", with no inks or printing extending to the edges of the tape.

All printing shall be encased to avoid ink rub-off. The adhesives that bond the protective plastic jacket to both sides of the foil shall be applied to both sides to the film and foil layers to provide a continuous seal.

The tape shall be buried above the centre line of the pipe 300mm to 400mm below the finished surface. The tape shall be brought up inside the surface box risers or manholes at the start and end of the main with a 300mm long tail, so that pipe location equipment can be readily connected.

5.1.17.2 Tracer Wire

When a pumping main or swallow pipe is installed by a directional drilling method or is bored through the ground for a distance exceeding 20 metres, the pipe shall have a tracer wire attached. The wire shall be a continuous 2.5mm² multi strand polythene sleeved cable, strapped to the pipe wall with at least two complete wraps of heavy duty adhesive tape, at no more than 3.0m intervals. The tracer wire shall be terminated at each end as for tape in section 5.1.17.1 above.

5.1.18 PUMP STATIONS

5.1.18.1 General

Where a proposed development cannot be adequately serviced by a gravity system, public sanitary sewage pumping stations will be permitted provided they are logically located and designed to service the entire catchment area of the land beyond the reach of the existing gravity system.

The design life of the pumping station shall be not less than 50 years.

Where isolated building sites cannot be provided with a gravity connection, consideration may be given to the use of individual privately owned sewage pump stations.

A sewage pumping station shall be capable of servicing the entire catchment for land uses likely to prevail during its economic life, and shall, where necessary for sound engineering design practice, accommodate pumped flows from adjacent areas.

The consent holder undertaking the development shall obtain a Discharge Consent from Environment BOP for any emergency overflow from the pump station if required.
Public sewage pumping stations shall be designed generally in accordance with the Standard Drawings and shall be vested in the Whakatane District Council. They shall meet the requirements of the Resource Management Act 1991, shall be subject to the Engineer's specific approval, and shall meet the following minimum requirements:

- Residential pump stations shall be designed for a peak flow calculated in accordance with Clause 5.1.4.1 above with a minimum of 1000 litres per person per day for the full development catchment. The capacity of other pump stations will be subject to specific design and must be approved by the Engineer
- A minimum of eight hours on-site emergency storage shall be provided, based on the average dry weather flow, measured between the overflow and the first stage alarm
- Storage in upstream pipes and manholes may be used in calculating the storage volume.

5.1.18.2 Site and Layout

The layout of the site of a sewer pump station will require the specific approval of the Engineer and will meet the requirements set out below.

The site layout and pump station shall be as follows:

- Pump stations shall be located on a separate lot solely for that purpose and shall be provided with a permanent all-weather access of not less than 2.7m paved width.
- The vehicle access shall be designed to accommodate a standard 8metre rigid truck, with suitable corner widening
- An adequate turning area shall be incorporated adjoining the station wet well and control cabinet to accommodate light commercial maintenance vehicles
- The pump station lid levels shall be provided with suitable freeboard above a 1% AEP flood level. This will be of particular concern where the pump station access is also being utilised as a designated secondary flow path
- The site shall be contoured in such a way as to prevent entry of surface runoff into the station.
- Where a storage well, in addition to the pump wet well, is to be provided, it shall be positioned to allow ready access in close proximity to the valve chamber
- The pump station lot shall be fenced to the Engineer’s satisfaction
- A 150mm wide mowing strip at ground level shall be provided around the wet well, the valve chamber, the electrical cubicle and the boundary fence.

5.1.18.3 Pump Design

All pumps shall comply with the following requirements;

- Pumps shall be "Flygt" 3 phase submersible type and be fitted with impellors having a minimum throughlet of 75mm. In isolated small stations where this is not achievable, either a cutter or grinder type shall be used
- There shall be a minimum of two identical pumps in all pump stations, and each shall be capable of discharging the design peak flow
- Each pump shall be capable of pumping a peak flow calculated as per section 5.1.4
- Pumps shall be fitted with thermistors embedded in their windings. The thermistors shall be wired to the pump control system for the protection of the motors
- In selecting the appropriate pumps the operating conditions shall correspond as closely as possible to the point of maximum pump efficiency with the final pump choice taking into account the most cost effective operations situation
- All pumps shall be operated from a three phase power supply system
- In calculating the head lose the effects of all bends and fittings beyond the pump discharge bend shall be allowed for, together with rising main friction losses based on a roughness “ks’ value of 1.5mm. (Colebrook White formula)
- The system static head shall be based on the difference in level between the flange of the pump discharge bend and the highest point of the rising main system
- If the discharge is to an existing rising main, the head shall be calculated to include the operating head in the existing rising main
- The pump and rising main selection shall ensure that the minimum velocity in the rising main is 0.75m/s and the maximum velocity is 3m/s under normal operating conditions
- The gravity outlet system to which the station discharges shall be designed to accommodate the full discharge of pumps operating under emergency conditions in combination with the peak design flow from the adjoining gravity system
- A system head curve is to be calculated and plotted on the pump curve for the proposed pumps to ensure pump selection is adequate and shall be submitted for approval
- The system head curve shall also be calculated for a roughness ‘ks’ value of 0.1mm, and compared with the selected pump curve to ensure that the pump is not operating beyond the stable zone of its own pump curve

5.1.18.4 Wet Well and Storage Well

All wet and storage wells shall be constructed in accordance with the following requirements:

- The tops of the structures shall be designed to accommodate all anticipated loadings with particular regard to the close proximity of maintenance and service vehicles
- The wet well sump volume (between duty pump start and stop level) shall be designed to limit pump starts to a maximum of 10 per hour, as well as to accommodate a minimum 300mm depth, whichever is the greater
- The design and construction of the wet and storage well foundations shall ensure minimum settlement of the completed structure and provide adequate safety against flotation and liquefaction
- In determining the appropriate well diameter the minimum clearance between individual

pumps and side clearances shall comply with the manufacturers recommendations, together with accommodating full benching of the base

- Where a separate well is considered necessary to accommodate the emergency storage volume it shall be benched to direct all flow to the outlet point. The benching shall be a a minimum gradient of 1 in 3 to allow self draining. A central channel within the storage well with a minimum gradient of 1% is acceptable
- The invert level of the storage well shall be a minimum of 100mm above the standby pump start level.
- The storage well shall not drain directly to the wet well unless specifically approved by the Engineer
- The wet well shall have a single inlet pipe
- The duty and standby pump start levels shall be located at a level lower than the invert level of the inlet pipe

- The pump and storage wells shall be underground and shall be fitted with lockable aluminium lids
- The finished lid level shall be 150mm above the surrounding ground
- The pump well shall be vented with either a galvanised or stainless steel stack with bird entry prevention. The height of the vent shall be no lower than the top of the electrical cabinet
- Details of the hanger bar and chain details for the pumps are to be submitted for approval
- All bolt fittings for attachments are to be stainless steel and where required are to be drilled and fixed into the concrete walls, using an approved epoxy grout in accordance with the manufacturers instructions
- All pipes and pipe fittings from the pump discharge bend to the Gibault joint outside the valve chamber shall be ductile iron and shall be coated with Rilsan Nylon 11 or an equivalent approved coating. All pipes and fittings shall be not less than 100mm for standard pumps.

5.1.18.5 Valve Chamber

The valve chamber shall be constructed in accordance with the following requirements:

- It shall be below ground level and constructed with either reinforced concrete or concrete block walls, attached to the pump well by means of starter bars, fixed by drilling and setting with an approved epoxy grout into the pump well
- Where the valve chamber is below winter water table levels, the concrete block walls shall be coated with an approved bituminous waterproofing system
- The chamber floor shall be reinforced concrete
- The chamber shall be fitted with lockable aluminium lids
- All valves shall be Rilsan Nylon 11 coated and non-return valves shall be swing-check valves with full bore openings nylon coated
- A 50mm diameter drainpipe shall be fitted between the valve chamber and the pump well with a push/pull knife valve to allow draining of the valve chamber into the pump well from lid level
- All pipe fittings through the valve chamber and pump well walls shall be ductile iron with

slip joints
- Provision shall be made to bypass the pump in case of breakdown

5.1.18.6 Emergency Provisions

Pump stations shall have emergency storage in case of mechanical or electrical failure or blockage of the pumps or rising main. The storage must be located at such a level as to prevent overflow from any manholes, gully traps, pump station lids or any other outlet from the system. Emergency storage capacity equal to eight hours at the design average hourly flow is to be provided.

All stations shall be constructed with a standard plug for the connection of the Council's mobile generator. All pump stations shall have an approved and controlled overflow system which discharges in such a manner to ensure maximum storage is used prior to discharge. The overflow discharge must avoid ponding on private property and shall be directed to the nearest public stormwater system

5.1.18.7 Rising Mains

The following materials are acceptable for rising mains;
- PVC-U (To AS/NZS 1477)
- PVC-UM (To AS/NZS 1477)
- PE80B (To AS/NZS 4130)
- PE100 (To AS/NZS 4130)

The selected pressure class shall be based on analysis of the rising main for maximum pump head, transient pressures under power failure, temperature of fluid being conveyed, the number of operational cycles over a 100 year life span and a factor of safety against rupture of 1.25.

Notwithstanding the above, the minimum acceptable PVC/PN ratings are as follows:
- PVC U PN 9
- PVC M PN 12.5

The minimum nominal bore for standard pumps is 100mm.

Where possible, to minimise the need for air release and scour valves, the gradient of the rising main shall be designed to avoid over verticals and under verticals.

To accommodate all out of balance forces on the main, its installation shall be similar to that of a water main, incorporating suitable anchorage of the pipe at all changes of direction. The bearing area of all anchor blocks shall be specifically designed for the ground conditions and shall be subject to approval by the Engineer.

Elastomeric seal joints shall be used for all PVC pipework. Solvent cement joints are not acceptable.

Rising mains shall be marked with tracer tape or wire in accordance with the details set out in Clause 5.1.17.

Rising mains in private property shall be located clear of building sites and the alignment shall be protected by an ”Easement in Gross” in favour of the Council.

5.1.18.8 Electrical Controls

The electrical cabinet and controls shall be in accordance with the following requirements:

- The control cabinet shall be above ground level and shall be constructed in accordance with Standard Drawings SS 15 and SS 16.
- The telemetry equipment shall be Qtech Datran as used by the Whakatane District Council, and is to be programmed to communicate to Council’s base. The functions and requirements of the module shall be as required by the Engineer
- The radio telephone shall be Tait
- A 12v 60 amp hour Jell-cell battery shall be fitted that will operate the telemetry in the event of a power failure
- The antenna pole shall be attached to the side of the cabinet

- The pump control is to be provided by means of an ultrasonic level transducer installed in the pump well and connected to the telemetry
- Each pump shall have an Auto/Manual/Off control switch and ammeter
- Hour run meters shall be provide for both pump sets
- A high level alarm shall be installed at an appropriate level in the pump well
- An internal fluorescent cabinet light and a general purpose 3 phase 32 amp residual current protected socket outlet shall be provided
- The thermal protection devices installed in the pump windings and wired in the pump flexible cable shall be connected into the pump protection circuit
- The pumps shall be connected by a plug and socket arrangement installed in the pump well or alternatively, the plug and socket may be fitted within the control cabinet
- The electrical cables from the pump well shall pass through the side wall of the well via an isolating gland. The duct for the gland and cables shall be 150mm diameter
- A 12 volt DC flashing light shall be installed near the top of the telemetry aerial pole and be connected for fault warning
- The cabinet shall include all power supply company equipment. All negotiation and supply co-ordination shall be carried out by the electrical contractor
- Cabinet design shall be in accordance with Standard Drawing SS 16.
- Cabinet layout and labelling shall be submitted to the Engineer for approval before construction is commenced.

Detailed data sheets which specify the particular requirements for the control cabinet, the switchboard and the telemetry controls, hardware and programming are available from the Council. These show the required acceptable hardware and the details of the electrical installation, as well as the pump requirements and operational controls. These requirements are to be adhered to so as to ensure compatibility with the equipment and operation of the present control and monitoring systems.

5.1.18.9 Pump Duty

Pumps shall be controlled so that while one pump is acting as duty pump, the other is on automatic standby. The switchboard configuration shall allow the duty sequence to be interchanged remotely via the District Council Telemetry System, and shall be set to automatically rotate the duty pump every two weeks.

5.1.18.10 Power Supply

The power supply to the station shall be underground.

5.1.18.11 Water Supply

A 25 mm water supply shall be provided adjacent to the pump station. The supply shall be fitted with a 25mm backflow preventer in accordance with clause 6.2.3.2 of Section 6 of this standard and Standard Drawing SS 18, and to the approval of the Engineer

The backflow preventer and associated components shall be installed in a lockable aluminium box adjacent to the electrical cabinet. Access to the backflow preventer and Camlock connection to meet maintenance, testing and operational requirements shall be provided.

The backflow preventor shall be fitted and certified by an approved installer.

The supply shall be fitted with an approved meter, which shall be installed by the Council at the developers cost.

5.1.19 TREATMENT PLANTS

5.1.19.1 General

In special cases where a treatment plant is required, the subdivider must construct a plant to a design that is satisfactory to the Engineer and Environment BOP. The design must have the prior approval of these authorities and be subject to the issue of a building consent. Resource consents may be required and where necessary, must be obtained by the subdivider prior to the commencement of any engineering works within the subdivision.

5.1.19.2 Power Supply

The power supply to the plant must be underground.

5.1.19.3 Water Supply

The treatment plant is to be provided with a water supply in the immediate vicinity in accordance with Clause 5.1.18.7 above.

5.1.19.4 Access

Sealed vehicle access and manoeuvring areas must be provided to the plant.

5.1.19.5 Fencing

The area around the plant must be fenced and provided with a suitable locked gate, all to the Engineer's satisfaction.

5.1.19.6 Site

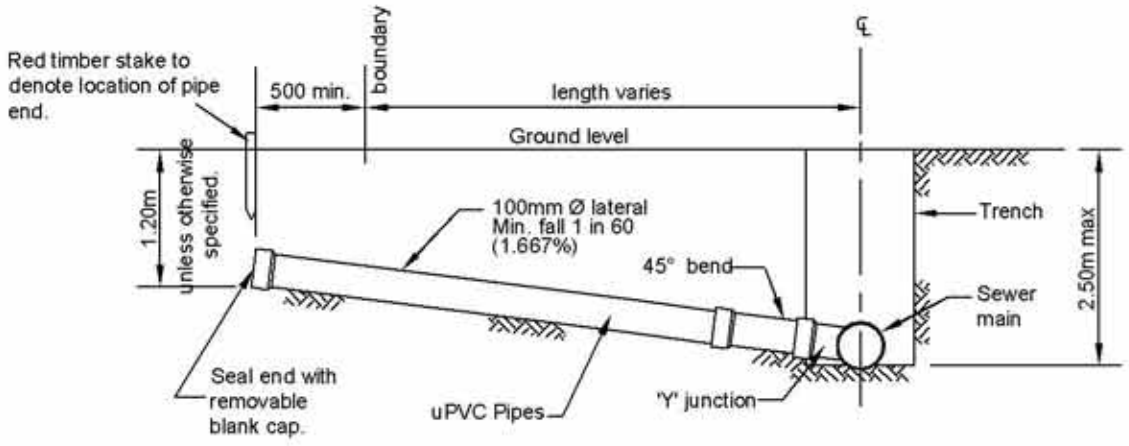
The site of the plant shall be on a separate lot with access to a formed road. If the plant is only required on a temporary basis while other sections of the reticulation are being constructed, it shall be removed after it is no longer required, and the area may revert to any suitable use the subdivider may stipulate.

In certain cases, Council may require that the site and plant be vested in Council. In such a case, specific conditions will be set by Council at the time of the subdivision consent approval.

