ENGINEERING
CODE OF PRACTICE

WAIROA DISTRICT COUNCIL

DOCUMENT PREPARATION & QUALITY ASSURANCE

	Name	Date
Prepared by Department	Community Assets and Services	March 2021
Document Approved		
Adopted by Council		

UPDATE REGISTER

Version	Date	Update Description	Updated By

CONTENTS

PART 1 - CONTEXT

This document sets the minimum engineering standards for subdivision and land developments within the Wairoa District. It sets out what the Wairoa District Council (Council) expects from developers (and their agents) so that the requirements of the Resource Management Act 1991 and the District Plan are met. The intention of this engineering code of practice (CoP) is to set the expectations of engineering services to meet the current and future needs of the Wairoa community. This document is intended to provide as much certainty as possible for developers and the public.

The document applies the New Zealand Standard NZS 4404:2010 Land Development and Subdivision Infrastructure (NZS 4404:2010) as the base document for meeting minimum engineering requirements. However, there are some specific variations from NZS 4404:2010 which are included across the seven technical chapters in this document. The seven chapters are General Requirements and Procedures, Earthworks and Geotechnical, Transportation, Stormwater, Wastewater, Water supply, and Landscape.

Alternative means of compliance are not discouraged, however will require certification consistent with the matters set in this document. Refer to Section 1.7 on page 6.

OBJECTIVE OF DOCUMENT

The objective of this document is to;

- Assist developers to assess their obligations, responsibilities and liabilities on engineering issues before embarking on a subdivision or land development project, or a building project within the Wairoa District.
- Assist developers to determine the engineering design standards and performance targets that must be achieved in order to meet the conditions set by the Council for the development of new facilities in the Wairoa District.
- Help Council to maintain a consistent and fair approach to the appraisal of developments while allowing for some degree of flexibility on solutions.

INTENTION OF DOCUMENT

This document intends to be;

- Applicable to all land and infrastructure development within the District, including:
    1. Subdivision Consents - By providing a set of Engineering Standards to enable compliance with the rules for subdivision activities in the District Plan, and to identify standards which developers may be required to comply with as a condition of a subdivision consent.
    2. Land Use Consents - By providing a set of Engineering Standards to enable compliance with the rules for land use activities in the District Plan, and to identify standards which developers may be required to comply with as a condition of a land use consent.
    3. Building Consents - By providing a set of requirements/ standards for the provision of services in accordance with the requirements of the Building Act.
- An end-product based document that requires developers to document each phase of the proposed development and

to certify, through appropriately qualified professionals, any work that is put to Council for acceptance, either as a public or private asset, in accordance with the requirements of the District Plan or the Building Act.

RELATIONSHIP BETWEEN THIS CODE AND THE LOCAL PLANNING LEGISLATION (REGIONAL AND DISTRICT PLANS)

The purpose of the District Plan is to assist the Wairoa District Council to carry out its statutory functions in accordance with the Resource Management Act. The Council has the responsibility for the integrated management of the effects of subdivision and land development activities, and the control of those effects on the environment.

The Wairoa District Plan controls subdivision and land development and sets minimum performance standards for these activities. Infringement of these standards generally triggers the requirement for a resource consent. Conditions of consent might require the provision of infrastructure that is consistent with the engineering code of practice. In some instances, permitted activity performance standards might also require the provision of infrastructure.

This CoP is not a part of the District Plan. The CoP describes engineering standards which Council believes provide acceptable solutions, but not necessarily the only solutions, for the engineering works associated with subdivision and land development. Council will impose conditions on resource consents, using the CoP as a reference document for acceptable solutions. These conditions will be enforceable through the rules in the District Plan. If a developer wishes to use engineering solutions or standards other than those described in the CoP, these will need to be fully justified by an appropriately qualified professional.

RELATIONSHIP BETWEEN THIS CODE AND THE BUILDING ACT

The Building Act establishes a system of building control and includes a Building Code. All elements of building are brought into the scope of this Act.

This CoP provides the builder and building owner with information on the Engineering Standards that Council will use when setting conditions for building consent, on topics such as:

- land stability
- vehicle access
- road development
- services such as water supply, stormwater and sewage
- and Council's requirements regarding the connection of services in a subdivision or land development to existing Council services.

This CoP does not provide specific technical information relating to building works, such as plumbing, drainage, structural design, electrical standards or painting and decoration.

PART 2 - ENGINEERING STANDARDS

SECTION 1 - GENERAL REQUIREMENTS AND PROCEDURES

1.1 INTRODUCTION

Council has adopted the New Zealand Standard *NZS 4404:2010 Land Development and Subdivision Infrastructure* as the base document to specify the minimum engineering requirements. Schedules outlining the Council requirements that are different to, or not covered in this Standard, have been developed and form part of the minimum engineering requirements. These are presented in Schedules A - G of this document.

1.2 GENERAL REQUIREMENTS AND PROCEDURES

Developments shall comply with Section 1, General Requirements and Procedures of NZS 4404:2010 whether using the Minimum Engineering Requirements or alternative approaches, except as modified by Section 1.3 to 1.8 or Schedule A below.

1.3 SUITABLY QUALIFIED PERSONS

Where investigations and reports are required by a suitably qualified person, this person or persons will have nationally recognised qualifications and accreditation. The person or persons will normally be expected to be professionally recognised in the area of competence claimed and to carry professional indemnity insurance to a level suitable for the purpose, but in any case not less than $1,000,000 per project.

Council reserves the right to have any work peer reviewed regardless of any prior approval as to the acceptability of the suitably qualified person. The cost of all peer review work will be borne by the developer.

Without limiting the Council's rights to require the use of suitably qualified persons the following are examples of areas of expertise, together with the expected minimum qualifications where such people may be required:

- Geotechnical engineering (CPEng with recognised discipline competence or Engineering Geologist with PEngGeo with recognised discipline competence);
- Structural engineering (CPEng with recognised discipline competence);
- Traffic and transportation engineering (CPEng with recognised discipline competence);
- Stormwater engineering and flood mitigation (CPEng with recognised discipline competence);
- Wastewater engineering (CPEng with recognised discipline competence);
- Potable water supply engineering (CPEng with recognised discipline competence);
- Non- potable or rural water supply engineering (CPEng with recognised discipline competence);
- Landscape design and practice (Registered Landscape Architect);
- Land surveyor (survey plans) (Registered Professional Surveyor, Registered Engineering Surveyor or Licensed Cadastral Surveyor);

- Land legalisation, etc. (Registered Professional Surveyor and Licensed Cadastral Surveyor).

1.3.1 DISPENSATION TO SECTION 1.3

It is not Council policy to accept any infrastructural design that does not meet the expertise criteria. However, if circumstances arise which require any engineering solution by a professional who cannot be categorised by Section 1.3 above, then an application for dispensation shall be submitted.

An application for dispensation shall include;

- Details of the proposal;
- Demonstrated compliance with the relevant chapter(/s) of this document;
- The reason why dispensation is necessary; and
- Any potential risks of reliance on a professional not listed in Section 1.3 shall be highlighted.

Dispensation will only be considered with substantive reasoning put forward in support of the non-compliance. All dispensations require approval from the relevant Wairoa District Council Asset Manager.

1.4 MAINTENANCE OF STANDARDS

Developers have the responsibility, both directly and through their appointed representatives, to ensure that all works carried out directly or by contractors or sub-contractors on their behalf are at all times in accordance with the approved drawings and specifications (including approved variations), and in accordance with sound engineering practice. While Council staff will be available to offer advice and guidance, it remains the developers' representatives' responsibility to supervise all investigation, design and construction and certify that the required standards have been achieved.

1.5 WORKING IN LEGAL ROAD RESERVE

Any person proposing to carry out construction or maintenance work in a Legal Road Reserve shall apply to Council (or if required Waka Kotahi) for a Corridor Access Request.

For physical work within a legal road reserves under the control of Council the developer/contractor shall:

- Submit a Corridor Access Request (CAR). This can be requested online at 🌐 www.submitica.com or 🌐 www.wairoadc.govt.nz (search for 'permits'). The CAR will be needed for such things as:
    - a driveway - construction or reconstruction, installing culverts
    - drainage work - stormwater, wastewater or water pipes
    - services - power, cables, trenches, cabinets, poles
    - planting a tree
    - Installing a gate/cattlestop
    - Traffic management
    - Felling trees
- Carry out the work in accordance with the current codes of practice (National Code of Practice for Utility Operators' Access to Transport Corridors) for working on the road;
- Restore the road and berms to the specified standards, by appropriately qualified and experienced contractors;
- Submit a works completion certificate on completion of the works.

1.6 COMMUTED SUMS

In some situations, the Council will require a commuted sum to be paid by the developer based on the net present value of the ongoing operation, maintenance and replacement costs for a facility taken over by the Council. This particularly relates to sewer pumping stations, but may also apply to other non-normal situations. If relevant, applicants should discuss this aspect with the Council at an early stage.

1.7 ALTERNATIVE APPROACHES

Though less desirable, the Council may consider alternative approaches to engineering design and construction provided that the District Plan requirements can still be achieved.

Approval for the engineering design and construction of works on subdivision and land development projects can be achieved by either:

- Following minimum engineering requirements as outlined in this document, or
- Utilising a less prescriptive approach, which offers opportunity for greater innovation, and which is based on other published design guides and standards provided that a suitably qualified chartered professional has designed and approved the service. In assessing the acceptability of alternative engineering solutions, there will be a particular focus on the medium to long term implications of the infrastructure on Council and the community. Designs will need to be supported by information on ongoing maintenance implications, asset maintenance plans, replacement / renewal costs.
- Other published design guides including the Hawkes Bay Regional Council Waterway Design Guidelines 2009 and Standards New Zealand Handbook, SNZ HB 44:2001 Subdivision for People and The Environment provide guidance on alternative means of carrying out the engineering of subdivision and land development projects. Applicants can also submit to Council alternative designs based on other appropriate published Design Guides and with appropriate supporting detail.

Requests for dispensation must be supported by a report that describes:

- The background relating to the need for the dispensation
- Reference to the relevant Code clauses that the proposal will contravene
- The reasons why the dispensation is necessary
- Any benefits that may arise from dispensation consent
- The likely impacts on existing infrastructure
- Other alternatives considered

In compiling a request for dispensation, the following headings are suggested:

- Background
- Code clauses related to the Works
- Reasons for dispensation request

- Benefits accruing
- Resultant Outcomes and related non-compliances with The Code.

Applications for a dispensation to the Code should be made using the form in Appendix B1.

1.8 VESTING ASSETS

If a proposal includes design of an asset that is to be vested in Council, the solution that delivers the lowest whole of life cost to Council and the community should be used.

Prior to vesting an asset with Council, the developer shall collate and provide all relevant documentation. This shall include;

- The relevant certificates and producer statements (refer to Schedule A Cluse 1.8.1)
- Meeting the requirements of Schedule 1D (As-Built Plans & Data)
- An itemised schedule of quantities and costs shall be provided for the services and/or assets (Refer to Appendix B4).

SCHEDULE A

WAIROA DISTRICT COUNCIL ALTERED REQUIREMENTS TO SECTION 1 NZS 4404:2010 - GENERAL REQUIREMENTS AND PROCEDURES

The Wairoa District Council has adopted Section 1 of NZS 4404:2010 with the following additions and/or alterations to be used in conjunction with NZS 4404:2010.

CLAUSE 1.8.1 DOCUMENTS TO BE SUBMITTED FOR DESIGN APPROVAL

Full engineering documentation shall be prepared and submitted to Council. No work shall commence until these documents have been approved in writing by the Council. Engineering Approvals are required for all work on Council services and roads, and for new services and roads that are to be vested in Council, following a subdivision or land development activity. Council requires the submission of the relevant documents in paragraphs 1.8.1.1 (a) to (d).

Council may require in some instances that Engineering Producer Statements PS1s to PS4s are submitted in addition to the documents listed in paragraph 1.8.1.1 (d) (Schedule 1A)[1].

When the application satisfies the requirements, the plans will then be digitally stamped, and distributed to the applicant, inspection team, and Council's files.

A package will be prepared by WDC, comprising the approved plans, check sheets, examples of Asset Valuation forms, a countersigned Ownership Transfer Agreement, and any other relevant information. The package will be released to the applicant, on payment of the appropriate fees.

Construction work may proceed on release of the approval package. No work may be undertaken prior to Engineering Approval.

CLAUSE 1.8.3.3 LIFESTYLE COSTING

Where a developer proposes to use "alternative" solutions evidence that the proposed solution provides the least whole of life cost option for Council owned assets shall be provided with the design documentation. The discount rate shall be 10%, over a 100-year life cycle.

CLAUSE 1.8.4 APPROVAL OF DESIGN

Add to the existing paragraph 1.8.4.1:

In order to expedite the commencement of works, design approval in principle may be applied for prior to the granting of the resource consent (agreement in principle does not mean that works can commence). However, design approval will not be given until after a resource consent is granted.

CLAUSE 1.8.6 SUPERVISION OF CONSTRUCTION

The Council may require a completion certificate using Producer Statements (e.g. PS3 and PS4) in addition to Schedules 1B and 1C[1].

The Developer shall appoint a Design Co-ordinator, who shall be responsible for satisfying all engineering standards in respect of a development design and obtaining any resource consent and any plan approval. Where compliance with the district plan standards are uncertain, a request may be made to the Council for a Certificate of Compliance under Resource Management Act (section 139).

The Construction Co-ordinator shall be responsible for satisfying all engineering standards pertaining to construction of the work including compliance with the conditions of any resource consent and the conditions pertaining to any planning approval.

All construction shall be carried out in accordance with the approved design, specification and the requirements of this CoP and any approved variations.

1.8.6.1 CONSTRUCTION MONITORING (ADDITIONAL SUBSECTION TO NZS 4404: 2010).

Construction shall be carried out in accordance with the approved design specification and the requirements of this Code (and any approved variation).

Adequate construction monitoring shall be implemented, in order to provide verification by personnel independent of the construction contractor, that the construction has been carried out in accordance with the approved design and the design intent.

The function of construction monitoring is to provide, an independent assessment of the compliance of the construction with the design intent to a level appropriate to the nature of the project, and to ensure that all conditions of any relevant resource consent are complied with.

Construction monitoring shall be undertaken by a suitably experienced and qualified person, independent of the contractor building the project. Sufficient construction monitoring shall be undertaken to enable the Construction Co-ordinator to:

a. Maintain a knowledge of the status of the project at any time during construction
b. Be assured that construction standards are satisfying the design standards and intent, and are compliant with the Council's requirements.
c. Ensure that construction methods are appropriate to the size, importance and complexity of the project and to the potential adverse environmental effects of the works.
d. Ensure that adequate construction monitoring and testing is carried out with the results clearly recorded such that achievement of the design specification can be determined.

ADDITIONAL CLAUSE 1.8.6.2 COUNCIL INSPECTIONS

The Council requires access to inspect reticulated wastewater systems, stormwater and water supply utilities together with road works and reserves areas at certain stages during construction and on completion. The times at which Council requires access to inspect or test infrastructure are detailed in Appendix B2.

The developer/developer's agent shall ensure the Contractor is aware of such inspection requirements. The developer/developer's agent shall ensure the Council is given at least one working days' notice for each separate inspection. Time of notice to exclude public holidays, Saturdays and Sundays.

Covering over of pipes shall not be carried out until relevant inspection or testing has been completed and the work approved by Council.

[1] ***Schedules 1A to 1C – Certificates*** *The Certificates covering design and construction in NZS 4404:2010 shall be used for all subdivision or land development works. In cases where design or construction certification is required for all or parts of works requiring a Building Consent, recognised producer statements shall be used.*

Re-inspections are required until all work is approved.

CLAUSE 1.8.9 MAINTENANCE

Replace the existing clause with the following.

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

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

CLAUSE 1.9 BONDS AND CHARGES

A cash deposit of a bond will be required to cover any construction defects that become apparent during the 12-month period following issuing of the Completion Certificate. The value of the bond will be as described in the following section.

CLAUSE 1.9.1 UNCOMPLETED WORKS BONDS

The amount of any bond under paragraph 1.9.1.3 is 150% of the estimated and agreed value of the uncompleted work.

ADDITIONAL CLAUSE 1.9.2 CONSTRUCTION DEFECTS BONDS

The developer shall be responsible for the complete maintenance of the engineering works until such time as the Council has been advised that the survey plan has been deposited.

The Developer shall be responsible, in perpetuity, for any defects as a direct result of faulty and/or substandard workmanship.

A cash deposit or bond will be required to cover any defects that are identified within the maintenance period, and shall equate to 50% of the total retention. The cash deposit or bond shall be to the value of (in respect of the value of the Contract Works): 5% of the first $200,000 plus 2.5% of the next $800,000 plus 0.875% of any amount in excess of $1,000,000 as prescribed by NZS 3910, Schedule 1, cl 12.3.1.

The bond will be released at the end of the 12-month maintenance period, subject to any defects having been repaired to the satisfaction of Council.

CLAUSE 1.10 EMERGENCY WORKS

If during the course of the development, any situation arises associated with the development whereby, in the opinion of the Council, public safety, the security of public or private property, or the operation of any public facility or ecological site is endangered, the developer shall immediately carry out such remedial measures as the Council requires removing the danger. Any work so required shall be at the expense of the developer. If such emergency works are not immediately carried out, the Council will be entitled to arrange for the necessary remedial work to be carried out and charge the developer the cost for carrying out the works.

CLAUSE 1.11 FINAL VALUATIONS FOR THE COUNCIL´S ASSET REGISTER

An itemised schedule of quantities and costs shall be provided for those services and assets which are to vest in the Council.

Where the work has been built by an “arm’s length” contractor (i.e. not by developers own staff) the work Schedule of Prices, modified to represent the work as built and complete with the market unit rates, will be considered a current market valuation.

Where the work has not been undertaken by an arm’s length contractor (i.e. by own staff) the valuation shall be provided by a suitably qualified person in the form of a Schedule of Works as built, priced at current commercial market rates as assessed by the suitably qualified person.

The Schedule shall take the following form:

Item Description	Unit	Quantity	Rate *$/Unit*	Amount *$*

ALTERATION TO SCHEDULE 1D - AS-BUILT PLANS

Council will require that as built drawings are submitted with the information required for Compliance. These will need to be submitted by a suitably qualified person.

- “As built” drawings of all engineering works will be drawn as required in clause 1.8.2 of NZS 4404:2010 and meet the requirements as set out in clause 1.8.10 and Schedule 1D of NZS 4404:2010.
- Each drawing will be clearly stamped as ‘as built’ and signed by the appropriately qualified person so certifying the same. Council will retain a copy of all “as built” drawings. If Computer Aided Drawing (“AutoCAD”) has been used, A1 paper “as built” copies and computer file copy will be supplied in all cases. The computer file must be compatible with council’s systems. Developers should confirm with council the software

compatibility before supplying the computer file copy.

- RAMM data shall be provided for all public roads or roading assets to be vested in Council.
- AssetFinda data shall be provided for all 3-Waters or community services assets to be vested to Council.
- Survey control and locations for “As-Builts” will be based on co-ordinated data (x, y and z) from permanent control points, in accordance with LINZ datum. All locations will be dimensioned and shown on the plans.

  The tolerances shall be:
  - Horizontal ± 10mm
  - Vertical ± 10mm

SECTION 2 - EARTHWORKS AND GEOTECHNICAL ENGINEERING

2.1 GENERAL REQUIREMENTS AND OBJECTIVES

All development throughout the Wairoa District shall comply with Section 2, Earthworks and Geotechnical Requirements of NZS4404:2010, whether using the Minimum Engineering Requirements or the Design Guide approaches, except as modified by Section 2.2 to 2.3 or Schedule B below.

Geotechnical appraisal and design may be required:

- Prior to detailed planning, which usually involves some form of subsurface investigation and consideration of historic behaviour;
- During the review of design concepts;
- During construction to ensure the adequacy of bulk filling and the execution of the earthworks design; and
- Following construction, to provide certification and/or define limitations of the works.

Because of the wide range of soil types, physical conditions, erosion potential and environmental factors experienced in the Wairoa District, it is not possible to set precise requirements which will be applicable in all cases. The criteria set out in this section are therefore intended as minimum standards only. Any divergence from this chapter shall be at the discretion of Wairoa District Council approval. It is expected that if a Subdivision or Land Development involves earthworks, that the advice of a suitably qualified and experienced professional will be obtained.

2.2 PERFORMANCE CRITERIA

✓	Meet the relevant standards and criteria of the District Plan (unless dispensation has been approved by a resource consent)
✓	Be safe and stable and geotechnically sound during and after construction, and for the life of intended structures
✓	Not unnecessarily alter the natural landform or interfere with natural features
✓	Provide stable locations and foundations for roads, berms and drainage paths, pedestrian and cycleway access, overhead and underground services
✓	Provide an accessible and stable building platform within each lot of a subdivision appropriate to the zoning of the land and in accordance with the requirements of the Building Act 2004
✓	Control surface and ground water flows and sediment movement both during and after construction
✓	Not cause undue nuisance from silt, dust, noise or disposal of vegetation
✓	Apply erosion and sediment controls where appropriate consistent with the Hawkes Bay Regional Council Hawkes Bay Waterway Guidelines: Erosion and Sediment Control 2009
✓	Be able to be reinstated and planted in a manner that is consistent with the zoning and consent conditions

THE WAIROA DISTRICT COUNCIL HAS ADOPTED PART 2 OF THE NZS4404:2010

THE OVERALL SITE, INCLUDING EARTHWORKS PROPOSED AS PART OF THE DEVELOPMENT SHALL MEET KEY CRITERIA

2.3 ARCHAEOLOGICAL AND CULTURAL SITES

Prior to undertaking land development, Wairoa District Council's Māori Relationship Manager should be consulted. The Relationship Manager is a well-placed resource who is able to advise on archaeological and cultural sites within the district and the current contacts details of iwi representatives.

Should an archaeological site, wāhi tapu or other cultural site be unearthed during earthworks the contractor and/or owner must:

a. Cease operations;

b. Engage Council's Māori Relationship Manager;

c. Inform local iwi/hapū

d. Inform Heritage New Zealand Pouhere Taonga and apply for an appropriate authority if required; and

e. Take appropriate action, after discussion with the NZHPT, the Council and iwi to remedy damage and/or restore the site.

Where an archaeological site is present (or uncovered), an authority from the Heritage New Zealand Pouhere Taonga is required if the site is to be modified in any way, in accordance with the Heritage New Zealand Pouhere Taonga Act 2014.

The Heritage New Zealand Pouhere Taonga Act 2014 contains penalties for unauthorised site damage. Evidence of archaeological sites may include burnt and fire cracked stones, charcoal, rubbish heaps including shell, bone and/or glass and crockery ditches, banks, pits, old building foundations, artefacts of Māori and European origin or koiwi/human burials.

SCHEDULE B

WAIROA DISTRICT COUNCIL ALTERED REQUIREMENTS TO SECTION 2 NZS 4404:2010 - EARTHWORKS AND GEOTECHNICAL

The Wairoa District Council has adopted Section 2 of NZS 4404:2010 with the following additions and/or alterations to be used in conjunction with NZS 4404:2010.

STANDARDS AND CODES

Any development that involves significant earthworks may, on the advice of the geotechnical engineer require reference be made to the following recommended publications including revisions and new versions:

- NZS 4431:1989 Code of Practice for Earth Fill for Residential Development
- NZS 3604:2011 Timber-Framed Buildings (Part 3 – Site Requirements and 4 – Durability in Particular)
- NZS 4229:2013 Concrete Masonry Buildings Not Requiring Specific Engineering Design (Parts 3 – Site Requirements and 4 – Bracing Demand in Particular)
- NZS 4402:1986 Methods of testing Soils for Civil Engineering Purposes – Soil Tests, Parts 1 – Preliminary and General & 2 – Soil Classification Tests
- The New Zealand Building, in Particular Section B1 and Section E1
- AS/NZS 1170.2:2011 Structural Design Actions Part 2: Wind Actions
- NZS 1170.5:2004 Structural Design Actions Part 5: Earthquake actions
- MBIE - NZGS Earthquake Geotechnical Engineering Modules 1- 6
- MBIE – Planning and engineering guidance for potentially liquefaction- prone land

CLAUSE 2.1 SCOPE

In addition to the scope described in this section of NZS 4404:2010, Council would expect that a geotechnical assessment would be required in support of a Land Development or Subdivision proposal when a particular project involves any of the following (this is a guide only and not an exhaustive list):

EARTHWORKS - GENERAL

- Total earthworks volume (cut plus fill) > 100m^3, in-situ measure
- Earthworks within hazard zones as identified by the Hawkes Bay Hazard Portal
- Earthworks that significantly alter surface or subsurface drainage patterns

EXCAVATION

- Excavations greater than 2.5 metres overall vertical extent
- Excavations steeper than 2.5 Horizontal to 1 Vertical (22o)
- Excavations on, or within ten metres of, existing slopes higher than 5 metres overall vertical extent
- Excavations below the ground water table
- Excavations the top of which are within 10 metres of buildings or surcharge loads

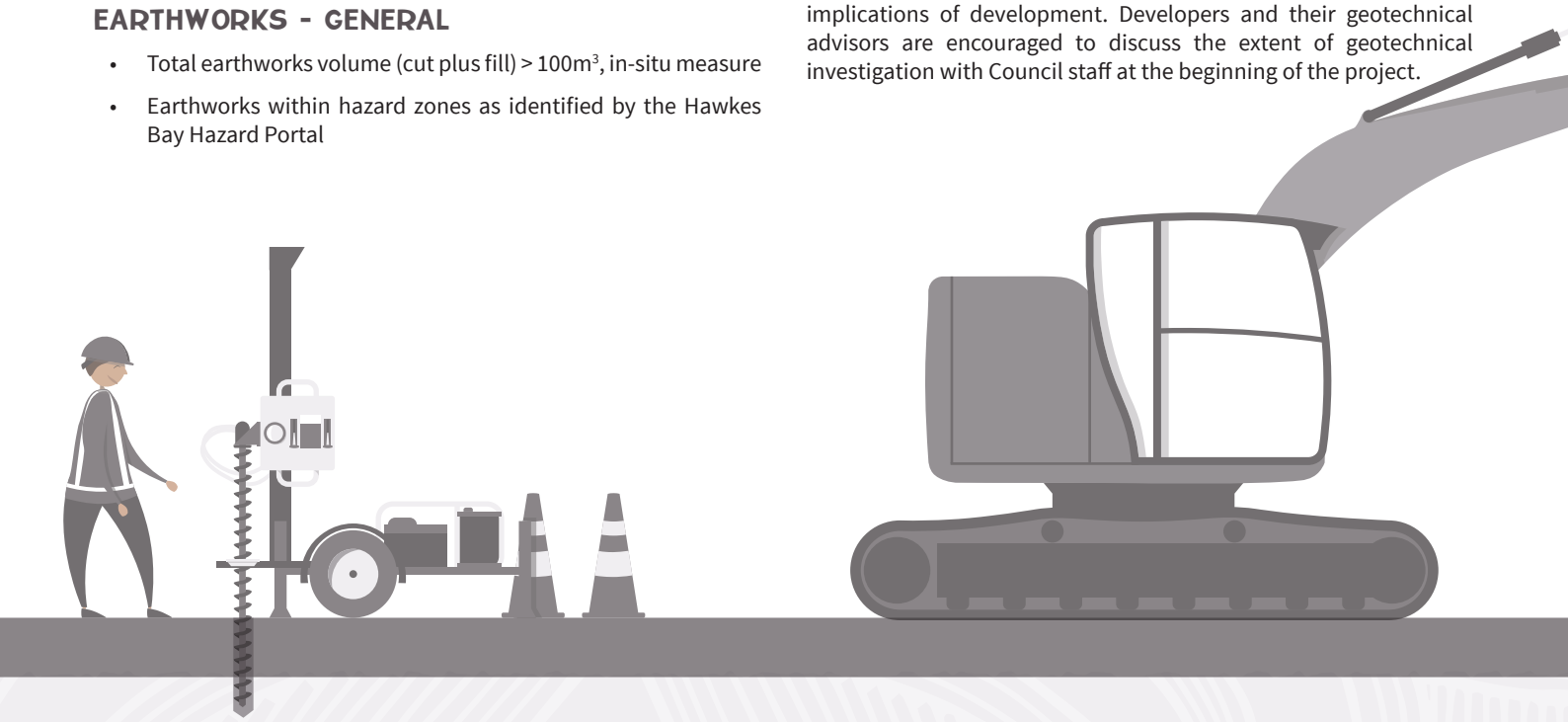
FILL

- Building platforms or roads on fill or made ground
- Fills on existing ground sloping steeper than 3.5H:1V (16 o)
- Fills constructed on, or within a zone extending above an angle of 3 Horizontal to 1 Vertical (18o) from, the toe of a slope or river bank
- Fills within 10 metres of a building or the base of a slope
- Fills with a maximum depth greater than 1.5 metres
- Fills with batter slopes steeper than
    a) 2H:1V (26o) in sand and gravel
    b) 3H:1V (18o) in silt and clay

RETAINING STRUCTURES

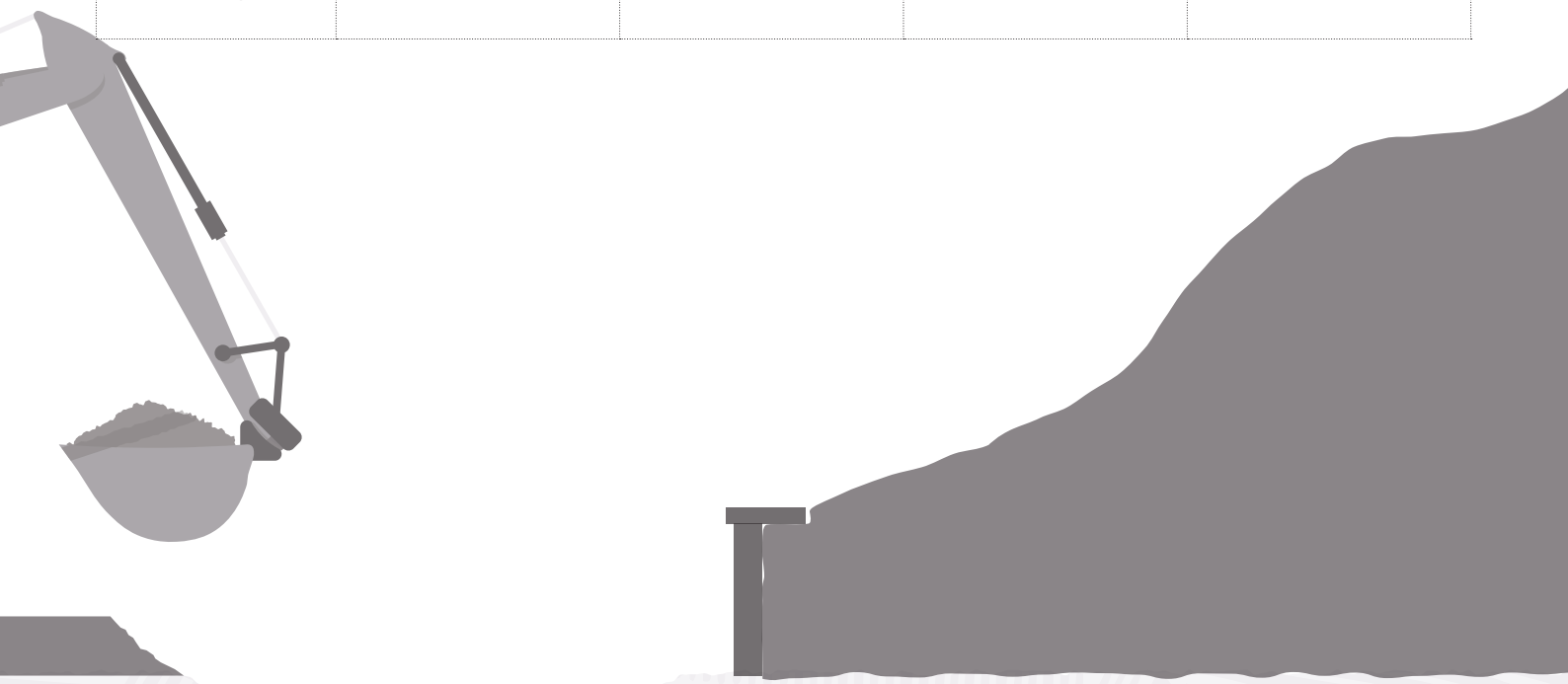
- Retaining walls higher than 1.5 metres overall vertical extent
- Retaining walls with sloping backfill
- Retaining walls with surcharge loading within three metres of top of wall

Table 1 on the right gives guidance on the extent of geotechnical investigation required based on the risk of instability, and the evidence on the site, the consequences of instability, and the implications of development. Developers and their geotechnical advisors are encouraged to discuss the extent of geotechnical investigation with Council staff at the beginning of the project.



Risk Classification for Sites Subject to Instability

Risk of Instability	Evidence / Type of Instability	Consequence of Instability	Implications for Development	Minimum Extent of Investigation Required
	Evidence of active or past instability – landslip or rock face failure; extensive instability may occur within site or beyond site boundaries.	High risk of loss of life. Catastrophic or extensive significant damage or economic loss.	Unsuitable for development unless major geotechnical work can satisfactorily improve the stability. Risk after development may be higher than normally accepted (includes Building Act Section 36(2)).	Extensive geotechnical investigation required.
	Evidence of active creep, potentially progressive/ regressive/minor slips or minor rock face instability; significant instability may occur during and after extreme climatic conditions and may extend beyond site boundaries.	Low risk of loss of life. Significant damage or economic loss.	Development restrictions and/or geotechnical works required. Risk after development may be higher than normally accepted (may include Section 36(2)).	Engineering geological assessment with drilling investigation required.
	Evidence of possible soil creep or a steep soil covered slope; significant instability can be expected if the development does not have due regard for the site conditions.	Virtually nil risk of loss of life. Moderate damage and economic loss.	Development restrictions may be required. Engineering practices suitable to hillside construction necessary. Risk after development generally no higher than normally accepted.	Visual assessment. Hand and possible drill investigation methods.
	No evidence of instability observed; instability not expected unless major site changes occur.	Minor damage, limited to site unless major development occurs.	Good engineering practices suitable for hillside construction required. Risk after development normally acceptable.	Visual assessment. Possible hand investigation method.
	Typically shallow soil cover with flat to gently sloping topography.	Virtually nil. Low importance structures.	Good engineering practices should be followed.	Visual assessment.



CLAUSE 2.2.4: GEOTECHNICAL REQUIREMENTS

- Function (b) will be reported on in a Preliminary Geotechnical Assessment which will need to be submitted with the Resource Consent Applications.
- Functions (c) and (d) will be reported on in a Comprehensive Geotechnical Assessment which will need to be submitted in support of any consent conditions and as a normal part of the documentation of the design process.
- Functions (d) to (g) will be reported on in a Geotechnical Completion Report, as discussed in Section 2.6.1 of NZS 4404:2010, which will need to be submitted with the application for the 224 Certificate.

CLAUSE 2.6.2 - AS BUILT DRAWINGS FOR EARTHWORKS AND SUB SOIL DRAINS

Refer to Section 1- General Requirements and Procedures of this document.

3.1 GENERAL REQUIREMENTS AND OBJECTIVES

Development shall comply with Section 3, Roads, of NZS 4404:2010, whether using the Minimum Engineering Requirements or the Design Guide approaches except as modified by Section 3.2 to 3.4 and Schedule C below.

The Council's transportation objective is to plan, provide and maintain an efficient transportation network appropriate to the agreed level of use that will ensure the safe and orderly passage of all road users (including public transport, cyclists and pedestrians) throughout the Wairoa District. This will be achieved by;

- Planning and implementing a balanced transportation network, including roads, cycleways and footpaths with adequate opportunity for future growth, that supports the wellbeing and economic development of the District; and
- Require the developer to ensure any development results in nil detriment to the transportation network as a direct consequence of the development. The costs thereof can be fully or partially borne by the developer depending on the circumstance.

Throughout this chapter, any rules in the District Plan take precedence over the engineering standards, except where resource consent has provided dispensation for the non-compliance with the relevant rule.

3.2 PERFORMANCE CRITERIA

✓	Meet the relevant standards and criteria in the District Plan (unless dispensation has been approved by a resource consent)
✓	Be appropriate for the relevant position in the published Waka Kotahi One Network Framework (ONF) road hierarchy
✓	Provide safe and sustainable transport systems, compatible with the surrounding environment;
✓	Provide effective and sustainable linkages and connectivity
✓	Be fit for purpose, and generally allow for the least "whole of life" cost in respect to structures, pavements and amenities
✓	Provide adequately for stormwater management, landscaping and other utility services
✓	Minimise the adverse effects of noise, runoff and contaminants in a manner compatible with the surrounding environment and the character of the neighbourhood
✓	Provide all Lots in the land development or subdivision with safe, sustainable and stable road access prior to requesting Section 224 approval

DEVELOPMENT SHALL COMPLY WITH SECTION 3, ROADS, OF NZS 4404:2010

THE LAYOUT, STRUCTURE AND PERFORMANCE OF THE TRANSPORTATION NETWORK AND THE ASSOCIATED AMENITIES SHALL MEET KEY CRITERIA

3.3 ROADING HIERARCHY

A road hierarchy is an essential component in the management of the District's Roading Asset. The Wairoa District Council has adopted the ONF road hierarchy. The ONF divides New Zealand's roads into six categories based on how busy they are, whether they connect to important destinations, or are the only route available.

3.4 CONSTRUCTION

Construction of all transportation systems shall be undertaken in accordance with the requirements of Section 3, Roads of NZS 4404:2010, except as modified Table 2 below and Schedule C unless otherwise approved by Council.

SCHEDULE C

WAIROA DISTRICT COUNCIL ALTERED REQUIREMENTS TO SECTION 3 NZS 4404:2010 - ROADS

The Wairoa District Council has adopted Section 3 of NZS 4404:2010 with the following additions and/or alterations to be used in conjunction with NZS 4404:2010 due to the Council's adoption of the One Network Road Classification (ONF).

CLAUSE 3.3.1 DESIGN REQUIREMENTS

Table 3.2 of NZS4404:2010 sets out the minimum road design standards. These standards shall be adopted except as modified by Table 2 on the following pages. The following additional text shall also apply.

Place Context		General Classification Hierarchy (not updated for ONF)	Traffic Volume (Max vpd)	Design Environment				Link Context			
Area	Land Use			Locality Served (du = dwelling units)	Target operating speed (km/h)	Minimum road reserve width (m)	Max grade	Pedestrians	Passing, parking, loading & shoulder	Cyclists	Minimum total movement lane (m) (excluding shoulder)
Urban	Live & Play (Residential & Home Occupation)	Access	100vpd	1 – 10 du (public) or 1-6 du (private)	10	4.5	20%	Shared (in movement lane)	Allow for passing every 50m	Shared (in movement lane)	3.5
		Access	200vpd	Side or rear service access, up to 100m in length (1-20 lots)	10	6	12.5%	Shared (in movement lane)	Shared parking in the movement lane	Shared (in movement lane)	2 x 2.75
		Access	200vpd	1 – 20 du	20	12	16%	1.4m footpath each side	Shared parking in the movement lane	Shared (in movement lane)	2 x 2.75
		Access	2000vpd	1 -200 du	40	15	12.5%	1.4m footpath one side or 1.4m each side where more than 20 du or more than 100m in length	Separate parking in addition to movement lane	Shared path with pedestrians where possible	2 x 2.75 plus parking
		Collector/ Arterial	8000vpd	All other activities in this locality not specified in this table	40	20	10%	1.4m wide footpath each side	Parking, bus stops, turning in addition to movement lane	Preferably segregated or painted on-road cycle lanes	2 x 3m plus parking, bus stops, turning
	Shop and Trade (Commercial and Industrial	Access	200vpd	Side or rear service access(1 – 20 lots)	10	6	12.5%	Shared (in movement lane) allow for passing every 50m	Loading bays in addition to movement lane	Shared (in movement lane)	2.75 plus loading bays
		Access	200vpd	1 – 20 lots	10	15	10%	1.5m wide footpath one side or 1.5m each side	Parking in addition to movement lane	Shared (in movement lane)	2 x 2.75 plus parking
		Access	2000vpd	1 – 200 lots	30	20	10%	3m wide footpath each side	Parking and loading bays in addition to movement lane	Shared (in movement lane)	2 x 2.75 plus parking and loading
	Work and Learn	Access	200vpd	Side or rear service access (1 – 20 lots)	10	6	12.5%	Shared (in movement lane)	Loading bays in addition to movement lane	Shared (in movement lane)	2 x 2.75 plus loading bays
		Access	200vpd	1 – 20 lots	10	15	10%	1.5m wide footpath one side where more than 100m in length	Parking in addition to movement lane	Shared (in movement lane)	2 x 2.75 plus parking
		local	2000vpd	1 – 200 lots	30	20	10%	1.5m wide footpath each side	Parking and Loading bays in addition to movement lane	Shared (in movement lane)	2 x 2.75 plus parking and loading
	Mixed Use	Access	2000vpd	1 – 200 lots	30	20	10%	1.5m wide footpath each side	Parking in addition to movement lane	Shared (in movement lane)	2 x 2.75 plus parking
		Collector / Arterial	8000vpd	Neighbourhood centre, 200 – 800 lots	50	20	10%	2m wide footpath each side	Parking, bus stops , turning in addition to movement lane	Shared on footpath or in movement lane	2 x 3.5 Plus parking, bus stops and turning

Place Context		General Classification Hierarchy (not updated for ONF)	Traffic Volume (Max vpd)	Design Environment				Link Context			
Area	Land Use			Locality Served (du = dwelling units)	Target operating speed (km/h)	Minimum road reserve width (m)	Max grade	Pedestrians	Passing, parking, loading & shoulder	Cyclists	Minimum total movement lane (m) (excluding shoulder)
Centre	Mixed Used	Access	200vpd	Side or rear service access 1 – 20 lots	10	6	10%	Shared (in movement lane)	Loading bays (shared in movement lane)	Shared (in movement lane)	5
		Access	200vpd	1 – 20	20	15	10%	2 x 2.5m wide footpaths	Parking in addition to movement lane	Shared (in movement lane)	2 x 2.5 Plus parking
		Access	2000vpd	1 – 200 lots	30	20	10%	3m wide footpath each side	Parking in addition to movement lane	Shared in movement lane	2 x 3.5 Plus parking
		Collector/ Arterial	8000vpd	Urban Street. 200 -800 lots	40	20	10%	3-3.5m wide footpath each side	Parking in addition to movement lane	Shared on footpath or in movement lane	2 x 3.0 Plus parking
Rural	Live & Play (Residential & Home Occupation)	Access	100vpd	1 – 10 du (public) or 1 – 6 du (private)	20	6	20%	Shared (on shoulder & berm)	Allow for passing every 50m, total shoulder 0.5m shall be sealed)	Shared (in movement lane)	3
		Access	200vpd	1 – 20 du	30	9	16%	Shared (on shoulder & berm)	Total shoulder 0.5m, sealed	Shared (in movement lane)	2 x 2.75
		Collector/ Arterial	1000vpd	1 -150 du	70	15	12.5%	Shared (on shoulder & berm)	Total shoulder 1.0m, sealed shoulder 0.5m	Shared (in movement lane)	2 x 2.75
	Make and Move	Access	500vpd	Low level agricultural activity	Up to 100	20	10%	Shared (on shoulder & berm)	Total shoulder 1.0m	Shared (in movement lane)	2 x 2.75
		Collector	1000vpd	Medium level agricultural and forestry	Up to 100	20	10%	Shared (on shoulder & berm)	Total shoulder 1.0m, sealed shoulder 0.5m	Shared (in movement lane)	2 x 3.0
		Minor Arterial	2500vpd	Medium/ High level agricultural activity + medium through traffic	Up to 100	20	10%	Shared (on shoulder & berm)	Total shoulder 1.0m, sealed shoulder 1.5m	Preferred on Sealed shoulder	2 x 3.5
		Primary Collector/ Arterial	>2500vpd	High/medium level agricultural activity + high level through traffic	Up to 100	20	10%	Shared (on shoulder & berm)	Total shoulder 1.0m, sealed shoulder 1m	Preferred on Sealed shoulder	2 x 3.5

Notes

a) Where not shown in the table, cyclists shall be provided with separate movement lanes if identified in a local or regional cycle network.

b) Where pedestrians and cyclist share a footpath, the minimum width shall be 2.5m

c) Where 9.0m carriageway or less, parking lanes are not required to be road marked.

d) Deviation from these standards shall be subject to approval from the consent authority. Drawings for deviations shall be certified by a suitably qualified and experienced profession (please refer to Section 1.7)

e) Deviation from these standards may be required to be accompanied by a full safety audit process. Refer to Clause 3.3.2 regarding Road Safety Audits.

f) A movement lane may be reduced at intervals to provide for increased amenity and greening of the street and/ or traffic calming with approval from Wairoa District Council, provided that in note d) is met.

g) Any private road or lane serving greater than 10 sites shall be offered as public road to be vested by Council.

h) Link Context in Rural area will only apply where residential activities are located within 800m of the subject site.