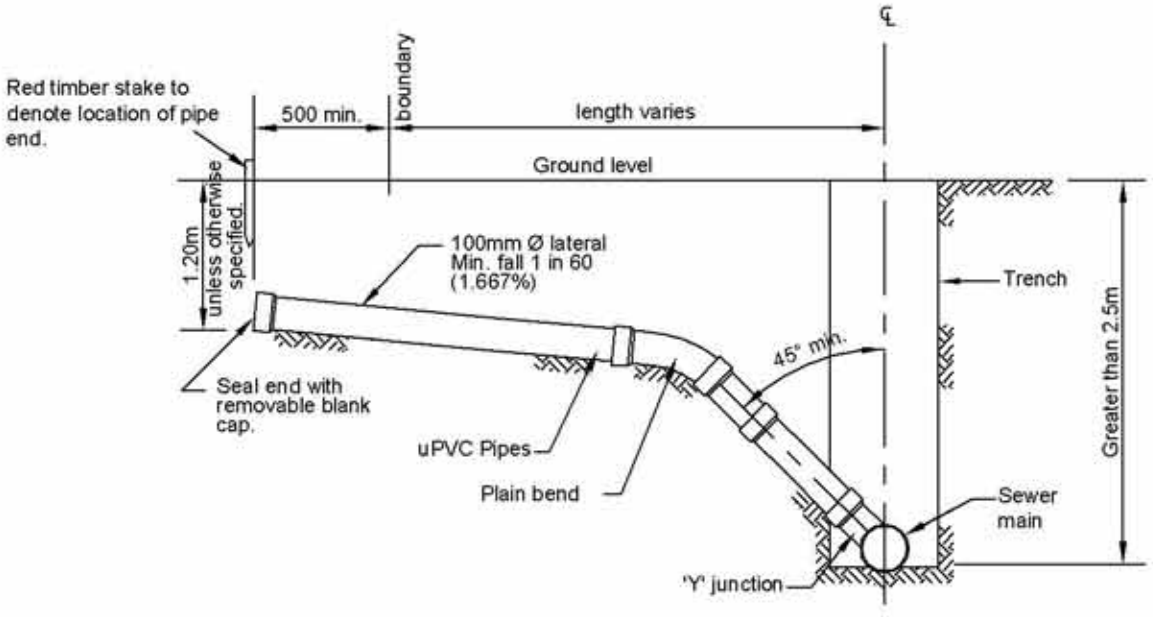
CHAPTER 5

WASTEWATER

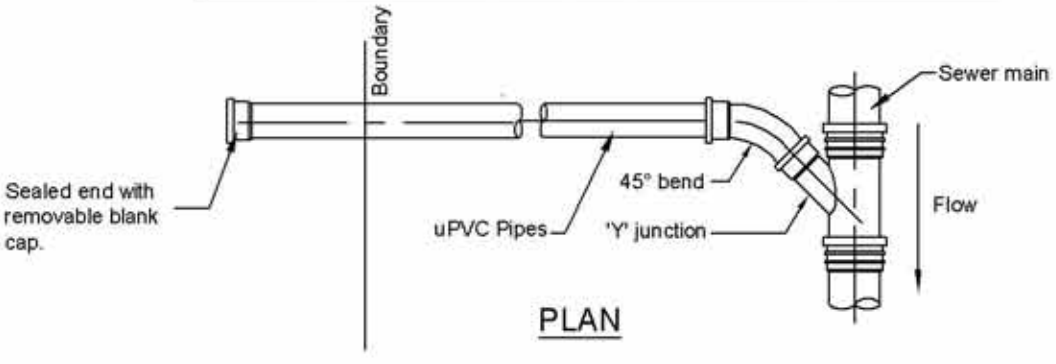
STANDARD DRAWINGS



STANDARD CONNECTION FOR SEWERS WITH A DEPTH TO INVERT LESS THAN 2.50m - SECTION



RAMP RISER CONNECTION FOR SEWERS WITH A DEPTH TO INVERT GREATER THAN 2.50M - SECTION



PLAN

WHAKATANE DISTRICT COUNCIL

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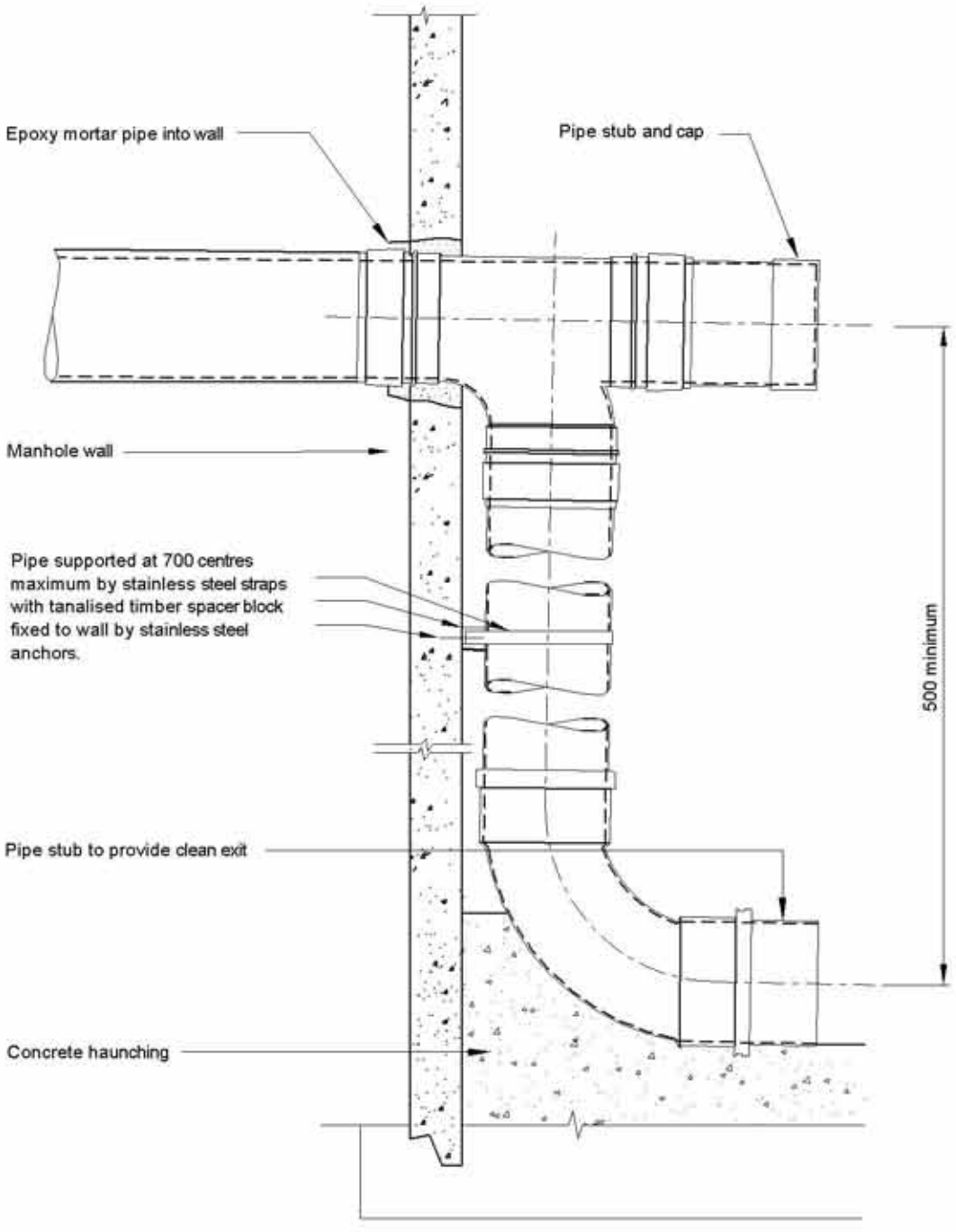
STANDARD DRAWING

NOT TO SCALE

STANDARD SEWER CONNECTIONS

SS 01

ISSUE 7.0
SEPTEMBER 2007



WHAKATANE DISTRICT COUNCIL

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STANDARD DRAWING

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INTERNAL DROP CONNECTION 100mm DIAMETER PIPES

SS 02

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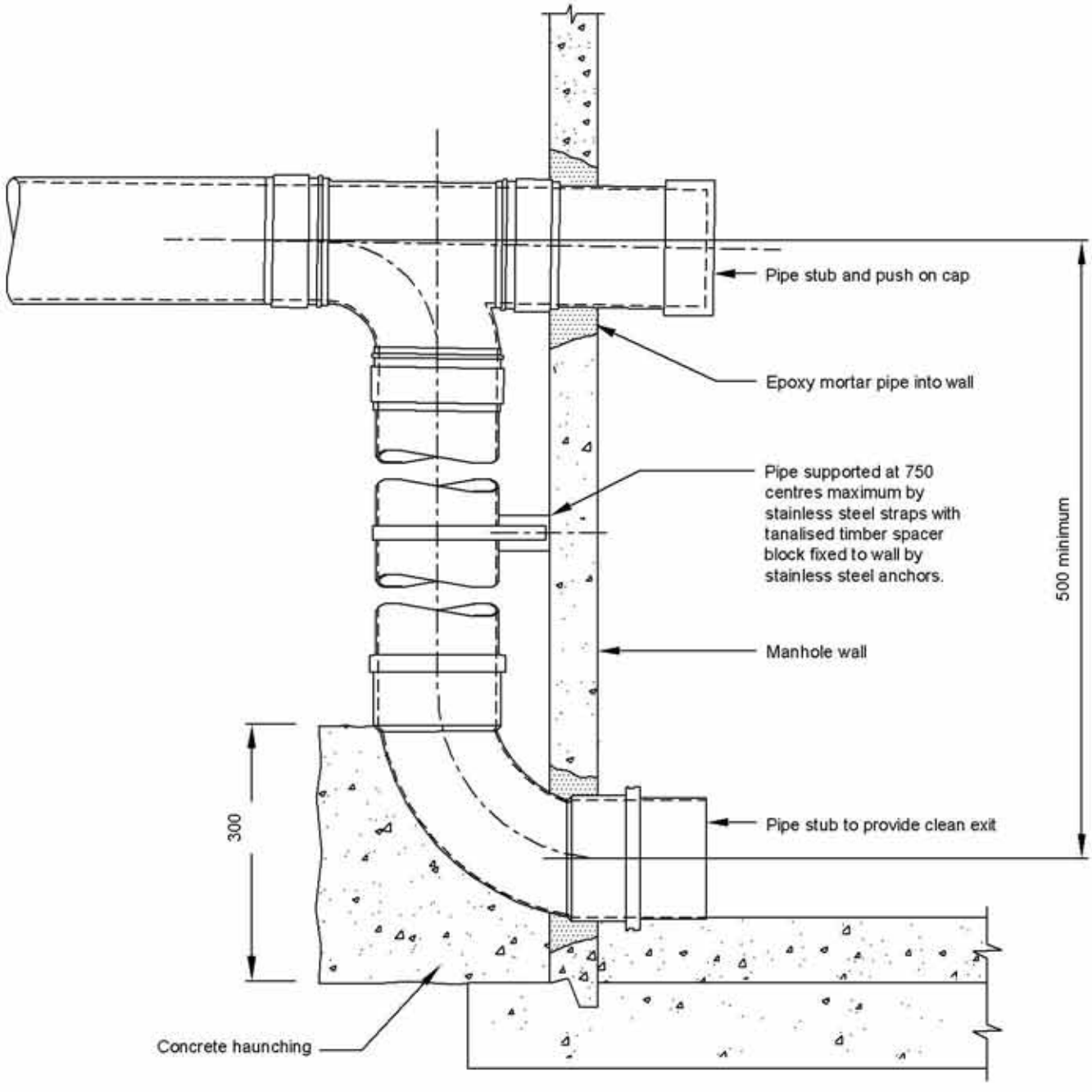

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EXTERNAL DROP CONNECTION 150mm & 225mm DIAMETER PIPES

SS 03

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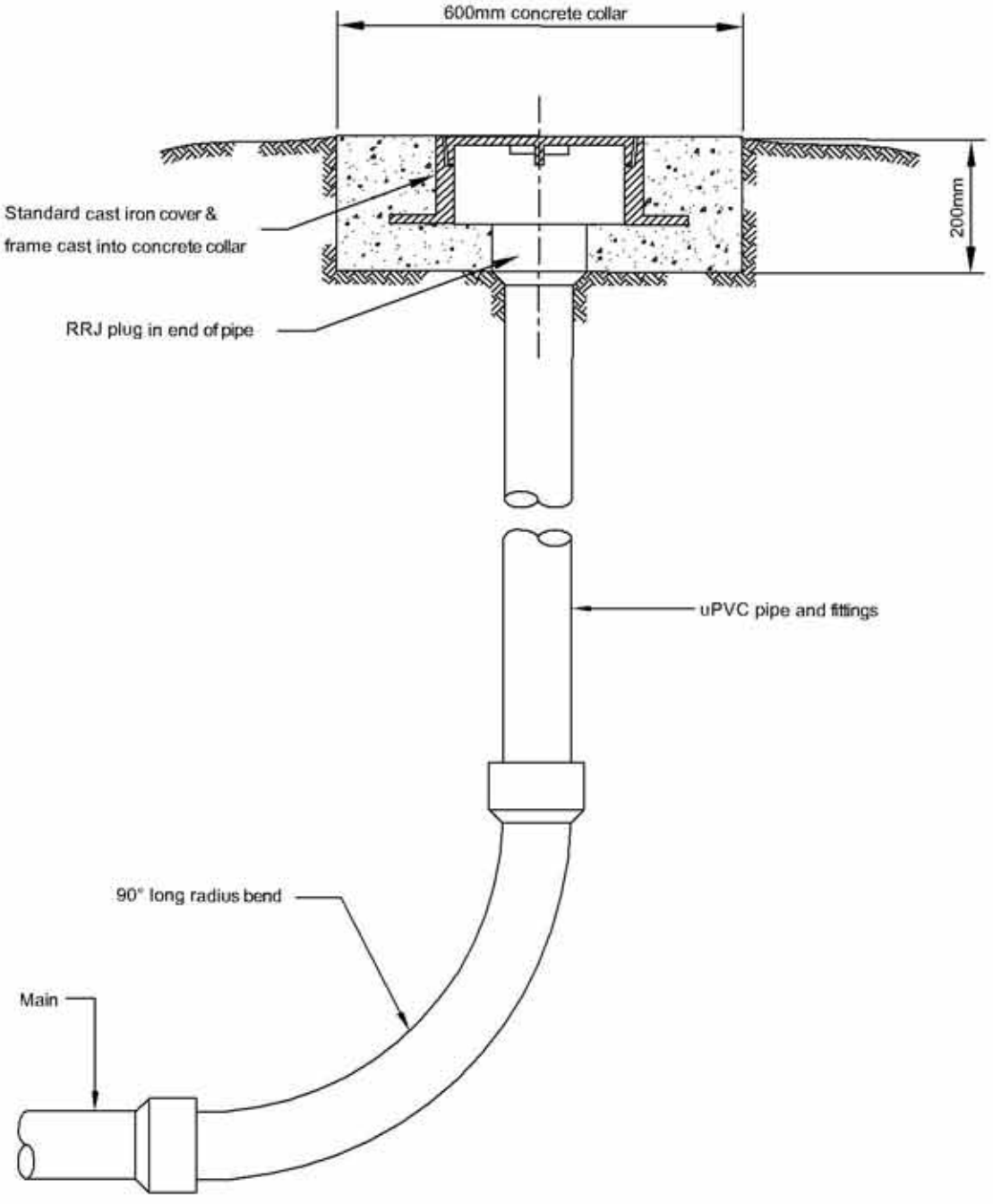

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STANDARD CLEANING EYE

SS 04

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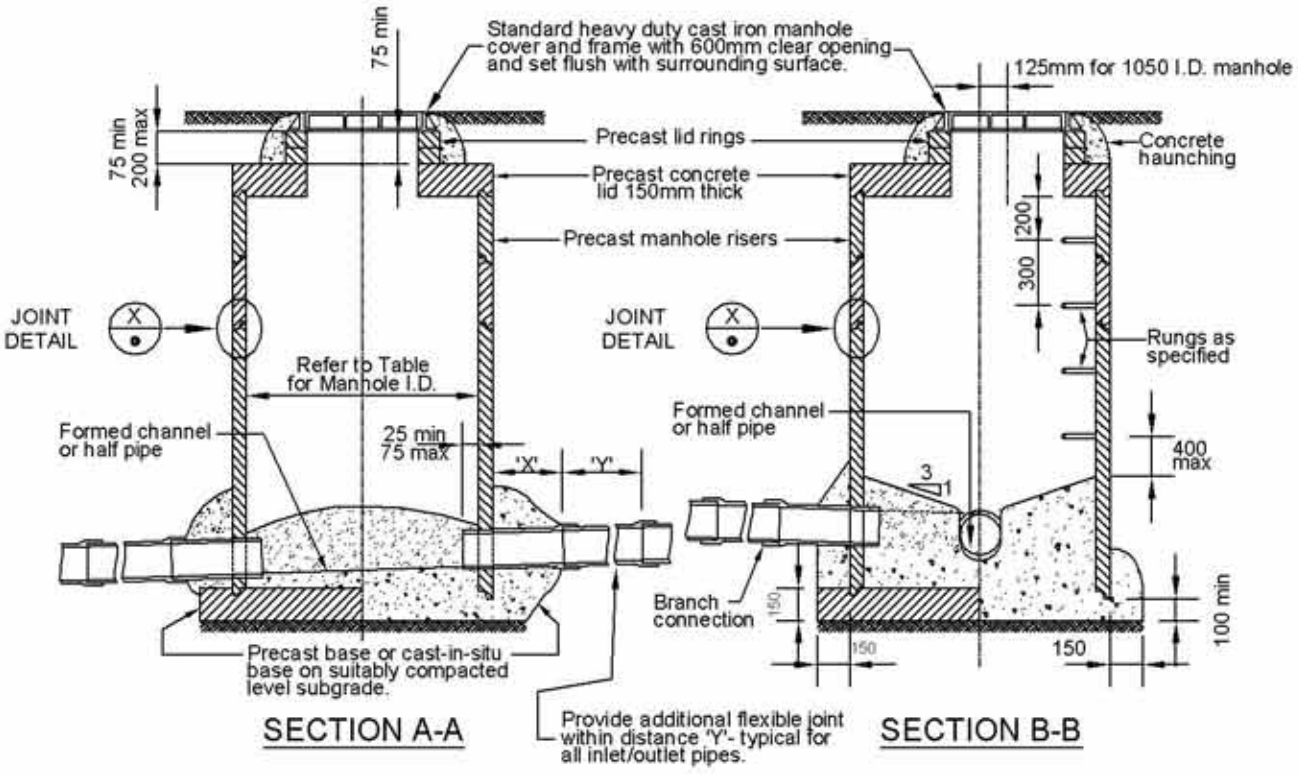

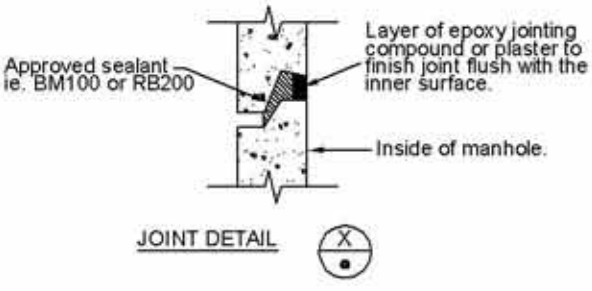

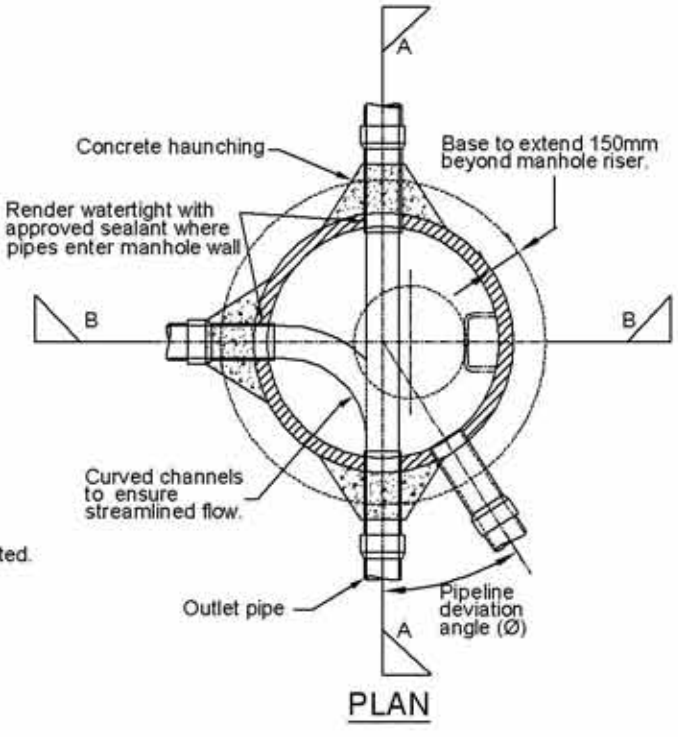

MINIMUM MANHOLE INTERNAL DIA (mm) *						
OUTLET PIPE DIA (mm)	PIPELINE DEVIATION ANGLE (Ø) 0°-15°	16°-45°	46°-75°	76°-90°	'X' (mm)	'Y' (mm)
Up to 300	1050	1050	1050	1050	300	500
375 to 600	1050	1050	1050	1050	500	700
675 to 750	1050	1200	1500	1500	600	750
825 to 900	1500	1500	1800	1800	600	900

* To be used as a guide only. Larger diameters may be required where more than one inlet pipe is to be constructed.

Notes

1. All in-situ concrete other than site concrete shall have a minimum compressive strength of 20 MPa at 28 days.
2. All precast manhole units (shown shaded) are standard manufactured concrete units from a certified precast supplier

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STANDARD DRAWING

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STANDARD SEWER MANHOLE

SS 05

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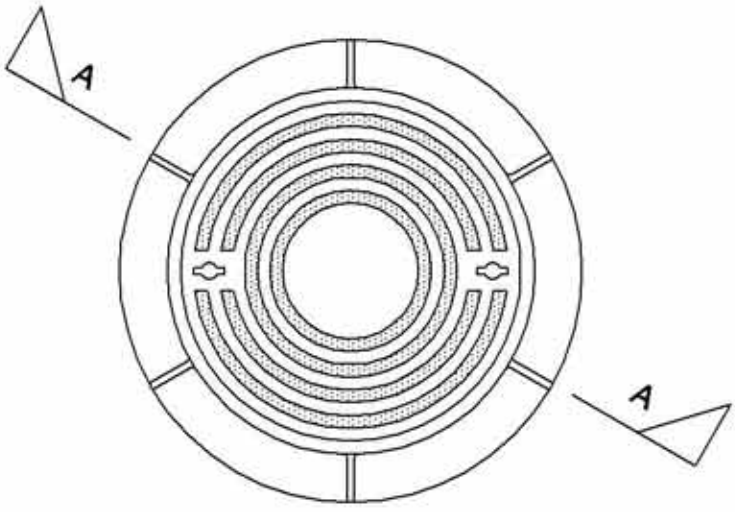
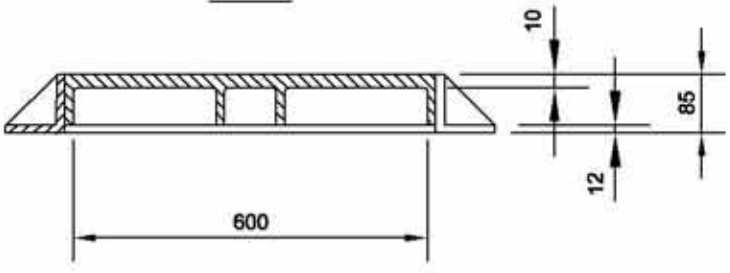
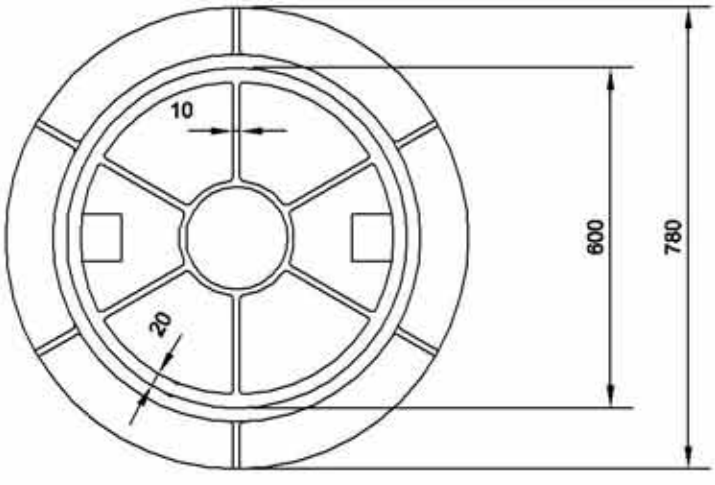


PLAN



SECTION A-A



BOTTOM VIEW

Approx weights
Cover 48 kg
Frame 40 kg

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STANDARD DRAWING

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HEAVY DUTY MANHOLE COVER AND FRAME

SS 06

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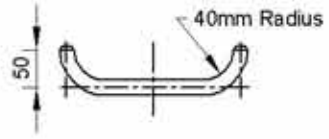
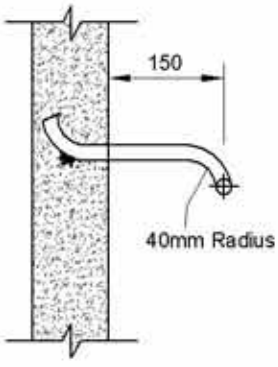
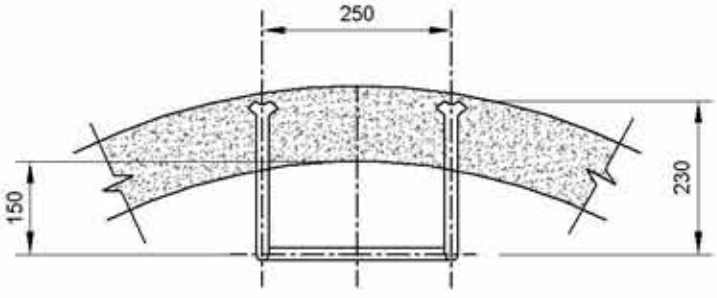


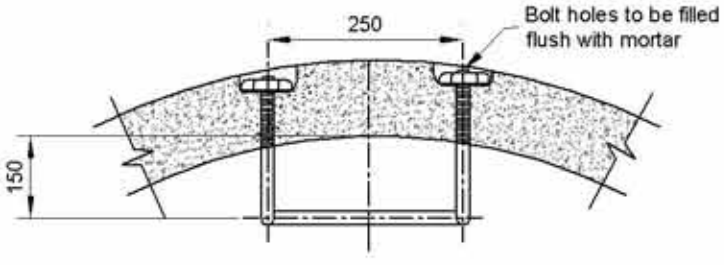
ELEVATION



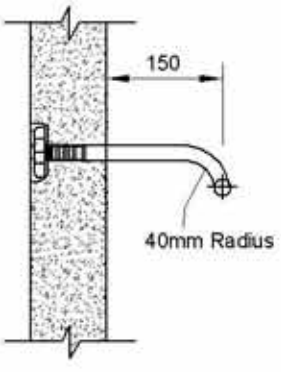
SECTION (Cast in Situ)



PLAN (Cast In Situ)



PLAN (Precast)



SECTION (Precast)

Note:

- Stepped rungs shall be fabricated from 20mm diameter mild steel rods, hot dipped galvanised after fabrication.
- The zinc coating is to be not less than 400g/sq.m.

DETAILS OF STEPPED RUNGS

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MANHOLE STEPPED RUNGS

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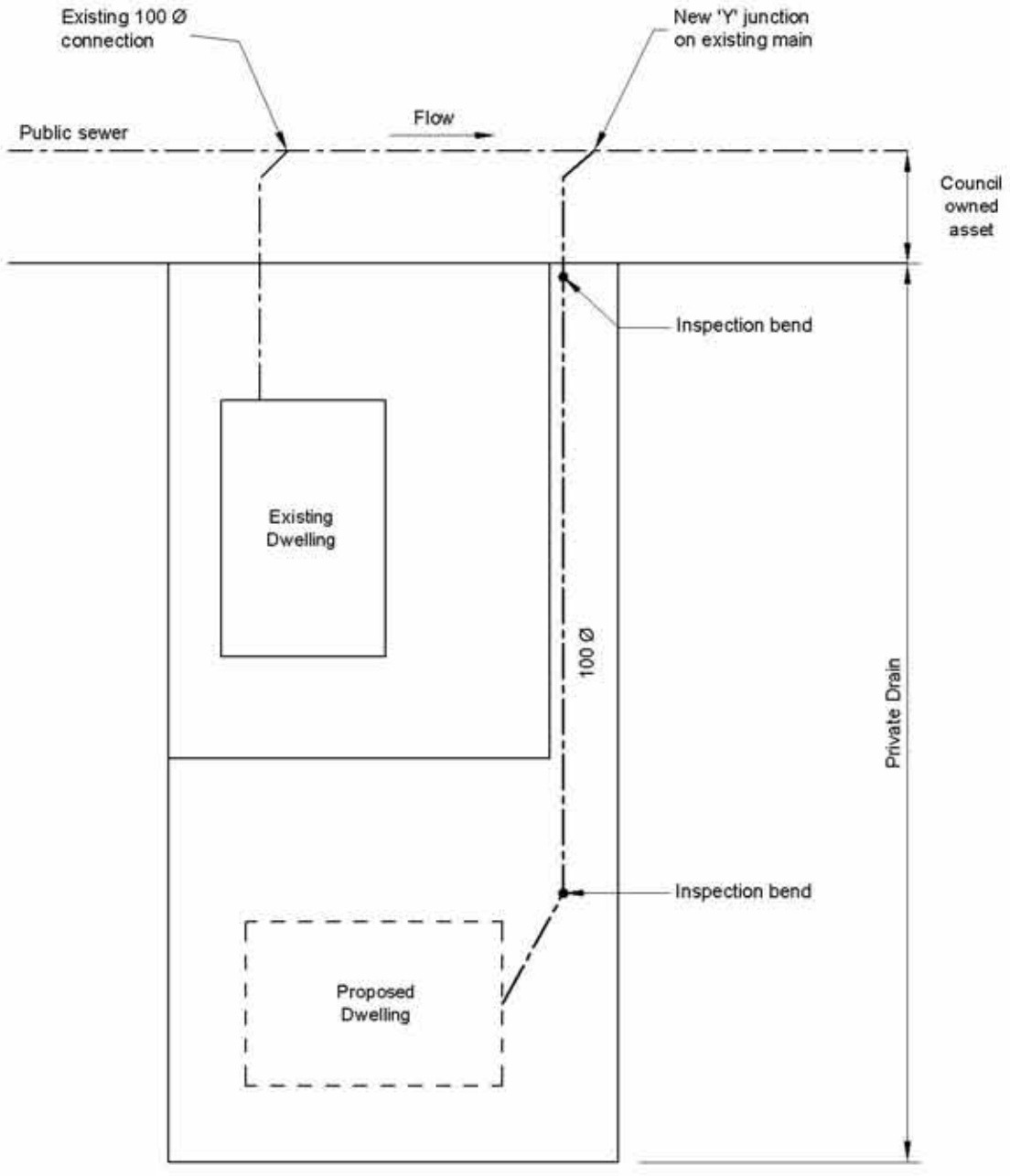

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STANDARD DRAWING

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PRIVATE DRAIN to PUBLIC SEWER

SS 08

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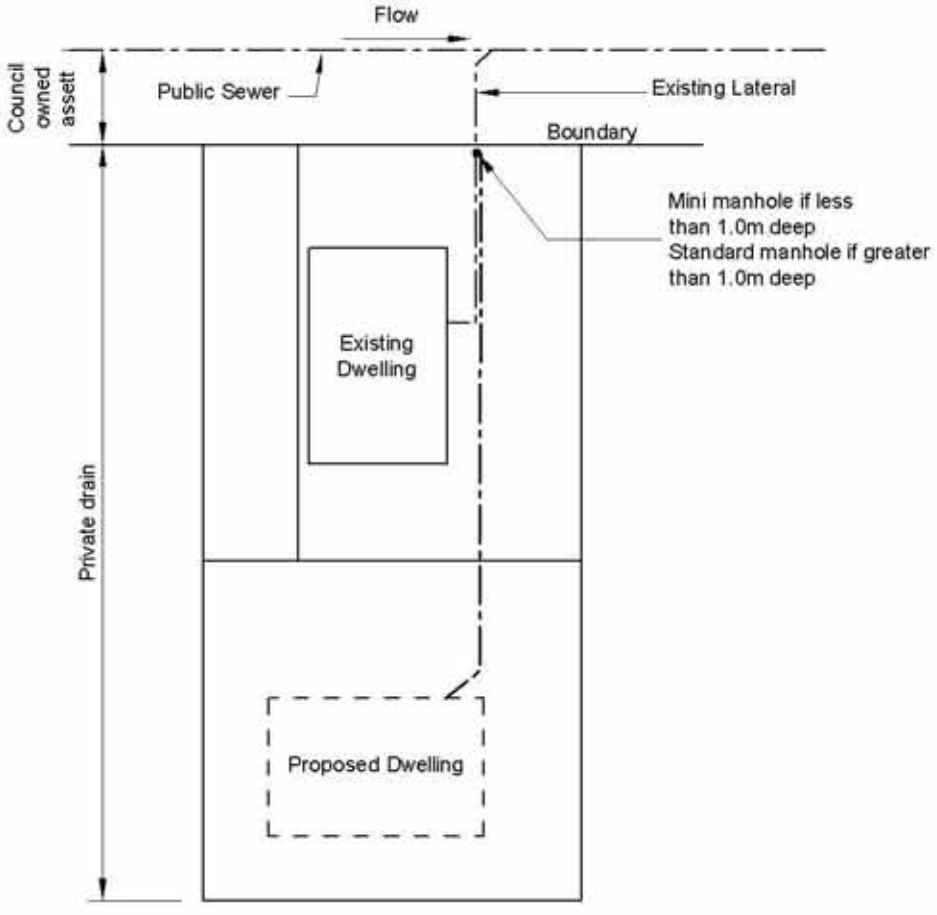

NOTES

1. A mini manhole may be installed if the lateral is less than 1m deep.
2. A stndard manhole is required of the lateral is greater than 1m deep.
3. A sewer lateral inspection test will be required by the Council and will be carried out at the cost of the developer. If the test is passed then the connection will be approved. If the test is not passed then the developer will be required to upgrade the lateral to the required standard at their cost.

WHAKATANE DISTRICT COUNCIL

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STANDARD DRAWING

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PRIVATE DRAIN to an EXISTING LATERAL CONNECTION

SS 10

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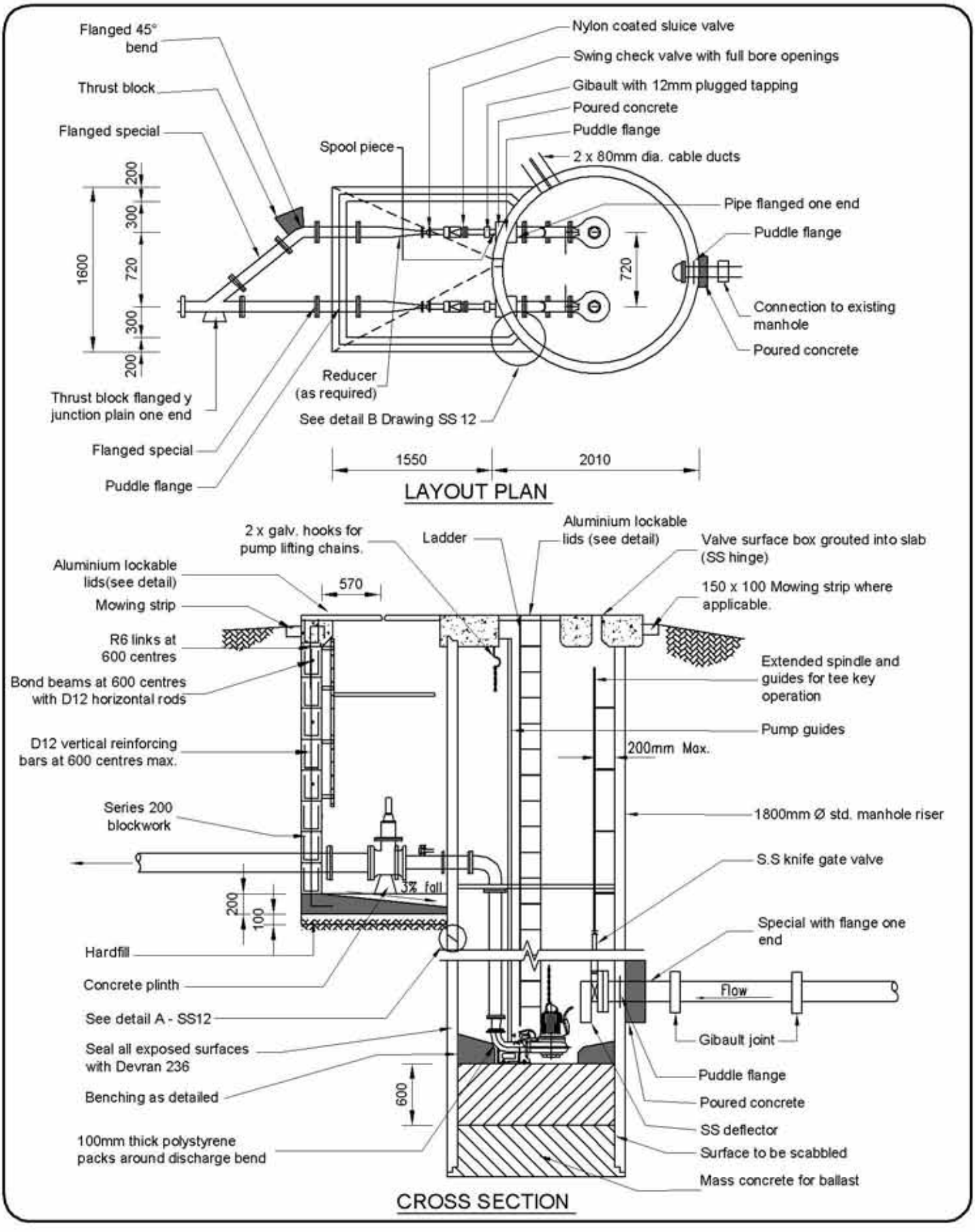

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SEWER PUMP STATION INTERNAL LAYOUT

SS11

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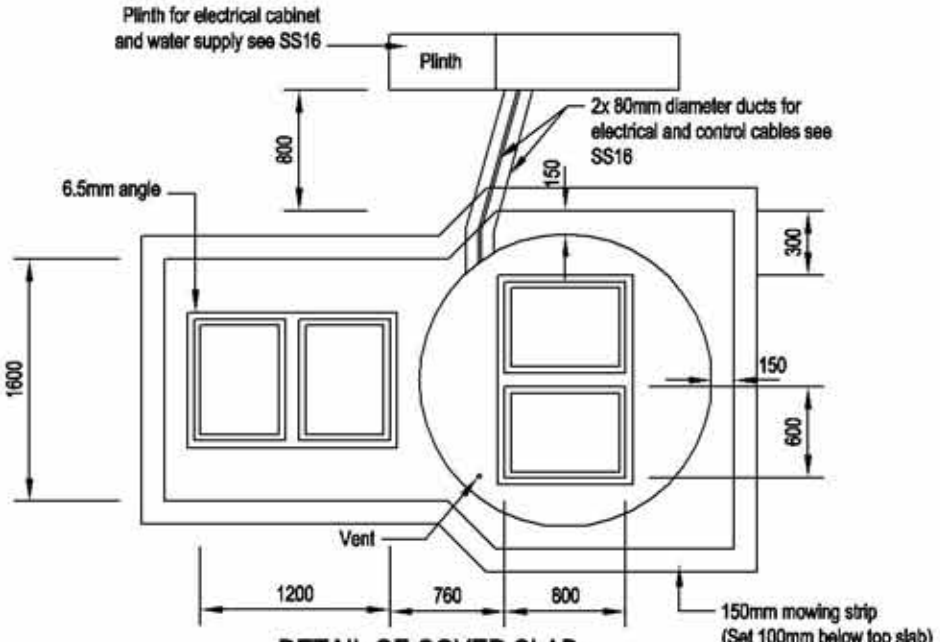
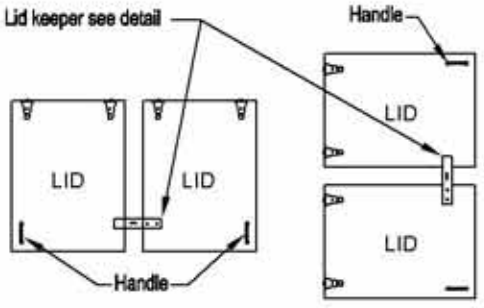
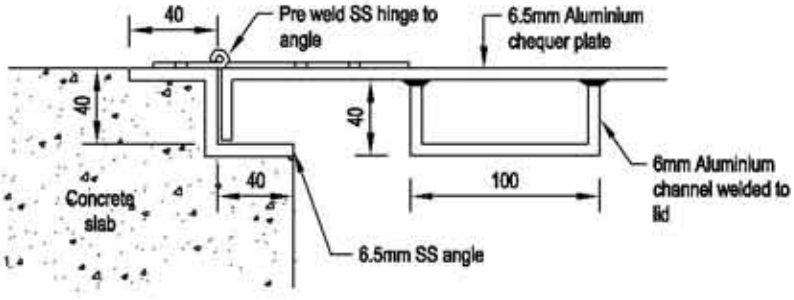