Provision shall always be made for vehicles turning circles in the road design. On local roads access for emergency and commercial vehicles, e.g., refuse truck, and in particular fire service vehicles shall always be maintained.

CLAUSE 3.3.2 ROAD SAFETY AUDITS AND SAFE SYSTEM ASSESSMENTS

ROAD SAFETY AUDITS

Wairoa District Council, may, at its discretion, request that any traffic or roading project be subject to an independent Road Safety Audit (RSA). An RSA is merely a formal examination of a future road or traffic project or an existing road or road related area, in which an independent, qualified team reports on the project's crash potential and actual safety performance respectively.

Audits can be undertaken at various stages in the life cycle of a project or scheme – from feasibility to post construction.

The ultimate benefit of conducting an RSA ensuring the project reduces the exposure of road users to safety risks and where not possible to eliminate the risk, ensure that the likelihood and severity of the risk is reduced to an acceptable level.

It is important to recognise that even projects that have been to a specific standard does not necessarily mean that the road is safe or risk-free. This is because the safety outcome can be affected by several other factors depending on the location and operation of the road.

Additional information on the processes of an RSA is set out in Austroads Guide to Road Safety Part 6: Road Safety Audit (2022).

In the event the Council request for an RSA to be conducted, the cost is typically borne by the applicant and the audit completed by an independent party who was not involved in the design process.

LINK TO SAFE SYSTEM

Across New Zealand approaches to improving road safety continue to be guided by the principles of the Safe System, which forms part of New Zealand's road safety strategy to significantly reduce road trauma over the period 2020 to 2030.

The Safe System approach demands a holistic approach to the safety of the road system, with the aim of no person being killed or seriously injured on the road network. All elements of the road system, including safe roads, safe vehicles, safe road use and safe speeds are incorporated in the approach with responsibility required from road controlling authorities, governments and road users.

To ensure that Safe System elements are considered and measured, the Safe System Assessment Framework guides the user on how to assess how well a given project aligns with Safe System principles.

SAFE SYSTEM ASSESSMENT FRAMEWORK

Safe system Assessments (SSA) were developed as a practical took to consider and quantify the degree of 'alignment' of a project design with Safe System principals. The tool is in the form of an SSA Framework that uses a Safe system focused risk matrix to ensure a consistent consideration of any project with respect to key crash types and prompts an assessment of risk exposure, likelihood and severity.

It is important to note that despite their apparent similarities, a contemporary RSA under the Safe System and an SSA are not identical but can be complementary. Both processes have their place and are important components of a road safety network management system.

As with RSAs, it is strongly advised that SSAs should also be undertaken to a detailed brief and by an independent and suitably competent team.

STANDARD SAFETY INTERVENTION TOOLKIT

Reference is made to Waka Kotahi's Standard Safety Intervention (SSI) Toolkit published in September 2021, which not only outlines the Safe system approach, but also includes a raft of road safety intervention guidance for transport practitioners. The primary objective of the SSI toolkit is to provide examples of SSI and technical references. Often there is a suite of interventions that can be implemented to manage a particular risk, with some measures typically being more effective than others. The selection of treatment is categorised into 'Primary' and 'Supporting'.

Primary treatments are generally preferred and include Median barrier, roundabouts, raised safety platforms, Midblock raised pedestrian crossing, signalised intersections.

Supporting treatments include, roadside barriers, audio tactile pavement marking, shoulder widening, high friction skid resistance, signs and markings, and speed management.

Designers are therefore urged to refer to the SSI toolkit and to choose treatments that are in line with the Safe System approach when considering new road infrastructure. Similarly, the Council must be seen as promoting SSI treatments where appropriate.

CLAUSE 3.3.3 ROAD GEOMETRIC DESIGN

The table above shall be adopted instead of Table 3.2 in NZS 4404:2010.

CLAUSE 3.3.4 PAVEMENT STRUCTURAL DESIGN

The requirements set out in Clause 3.3.3 of NZS 4404:2010. will apply to all public and private road pavements presented with a development proposal, with the following additions:

- Pavement design shall be in accordance with the current published versions of the Austroads and Waka Kotahi: NZ Supplement. The latter can be downloaded from the Waka Kotahi website 🌐 www.nzta.govt.nz
- The minimum pavement design life is 25 years;
- Unsealed roads may be used subject to specific approval by Council;
- In situations where seal widening is required the extended pavement shall be designed as a new pavement.

DESIGN TRAFFIC LOADING

Pavement design requires the calculation of the design traffic loading for the 25-year minimum design life. The following guidelines are provided as a simplification to the process given in Austroads as being appropriate for Local Road conditions. Any subdivision involving Arterial and Collector roads will require the more rigorous approach given in Austroads.

- Design traffic loading is measured in terms of Equivalent Standard Axles (ESA).
- The data required in order to calculate the design traffic loading is:
  a) Annual Average Daily Traffic (AADT)(can be obtained from Mobile Road 🌐 www.mobileroad.org).
  b) Percentage of AADT that are Heavy Commercial Vehicles (HCVs)(also obtained from Mobile Roads).
  c) Average ESA/HCV. If this is not gathered from a commodity survey or adjoining Weigh in Motion (WiM) site, a minimum ESA/HCV of 1.5 shall be used for Local Roads, however this should be confirmed with WDC in all cases.

From this data the ESA/year for the first year of the pavement design life can be calculated.

- Design Traffic Loading

To calculate the design traffic load over the design life of the pavement the following formula should be used:

T = Total Traffic (ESA)

$$T = \frac{P((1+r)^n-1)}{\log_e(1+r)}$$

P = First year traffic (ESA/year)

n = Design life (years)

r = Growth rate (e.g. 1% per annum = 0.01)

The growth rate r required for Arterial and Collector roads should be selected from the Transit New Zealand, Project Evaluation Manual, or may be obtained from Council. For Local Roads a minimum growth factor of 1% shall be used. For cul-de-sacs a minimum growth factor of 0.5% shall be used.

The traffic load category for pavements are shown in the table below.

Traffic Loading		Traffic Category
Heavy Commercial Vehicles/Lane/Day	Design Traffic	
<100	< 5 x 105	Light
100 - 500	5 x 105 - 5 x 106	Medium
500 - 1000	5 x 106 - 2 x 107	Heavy

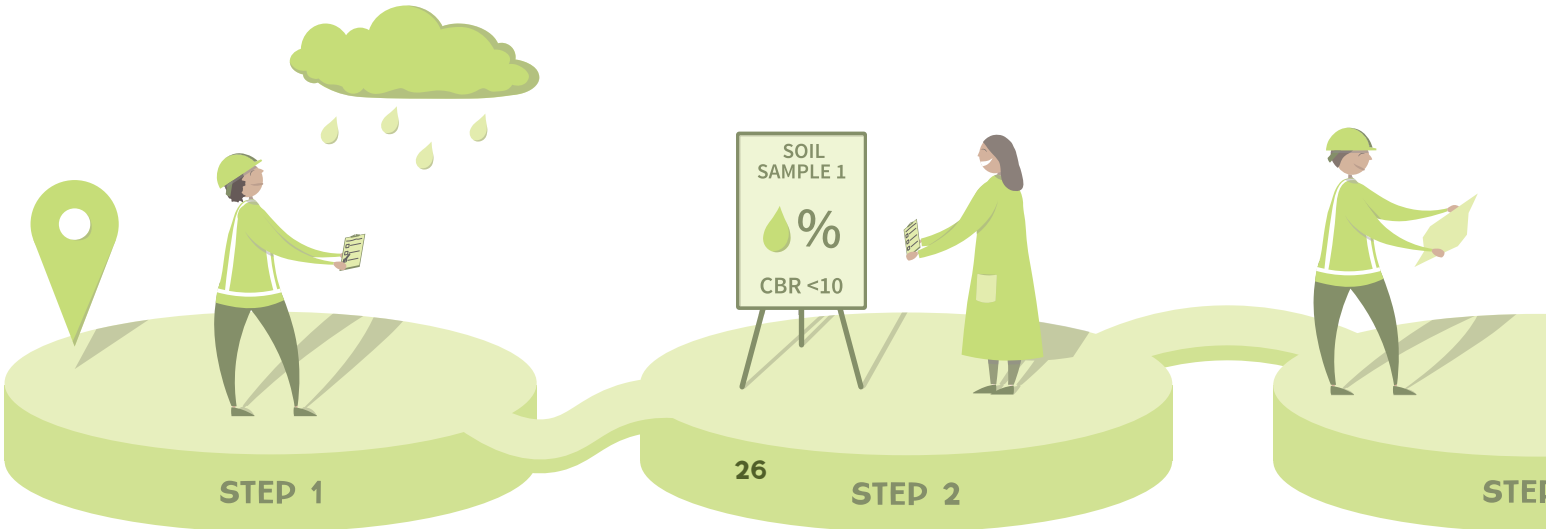
PAVEMENT DESIGN PROCEDURE

For all roads to be vested in Council, the designer must present comparisons of various pavement designs with respect to the following, to ensure that the best design option is being presented:

- Whole of life costing, taking into account construction, maintenance and rehabilitation costs, including possible salvage value of the pavements at the end of the design life;
- Constructability, including the availability of equipment especially material mixing, placing and compaction plant.

The structural design of a pavement also needs to take into account the surfacing treatment. For flexible pavements, surfacing treatments are considered to be thin surfaces and their purpose is to provide weather protection for the underlying pavement, and to improve the safety on the road by removing dust nuisance and providing adequate skid resistance.

The design of a road pavement shall involve the following steps:



STEP 1: ASSESSMENT OF LOCAL CONDITIONS

The assessment of local conditions, and how these could influence pavement design, construction and maintenance options, should include:

- Local geology and pavement subgrade conditions
- Climate (e.g. extreme dry or wet conditions)
- Drainage conditions (both surface and subsurface drainage)
- Topography
- Local environment, social and cultural considerations, e.g. adverse effects of traffic noise.

STEP 2: SUBGRADE EVALUATION

- The principal subgrade strength measurement for flexible pavement design is the California Bearing Ratio (CBR).
- Subgrade CBR can be determined using the laboratory testing methods described in NZS 4407 Methods of Sampling and Testing Road Aggregates Test 3.1.5, or in situ testing using devices such as a Scala penetrometer or Hand-Held Shear Vane, (refer Figure 3.1 in NZS4404:2010)
- The insitu tests should be used to give an indication of subgrade strength and variability over the site. The design CBR should be the 10th percentile value of CBR tested.
- Subgrade strength is highly dependent on the moisture content of the soil. Where subgrade soils are expected to be adversely affected by moisture over the life of the pavement, the subgrade strength should be based on laboratory based soaked CBR tests (NZS 4407:2015, Test 3.15).
- The use of lime or cement stabilisation methods to increase subgrade strength should be considered when the subgrade CBR is less than 10.
- The design of pavements using stabilised subgrades should incorporate subgrade improvement layer (SIL) sub layering as required by Austroads.
- Consideration should be given to the effect in-service conditions such as drainage improvement will have on subgrade CBR.

STEP 3: PAVEMENT LAYER THICKNESS DESIGN

- Once determined, the typical CBR value or values for the subgrade (based on representative pavement sections or lengths) can be used directly in the pavement design. In cases where the pavement is unbound, and incorporates a basecourse overlaying a subbase, Figure 8.4 in Austroads can be used.
- In cases where a stabilised subgrade or otherwise modified/bound pavement or surfacing layers are used, the design shall be based on mechanistic principles, and incorporate sub layering, as described in Austroads. Software packages such as CIRCLY can be used in these cases. Mechanistic design by an experienced professional will be required in this case.

STEP 4: MATERIALS SELECTION

The following material types should be considered.

- **Unbound subbase**. Materials such as river gravels and quarry metals can be considered. Care needs to be taken in the specification and use of such materials. Reference should be made to *Waka Kotahi M/3 Specification, Notes for Subbase 1983*.
- **Modified subbase**. Lime or cement stabilised material including subbase material can significantly improve pavement performance. If an increase in CBR of less than three-fold is achieved it is said to be "modified". Pavements using such material should be designed as unbound pavements.
- **Cemented subbase**. Lime or cement stabilised material that exhibits an increase in CBR of three-fold or greater are said to be "cemented". Mechanistic design by an experienced professional will be required in this case.
- **Other materials** such as geofabric or geogrid may be considered. Mechanistic design by an experienced professional will be required in this case.
- **Basecourse materials**. Well graded, crushed basecourse, generally meeting the *Waka Kotahi M/4, 2006, Table 4, Napier River Gravel specification* will be used, modified as shown below:
    - For light traffic (or low volume) pavements the Crushing Strength (Minimum Load (dry) for 10% fines (kN)) can be 110kN

STEP 5: COMPARISON OF DESIGNS

It is often an advantage to compare various pavement designs with respect to the following, to ensure that the best design option is being presented:

- construction costs
- construction under traffic
- available equipment especially material mixing, placing and compaction plant
- maintenance and rehabilitation costs
- salvage value of the pavements at the end of the design life.

TREATMENT SELECTION

Chip sealing is the most common surface treatment used on the District's roads and will be given preference where appropriate. The designers of pavements using chip seal surfacing for a new development shall design both coats of the seal. Reference should be made to the *Chipsealing In New Zealand (2005)* and *Chipsealing In New Zealand Practice Notes (April 2011)* of New Zealand Transport Agency when designing the seal surfacing.

- First coat sealing shall be designed to the current published versions of Waka Kotahi specifications (refer to 🌐 www.nzta.govt.nz):
- *M/01 (2011)*: Specification for Roading Bitumens
- *P/3 (1995)*: Specification for First Coat Sealing
- The sealing chips shall comply with Waka Kotahi specification *M/06 (2011): Specification for Sealing Chip*.
- The second coat seal shall be selected based on the first coat type, texture and other environmental factors. A second coat shall be applied within 12 months unless extraordinary circumstances require it sooner.

The designer of alternative surfacing treatments should utilise the following design advice:

- Asphaltic concrete surfacing shall be designed in accordance with the current published versions of Waka Kotahi specification M/10 (2014): Specification For Dense Graded And Stone Mastic Asphalts.
- As an alternative to AC a friction course (FC) can be used. The design shall be carried out as detailed in the current published version of Waka Kotahi specification P/11 (2007): Specification for Open Graded Porous Asphalt.
- The use of concrete block pavers as a surfacing treatment on roads can be considered particularly in traffic calming areas. Design of such surfaces shall comply with NZS 3116:2002 Concrete Segmental And Flagstone Paving, with specific note being made that collector and arterial roads are considered to be main roads for application of the standard. Cement and Concrete Association of New Zealand (1988): IB 67 Interlocking Concrete Block Road Pavements provides a guideline for the construction of paved roads. As an alternative to Concrete Pavers, kiln fired Clay Pavers may be used provided that appropriate design certification is provided.
- All pavements will require seal to be correctly applied to satisfy engineering conditions for S224 Certificate.
- For private pavements it will remain in perpetuity the (collective) responsibility of the owners of the pavement to ensure ongoing maintenance and the funding of any subsequent seals as and when required. If no Body Corporate or similar management arrangements for the common private property is provided, it is required that the responsibility for future maintenance is advised by way of an advice notice on each affected title.

CLAUSE 3.3.6: PARKING, PASSING AND LOADING

Council's requirements for off road parking are outlined in the District Plan, and in this section. The dimensions of car parks shall be as per NZS 4404:2010.

If a development proposal includes provision for on road car parking in association with mountable kerb and channel, then the designer shall ensure that all associated infrastructure (e.g. footpaths, kerb and channel, sumps and grassed berms) are able to safely and effectively carry the proposed traffic loads from parked cars (and commercial vehicles as required).

CLAUSE 3.3.7: INTERSECTION DESIGN

Section 3.3.7 of NZS 4404:2010 is largely adopted except for the following;

INTERSECTIONS AND ALIGNMENT DESIGN

Intersections at grade in both the urban and rural environment include tee, cross-road and staggered intersections.

The following references provides effective guidelines to be used in conjunction with this Code of Practice.

- Austroads Guide to Traffic Management Part 5: Link Management, April 2020;
- Austroads Guide to Traffic Management Part 6: Intersections, Interchanges and Crossings Management, April 2020
- Austroads Guide to Road Design Part 4: Intersections and Crossings, Feb 2021
- Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections, Feb 2021
- Waka Kotahi Traffic Control Devices Manual: Part 5 – Traffic Control Devices for General Use-between Intersections, June 2018
- Waka Kotahi Standard Safety Intervention Toolkit, September 2021

Particular attention shall be made of the following:

- The type of priority control needs careful consideration.

- The vehicle turning-path design shall be specific to each intersection. As a guide the minimum vehicle configuration to be catered for in most intersection design is a standard B-train, or 19m semi-trailer on main roads or industrial subdivisions.
- Through-lane widths at intersections may vary. The actual value will depend on the hierarchy of the intersecting roads. This will require specific design.
- Staggered intersections are preferable over cross-road intersections due to the reduced number of vehicle conflict points.
- Council has developed a preferred splitter island detail, as shown on the Drawings attached. Island alignment subject to specific design.
- Lighting, Signage and Roadmarking at intersections are discussed in Sections 6.11, 6.12 and 6.13 of this document.
- Flush medians can be used on main roads in particular. Refer to Traffic Control Devices Manual: Part 5, Section 2.4.3

ROUNDABOUTS

Roundabouts are the Council's preferred intersection treatment due to its improved safety performance over priority intersections. Roundabout should always be considered as one of the options during the feasibility stage.

Consideration should also be given to raised safety platforms, which align with a safe system approach.

Roundabouts shall be designed in accordance with Austroads Traffic Management and Road Design Guides (Part 4 and 4A).

The designer shall submit evidence supporting that the design will meet the requirements for capacity, safety and turning movements of intended vehicles.

Traffic modelling shall show that the design can mitigate the effects of traffic generation due to the development. Where applicable, consideration should be given for future network growth and development.

Mountable lips are appropriate for roundabouts in urban areas in particular. Council has a preferred roundabout detail which is shown in Drawing C34 and C35.

CLAUSE 3.3.8: NO EXIT ROADS

Council prefers designers to design out no exit roads to ensure positive connectivity; however it should be noted that in instances where this is practically unachievable the use of cul-de-sac turning heads will be required. This will also apply to low level roads and Right of Ways.

CLAUSE 3.3.11: FOOTPATHS, ACCESS WAYS, CYCLEWAY PATHS AND BERMS

Footpaths are required on most urban roads on either side of the carriageway (refer to Table 2). It will be the objective to create footpaths that do not deviate in crossfall or gradient especially through access crossings. In rural areas footpaths may be required for safety reasons. In areas where topography makes it impractical or where the road width is insufficient one footpath may be approved.

Concrete footpaths are preferred. The minimum acceptable width of the footpath is 1.4m, with the footpath desired to be separated from the kerb for the safety of pedestrians. The footpath shall not sit over the underground service corridor provided from the back edge of the boundary. Refer to Indicative Locations of Utility Services in Berms Drawing C6 for further details. Concrete shall comply with *NZS 3109:1997 Concrete Construction*, and shall have a minimum strength of 25 MPa at 28 days. All surfaces to have a broom finish.

Footpaths on local roads with vista control can be less than 1.4m wide and can be adjacent to the kerb in special approved circumstances.

Footpaths that are utilised as shared walkways/cycleways shall have a minimum width of 2.5m wide.

All footpaths and cycleways shall have a minimum basecourse of 100mm and when formed with concrete shall be a minimum of 100mm thickness.

The maintenance of grass berms will be undertaken by adjoining residents, however until occupancy occurs the maintenance of those berms will be the responsibility of the developer. A bond to cover the cost may be required.

In circumstances were mountable kerb and channel is installed, footpaths may need to support parked vehicles and therefore adequate provision of strength will be required.

Other surfacing materials (e.g. Asphaltic concrete or block paving) will be considered by Council provided specific design details are provided with the consent application, but the criteria and process in Section 1.7 must be followed.

Footpaths in commercial areas shall be the full width of the berm; that is from the kerb to the property boundary, unless specific features such as garden areas are approved by Council.

The longitudinal grade of the footpath should follow that of the carriageway. Where the footpath grade is steeper than 12.5 percent a special surface treatment may be required for safety reasons. On steep grades consideration shall be given to the use of steps and handrails. Specific attention needs to be paid to disabled persons access.

In this and other regards, footpaths shall be designed as detailed in the current published version of the following references:

- *NZS 4121:2001 Design for Access and Mobility: Buildings and Associated Facilities*
- *Austroads Traffic Management and Road Design Manuals*
- *The New Zealand Building Code*

Crossfall should be placed on the footpath surface towards the road (minimum crossfall 2%) sufficient to facilitate stormwater runoff to the street channel, while still preserving walking comfort.

Where due to the contour of the finished ground surface it is necessary to situate the footpath below the level of the road, adequate drainage must be provided, which includes provision for effective long term operation and maintenance.

When designing footpaths in high use areas, consideration shall be given to using tactile paving to assist vision-impaired people, in accordance with the reference below:

- *New Zealand Transport Agency (2015): Rts 14 - Guidelines for Facilities for Blind and Vision Impaired Pedestrians*

In all cases footpaths shall be designed to ensure there are good sightlines for drivers, cyclists and pedestrians, especially at intersections, driveways, desire lines and crossing points. At intersections a 1.4m x 1.4m pedestrian visibility splay is recommended, accompanied with low height fencing and vegetation so that vehicles can see pedestrians and cyclists.

PEDESTRIAN AND CYCLIST CROSSINGS

Mid-block raised pedestrian crossings are the Council's preferred treatment where appropriate. Raised crossings align with a safe system approach and is deemed a primary treatment. Raised crossing should only be provided on roads where the speed limit is 60km/h or less and on urban connector or activity streets.

CYCLISTS AND PEDESTRIAN TRAFFIC

Where provision needs to be made for cycle and pedestrian traffic, and in particular disabled pedestrian and mobility access, use shall be made of the current published versions for the following references when preparing the design detail:

- *Austroads Traffic Management and Road Design Manuals*
- *Cycling Aspects of Austroads Guides (2017 Edition)*
- *Land Transport NZ - Cycle Network and Route Planning Guide 2004 (Ltsa Guidelines)*
- *Waka Kotahi Pedestrian Planning and Design Guide (October 2009)*

CLAUSE 3.3.12: TRAFFIC SERVICES, SIGNAGE AND ROAD FURNITURE

For guidance on content of signs in the Wairoa District please refer to Councils Te Reo Māori Policy which incorporates the use of bilingual signs.

Drawings C10 to 17 provide details on acceptable design for traffic services, signage and road furniture.

Council places great emphasis on the standard of manufacture and maintenance of traffic signs, name signs, posts and fittings. The references, *Traffic Control Devices Manual (TCD Manual), Nz Transport Agency, 2008 and RSMA Compliance Standard for Traffic Signs, 2008 and WK P/24 Performance Based Specification for Traffic Signs* shall be used in this regard.

All traffic signs shall be designed and located in accordance with the current published version of the following references:

- *New Zealand Transport Agency (2010): Manual of Traffic Signs And Markings (MOTSAM), Part 1: Traffic Signs.*
- *Land Transport Rule 54002 - Traffic Control Devices 2004,* with subsequent amendments.

Corner signage is particularly important. Any variance from nationally recognised standard will need to be supported by a suitably qualified person.

Private access ways that have a number of residential properties can have street numbers associated with streets they access off and an appropriate street name blade, with numbers, erected at the entrance showing all the numbers.

All road marking and delineation treatments in both urban and rural areas shall be designed with regard to the current published version of the following standards, and the table on the right.

- *New Zealand Transport Agency (2010): Manual of Traffic Signs and Road Markings (MOTSAM), Part 2: Markings.*
- *New Zealand Transport Agency (2002): Rts 5, Guidelines for Rural Road Marking and Delineation.*
- *Land Transport Rule 54002 - Traffic Control Devices 2004* with subsequent amendments.

The table describes the link between road marking, delineation standards and the road hierarchy preferred within the District. The installation of road marking and delineation shall be in accordance with the current published version of the following:

- *WK P/12 (2000): Specification for Pavement Marking*
- *WK M/07 (2009): Specification for Road-Marking Paints*

Roading Hierarchy	Minimum Treatment Required				
	Centreline	Edge Lines	R R P M	Edge Marker Posts	Intersection Marking (3)
Urban					
Local Roads Carriageway Width					
<6m	No (note 1)	No	No	No	Yes
8m	Yes	No	No	No	Yes
10m	Yes	No	No	No	Yes
12m	Yes	Yes	No	No	Yes
Principal and Arterial	Yes	Yes	Yes	No	Yes
Rural					
Local Road	No	No	No	No	Yes
Collector (note 4)	Yes	Yes	Yes	Yes	Yes
Arterial (note 4)	Yes	Yes	Yes	Yes	Yes

Notes

a) On some narrow carriageways, a centreline will be required, following consultation with Council.

b) On narrow rural roads (£6m traffic width) isolated centrelines may be necessary on corners and intersections for safety reasons.

c) In all cases, standards for Intersection Marking will be checked with Council.

d) If the carriageway width is £6m, local road delineation standards apply.

Where sections of new or improved road have been reconstructed to a greater width than the adjacent lengths, edge lines must be smoothly transitioned between the different widths.

Over wide seals can occur where sections of roads, usually locals or collectors, are rehabilitated and upgraded. Some have been sealed out to include the water tables to deal with scour, but with others it is the discontinuity of building a standard width of seal within a substandard length of road. Where sections of road have been upgraded and made significantly wider than the adjacent pavement, they must be marked to the correct standard for their classification.

CLAUSE 3.3.14: ROAD LIGHTING

This lighting is provided for traffic safety and public amenity value only. It is not intended that roadway lighting is provided for security purposes, although there will obviously be some mutual benefit.

The reference document *AS/NZS 1158 Lighting for roads and public spaces Set*, is the guideline preferred by Council for the design of roadway lighting. As a general philosophy the following aspects need to be considered:

- Street lighting shall be LED only.
- Lighting should be selected to have a high illuminating efficiency and to provide no more illumination than is necessary for safety. Lighting should be located to minimise light shining upon residential windows, or into the eyes of drivers, pedestrians or cyclists.
- The role of the lighting in relation to the roading hierarchy is a factor in determining the standard of lighting required.
- Lighting design needs to take into account the maintenance requirements of lights when in service. Council will not approve for use on District Roads lighting components which do not have a proven and certified maintenance performance history, or which are made from inappropriate materials. Particular attention needs to be taken of the sensitivity of lighting components to UV damage.
- Luminaries shall be provided that have at least a minimum ten years manufacturer's guarantee and shall be on the Waka Kotahi *M/30 (2014): Specification and Guidelines For Road Lighting Design* approved list.

URBAN ROADWAY LIGHTING DESIGN

The lighting of urban roads should be designed to provide safety for vehicles, cyclists and pedestrians using NZS 1158 parts 1.1 and 1.3 for vehicular traffic. Lighting for other areas such as local roads, walkways, separate cycleway, car parks and access ways in public areas will require specific design to AS/NZS 1158 Lighting for Roads and Public Spaces Set, Part 3.1 – Pedestrian area (Category P) lighting – Performance and design requirements.

RURAL ROADWAY LIGHTING DESIGN

Lighting on rural roads is provided for vehicle safety in hazardous areas such as intersections in or particular locations, such as marae, community halls etc where concentrated vehicle movements can be expected. Lighting in these situations should be discussed with Council. With new roads intersecting with a Rural Arterial or Collector road, a single Flag Light will not be sufficient lighting at an intersection. In this case one light on the opposite side of the main road, and one on the side road will be required.

CLAUSE 3.3.16: PRIVATE WAYS, PRIVATE ROADS, AND OTHER PRIVATE ACCESSES

Shared private access shall be suitable for the intended use, including the provision of emergency vehicle access. Shared private access in the urban environment including but not limited to private roads, access ways, and access legs shall be sealed (unless stipulated otherwise by the District Plan).

The shared private access shall be constructed prior to undertaking the activity i.e. prior to Section 224 approval for subdivision and prior to occupation of the dwelling for a building consent.

The *Minimum Road Design Standards* table on page 22 sets the minimum widths for private access.

CLAUSE 3.3.17 VEHICLE CROSSINGS

Vehicle crossings are to provide appropriate and safe standards of vehicular access to and egress from each property, whilst preserving the integrity of the roads, footpaths, drains and other facilities that may be affected by the crossing.

Refer to drawings C19, C24, C26 and C28 for vehicle crossing standards.

Vehicle crossings shall be located so that:

a. Adequate distance is maintained from road intersections

b. Adequate pedestrian refuge is provided between crossings

c. Safe sight distance is provided for the prevailing speed environment

d. Minimum geometric standards are met

e. Adequate width is available to safely accommodate the expected volume and type vehicles

f. They are limited in width having regard for pedestrian safety and to conserve on-road parking

All vehicle crossings shall be designed and constructed to:

a. Be of suitable width to safely accommodate the expected volume and type of vehicles but limit width having regard for pedestrian safety and to conserve on-road parking.

b. Withstand the expected traffic loadings

c. Comply with the specified standards relating to surfacing type and vehicle types.

d. Prevent discharge of loose aggregate or other detritus onto road surfaces or into drainage facilities

e. Have a design drainage capacity to ensure that any restriction to the road or land drainage system is minimised.

Subject to any special restrictions imposed on limited access highways, access to land fronting onto State Highways is controlled by this ECoP. However, the location, design and construction of new or relocated vehicle crossings and new road intersections on State Highways is controlled by Waka Kotahi New Zealand Transport Agency, or its successors.

CLAUSE 3.3.17.1: URBAN CROSSINGS

All crossings shall be constructed (or upgraded) prior to undertaking the proposed activity on site. For example, vehicle crossings shall be installed prior to requesting Section 224 approval as part of a subdivision development, or prior to occupation of a building as part of building consent. In some instances Council may grant dispensation as part of a subdivision consent decision. Dispensation might be provided when:

- There is more than one feasible and practical location to place the vehicle crossing and there is more than one possible and practical location for where a future house might be built.

A vehicle crossing shall be provided between the kerbline, or the edge of the road carriageway if there is no kerb, and the property boundary, as shown on Drawing C19.

Refer to the current published version of the following;

- *Austroads (2017): Guide to Traffic Management Part 6, Intersections, interchanges and crossings*
- *Austroads (2009): Guide to Road Design Part 4, Intersections and Crossings - General*
- *New Zealand Transport Agency (2015): RTS 14 - Guidelines for Facilities for Blind and Vision Impaired Pedestrians*
- *New Zealand Transport Agency (2009): Pedestrian Planning and Design Guide*

Concrete crossings are required unless otherwise approved by Council. Concrete shall comply with *NZS 3109:1997 Concrete Construction*, and shall have a minimum strength of 30 MPa at 28 days. All surfaces shall have a broom finish. The underlying base course shall comply with the *Waka Kotahi M/04 (2006): Specification for Basecourse Aggregate* and have a minimum compacted depth of 150mm below the concrete. Access points being constructed on low strength subgrade (CBR < 5%) shall have a specifically designed foundation.

If an alternative crossing design is proposed using either Asphaltic concrete or block paving, this shall be specifically designed and its use justified (refer to Clause 3.3.3 of NZS 4404:2010).

For more difficult access across kerb and channel, especially where the access is a steep gradient (above 5%) a specific design is also required.

No part of any crossing shall encroach any closer than 5m to the tangent point on any kerb radius at an intersection and any crossing to be installed directly onto a collector or arterial road shall be subject to safety audit.

Crossings expected to carry industrial or commercial traffic must be specifically designed to accommodate the additional traffic loading, usage and turning circles.

Pram, wheelchair and mobility scooter crossings shall be designed to the standards contained in the current published version of *NZS 4121:2001 Design for Access And Mobility: Buildings And Associated Facilities*.

Notes

a) Access locations shall be confirmed with Council prior to construction.

b) All crossings shall be constructed at the expense of the Developer.

c) Alternative crossings may be used however, design shall be undertaken and approved by a suitably qualified profession (please refer to Section 1 – General Requirements and Procedures)

CLAUSE 3.3.17.2: RURAL CROSSINGS

All crossings shall be constructed (or upgraded) prior to the activity commencing i.e. prior to Section 224 approval for subdivision or prior to occupation of a building for building consent. In some instances Council may grant dispensation as part of a subdivision consent decision. Dispensation might be provided when:

- There is more than one feasible and practical location to place the vehicle crossing and there is more than one possible and practical location for where a future house might be built.

Rural vehicle crossings generally exist in a higher speed environment, and often have more complex topography to accommodate. The design of the vehicle crossing shall:

- protect the traffic on the existing road,
- protect the users of the access,
- prevent detritus material encroaching onto the road and
- prevent vehicles from eroding the edge of the existing road seal. A sealed access provides better traction for vehicles using the entranceway and thus improves the safety of all traffic in the vicinity. Where the existing pavement is sealed the crossing shall also be sealed.

All vehicle crossings shall be specifically designed to suit the location in which these are being placed.

Note

a) Waka Kotahi retains control of the design and construction standards of crossings adjoining State Highways.

The following design guidelines should be achieved:

- Visibility at rural crossing points is critical. Reference should be made to *AUSTROADS (2017): Guide To Traffic Management Part 6, Intersections, Interchanges And Crossings and AUSTROADS (2009): Guide To Road Design Part 4, Intersections And Crossings - General*. In some instances it will be appropriate to make reference to *New Zealand Transport Agency (2001): RTS 6 Guidelines For Visibility At Driveways*, which provides useful guides to the design of commercial vehicle crossings. Alternative design options including the use of flush medians can also be considered. Existing cuttings and batters may require cutting back both within the road reserve and on private property in order to meet sight distance requirements. The speed environment is actual average vehicle speed (85% percentile speed km/hr), not the posted speed limit.
- Crossings must be constructed at right angles to the road. Where an access way then turns, a minimum 8m long straight must be provided from the edge of the carriageway to the gate or boundary.
- The gradient of entrances should be a flat as possible, however shall not be steeper than +3% over the distance from the carriageway to the boundary and shall have adequate cross fall to prevent water flowing onto the rural road. Additional measures may be required, E.g. Extended sealing may be required to prevent gravel migration in rural approach grades > 10%.
- Crossings expected to carry industrial or commercial traffic shall be specifically designed to accommodate the additional loading and vehicle usage. If necessary, the crossing width, radii and splay shall be greater than the standard dimensions.
- The pavement used in the crossing shall have sufficient strength to meet the anticipated traffic loads (refer to Clause 3.3.3 for NZS 4404:2010). A rural crossing shall have a minimum formation thickness before sealing of no less than 150mm for flexible pavements.

Council accepts in in most instances a vehicle crossing onto an unsealed rural road will not need to be sealed. However, in some circumstances the sealing of the crossing may be required for safety reasons. Sealed crossings are required onto sealed roads in the rural environment.

The Drawings C24, C26 and C28 can be used for guidance with respect to the design of acceptable solutions for rural crossings. Alternative crossings may be used however, design shall be undertaken and approved by a suitably qualified profession (please refer to Chapter 2 – General Standards).

CLAUSE 3.3.19: ROAD RUN OFF

In general carriageway drainage on urban roads uses kerb and channel although dish channels, slotted drains, subsoil drains, open drains or culverts can be considered. Stormwater will normally be connected to a sump which in turn is connected by a lead to a manhole on the main stormwater system.

On rural roads the provision of a surface water channel a minimum of 0.5m below the adjacent road surface is appropriate on a majority of rural roads where 5:1 verge slopes can be readily constructed. In situations where open drains are inadequate additional stormwater systems such as kerb and channel, sealed, paved or concrete channels and subsoil drains will be necessary.

Refer to the table below for Expected Road Corridor Stormwater Level of Service requirements.

Road Corridor Level of Service for Stormwater Management

General Hierarchy Classification	Stormwater Return Period (years)			
	5	10	20	50
Arterial Road	All designed movement lanes	All designed movement lanes	2 X Full traffic lane	2 X Full traffic lane
Collector Road	All designed movement lanes	2 X Full traffic lane	2 X Full traffic lane	1 X Full traffic lane
Access Road	1 X Full traffic lane	1 X Full traffic lane	0 mm depth on the carriageway centreline	100 mm depth on the carriageway centreline
Lane	1 X Full traffic lane	0 mm depth on the carriageway centreline	100 mm depth on the carriageway centreline	200 mm depth on the carriageway centreline

On rural roads the provision of a surface water channel a minimum of 0.5m below the adjacent road surface is appropriate on a majority of rural roads where 5:1 verge slopes can be readily constructed. In situations where open drains are inadequate, additional stormwater systems such as kerb and channel, sealed, paved or concrete channels and subsoil drains will be necessary.

There may also be other sustainable stormwater systems that can be put forward for consideration by Council. Please refer to Section 4 (stormwater) of this practice.

CLAUSE 3.3.19.3: SUBSURFACE DRAINS

Subsoil drainage is required if:

- a permanent wet spot in the subsoil exists.
- the control of the groundwater level is necessary.
- the subgrade is not free draining.

Figure 3.5 in NZS 4404:2010 describes an acceptable solution.

CLAUSE 3.3.19.6: KERB AND CHANNEL

Kerb and channel is generally required on all urban roads and on rural roads where open drainage is impractical. Refer to Drawings C30 and 31 for design detail.

The following general standards shall be applied:

- The desirable minimum fall on channels is 1 in 400, with the absolute minimum fall being 1 in 500
- A kerb and channel shall be manufactured of concrete complying with NZS 3109:1997 with a minimum strength of 25 MPa at 28 days.
- All kerb and channel shall be placed on a foundation of not less than 200mm of compacted base course meeting the current Waka Kotahi M/04 (2006): Specification for basecourse aggregate.
- The use of mountable or non-mountable kerb is influenced by the roads intended function and position within the hierarchy. When the use of mountable kerb and channel is required because there is insufficient room within the carriageway to accommodate reasonable on-road parking, then the design will need to consider whether un-reinforced kerb and channel will have sufficient long term strength and will not crack or deform under load. If cracking or deformation is expected in un-reinforced kerb and channel, Council will expect the designer to propose options to mitigate this risk, such as reinforcement or foundation strengthening.
- If the development proposes to use the mountable kerb and channel profile then no domestic stormwater connections can be made through this kerb and channel. Therefore, in these situations the developer should provide a design that satisfies both transportation and stormwater requirements.

A stormwater connection is required between the kerb and the boundary where runoff from adjacent properties is to be directed into the roadside channel

Council expects that designers consider the option of connecting stormwater connections from adjoining lots directly to stormwater mains placed underground in the berm.

CLAUSE 3.3.19.7: SUMPS

Refer to Clause 4.3.9.7 (sumps) of this document.

A number of manufacturers can supply precast concrete and cast iron components for sumps and leads. Refer to Drawings WS 402 to WS 406 for sump details.

Council's expectation with respect to the design and construction of sumps within a road drainage system are as follows:

- Sumps should allow for the most effective movement of stormwater from the road into the stormwater drainage system that mitigates as much as possible the risk of blockage by debris such as plastic bottles and leaves.
- The design of sumps, and in particular sumps intruding either into the carriageway (cycle and parking lanes) or into the footpath (e.g. access lids to sump barrels) need to consider the safety of all road and footpath users, and mitigate accident risks by using appropriate components (e.g. cycle friendly sum grates).
- Access into the sump must be provided for long term maintenance.
- All components must be of suitable quality, and provide Council with the least whole of life cost option with respect to long term maintenance and system capacity.

On rural roads sumps are not usually required, except in areas where kerb and channel is used. Transverse and longitudinal culverts are the more common. Drawings WS 107 and WS 108 provides suitable details.

- Culverts should be installed to ensure longitudinal scouring of the water tables does not occur.
- Culverts controlling stormwater flow across the road are generally spaced no greater than 100 metres apart.
- Spacing is dependent on a number of factors including area rainfall intensity, slope, soil type and the existing natural watercourses, refer to Section 4 (stormwater).
- Minimum culvert sizes are 375mm for culverts passing under the road and 300mm for culverts at vehicle crossings. Calculations provided by a suitably qualified person are required for culverts under a road.
- Design of appropriate inlet/outlet structures should ensure support is provided under all flow conditions to the culvert structure and the adjoining road.
- No culverts are to be constructed in such a manner as to concentrate runoff into a neighbouring property without the consent of the owner of that property.
- Stormwater should, where possible, be directed onto stable virgin ground and energy dissipation by rock rip-rap or equivalent shall be provided in erosion prone areas. Where outlets are required on fillings or on unstable ground, fluming or other protection will be required.

CLAUSE 3.4 PAVEMENT CONSTRUCTION

In general, the design principles outlined in Section 3.4 of NZS 4404:2010 are to be followed. The following text provides additional comments and some specific changes that will take precedent over Section 3.4 in NZS 4404:2010.

CLAUSE 3.4.2.2 SUBBASE

TNZ M/03 (1986): Sub-Base Aggregate Notes provide an acceptable specification for subbase aggregate. Where possible it is desirable to use local material or recycle existing material to minimise carbon footprint and reduce waste.

CLAUSE 3.4.3.1 ACCEPTABLE SURFACING MATERIALS

All new roads, public or private, shall be sealed, unless dispensation has been provided by a resource consent.

CLAUSE 3.4.11 DEFLECTION TESTING

The designer will need to assess acceptable defection standards for each individual pavement project, based on the subgrade strength and proposed pavement structure. The proposed defection standards to be used for quality assurance testing in the field will need to be described and justified in the design reports which are submitted with the Consent.

CLAUSE 3.4.16 BERMS AND LANDSCAPING

The designer will need to consider the location and climatic conditions, and the purpose of the vegetation cover when designing grass mix and vegetation types proposed to be used in a development. The Hawke's Bay climate will expose grass and vegetation to extremes of climate including drought in summer and cold temperatures in winter.

CLAUSE 3.4.20: AS-BUILT AND COMPLETION DOCUMENTATION

On completion of construction, the developer shall submit information and documentation consistent with Section 1 (General Requirements and Procedures).

DEVELOPMENT SHALL COMPLY WITH SECTION 4, STORMWATER, OF NZS 4404:2010

THE CAPACITY, LAYOUT AND STRUCTURAL INTEGRITY OF THE STORMWATER SYSTEM SHALL MEET KEY CRITERIA

4.1 GENERAL REQUIREMENTS AND OBJECTIVES

Development shall comply with Section 4, Stormwater, of NZS 4404:2010, except as modified by Section 4.2 to 4.6 and Schedule D below.

The intention is to:

- ensure that the stormwater drainage system is designed and constructed so that the subdivision complies with or exceeds the surface water performance criteria of the *New Zealand Building Code*.
- provide guidance for effective supervision leading to high construction standards.

4.2 PERFORMANCE CRITERIA

Capacity and Layout	
✓	Provide protection to habitable floor levels (with the required freeboard) from design rainfall events or flood events up to a 2% Annual Exceedance Probability (AEP) / 1 in 50 year Annual Recurrence Interval (ARI) using a system of primary and secondary flow paths and other means (for example flow attenuation) which are appropriate to the intended land use.
✓	Provide a primary system of conveyance that can manage design rainfall events of up to a 10% AEP / 1 in 10 year ARI appropriate to the intended land use.
✓	Provide a drainage system that prevents the ingress of stormwater into the reticulated sewerage system in all events up to the 2% AEP rainfall event.
✓	Provide rural lots with an area suitable for domestic effluent disposal that is free from inundation in a storm of up to a 10% AEP / 1 in 10 year ARI.
✓	Adequately service the development catchment and accommodate the design flows and any upstream catchment flows through the site, for both the level of development at the time of design and that which can reasonably be expected to exist once the catchment is fully developed as allowed for under the District Plan.
✓	Adequately service each lot, road area or land area discharging to a point of entry and conveying such surface water to an approved outlet.
✓	Wherever practical convey the flow by gravity.
✓	Not cause an adverse effect to any existing drainage system, or to any upstream, adjacent and downstream properties. This shall include consideration of flood risk on-site and off-site, including the modification to, or filling of, any existing flood plain or ponding / flood storage areas.
✓	Not place undue restrictions on the location of any future building or development nor cause any undue risk to public health and safety.