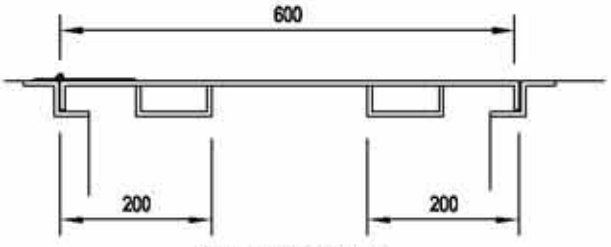
DETAIL OF COVER SLAB



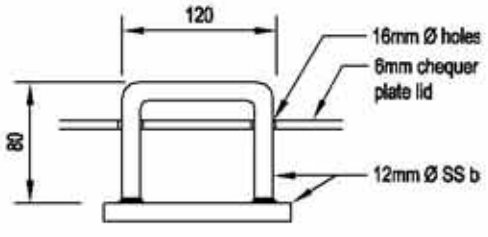
LID HINGES & HANDLE SET-UP



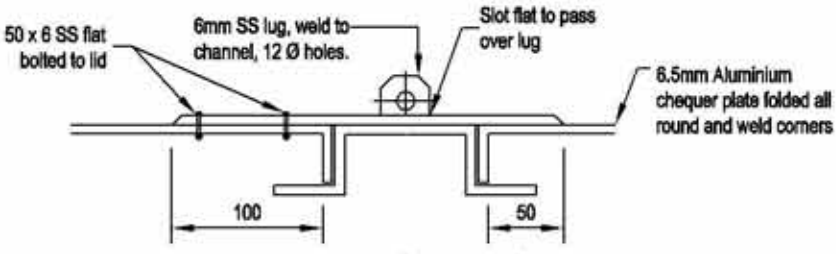
HINGE DETAIL



LID CHANNELS



DROP THROUGH HANDLE



LID KEEPER (Twin Lids)

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STANDARD DRAWING

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SEWAGE PUMPSTATION COVER SLAB AND LID DETAIL

SS 13

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WHAKATANE DISTRICT COUNCIL

PUMP STATION ELECTRICAL CABINET

STANDARD DRAWING

SS14

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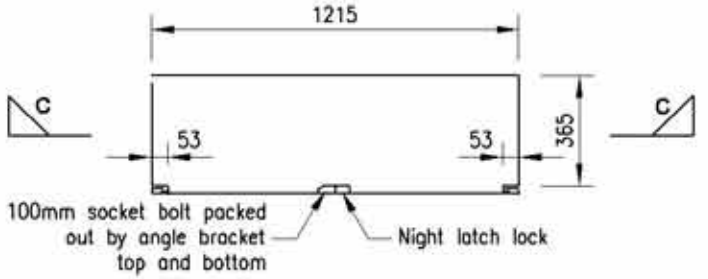
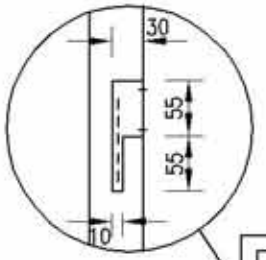
NOT TO SCALE



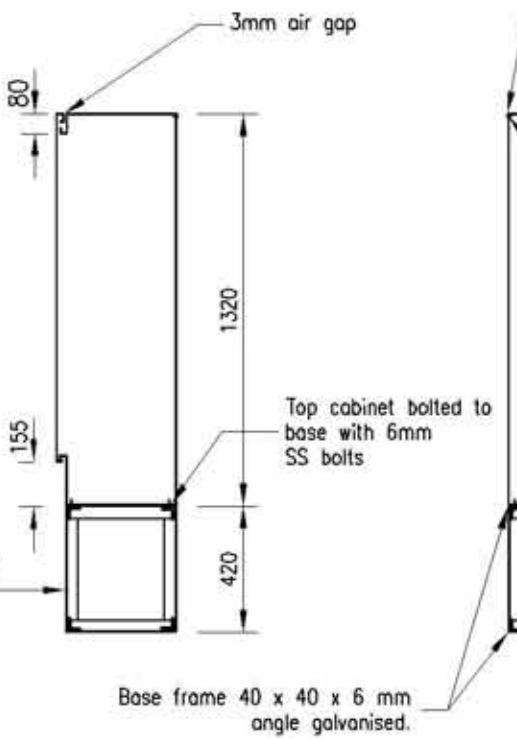
SECTION A–A



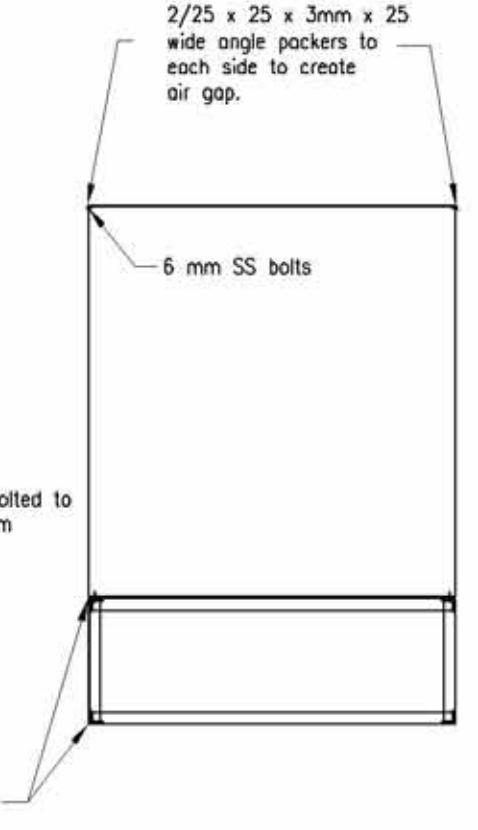
HINGE DETAIL

FRONT ELEVATION

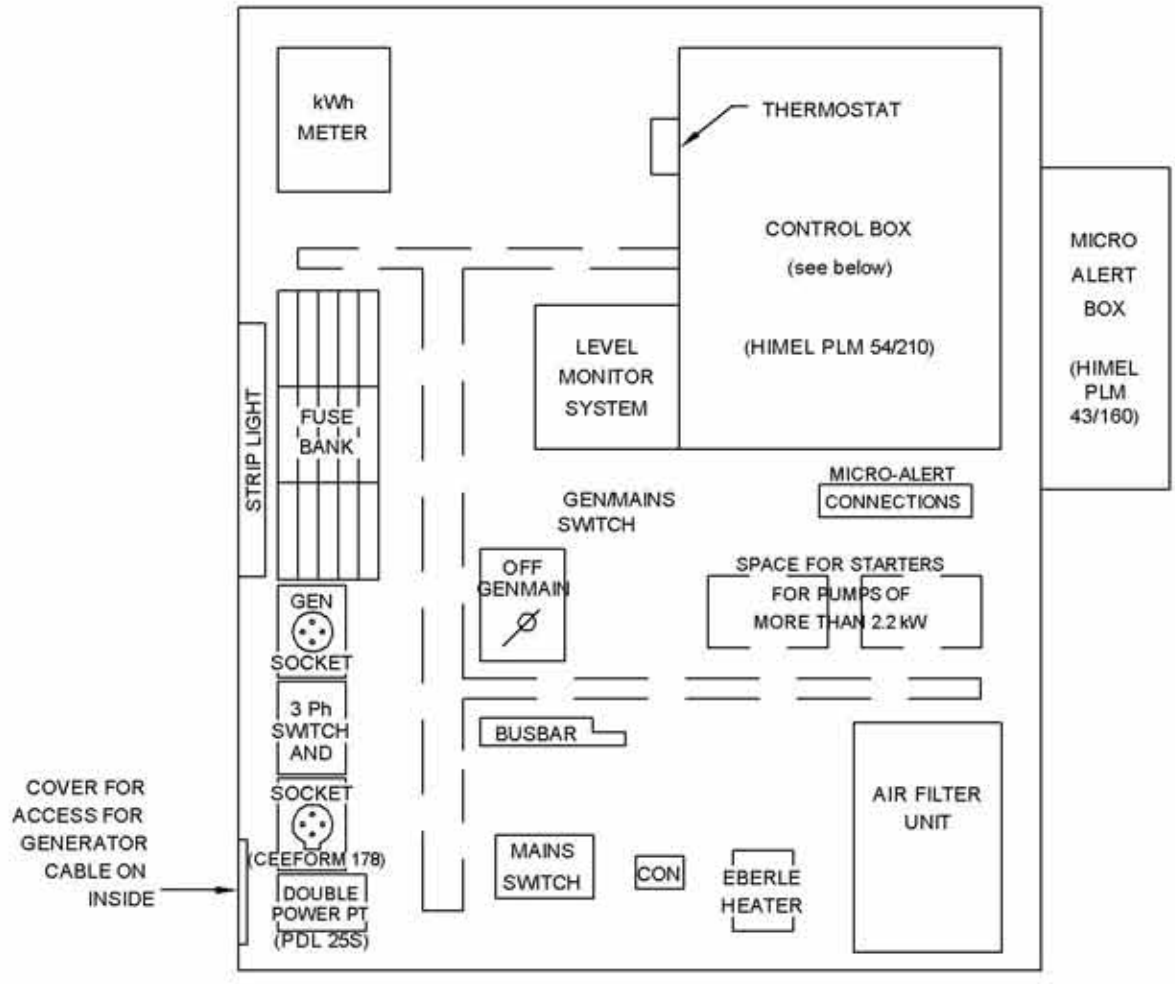
NOTES: Structure made from 3mm Aluminium plate unless shown otherwise.
Finish to be powder coat, colour green.



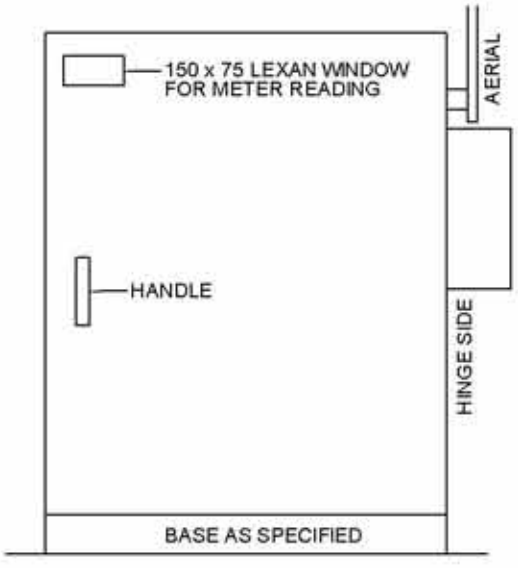
SECTION B–B



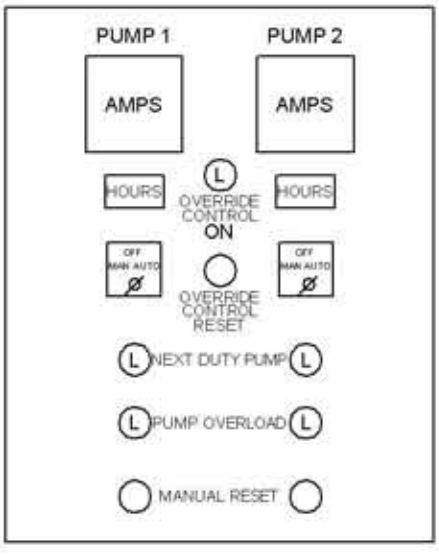
SECTION C–C



CONTROL CABINET LAYOUT



ELEVATION



CONTROL BOX LAYOUT

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SEWER PUMP STATION CONTROL CABINET LAYOUT

SS 15

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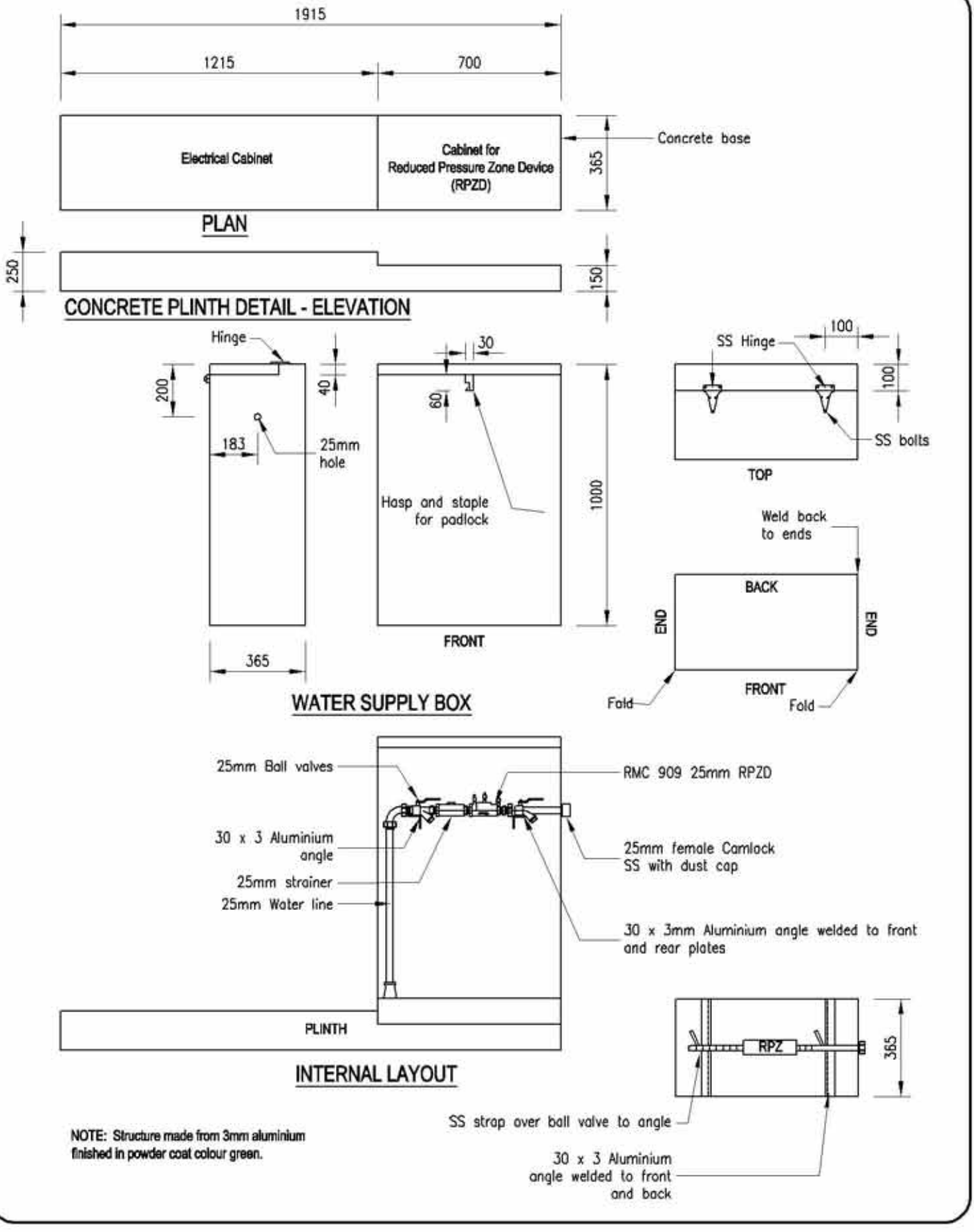

NOTE: Structure made from 3mm aluminium finished in powder coat colour green.

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SEWER PUMP STATION BACKFLOW PREVENTION DETAIL

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CHAPTER 6

WATER SUPPLY

CHAPTER 6 WATER SUPPLY

PART 1 DESIGN

6.1.1 INTRODUCTION

This chapter sets out the basic design principles for the provision of reticulation for the supply of water. While some construction information is included for completeness, detailed information on construction standards will be found in Part 2 of this Chapter.

6.1.2 GENERAL

6.1.2.1 Standards

a) All lots shall be connected to an approved potable water supply
b) Where a Council water supply is not available for connection to the proposed development, the developer shall nominate an independent potable water supply for each lot, to the satisfaction of the Director Environment and Policy.

If a communal water supply is to be used to satisfy condition (b), then the consent holder shall:

(i) Establish to the satisfaction of the Director Environment and Policy that the proposed source of water supply to serve the lots meets the requirements of the New Zealand Drinking Water Guidelines in terms of potability. All costs incurred in establishing this condition are to be met by the applicant;
(ii) Create appropriate easements over the proposed source of water supply serving the development as well as over the water supply lines should they pass through adjoining lots;
(iii) Submit to Council for approval a comprehensive supply and maintenance agreement which shall address such matters as:
- Maintenance
- Continuity of supply
- Monitoring and costs associated with monitoring to the satisfaction of the Director Environment and Policy.

c) A backflow preventer shall be installed at the boundary of the lot where required under Clause 6.1.12

6.1.2.2 Design Life

Any water supply system shall have a design life of not less than 50 years for in-ground pipeline components.

6.1.2.3 Level of Service

The water supply reticulation shall be such that a water supply connection can be readily installed outside the lot boundary and at the “front” of each site [ie where the driveway will be installed] for all new allotments within reticulated supply areas in the Whakatane District.

The system shall comply with the current NZ Fire Service "Code of Practice for Fire Fighting Water Supplies".

All pipes shall conform to PN 12 requirements unless the Engineer expressly approves a lesser standard for low pressure areas or requires a higher class of pipe for an area of higher working pressure.

6.1.2.4 ADDITIONAL RETICULATION REQUIREMENTS

The Council may require the Developer to install a reticulation system with greater capacity than that required for the development, in order to service future areas or to upgrade the present level of service. In such cases, the Council may by agreement negotiate with the Developer and make a financial contribution to the additional cost that may be incurred. Such an agreement shall be made in writing with the Council, preferably before the issue of a Resource Consent, and before the commencement of construction.

6.1.3 FLOW REQUIREMENTS

The system shall provide sufficient water at fire hydrants to comply with the current NZ Fire Service Code of Practice for Fire Fighting Water Supplies for the class of development proposed, plus the daily average domestic demand or any other demands where those in total exceed one-third of the appropriate fire demand. For purely residential subdivisions, this shall be 25 litres per second from each hydrant at a minimum running pressure of 100kPa.

The minimum working residual pressure, in other than fire fighting conditions, shall be 300kPa at the ground level at the house site of every lot. Any reduction below this pressure will require the approval of the Engineer.

For other than residential subdivisions and developments, the developer shall meet the appropriate level of protection as required by SNZ PAS 4509:2003, NZ Fire Service Code of Practice for Fire Fighting Water Supplies.

Where a development is situated in an area where the water main is defined as having a fire fighting capacity, and the water demand for fire fighting purposes for any single building exceeds 25 litres per second, that building shall be provided with a fire fighting system in accordance with the Fire Fighting Code of Practice.

The upgrading of any existing water main to a capacity greater than 25 litres per second for fire fighting purposes shall be at the Developer's expense, if the feasibility of such is agreed to by the Engineer.

In urban residential areas the following demands should be assumed:

- Average daily requirement /person — 240 litres per head per day
- Average number of people per dwelling — 3.1
- Number of houses per hectare — the maximum allowed by zoning. (May be assumed to be 15 where unknown)
- Peak flow factor — Four (4) times daily average flow

Rural, commercial and industrial areas shall be worked out on a case by case basis, subject to the approval of the Engineer.

For design purposes, the Council will provide the details of working pressure if it is available in the zone where the connection to the existing reticulation will be made. Where such details are not available, or if required by the Council, the Developer shall obtain the necessary information by carrying out independent investigations at his own cost.

Where any investigation is required to assess the capacity of the existing system, or to determine the upgrades required to the existing reticulation to supply water to a particular development at the specified level of service, the cost of such investigation shall be borne by the Developer.

6.1.4 RETICULATION LAYOUT

A water main fitted with fire hydrants and service connections to the street frontage of each lot is required on one side of all streets and a rider main with service connection to the street frontage of each lot is required on the opposite site of the street. Mains and rider mains are to be laid in the berm on the standard alignments specified in Standard Drawing R 02.

Dead end water mains are not permitted except with the approval of the Engineer.

Reticulation shall be designed to minimise pipework passing under road surfaces. Rider mains shall be looped so as to serve the maximum number of lots with the minimum number of road crossings. In the case of cul-de-sacs, the rider main will continue on the standard alignment from the end of the larger main around the head of the cul-de-sac and up the other side of the street.

Should an unreasonable length of rider main with no service connection be involved, the Engineer may agree to extra road crossings being provided. In the case of some routes, eg dual carriageways or industrial developments, the Engineer may require mains to be laid on both sides of the street.

6.1.5 ALIGNMENT OF MAINS

The standard position of water mains in the street shall be in the berm in the position shown on Standard Drawing R 02 and shall generally be in straight lines.
Where water mains cannot be laid on the standard alignment, an alternative alignment showing the relative location of all services shall be designed and submitted for approval with the engineering plans.

Water mains that cross roadways shall be at right angles to the carriageway.

6.1.6 INTERSECTIONS

At street intersections, wherever possible, 90 degree tees or 90 degree bends are to be used in preference to 45 degree bends.

6.1.7 RIDER MAINS

All rider mains shall be MDPE of a minimum size of 63mm nominal outside diameter. Rider mains shall be connected to the supply main by means of a tee. Where possible, rider mains shall be fed from both ends, by connection to a larger main. Specific approval from the Engineer will be required if the rider main is not to be fed from both ends.

In this requirement, it is assumed that all service connections will be for normal 20mm internal diameter connections to all lots. Where special provision is to made for larger supplies, then larger rider mains may be required or special connections made to the principal main in the street. Such cases shall be subject to special approval by the Engineer.

6.1.8 HYDRANTS

No main on which a fire hydrant is installed shall be less than 100mm in diameter.

Hydrants shall generally be located at street intersections and near private accessways and shall be evenly spaced between these points so that the maximum spacing does not exceed 135m. Where special conditions apply, the Engineer may require this spacing to be reduced.

In cul-de-sacs or other terminal streets or rights of way, the last hydrant at the end of the supply main shall be not more than half the maximum approved spacing from the head of the street, and in no case more than 125 metres from the furthest building site on any allotment when measured along the route of travel.

In urban areas, a principal main shall be constructed and a hydrant installed within every private accessway, where required to ensure that every building is within the distance from a hydrant as specified above.

6.1.9 VALVES

Valves shall be placed on all branches of each tee or cross and shall be sited adjacent to the flanged tee or cross or at such other location as may be directed. Valves shall be located clear of the carriageway.
The spacing of line valves on principal mains in any street shall not exceed 500m. Where possible, not more than 40 consumers on a main or rider main shall be isolated should the supply be shut down for maintenance purposes. Individual branch mains are to be valved at the tee or cross and all sections of inter-connecting mains and riders are to be provided with isolation valves at each end. In no case shall more than three valves be required to isolate any section of the reticulation.

6.1.10 DEPTH OF MAINS

The minimum depth of mains from the finished surface level to the top of the pipe shall be as shown in Table 6.2 below except where special protection is provided to the main, with the approval of the Engineer.

Table 6.2: Depths of Water Mains

Table 6.2: Depth of Mains		
Location	**Minimum Depth of Mains from Finished Surface Level to Top of Pipe (mm)**	**Maximum Depth of Mains from Finished Surface Level to Top of Pipe (m)**
Under grass berms and footpaths	600	1.00
Under carriageways	750	1.20
Service pipes in all cases	500	

Note: S*ervice pipes shall not be deeper than 500mm, nor be shallower than 160mm, at the property boundary.*

In cases where there are practical difficulties in complying with the above requirements, the Engineer's approval may be given to change the minimum and maximum depths set out above.

6.1.11 ANCHOR AND THRUST BLOCKS

Cast in-situ thrust blocks shall be provided at all bends, sluice valves, tees, and crosses. All thrust blocks shall be poured against trimmed natural ground and placed in such a way that access to and removal of any bolts on adjacent fittings is unimpaired.

All sluice valves shall be provided with anchorage in accordance with Standard Drawing WS 01.

Special requirements apply to the anchoring of uPVC lines and Developers should refer to the manufacturer's specification for these.

6.1.12 SERVICE PIPES AND CONNECTIONS

Note: *All sizes refer to internal diameter.*

Service connections will normally be provided by the subdivider. In subdivisions where extensions to the existing reticulation system are not required, the service connections will be installed by Council after the Developer has made application and paid the relevant fees.

Where service connections are required, the following Standards shall apply:

- Except for special large connections, all lots shall be provided with a 20mm internal diameter service connection connected to the main by means of a tapping band of approved proprietary type as shown on Standard Drawing WS 05 or WS 06.
- All rear lots shall be individually serviced by connection to the street frontage with the connection points located offset from the right of way so as to be clear of the vehicle crossing, except in accordance with the options as set out in Standard Drawing WS 14.
- All service connections shall terminate with a 20mm manifold. Valves shall be enclosed in a meter box in accordance with Standard Drawing WS 05 or WS 06. The installation of water meters will be carried out by the Council.
- All connections, other than urban residential connections which are used solely for normal domestic supply, shall be provided with an approved backflow preventor.

- The type of backflow preventer to be installed shall be appropriate to the on-site occupation or usage and shall meet the requirements for High, Medium and Low risk hazards as set out in Table 1 of Acceptable Solution G12/AS1 of the NZ Building Code.
- Where a private water supply serves more than one lot and it is used for purposes in addition to normal domestic usage (eg stock watering), back flow prevention complying with the NZ Building Code and the Water Supply Protection Regulations shall be installed, to ensure that no cross-contamination can occur in the supply.

6.1.13 HYDRANT FLOW TESTS

Following completion of the pipe test and connection to the main supply, the subdivider shall provide certification from an independent authority (eg Fire Service) that each hydrant meets the required minimum flow for 95% of the time.

6.1.14 AIR AND SCOUR VALVES

All high points on mains and rider mains shall be provided with a 20mm service connection and valve mounted vertically and enclosed in a surface box for the purpose of air release. Approved scour points shall be provided where directed by the Engineer. Notwithstanding the gradients of mains to be laid, all rider mains shall have one such scour point for the purpose of flushing the line.

6.1.15 INDICATION

The position of all sluice valves and hydrants shall be indicated by means of approved markers as set out in Clause 6.2.9 and in accordance with Standard Drawing WS 04.

PART 2 MATERIALS AND CONSTRUCTION

6.2.1 WATER MAINS

All water mains and service connections shall conform to PN12 requirements.

Mains shall be laid using uPVC unplasticized Polyvinylchloride (Series 2) or PVC-M (Series 2).

In special cases, Medium Density Polyethylene [MDPE] pipe may be used, subject to the approval of the Engineer.

uPVC pipes shall comply with the requirements of AS/NZS 1477 : 1999 – "PVC Pipes and Fittings for Pressure Applications" Series 2

PVC-M pipes shall comply with AS/NZS 4765 : 2000 Series 2 -."Modified PVC [PVC-M] Pipes for Pressure Applications"

PE 80 Type B (MDPE) and PE 100 (HDPE) pipes shall comply with AS/NZS 4130: 2001 – "Polyethylene [PE] Pipes for Pressure Applications"

Fittings for HDPE pipes shall comply with AS/NZS 4120 : 2000 – "Fittings for Polyethylene (PE) Pipes for Pressure Applications"

Installation of water mains shall comply with:

NZS/AS 2566.1 : 1998 - "Buried Flexible Pipelines – Structural Design"
NZS/AS 2566.2 : 1998 - "Buried Flexible Pipelines - Installation"
NZS/AS 2033 : 1980 - "Installation of Polyethylene Pipe Systems"
NZS 7643 : 1985 – "Code of Practice for the Installation of Unplasticized PVC Pipe Systems"

Pipe joints shall be of an approved type and generally of the pipe manufacturer's proprietary rubber ring flexible joint or detachable gibault type.

Special pipes may be approved by the Engineer in the case of unusual circumstances.

6.2.2 RIDER MAINS

For normal construction works, rider mains shall be of Medium Density Polyethylene Pipe (MDPE) Class PN 12.5 to NZS 7610 : 1991.- Blue Polyethylene Pipes up to Nominal Size 63 for Below Ground Use for Potable Water" .

Subject to special written approval, pipes of other manufacture, material or class may be used.

6.2.3 SERVICE CONNECTIONS

6.2.3.1 Urban Connections

All pipes for service connections shall be MDPE as specified in Clause 6.2.2 above. All fittings for service connections shall be Marley "Pushlok" and shall incorporate the use of a nose cone

liner in the pipe. The sealing system between the pipe and the body of the fitting shall be an EPDM or Nitrile rubber 'O' ring.

Service connections shall be connected to mains or riders with an appropriately sized tapping band as manufactured by "Milnes" or a Marley "Talbot' self tapping ferrule, and all work shall comply with the details as shown on Standard Drawing WS 06.

All service pipes shall terminate with an 20mm "RMC" or such other manifold as approved by the Engineer, complete with pressure cap manufactured from gunmetal dezincification resistant brass with compliance certificates to BS 5433 or WIS:ISSN 0267-305. The manifold shall be of non vibration design, guided, spring loaded resilient seating with integral non-return valve and shall incorporate an isolating ball valve and an inbuilt double check valve. Valves and meters shall be enclosed in a meter box in accordance with Standard Drawing WS 04. The installation of all meters will be carried out by the Council**.**

6.2.3.2 Rural Connections

All pipes and mains connections shall be as Clause 6.2.3.1 above and all work shall comply with the details as shown on Standard Drawing WS 06.

The service pipe shall include an RMC 20mm inline ball valve and strainer. A Watt 007M2 QT or a Wilkins 950 LXLT 20mm back flow preventer shall be installed on the property side of the manifold, complete with a 20mm ball valve. A meter box of the appropriate size shall be used to enclose the meter and back flow preventer.

The back flow preventer shall be a testable double check assembly with down stream side shutoff ball valves, 20mm diameter, suitable for supply pressure up to 175 PSI and temperature of 180ºF, with a cast bronze body assembly.

For installations on the Braemar Water Supply Scheme, a flow restrictor shall be included in the connection installation.

6.2.3.3 Meter Boxes

All water meter boxes shall comply with the following:

- The body and the lid shall be constructed from HDPE/Polypropylene
- The lid shall be secured to the body with a stainless steel flexible wire or a galvanised chain with stainless steel bolt and nut.
- Shall have a proven resistance to soil and to ultra violet light
- Shall have the name /brand printed on the underside of the lid
- The lid shall be blue in colour with "Water Meter" moulded on the top surface
- The lid shall comply with slip resistant standard AS/NZS 36661.1 : 1991

6.2.4 VALVES

Sluice valves on mains shall be epoxy coated cast iron water works pattern sluice valves, conforming to NZS/BS 5163 : 1986 -.:Specification for Predominately Key Operated Cast Iron Gate Valves for Waterworks Purposes" to PN16, anti-clockwise closing, with external and

internal protective coating to AS/NZS 4158 : 2003 – "Thermal Bonded Polymeric Coatings on Valves and Fittings for Water Industry Purposes" Flanges shall be raised face and shall be drilled to NZS/AS 4087 : 1996 – "Metallic Flanges for Waterworks Purposes", rated at PN16 (Equivalent to BS10 Table D).

The use of light pattern valves will not be permitted. All valve joints isolated from other fittings may be plain ended. In all other cases, valves shall be flanged.

All sluice valves shall be enclosed in a surface box set flush with the finished ground surface in such a way that the spindle is not more than 600mm below finished ground level and readily accessible to a standard valve key and all work shall comply with the details shown on Standard Drawing WS 01

Valves in rider mains shall be either sluice valves as above or gate valves. Gate valves shall be hand wheel operated and enclosed in a surface box set flush with the finished ground surface. Valves shall have the hand wheel not more than 600mm below the finished ground level. Gate valves shall conform to NZS/BS 5163 : 1986 Class 150 or higher, with non-rising stems.

6.2.5 HYDRANTS

Hydrants shall be "medium" pattern clockwise closing, screw-down type, and shall be cast iron complying with NZS/BS 750 : 1984 – "Specification for Underground Fire Hydrants and Surface Box Frames and Covers", with protective coating complying with AS/NZS 4158 : 2003, or as otherwise approved by the Engineer.

Hydrants shall be mounted on approved hydrant tees with risers, if necessary, so that the top of the spindle on the valve is between 115mm and 300mm below the finished surface level.

The installation of all hydrants shall be strictly in accordance with he details shown on Standard Drawing WS 02.

Hydrant boxes shall be Heavy Duty cast iron complying with NZS/BS 750 : 1984, Grade A in accordance with the details shown on Standard Drawing WS 03. Boxes shall be installed in accordance with the details shown on Standard Drawing WS 02 so that no traffic load on the surface box can be transferred onto the pipe or fittings.

A loose lid surface box shall be installed to enclose the hydrant in such a way that a standpipe and key can be fitted and the hydrant operated without obstruction and the box shall be aligned to show the direction of the main.

The top surface of the hydrant box shall sit flush with the finished level of the surrounding ground or seal, and the following tolerances shall be adhered to: a) Grass berm
+ 5mm to - 5mm
b) Footpath or road +10mm to - 0mm.

6.2.6 PIPE FITTINGS

Pipe fittings such as tees, hydrant tees, tapers, crosses, hydrant risers, caps, plugs and bends shall be of approved manufacture and shall comply with AS/NZS 2544 : 1995 – "Grey Iron

Pressure Fittings", or AS/NZS 2280 : 1999 .-."Ductile Iron Pressure Pipes and Fittings". All pipe fittings shall comply with the dimensions of the line in which they are to be used. Flanges shall be drilled to NZS/AS 4087 : 1996 Table D.

All fittings for use with uPVC pipe shall be moulded fittings as produced by the pipe manufacturer to a pressure rating equal to at least that of the pipe used or as otherwise approved by the Engineer.

In the case of specials, the Engineer may approve fabricated units of welded steel pipe complying with the specification for pipes of like material. All specials shall be dimensionally equivalent to the pipe line in which they are to be used and capable of insertion using the same joining method as the main.

Gibaults, tapping bands, etc, shall be of approved type and material.

The arrangement of inter-connected flanged and flexible jointed fittings is to be to the approval of the Engineer.

All bolts, nuts and washers for flanged joints shall be Grade 316 stainless steel with Molybond anti-galling coating. Graphite greases, graphite packing and graphite compounds shall not be used in contact with stainless steel. Where dissimilar metals are used, purpose made Delrin thermoplastic inserts shall be installed in the flanges to prevent electrolytic action.

Electrofusion fittings and couplings for MDPE pipes shall comply with NZS/AS 4129

6.2.7 PIPE BEDDING

Pipe bedding material shall be clean, well graded non-cohesive granular material complying with the requirements of NZS 7643 for PVC pipes and AS/NZS 2033 for PE pipes.

6.2.8 PIPE LAYING

uPVC pipes shall be laid in conformity with the requirements of NZS 7643 : 1979 and PE pipes shall comply with the requirements of NZS 2033 : 1980.

Pipes shall be laid on straight grades or lines or on smooth curves without exceeding the manufacturer's recommended deflection of the joints or, in the case of flexible pipe, the recommended curvature of the barrel.

Where greater deflections are needed, formed bends shall be separated by one full pipe length unless flanged joints are used. Flanged joint combinations must be interspersed by flexible couplings to allow ready removal and replacement of individual fittings.
A series of flexible joints in close proximity to each other without adequate lateral support will not be acceptable.

The method of pipe laying and jointing shall be as recommended by the manufacturers for the type and class of pipe in use.

All pipe barrels shall be evenly supported over their entire length by the trench floor or other suitable bedding material placed before the pipe is laid.

Collars shall be unsupported. The open ends of pipes shall be kept covered to prevent the ingress of foreign matter and all pipes shall be inspected and cleared as laying proceeds.

Where possible, when pipes are installed in existing roadways, underground drilling or thrusting of road carriageways, driveways and footpaths shall be utilised. Depths of pipes that are drilled or thrust, shall comply with Clause 6.1.10.

No joints shall be made in pipes under driveways or footpaths.

Where any new main crosses any other service, a minimum clearance of 200mm shall be maintained.

Where pipes are laid in existing paved or grassed areas, backfilling of the trench and reinstatement of the ground surface shall be in accordance with Clause 3.4.12 of Section 3 of this standard.

6.2.9 VALVE AND HYDRANT MARKERS

Marker posts shall be installed vertically in the ground within 200mm of the road boundary to show the location of all valves and fire hydrants in other than urban areas in accordance with the details shown on Standard Drawing WS 04.

The position of hydrants in urban areas shall marked with a painted or heat welded triangle on the carriageway surface in accordance with NZS 4501 : 1972 – “Code of Practice for the Location Marking of Fire Hydrants” Where the carriageway is not permanently surfaced, hydrant marker posts shall be used.

Hydrant indicator posts, valve indicator posts and toby boxes shall be painted with road marking paint complying with Transit New Zealand specifications.

6.2.10 TESTING

The subdivider shall be responsible for testing all lines and fittings and for providing all the necessary equipment, water and materials for such testing.

All pipes and fittings shall be subjected to a pressure test after laying, jointing and anchoring with backfill. The section to be tested shall be capped or flanged off at either end. The blanked off ends and all bends, tees, etc, shall be securely strutted or otherwise prevented from movement before applying any pressure.

The subdivider shall provide means of bleeding air from both ends of the pipeline. Pipes shall be slowly filled with water allowing all air to escape and left for 24 hours to allow any take-up. The pressure shall then be slowly raised by means of a pump to the test pressures indicated below. The test pressure shall be measured at the lowest point of the line under test and for steel pipe lines, shall be maintained for a period of 30 minutes during which time the leakage shall not exceed 750ml per 100mm of pipe diameter per kilometre of pipe.

Testing of uPVC pipe shall be in accordance with the requirements of Section 9 Procedure B of NZS 7643: 1979, except for pipes of diameter less than 100mm NB which shall be tested in accordance with Procedure A. Test pressures shall be as shown in Table 6.3 below:

Table 6.3: Test Pressures

Table 6.3 : Test Pressures for Pressure Lines		
Class of Pipe	**Test Pressure**	
	Meter Head	**kPa**
Class B uPVC	90	900
Class C uPVC	135	1350
Class D uPVC	180	1800

Any faulty pipes, joints or fittings shall be replaced by the subdivider and the line shall be retested. All pipes are to be tested so that the specified test pressures are achieved but not exceeded in such lengths of pipe as may be approved by the Engineer. All pipes shall be pre-tested by the subdivider before testing in the presence of the Engineer. Should any section of pipe fail this latter test, the cost of attendance by the Engineer at the subsequent test or tests shall be charged at cost. Test sections shall not be longer than 1000 metres.

As a minimum, a 100mm diameter test pressure gauge manufactured to NZS/BS 1780: 1985, "Specification for Bourdon Tube Pressure and Vacuum Gauges, Section 1 – Industrial" with an accuracy of less than 1% error, in good working order is required, holding current test certification (within last 12 months).

6.2.11 CONNECTION TO EXISTING RETICULATION

After the system has passed the pressure test, a connection to the existing distribution system will be made. It will be necessary for the contractor to give at least 48 hours notice to the Council in accordance with Clause 1.4.12 that a connection is required, and the work shall be carried out under Council supervision.