✓	Be designed and constructed to facilitate ongoing maintenance, minimize risk of blockage, leakage, penetration by roots, entry of groundwater (where pipes or lined channels are used), outlet scour or land instability, and provide efficient and safe inlet and discharge.
✓	Enhance the amenity value of any open channels and flood banks with protection from scouring, erosion or siltation.
✓	Comply with all applicable resource consents and avoid, remedy or mitigate adverse effects on the environment.
✓	Utilise mechanical, electrical, alarm and telemetry equipment, which is compatible with existing equipment used by WDC (where required).
✓	Ensure that mechanical and electrical equipment is either designed for submergence, or located above the 2% AEP / 1 in 50 year ARI flood level with freeboard (to accommodate, for example, bow waves, wind chop and uncertainty).
✓	Minimise whole of life costs, by utilising best practice in design, construction and operation.
✓	Provide allowance for the projected impacts of climatic change.
✓	Maintain existing fish passage through the site where waterways are present.
✓	Be designed with consideration of Safety in Design through the assets' life through to decommissioning and renewal.

Structural Integrity	
✓	Be designed and constructed for a minimum design life of 50 years, using approved materials with a proven record of performance.
✓	Not suffer damage from any anticipated superimposed load or normal ground movement and ensure safety during operation of the system.
✓	Minimize root penetration of piped systems and erosion, piping or collapse of batter slopes of open channels.

4.3 QUANTITY

A key characteristic of typical urbanised catchments is the high proportion of impervious surfaces. Impervious surfaces reduce rainwater infiltration to the soil and consequently an increase in the stormwater runoff occurs. A reticulated urban drainage network efficiently conveys runoff to rural drains or streams, with an increase in peak runoff rates.

In conjunction with design guidelines outlined within NZS 4404:2010, stormwater designs need to consider the following aspects:

- The current land use and any proposed changes in land use of the catchment/s affected;
- Engineering aspects such as stormwater inlet sizes, pipe and network capacity, downstream conveyance constraints, ponding areas and overland flow paths;
- Areas of concentrated population or assets, or localities at high risk of being prone to flooding. Any such areas will be subject to rules within the District Plan;
- Management of stormwater quantity at a community level as well as for individual sites, such as detention ponds;
- Be compatible with existing groundwater conditions, and control groundwater flows when necessary and in an appropriate manner;
- In areas subject to flooding, ensure any planting does not obstruct stormwater flows;
- On site disposal - Refer to Hawke's Bay Regional Council Waterway Design Guidelines 2009 for design options & solution.
- Maintain water flows to support healthy aquatic life by maximising infiltration;
- Give priority to solutions that incorporate water quality and habitat values. This should be done by ensuring a practical balance is achieved between both flooding and ecological considerations.

4.4 QUALITY

The passage of stormwater runoff over impervious surfaces to watercourse to discharge (or other environments) provides an effective pathway for contaminants to be entrained and discharged.

Developers should consider the following:

- Source control of contaminants and general site housekeeping;
- Current and future land use and potential for high contaminant discharge areas;
- Treatment options at a community level as well as for individual sites;
- The proposed receiving environment and its sensitivity to stormwater discharges.

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

When considering these issues, designers are referred to the Hawke's Bay Regional Council Water Design Guidelines 2009, which outlines low impact stormwater design solutions.

The Developer is responsible for complying with all statutes, standards, regulations, bylaws, requirements and obligations. The Developer is also responsible for giving all notices, obtaining all necessary consents approvals and providing for the protection of other property from damage resulting from the development works.

4.5 MANAGEMENT AND MAINTENANCE

Developers are required to ensure that any new stormwater networks are designed to provide for cost effective management and ease of maintenance in respect of the stormwater system.

The new stormwater system should:

- Be designed and constructed to facilitate accessible ongoing maintenance, minimise risk of debris or gravel blockage, outlet scour or land instability, and provide efficient and safe inlet and discharge;
- Not cause undue restrictions on the location of any future building or development;

- Not cause any undue risk to public health and safety.

The key areas of importance for providing efficient stormwater collection and disposal systems are:

- Identification of catchments, or sub-catchments that require additional maintenance and/or treatment installations;
- Management of identified high risk and consented sites;
- Management of the stormwater network in terms of capacity;
- Management and maintenance of the flood protection systems (flood gates, pump stations, open channels and ponding areas);
- Development of a renewal strategy for the stormwater network incorporating low impact design solutions, where practicable.

The extent of any stream or open watercourse improvement work shall be agreed with both the Regional and District Council.

Factors that should be considered in the design process are:

- The retention of natural topography, habitat and vegetation;
- Land stability;
- Hydraulics;
- On-going maintenance requirements.

Where open watercourses are retained through a new development, channel upgrading/enhancement and/or land-raising may be required.

Natural watercourses shall remain as public open space wherever possible, and become landscaped features of the urban environment. Bank protection and/or channel lining may be necessary to protect the adjoining environment (natural and developed) from the increased stormwater flows generated by a development. Protection works shall utilise methods that are sensitive to the surrounding environment.

All overland flow paths shall be identified and protected from conflicting uses and restrictions or obstruction.

The discharge of stormwater into ephemeral watercourses must not cause adverse effects to downstream owners, or increase the potential for erosion or land instability.

Health and Safety should be factored into all system design. This is to ensure safety to the public during construction and the life of the stormwater asset. This includes allowing for fencing and signage to prevent the public from entering or interfering with hazardous sites.

4.6 CONSTRUCTION

All elements of a stormwater drainage system must be constructed in accordance with the relevant New Zealand Standards, and with the specific requirements of the design prepared in accordance with this Code of Practice.

SCHEDULE D

WAIROA DISTRICT COUNCIL ALTERED REQUIREMENTS TO SECTION 4 NZS 4404:2010 - STORMWATER DRAINAGE

The Wairoa District Council has adopted Section 4 of NZS 4404:2010 with the following additions and/or alterations to be used in conjunction with NZS 4404:2010. In general, the principles outlined in Part 4 of NZS 4404:2010 are to be followed. Schedule D provides additional commentary and specific amendments that take precedent over the applicable clauses in Part 4 in NZS 4404:2010.

STANDARDS AND CODES

The design, materials and methods of construction shall comply with the relevant New Zealand or joint New Zealand/ Australian standards and codes as applicable. The standards applied shall incorporate the latest amendments. Standards superseding any listed below shall automatically apply.

- AS/NZS 4058 Precast concrete pipes (pressure and non-pressure)
- NZS 3109 Specification for Concrete Construction
- NZS 4442 Welded Steel Pipes and Fittings for Water, Sewage and Medium Pressure Gas
- AS/NZS 3725 Loads on Buried Concrete Pipes
- AS/NZS 5065 Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
- AS/NZS 3500.2.2 National Plumbing and Drainage Code, Sanitary plumbing and drainage, Acceptable Solutions
- AS/NZS 1260 PVC pipes and fittings for drain, water and vent applications
- AS/NZS 2566 Design and installation of flexible Buried Pipelines
- AS/NZS 2041.1 Buried corrugated metal structures Part 1: Design methods

CLAUSE 4.2.4: CATCHMENT MANAGEMENT PLANNING

Further to Clause 4.2.4 of NZS4404:2010, the upstream catchment shall be considered as being fully developed to the extent permitted in the current District Plan under both present and deferred zonings.

CLAUSE 4.2.8: WATER QUALITY

Further to Clause 4.2.8 of NZS4404:2010, the Water Quality (WQ) rainfall depth shall be equivalent to the ninetieth percentile daily rainfall depth calculated from the closest rain gauge, unless advised otherwise by WDC (for example for high risk industrial sites).

CLAUSE 4.2.9: CLIMATE CHANGE

Further to Clause 4.2.9 of NZS4404:2010, design for climate change impacts shall be based on NIWA's RCP 6.0 2081-2100.

Rainfall shall be adjusted in line with the methodology provided in the HIRDS V4 Client Report (NIWA, 2018), or as calculated using the HIRDS V4 website (🌐 www.hirds.niwa.co.nz). Sea level boundary conditions, where required, shall be vertically offset by the upper bound value forecast for RCP 6.0 2081-2100.

Pre-development flow rates used to calculate the volume of attenuation systems shall not incorporate any allowance for projected climate change. The Water Quality (WQ) rainfall depth shall not be adjusted to account for climate change.

Where observed flow data is used to determine a design flow rate e.g. the Regional Flood Frequency Method (RFFM) or a flood frequency analysis of a gauge, the flow rate shall be factored upwards by 20% to account for potential increases in flood flows due to projected climate change.

CLAUSE 4.3.3: FUTURE DEVELOPMENT

Add the paragraph:

In all new developments, the upstream catchments are to be considered in design calculations.
Consultation must be undertaken with Council to confirm upstream catchment assumptions for use in design calculations and options determination.

CLAUSE 4.3.4.1: PRIMARY AND SECONDARY SYSTEMS

When preparing a system design, the designer must:

1. Use the best hydrological information available to reflect local conditions.
2. Be a person who, on the basis of experience or qualification, is competent to assess them.
3. Take into account any possible secondary flow, including from upstream areas of the development.

The primary stormwater conveyance shall be comprised of kerb and channel, dish channel, pipes and/or swales, except where WDC approves an open watercourse.

CLAUSE 4.3.5: DESIGN CRITERIA

Runoff for catchments areas greater than 50 ha shall be determined using one of the following methods:

- Fixed run-off with an appropriate routing model and time-varying rainfall
- As estimated using design rainfall and an appropriate hydrological run-off and routing model, such as fixed run-off, Horton or a SCS CN curve as determined by a suitably qualified professional
- As otherwise agreed with WDC

Stream flows may be estimated using one of the following methods:

- Griffith & McKerchar (2012)
- Regional Flood Frequency Method (NIWA, 2017)
- Statistical analysis of flood frequency from a gauged site
- Scaled from an appropriate gauged donor site
- As otherwise agreed with WDC

CLAUSE 4.3.5.1: DESIGN STORMS

Design rainfall depths shall be obtained from NIWA's HIRDS V4 website for the development's location.

Further to Clause 4.3.5.1 of NZS4404:2010, where time-varying (unsteady) hydrological / hydraulic analysis is employed:

- Rainfall hyetographs shall be constant intensity for durations 1 hour or shorter for consistency with the rational method.
- HIRDS V4 normalised hyetographs for event durations greater than 1 hour.
- Hydraulic analysis of any storage-based systems shall consider multiple event durations up to 24 hours duration to determine the worst-case scenario(s), or as otherwise agreed with WDC.
- Nested storms shall only be used for the determination of peak flows for networks where there is minimal attenuation or use of soakage systems.
- Impervious run-off shall be represented separately to pervious run-off using a fixed run-off coefficient if using a CN curve number to estimate flow from pervious surfaces.

A real reduction may be applied to the design rainfall for large areas (greater than 50 ha) in accordance with Equation 7 of the HIRDS V4 Client Report.

CLAUSE 4.3.5.4: HYDRAULIC DESIGN OF STORMWATER SYSTEMS

The values in Table 6 of NZS4404:2010 shall be replaced with the following values:

Guide to roughness coefficients for gravity stormwater pipes concentrically jointed and clean

Description	Manning Roughness Coefficient *(n)*	Colebrook-White Coefficient k *(mm)*
Circular Pipes		
PE, GRP and PVC	0.011	0.15
Concrete (machine made to AS/NZS 4058) and clay pipe	0.013	1.5
Corrugated metal	0.025	21.0
Concrete Culverts		
Concrete pre-cast (pipes and boxes)	Min. 0.013	Min. 1.5

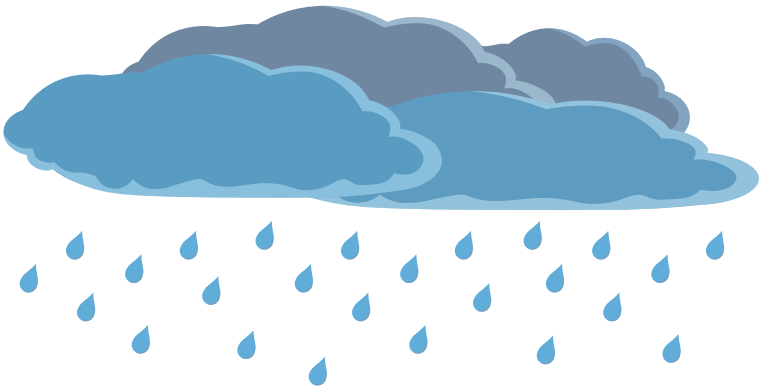
Hydraulic calculations for embedded culverts for fish passage shall include higher invert roughness to reflect the substrate material of the watercourse.

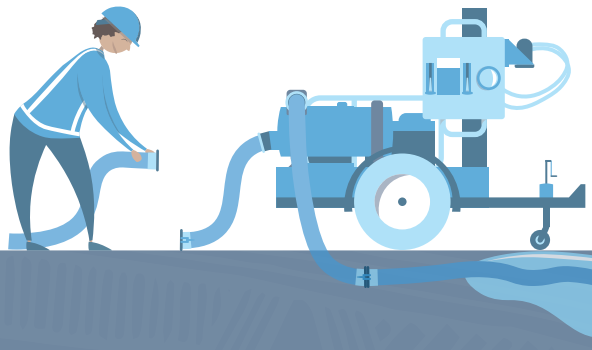
Hydraulic calculations for culverts with fish passage structures fixed to the invert, such as disruptor baffles, shall also incorporate increased invert roughness.

CLAUSE 4.3.6: STORMWATER PUMPING

Stormwater pumping will only be approved where gravity disposal is not feasible.

Pumping systems shall be specifically designed using a multi pump system to best balance the need for regular pump operation against the relative infrequency of major storm events. Design philosophy and technical details shall be discussed with WDC before detailed design is commenced. All electrical equipment shall be designed for a maximum of 15 starts per hour.





An additional installed pump shall act as standby where the pump station is essential for the management of flood risk. Depending on the consequence of flooding during a pump station power outage, WDC may also require that on-site emergency power generation be provided.

Valving of pumps shall be such that maintenance can be undertaken on the standby pump and check valve without interfering with the operation of the duty pump.

Pipes of 100 mm diameter or larger shall be ABS, API Schedule 40 line pipe, concrete lined steel, PE, or PVC material (of appropriate class); with all bends and valves adequately protected against movement. Flanged or welded fittings shall be provided throughout, with a proprietary dismantling joint or similar in the system to facilitate dismantling.

Stormwater pump stations shall incorporate control, monitoring, alarm and telemetry communication systems to WDC standards at the time of the design. Any station on private land must have all weather access for light 5 to 7 tonne trucks.

CLAUSE 4.3.7: LOW IMPACT DESIGN

Further to Clause 4.3.7 of NZS4404:2010, attenuation systems shall be designed as outlined below unless directly contradicted by the District Plan, in which case the District Plan shall take precedence.

- Determine the pre-development peak flow rate (using the NIWA HIRDS V4 normalised hyetograph for event durations greater than 1 hour) for each event duration considered without allowance for projected climate change.
- Determine the attenuation volume needed through volume differencing for event durations up to and including 24 hours (1440 minutes) using the NIWA HIRDS V4 normalised hyetograph for durations greater than 1 hour duration. The post-development run-off rate and volume shall include allowance for climate change.
- Ensure that no post development event duration exceeds the pre-development flow rate for the same duration event up to and including 24 hours for 50% and 10%.
- Ensure that the peak post-development 2% AEP event run-off rate is no more than 80% of the corresponding pre-development discharge rate to mitigate potential downstream stream erosion due to the extended duration of peak discharge.

Select an appropriate hydrological model for determination of pervious run-off, as outlined in this document. A fixed run-off model (modified rational method) aligned to the run-off coefficients in E1 of the New Zealand Build Code may be used in lieu of more detailed hydrological methodologies.

The use of nested storm events shall not be permitted for the design of attenuation systems. Discharge rates governed by the sites critical duration (Tc) in this case do not equate to conservative design of an attenuation basin due to volume differencing.

The assessment of durations up to and including 24 hours shall only be reduced where:

- agreed in advance with WDC
- it can be comprehensively demonstrated that a reduced event duration for design purposes will have no adverse downstream effect e.g. either through catchment modelling or by demonstrating that the catchment's estimated critical duration is well below 24 hours at the coastal interface. This would apply, for example, for a discharge direct to the coastline, or to a small tributary near the coast.
- stated otherwise in the District Plan

CLAUSE 4.3.7.9: SOAKAGE DEVICES

Add the following:

- Soakage systems shall be protected from the entry of sediment during construction activities
- Soakage systems shall not be permitted in sag locations with no secondary flow path unless agreed with WDC
- Soakage rates shall be calculated in accordance with the flooded pit test as defined in BRE Digest 365 or via constant head or falling head test using an augured hole. The auger-hole test shall be carried out until a terminal saturated infiltration rate is achieved and repeated at least once.
- Soak-pit design shall comply with E1 of the New Zealand Building Code, with a factor of safety applied to the infiltration as outlined in the table below.

Soakage System Requirement

Soakage System Type	Factor of Safety Required
Individual residential property systems	2
Communal soakage system with an overland flow path	3
Communal soakage system with no overland flow path	5 (permitted only with approval from WDC)
Communal soakage systems adjacent to critical infrastructure (e.g. schools, major arterial roads, hospitals) with no overland flow path	10 (or as agreed with WDC)

CLAUSE 4.3.8: NATURAL AND CONSTRUCTED WATERWAYS

Open watercourses may be provided as permanent features in urban areas in agreement with WDC. Easements shall include clear land sufficient to allow access for maintenance purposes with the minimum berm requirements.

The extent of any stream or open watercourse improvement work shall be agreed with WDC. Factors for consideration are:

- the retention of natural topography, ecological habitat and vegetation
- hydraulics
- maintenance requirements

Where open watercourses are retained through a new development, channel improvement and/or land raising may be required.

All overland flow paths to the watercourse, or associated with the watercourse, shall be identified, and protected from conflicting uses and restrictions or obstruction by way of easements or encumbrance on the title.

CLAUSE 4.3.9.1: LOCATION AND ALIGNMENT OF PUBLIC MAINS

Add the following:

- In residential areas stormwater pipelines should be laid within the road reserve preferably in the berm. Due account should be given to location of other services, when defining pipeline alignments. If possible, drains shall be laid where access from the surface is available at all times. Pipelines shall not be laid parallel with kerb lines within 500 mm of kerb lines.
- Pipelines on private land shall be sited to minimize reduction of the building area available. Pipelines shall be laid at least 1.0 m clear of existing buildings. Drainage structures including manholes shall be located clear of boundaries and kerb lines.
- Stormwater pipelines shall be extended to the upper boundary of a subdivision unless otherwise approved. Easements shall be provided for any public drainage on private property.

CLAUSE 4.3.9.2: MATERIALS

The following pipe materials may be specified for use in the construction of stormwater drains provided they comply with the latest amendment of the Australian/New Zealand Standard listed above.

- Reinforced concrete pipes (minimum Class 2)
- Concrete lined steel (CLS)
- PVC-U and PE pipes
- Corrugated Steel (CSP)

PIPE STRENGTH, BEDDING AND PIPE SURROUND

Pipe strength, bedding and pipe surround shall be selected for suitability under the design loading conditions, using the appropriate pipe material standard, and the manufacturer's pipe laying publication.

PVC-U and PE pipes shall be fully embedded as per AS/NZS 2566. Concrete pipe shall be bedded as per AS/NZS 3725. The support type for concrete pipes shall be a minimum of H2 unless agreed otherwise with WDC. The structural design for concrete pipes shall include a reduced bedding factor to accommodate the use of embedment material outside the grading limits stated in AS/NZS 3725.

CONCRETE PIPE

Placement of embedment material and AP40 backfill to at least 150 mm above the pipe crown shall be carried out in accordance with the manufacturer's recommendations and in general agreement with AS/NZS 3725. The embedment material and backfill shall be placed in 150 mm lifts and compacted with a hand operated vibrating compactor or rammer to 95% of Maximum Dry Density as determined by NZS 4402, Test 4.1.2.

Compaction testing shall be carried out with an NDM or calibrated Clegg Hammer, with at least one test per lift, per 100 m of pipeline installed.

FLEXIBLE PIPE

Placement of embedment material shall be carried out in accordance with the manufacturer's recommendations and in general agreement with NZS 2566. The embedment material and backfill shall be placed in 150 mm lifts and compacted with a hand operated vibrating compactor or rammer to 95% of Maximum Dry Density as determined by NZS 4402, Test 4.1.2.

CLAUSE 4.3.9.3: MINIMUM PIPE SIZE

The minimum sump outlet diameter shall be a nominal internal diameter of 225 mm.

CLAUSE 4.3.9.4: MINIMUM COVER

The following table gives the minimum cover to finished surface level above the crown of pipes in different locations. Any design involving a cover less than the minimum shown below, shall demonstrate that compliance is impractical and be supported with full calculations to the relevant standard for approval.

Minimum Ground Cover for Stormwater Pipes

Location	Minimum Cover *(mm)*
Private property	500
Carriageways, driveways, road reserve, and parking areas	750
Berms and paths	600

The designer shall check that in any particular case the surface load does not require more cover for the chosen pipe.

Where topographical conditions do not allow minimum cover to be achieved, reinforced or unreinforced concrete protection shall be provided over the pipelines to the approval of WDC.

CLAUSE 4.3.9.5: MINIMUM GRADE AND FLOW VELOCITIES

Minimum tractive force shall also be accepted as a means to demonstrate self-cleansing during a 50% AEP design rainfall event. A minimum shear stress of 3.0 N/mm2 shall be achieved at the peak 50% AEP event flow rate.

Lower velocities or shear stresses will only be accepted where required for fish passage.

CLAUSE 4.3.9.6: CULVERTS

The requirement for security and trash screens and their design shall be in accordance with Auckland Council Practice Note 2017/002 'Trash and security screens for culverts' (2017).

All new culverts vested in WDC shall maintain fish passage in accordance with the requirements of the National Environmental Standards for Freshwater and the Resource Management Act 1991. Refer to the NIWA Fish Passage Guidelines for reference.

CLAUSE 4.3.9.7: INLETS AND OUTLETS

Permanent structures shall be constructed at the inlets and outlets of pipelines. Inlet structures shall be designed to develop sufficient head to overcome entry losses as determined using HEC-22 guidance or similar.

SUMPS

Add the following:

- Sumps shall be located at intervals not greater than 100 m in road carriageways and at street intersection radius tangent points to ensure the total design flow can enter the stormwater system without significant kerb and channel flow depth.
- The intake capacity of a road sump with grating and/or back entry, shall be calculated in accordance with HEC-22 for both sag and on-grade locations.
- The design of sumps within a subdivision shall consider the maximum flow width and ponded depth at sag locations downstream resulting from by-passing of on-grade sumps when 50% blocked.
- The ponded depth at a sag point, including from upstream by-pass, shall not exceed the top of kerb height with 50% blockage during a 10% AEP event.
- Discharge from sumps shall be via pipe leads with a minimum internal diameter of 225 mm, either
    - directly into manholes, or
    - centre to centre into a stormwater main of at least 600 mm diameter, provided that the receiving pipe has a manhole within 40 m of the sump lead connection. Where the hydraulic gradient of a sump lead is affected by pipe full conditions in the main, specific design calculations to determine size will be required.
    - Into another sump chamber, where the pipe is no larger than 225 mm internal diameter
- Sumps shall have a minimum trap depth of 450 mm below the invert of the sump outlet.
- Sumps shall be sited upstream of accessways or kerb crossings where practical to reduce the flow rate at these locations.
- During road works or construction, a suitable means of preventing debris entering sumps must be used. Any gravel or debris entering sumps, or the stormwater system shall be removed or flushed from the system prior to acceptance by WDC.

The sump design preferred by WDC is shown on the Drawings WS 401 – 407.

CLAUSE: 4.3.10: MANHOLES

Step irons shall be provided where deemed necessary for safety through a Safety in Design assessment. Step rungs shall be fully plastic-encapsulated steel or stainless steel. Step irons shall be of the “dropper” or “safety” type such that a foot will not slide off and shall be spaced at 300 mm centres. For details see the Drawings WS 103, WS 202 – 204, and WS 207

Manholes shall be constructed of pre-cast concrete manhole risers, pre-cast flanged concrete bases, pre-cast concrete lids and frames and covers.

Manholes located within trafficable areas shall be rated for HN-HO-72 loading with Class D rated access covers with 600 mm internal clearance for access.

Manholes shall be constructed from the longest available risers relative to the depth of the manhole, in order to reduce the number of joints. This will normally mean that no joints will be permitted in the risers for manholes less than 2.4 m deep.

Shallow manholes of 600 mm maximum depth may be constructed outside of trafficable areas using 600 mm diameter reinforced concrete pipe (½ sump barrels) to NZS 3107 for pipes up to and including DN375, subject to specific approved from WDC. Lids and fittings must be compatible with the reduced diameter.

Manholes on large pipelines where the use of a standard pre-cast manhole is not suitable shall be specifically designed to the approval of WDC. Manholes on straight sections of pipelines of 1.2 m diameter and larger may be constructed using pre-formed tees, subject to approval by WDC. Such chambers within trafficable areas shall be rated for HN-HO-72 loadings in accordance with the NZTA Bridge Manual.

Manholes deeper than 5 m shall be subject to specific design in terms of earth loads and safe access and require specific approval from WDC.

The pipe invert and benching through manholes shall be as detailed in the drawings up to and including pipe diameters of 450 mm internal diameter. Edges shall be rounded and the benching given a form and finish which facilitates smooth flow, non-entrapment of debris, and easy access with cleaning rods.

Benching to half pipe height shall be specified for pipes larger than 450 mm internal diameter.

Where a manhole is to be constructed in soft ground (less than 2 blows per 50 mm using a Scala Penetrometer) the foundation needs to be specifically designed by a geotechnical engineer and approved by WDC.

4.3.10.5: HYDRAULIC FLOW IN MANHOLES

The drop though manholes many be omitted in low-gradient catchments to achieve the best overall pipe gradient for the network, so long as the grade of the connected pipes continues through the manhole and the manhole is well benched.

CLAUSE 4.3.10.6: MANHOLE CONNECTIONS

The typical pipe connection to manholes is detailed in the drawings. For intrusions through the manhole using PVC pipe, the surface of the pipe must be roughened in accordance with the manufacturer’s recommendations (e.g. solvent bonded sand to roughened pipe connections) so that the pipe adheres to the mortar used.

On rigid pipes entering and leaving manholes, a flexible joint shall be provided as detailed in Drawing 202.

CLAUSE 4.3.10.7: FLOATATION

Floation for pipes shall be calculated in accordance with Design Data 22M ‘Flotation of Circular Concrete Pipe’ as published by the American Concrete Pipe Association.

CLAUSE 4.3.11: CONNECTION TO THE PUBLIC SYSTEM

Refer to Drawing WS106 for kerb outlet details.

CLAUSE 4.3.12: CONNECTION OF LATERAL PIPELINES TO PUBLIC MAINS

Addition of the following points:

- Each residential stormwater connection shall be capable of providing drainage from the whole building area of a lot (including all surface water from the yard), at grades and cover complying with the New Zealand Building Code. However, under special conditions, and subject to certification by the designer and approval by WDC of an adequate soakage system, the requirement to include the yard surface water in the capacity of the connection may be waived. The certification from the designer shall include adequate proof that the soil and ground water level on the lot can provide sufficient soakage. A suitable solution for catchment areas not exceeding 0.25 ha is provided in the *NZ Building Code Approved Document E1- Surface Water Acceptable Solution 1*. (Note: the limitations detailed in Clause 1.0.1 of this Acceptable Solution).
- Council expects that designers consider the option of connecting stormwater connections from adjoining lots directly to stormwater mains placed underground in the berm.
- A connection laid to a residential lot shall end at least 500 mm inside the boundary. The connection shall preferably connect directly to the mains but where this is not possible/ practical, the discharge may be road channel or manhole, or sump subject to approval. Pipes larger than 100 mm diameter shall discharge direct to a pipe or enter the kerb via a back-entry sump. See also notes under 3.3.21 for inter-connections.
- Where a connection is deeper than 1.8 m below ground level, a ramped riser shall be constructed to bring the connection to within 1.2 m of ground level at the property boundary.
- The connection provided for each residential lot shall be capable of taking the spigot end of a 100 mm nominal internal diameter PVC pipe.
- Connections for commercial and industrial lots shall be designed to accommodate the design flow from the area served by the connection and meet the requirements of *NZ Building Code E1- Surface Water*. Connections larger than 100 mm diameter shall be made directly to a main pipeline or sump. The end shall be sealed either by a factory sealed stopper or a plug fixed with a rubber ring and held with stainless steel wire.

IN ADDITION TO THE STANDARDS IN NZS 4404:2010 THE FOLLOWING GUIDANCE IS PROVIDED;

MISCELLANEOUS FEATURES

Components of stormwater drainage systems which have not been specified here may be proposed for use in stormwater drainage. Possible examples include stopbanks, dams and spillways. Such items will be subject to the specific approval of WDC.

SIPHON

Inverted siphons are not acceptable, except with the approval of WDC.

EASEMENT

The developer shall create easements for all private and public drains which cross adjacent private land. In cases where the sub-divider gives WDC a formal statement declaring the drain as public, the creation of an easement may be omitted. Public drains shall be vested in the WDC.

For buried pipes, easement widths shall be the larger of:

d. a width equal to 1.5 times the depth to invert with the service laid in the centre, or

e. a minimum of 3 metres with the service laid in the centre.

For watercourses and open drains the WDC will generally require an easement to be created, with a width as follows:

- A width equal to the width of the primary channel and secondary berms, which shall be provided on each side of the primary channel. In all cases the flood berm width used shall be not less than 6 metres to allow access for maintenance vehicles.
- In urban areas where paths/accessways or broad swales are used the easement width shall be the larger of the designed width required or 3 metres.

CLAUSE 4.4 APPROVAL OF PROPOSED INFRASTRUCTURE

CLAUSE 4.4.2: INFORMATION TO BE PROVIDED

All information outlined in (a) to (j) is required to be provided as part of a development application.
All levels shall be referenced to the Hawke's Bay Datum (MSL = +10m).

In terms of horizontal alignment, the reference shall be to the Hawke's Bay 2000 Datum.

Note: Producer statements may be required in addition to the schedules contained in NZS 4404:2010.

CLAUSE 4.5 CONSTRUCTION

CLAUSE 4.5.2: TRENCHING

De-watering water (derived from groundwater systems or bores) may contain those characteristics defined as 'Controlled Stormwater'. Discharge of all de-watering water may require an approval. An alternative is to discharge de-watering water to the wastewater system (in accordance with a trade waste consent) but this option is often limited by the available pipe capacity and potentially high discharge flow rates.

The approval process for applications to discharge de-watering water will primarily focus on the effect of the proposed discharge on the integrity of the stormwater network. Consideration will also be given to the effect of the proposed discharge on the Council's stormwater network consent, but such consideration may not be

necessary if the applicant has obtained or intends to obtain a water take/discharge consent from the HBRC.

CLAUSE 4.5.4: INSPECTION AND ACCEPTANCE

Inspection on site shall be done by a suitably qualified person, who shall have reasonable liaison with and instruction from the design engineer for the works being inspected. The written records and certification of these inspections shall be included in the Completion Report, as specified in *Part 1 Of NZS 4404:2010 Section 1.8.10 Completion Documentation*.

Inspection during construction shall be as set out below:

- The pressure testing of sealed stormwater pipelines may be required, including pipelines that are being designed to operate in a surcharge condition. Testing will be to ground level.
- Appendix C of NZS 4404:2010 (field testing of pipelines) should be used to select an acceptable method for testing. The low pressure air test is the Council's preferred test method.
- Post construction CCTV inspection is required for all pipelines over 225mm diameter as set out in clause 4.5.4 Inspection and Acceptance.

Details of the acceptance criteria are set out as follows:

All CCTV inspections shall be carried out by a professional operator. The inspection shall be carried out using a pan and tilt camera. The operator shall pan around every joint and check every lateral connection for defects. The footage in digital format, and the accompanying CCTV log sheets for each inspected pipe length (as per the template in the NZ Pipe Inspection Manual), showing the features and condition of all inspected pipe lengths, shall be provided to the Council. Footage supplied without log sheets will not be accepted. All pipelines shall be flushed within 24 hours prior to inspection.

The CCTV inspection shall confirm that there is no:

- Pipe misalignment or deformation;
- Visible defects such as displaced joints or laterals, cracked barrels, or protruding rubber rings;
- Variation from the pipe design grades resulting in pipe displacement of greater than 10%;
- Visible dips or ponding;
- Evidence of inflow or infiltration at joints or laterals.
- CCTV will be required to be repeated after remediation work is carried out, should the first inspection indicate non-conforming pipe work.

To ensure that the stormwater drainage works are constructed to the required standards, inspection by the developer's agent shall cover at least the following details:

- Qualifications and experience of the staff constructing the works.
- Pipe sizes, pipe levels and pipe gradient. The inspection will need to confirm that the designer specified tolerances have been achieved for all stormwater system components, and in particular those relating to pipeline line and level.
- Quality, dimensions and reinforcement of all materials supplied, unless these are supplied by a manufacturer accredited to ISO 9002.
- Trench depth and width, quality of trench backfill material, and compaction data.
- Materials and workmanship in relation to jointing of pipes, manhole risers, etc.
- Sizes, construction materials and spacing of anti-scour blocks.
- Manhole benching and other details.
- CCTV inspection outcomes and defect reports. Refer clause 4.5.1 Pipeline Construction for acceptance criteria.
- Provision of as built drawings and information.

5.1 GENERAL REQUIREMENTS AND OBJECTIVES

All developments shall comply with Land Development and Subdivision Infrastructure, NZS 4404:2010, Section 5 - Engineering Requirements-Wastewater, whether using the Minimum Engineering Requirements or the Design Guide approaches, except as modified by Section 5.2 to 5.8 and Schedule E below.

The intention is to:

- ensure all schemes are designed and constructed to meet necessary regulatory and bylaw requirements;
- ensure design flow standards are met;
- provide guidance for effective supervision, leading to high construction standards, thereby ensuring that the design standards are met through “best practices”.

DEVELOPMENT SHALL COMPLY WITH SECTION 5, ENGINEERING REQUIREMENTS - WASTEWATER, OF NZS 4404:2010

5.2 PERFORMANCE CRITERIA

✓	Meet the relevant standards and criteria of the District Plan and ¬the Hawke’s Bay Regional Council (HBRC) Regional Plans; (unless consent is granted for alternative)
✓	Provide for the collection of wastewater, allowing for ultimate future development within the catchment and/or adjoining catchments
✓	Minimise public health and safety related risks
✓	Minimise environmental risks
✓	Be compatible with the existing wastewater system where this is available
✓	Zero tolerance of stormwater ingress (inflow and infiltration) into the system and sewage egress out of the system
✓	Maintain adequate self-cleansing velocities under dry weather flow
✓	Minimise whole of life costs
✓	Where the WDC wastewater system is available, provide individual connections for each lot

FOR ALL SUBDIVISION AND LAND DEVELOPMENT PROJECTS, THE DESIGN OF A WASTEWATER COLLECTION AND DISPOSAL SYSTEM SHALL MEET KEY CRITERIA

5.3 DESIGN PRINCIPLES

The design of a wastewater collection and disposal system shall include consideration of the following:

- Pipe sizes shall be based on the design flow without surcharging. Mains that are to pass into WDC ownership shall be a minimum of 150 mm diameter, except where a common private drain services more than one dwelling on a lot;
- The design flows shall be calculated using the flow parameters detailed in Schedule D.
- The proposed wastewater system shall be compatible with the existing network and comply with current requirements as identified by WDC;
- If future demand on the system requires use of WDC's wastewater reticulation model to ascertain effects, then this will be at the cost of the applicant;
- The system design shall identify and incorporate downstream improvements required as a result of the proposed works;
- Where a proposed development cannot be adequately serviced by a gravity system, a public wastewater pumping station may be proposed for consideration by WDC, provided it is located and designed to service the entire area of potential catchment beyond the reach of the gravity system;
- Adequate self-cleansing velocities under dry weather flow conditions shall be maintained;
- All mechanical and electrical equipment shall either be designed for submergence, or located above, the 50-year design flood level (2% probability of exceedance) plus 100mm freeboard. The developer should consult WDC to confirm the necessary flood level.
- On-site wastewater disposal systems shall be designed in accordance with HBRC Regional Plan requirements.
- All new Lots/Titles in existing developed areas shall be individually serviced unless otherwise approved by WDC.

5.4 PUBLIC AND PRIVATE SEWER

PRIVATE SEWER

- Means a section of sewer between any premises and the point of discharge to WDC's sewer system. A private sewer is owned and maintained by the property owner, not WDC.
- A private sewer is a sewer which serves one dwelling, regardless of whether it traverses adjacent lots.
- The minimum size of private sewer pipes shall be 100mm in diameter.

COMMON PRIVATE SEWER

- May service a maximum of two single dwellings and have one point of discharge only.
- Serve a maximum of four single dwelling units provided the discharge unit entitlement of each dwelling has been defined and registered against the titles of the properties and have one point of discharge only.
- Serve any number of single dwelling units located on the property of a company from which they obtain services.
- Serve any number of single dwelling units located on a property served by a body corporate providing drainage services in which they hold a common interest.
- Means a sewer with appropriate easements, served by a Body Corporate or Company serving more than two dwellings will be considered common private sewer.

PUBLIC SEWER

- A sewer or pipeline which serves more than one lot, except where a common private sewer situation applies and includes the sewer lateral within the road reserve between the lot served by it and the pipeline to which it connects.
- Any sewer over which WDC has exercised control for a period of not less than 20 years.
- Any sewer provided for the general interest of the district as opposed to the particular or personal benefit of one or two individuals or households.
- Any sewer so declared under Section 462 of the Local Government Act 2002.

Refer to Drawing WS 301B for details.

POINT OF DISCHARGE

The Point of Discharge is defined as the boundary between the public sewer system and a Private sewer (marking the boundary of responsibility between the occupier and WDC, irrespective of property boundaries). Refer to Drawing WS 301A.

A Trade Waste Consent may further designate the Point of Discharge for the purposes of monitoring, sampling and testing. Refer to Drawing WS 204A for typical trade waste layout and sampling chambers.

5.5 ALTERNATIVE WASTEWATER SYSTEMS

STEP SYSTEM

5.5.1.1 GENERAL

A 'step system' may be an acceptable alternative system when servicing a township or community beyond the Wairoa District Council central reticulation network. The Mahia Beach Community Sewage Scheme (MBCSS) is the preferred step system option. Details and specifications of this scheme can be found in document *Mahia Beach Community Sewage Scheme Private Property Connection Requirements and Specifications 2013*.

Private Property Connections
To connect to the MBCSS, or similar community system, private property connections are managed by WDC to ensure design specifications are met. An 'agreement to connect' will need to be signed by both WDC (or delegated official) and the property owner. A template of this agreement can be found as Appendix C1.

PRESSURE SEWER SYSTEMS

5.5.1.2 GENERAL

The use of pressure sewer systems shall be subject to the discretion of WDC and will require specific approval. WDC will consider the connection of pressure sewer systems to WDC reticulated network

where;

- The cumulative effects of onsite sewage disposal on public health and/or the environment are deemed by WDC to be significant;
- Risk issues such as infiltration through the use of conventional gravity sewerage is high.

For WDC to consider approval of pressured systems, the designer will be required to demonstrate the need for the system in terms of at least one of the following criteria:

- Topographical constraints: Steep catchment that makes the installation of conventional gravity sewer systems very difficult;
- Presence of watercourse or open stormwater channels within the development area that make the use of onsite disposal impractical;
- Difficult ground conditions such as high groundwater table, widespread hard rock within 1.0m of the natural ground surface;
- Density of development not likely to change by greater than 20%.

5.5.2.2 DESIGN

The design of the pressure sewer system must be carried out by a suitably qualified expert with proven experience.

The design must:

- Be in accordance with WDC adopted Water Services Association of Australia's *WSA-07-2007 Pressure Sewerage Code of Australia* as the engineering code of practice for pressurised systems;
- Include provisions for 1 day's storage (24hrs);
- Show that there is sufficient capacity in WDC's network to accept peak flows from the pressurised system;
- Include a septicity assessment to prove that there is no risk to the receiving WDC network or demonstrate how any risk will be mitigated;
- Include provision for a boundary kit for isolating the household system close to the point of connection to the receiving system.

5.5.2.3 LEVEL OF RESPONSIBILITY FOR PRESSURE SEWER SYSTEMS

- WDC will be responsible for the system downstream of the boundary kit.
- Responsibility for installation and maintenance of the system upstream of this point is the responsibility of the property owner(s).
- The systems used should be selected on the basis that they meet and exceed WDC performance and quality standards.
- The property owner is responsible for the cost of operation and maintenance of the pumping unit.
- The developer/private owners are responsible for any fines or consequential damages due to a failure to adequately maintain the system.

5.5.2.4 PRESSURE SEWER SYSTEMS WITH A PRE-TREATMENT STAGE

- The installation shall be the responsibility of the developer.
- This includes full responsibility for maintaining and operating the pre-treatment stage and pumping unit.
- The property owner is responsible for the operation and maintenance costs of the pumping unit.

COMPOSTING TOILET

The use of a composting toilet is a viable alternative where no reticulation is available. Resource consent may be required from the Hawke's Bay Regional Council (see Rule 37 of the Resource Management Plan). Evidence must be provided to WDC at building consent stage that either the composting toilet is a permitted activity under the relevant regional plan rules, or resource consent have been obtained for the composting toilet. The design of the toilet must also comply with the requirements in the BRANZ guidelines for Batch-type units and Continuous units - 🌐 www.level.org.nz/water/wastewater/on-site-wastewater-treatment/composting-toilets/types-of-composting-toilet/.

5.6 COMMUNITY WASTEWATER COLLECTION AND DISPOSAL SYSTEMS

Community Wastewater Collection and Disposal Systems will require resource consents from the HBRC. Reference should be made to the Hawkes Bay Regional Resource Management Plan for further details regarding the rules and consent requirements. Consents will be subject to conditions that will be the responsibility of both the Developer and the future residing community to meet.

5.7 REUSE OF TREATED AND UNTREATED WASTEWATER

- Any wastewater system proposing the re-use of treated wastewater will require consents WDC and the HBRC.
- Acceptance of the alternative solution will be at the discretion of WDC.
- Any alternative solution should be discussed with WDC at an early stage.

5.8 CONSTRUCTION

Construction of wastewater systems shall be undertaken in accordance with the requirements of Section 5, Wastewater of NZS 4404:2010, except as modified by Schedule E below.

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

SCHEDULE E

WAIROA DISTRICT COUNCIL ALTERED REQUIREMENTS TO SECTION 5 NZS 4404:2010 - WASTEWATER

The Wairoa District Council has adopted Section 5 of NZS 4404:2010 with the following additions and/or alterations to be used in conjunction with NZS 4404:2010.

DRAWINGS

NZS 4404:2010 includes Standard Drawings in Appendix B. Council has opted in this document to make reference back to the drawings produced for Water Services Association Australia ('WSA') WSA 02.

ALTERATIONS TO WSA 04-2005

The WSA 04-2005 has been referred to through the chapter and within NZS 4404:2010 for design specifications, however Note A below includes specific alterations to these standards.

CLAUSE 5.2.1: OBJECTIVES

Under item (m) Council would expect the least "whole of life costs" to be achieved in the preferred design solution.

SECTION 5.3 DESIGN

CLAUSE 5.3.5.1: DESIGN FLOW

When calculating the design flows, using the method outlined in NZS 4404:2010, the following information and tabulated data shall also be used:

A - RESIDENTIAL FLOWS

Estimation of Equivalent Population (EP)

Single occupancy lots – the EP per single occupancy shall be based on the following:	
Wairoa region general, excluding Mahia Residential & Coastal Mahia, Opoutama, Blue Bay, Frasertown & Tuai	3.5
Mahia Residential & Coastal Mahia, Opoutama and Blue Bay	5.0
Frasertown & Tuai	4.0

Equivalent Populations for Synchronous Discharges

Residential classification - Single occupancy lots	EP per Unit shall use the data above.
Peak dry weather (sanitary) flow	the ADWF is deemed to be 250 L/p/EP or 0.0029 L/s/EP

B - COMMERCIAL AND INDUSTRIAL FLOWS

- For commercial and industrial flow and trade wastes, design flow shall be the actual flows, where known.
- Where information is not available, the provision for domestic and trade wastes from industrial areas must be confirmed with WDC. As a guideline only, the following flows may be used as a basis for design:

Average Dry Weather Flows, Industrial Areas by Type

Industry Type	ADWF l/s/ha (m3/ha/d)
Mixed	0.23 (20)
Warehouses	0.07 (6)
Food Manufacture & Materials	0.69 (60)
Chemical Manufacture etc	0.35 (30)

PDWF = 3 x ADWF
PWWF = 3 x ADWF

- The design of sewerage systems for "wet" industries (very heavy water usage) shall be based on the specific requirements for that industry.
- For retail and suburban commercial areas, the design flow guidelines are:

  ADWF = 0.07 l/sec/ha (6 m3/ha/d)
  PDWF = 3 x ADWF
  PWWF = 3 x ADWF

  The flows for each site need to be confirmed with Council.