6.2.12 FLUSHING AND STERILISING

All pipes, valves, service connection and other fittings in the reticulation shall be fully disinfected and flushed in the presence of the Engineer, before being put into service. The Developer shall give at least 24 hours advance notice of his intention to disinfect a pipeline.

Disinfection chemicals shall be applied to achieve a free chlorine concentration of between 10mg/litre and 100mg/litre. (The pH should not be higher than 9 0)

The disinfectant requires time to be effective. The required contact time is a function of concentration. The product of free chlorine concentration (mg/litre) and contact duration (minutes) shall be not less than 7,200. Eg a satisfactory treatment regime would involve a free chlorine concentration of 10mg/litre with a contact duration of 720 minutes.

At the end of the disinfection period the free chlorine concentration shall be not less than 10mg/litre.

If at the end of the disinfection period the free chlorine concentration is less than 10mg/litre, the pipeline shall be thoroughly flushed and the disinfection process shall be repeated.

If the disinfection process is being applied to a pipeline with consumer connections, each service pipeline shall be closed at the supply point prior to the disinfectant being administered.

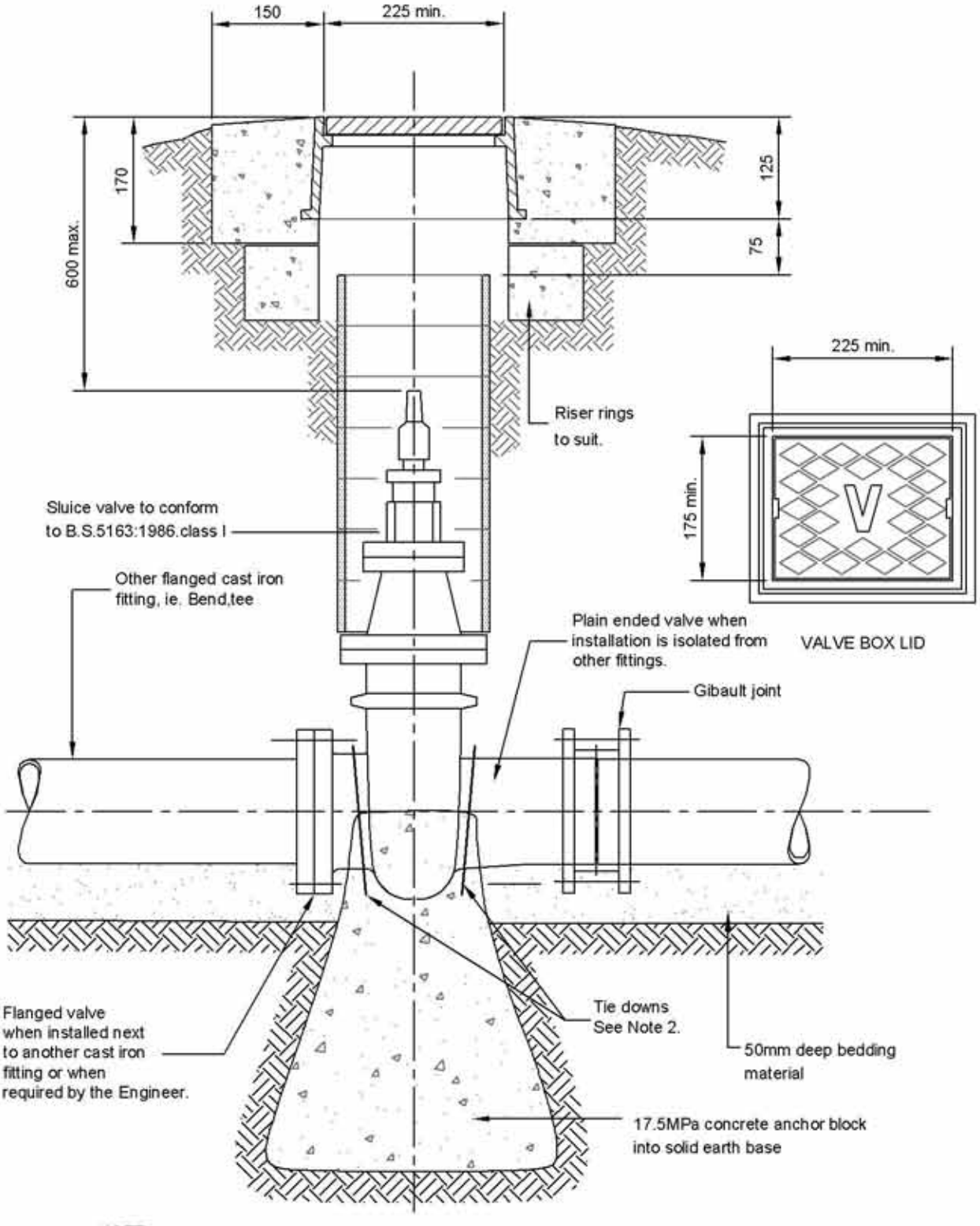
The quantity of available chlorine varies for each chemical so it is not appropriate to apply ‘rules of thumb’ as to how to achieve a particular concentration.

All mains shall be kept at working pressure on completion of testing and flushing to ensure any subsequent damage caused by installation of other services is detected.

CHAPTER 6

WATER SUPPLY

STANDARD DRAWINGS



NOTE

1. Allow to paint valve lid with two coats of white road marking paint to TNZ specifications.
2. For valves 150mm Ø and over tie down straps cast into the anchor block shall be installed.
3. Valves isolated from other fittings may be plain ended. In all other cases they shall be flanged.

WHAKATANE DISTRICT COUNCIL

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STANDARD DRAWING

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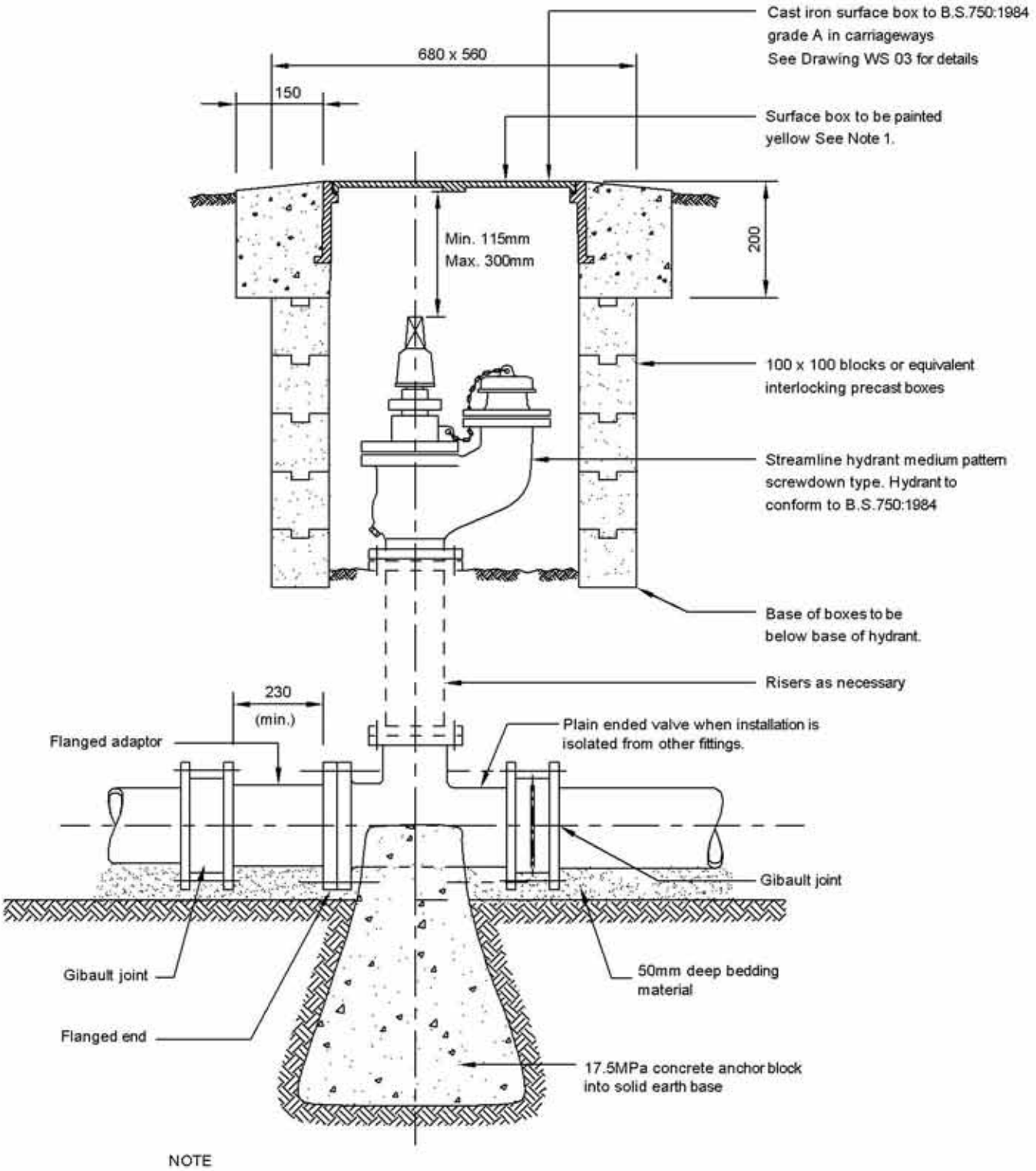
SERVICE VALVE INSTALLATION

WS 01

ISSUE 7.0
SEPTEMBER 2007



NOTE

1. Allow to paint valve lid with two coats of yellow road marking paint to TNZ specifications.
2. For valves 150mm Ø and over tie down straps cast into the anchor block shall be installed.
3. Valves isolated from other fittings may be plain ended. In all other cases they shall be flanged.
4. Frost drain plug to be plugged.
5. When mains are constructed in PVC, use standard cast iron hydrant tee and step gibault joint.

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FIRE HYDRANT INSTALLATION

WS 02

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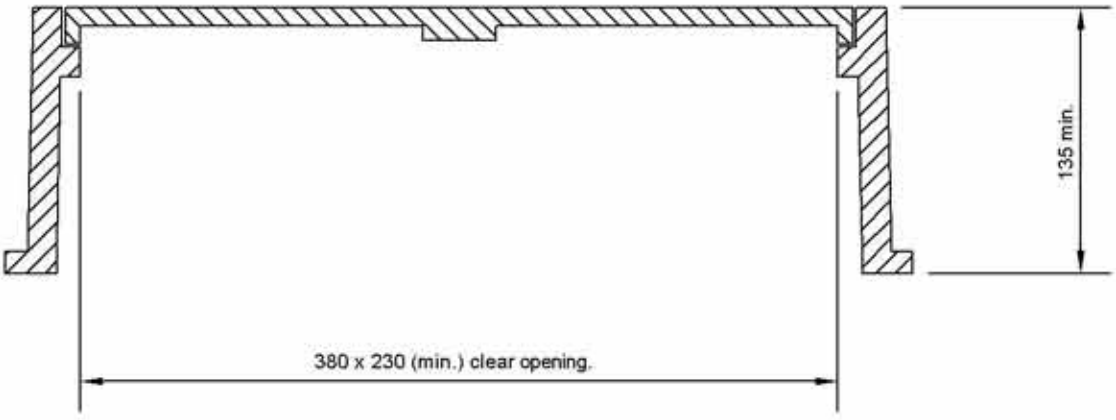
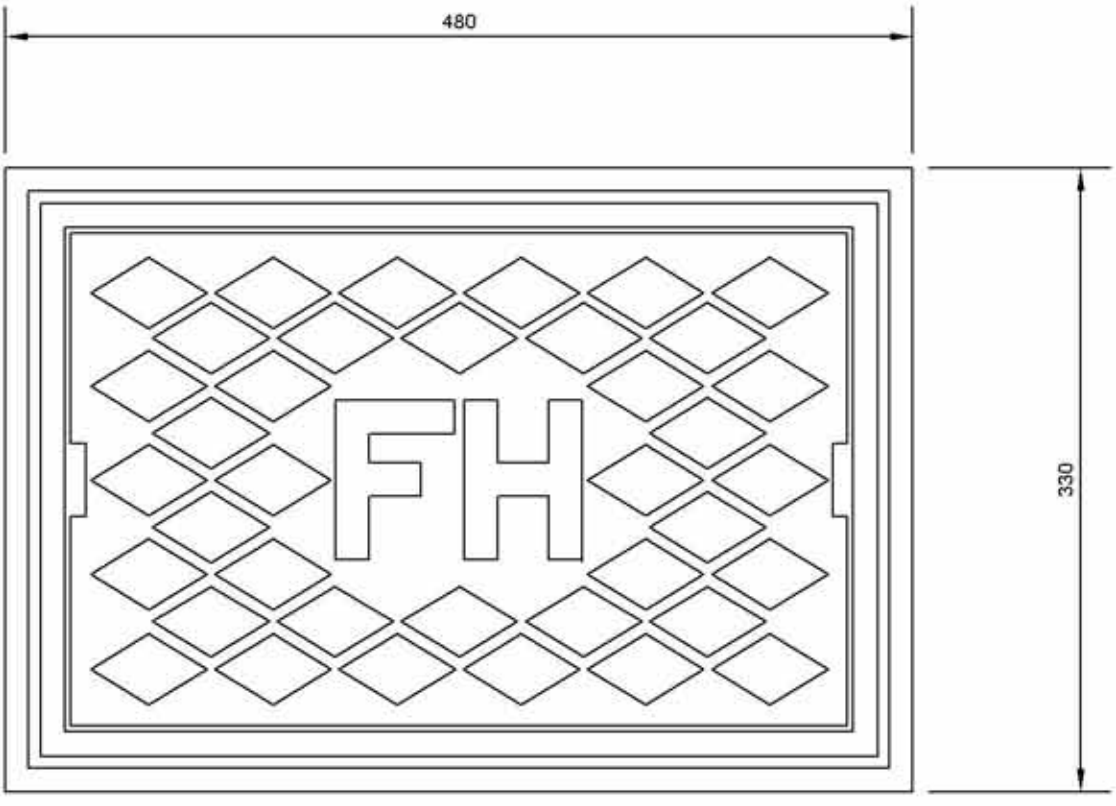


SECTION THR OUGH FRAME & COVER



PLAN

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HYDRANT BOX

WS 03

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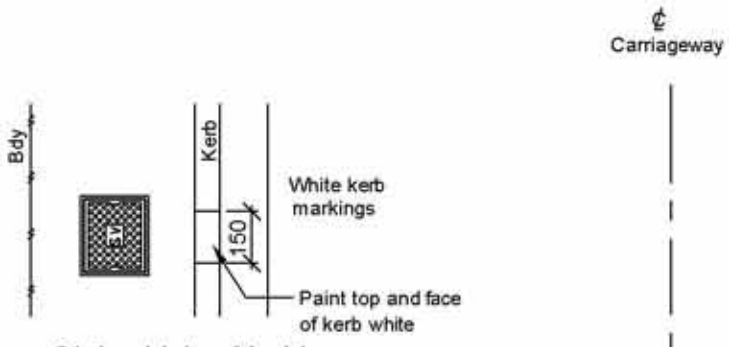
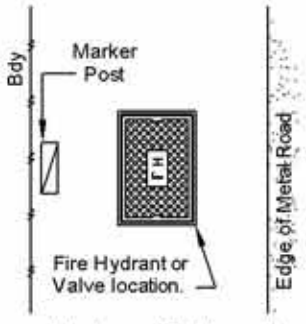
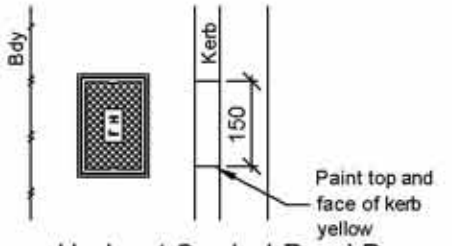


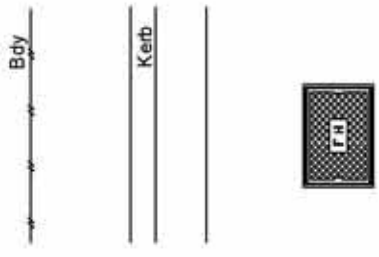
Sluice Valve Marking
Sealed Road Berm



Hydrant/Valve Unsealed Road Berm

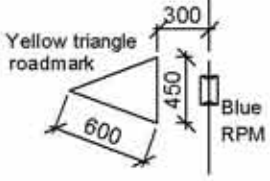


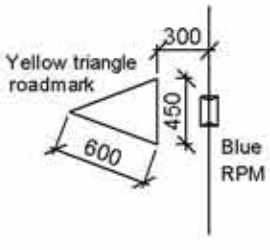
Hydrant Sealed Road Berm

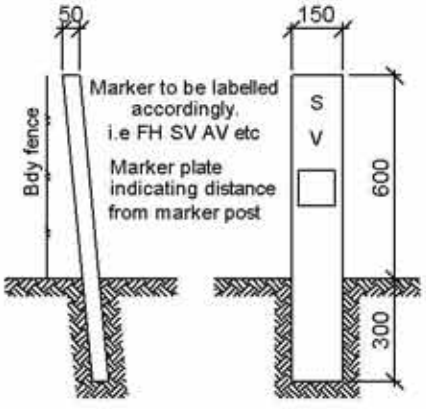


Hydrant in Carriageway

HYDRANT MARKINGS







NOTE: To be constructed using 50mm thick concrete.