Allowance shall be made for any future development in the vicinity of the proposed subdivision, which could flow into any or all of the proposed system, when determining design flows. For this purpose the designer must check with WDC whether such development is possible. If this check indicates an increase in pipe size, above that required for the particular development, any increase in cost above that required for the particular development may be met by Council.

CLAUSE 5.3.7.1 PIPE LOCATION

In residential areas sewers shall be laid within the road berm where possible. Due account shall be taken of the location of other services when defining sewer alignments. Wherever practicable, sewers shall be laid where vehicle access for maintenance is available at all times.

Sewers on private land shall be sited to minimise reduction of the building area available; e.g., in yard spaces as defined in the District Plan or in grass berms. Sewers shall be laid at least 1.0m clear of existing buildings, and not within the foundation pressure zone defined by a line drawn from the outside edge of the lowest part of the foundation 1H:2V.

Sewerage pipes including manholes, shall be located clear of boundaries and at least 0.5m from kerblines.

Sewers shall be extended to the upper boundary of a subdivision unless otherwise requested by WDC. Easements shall be provided for any public sewer on private property, and for private sewer connections crossing land in other ownership.

CLAUSE 5.3.7.2: MATERIALS

Appendix A of NZS4404:2010 sets out various acceptable pipe and fittings materials for wastewater uses. In addition to this Council has a list of approved products for use in wastewater construction. This is available from Council's Engineering Division. Where products are specifically stated, this shall be taken to mean that alternative products are not acceptable, unless specifically approved by Council.

Where no specific products are stated as being acceptable, all of the following product selection criteria shall be met:

- Manufacture by a nationally and/or internationally recognised leader in the applicable product range; and
- Manufactured in compliance with relevant standards, given in descending order of priority below. Should there not be a relevant standard for manufacture of the applicable product found within the standard at the higher level (highest = (i)) as stated below, then compliance with a standard found on the next level down shall be demonstrated unless again no applicable standard exists, moving on down the list until a applicable standard is found to demonstrate compliance:
    - i) NZS, AS, AS/NZS
    - ii) BS, EN
    - iii) Other international standard authority (e.g. JAS, ASTM, DIN, ISO)
    - iv) WSAA approved
    - v) Australasian material supplier association recommended practice document(s)

Should there be no available standard to which the product's manufacture can be verified, the product will be deemed unacceptable.

- Local maintenance support for the product within the Hawkes Bay region is required; and
- For Principal Gravity Sewer Pipeline Systems, with reference to PVC-U pipe, SN16 pipe is the only acceptable stiffness class for ductility reasons.

CLAUSE 5.3.7.4: PIPES IN PRIVATE PROPERTY

Pipelines on private land shall be sited to minimize reduction of the building area available (i.e. within side and rear yards as defined in the District Plan). Pipelines shall be laid at least 1.0m clear of existing buildings, and consideration shall also be given to the width required for maintenance access and interaction with building foundations when locating pipelines. Drainage structures including manholes shall be located clear of boundaries and kerb lines. Easements shall be provided for any public drainage pipelines located on private property.

CLAUSE 5.3.7.9: CLEARANCE FROM UNDERGROUND SERVICES

Table 5.6 in NZS 4404:2010 shall be replaced by the table below:

Clearances between Wastewater and other Underground Services

Utility (Existing Service)	Minimum Horizontal Clearance *(mm)*		Minimum Vertical Clearance [1] *(mm)*
	New Wastewater Size		
	≤DN300	>DN300	
Stormwater Pipes <DN 300	300	600	150[2]/300
Stormwater pipes >DN 300	600	600	300
Low pressure Gas mains	300[3]	600	150[2]/300
Telecommunication conduits and cables	300[3]	600	150[2]/300
Electricity conduits and cables	500	1000	225[2]/300
Other drains	300[3]	600	150[2 and 4]/300[4]
Water mains	1000[5]/600	1000[5]/600	500[4]

Notes

a) Minimum vertical separation between wastewater pipe and other service.

b) A minimum vertical clearance of 300mm applies if the size of either the existing service or proposed pipe is >DN 300.

c) Clearances can be further reduced to 150mm for distances up to 2m when passing installations such as poles, pits and small structures, providing the structure is not destabilized in the process.

d) Clearance from kerbs shall be measured from the nearest point of the kerb.

e) A smaller clearance can be accepted if the upper pipe is suitably supported on a pedestal either side of the lower service pipe.

The table below gives minimum cover requirements for wastewater pipes.

Minimum Cover over Wastewater Sewers

Location	Minimum cover to top of sewer (mm)
Private residential property/public land	375mm (no vehicle loading)
Private residential property	600mm (subject to vehicle loading)
Road reserve – berms and footpaths	600mm
Un-sealed carriageways	750mm

Location	Minimum cover to top of sewer (mm)
Sealed carriageways (<1000 vpd)	750mm
Sealed carriageways (>1000 vpd)	900mm
State Highway	Refer to New Zealand Transport Agency

CLAUSE 5.3.8.4: MANHOLES

In addition to the information in Section 5.3.8.4 of NZS 4404:2010 the following guidelines should be followed:

GENERAL

Manholes shall be provided on all pipelines at each change of direction and/or gradient, at each branching line of a diameter between 150mm and 600mm, at the termination of mains, and at a spacing of not more than 90m unless specifically approved by Council. Manholes using pre-cast component are required, unless the design conditions dictate otherwise in which case specific approval will be required. The standard manholes drawings in NZS 4404:2010 (CM 004 to 006) are to be used, expect that Council will not allow the use of any rungs or permanent ladders. The use of lock down lids is required in heavily trafficked areas, or where a positive barrier to access is required by Council.

On Drawing CM 005 designers should note that sufficient workspace needs to be available within any manhole utilising an internal drop. In cases where the manhole does not provide sufficient internal space and external drop shall be used. Within any drop inlet, allowance needs to be made for rodding access in line with the entry pipe. One means of achieving this requirement is to use a Tee junction with screw cap.

For manholes located in road carriageways, the finishing of the concrete manhole lid and cast-iron frame and cover must take into account the flexibility or otherwise of the adjoining road pavement. If the adjoining road pavement is a flexible pavement, then the manhole lid needs to be located below the base course layer (at least 150mm) and the lid and cast-iron frame brought up to the surface using appropriate risers and rings. The lids used in any manhole structure must be compatible with the expected traffic loading.

Manholes requiring person-entry fall within the definition of a “confined space” and the design must facilitate the use of safe operating procedures (e.g. the use of tripods and harnesses) when entry is necessary.

STANDARD MANHOLES

Standard manholes (refer NZS 4404:2010 Drawing CM 004) are to be circular with an internal diameter of not less than 1050mm and shall be used on pipelines deeper than 600mm.

Precast manholes shall consist of 1050mm internal diameter spun concrete pipe to NZS 4058:2007 Class 2. The manhole shall be constructed of pre-cast concrete manhole risers, pre-cast concrete bases, pre-cast concrete lids and cast iron frames and covers, as shown on the Drawings.

Manholes shall be constructed from the longest available risers relative to the depth of the manhole, in order to reduce the number of joints. This will normally mean that no joints will be permitted in the risers for manholes less than 2.4m deep.

In addition to the manufacturer’s standard jointing details all joints must be wrapped externally with a waterproof “Polytkin” wrap or similar for additional infiltration protection. Cast in-situ manholes may be used but require specific approval from WDC. If used WDC would expect these to be constructed using high strength concrete (20 MPa) vibrated to give maximum density and watertight construction.

MANHOLES ON LARGE PIPELINES

Manholes on large pipelines where the use of a standard manhole is not suitable shall be specifically designed to the approval of WDC. Manholes on straight sections of pipelines of 1.2m diameter and larger may be constructed using pre-formed tees.

On pipelines 1m diameter and larger the spacing of manholes may be extended to 200m and curvature on the pipeline may be permitted providing that joint deflections are within the limits of the manufacturer’s recommendations.

DEEP MANHOLES

Manholes deeper than 5 metres shall match the wastewater manhole shown on Drawing WS 202 and SEW 1311. Intermediate platforms shall not be used (to facilitate the use of exterior fall restraint and emergency evacuation equipment). Step irons or ladders are not to be installed, unless specifically approved by Council.

HYDRAULIC FLOW IN MANHOLES

Losses in a manhole shall be compensated for by a drop in the invert across the manhole equivalent to 20mm plus 5mm per 10° of change in direction of flow, or as determined from a specific calculation. For a pipeline greater than 1m in diameter the drop shall always be determined by specific calculation.

BENCHING

The pipe invert and benching through manholes shall either be as detailed in the standard drawings, or can utilise other options (e.g. half pipe) provided that the appropriate energy loss allowance has been made in the design. Edges shall be rounded and the benching given a form and finish which facilitates smooth flow, non-entrapment of debris, and easy access with cleaning rods.

STEPS AND LADDERS

Permanent steps and ladders are not to be used. This policy is to discourage entry to the confined space.

MANHOLE LIDS AND COVERS

Manhole lids and covers shall be as detailed on WSA Drawings SEW 1308 and CM 004 in NZS 4404:2010. The use of precast spacer rings shall be detailed to allow for the slope of the road, and the need to provide for the proper construction of base course and surfacing construction, taking into account the need to apply both a first and second coat seal in the case of a chip sealed surface. Aluminium covers are not permitted.

MANHOLES IN SOFT GROUND AND HIGH WATER TABLES

Where a manhole is to be constructed in soft ground the foundations will require specific investigation and design. Options for foundation strengthening can include undercutting the surrounding area down to stable ground and backfilled with suitable compacted hard fill to provide an adequate foundation bearing capacity. Alternatively, the manhole could be founded on hard fill/reinforced concrete base. The dimensions of this base will require specific design, (refer to Chapter 2 – Geotechnical and Earthworks) but will not be less than 150mm thick, and twice the area of the manhole.

Where manholes are to be constructed in areas of high water tables and there is a possibility of flotation, specific design shall be undertaken to ensure the manhole is stable under all conditions.

PIPE MAIN CONNECTIONS TO MANHOLES

On all rigid pipes (i.e. concrete or earthenware) entering and leaving manholes, a flexible joint must be provided as detailed in WSA Drawings SEW 1302 and WS 202.

Pipe junctions in manholes shall be aligned to ensure streamlined flows through the manhole, unless specifically approved otherwise by Council.

WSA Drawing SEW 1304 give guidelines on typical entry/exit arrangements.

DROP CONNECTIONS FOR SERVICE LINES

Refer to WSA Drawings SEW 1303, 1306 and CM 004 and CM 005 in NZS 4404:2010. Drop connections at sewer manholes may be used only with approval from Council.

MANHOLE REQUIREMENTS FOR PIPE INTER-CONNECTIONS

Manholes are required at all public drain pipe junctions.

CLAUSES 5.3.8.5: MAINTENANCE SHAFTS AND 5.3.8.6: TERMINAL MAINTENANCE SHAFTS

The maximum depth of any Maintenance Shaft (MS) or Terminal Maintenance Shaft (TMS) shall be 2.0 m. Council will not accept the connection of reticulation sewers and property connections directly into the riser shaft of a MS or TMS.

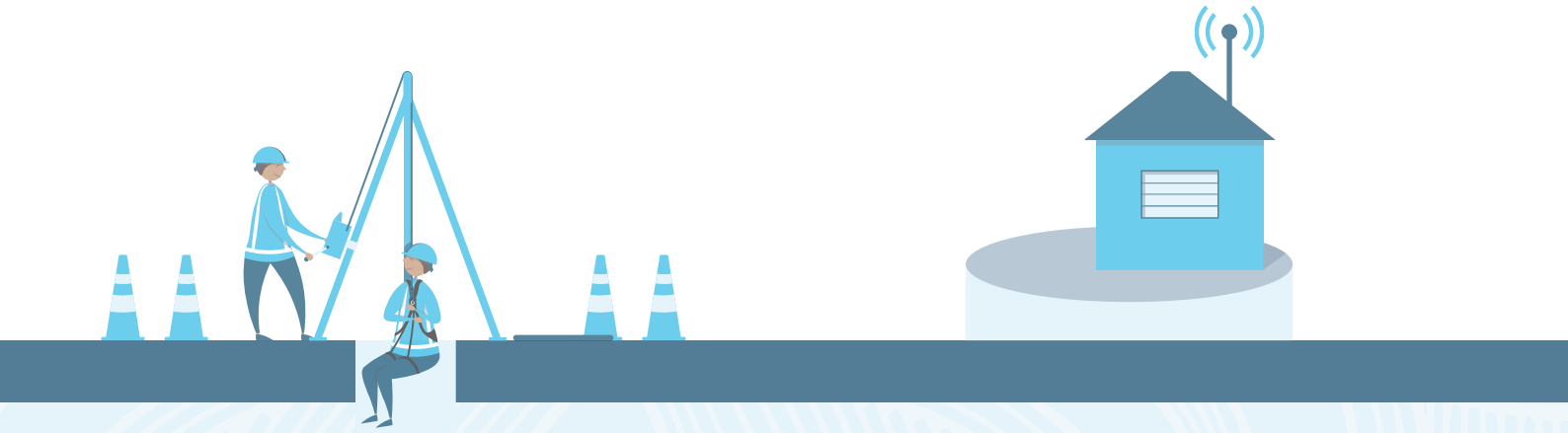
CLAUSE 5.3.10: CONNECTIONS

In cases where the reticulation sewer is deeper than 1.5m and the required property connection level is such that the vertical drop from the required connection level to the sewer is greater than 1.2m, then a vertical riser (jump-up) shall be constructed as shown on WSA Drawing SEW 1106 (Vertical riser with single or double connections). Where the reticulation sewer is located in private property, the riser pipe and IO shall be located above the reticulation sewer as shown on WSA Drawing SEW 1106. The buried interface method is not permitted by Council unless otherwise specifically approved for the development.

CLAUSE 5.3.11: PUMPING STATIONS AND PRESSURE MAINS

Sewage pumping will only be approved where gravity conveyance is not feasible. Pumping stations that will come under the ownership of WDC shall be designed as follows:

- Only pumps that are compatible with those already installed in the WDC network will be approved. This helps to facilitate maintenance and holding of spares
- A single pump shall be capable of coping with peak wet weather inflows.
- Sewage pumps shall have non-clogging impellers capable of handling minimum solid size of 75mm discharging into 100mm diameter or larger rising mains. Smaller diameter rising mains may be approved subject to specific design calculations submitted to WDC.
- The effects of water hammer pressures shall be addressed and measures to limit their impact shall be designed as necessary. Rising mains shall be rated appropriate to the maximum total head but not less than Class C (90 metres), and with not less than 2 pumps operating shall deliver not less than six time (6) ADWF.
- Pumps and chambers shall be designed for a maximum of 12 starts per hour.
- A system curve shall be developed for the pump station and rising main. Pumps shall be selected to operate efficiently at the design flow rate on the system curve.
- Pumps shall be fitted in pairs so that while one pump is acting as duty pump, the other is on automatic standby; i.e., all pumping installation shall have 100% standby capacity. Each pump operating separately shall be capable of delivering the design wet weather flow. The duty sequence shall be automatically interchangeable, with a manual override.
- Pumps shall be protected by non-return valves and isolated



for maintenance purposes by gate valves housed in a separate chamber. A station valve shall be incorporated to enable the whole pump station to be isolated. Valving of pumps shall be such that maintenance can be undertaken on the standby pump and check valve without interfering with the operation of the duty pump.

- Within the pump station, pipes of 100mm minimum diameter shall be ABS, API Schedule 40 line pipe, ductile iron or cast iron, with all bends and valves adequately protected against movement. All iron and steel shall be internally and externally protected against corrosion to the requirements of AS/NZS 4158. Flanged or welded fittings shall be provided throughout, with a proprietary dismantling joint or similar in the system to facilitate dismantling. Outside the pump station, the rising main can also be in uPVC or similar material of appropriate class, accounting for pressure, abrasion, chemical and temperature effects.
- Pump chambers and the reticulation system shall be designed to be of adequate size to provide emergency flow storage of four hours minimum of design flow, and still be safe to enter for work and repairs. Provision shall be made for overflow and standby functionality; e.g., generators etc. Chambers shall be designed against flotation when empty. The wet well capacity should be designed to allow time for emergency backup measures to be put in place in the event of a major pump failure, pipework or power supply failure i.e., 1 hour minimum design flow (PWWF) above the high water alarm level without causing overflow
- The pump station building will include provision for an access hoist for lifting and maintenance of all equipment.
- All electrical switch gear is to be located above ground level and above the 100 year flood level (1% probability of exceedance) +100mm freeboard, in a separate building such as a precast killing shed or similar. This helps with maintenance of the pump station. The building shall be fixed in such a way that it blends in with the surrounding environment. Pump stations shall incorporate all necessary control, monitoring, and alarm and telemetry systems to WDC standards at the time of design. Radio linkage shall be provided to every new pumping station
- All electrical equipment and cabling shall be safety rated for its particular location and use, and constructed, installed and set-up in accordance with the current electrical regulations.
- A water supply with backflow prevention to the approval of WDC must be provided to the immediate vicinity of the station, and within 3m of the wet well. This is provided to assist with the wash down on the well.
- Pumping stations shall be located on a separate lot in the subdivision. A sealed accessway of not less than 3 metres width shall be provided to the nearest public street. Provision will be made close to the pumping station for the turning circle requirements of a light 5 to 7 tonne truck. The immediate area around the station shall be fenced and provided with a locked gate.
- Overflow facilities are to be provided to the immediate vicinity of the pump station in case of mechanical or electrical failure, or blockage to pumps or rising mains. The location of the overflow is subject to Council approval.
- Pump station wet wells shall be vented to limit the build-up of odours. The vent shall be a minimum of 3m high, made of 200mm diameter uPVC pipe, including an electrical extractor from which can be turned on upon entry to the pump station.
- Rising mains shall have a minimum velocity of 0.75m/sec. To limit the effects of hydrogen sulphide, the main should be kept full at all times. This can be best achieved by incorporating a pronounced upturn or water trap at the outlet to exclude free air from the main. Rising mains should be sized so that sewage is not held in an anaerobic situation for more than 6 hours, in order to avoid the release of odours at the discharge point and minimise sulphate attack on concrete pipes and manholes.
- Rising mains shall be provided with access points every 200m for clearing and inspection purposes.
- Where the ultimate population will not be achieved in the three years after construction, and the six-hour holding limitation cannot be achieved as a result, the developer shall insert a smaller diameter pipe in the rising main, or alternatively provide odour control at the discharge.

A Resource Consent (including a hazard rating for trade waste) and Building Consent shall be obtained (if required) before the construction of any pumping station may commence. This may include the certification of the hazard rating for electrical equipment. An Environmental Impact Statement may be needed for any overflows.

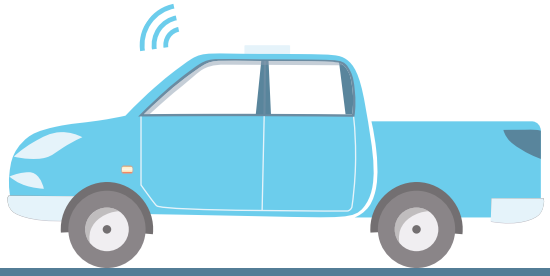
CLAUSE 5.5 CONSTRUCTION

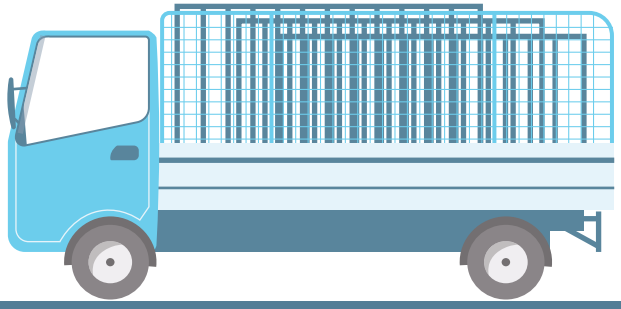
In general, Clause 5.5 of NZS 4404:2010 shall be followed. The following text provides additional comments and some specific changes that will take precedent over Section 5.5.

COVER TO PIPELINES

The cover provided to pipeline systems shall be in accordance with the specifications listed within this schedule, the manufacturers' published recommendations, and will need to take into account the following:

- Imposed loads during construction of the pipeline or





reconstruction of the road or other infrastructure assets above the pipeline (including possible reshaping of the road profile).

- Imposed loads during the lifetime of the pipeline system from backfill, expected traffic, and any surface structures.

If the required cover cannot be provided for technical reasons, then other means of protecting the pipeline such as spreading the imposed load should be implemented.

PIPE STRENGTH, BEDDING, SURROUND AND BACKFILLING

In general, with good ground conditions, bedding and other trench details shall be as shown in NZS 4404:2010 Drawings CM 001 to CM 003, or WSA Drawings SEW 1200 to 1202. In poor ground conditions, potentially unstable ground, or where extreme loadings will be encountered; pipe strength and bedding shall be specifically designed and certified, and as shown on Drawings SEW 1203 to 1205.

OTHER ADDITIONS TO THESE DRAWINGS ARE:

NZS 4404:2010 Drawing CM 002: Note 7 should also include the use of geotextile separation between granular trench fill (e.g. road base course) and the underlying pipe embedment if required to prevent migration of fines.

RIGID PIPES UP TO 525MM DIAMETER (REINFORCED CONCRETE)

Pipe strength and bedding shall be selected for suitability under the design loading conditions. The type of bedding and class of pipe adopted shall be in accordance with *AS/NZS 3725:2007– Design For Installation Of Buried Concrete Pipes*, and the appropriate pipe material standard (e.g. *AS/NZS 4058:2007 Precast Concrete Pipes (pressure and non-pressure)*).

Pipe bedding and backfilling shall be carried out in accordance with WSA Drawing SEW 1201 and SEW 1202 Types 1 & 2, and AS/NZS 3725:2007 - Design for Installation of Buried Concrete Pipes. The selected fill (free of organic materials, lumps larger than 75mm, and stones larger than 40mm) shall be placed in 150mm layers and compacted to a density of not less than 95% of Maximum Dry Density as determined by Test 4.1.2 of *NZS 4402:1986 Methods of Testing Soils for Civil Engineering Purposes – Soil Tests*. The compaction shall be completed using a hand operated vibrating compactor with a total static weight not exceeding 0.5 tonne.

RIGID PIPES GREATER THAN 600MM DIAMETER (REINFORCED CONCRETE)

As per rigid pipes up to 525mm diameter except backfilling pipe surround shall be carried out in accordance with WSA Drawing SEW 1202 Type 4. The pipe bedding material shall comply with *AS/NZS 3725:2007– Design for Installation of Buried Concrete Pipes* and a 150mm diameter subsoil pipe shall be laid for the first 30m upstream of every manhole (refer WSA Drawing SEW 1207).

ALL OTHER PIPES

Pipe strength and bedding shall be selected for suitability under the design loading conditions. The type of bedding and class of pipe adopted shall be in accordance with *AS/NZS 2566.1:1998 (RECONFIRMED 2018) – Buried Flexible Pipelines - Part 1: Structural Design* and *AS/NZS 2566.2:2002 (RECONFIRMED 2016) – Buried Flexible Pipelines - Installation*.

Pipe bedding and backfilling shall be carried out in accordance with WSA Drawing SEW 1201 and SEW 1202 Types 3 & 4. Following placement of the pipe, the granular bedding material shall be placed in layers not exceeding 150 mm and shall be carefully tamped with hand or mechanical tampers, with particular attention to compacting under the pipe haunches. The material shall not be dropped from a height of greater than 600mm. The granular fill shall be compacted to a density of not less than 95% of the Maximum Dry Density as determined by Test 4.1.2 of *NZS 4402:1986 Methods Of Testing Soils For Civil Engineering Purposes – Soil Tests*.

PIPES ON STEEP GRADES (GREATER THAN 1 IN 10)

If the pipeline gradient is steep (i.e. greater than 1 in 10), and/or ground conditions are poor, sufficient cement shall be added to the granular bedding material to provide a weak concrete with a strength of not less than 7 MPa. The depth of bedding shall be as shown in WSA Drawing SEW 1201 and SEW 1202 and shall be cleanly broken at the pipe joints with a 25mm gap formed with expanded polystyrene to maintain flexibility. Where the pipeline gradient exceeds 1 in 10 anti-scour blocks (refer to WSA Drawing SEW 1206) shall be constructed at the spacing's shown in the table below, or alternatively, metal cut off plates made specifically as anti-scour blocks may be used.

Spacing of Anti Scour Blocks

Grade	Spacing *(m)*
Steeper than 1 in 5	5
1 in 5 to 1 in 10	10

CONSTRUCTION AND BACKFILLING IN ROAD RESERVE

Within a road reserve, filling above the pipe surround shall be in accordance with the WDC *Specification for Service Maintenance Operations and New Service Installations within Road Reserve*.

ACCEPTANCE AND TESTING OF WASTEWATER SYSTEM

Acceptance will be on the basis of the quality of materials and the general standard of construction. Inspection during construction shall be as set out below.

The pressure testing of sealed wastewater pipelines will be required, including pipelines that are being designed to operate in a surcharge condition. Testing will be to ground level or 50% above the hydraulic grade line head whichever is the greater. Pressure testing will be for leaks, with the acceptance requirement being that the pipeline must pass one of the three drainage leakage tests described in Clauses 8.1 to 8.3 of Section E1/VM1 of the Compliance Document for the New Zealand Building Code. Low pressure air testing is the preferred test. Pipeline inspection and recording by CCTV is required for all pipelines over 225mm diameter.

INSPECTION DURING CONSTRUCTION

To ensure that the works are constructed to the required standards, inspection by the developer's agent during construction shall cover at least the following details:

- Qualifications and experience of the staff constructing the works;
- Pipe sizes, pipe levels and gradient.

  Note: the designer will need to specify the tolerances required for construction of all system components, in particular the tolerances required for pipeline line and level. Achieving specified construction tolerances is extremely important;
- Quality, dimensions and reinforcement of all materials supplied, unless these are supplied by a manufacturer accredited to ISO 9002;
- Trench depth and width, quality of trench backfill material, and compaction data;
- Materials and workmanship in joints between pipes, manhole risers, etc.;
- Sizes, construction materials and distances of anti-scour blocks;
- Manhole benching and other details;
- CCTV inspection outcomes and defect reports.

Inspection on site shall be done by a suitably qualified person with a good knowledge of drainage theory and construction practice, who shall have reasonable liaison with and instruction from the design engineer for the works being inspected. The inspector shall not have any financial affiliation with the contractor carrying out the work. The written records and certification of these inspections shall be included in the Completion Report, as specified in Part 1 of NZS 4404:2010.

SPECIFIC DESIGN REQUIREMENTS FOR PUMPING AND PRESSURE MAINS

If the scope of the proposed development is sufficiently large and/or complex to justify inclusion of pumping and pumping stations, then reference should be made to the current version of *WSA 04-2005 Sewage Pumping Station Code of Australia*, along with the following amendments and additions to WSA 04-2005.

ALTERATIONS TO WSA 04-2005:

SECTION 2.1 CONCEPT DESIGN PLAN

Under 'Maintainability' the last bullet point shall be modified to read "Utilise standard components that are readily available within the Hastings/Napier area and which are interchangeable where possible".

SECTION 3.4.3 EMERGENCY STRUCTURES

Storage volumes shall be a minimum of six hours of ADWF. It should be noted that emergency relief discharge from the pumping station is not permissible.

SECTION 3.5.4.3 TOTAL HEAD LOSSES

The energy losses due to friction shall be calculated by a suitably qualified person from the Colebrook-White equation or Mannings equation. The roughness value 'k' used shall be 1.5mm for selecting the pump, but a sensitivity check with a k=0.1mm shall be undertaken to ensure the selected pump does not run off the end of its curve.

SECTION 4.2.3 PUMP SELECTION

The standard pumps shall be guiderail mounted Flygt pumps with either a C or N impellor, Tsurumi pumps with a BZ channel impellor, or an industry recognised pump. Grinder pumps from the above two manufacturers may be acceptable where the duty flow is < 5 L/s. Approval from Council is required for using grinder pumps.

With reference to (ii), the minimum sphere clearance (through let) shall be 75mm.

With reference to (vi) and Note 4, the overall pump efficiency at the duty point for channel type impellors should be within 10% of the best efficiency point (BEP), with the BEP not less than 60%. Should the overall efficiency of the duty point be less than 54%, the designer shall provide details demonstrating the basis for the selection and showing why a pump of higher efficiency cannot be used.

SECTION 4.3.5.1 DESIGN

Cabinets shall be constructed from marine grade aluminium alloy, stainless steel or powder coated steel sheet to a colour agreed with Council.

SECTION 4.3.5.4 LIGHTING

Incandescent lighting shall be used instead of fluorescent.

SECTION 4.4.6 OPERATING LEVELS AND DEFAULT SETTINGS

With reference to (c) Cut-in and cut-out levels the maximum number of starts per pump per hour is 12.

SECTION 4.5.2.4 SOIL INVESTIGATION

Replace the reference to NATA to read IANZ. Refer also to Part 2 – Geotechnical and Earthworks of this document.

SECTION 4.5.2.5 CONTROL LEVELS

Replace Table 4.4 with the table below.

Typical Control Levels

Parameter	Description
Low level alarm	Set at 50mm above the snort level of the pumps
Duty cut-out level	The cut-in/cut-out volume height determines the cut-out level. The cut-out level shall be 100mm above the manufacturer's specified minimum submergence level
Standby cut-out level	Set at 100mm above the duty cut-out level
Duty cut-in level	Set at 300mm below the incoming sewer invert level
Standby cut-in level	Set at 150mm below the incoming sewer invert level
High level alarm	Set at 100mm below the incoming sewer invert level

Parameter	Description
High level alarm	Set at the higher of the soffit level of the upstream end of the pipe connecting the inlet maintenance hole with the wet well, or the invert of the upstream end of the diversion pipe from the inlet maintenance hole to the emergency storage chamber
Inflow emergency alarm	Set at the obvert to the outlet to the wet well in the collecting chamber

SECTION 4.5.5.3 EMERGENCY RELIEF STRUCTURE

No emergency relief discharge to the environment is permitted.

SECTION 4.6.1.3 SYSTEM CURVES

Only the Colebrook-White equation or Manning's equation is acceptable for determining pipe work friction losses. The roughness value (k) used for selecting the pump duty point shall be based on a k=1.5mm, a sensitivity check with a k=0.1mm shall be undertaken to ensure the selected pump does not run off the end of its curve.

SECTION 4.6.4.7 SURGE AND FATIGUE CONTROL

Variable speed drives (VSDs) are also acceptable to minimise the development of a transient wave by controlling the acceleration and deceleration of the pump. Programming of the VSD controller shall be undertaken by a suitably experienced person familiar with the ramping requirements.

SECTION 4.6.4.8.1 PIPE AND FITTINGS WITHIN THE PUMPING STATION

Suitable pipe work for use in the wet well and valve chamber are in order of preference:

1. ABS (AS/NZS 3518:2004);
2. Grade 316 or 316L Schedule 10 stainless steel (to ASTM-A312 specification);
3. Ductile Iron (PN 20 classification with internal and external coatings – refer to AS/NZS 2280).
   - Bends shall be standard radius bends.
   - All valves and fittings shall be ductile iron with thermal bonded polymeric coatings to AS/NZS 4158.
   - Gate valves shall be compliant with AS2638.2.
   - All connections shall be via bolted flanges. Flanges shall be a minimum of PN16 as specified in AS 4087. Bolts shall be Grade 316 SS.

SECTION 4.6.4.8.2 PRESSURE MAIN SELECTION

Further to the requirements of this section, the acceptable materials for rising mains are:

- PE 80B and PE 100 (minimum PN 8)
- PVC-U (minimum PN 9)
- PVC-M (minimum PN 12)
- Reinforced Concrete

SECTION 4.8.1.3 GENERAL LIGHTING AND POWER

Further to paragraph two, elevated lighting shall be provided over the wet well to provide illumination of the wet well opening and internals. Lighting units shall be fitted with vandal protection guards.

LOW PRESSURE SEWER SYSTEMS

Council will consider the use of low pressure sewer (LPS) systems to join with the Council reticulated network where the cumulative effects of onsite sewage disposal on public health and/or the environment are deemed by Council to be significant, or where risk issues such as infiltration through the use of conventional gravity is high.

The use of LPS systems shall be subject to specific site specific Council approval.

For Council to consider approval of LPS systems, the designer will be required to demonstrate the need for the LPS system in terms of at least one of the following criteria:

Topographical constraints:

1. Steep catchment that makes the installation of conventional gravity sewer systems very difficult;
2. Presence of watercourse or open stormwater channels within the development area that make the use of onsite disposal impractical.

Difficult ground conditions such as high groundwater table, widespread hard rock within 1.0m of the natural ground surface.

Density of development not likely to change by greater than 20%.

In addition to the above, the development or scheme proposal shall be for a minimum of 50 lots and shall be for the servicing of the full scheme area using LPS systems

Council have adopted the WSA 07-2007 Pressure Sewerage Code of Australia as the engineering code of practice for LPS systems.

For grinder pump LPS systems Council will be responsible to the upstream side of the boundary kit. Responsibility for installation and maintenance of the system upstream of this point is the responsibility of the property owner(s).

For LPS systems with a pre-treatment stage, Council will accept responsibility for the maintenance of the pre-treatment unit and the pump. The installation shall be the responsibility of the developer and shall include full responsibility for managing and meeting the costs of a five year operational support agreement with the system manufacturer/constructor. After five years of operation in which the system is demonstrated to be performing satisfactorily, Council will take over the maintenance of the system.

6.1 GENERAL REQUIREMENTS AND OBJECTIVES

Developments shall comply with Section 6, Water Supply, NZS 4404:2010, whether using the Minimum Engineering Requirements or the Design Guide approaches, except as modified by Sections 6.2 to 6.3 and Schedule F below.

This section provides acceptable engineering standards for the design and construction of drinking-water reticulation systems that are to come under Wairoa District Council (WDC) jurisdiction and/or ownership. The section also provides guidance for effective and systematic construction supervision leading to high standards. All water supply infrastructure shall be consistent with the WDC Water Supply Bylaw 2011.

Our objective in design and construction is to distribute water for consumption and fire fighting which meets the appropriate standards and level of service for these uses.

6.2 PERFORMANCE CRITERIA

	Hygiene
✓	Deliver water to the point of supply that complies with the New Zealand Drinking Water Standards (NZDWS), 1995 (Revised 2018).
✓	Shall make provision for the sampling requirements of the Drinking-water standards for New Zealand 2005 (Revised 2018).
✓	Minimise the risks of contamination being introduced into the water.
✓	Meet the water supply performance criteria defined by Council Bylaws.
✓	Have due regard for the New Zealand Building Code.

	Capacity and Layout
✓	Have sufficient capacity to provide adequate flow and pressure to meet the anticipated demand over its lifetime.
✓	Meet the fire protection requirements of the NZ Fire Service Code of Practice for Fire Fighting Water Supplies NZS PAS 4509:2008.
✓	Be located in such a way as to adequately service each lot and provide reasonable access for maintenance.
✓	Minimise adverse effects on, and be compatible with, the existing water reticulation network.
✓	Where connection to an existing reticulation supply is possible, provide a connection for each new Lot.
✓	Minimise disruption to other parts of the network during maintenance; by having adequate interconnections, valves, and separating trunk main supplies from local reticulation.

DEVELOPMENT SHALL COMPLY WITH SECTION 6, WATER SUPPLY, OF NZS 4404:2010

THE WATER SUPPLY SYSTEM SHALL AT ALL TIMES CONSIDER THE WATER SAFETY AND QUALITY AND MEET KEY CRITERIA

Capacity and Layout	
✓	Where practical utilise mechanical, electrical, alarm and telemetry equipment which is compatible with existing equipment used by WDC.
✓	Where the expected life of any component is less than that of the system of which it is a part, make provision for access and maintenance of that component.
✓	Ensure that mechanical and electrical equipment is either designed for submergence or located above the 100-year design flood level.
✓	The design considers “least whole of life costs” and environmental sustainability.

Structural Integrity	
✓	Be constructed of materials compatible with the chemical properties of the water being conveyed, suitable for the intended duty with a minimum design life of 50 years and having a proven performance record.
✓	Minimise leakage, eliminate the ingress of contaminants, and the penetration of roots, using current best practice.
✓	Provide electrical and mechanical equipment with a life span and quality of the best currently available technology.
✓	Withstand all anticipated superimposed loads and network pressures (including those from transient surges that could reasonably be expected from pump failure, pump starts, and sudden valve closure).

6.3 DESIGN PRINCIPLES

The design of a new water supply system shall:

- Confirm pipe sizes, pump, valve and hydrant sizes and positions, and overall reticulation layouts based on the need to deliver the design flows required to meet anticipated fire-fighting level of service and water supply consumptive demands;
- Where appropriate, identify and incorporate improvements to the existing network as a result of the proposed works;
- The designer shall demonstrate resilience in the design and document Safety in Design considerations;
- Early in the development process, confirm with Council whether the proposed works require the inclusion of booster pumping stations and/or storage in order to comply with Council’s requirements;
- Where on-site water supply systems are required, these shall be specifically designed with water quality and public safety as the primary objective.

SCHEDULE F

WAIROA DISTRICT COUNCIL ALTERED REQUIREMENTS TO SECTION 6 NZS 4404:2010 - WATER SUPPLY

The Wairoa District Council has adopted Section 6 of NZS 4404:2010 with the following additions and/or alterations to be used in conjunction with NZS 4404:2010.

ADD CLAUSE 6.3.3A: CONNECTIONS MADE AT SUBDIVISION

In roads that may be extended in the future, mains shall be laid to the end of the legal road, unless a staged development is agreed with WDC. Layout of mains shall, wherever possible, provide a ringmain system so as to avoid dead ends and provide alternative flow paths. If the principal mains have dead ends then provision for scouring must be made, by placing a hydrant at the end of any principal main and a scour valve at the end of any rider main.

In localities where either the existing system is inadequate or where a higher-pressure supply system is required, the subdivider or developer shall provide and meet the cost of supply and installation of all pumping facilities, pumping mains, storage facilities, reticulation mains, rider mains, and backup facilities (e.g. generators) as required.

In the case of larger subdivisions, and/or areas difficult to supply, the proposal should be discussed at an early stage with WDC who will advise of any special requirements or conditions.

The requirements for on-site storage will need to be confirmed with WDC. On-site storage may need to include provision for fire protection.

CLAUSE 6.3.3: FUTURE DEVELOPMENT

The location of mains, reservoirs and other infrastructure shall ensure that adjacent developments in the same supply zone are able to be provided for.

CLAUSE 6.3.4: SYSTEM DESIGN

Liaison with, and acceptance by WDC will be required with regard to transfer of assets following project competition.

Please refer to 6.4 below for vesting requirements.

CLAUSE 6.3.4: NETWORK ANALYSIS

The planned demand period shall encompass at least a 25-year growth model. These results shall be submitted to the Council for review with the detailed design documentation and drawings.

The correct application of the results shall be included as a condition of approval when appropriate.

CLAUSE 6.3.5.3: PEAK FLOWS

The peak demand shall be based on the average summer day or hour demand. The peak day and peak hour demands shall be calculated using typical summer peak day and peak hour demand.

Residential demand shall be determined by multiplying the relevant peak hour demand per property or unit and the number of properties serviced.

In existing residential areas, the number of properties serviced shall be determined by either:

a. A field house count, or;

b. Interrogation of census data, or;

c. Interrogation of GIS system data, or;

d. A combination of (a), (b) and (c).

For un-subdivided areas zoned for future residential development in the district plan, an allowance shall be made for future potential demand in the area based upon the appropriate peak hour demand and advice from WDC with regards to the number and type of properties which may be permitted. Care must be taken to avoid overly conservative design.

Rural residential development, where a water supply is approved, shall be provided with a restricted supply based on supply of a fixed maximum volume over a 24hr period (e.g. 1500 litres per 24 hrs). The demand allowance used must be approved by Council, preferably at an early stage in the design process.

The actual demand allowance used for design purposes shall be authorised by WDC.

CLAUSE 6.3.5.6: MINIMUM WATER DEMAND

Replace 6.3.5.6(a) with a daily consumption of 400L/p/day.

CLAUSE 6.3.5.7: SIZING OF MAINS

DN50 rider mains are permitted if accompanied by a 100 DN (minimum) main.

CLAUSE 6.3.5.8: PRESSURE ZONES

A number of variable pressure zones exist within the existing water supply networks. Consultation with Council is required to determine any specific zone requirements.

CLAUSE 6.3.5.10: DESIGN PRESSURE

Proposed system must be designed to enable operation at minimum pressure.

CLAUSE 6.3.6: WATER QUALITY

CLAUSE 6.3.6.2: PREVENTION OF BACKFLOW

Backflow prevention shall be incorporated into the water reticulation design, to protect the potable water supply at the point of supply.

All connections of reticulated water to mains shall incorporate Council approved backflow prevention devices. The preferred option is the Sensus 640MC as the meter has a built-in backflow preventer.

For industrial/commercial supplies backflow prevention at the point of supply shall be specifically designed according to flow requirements, the hazard of the particular premises, and to the approval of WDC. This is in addition to the requirements of the

Building Act.

Further detail of prevention of backflow can be found within the Water Supply Bylaw 2011.

CLAUSE 6.3.8.3: MAINS LAYOUT

Additions of the following;

f) A water main of not less than 100mm internal diameter (principal main) shall be laid on one side of all through streets.

g) Water main must be located within public open space, unless Council approves otherwise. See Drawing 501 for details

h) Watermains shall not be placed under footpaths, beneath verandas in the CBD or shopping areas, or within 200mm of road kerbs

CLAUSE 6.3.8.8: RIDER MAINS AND DUPLICATE MAINS

In addition to the NZS 4404:2010 listed points;

- A rider main shall be 50mm minimum internal diameter.
- Individual road crossings for a service connection will not be accepted.
- Rider mains shall be supplied from a principal main at both ends, except for rural roads, non-residential roads and private ways.
- Intermediate connections to a principal main will be required for rider mains longer than 100 metres in urban areas.
- Special conditions may need to apply to staged developments. These will need to be agreed with WDC. Longer distances may be permitted, subject to a capacity check by the designer.

CLAUSE 6.3.8.9: CROSSINGS

Where crossing existing services, WDC may require the replacement of existing assets if deemed necessary.

CLAUSE 6.3.8.11: LOCATION MARKING OF VALVES AND HYDRANTS

The location marking of fire hydrants shall be to NZS 4501:1972. Extra marking near schools and other high-risk areas may require as per NZS 4501:1972 (e.g. blue reflector in the centre of the street).

CLAUSE 6.3.9: CLEARANCES

In addition to the NZS 4404:2010 listed points;

- The minimum horizontal clearance between a new main and any stormwater main shall be 600mm.
- The minimum vertical clearance between a new main and any stormwater main shall be 600mm.
- Water mains shall be located to allow unhindered access for repairs and maintenance, e.g. not below kerb lines.

CLAUSE 6.3.11: FIRE FLOW

The designer shall limit lot development such that the water supply system always meets the national guide. Where an extraordinary potential water demand for firefighting purposes is identified, the designer shall ensure provision is made in the development plans for alternative firefighting water sources which satisfy the Code of Practice.

Additionally;

- Any fire protection system must remain completely independent of and must not be interconnected with any other water system.
- In any case where the supply of water is metered, fire hose reels shall be connected only to the metered supply, not to a fire protection connection.

CLAUSE 6.3.12.10.1: MINIMUM PIPE COVER

The minimum cover to pipelines shall be:

- 600mm in berm and;
- 800mm in road;
- Sufficient such that allowance for future road levels can be made, e.g. lowering of surface level where high crowns exist.

The minimum cover to trunk mains shall be;

- 1000mm for trunk mains.

CLAUSE 6.3.12.11: PIPELINE RESTRAINT

Where water mains are laid on slopes steeper than 1 in 4, they shall be suitably tied and anchored in accordance with the manufacturer's recommendations.

Council requires the use of anchors blocks over self-restrained pipes. Council will not allow the use of timber and recycled plastic blocks.

Anchorage is necessary for valves larger than DN100.

Refer to Drawing WS 507a and WS 507b for details.

CLAUSE 6.3.12.11.1: THRUST BLOCKS

The design of any thrust block for mains greater than or equal to DN200 shall be checked and signed off by a chartered engineer.

CLAUSE 6.3.13: RESERVOIRS AND PUMPING STATIONS

If a storage reservoir is necessary to support the development it shall be provided to the approval of WDC and at the expense of the developer. Any structure shall have a minimum design life of 50 years.