HYDRANT/SLUICE VALVE
MARKER POSTS

WHAKATANE DISTRICT COUNCIL

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VALVE AND HYDRANT MARKERS

WS 04

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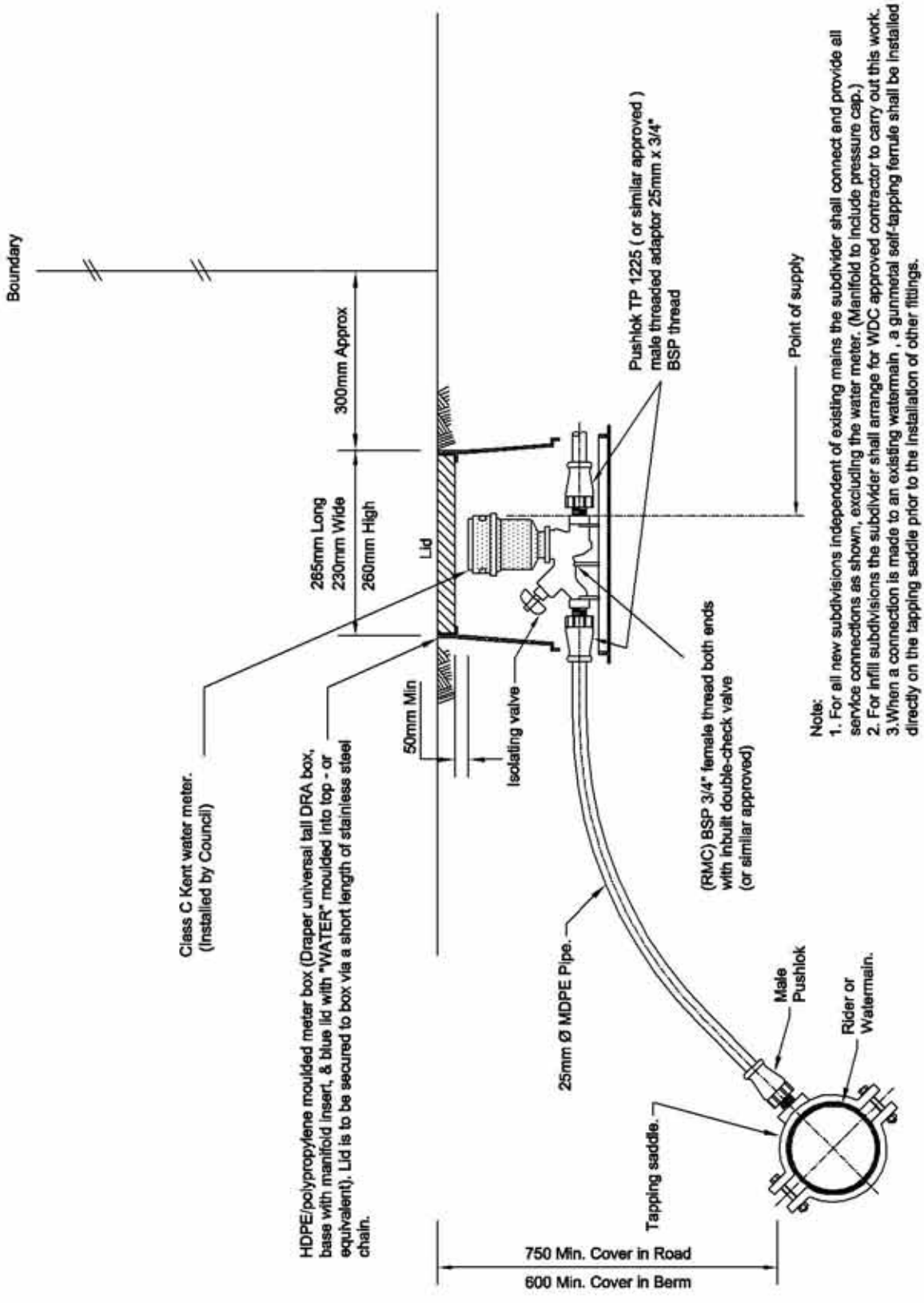

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SERVICE CONNECTION DOMESTIC

WS 05

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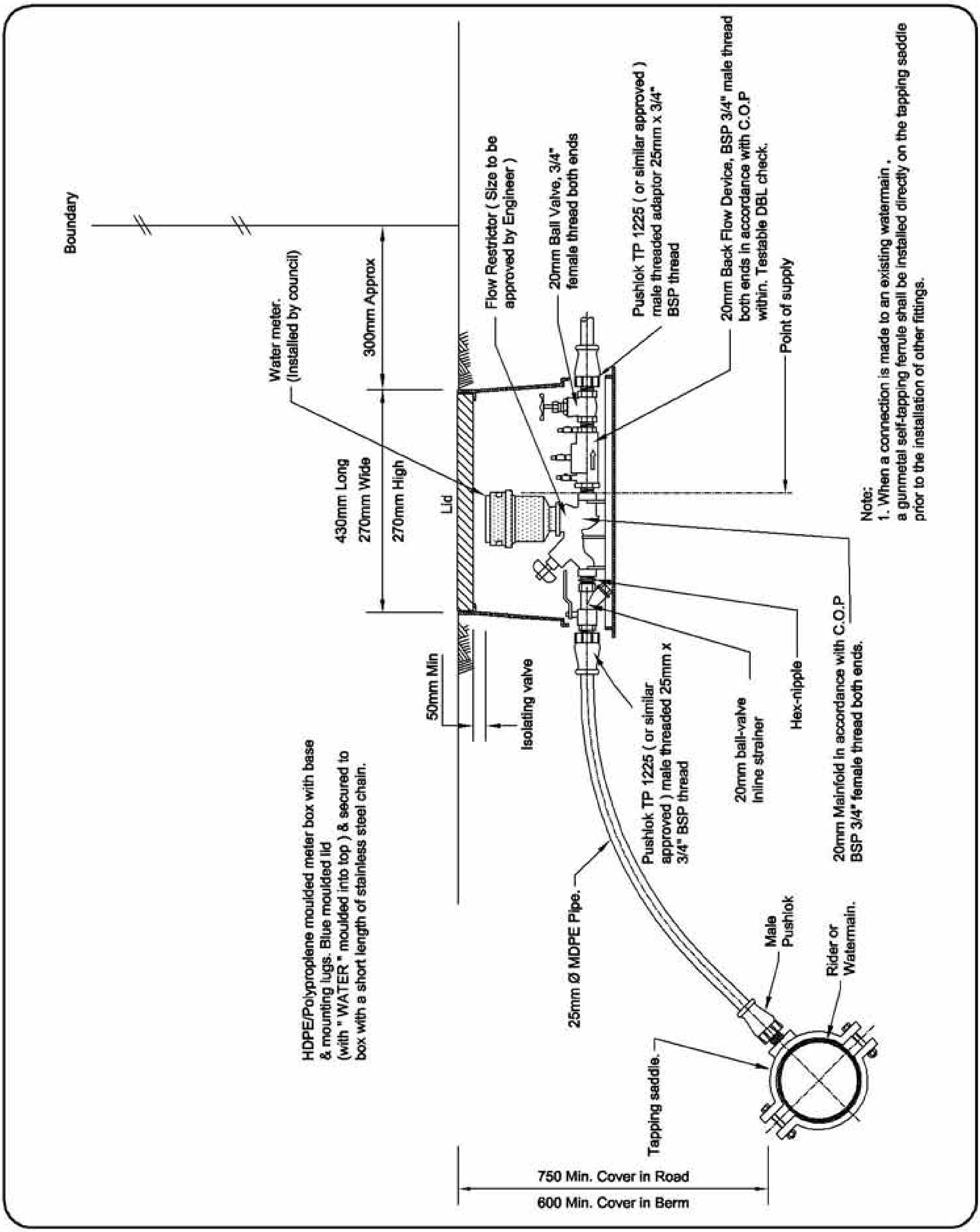

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SEVICE CONNECTION RURAL/INDUSTRIAL

WS 06

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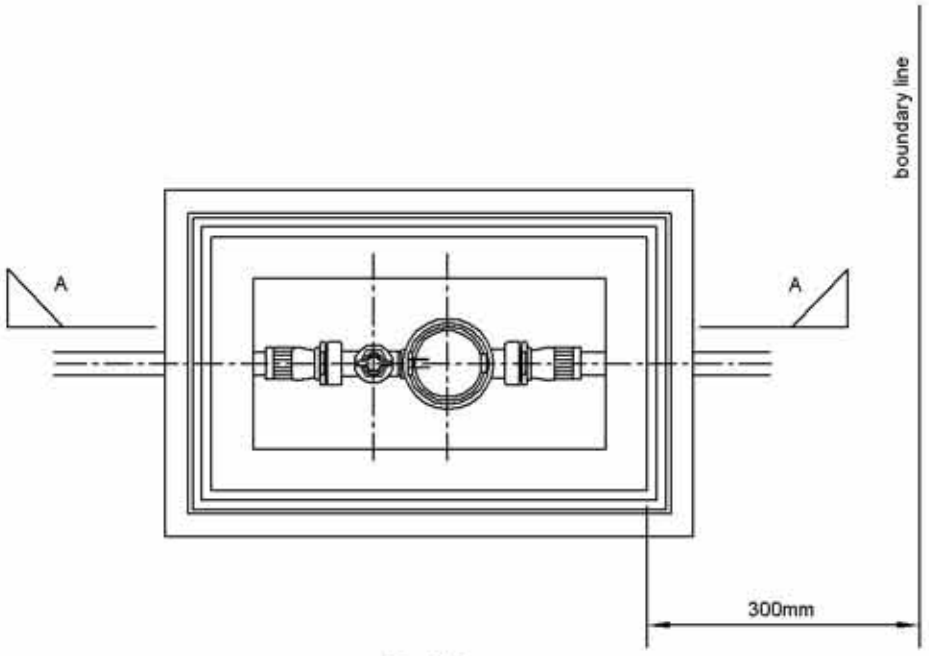
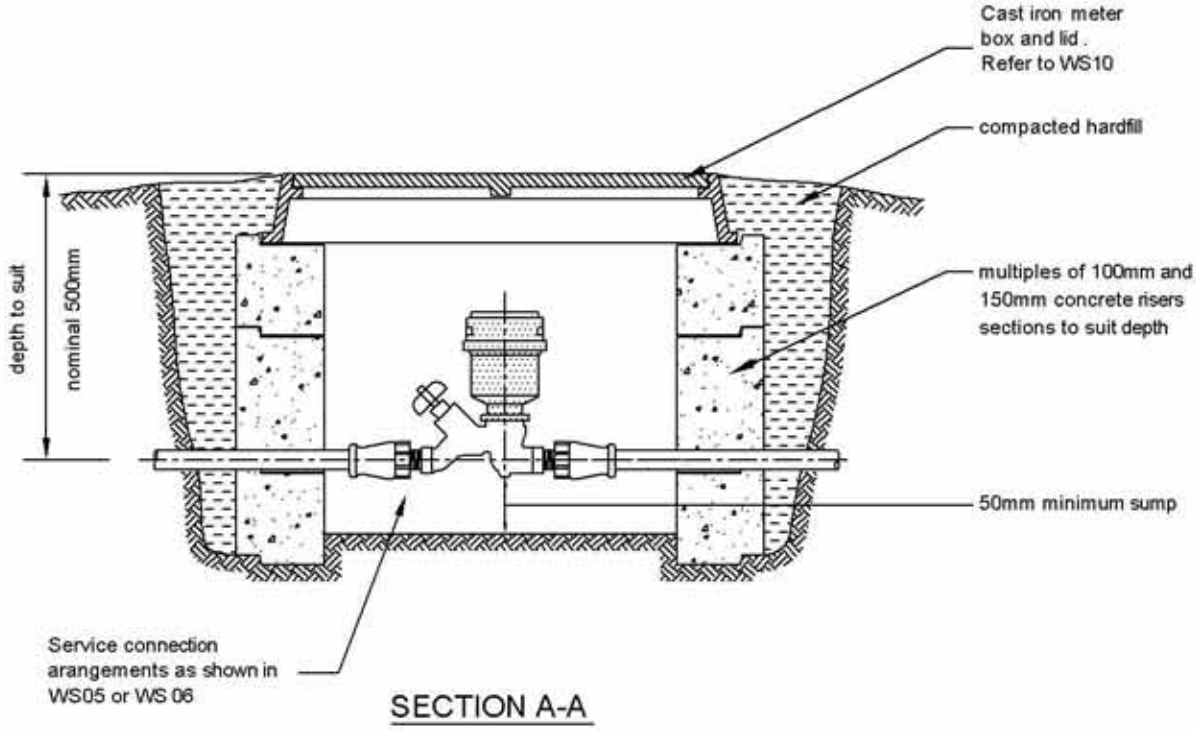


PLAN



SECTION A-A

NOTE:

For installation in vehicle crossings or in areas where a standard meter box would not be suitable or where directed by the Engineer.

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STANDARD DRAWING

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HEAVY DUTY METERED CONNECTION

WS 08

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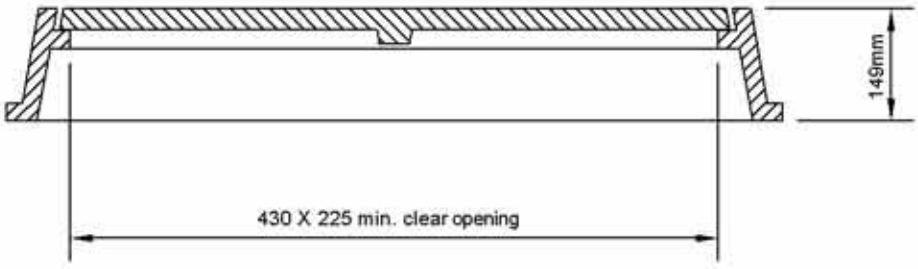
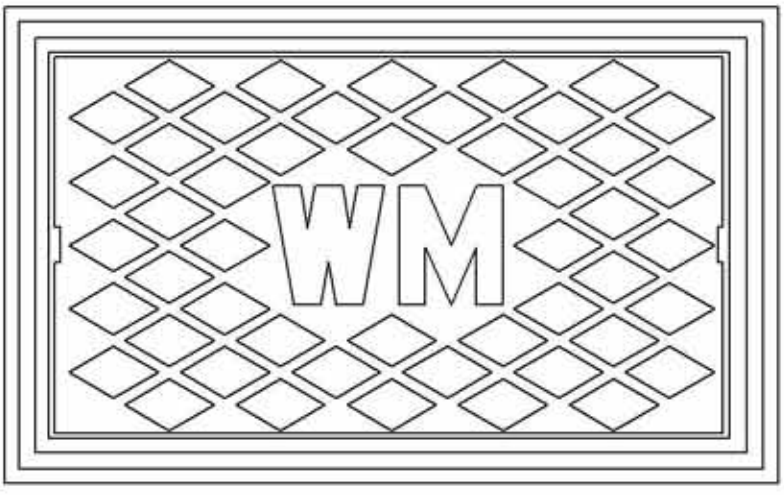


SECTION THRU' FRAME & COVER



PLAN

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STANDARD DRAWING

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CAST IRON WATER METER BOX

WS 10

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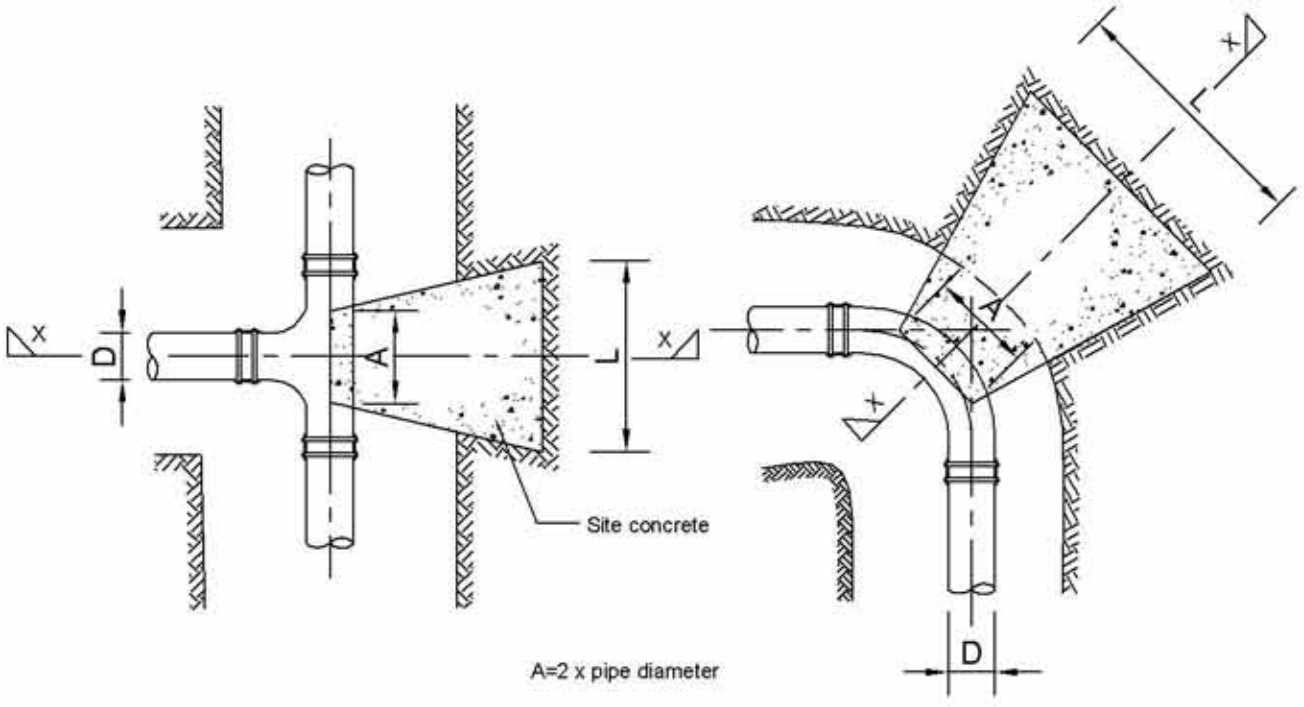

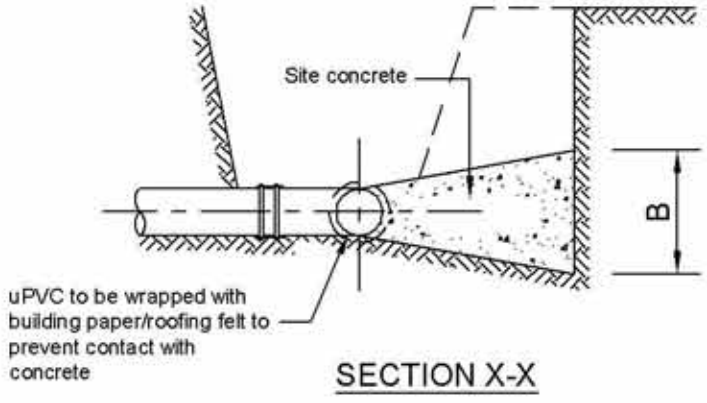

SECTION X-X

	Tee		90°		45°		22.5°		11.25°		BEC	
D	L	B	L	B	L	B	L	B	L	B	L	B
40	150	150	150	150							150	150
50	300	150	300	150	150	150	150	150	150	150	300	150
100	450	300	600	300	300	300	300	150	150	150	450	300
150	600	300	600	600	600	300	450	300	300	300	600	450
200	600	450	1000	600	600	450	600	300	450	300	600	600
225	600	600	1300	600	600	600	900	300	450	300	900	600
250	1000	600	1300	600	900	600	900	300	600	300	1000	600
300	1150	900	1300	900	1000	600	1000	300	600	300	1150	900
375	1150	1000	1600	1000	1000	1000	1000	450	600	450	1150	1000

1. Concrete strength : 17.5MPa
2. Concrete thickness: 150mm
3. Bedding against solid natural ground .

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THRUST BLOCK DETAILS

WS 11

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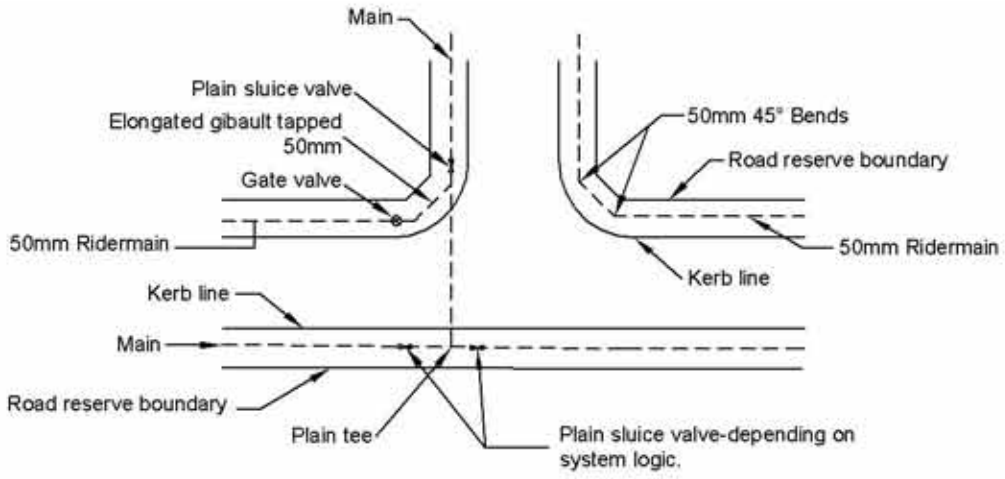
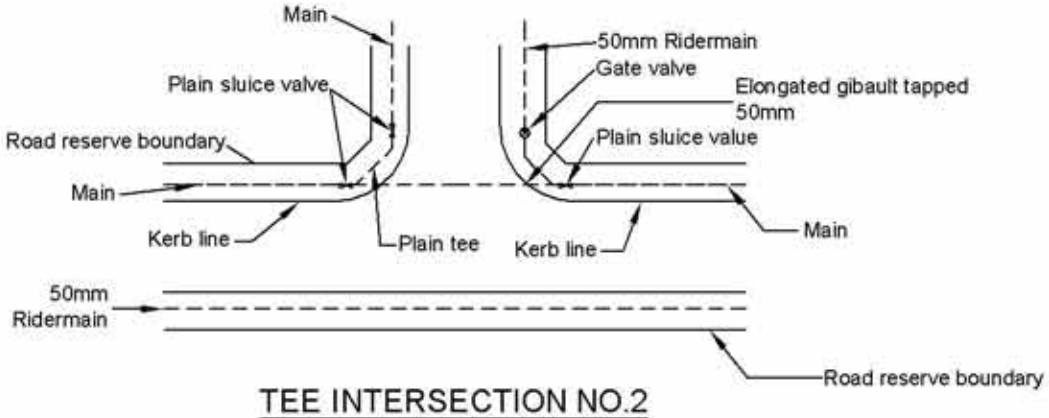
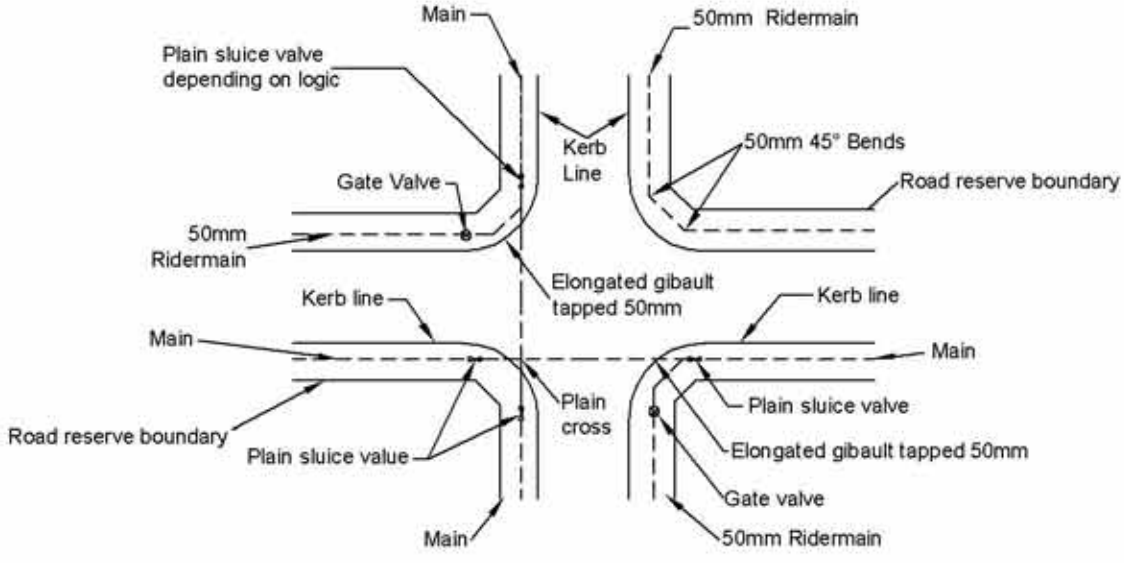


TEE INTERSECTION NO.1



TEE INTERSECTION NO.2



CROSS INTERSECTION

NOTE:
1. Valves to be located adjacent to change in boundary direction where practicable.

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WATERMAIN LOCATIONS AT INTERSECTIONS

WS 13

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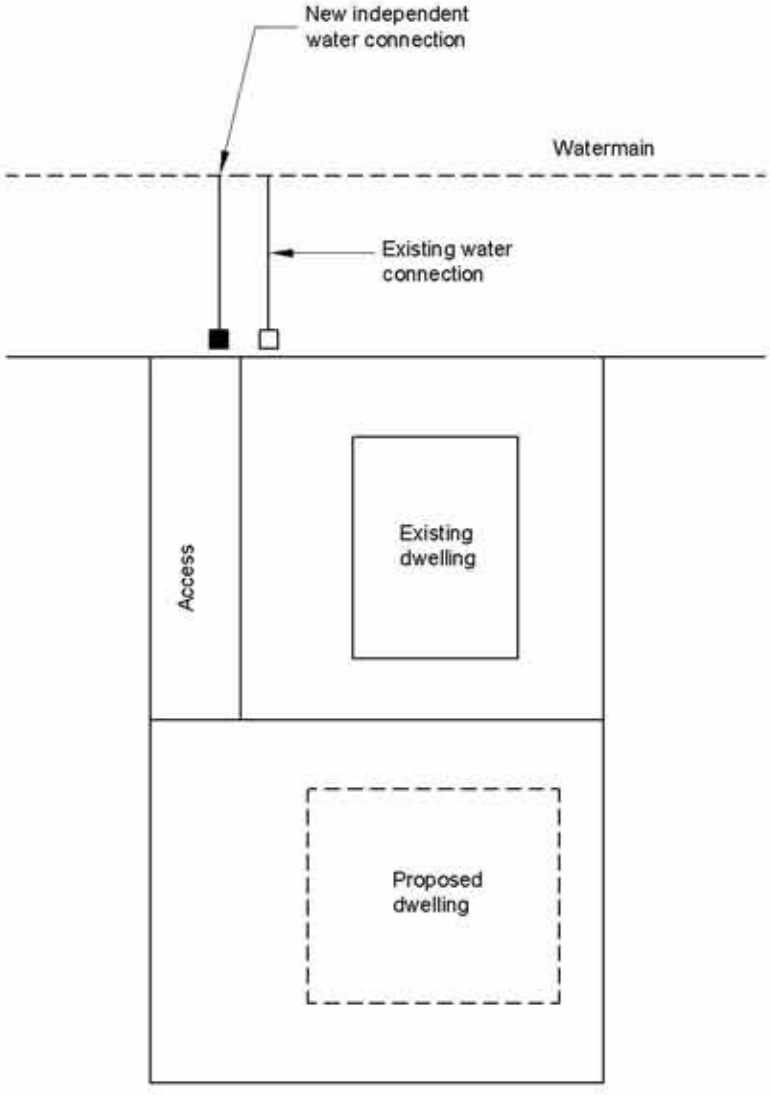

1. All new lots shall be supplied with a connection at the road boundary.

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WATER CONNECTIONS

WS 14

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CHAPTER 7

LANDSCAPING

CHAPTER 7 LANDSCAPING

PART 1 MEANS OF COMPLIANCE

7.1.1 INTRODUCTION

This part applies to the provision of street landscaping to enhance the environment in any part of a subdivision or where required as a condition of subdivision consent.

7.1.2 REQUIREMENTS

Street landscaping is to enhance and strengthen the existing character and intended future character of neighbourhood areas and unify those areas into an integrated town.

The planting shall provide maximum long term benefit to the public with minimum ongoing maintenance. It must not compromise the safe use of the legal road reserve or affect its structural integrity.

Opportunities for street landscaping are diverse, ranging from specimen tree planting within the standard road berm (Standard Drawing R 02), to planting associated with traffic calming devices (Standard Drawings R 19-R 22) and specific landscape features within the subdivision.

Detailed prescription of requirements is not considered appropriate, but provision of landscape elements within the street should be included at the design stage and submitted for approval with the engineering plans.

7.1.3 LOCATION

7.1.3.1 Trees

Trees are generally to be planted in the front berm area between the kerb and footpath and not within the rear (services) berm or in road verges less than 1 metre in width. Tree density shall be equivalent to a minimum of one tree for every 15 lineal metres of roadway.

The minimum separation distances shown on Standard Drawings R 05 and LS 02 should be observed for tree planting. These separation distances are guidelines and may have to be increased depending on the road geometry.

7.1.3.2 Gardens

Gardens shall be designed to keep maintenance to a minimum. Gardens must be located within street medians. The finished level of the soil is to be slightly raised to the centre rather than flat or sunken. The Council wishes to limit garden areas to keep maintenance costs within reasonable limits.

7.1.4 SIZE

The mature size of any tree or garden planting is to be assessed for each planting location and is to be in scale with the surrounding street environment and the space available.

Garden planting should not exceed 600mm in height above the roadway when planted in the sight triangle at intersections, or other traffic or pedestrian conflict areas.

7.1.5 SPECIES SELECTION

Species are to be selected with regard to overall composition, low maintenance, longevity and must comply with Council's Tree Planting Policy. A copy of the Policy is available for viewing at the Council offices.

The number of species used is to be limited to ensure a unified results and species choice in street gardens is to complement the street tree planting.

The following matters are to be considered for correct species selection:

- Tolerance to pollution, drought, wind damage, pruning and vandalism
- Pest and disease resistance
- Invasive potential through suckering or seeding
- Root habits
- Shading characteristics
- Maintenance requirements
- Growth rate and mature size

7.1.6 QUALITY CONTROL

All plant material shall be sound, health, vigorous and free of any defects which may be detrimental to plant growth and development.

7.1.7 LANDSCAPING STRUCTURES

Landscaping structures may include sculptures, walls, fences, screens, bollards, entranceways, posts and the like, and could be made from materials such as concrete, brick, stone, rock and timber. The design of the landscape shall be considered as an integral part of the development and surroundings to fulfil both functional and aesthetic requirements. Durability and maintenance requirements shall be considered.

The structures shall be located so that they do not obstruct the sight lines for intersections, pedestrian crossings and signs. The separation distances shall be considered together with trees and other landscaping features.

Structures shall be designed to safely withstand appropriate loadings and shall not be a hazard to traffic.

Entranceway structures shall be located fully on private land. This policy applies mainly to arterial routes and on minor roads. Council may allow structures in the road reserve on a specific approval basis.

7.1.8 STREET TREES AND GARDENS

7.1.8.1 Plan Approval

Plans are to be submitted by the subdivider's representative at an appropriate scale (generally not less than 1:500 for tree planting and not greater than 1:100 for gardens) which detail both the botanical and common names, number proposed, size at planting, staking or other planting requirements and planting date (season). The location of services and street furniture is also to be provided. Plan approval, pre-construction, etc, are to follow the standard engineering requirements as set out in Chapter 1 of this Manual.

7.1.8.2 Irrigation

Council approval is required prior to the installation of any permanent or semi-permanent irrigation system. If an irrigation system is to be installed, island gardens shall be provided with a duct for a water connection. Developers shall apply and pay for a metered water connection for irrigation purposes, and shall be responsible for all water usage costs.

7.1.8.3 Gardens

All garden areas are to have a minimum of 400mm depth of organic topsoil free of all perennial weeds and stones greater in any dimension than 25mm.

The subgrade below the topsoil is to be free draining and shall not contain any rock or concrete material and shall be loosened to a depth of 600mm to provide free drainage prior to placing the topsoil.

7.1.8.4 Tree Pits

Tree pits should be 1½ times the diameter of the root ball and exceed its depth by a minimum of 200mm.

The subgrade below the tree pit is to be free draining and shall not contain any rock or concrete materials.

The subgrade shall be loosened to a depth of 600mm below the base of the pit to provide free drainage.

7.1.8.5 Root Control Barrier Planter

All specimen trees in islands in front berms of streets shall be planted in conjunction with an approved root control barrier planter.

Root control planters shall be of a proprietary structural polyethylene material or as approved by the Engineer and installed in accordance with the manufacturer's recommendations and Standard Drawing LS 01.

A 100mm wide drainage metal layer shall be placed between the root control planter and any kerb, footpath, pipework or other fixed structure as shown on Standard Drawing LS01.

7.1.8.6 Maintenance Period

The developer is responsible for the routine maintenance and replacement of the planting including dead wooding, weed control, mulching, replacing dead trees and watering for the period up until the issue of the Section 224C certificate or such other period as stated in the Resource Consent.

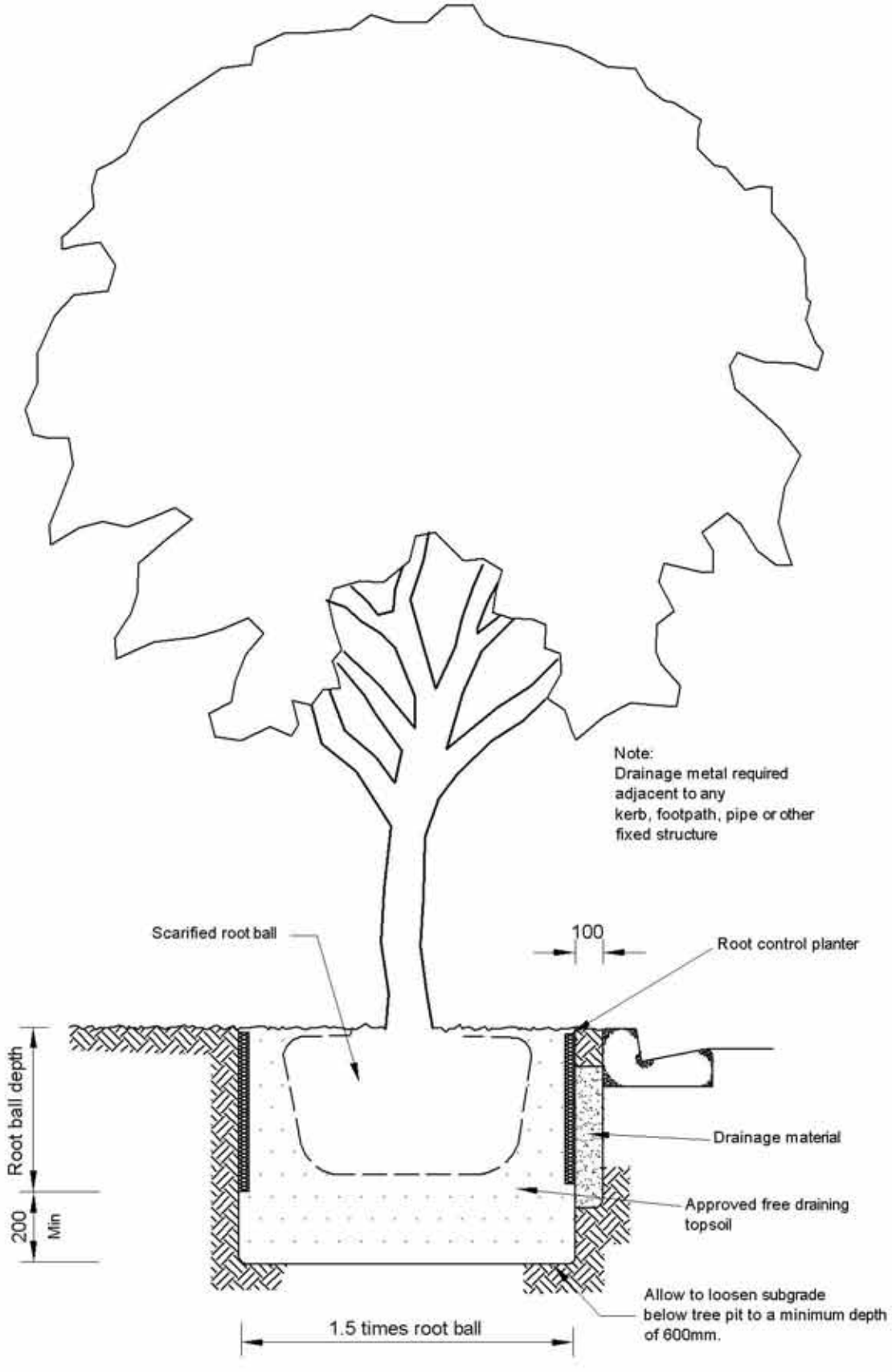
7.1.8.7 Completion

The Council does not require "As Builts" of the street landscaping. The Developer's Representative must be satisfied that the street landscaping is in accordance with the design and must include any specified landscaping in the Certificate of Completion.

CHAPTER 7

LANDSCAPING

STANDARD DRAWINGS



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ROOT CONTROL PLANTERS FOR TREES

LS 01

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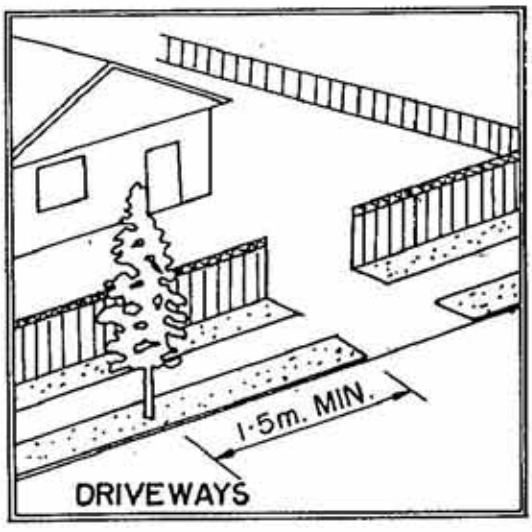

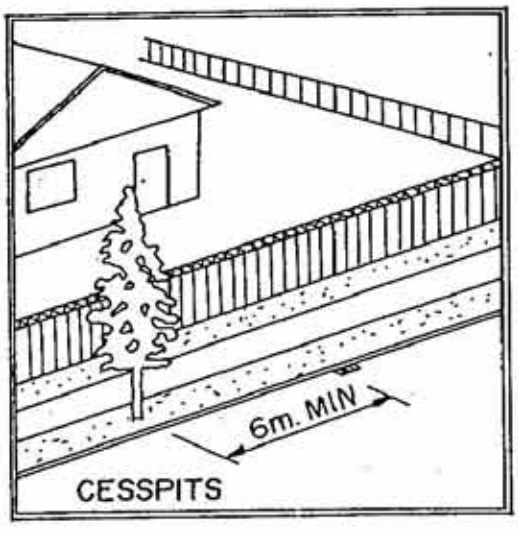

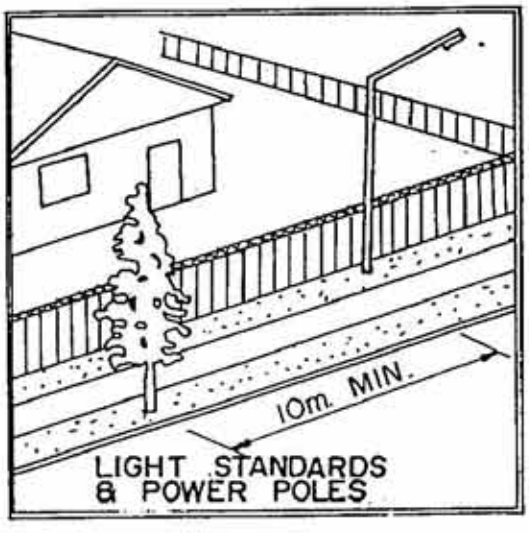

NOTE

1. At Intersections trees shall be placed far enough back to maintain adequate sight distances. Refer to Drawing R 25 for sight distances.

2. The clearances shown in the diagram above may be varied with Council approval depending on the selected species.

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STANDARD DRAWING

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STREET TREE PLACEMENT

LS 02

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