Reservoirs shall have scour and overflow connections and fall shall be provided in the floor to the scour outlet. Depth monitoring and telemetry equipment shall be to the approval of the WDC.

The reservoir design must ensure adequate circulation at all times (to prevent short circuiting and uneven chlorine distribution). An external sample point must be provided to give access to a

representative water sample. A Building Consent is required for all storage structures.

ADD CLAUSE 6.3.13.1 SERVICE RESERVOIRS

The storage capacity shall consist of operating and reserve storage. Operating storage shall cater for demands exceeding the maximum available inflow rate. Reserve storage shall cater for system component failure. The reservoir capacity shall be determined through a risk assessment study of the supply zone, considering the characteristics of the zone to determine the risk to the continuity of water supply in the event a system component fails.

The reservoir design shall consider the following:

- Life cycle cost;
- Water safety/quality considerations; construction material, security, operational turnover;
- Operating storage capacity versus pumping station or supply capacity;
- Reserve storage capacity needed to enable emergency maintenance work;
- Availability of emergency supply from adjacent systems;
- The ratio of estimated long term demands to short term demand to deduce if additional storage be provided with initial storage or allowance for future provision will be more economical;
- Reserve storage capacity should be taken to be equal to 1/3 peak day capacity or 24 hr average summer usage storage capacity shall be provided whichever higher;
- For the design, due consideration shall be given for earthquake resistance. Additional features such as seismic shut off valves and controls shall be considered;
- Geological conditions should be considered when addressing the reservoir site aspect;
- The reservoir can provide no less than the minimum design pressure at the customer's services under peak demand conditions;
- Risk assessment in accordance with *AS/NZS ISO 31000:2009 Risk Management – Principles and Guidelines* shall be undertaken as part of the reservoir and pump station sizing and system configuration process. The minimum storage shall be based on an assessment and costing other risks associated with the most critical supply being interrupted;
- Site and reservoir access requirements/safety considerations (heights/confined spaces);
- Site security;
- Allowance for chlorination boosting or testing facilities;
- Screening/siting/colour to minimise landscape impact;

ADD CLAUSE 6.3.13.2 PUMP STATIONS

- All pump station shall have standby power generators to cut in during power failure and remote telemetry in accordance with WDC requirements.
- A standby pump unit shall be provided in addition to one or more duty units with automatic controls to alternate the pumps between duty and standby.
- Surge conditions arising from normal pump starts, stops and power failure during pumping to be assessed. The impact of any surge on connected pipe systems shall be assessed and any surge reduction measures shall be implemented accordingly.
- Variable speed drives (VSD) on pumps are required for new installations.
- Inline booster pumping without high-level storage to be used only if sufficient pressures can be provided by gravity flow during low demand periods or booster failure. Acceptance of design by WDC will be required.

CLAUSE 6.3.14: VALVES

CLAUSE 6.3.14.1: GENERAL

All valves shall have a protective coating on all parts subject to corrosion.

The valves on the main shall be sluice valves Class 1 to BS 5163:1986 16 bar rating, non- rising 2 spindles and anti-clockwise closing. They shall be a "Grade A" construction and suitable for gland packing under mains pressure. Flanges shall be to AS/NZS 4087:2011 Metallic flanges for waterworks purposes PN16 except where the designer deems this unsuitable. In these circumstances, advice from WDC shall be sought.

Valves to individual properties are to be Acuflo900S manifolds or other approved equivalent. Hand wheels and retaining nuts shall be of corrosion resistant material. Valve packing shall be Teflon or similar approved.

VALVE AND HYDRANT BOXES

Ductile iron surface boxes within the precast top block, shall be fitted over fire hydrants, valves and other fittings on the principal and rider main which allow access for operation and maintenance. Service valves can be fitted in approved plastic surface boxes.

Boxes and surrounds shall be constructed so that no load can be transferred to any pipe or fitting. They shall not move under expected loads. Wood shall not be used as packing between surrounds or surrounds and boxes. Valve and hydrant boxes shall be bedded on compacted granular backfill.

The lids of valve boxes shall be painted light blue, and hydrant boxes painted yellow.

Refer to Drawing WS 503 and WS 504 for details.

STOP VALVES/GENERAL

Stop valves shall be located where possible in the berm and in locations where these cannot become obstructed (e.g. parking areas).

CLAUSE 6.3.14.3: GATE VALVES

Stop valves greater than or equal to DN32 shall be sluice valves. In line stop valves shall be the same diameter as the reticulation main.

CLAUSE 6.3.14.3.2: BRANCH MAINS

Branch mains shall be connected by means of a flange directly to the adjoining mains tee.

CLAUSE 6.3.15: HYDRANTS

Hydrants shall be to NZS/BS 750 with tees flanged for connection to AS/NZS 4087:2011 Metallic Flanges for Waterworks Purposes PN16. The medium pattern shall be used although short or tall may be allowed, in specific circumstances with the approval of WDC.

The following modifications shall be specified:

- Hydrants shall close by turning the spindle clockwise
- All steel nuts and bolts used in the construction of the hydrant shall be hot dip galvanised (or stainless steel) with bolts of the hex headed type.
- The hydrant shall be coated internally and externally with an approved coating, unless otherwise approved by WDC.
- The washer shall be nitrite rubber
- No frost plug drain is to be fitted.

A hydrant riser shall be used where necessary to ensure the spindle top is between 150 and 250mm below finished surface level.

The location marking of fire hydrants shall be as per NZS 4501. Council also requires that the hydrant location be marked by a blue bi-directional RPM in the centreline of each road directly opposite the hydrant.

CLAUSE 6.3.16: CONNECTIONS

The approval of WDC shall be obtained for any proposed connection to a piped water supply service under WDC control. Approval shall be obtained in writing before work commences. Approval to connect will be based on the capacity available (which will be checked by WDC staff at the applicant's expense), as well as the engineering aspects for the proposed works. Connections to piped systems controlled by the WDC will be carried out by WDC or their nominated representative at the applicant's expense.

Property connections shall be made as per Drawing WS 508 and 509.

CLAUSE 6.4: APPROVAL OF PROPOSED INFRASTRUCTURE

Add paragraph:

Once the designer has completed the system review, a written report with the appropriate Producer Statement is to be submitted to Council with the design documentation.

Specific connection requirements should be investigated and agreed with WDC during design to ensure any enabling works in the existing network can be understood and planned.

Application for connection to the WDC network must be completed prior to any connection being undertaken. No connection will be permitted until WDC provides written approval that all WDC specific requirements have been met.

ADD CLAUSE 6.4.2 (I)

All levels shall be referenced to the Hawke's Bay Datum (MSL = +10m). In terms of horizontal alignment the reference shall be to the Hawke's Bay 2000 Datum.

CLAUSE 6.5: CONSTRUCTION:

To ensure that the water supply works are constructed to the required standards, inspection by the developer's agent during construction shall include as a minimum the following:

- Qualifications of the staff constructing the works.
- Pipe sizes and locations (lines and level).
- Quality, dimensions and reinforcement of all materials supplied, unless these are supplied by a manufacturer accredited to ISO 9002.
- Trench depth and width.
- Quality of trench backfill material, and compaction of trench fill material.
- Quality, dimensions and photographic records of all valve, hydrant, pipeline and service connections.
- Certified test results from all pressure testing and disinfection works.

Inspection on site shall be done by a suitably qualified person with a good knowledge of water supply theory and construction practice, who shall liaise closely with and receive instruction from the design engineer for the works being inspected. The inspector shall not have any financial affiliation with the contractor carrying out the work.

The written records and certification of these inspections shall be included in the Completion Report, as specified in Section 1 of NZS 4404:2010.

CLAUSE 6.5.1: EXCAVATION

De-watering water (derived from groundwater systems or bores) may contain those characteristics defined as 'Controlled Stormwater'. Discharge of all de-watering water may require an approval. An alternative is to discharge de-watering water to the wastewater system (in accordance with a trade waste consent) but this option is often limited by the available pipe capacity and potentially high discharge flow rates.

The approval process for applications to discharge de-watering water will primarily focus on the effect of the proposed discharge on the integrity of the stormwater network. Consideration will also be given to the effect of the proposed discharge on the Council's stormwater network consent, but such consideration may not be necessary if the applicant has obtained or intends to obtain a water take/discharge consent from the HBRC.

In general, with good ground conditions, suitable bedding and trench details, installation shall be as shown in Drawing WS 201. In poor ground conditions, potentially unstable ground, or where extreme loadings will be encountered; pipe strength and bedding shall be specifically designed and certified.

CLAUSE 6.5.3: BACKFILLING AND REINSTATEMENT

The backfilling and reinstatement of suitable material (refer to Drawing WS 104) shall be undertaken by suitably experienced contractors. The required standards for backfill material supply and compaction of fill materials shall be described in the contract specification.

The objectives of the backfilling and reinstatement are:

- To prevent undue stress being imposed on the pipelines and

associated infrastructure as a result of settlement or lack of foundation support;

- Control the movement of water into and along the backfill material;
- To control long-term settlement in all materials used to backfill the trench. Comply with Waka Kotahi Specifications F/1 and B/2;
- For backfill and reinstatement projects within a road carriageway, required reference for pavement construction is Waka Kotahi Specification B/2, with materials being specified from the M/3 and M/4 specifications.

CLAUSE 6.5.5: DISINFECTION OF WATER MAINS

Replace the first sentence of Clause 6.5.5 with:

The Developer shall disinfect the entire length of each pipeline after pressure testing, and flushing.

A solution of sufficient Free Available Chlorine (FAC) concentration, to achieve a residual FAC after the minimum contact period (as given in Table 14), of at least 10 mg/litre shall be introduced into the pipeline. The minimum Ct value (the product of FAC concentration and contact time) achieved, shall be 7,200 ((mg/litre). minutes), subject to a pH of less than 8.5. To achieve this Ct value, the FAC and/or the contact time may be adjusted according to the following table.

Relationship between Contact Time and Minimum FAC

Contact Time *(hours)*	Minimum FAC *(mg/litre)*
12	10
10	12
8	15
6	20
4	30
2	60

Connection to the water supply shall ONLY be completed by WDC nominated maintenance contractor.

CLAUSE 6.5.6: DISCHARGE OF TESTING WATER

After the disinfection period the sterilising solution in the pipeline must be flushed into the sewerage system with water from the WDC reticulation but only after approval is obtained on the day from WDC. When connecting to the WDC reticulation, adequate backflow prevention must be provided at the point of connection (see clause 6.3.6.2 for backflow prevention)

The flushing will need to be carefully controlled to avoid surcharging the existing sewers. Alternatively, the developer may de-chlorinate the discharge and dispose of it to the stormwater system or a natural watercourse. If de-chlorination is undertaken, testing shall be carried out to confirm that the chlorine concentration of the washout water has been reduced to less than 0.3 mg/litre. Consent to Discharge from the Regional Council will be required.

The FAC of the washout water shall be tested at regular intervals during the flushing period to confirm the uniformity of the disinfection solution and to avoid unnecessary waste of flushing water.

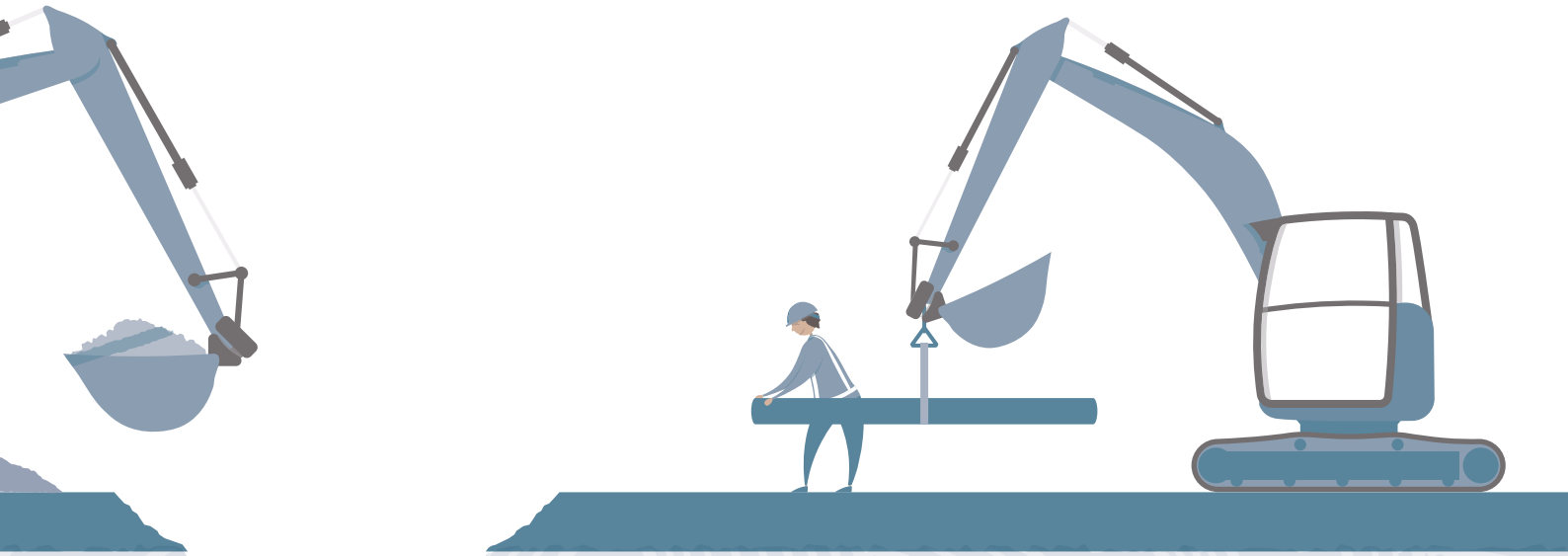
The flushing shall continue until the FAC residual has been reduced to not more than 0.5 mg/litre, and the main left to stand for at least 6 hours. At the completion of the standing time, bacteriological samples shall be taken from the pipeline, at the rate of at least one sample for every 300 m of principal main pipe length.

ADD AN ADDITIONAL CLAUSE: BACTERIOLOGICAL TESTING

It is the Developer's responsibility to ensure that all samples shall be tested for faecal coliforms by a IANZ registered laboratory. Note that sampling should be carried out by trained, IANZ registered personnel to avoid the possibility of contamination of the sample. WDC can assist with the testing if required, at the Developer's expense.

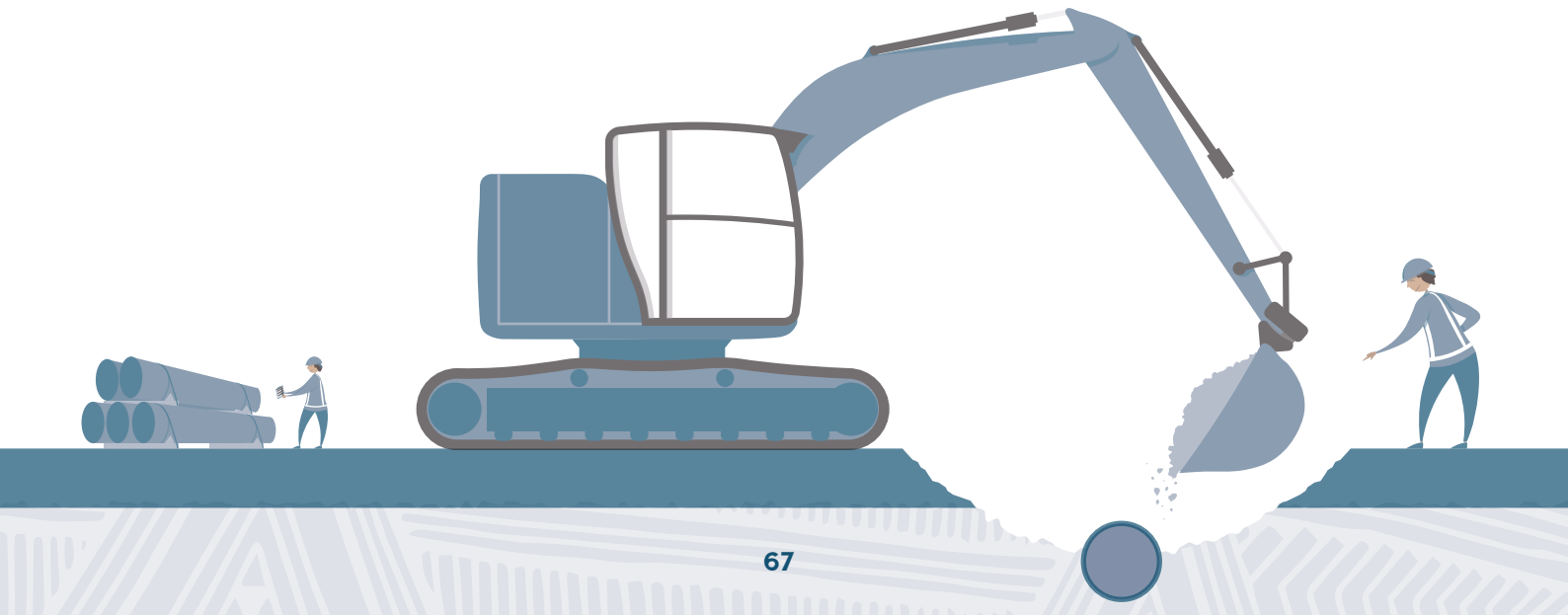
The Developer shall provide WDC with a certified report from the testing laboratory detailing the date, the sampling point location/s and the results achieved. If the results conform to the following requirements, the main may be connected to the existing reticulation. If the results of the bacteriological testing are unsatisfactory, the Developer shall repeat the full sterilising procedure until "clear" microbiological results are achieved.

Sample results will be considered acceptable if nil faecal coliforms and hetrotropic plate counts per 100 ml are reported.



It should be noted that the use of a non-bactericidal jointing lubricant may prevent the achieving of the above results, and that 24 hours is required to obtain nil test results.

If any contaminated water is allowed to enter the pipeline (for any reason), after disinfection (e.g. during connecting up or flooding of the site), the Developer shall re-disinfect the whole pipeline and carry out further confirming tests.



DEVELOPMENT SHALL COMPLY WITH SECTION 7, LANDSCAPE, OF NZS 4404:2010

7.1 GENERAL REQUIREMENTS AND OBJECTIVES

Developments shall comply with Section 7, Landscape, of NZS 4404:2010, whether using the Minimum Engineering Requirements or the Design Guide approaches.

Developers are encouraged to undertake landscaping within their developments that will provide an interesting and varied living environment which is attractive to residents and visitors.

As a minimum, developers are required to:

- Meet the relevant standards and criteria of the District Plan with regard to landscaping and amenity value;
- Submit to the Council for approval with the proposal a comprehensive landscape plan where new roads are created or existing roads extended, and, where required, for reserves and other community features. The plan shall consider existing amenity value and ambiance of and any special character of the adjacent street and landscape;
- Complete the landscaping work in accordance with the approved landscape design and provide temporary screening as protection during building construction;
- Other landscaping and plantings may be required for specific locations e.g. riparian planting in drainage situations, coastal areas and adjacent to open space.

When preparing the landscape plan, the designer shall consider how the Hawke's Bay climate will affect the proposal and seek within the design to mitigate the risk of hot dry summers and cold winters where appropriate.

APPENDIX A - STANDARD CONSTRUCTION DRAWINGS

Standard Construction Drawings of NZS 4404:2010 in Appendix B are to be replaced with the following Wairoa District Council modified Engineering Code of Practice Drawings:

Transportation Drawings

Drawing No.	Issue	Drawing Title
C 1	JULY 2011	SEALED URBAN ROAD TYPICAL CROSS SECTION
C 2	JULY 2011	SEALED RURAL ROAD TYPICAL CROSS SECTION
C 3	JULY 2011	PRIVATE LANES TYPICAL CROSS SECTIONS
C 4	JULY 2011	URBAN ENVIRONMENT VEGETATION CONTROL
C 5	JULY 2011	RURAL ENVIRONMENT MOWING & VEGETATION CONTROL
C 6	NOV 18	INDICATIVE LOCATION OF SERVICES IN BERM
C 7	NOV 18	SHARED FACILITY AND FOOTPATH CONSTRUCTION TYPICAL CROSS SECTIONS
C 8	JULY 2011	STANDARD PEDESTRIAN CROSSING CORNER LAYOUT
C 9	JULY 2011	STANDARD PEDESTRIAN CROSSING DETAIL
C 10	JULY 2011	STANDARD CYCLE BARRIER
C 11	JULY 2011	TYPICAL SIGN DETAILS POLE FOUNDATIONS
C 12	JULY 2011	APPROACH VISIBILITY FOR TRAFFIC SIGNS & STREET FURNITURE
C 13	JULY 2011	APPROACH VISIBILITY FOR TRAFFIC SIGNS & STREET FURNITURE
C 15	JULY 2011	TYPICAL SIGN DETAILS FOR PATH LOCATION
C 16	JULY 2011	TYPICAL SIGN DETAILS SPLITTER ISLAND LOCATION
C 17	JULY 2011	TYPICAL SIGN DETAIL RURAL VERGE
T1	N/A	ACCESS SIGHTLINES
T2	N/A	ACCESS SEPARATION FROM INTERSECTIONS AND OTHER ACCESS
C19	NOV 2018	MINIMUM STANDARDS FOR VEHICLE CROSSINGS ONTO URBAN ROADS
C24	JULY 2011	PRIVATE RURAL ACCESS LOW USE – DIAGRAM C
C26	JULY 2011	PRIVATE RURAL ACCESS – MODERATE VEHICLE USE – DIAGRAM D
C28	JULY 2011	PRIVATE RURAL ACCESS REGULAR HEAVEY VEHICLE USE – DIAGRAM E
C 30	JULY 2011	CROSS-SECTION GUIDELINES FOR VEGES ON RURAL ROADS
C31	NOV 2018	KERB AND CHANNEL AND DISH CHANNEL TYPICAL CROSS SECTIONS
C32	NOV 2018	NIB DETAILS TYPICAL CROSS SECTIONS
C 33	JULY 2011	TYPICAL SPLITTER ISLAND DETAILS
C 34	JULY 2011	TYPICAL ROUNDABOUT DETAILS
C 35	JULY 2011	TYPICAL ROUNDABOUT DETAILS
C 36	JULY 2011	TYPICAL SPEED HUMP
C 38	JULY 2011	PEDESTRIAN VISIBILITY SPLAY
RM 1	JULY 2011	ROAD MARKING CYCLE LANE
RM 2	JULY 2011	ROAD MARKING CYCLE LANE WITHOUT PARKING
RM 3	JULY 2011	ROAD MARKING CYCLE LANE WITH PARKING
RM 4	JULY 2011	ROAD MARKING GIVEWAY / STOP INTERSECTION
RM 5	JULY 2011	ROAD MARKING ROUNDABOUT
RM 6	JULY 2011	ROAD MARKING TRAFFIC SIGNALISED INTERSECTION

Water Services Drawings

Drawing No.	Issue	Drawing Title
WS 103	DEC 2018	TYPICAL MANHOLE COVER ADJUSTMENT AND ARRANGEMENT
WS 104	DEC 2018	TYPICAL TRENCH REINSTATEMENT AND SURFACING DETAILS
WS 105	DEC 2018	STORMWATER PROPERTY DISCHARGE TO KERB
WS 106	DEC 2018	DOMESTIC PROPERTY DISCHARGE BUBBLE UP SUMP
WS 107	DEC 2018	TYPICAL CULVERT HEADWALL DETAILS
WS 108	DEC 2018	TYPICAL CULVERT SAFETY HEADWALL
WS 201	DEC 2018	STANDARD EMBEDMENT DETAIL FLEXIBLE AND RIGID PIPES
WS 202	DEC 2018	STANDARD MANHOLE AND PIPE CONNECTION
WS 203	DEC 2018	MANHOLE – TYPICAL CHANNEL ARRANGEMENT
WS 204	DEC 2018	TYPICAL MAINTENANCE SHAFT DETAILS
WS 204A	DEC 2018	TRADE WASTE CHAMBER DETAILS
WS 205	DEC 2018	FIELD JOINT / REPAIR DETAILS – GRAVITY PIPES
WS 206	DEC 2018	CLOSE PIPE CROSSING SUPPORT DETAIL
WS 207	DEC 2018	STANDARD CHIMNEY MANHOLE DETAIL
WS 301	DEC 2018	TYPICAL SEWER RETICULATION LAYOUT
WS 301A	JAN 2019	SEWER POINT OF DISCHARGE DETAIL
WS 301B	JAN 2019	TYPICAL SEWER RETICULATION CONNECTION LAYOUTS
WS 401	DEC 2018	TYPICAL SUMP BARREL AND OUTLET PIPE
WS 402	DEC 2018	BACK SUMP LID DETAIL
WS 403	DEC 2018	GRATE SUMP LID DETAIL STANDARD AND HIGH CAPACITY
WS 404	DEC 2018	DIRVERTED BACKSUMP DETAIL
WS 405	DEC 2018	STANDARD MAX-PIT DETAIL
WS 406	DEC 2018	STANDARD SPLAY SUMP DETAILS
WS 407	DEC 2018	DIRECT SUMP/LATERAL CONNECTION
WS 501	DEC 2018	TYPICAL WATER RETICULATION LAYOUT PLAN
WS 502	DEC 2018	TYPICAL PIPE AND FITTING INSULATION
WS 503	DEC 2018	TYPICAL VALVE DETAIL
WS 504	DEC 2018	HYDRANT DETAILS
WS 505	DEC 2018	TYPICAL CONNECTIONS TO EXISTING MAINS
WS 506	DEC 2018	FLANGED JOINTS BOLTING DETAIL
WS 507A	JAN 2019	TYPICAL THRUST BLOCK DETAILS SHEET 1
WS 507B	JAN 2019	TYPICAL THRUST BLOCK DETAILS SHEET 2
WS 508	DEC 2018	TYPICAL SERVICE CONNECTIONS FROM MAINS
WS 509	DEC 2018	MANIFOLD BOX AND FITTINGS

APPENDIX B - SUPPORTING INFORMATION

B1 - APPLICATION FOR A DISPENSATION TO THE CODE REQUIREMENTS

Details of Applicant

Name

Phone Number

Email

Details of dispensation requested

Location description (attached plan if applicable)

Background

Code clauses applicable/affected

Reasons for dispensation requested

Any benefits accruing from dispensation

Resultant outcome

Signature of Applicant

Signed _____ Name _____ Date _____

Office use only

Application APPROVED / REJECTED

Signed _____ Services Engineer Date _____

Authorised _____ Position: _____ Date _____

B2 - INSPECTION REQUIREMENTS

The following inspections are required to be made by Council on land development works.

1.0 RETICULATED WASTEWATER SYSTEMS AND STORMWATER DRAINAGE

a) inspections of all pipework after laying and bedding but before backfilling.

b) observation of pressure and leak testing of all pipes and manholes

c) final inspection - made after completion of all land development works. items covered under this inspection will include:
   - access chamber covers
   - access chamber benching
   - access chamber location
   - access chamber central to pipe
   - pipes – continuously graded
   - catchpits - standard type
   - catchpits - sealing off and clear of sediment, debris and road chip
   - stormwater and sewer connections
   - CCTV inspection
   - connection marker posts

d) the construction co-ordinator shall give the council at least one working day notice of request for all inspections required under the above headings and shall have a representative present at all such inspections.

e) in addition to the above council staff may at their discretion visit the site at any time during the project to inspect such things as:
   - general work standards
   - position and depth of connections
   - trench reinstatement standards

Acceptance of wastewater systems and stormwater drainage works for take-over by the council will not be considered until all areas of non-compliance identified during such inspections have been remedied.

2.0 WATER SUPPLY

a) inspection of pipework after laying, bedding and placing of all thrust blocks etc. but before commencement of trench backfill.

b) observation of pressure and leak testing of all pipework, fittings.

c) observation of pipe disinfection and perusal of laboratory test results of the chlorine residual.

d) final inspection - made after completion of all land development works. items covered under this inspection will include:
   - all surface covers
   - surface covers properly founded, orientated, and located
   - hydrants and valves including test operation where requested by the inspector
   - meters correctly located and isolated by valves
   - all house leads and meter manifolds correctly positioned.

e) The construction coordinator shall give the council at least one working day notice of request for all inspections required under the above headings and shall have a representative present at all such inspections.

f) in addition to the above, council may at their discretion visit the site at any time during the project to inspect such things as:
   - general work standards
   - position and depth of pipes and connections
   - trench reinstatement standards
   - the accuracy of as-built surveys

Acceptance of the water supply works for takeover by the council will not be considered until all areas of non-compliance identified during such inspections have been remedied.

3.0 ROADS

a) inspection of subgrade after it has been excavated but before placing of aggregate layers is commenced.

b) inspection of foundation preparation for kerb and channel and footpath construction before any concrete is poured.

c) inspection of basecourse after rolling, grading and sweeping but before surfacing is commenced. This inspection will only be made after deflection test results satisfying the deflection requirements of the Code have been forwarded to Council. Council requires to observe the deflection testing being carried out and this may be combined with the basecourse inspection.

d) Final inspection made after completion of all subdivisional works. Items covered under this inspection include:
   - road surfacing
   - kerb and channel construction including joints and grades
   - footpath including joints and grades
   - berms
   - vehicle and pedestrian crossings
   - traffic services

The Construction Coordinator shall give Council at least one working day notice of request for all inspections required under the above headings and shall have a representative present at all such inspections.

e) In addition to the above, Council officers may at their discretion visit the site at any time during the project to inspect such things as:
   - general work standards
   - metal quality, thickness and compaction standards
   - surfacing techniques and standards

Acceptance of the roadworks for takeover by the Council will not be considered until all areas of non-compliance identified during such inspections have been remedied.

4.0 RESERVES

a) Inspections immediately prior to development works.

b) Inspection of levels after cut/fill grading works carried out but prior to further developments.

c) Inspection of any drainage works installed.

d) Inspection of any water supply/irrigation systems installed

e) Inspection of final grade and cultivation work immediately prior to sowing.

f) Inspection on completion of works.

g) Final inspection at end of ninety (90) day maintenance period.

Note: Any topsoil or fill material which it is proposed to import onto site must be submitted for prior inspection and approved by The Reserves Asset Manager or appointed representative.

5.0 EARTHWORKS

Work is to be signed off by the Council at least at the following times:

a) After any part of the existing ground has been finally stripped and prepared and before the placing of any fill on that ground,

b) After any drain has been installed and before the drain is covered by fill,

c) Such other times as the Engineer considers necessary to enable an assessment of the general standard of earthworks and to be reasonable satisfied that:

   i. Fill is not placed over soft or organic material

   ii. All areas of existing ground showing seepage or potential seepage emission have relief drains provided iii) Unsuitable material is not incorporated into the fill

   iii. The compaction operations are systemic, the moisture content of the fill material appears on visual inspection to be suitable and the degree of compaction appears to be consistent and satisfactory.

B3 - OWNERSHIP TRANSFER AGREEMENT

This agreement is to be used where ownership of assets are to be transferred to the Council.

Ownership of all assets to be vested in the Council will, subject to the following clauses, be deemed to be transferred to the Council at the time an "Asset Compliance Certificate is signed by the Council, not withstanding that some services may already be in use and may be connected to City services.

a) All maintenance periods and guarantees shall commence from the date the Asset Compliance Certificate is signed, or such time as work is completed where it is subject to a bond for due completion, whichever is the later.

b) Where plant and equipment is involved the Council will only accept ownership when all plant and equipment has been proven, notwithstanding that an Asset Compliance Certificate may have been issued.

c) All guarantees for plant and equipment shall commence from the date of the Asset Compliance Certificate or date of proof that all plant and equipment is in operating order and complies with the specifications approved by the Council whichever is the later.

d) All assets transferred to the Council must be free of all encumbrances, liens or other claims and title must be available for Council.

e) All assets, must be insured for full replacement cost until vested in Council, in terms of the above.

f) This is to certify that the above conditions have been or are being complied with and that title will be available to Council on the transfer of assets in terms of the above conditions.

The Developer acknowledges that he will remain responsible for construction defects.

NAME OF DEVELOPMENT _____

Signed for Developer (Authorised Signatory)

Name _____ Position _____

Date _____

Signed for Council

Name _____ Position _____

Date _____

B4 - ASSET VALUATION FORMAT

Where there are a variety of asset types within a category, then the different types shall be listed and valued separately. Asset valuations are a Department of Internal Affairs requirement to record assets vested in Council. All assets vested in Council shall be recorded and itemised.

1. ROADS

Including pavements, kerbs, paths, berms etc. in the format (Note: catchpits and catchpit leads are not part of the road valuation for this purpose). Example format:

Description	Unit	Quantity	Value
(a) Traffic Pavements			
Pavement structure	m^2		
Asphaltic surfacings	m^2		
Interlocking pavers	m^2		
(b) Pedestrian Pavements			
Concrete footpaths	m^2		
Asphalt footpaths	m^2		
Interlocking pavers	m^2		
(c) Drainage			
Kerb and channel	m		
Concrete dish channels	m		
Sealed dish channels	m		
Catchpits	No		
Catchpit leads	m		
Culverts and bridges with cross section areas less than 3.4 m^2	m		
(d) Bridges and Structures			
Road bridges and culverts with cross section areas equal or to greater than 3.4 m^2	m		
Pedestrian bridges	m		
Structures	No		
Outdoor seats	No		
Bollards	No		
Cycle stands	No		
Litter bins	No		
Planter boxes	No		
Bus shelters	No		
(e) Road Lighting			
Road lights	No		
Road light poles	No		
Decorative lights	No		
(f) Traffic Services and Safety			
Traffic signals	No		
Traffic signs	No		
Road name plates	No		
Safety barriers	m		
Sight rails	m		
(g) Land (Total Area)	m^2		
Total Roading System Asset			

2. RETICULATED WASTEWATER SYSTEMS

Pipe lengths shall be taken from the centres of access chambers. Access chambers and special facilities are counted separately. Example format:

Description	Unit	Quantity	Value
Land (total area)	m^2		
DN150 SN16 uPVC gravity pipework	m		
DN125 PE100 PN10 SDR17 (109.9mm ID) pressure main	m		
DN100 SN16 house leads	No		
DN1050 RC access chambers	No		
Pump station including all M&E equipment - itemise	No		
Assets removed (abandoned in-situ or removed) - to be itemised	No		
Total Reticulated Wastewater System Asset			

3. STORMWATER DRAINAGE

Pipe lengths shall be taken from the centres of access chambers. Access chambers, normal inlet structures etc. shall be counted separately. Catchpits and catchpit leads shall be covered under stormwater drainage. Example format:

Description	Unit	Quantity	Value
Land (total area)	m^2		
DN375 RCRRJ gravity pipework	m		
DN1050 RC access chambers	No		
Special structures, eg. detention, pump etc. - to be itemised	No		
DN150 SN16 house leads	No		
Assets removed (abandoned in-situ or removed) - to be itemised	No		
Total Stormwater Asset			

4. WATER SUPPLY

The value of water reticulation shall be summarised by total length of each pipe size and material. Fire hydrants and valves shall be summarised separately by number of each size. Service Connections

shall be summarised by number and length of each size. Other features such as pump stations and reservoirs shall be summarised by structure, pipework, electrical and land. Example format:

Description	Unit	Quantity	Value
Land (total area)	m^2		
DN100 PN9 uPVC	m		
DN63 PE80 SDR13.6 PN10 (55.2mm ID) ridermain	m		
DN20 PE80 SDR11 PN12.5 (16.1mm ID) property connection	No		
DN80 hydrants	No		
Resilient seated DN100 gate valves	No		
Special items, eg. booster pump and chamber - to be itemised	No		
Assets removed (abandoned in-situ or removed) - to be itemised	No		
Total Value Water Asset			

5. RESERVES

This shall include land value and the value of any plantings, fencing and any permanent equipment. Example Format:

Description	Unit	Quantity	Value
Land (total area)	m^2		
Fences and barriers	Metres		
Trees and shrubs	No		
Gardens	LS		
Underground services (seperate each)	Metres		
Footpaths	Metres		
Car parks (improvements)	m^2		
Lighting (poles and type of lantern)	No		
Park furniture (specify seperately)	LS		
Play equipment (inc. safety surfaces)	LS		
Buildings or other structures (list)	LS		
Water features and associated controls (list)	No		
Total Reserves Asset			

B5 - RAMM UPDATE

RAMM UPDATE
Surfacing Information

Job Name			
Start RP (m)		Start Name	
End RP (m)		End Name	
Surface Date		Life	
Width		Offset	
Seal Area			
Surface Material			
Material Source			
Overlay Depth (mm)			
Chip 1		Chip 2	
PSV		ALD	
Binder		Flux Qty	
Cutter Qty		Cutter Type	
Adhesion Qty		Adhesion Type	
Additive Qty		Additive Type	

Application Rate

Organisation	
Surface Spec	Amend P/4
Notes	
Prepared by	
Date	

RAMM UPDATE
Pre-Seal Repairs Pavement Information

Job Name

Start RP (m) | Start Name

End RP (m) | End Name

Repair Date | Repair Type

Width | Repair Depth

Repair Area | Offset

Basecourse Material

Material Description

Basecourse Depth (mm)

Subbase Material

Subbase Description

Subbase Depth

Subgrade Material

Subgrade Description

CBR | Test Scala

Organisation

Notes

Prepared by

Date

RAMM UPDATE
Pavement Marking

Job Name

Start RP (m) Start Name

End RP (m) End Name

Marking Type

Marking Description

Side Offset CL

Width Colour

Marked Date

Notes

Marking Type	Description	Marking Type	Description
M01	Centreline 100mm cont.	**M47**	Disabled parking
M02	Centreline 100mm 3X7.	**M48**	No parking
M03	No overtaking 100 cont.	**M49**	Children
M12	Lane 100mm 3X7	**M50**	Stop ahead
M16	Painted shoulder	**M51**	Give way ahead
M17	Painted island	**M52**	Pedestrian crossing ahead
M18	Island pre-warn	**M56**	School
M19	Right turn-bay	**M59**	Intersection cont. lines
M20	Pedestrian crossing	**M60**	No stopping lines
M21	Pedestrian crossing diamond	**M61**	Loading zone
M24	Railway crossing	**M62**	Bus stop
M27	Passing lane taper	**M63**	Taxi stand
M29	One lane bridge	**M65**	Park limit lines parallel
M30	Stop	**M66**	Park meter bays
M31	Give way	**M67**	Park meter angles
M38	Speed circles	**M70**	Fire hydrant
M40	Straight arrow	**M71**	Caution
M41	Right turn arrow	**M72**	Cycle lane
M42	Left turn arrow	**M73**	Cycle symbol
M43	Combination arrows	**M74**	Flush median
M44	Turn left	**M77**	Traffic signal limit lines
M45	Turn right	**M78**	Give way limit lines
M46	Keep clear	**M79**	Stop limit lines

Prepared by

Date

Street Light RAMM Data Capture

This form shall be used for all developments requiring additional street lights to be maintained by Wairoa District Council. Subdivisions require one form for each pole and lamp type installed for each different road.

Location Details

Street Light Installing Company _____ Date of Installation _____

Installer Contact Name _____ Phone Number _____

Road Name _____ Suburb _____

Light Route Position
(GPS co-ordinates preffered OR fill in the boxes below)

House Numbers on Same Side of Street LEFT _____ RIGHT _____

House Numbers on Opposite Side of Street LEFT _____ RIGHT _____

Features on Same Side of Street Light
(Bus stop, power transformer, etc.)

Features on Opposite Side of Street Light
(Bus stop, power transformer, etc.)

Pole Details

Pole Primary Use
(Lighting unit, electrical distribution) _____ Owner of Pole _____

Pole Construction
(Steel, concrete, etc.) _____ Shape
(Round, square, etc.) _____

Manufacturer/Make _____ Model _____

Mounting
(Planted, frangible base) _____ Control
(Relay, PEC, other state) _____

Network Company ID No.
(Office use only) _____ Council ID No.
(Office use only) _____

_____ _____

Base Dimensions (mm) _____ Level (m)
(Height of base of pole from road surface) _____

Pole Height (m) _____ Height of Bracket (m)
(Where bracket is fixed to pole) _____

Pole Off Set (m)
(Steel, concrete, etc.) _____ Light Heigth (m)
(From centre of light to road surface) _____

Pole Coating
(Painted, powder coated, galvanised) _____ Colour _____

Bracket Details

Manufacturer _____ Type _____

Bracket Angle in Degrees
(From pole) _____ Light Tilt in Degrees _____

Luminaire Details

Manufacturer of Light Fitting		Model	
Coating on Lamp Cover *(Painted, powder coated, galvanised)*		Colour	
Manufacturer/Make		Wattage & Type	

B6 ROADING INSPECTION AND TESTING SCHEDULE

Roading Inspection and Testing Schedule			
Phase	**Testing**	**Passed Yes/No**	**Council Representative Comments/ Signed/Date**
Construction of Road			
Completion of Subgrade	1. To confirm that the pavement excavation depth and width is in accordance with the approved design. 2. To check that the sub-grade material is consistent in type and colour with the tested material on which the design was based. 3. The pavement surface is even and complies with the design crossfall. 4. To ensure that the subgrade is free from wet spots or any other visually defective areas e.g. tree stumps and other organic/inorganic matter. 5. CBR test results to confirm the strength of subgrade and are consistent with Design CBR.		
Completion of Subbase	1. The pavement surface is even and complies with the design crossfall. 2. The subbase has been trimmed to the correct level to allow for the placement of the specified thickness of basecourse. 3. Testing in accordance with TNZ B/2.		
Completion of Basecourse	1. The pavement surface is even and complies with the design crossfall. 2. The base course has been trimmed to the correct level to allow for the placement of the specified thickness of surfacing. 3. Any kerb and channel which has been damaged during construction (including kerb which contains excessive visual defects, scraping etc.) is to be replaced/repaired. 4. Where new work joins to an existing sealed pavement, a saw cut edge 150-300mm into the existing pavement is to be provided to enable a smooth join to be made. Where the sequence of construction dictates otherwise and the edge is liable to be damaged prior to the placement of the AC, this may be done immediately prior to the AC being placed. 5. Basecourse stringing - provide construction check sheet. 6. Compaction tests in accordance with TNZ B/2. 7. Benkelman beam test results.		
Road Surface Preparation for Sealing	The surface shall be clean, dry, uniform, tightly bound and shall present a stone mosaic appearance. The surface shall be rotary broomed beforehand so that the true surface is visible.		
Road Marking, Signs & Controls	To confirm that all road markings, signs are in accordance with the approved designs & MOTSAM.		
Construction of Kerb & Channel			
Completion of Kerb & Channel Subgrade	To ensure that the subgrade is free from wet spots or any other visually defective areas.		
Completion of Kerb & Channel Base	CIV/Nuclear Densometer test at 10 metre intervals.		
Kerb & Channel Stringline	To check kerb level, location and alignment in accordance with the approved design.		
Subsoil Drainage	Provide construction check sheet.		

Roading Inspection and Testing Schedule			
Phase	**Testing**	**Passed Yes/No**	**Council Representative Comments/ Signed/Date**
Construction of Footpath			
Completion of Footpath Subgrade	To ensure that the subgrade is free from wet spots or any other visually defective areas.		
Completion of Footpath Base	1. To ensure that the footpath base has the required depth & width. 2. CIV/Nuclear Densometer test at 10 metre intervals.		
Street Lighting			
Street Lighting	To confirm that all street lights are in accordance with the approved design.		
Construction of Berm			
Landscaping and Planting	1. Ensure the line of sight is maintained for vehicular and pedestrian movements. 2. Ensure that no trees are planted within 3 metres to a vehicle crossing. 3. Ensure that no trees are planted within 10 metres to a street light. 4. Trees are staked and tied to neatly cut timber stakes capable of providing support to the tree for at least 3 years. 5. A water supply tap shall be provided for the landscaped areas on the roundabout central island.		
Berm Area for Topsoiling and Sowing	1. Specification Reference clause F2.11 2. Approved topsoil from a Nominated Supplier.		

B7 AS BUILT CERTIFICATION

To: Group Manager Community Assets and Services
Wairoa District Council
P.O. Box 54
Wairoa 4160

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

B8 ENGINEERS INSPECTION CHECKLISTS

Road and Traffic Certification and Subdivision Construction	
Name of Subdivision	
Council File Number	
Main Contractor	
Roading Sub Contractor	
Engineer Responsible for Supervision	
Qualifications	

		Y	N/A	N	Inspection or Date	Comments
A	**Kerbing and Channeling**					
	Kerb and 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 asper 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 at 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 at time of sealing					
E	**Sealing/ Asphaltic Concreting**					
	Sealing chips supplied comply with documents approved by Council					
	Sealing chips sufficiently dry and good adherence to binder achieved					

		Y	N/A	N	Inspection or Date	Comments
	Bitumen cutback approved by supervising Engineer					
	Application rate approved by supervising Engineer					
	Chip rolled with pneumatic tyre rollers as per documents approved by Council					
	Second chip coat 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 and by approved specification					
	Street lights activated					
	Footpaths completed					
	All pedestrian accessways constructed in accordance with Council's Code of Practise					
	Berms topsoiled, grass established and mown once					
	Pedestrian accessways fenced					
	Road marking completed as per documents approved by Council					
	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 1.8.6 and 1.8.6.1 of this ECOP. I have been engaged by the owner to supervise the roading construction for the above subdivision. As per clause 1.8.6, 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 and Subdivision Construction

Name of Subdivision _____

Council File Number _____

Main Contractor _____

Roading Sub Contractor _____

Engineer Responsible for Supervision _____

Qualifications _____

		Y	N/A	N	Inspection or Date	Comments
A	**Lines and Laterals**					
	All pipe diameter and classes as per approved					
	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 to 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 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	**Slumps and Structures**					
	All slumps cleaned out at completion of roading					
	All inlet and outlet structures as per approved engineers drawings					

Comments

I am experienced in stormwater reticulation and, as per clause 1.8.6 and 1.8.6.1 of this ECOP for the above subdivision. As per clause 1.8.6, 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 and Subdivision Construction

Name of Subdivision _____

Council File Number _____

Main Contractor _____

Roading Sub Contractor _____

Engineer Responsible for Supervision _____

Qualifications _____

		Y	N/A	N	Inspection or Date	Comments
A	**Lines and Laterals**					
	All pipe diameter and classes as per approved engineers 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 to 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					
	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 Council's Code					
B	**Manholes**					
	All joints sealed as per manufacturer's instructions					
	No infiltration of water visible					
	All hunching 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	**Slumps and Structures**					
	Rodding eyes identified at surface with approved box letters RE on lid					

Comments

I am experienced in the construction of water reticulation and, as per clause 1.8.6 and 1.8.6.1 of this ECOP. I have been engaged by the owner to supervise the water reticulation construction for the above subdivision. As per clause 1.8.6, 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 and Subdivision Construction

Name of Subdivision _____

Council File Number _____

Main Contractor _____

Roading Sub Contractor _____

Engineer Responsible for Supervision _____

Qualifications _____

	Y	N/A	N	Inspection or 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 180mm at 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 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 building					
The new subdivision reticulation system connected to Council's mains					

Comments

I am experienced in the construction of water reticulation and, as per clause 1.8.6 and 1.8.6.1 of this ECOP. I have been engaged by the owner to supervise the water reticulation construction for the above subdivision. As per clause 1.8.6, 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 _____

MAHIA BEACH COMMUNITY SEWERAGE SCHEME

AGREEMENT TO CONNECT

Date…6/09/2018

To the Project Manager
Mahia Beach Community Sewerage Scheme
Wairoa District Council
P O Box 54
WAIROA 4160

Valuation Number: 08700-42678

I/We…Rob Mayhead
(full names of owners to be inserted)

together with my/our executors transferees and assigns.

Being the owner of the "property" situated at:
LOT 5 DP 478121
Mahia Heights
Mahia Beach

("the property") have received advice from Wairoa District Council of the works and costs that will be involved to connect the property into the Mahia Beach Community Sewerage Scheme.

I/we understand that my/our agreement to connect into the Mahia Beach Community Sewerage Scheme carries with it the following obligations:

1. **Ownership and responsibility for public infrastructure.** The Wairoa District Council will own and have full responsibility for the operation and maintenance of all parts of the Mahia Beach Community Sewerage Scheme beyond the property boundary.

2. **Ownership and responsibility for private infrastructure.** The property owner will own and take full responsibility for the operation and maintenance of all drainage and sewage pipelines on the property extending from source to the inlet of the septic tank.

3. **Ownership and responsibility for partnership infrastructure on private property.** The property owner will **own** all drainage and sewerage pipelines and associated fittings extending from the entry to the septic tank to the property boundary, including the septic tank, pump, filter, control panel and ancillary fittings and equipment. The **responsibility** for maintenance and management of this partnership infrastructure will lie with the Wairoa District Council until stated otherwise, and this responsibility will be exercised in accordance with the Access and Service provision described in Clause 7 below.

As specified in the Wairoa District Council Trade Waste and Wastewater Bylaw 2012, no permanent structures will be allowed to be built within one metre of the septic tank or any drainage and sewage pipelines extending from the septic tank to the property boundary, unless prior written approval of the Wairoa District Council has been obtained.

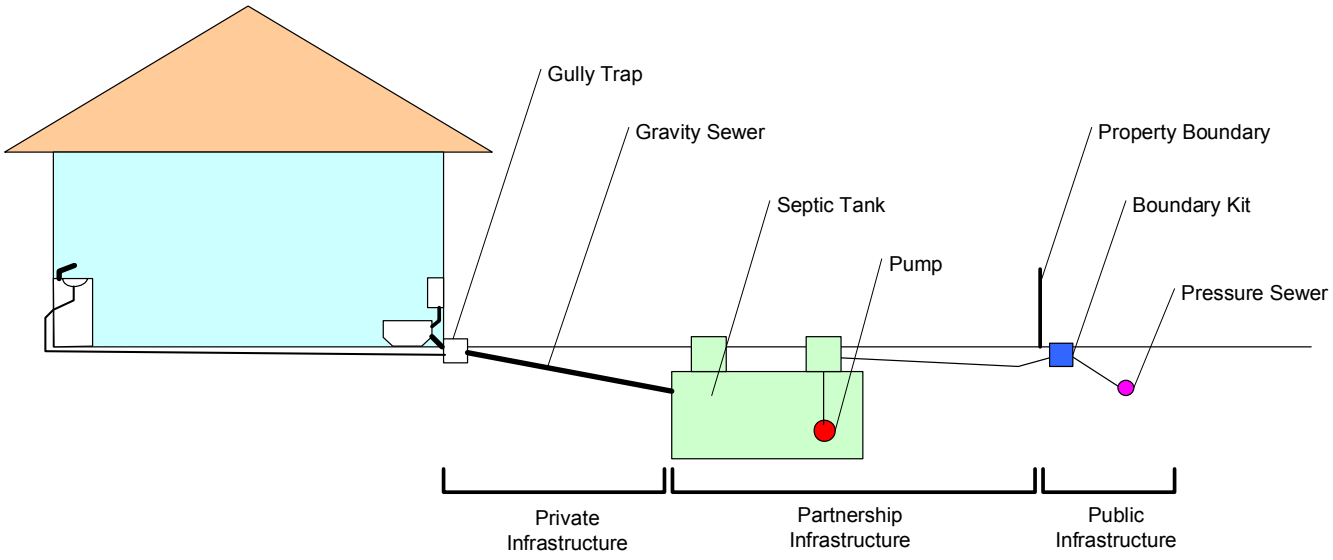
4. **Capital Costs.** The Wairoa District Council will recover from the property owner, and the property owner will pay to the Wairoa District Council, the allocated proportion of the capital cost of establishing and commissioning the Mahia Beach Community Sewerage Scheme. These "one-off" costs will be levied on the property pursuant to the provisions of the Local Government (Rating) Act 2002.

5. **Operational Costs**. The Wairoa District Council will recover from the property owner, and the property owner will pay to the Wairoa District Council, the allocated proportion of the on-going costs of operating and maintaining the Mahia Beach Community Sewerage Scheme. These annually recurring costs will be levied on the property pursuant to the provisions of the Local Government (Rating) Act 2002.

6. **Operational Rules**. The Wairoa District Council will from time to time establish and notify rules and/or bylaws governing discharges into and connections with the Mahia Beach Community Sewerage Scheme which will be binding upon the property owner. These rules and/or bylaws together with any variations to them, will be set by the Wairoa District Council following the Special Consultative Procedure specified by Section 83 of the Local Government Act 2002.

7. **Access and Service**. The Wairoa District Council is entitled by this agreement, and in accordance with the provisions of Section 181 of the Local Government Act (2002), to have access to the property for the purpose of the maintenance of all and any parts of the Mahia Beach Community Sewerage Scheme which are downstream from the inlet to the septic tank to which the property is to be connected.

Pictorial Sketch of Scheme Components and Responsibilities



AGREEMENT TO CONNECT

It is agreed that the works shall be installed for the benefit of the property owner and that no compensation shall be payable to the land owner whatsoever, in consideration for the land owner giving consent to the Wairoa District Council to place the works on the land.

I/we confirm my/our agreement to the property being connected to the Mahia Beach Community Sewerage Scheme, in accordance with the obligations recorded herein.

I/we elect to pay the proportion of capital costs referred to in Clause 4 above of the Mahia Beach Community Sewerage Scheme allocated to the property. Payment will include direct payment in full.

In the event that we sell or transfer the property to another person or party, I/we as vendor or transferor of the property will ensure that the purchaser will enter into an agreement with Wairoa District Council (together with its successors and assigns) so as to pass on to any purchaser or transferee the continuing obligations under this agreement.

.....
(Signature of the Wairoa District Council)

2

....
(Signatures of the property owners/s)

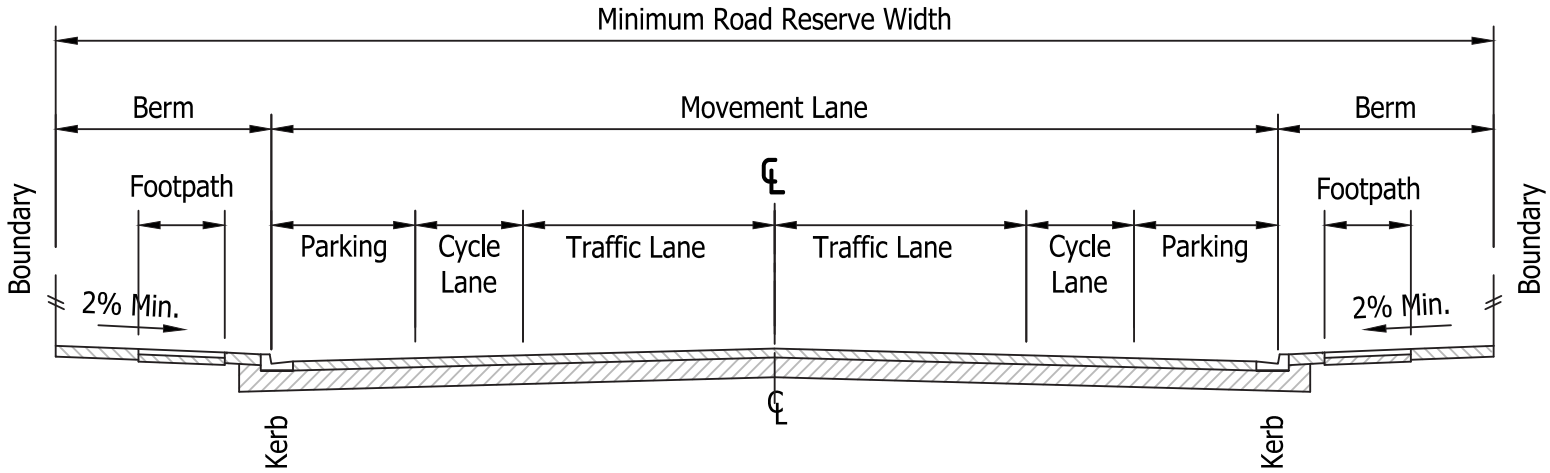
Confirmation of Contact Phone Nos:

Evening:

Daytime:

APPENDIX D - ENGINEERING CODE OF PRACTICE DRAWINGS

The Engineering Code of Practice drawings can be found on the following pages.



Refer To Table C2 For Dimensions

WAIROA DISTRICT COUNCIL

ROAD CONTROLLING AUTHORITY

ENGINEERING DIVISION

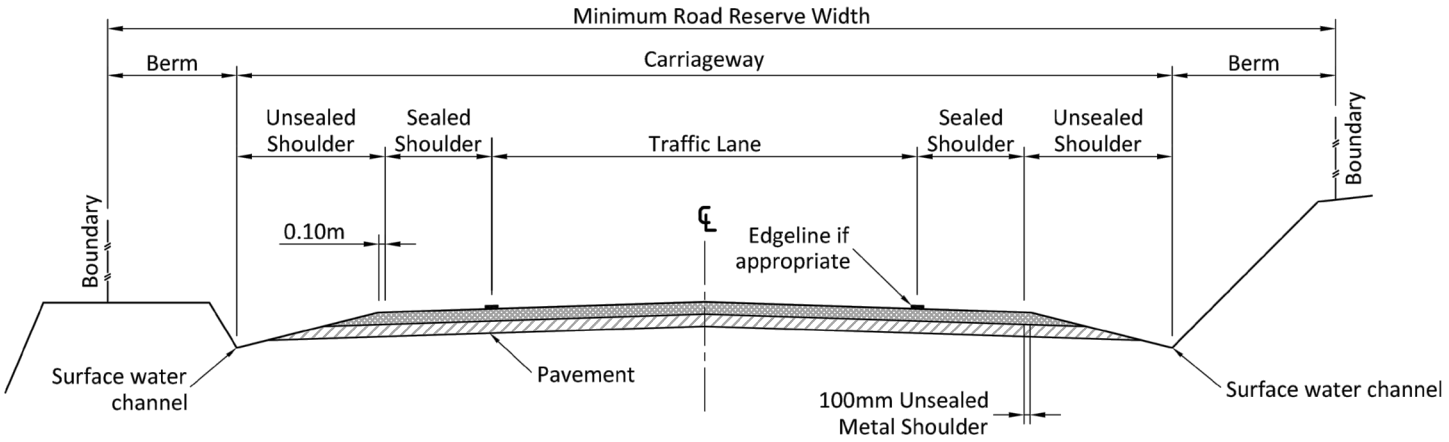
TYPICAL SEALED URBAN ROAD CROSS SECTION

Scale N.T.S.

Drawing No. C1

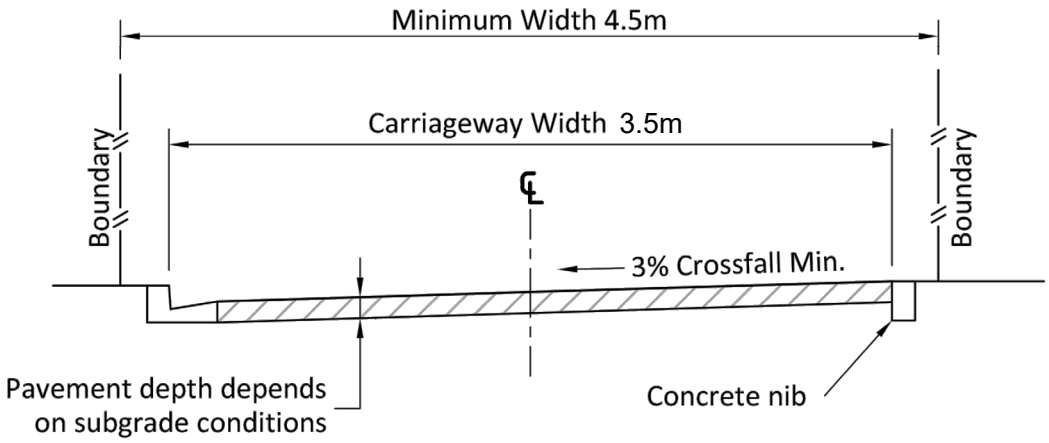
Issue MAR 2018

Trim Reference Manuals\CoP

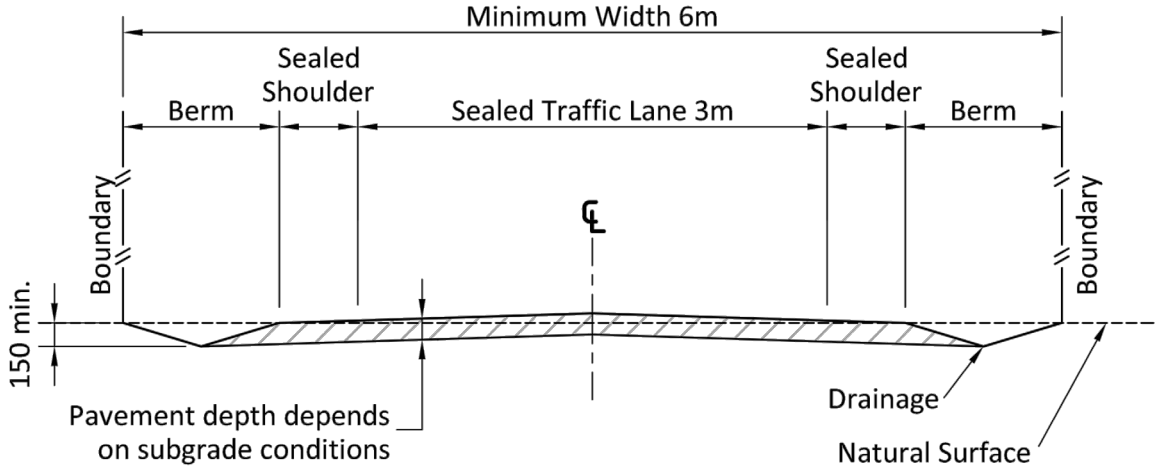


Refer To Table C2 For Dimensions

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C2
	SEALED RURAL ROAD TYPICAL CROSS SECTION	Issue JULY 2011	
		Trim Reference Manuals\CoP	



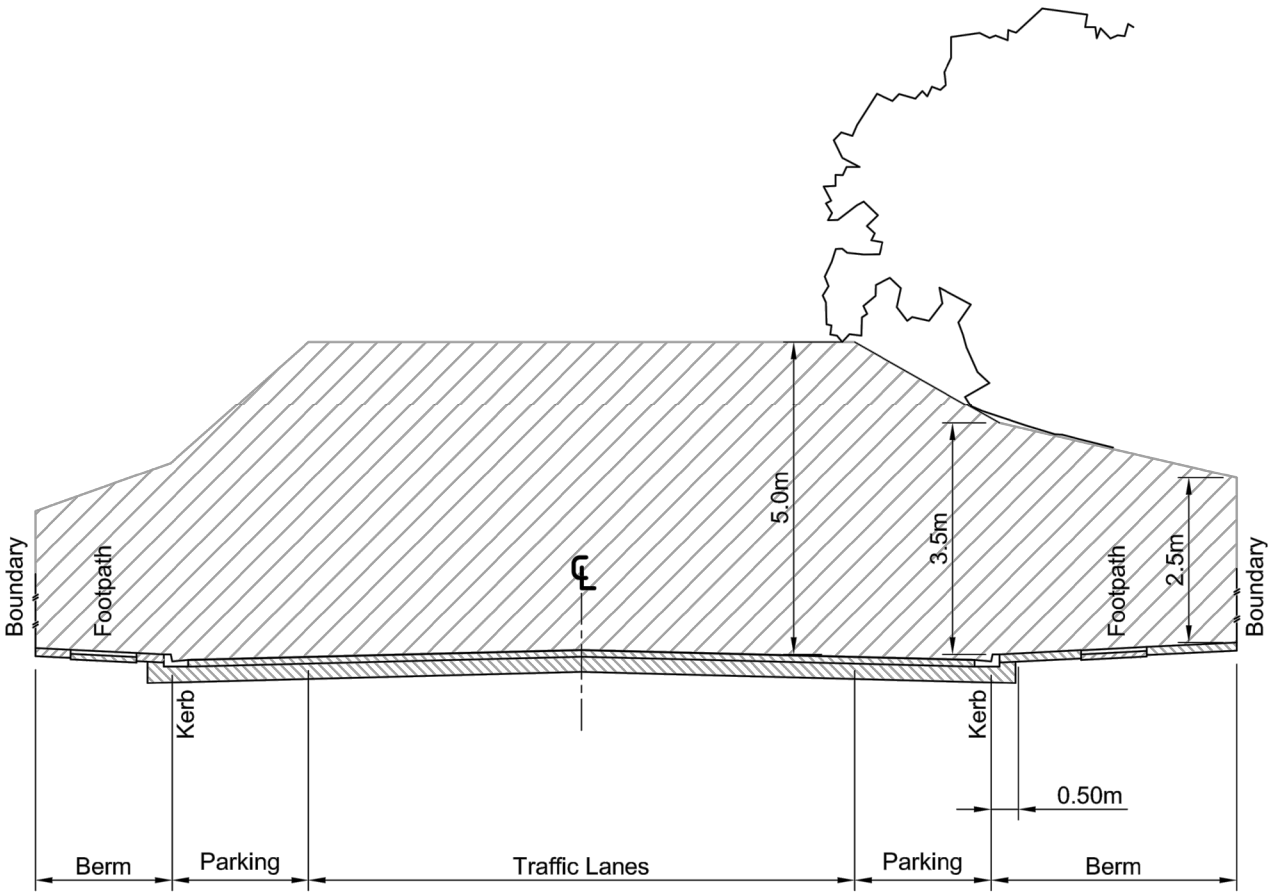
URBAN LOW VOLUME ACCESS



RURAL LOW VOLUME ACCESS

Refer To Table C2 For Dimensions

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C3
	PRIVATE LANES TYPICAL CROSS SECTIONS	Issue July 2011	
		Trim Reference Manuals\CoP	



WAIROA DISTRICT COUNCIL

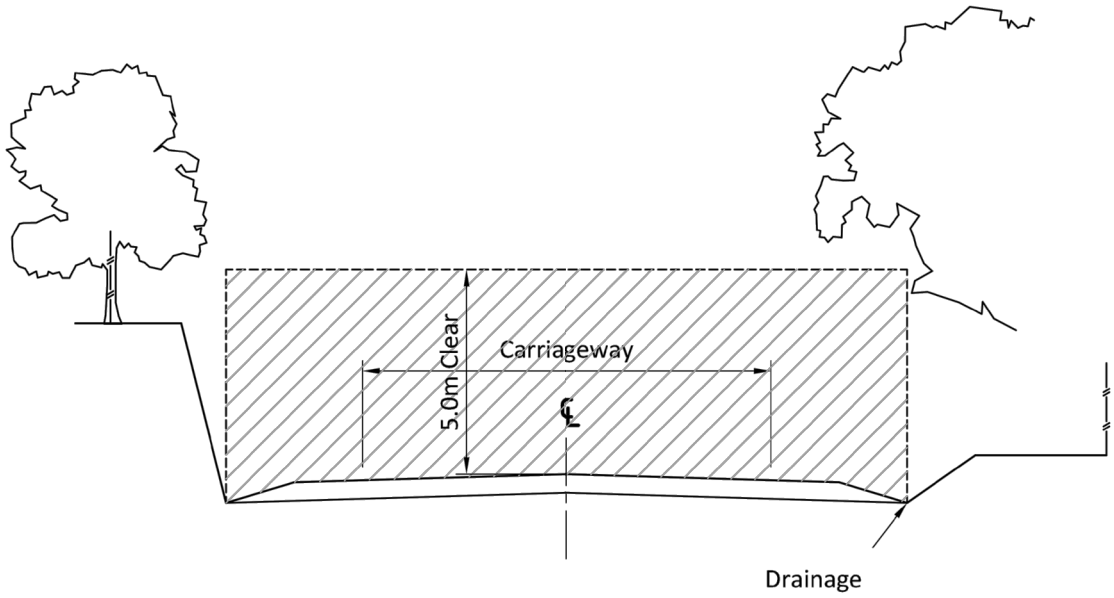
ROAD CONTROLLING AUTHORITY

URBAN ENVIRONMENT
VEGETATION CONTROL

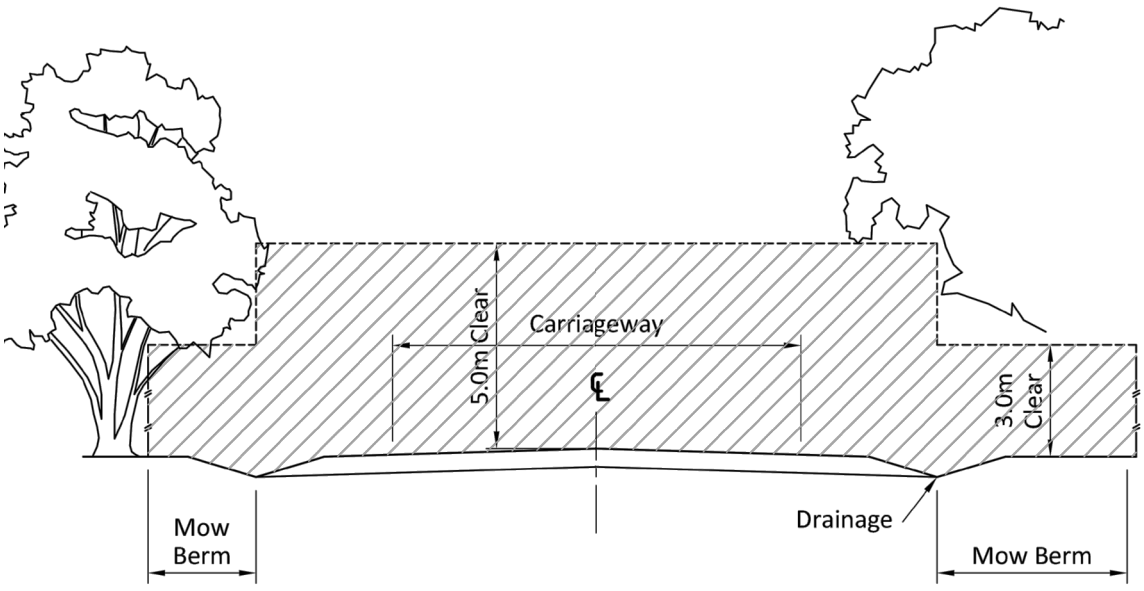
Scale	Drawing No.
N.T.S.	C4

Issue JULY 2011

Trim Reference
Manuals\CoP



RURAL - MOWING NOT POSSIBLE



RURAL - MOWN

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S.	Drawing No. C5
	RURAL ENVIRONMENT - MOWING & VEGETATION CONTROL	Issue July 2011	
		Trim Reference Manuals\CoP	

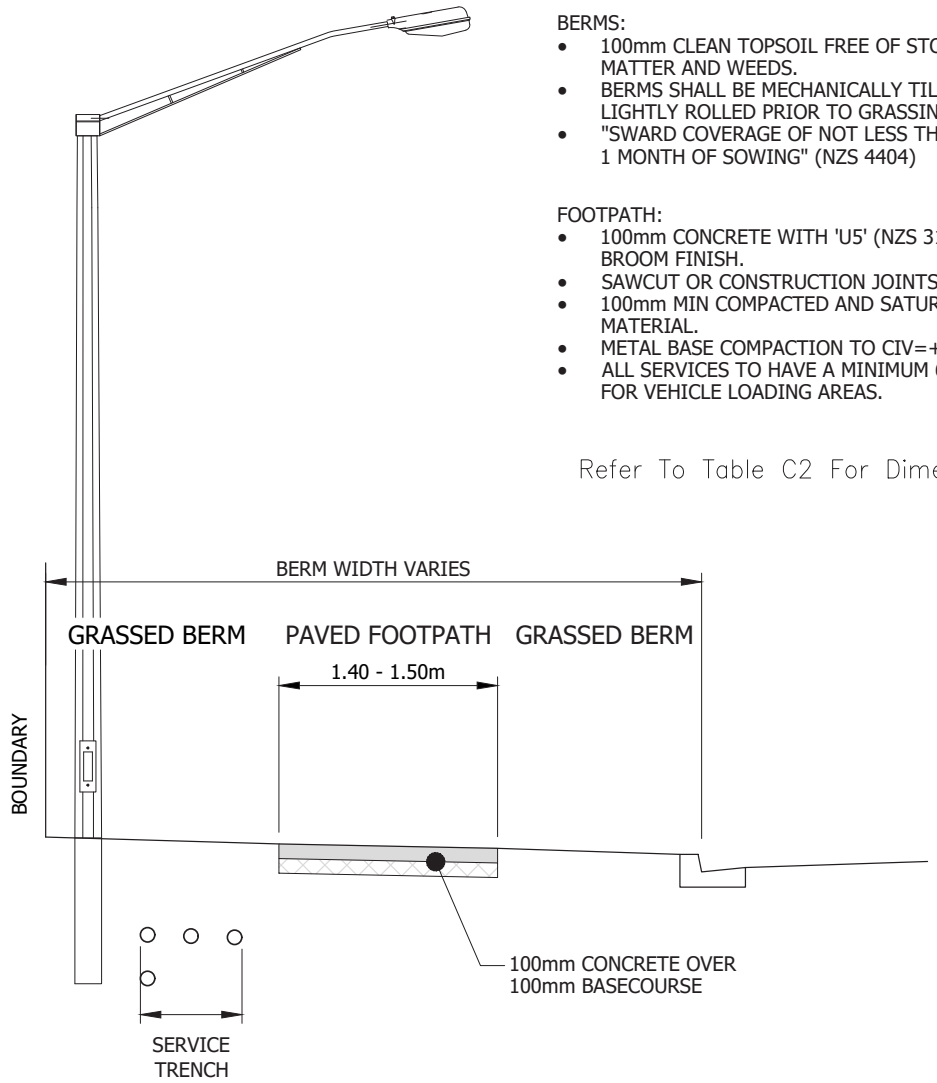
BERMS:

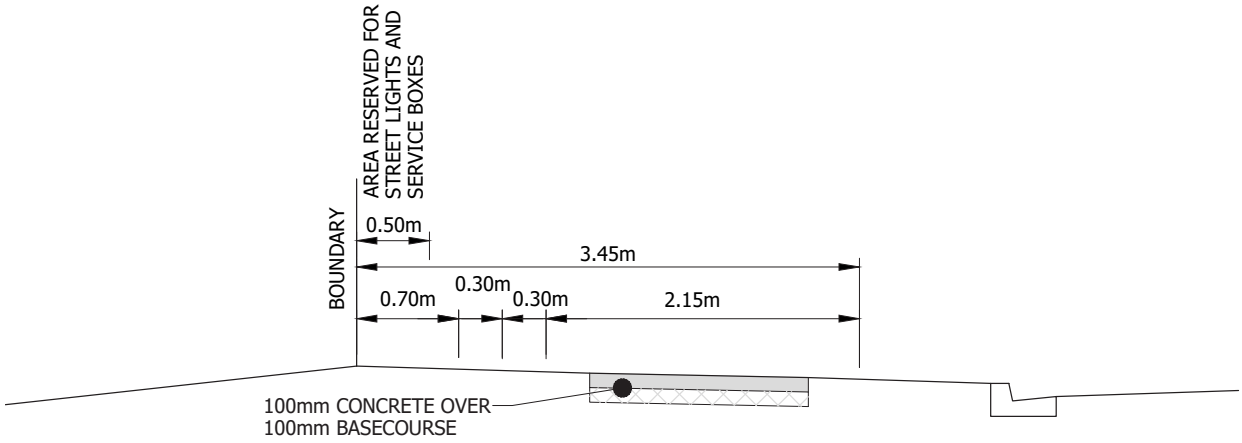
- 100mm CLEAN TOPSOIL FREE OF STONES, FOREIGN MATTER AND WEEDS.
- BERMS SHALL BE MECHANICALLY TILLED AND LIGHTLY ROLLED PRIOR TO GRASSING.
- "SWARD COVERAGE OF NOT LESS THAN 90% WITHIN 1 MONTH OF SOWING" (NZS 4404)

FOOTPATH:

- 100mm CONCRETE WITH 'U5' (NZS 3114) LIGHT BROOM FINISH.
- SAWCUT OR CONSTRUCTION JOINTS AT 3m CENTERS.
- 100mm MIN COMPACTED AND SATURATED M4 MATERIAL.
- METAL BASE COMPACTION TO CIV=+24.
- ALL SERVICES TO HAVE A MINIMUM 600mm COVER FOR VEHICLE LOADING AREAS.

Refer To Table C2 For Dimensions





LV POWER DUCT/CABLE
800 COVER

HV POWER DUCT/CABLE
1.1m COVER

RIDERMAIN 600mm COVER

WATER MAIN 750mm COVER

TELECOM DUCT 600mm COVER

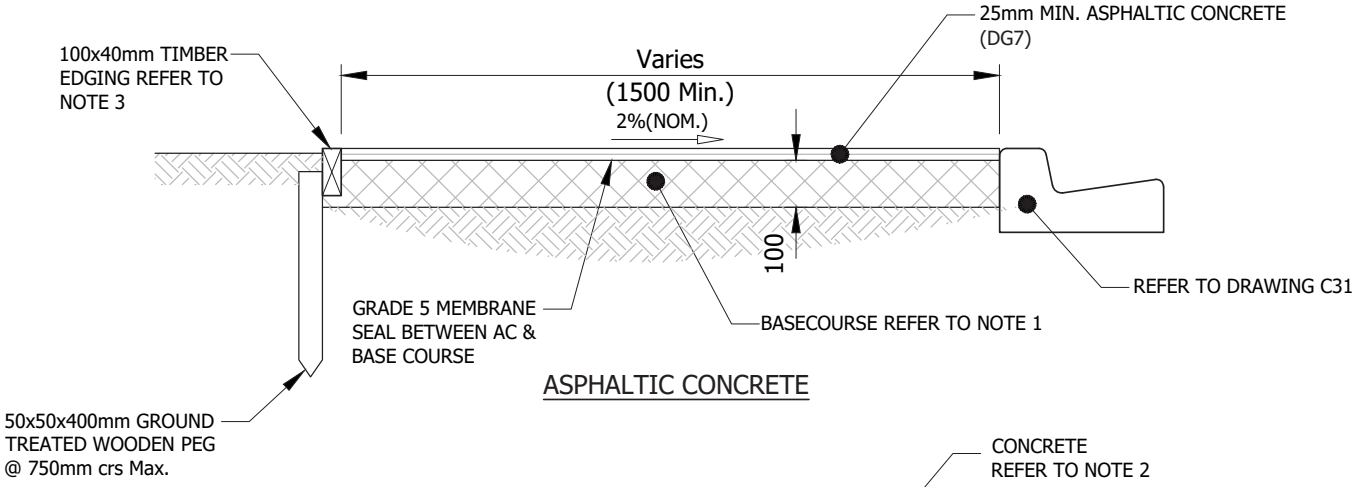
GAS LMP 600mm COVER

NB: POWER DUCTS UNDER THE CARRIAGEWAY SHALL HAVE THE FOLLOWING COVERS

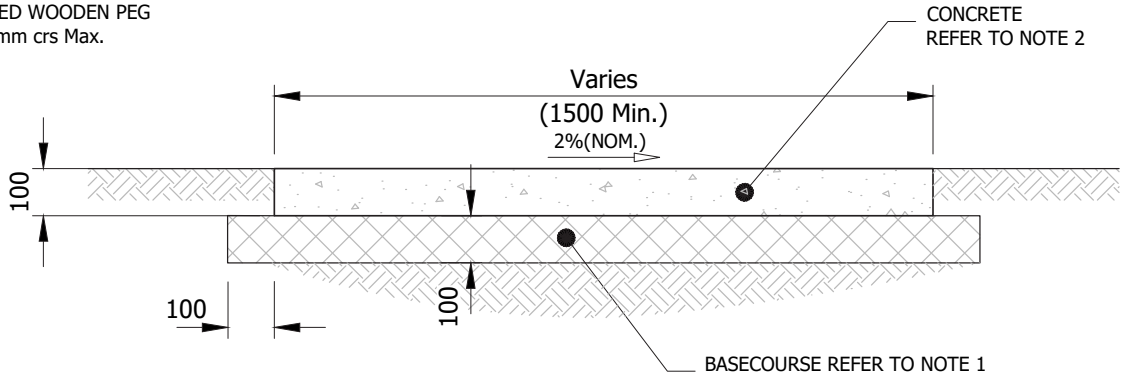
- LV : 1.1m
- HV : 1.3m

NOTE:
COVER TO INDIVIDUAL SERVICES NEEDS TO BE CONFIRMED WITH APPROPRIATE UTILITY COMPANY.

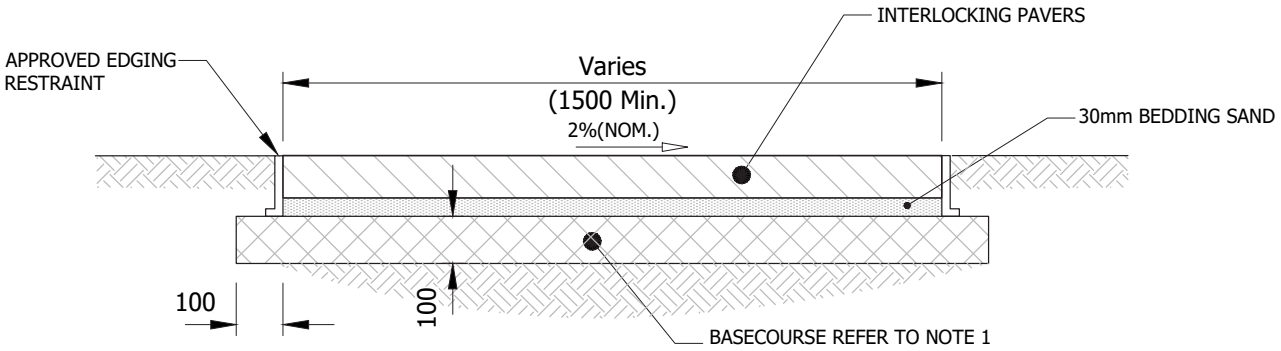
WAIROA DISTRICT COUNCIL	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	INDICATIVE LOCATION OF SERVICES IN BERM	C6
		NOV 2018



ASPHALTIC CONCRETE



CONCRETE



INTERLOCKING PAVERS

NOTES:

1. TNZ M/4 BASECOURSE COMPACTED TO OBTAIN A CLEGG READING NO LESS THAN 24.
   DEPTH OF BASECOURSE WILL DEPEND ON SUBGRADE STRENGTH. DEPTH IS TO INCREASE IF SUBGRADE CBR < 5
   (DEPTH TO BE DETERMINED BY THE ENGINEER).
   IF USED IN A PARK, BASECOURSE MAY BE CHANGED TO CRUSHED AP40 COMPACTED TO THE SAME SPECIFICATION AS ABOVE.

2. CONCRETE GRADE OF 25 MPa AT 28 DAYS. CONSTRUCTION JOINTS AT ≤3M, SAW CUT TO BE 40mm DEPTH WITHIN 48 HOURS OF POURING PLACING OR WETFORM.

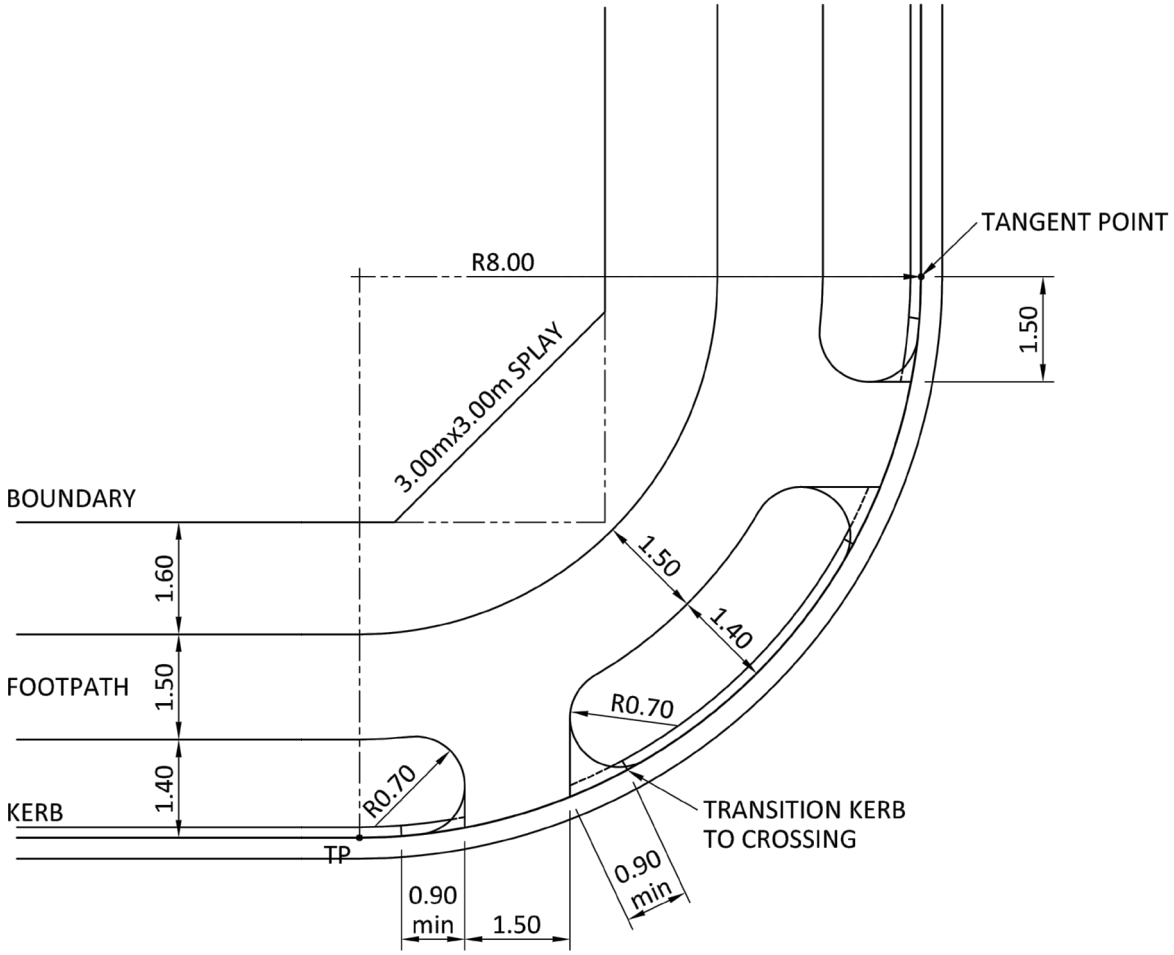
3. ALL TIMBER IN CONTACT WITH THE GROUND TO BE GRADE H4 TO NZS 36040, TIMBER EDGING TO REMAIN

4. ALL DIMENSIONS IN MILLIMETRES

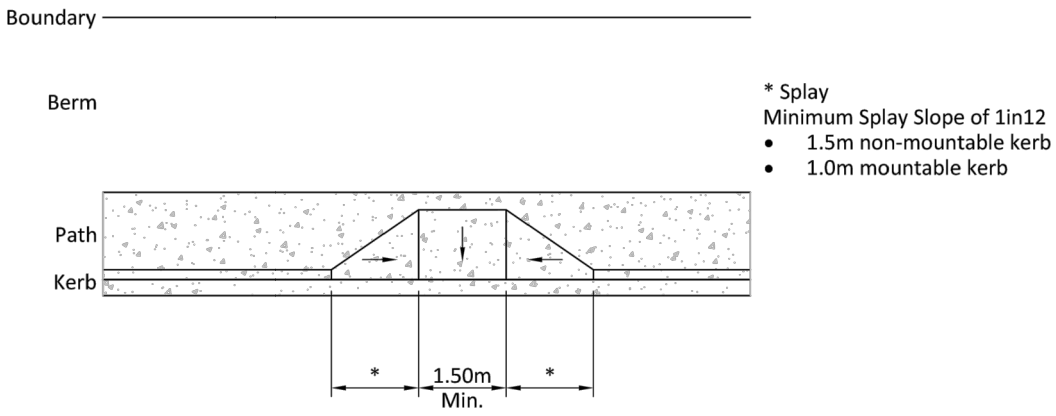
5. FOR CONSTRUCTION DETAILS OF BERM AND FOOTPATH REFER TO THE NOTES ON DRAWING C6.

6. MINIMUM SHARED FACILITY WIDTH IS 2.5m. ANY DEPARTURE FROM THIS STANDARD NEEDS THE APPROVAL FROM THE TRANSPORTATION DEVELOPMENT ENGINEER.

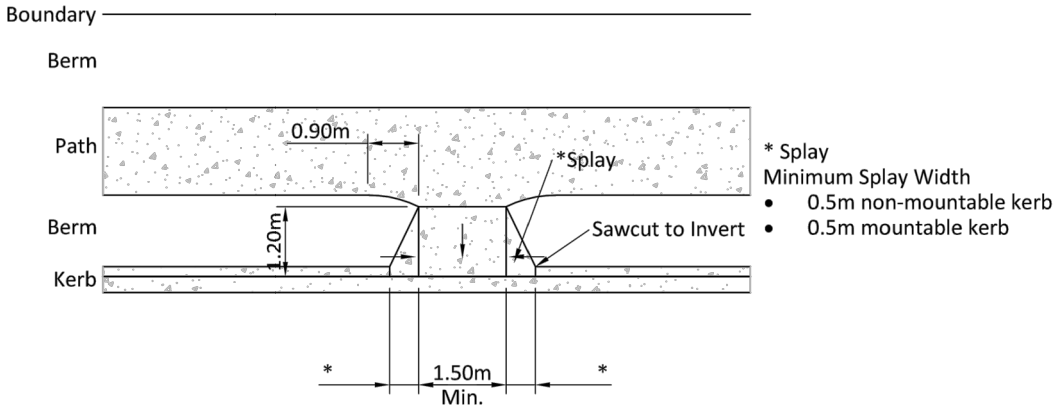
WAIROA DISTRICT COUNCIL	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	SHARED FACILITY AND FOOTPATH CONSTRUCTION - TYPICAL CROSS SECTIONS	C7
		NOV 2018



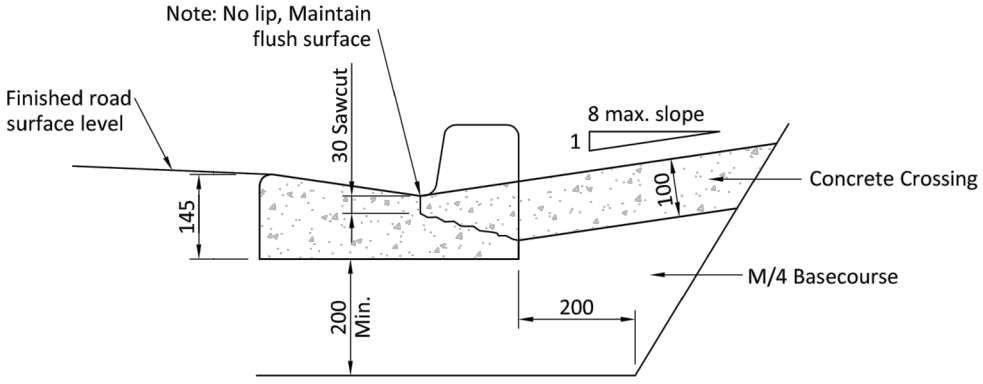
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	STANDARD PEDESTRIAN CROSSING CORNER LAYOUT	C8
		JULY 2011



PATH AGAINST KERB

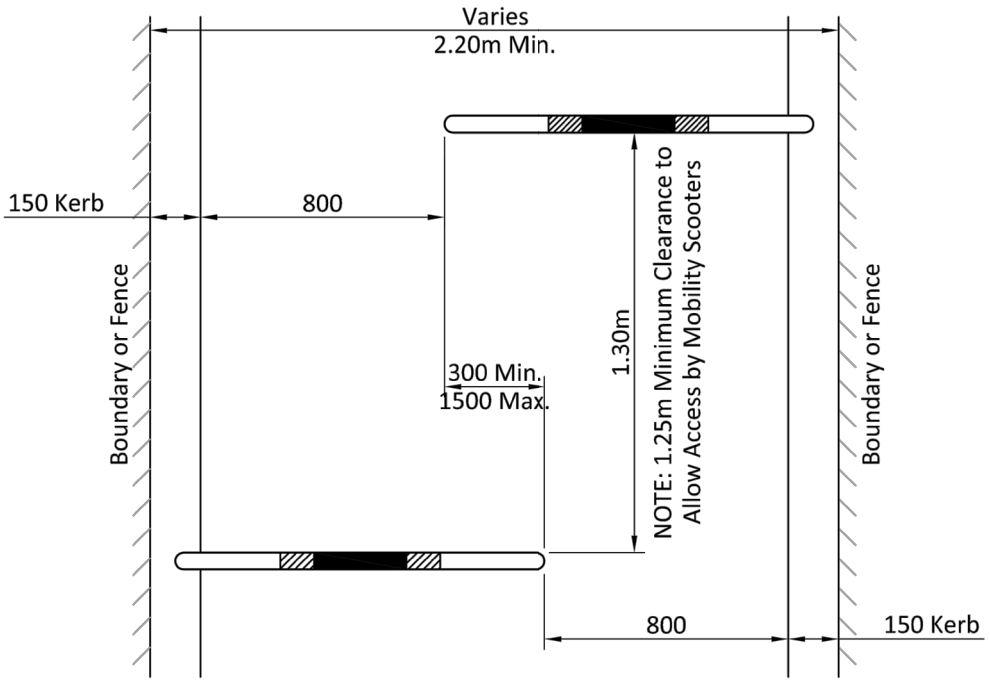


PATH OFFSET FROM KERB

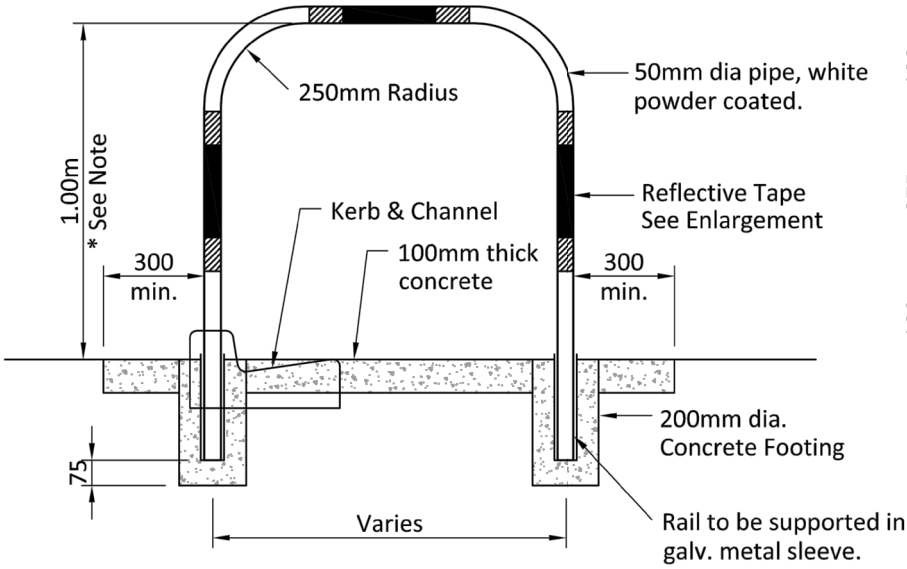


KERB/CROSSING INTERFACE

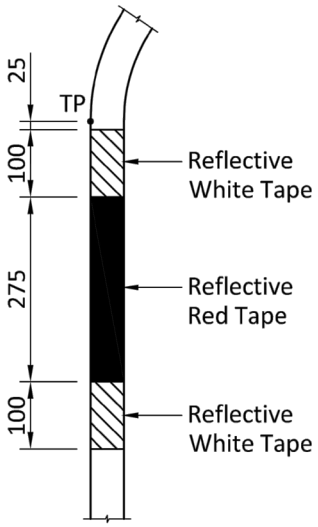
WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C9
	STANDARD PEDESTRIAN CROSSING DETAIL	Issue July 2011	
		Trim Reference Manuals\CoP	



PLAN



NOTE: * 1.25m Minimum Clearance to Allow Access by Mobility Scooters

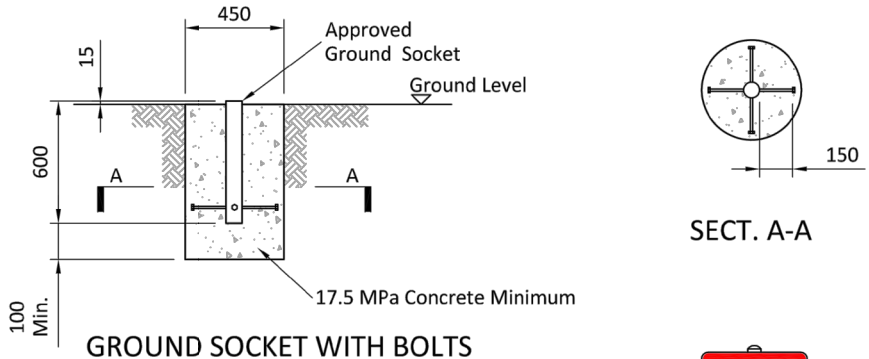


REFLECTIVE TAPE ENLARGEMENT

NOTE: Concrete to have a minimum strength of 17.5 MPa

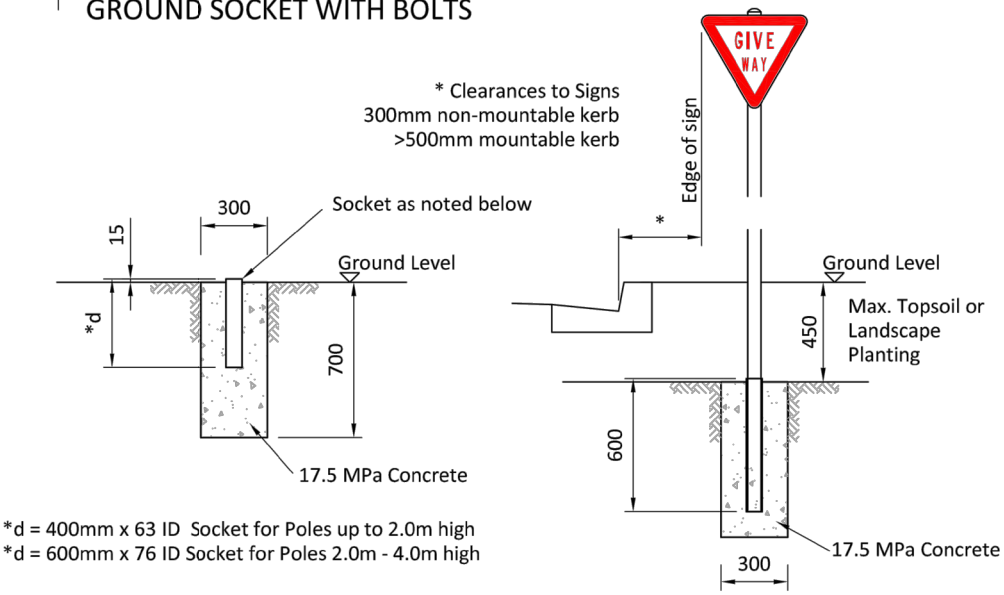
ELEVATION

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S.	Drawing No. C10
	STANDARD CYCLE BARRIER	Issue July 2011	
		Trim Reference Manuals\CoP	



SECT. A-A

GROUND SOCKET WITH BOLTS



*d = 400mm x 63 ID Socket for Poles up to 2.0m high
*d = 600mm x 76 ID Socket for Poles 2.0m - 4.0m high

TYPICAL 'SIGNFIX' GROUND SOCKET

GROUND SOCKET IN GARDEN

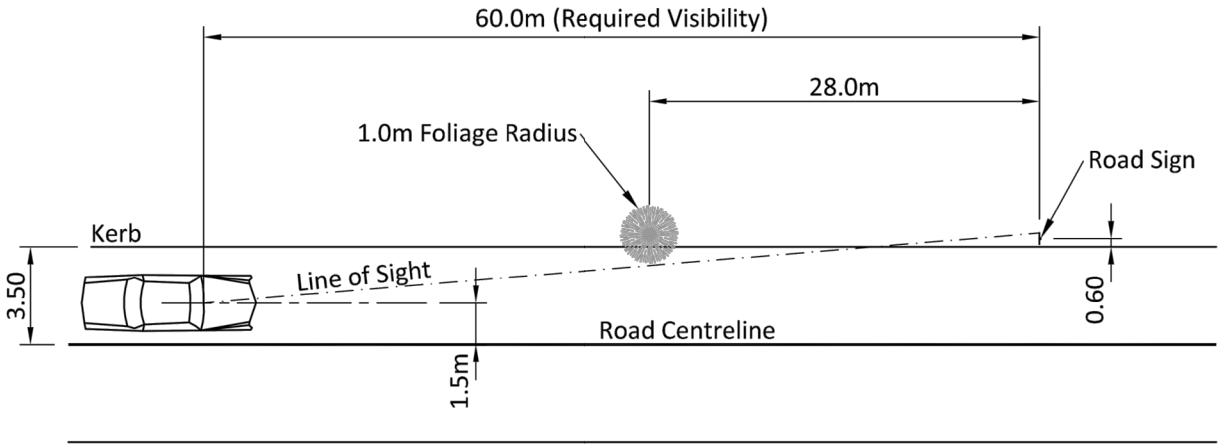
Foundations in Planted and Grassed Areas

A. Locate pole foundations to meet all contract requirements, and where possible, against a kerb for extra stability. Where socket is near a kerb place concrete to back of kerb to a minimum depth of 100mm. Side clearances, sight lines, pedestrian access, vehicle access and utility services must be considered during installation.

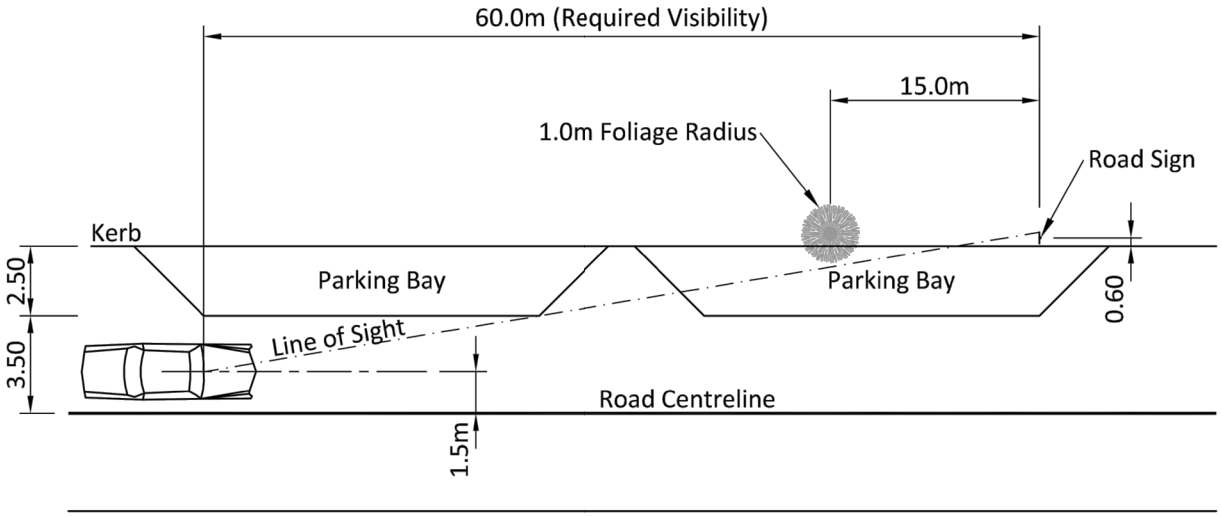
B. Where no suitable adjacent kerb described in Note 1 is present, locate the pole in the garden or grassed area to satisfy the contract requirements.

NOTE:
1. All foundations to conform with Road Sign Manufacturers Association Compliance Standard

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C11
	TYPICAL SIGN DETAILS POLE FOUNDATIONS	Issue July 2011	
		Trim Reference Manuals\CoP	



DRIVING LANE ADJACENT TO KERB

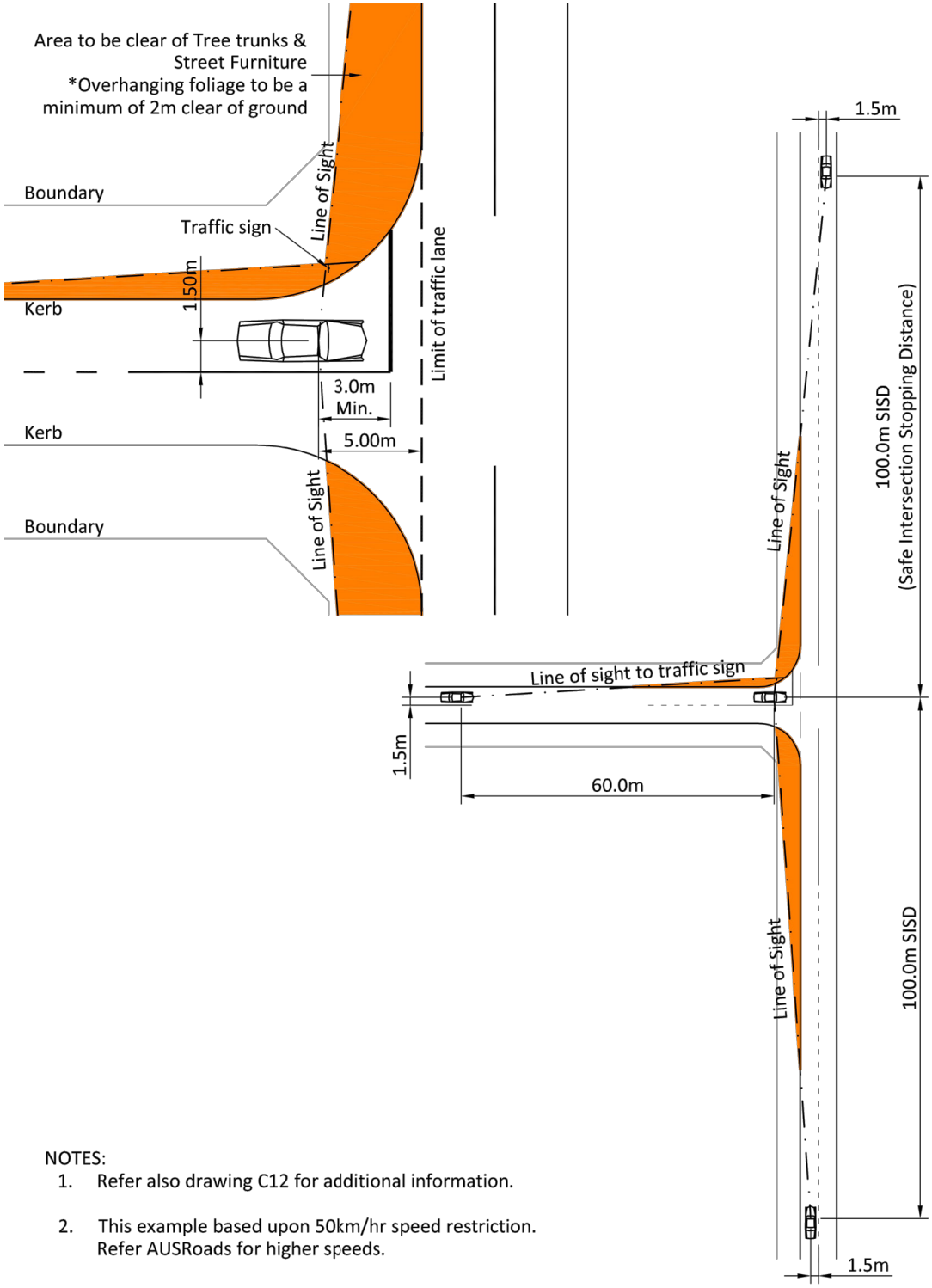


DRIVING LANE AND PARKING LANE

NOTES:

1. Mature foliage to be a minimum height of 2.0m clear of ground within the restricted zone.
2. Within intersections, plantings shall grow no higher than 0.5m to maintain clear sight splays.

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C12
	APPROACH VISIBILITY FOR TRAFFIC SIGNS & STREET FURNITURE	Issue July 2011	
		Trim Reference Manuals\CoP	

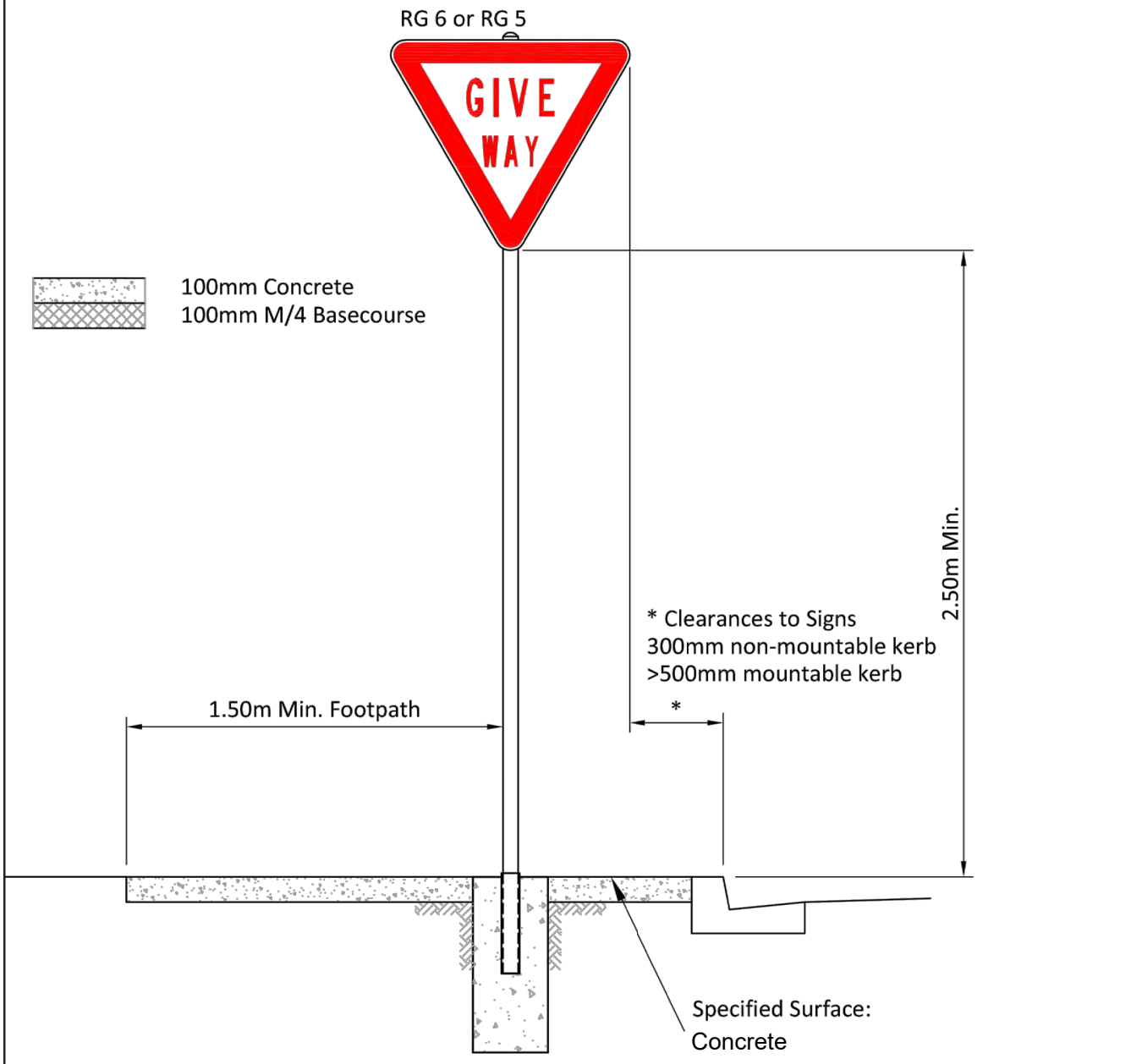


NOTES:

1. Refer also drawing C12 for additional information.
2. This example based upon 50km/hr speed restriction. Refer AUSRoads for higher speeds.

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C13
	APPROACH VISIBILITY FOR TRAFFIC SIGNS & STREET FURNITURE - SAMPLE SETOUT	Issue July 2011	
		Trim Reference Manuals\CoP	

Note: Sign Sizes & Siting Details shall be in accordance with MOTSAM

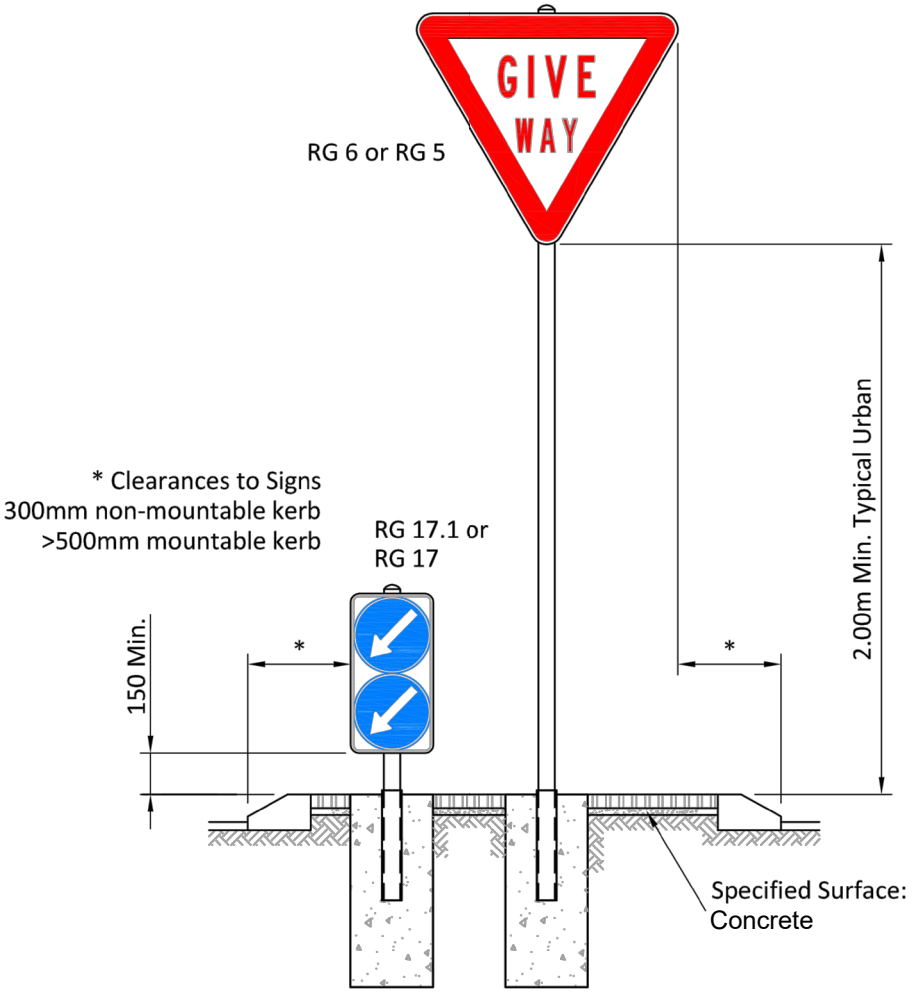


SIGN LOCATION IN FOOTPATH

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C15
	TYPICAL SIGN DETAILS FOR PATH LOCATION	Issue July 2011	
		Trim Reference Manuals\CoP	

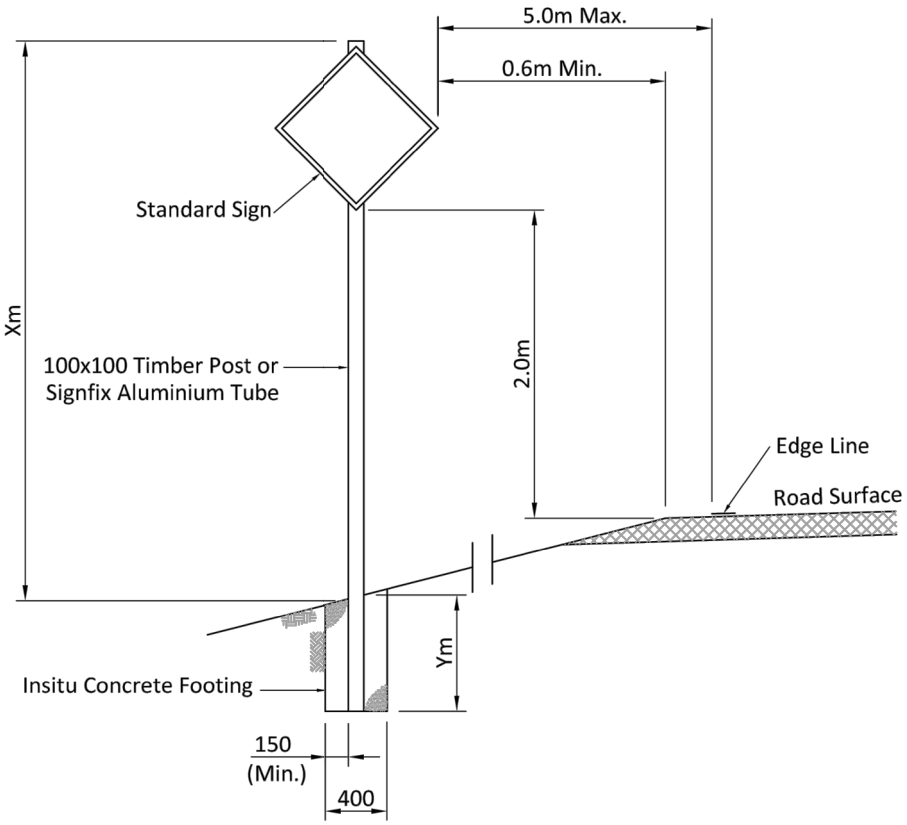
Note: Sign Sizes & Siting Details shall be in accordance with MOTSAM

100mm Concrete
100mm M/4 Basecourse



SIGN LOCATION IN SPLITTER ISLANDS

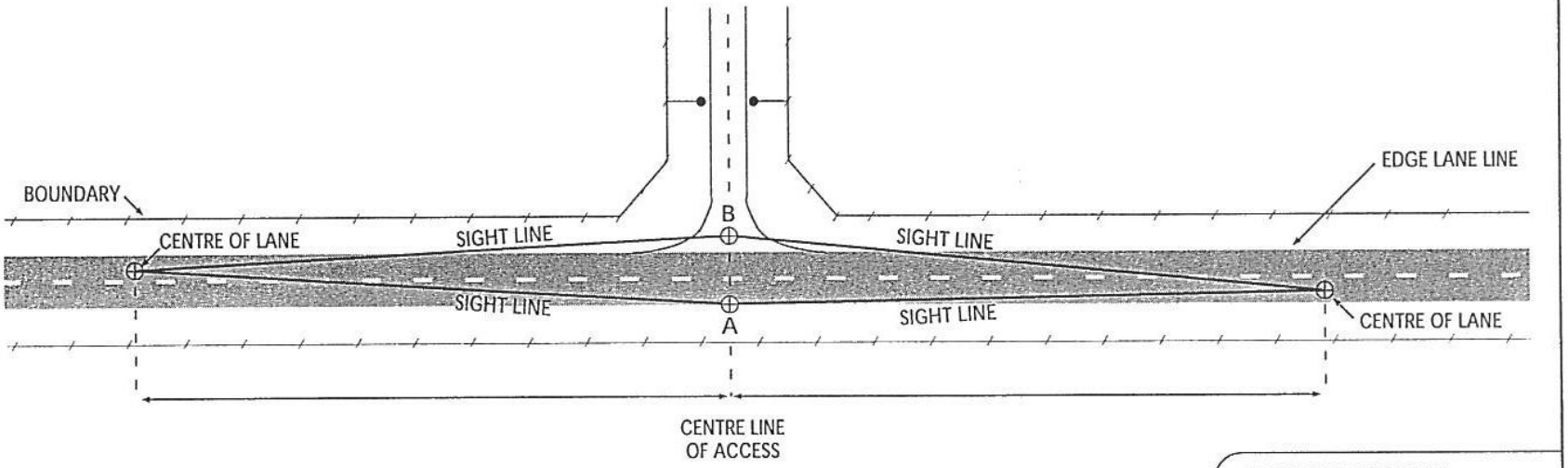
WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C16
	TYPICAL SIGN DETAILS SPLITTER ISLAND LOCATION	Issue July 2011	
		Trim Reference Manuals\CoP	



HEIGHT ABOVE GROUND LEVEL (X).	POST DEPTH BELOW GROUND (Y).	TOTAL POST LENGTH (X + Y)	POST ID mm	WALL THICKNESS	
				TROUGH	RIB
1.0m - 2.5m	0.70m	1.7m - 3.2m	60	2.80	3.75
2.5m - 3.0m	0.90m	3.4m - 3.9m	76	3.05	4.00
3.0m - 3.5m	1.10m	4.1m - 4.6m	89	3.55	4.50
3.5m - 4.5m	1.30m	4.8m - 5.8m	102	4.50	5.00
4.5m - 5.0m	1.50m	6.0m - 6.5m	114	4.60	5.50

Note:
All foundations to conform with Road Sign Manufacturers Association Compliance Standard

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C17
	TYPICAL SIGN DETAIL RURAL VERGE	Issue July 2011	
		Trim Reference Manuals\CoP	



POINTA On white line

POINTB *Forlowuseaccesses*
3.5metres from white edge lane line

Formoderateuseaccesses
5.5metres from white edge lane line

NOTES

- Sight distances shall be measured 1.15 metres (motorists eye level) above the finished surface of the access crossing place and the highway
- There shall be no obstructions to visibility inside the area bounded by the sight lines

SIGHTDISTANCES (metres)

SPEED LIMIT	LOWUSE ACCESS	MODERATE USEACCESS
50	65	85
60	85	115
70	115	140
80	140	170
90	170	210
100	210	250

TRANSIT NEW ZEALAND ARARAU AOTEAROA

DIAGRAM A: ACCESS SITE LINES

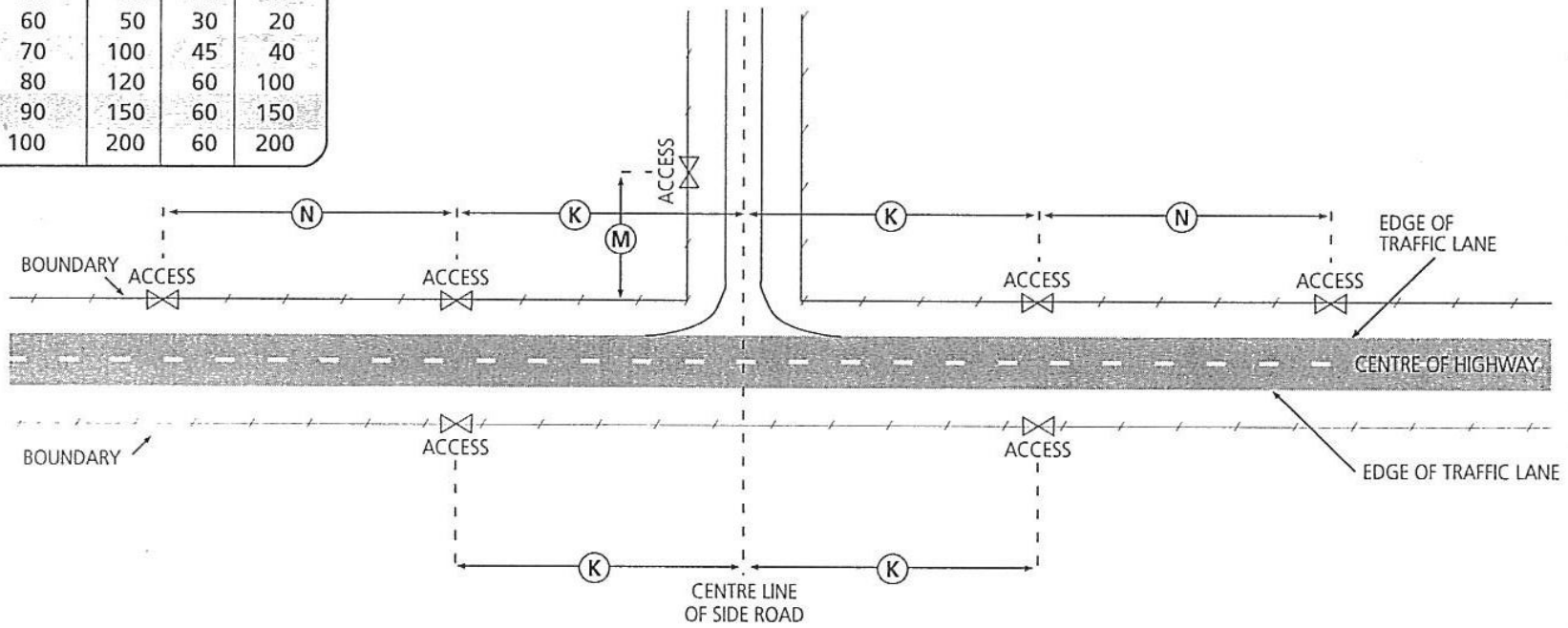
NOT TO SCALE

WAIROA DISTRICT COUNCIL

DRAWING NO. T1

ACCESS STE LINES

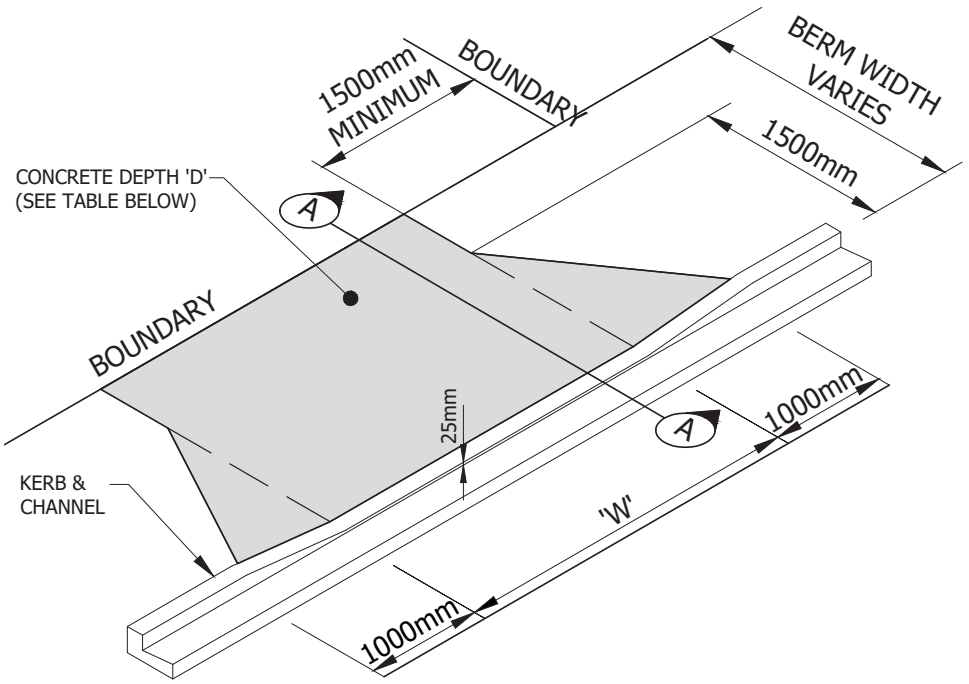
SPEED LIMIT	DISTANCES (metres) K	M	N
50	30	20	15
60	50	30	20
70	100	45	40
80	120	60	100
90	150	60	150
100	200	60	200

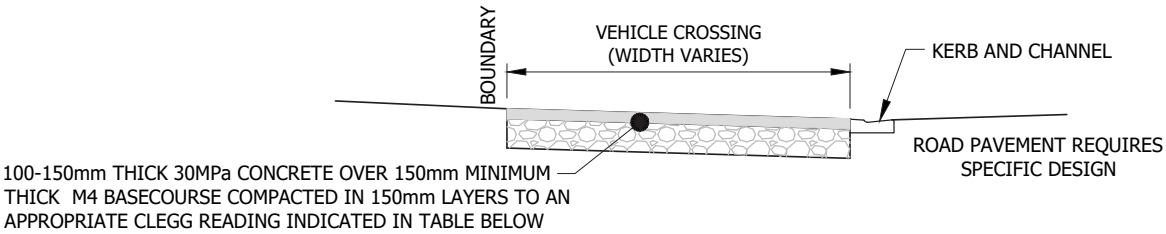


TRANSIT NEW ZEALAND ARARAU AOTEAROA

DIAGRAM B: ACCESS SEPARATION FROM INTERSECTIONS AND OTHER ACCESSES
NOT TO SCALE

	WAIROA DISTRICT COUNCIL	DRAWING NO. T2
	ACCES SEPERATION FROM INTERSECTIONS	



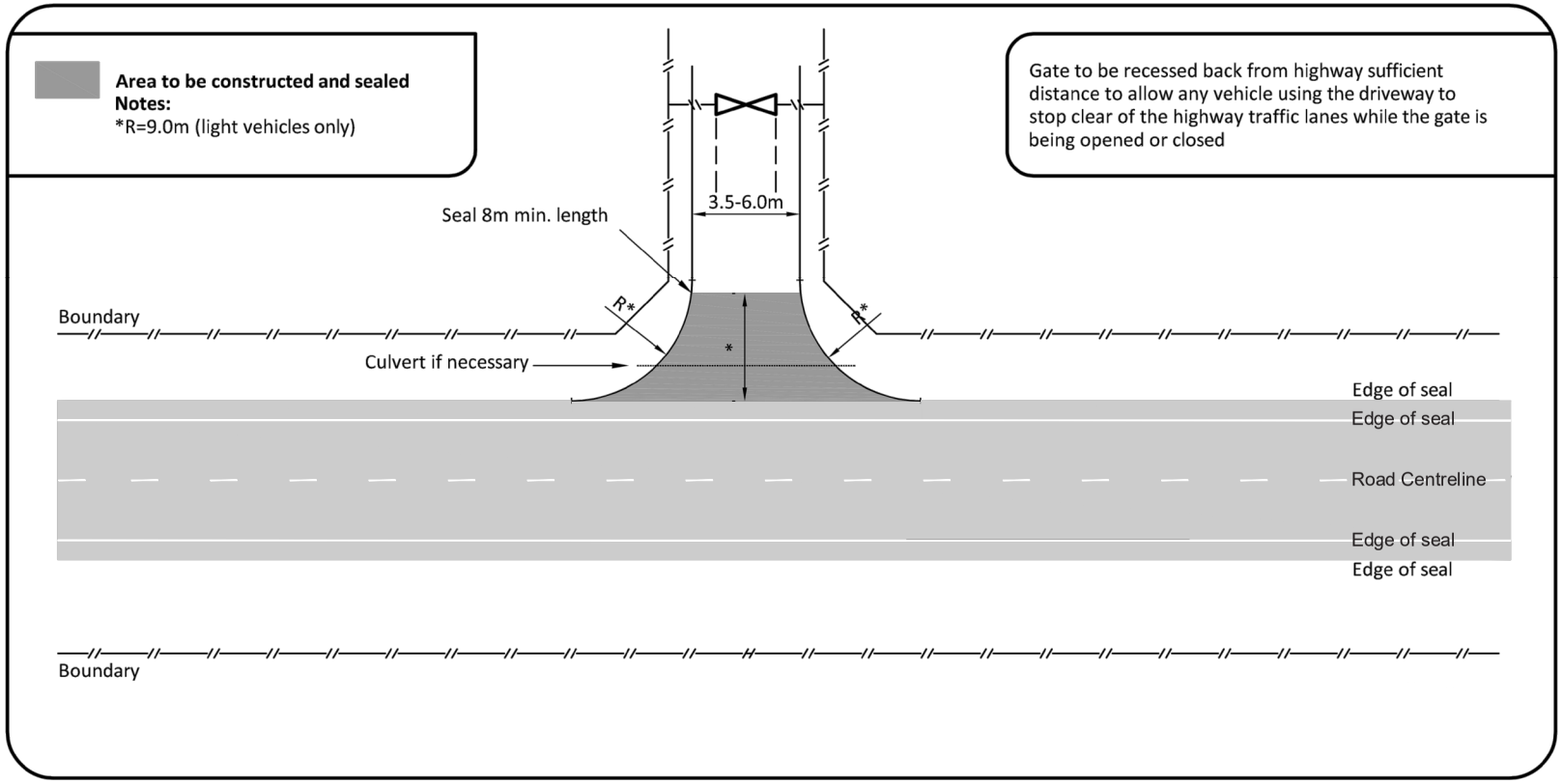


SECTION A-A

Property Description		Min. Width 'W'	Max. Width 'W'	Concrete Depth 'D'	Mesh Reinforcing	Basecourse Thickness	Target Clegg Reading
Residential	1-3 Dwellings	3m	4.8m	100mm	No	150mm	25
	4-6 Dwellings	4m	4.8m	125mm	No	150mm	25
	7+ Dwellings	6m	6m	150mm	1 Layer 665	200mm	35
Light Commercial (not requiring specific design).		4m	6m	150mm	1 Layer 665	200mm	35
Industrial (not requiring specific design).		6m	9m	150mm	1 Layer 665	200mm	35

NOTES:
1. DEPTH OF BASECOURSE WILL DEPEND ON SUBGRADE STRENGTH. THE DEPTHS SHOWN ASSUME A SUBGRADE CBR > 5%. BASECOURSE IS TO BE COMPACTED TO 95% STANDARD COMPACTION.
2. FOR SUBGRADE STRENGTH BELOW CBR 5% SPECIFIC DESIGNS ARE REQUIRED.
3. CONCRETE STRENGTH TO BE A MINIMUM OF 30MPA AT 28 DAYS.
4. WHERE MOUNTABLE KERBS ARE PRESENT THERE IS TO BE NO CUT DOWN AND THE VEHICLE CROSSING WILL TIE INTO THE TOP OF KERB LEVEL.
5. REFER TO DRAWING C19A FOR DETAILS OF KERB AND CHANNEL PROFILE ADJACENT TO SHARED CYCLEWAY AND FOOTPATH.

WAIROA DISTRICT COUNCIL	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	MINIMUM STANDARDS FOR VEHICLE CROSSINGS ONTO URBAN ROADS	C19
		NOV 2018



Note: TYPICAL LOW USE is defined as:
1 - 30 ecm/day using entrance
and
⩽ 5000 vpd using adjoining road

Equivalent Car Movements (ECM)

- 1 car to and from the property = 2 ECM movements
- 1 truck to and from property = 6 ECM movements
- 1 truck and trailer to and from property = 10 ECM movements

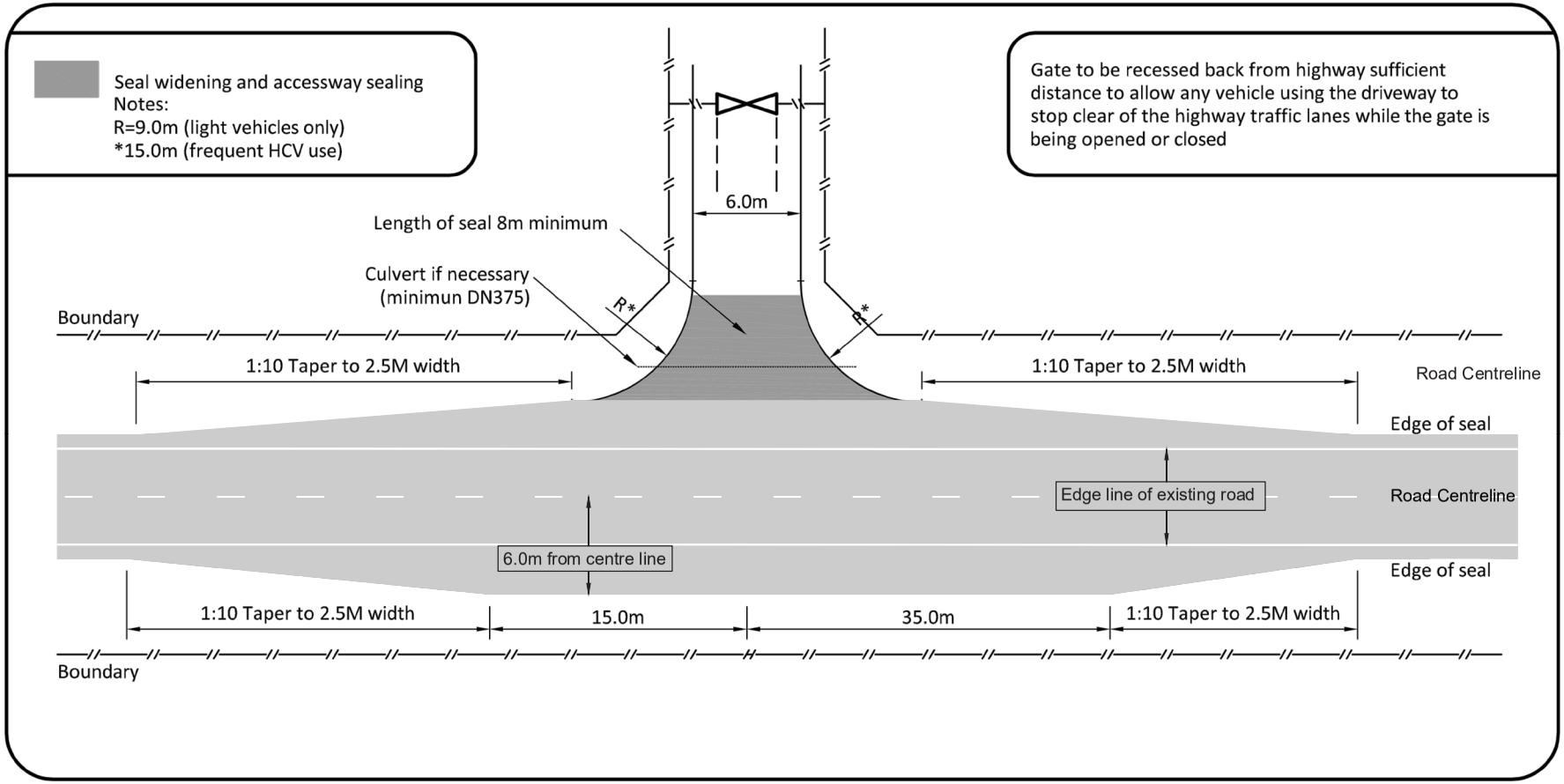
WAIROA DISTRICT COUNCIL

PRIVATE RURAL ACCESS
LOW USE - DIAGRAM C

Scale	Drawing No.
N.T.S.	C24

Issue JULY 2011

Trim Reference
Manuals\CoP



Note: TYPICAL MODERATE USE is defined as:
1 - 30 ecm/day using entrance
and
⩾ 5000 vpd using adjoining road

Equivalent Car Movements (ECM)
- 1 car to and from the property = 2 ECM movements
- 1 truck to and from property = 6 ECM movements
- 1 truck and trailer to and from property = 10 ECM movements

WAIROA DISTRICT COUNCIL

ROAD CONTROLLING AUTHORITY

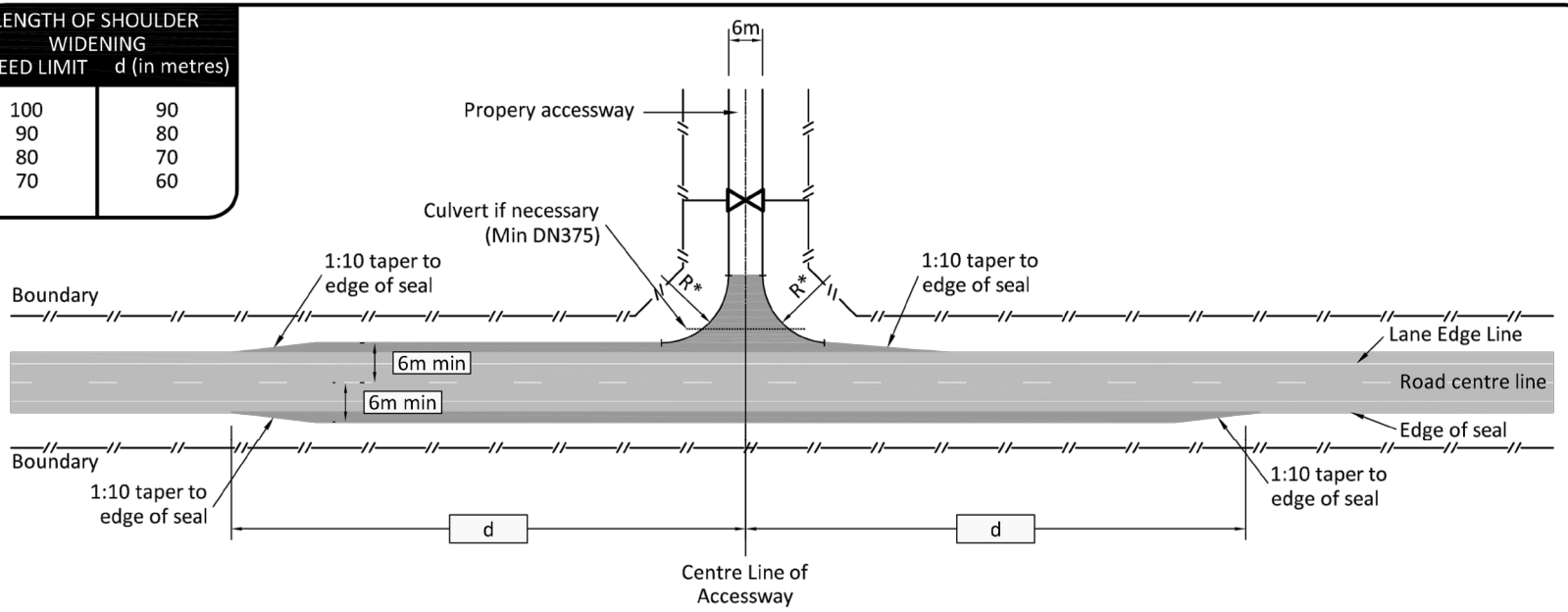
PRIVATE RURAL ACCESS
MODERATE VEHICLE USE - DIAGRAM D

Scale	Drawing No.
N.T.S	C26

Issue JULY 2011

Trim Reference
Manuals\CoP

LENGTH OF SHOULDER WIDENING	
SPEED LIMIT	d (in metres)
100	90
90	80
80	70
70	60



Bellmouth Radii (R)

R=9.0m (Light vehicle use only
R=15.0m (Frequent HCV use)

Area to be constructed and sealed

Gate to be recessed back from highway sufficient distance to allow any vehicle using the driveway to stop clear of the highway traffic lanes while the gate is being opened or closed

Note: TYPICAL HEAVY USE is defined as:
> 30 & < 100 ecm/day using entrance
and
> 5,000 & < 10,000 vpd using adjoining road

Equivalent Car Movements (ECM)
- 1 car to and from the property = 2 ECM movements
- 1 truck to and from property = 6 ECM movements
- 1 truck and trailer to and from property = 10 ECM movements

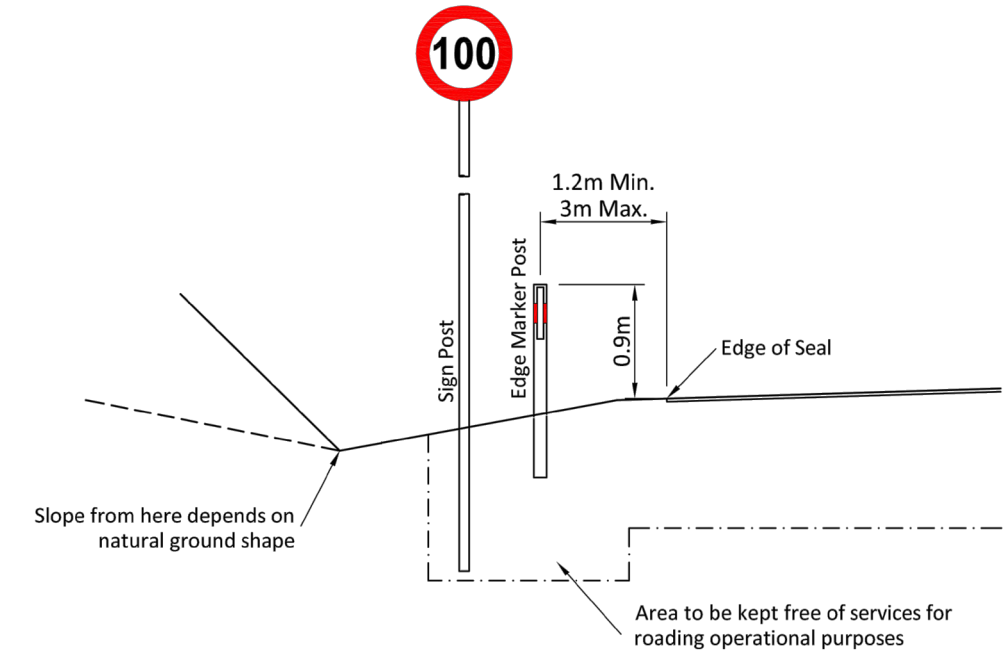
WAIROA DISTRICT COUNCIL

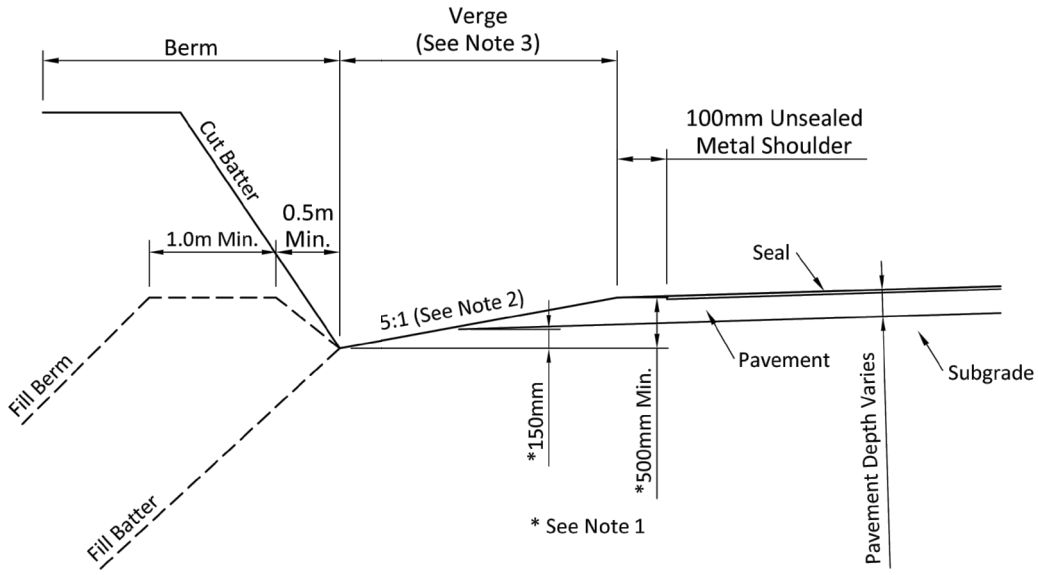
ROAD CONTROLLING AUTHORITY

PRIVATE RURAL ACCESS
REGULAR HEAVY VEHICLE USE - DIAGRAM E

Scale	Drawing No.
N.T.S	C28
Issue	JULY 2011
Trim Reference	Manuals\CoP

Note: Road & Verge Marking to be in accordance with MOTSAM





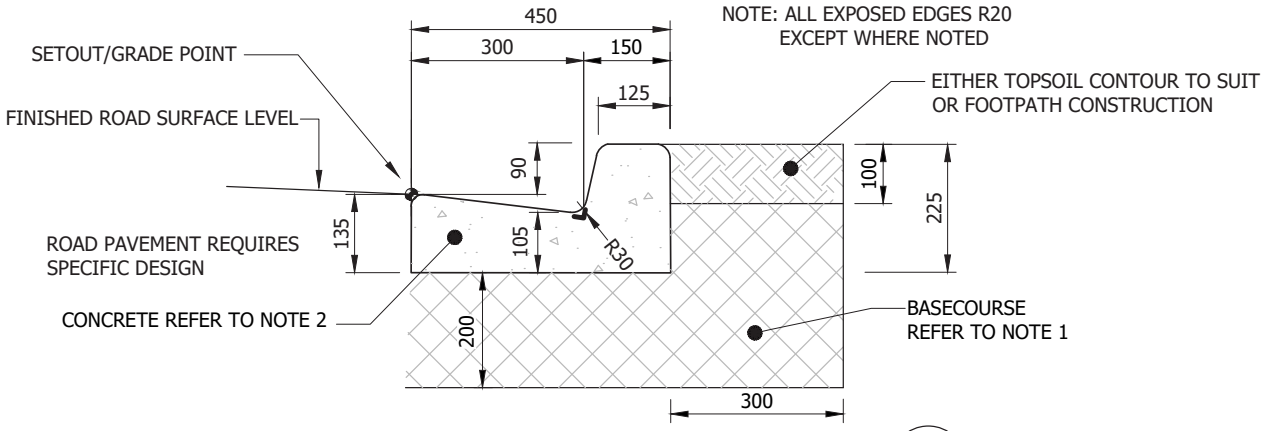
Notes:

1). * Adopt whichever provides the greater depth:
(A) 500mm below the seal edge, or
(B) 150mm below the pavement/subgrade interface.

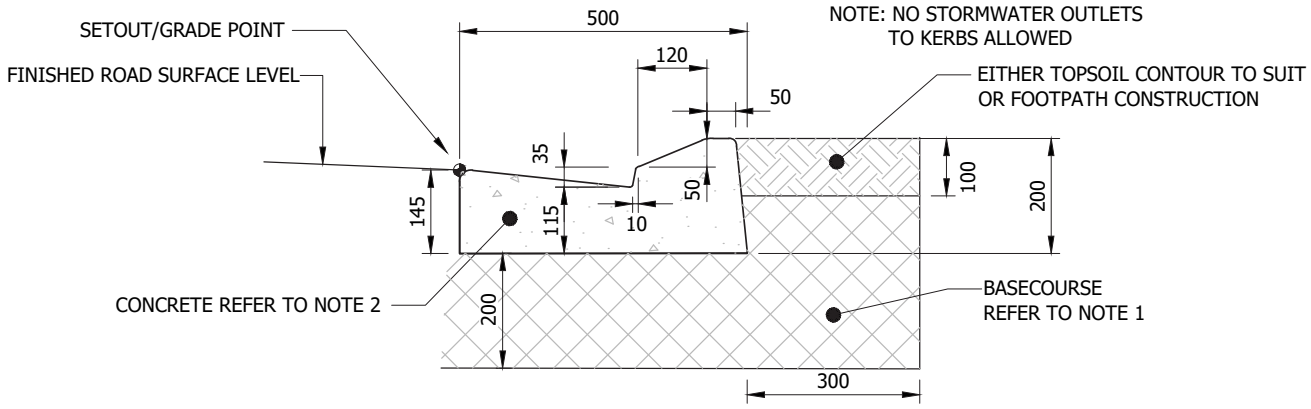
2). 5:1 Verge slope may be narrowed to an absolute minimum of 4:1 in constrained locations.
6:1 Verge slope is required within 3.0m of topside of curves.

3). Cut batter, Fill batter, Fill slopes are dependant on site soil stability criteria

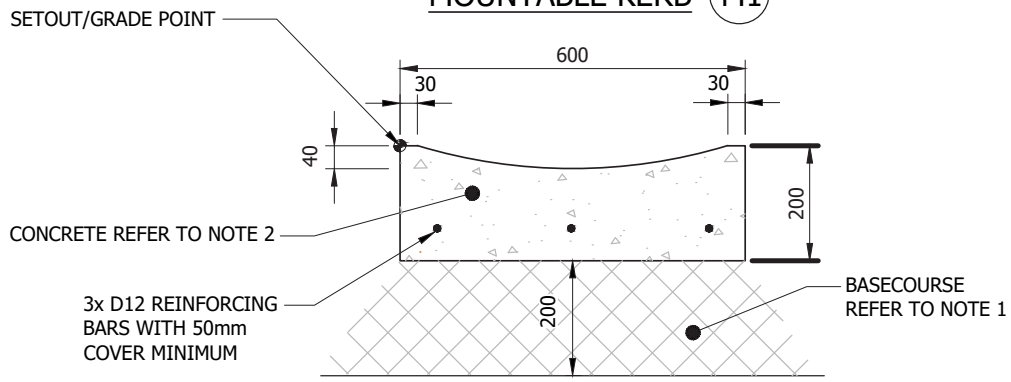
WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C30
	CROSS-SECTION GUIDELINES FOR VERGES ON RURAL ROADS	Issue July 2011	
		Trim Reference Manuals\CoP	



NON-MOUNTABLE KERB & CHANNEL (NM1)



MOUNTABLE KERB (M1)



DISH CHANNEL (C2)

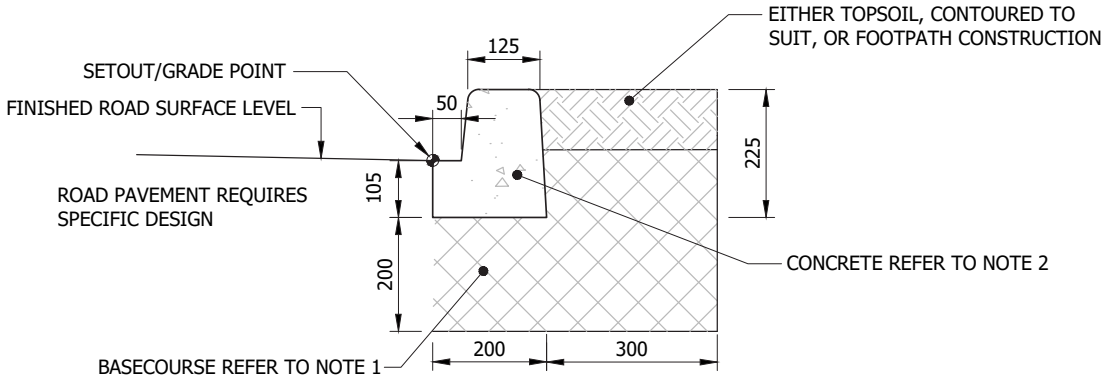
NOTES:

1. TNZ M/4 2006 NAPIER RIVER GRAVEL BASECOURSE COMPACTED TO OBTAIN A CLEGG READING NO LESS THAN 24
   DEPTH OF BASECOURSE WILL DEPEND ON SUBGRADE STRENGTH. DEPTH IS TO INCREASE IF SUBGRADE CBR <5 (DEPTH TO BE DETERMINED BY THE ENGINEER).

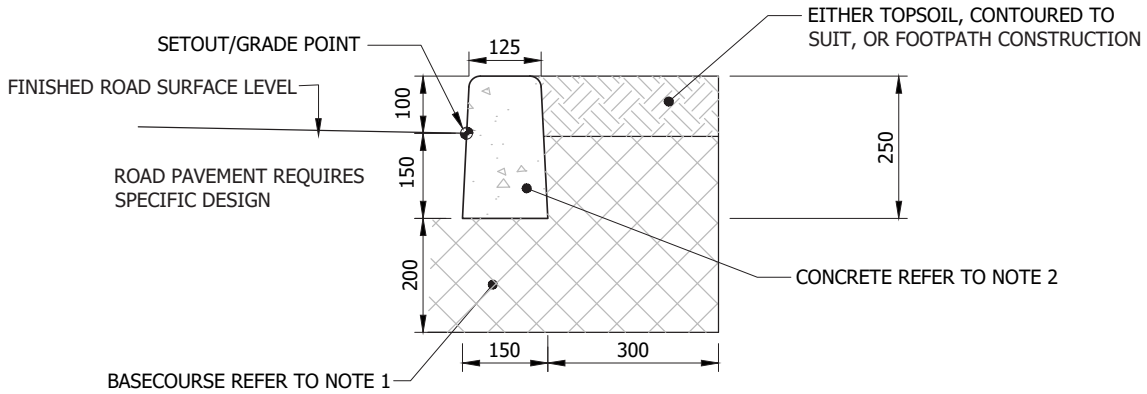
2. CONCRETE GRADE OF 20 MPa AT 28 DAYS. CONSTRUCTION JOINTS AT ≤3M, SAW CUT TO BE 40mm DEPTH WITHIN 48 HOURS OF POURING PLACING OR WETFORM.

3. ALL DIMENSIONS IN MILLIMETERS

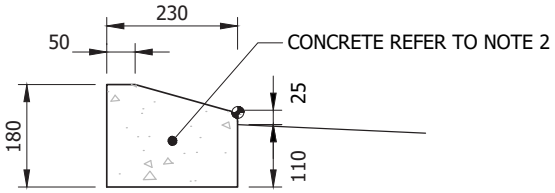
WAIROA DISTRICT COUNCIL	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	KERB AND CHANNEL AND DISH CHANNEL TYPICAL CROSS SECTIONS	C31
		NOV 2018



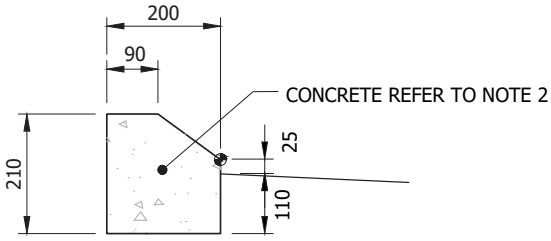
TYPE 1 NIB DETAIL



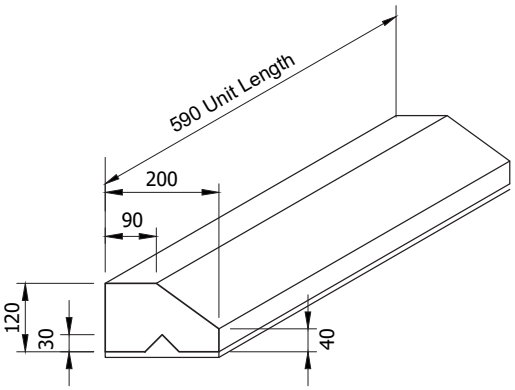
TYPE 2 NIB DETAIL



ROUNDABOUT KERB



MEDIAN ISLAND KERB

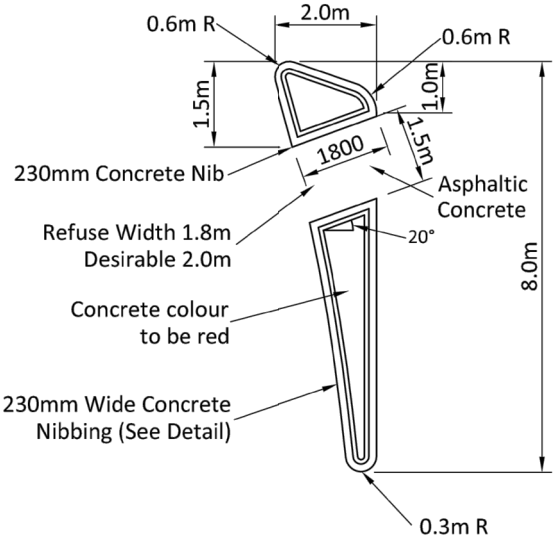


SURFACE MOUNTED PRECAST ISLAND KERB BLOCK

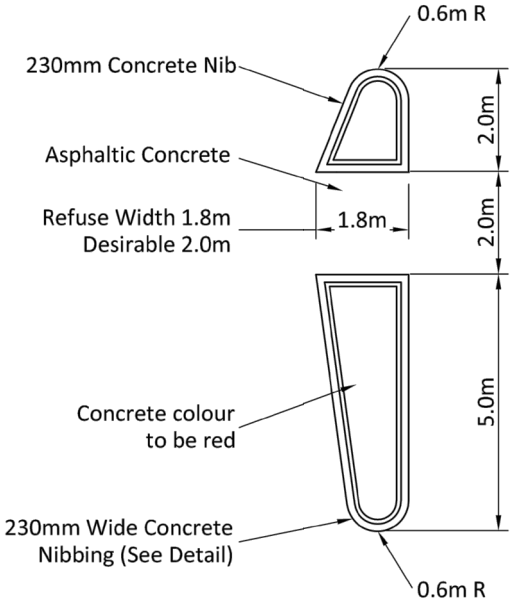
NOTES:

1. TNZ M/4 2006 NAPIER RIVER GRAVEL BASECOURSE COMPACTED TO OBTAIN A CLEGG READING NO LESS THAN 24 DEPTH OF BASECOURSE WILL DEPEND ON SUBGRADE STRENGTH. DEPTH IS TO INCREASE IF SUBGRADE CBR <5 (DEPTH TO BE DETERMINED BY THE ENGINEER).
2. CONCRETE GRADE OF 20 MPa AT 28 DAYS. CONSTRUCTION JOINTS AT ≤3M, SAW CUT TO BE 40mm DEPTH WITHIN 48 HOURS OF POURING PLACING OR WETFORM.
3. ALL DIMENSIONS IN MM
4. ALL EXPOSED EDGES ARE TO HAVE A 20mm RADIUS UNLESS NOTED ELSEWHERE

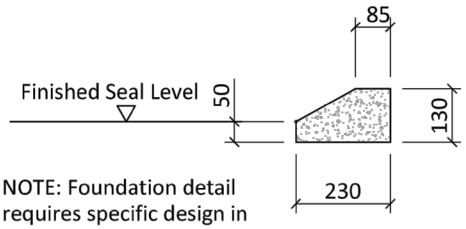
WAIROA DISTRICT COUNCIL	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	NIB DETAILS TYPICAL CROSS SECTIONS	C32
		NOV 2018



SPLITTER ISLAND DETAIL
ROUNDABOUTS



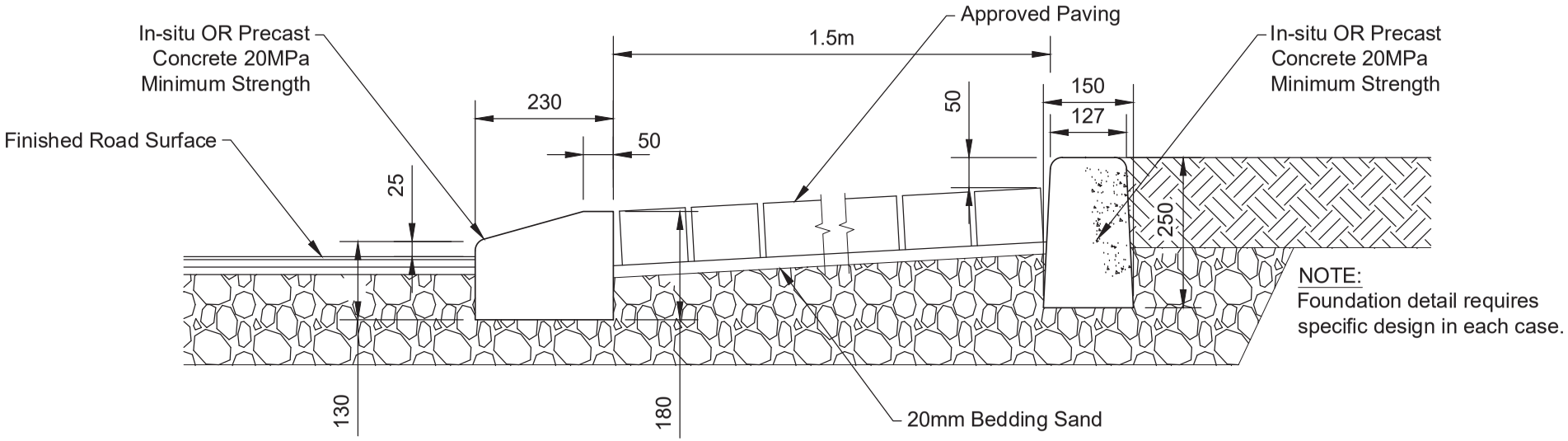
SPLITTER ISLAND DETAIL GIVE
WAY/STOP CONTROL INTERSECTIONS



NOTE: Foundation detail requires specific design in each case.

SPLITTER ISLAND NIB DETAIL

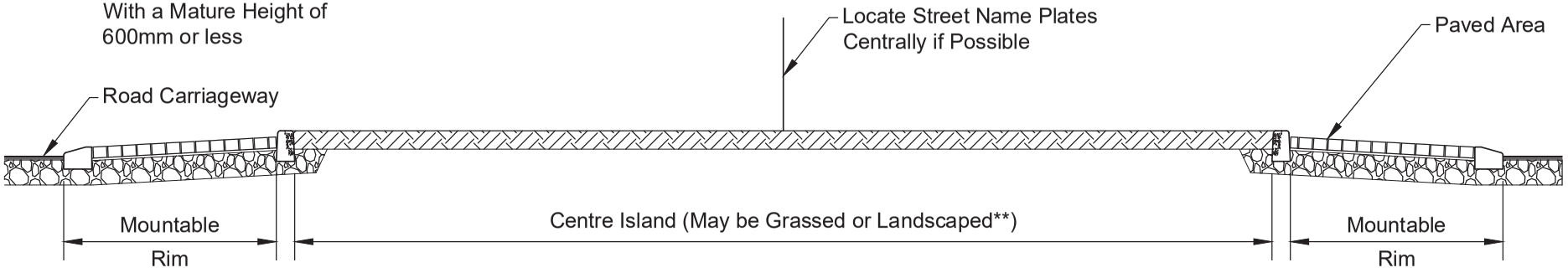
WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C33
	TYPICAL SPLITTER ISLAND DETAILS	Issue July 2011	
		Trim Reference Manuals\CoP	



ROUNDABOUT MOUNTABLE RIM DETAIL

SCALE 1:10

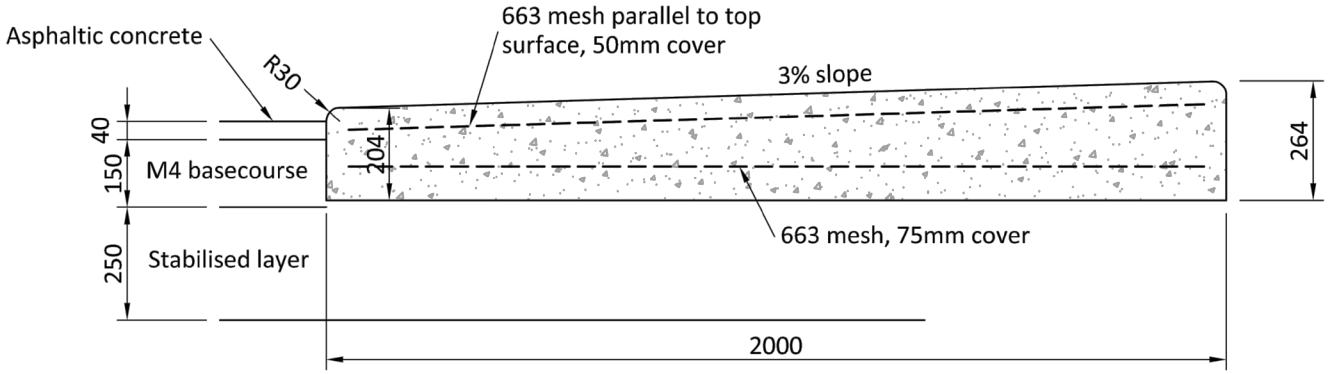
NOTE:
** Landscape Planting Shall be Limited to Shrubs etc, With a Mature Height of 600mm or less



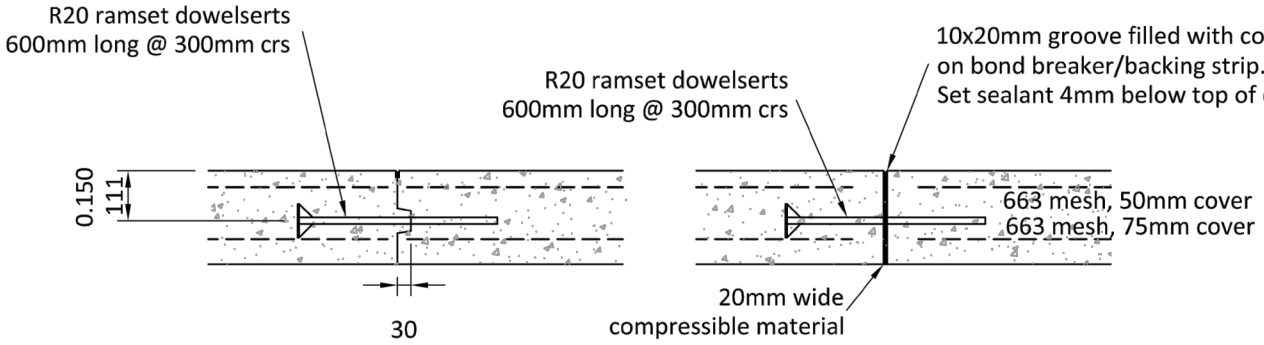
SECTION THROUGH ROUNDABOUT

N.T.S.

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S.	Drawing No. C34
	TYPICAL ROUNDABOUT DETAILS	Issue JULY 2011	
		Trim Reference Manuals\CoP	

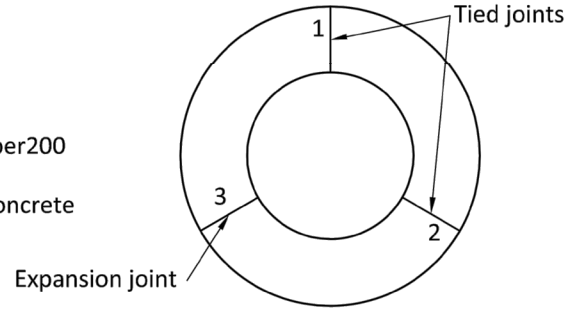


CONCRETE ROUNDABOUT SECTION



TIED JOINT DETAIL

EXPANSION JOINT DETAIL

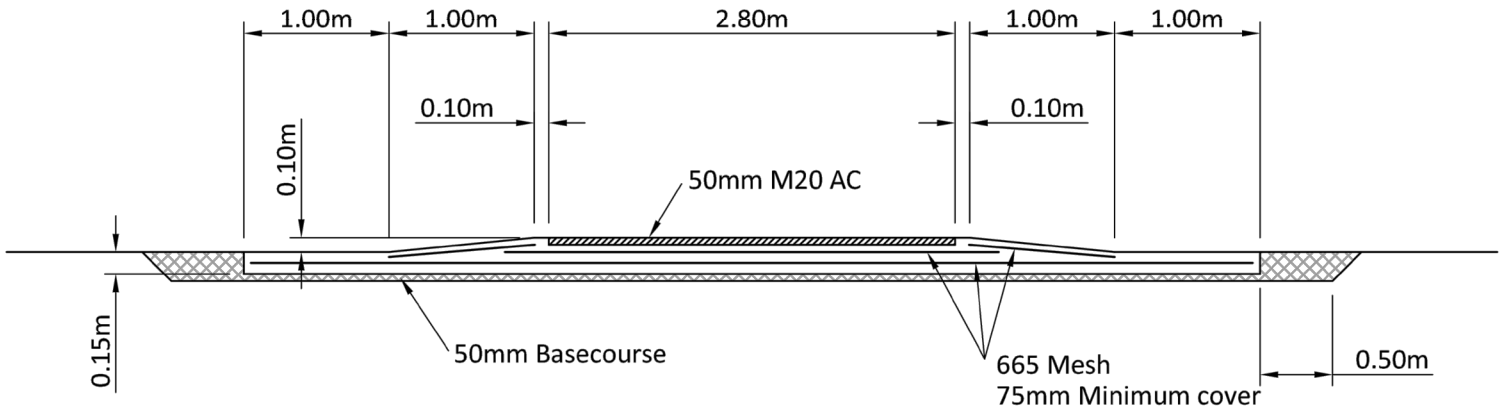


JOINT LAYOUT PLAN

NOTES

All concrete 25 MPa
Cover to reinforcement 75mm unless noted otherwise
Stop reinforcing mesh either side of joints

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C35
	TYPICAL ROUNDABOUT DETAILS	Issue JULY 2011	
		Trim Reference Manuals\CoP	



WAIROA DISTRICT COUNCIL

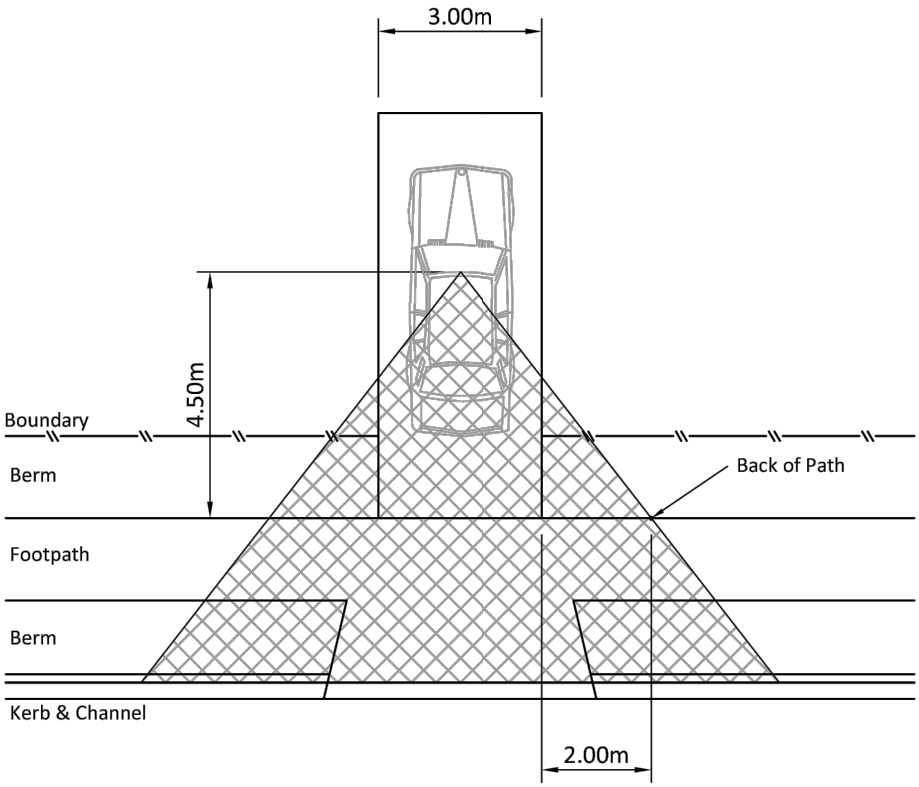
ROAD CONTROLLING AUTHORITY

TYPICAL SPEED HUMP

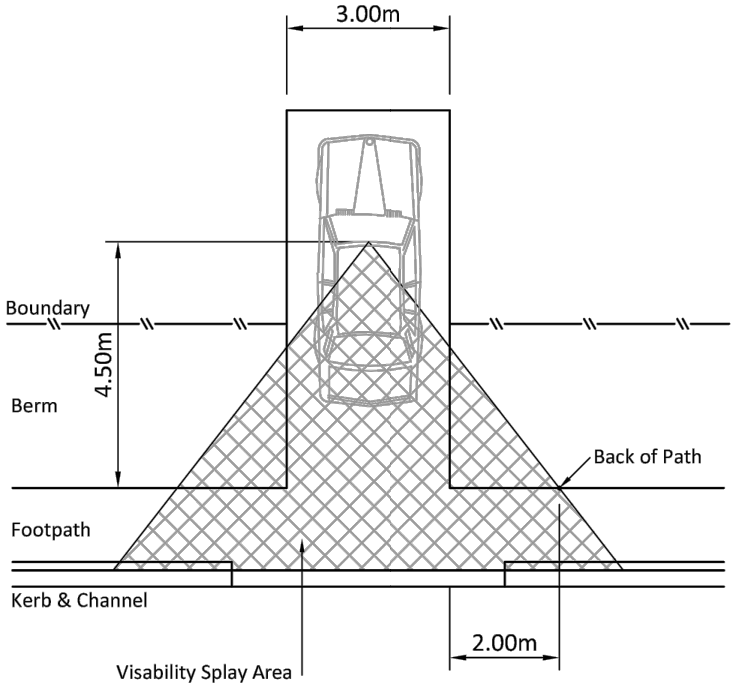
Scale	Drawing No.
N.T.S	C36

Issue JULY 2011

Trim Reference
Manuals\CoP

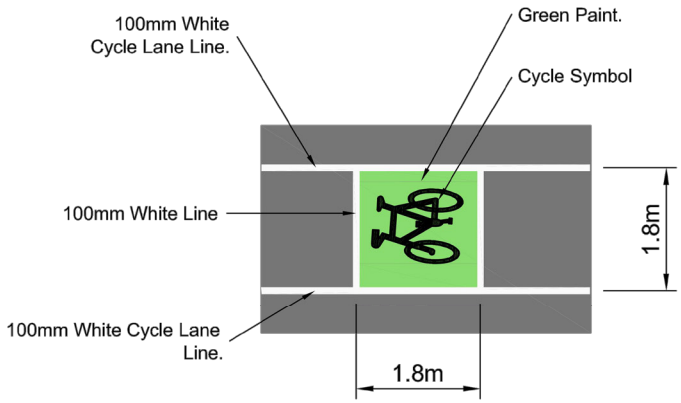


FOOTPATH OFF KERB

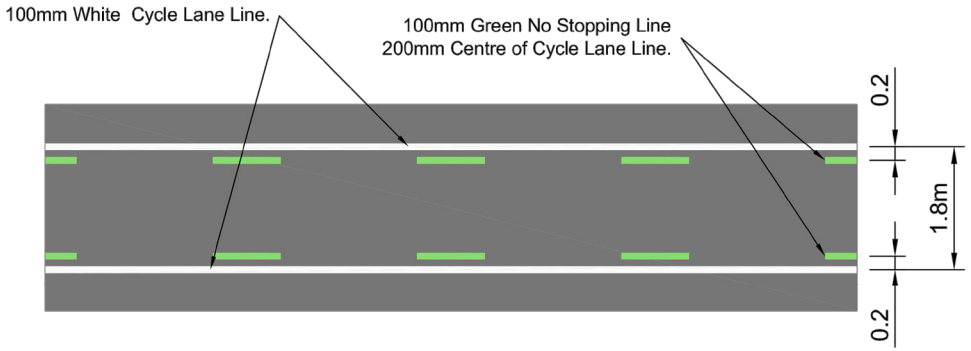


FOOTPATH ON KERB

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. C38
	PEDESTRIAN VISIBILITY SPLAY	Issue July 2011	
		Trim Reference Manuals\CoP	



CYCLE LANE SYMBOL BOX

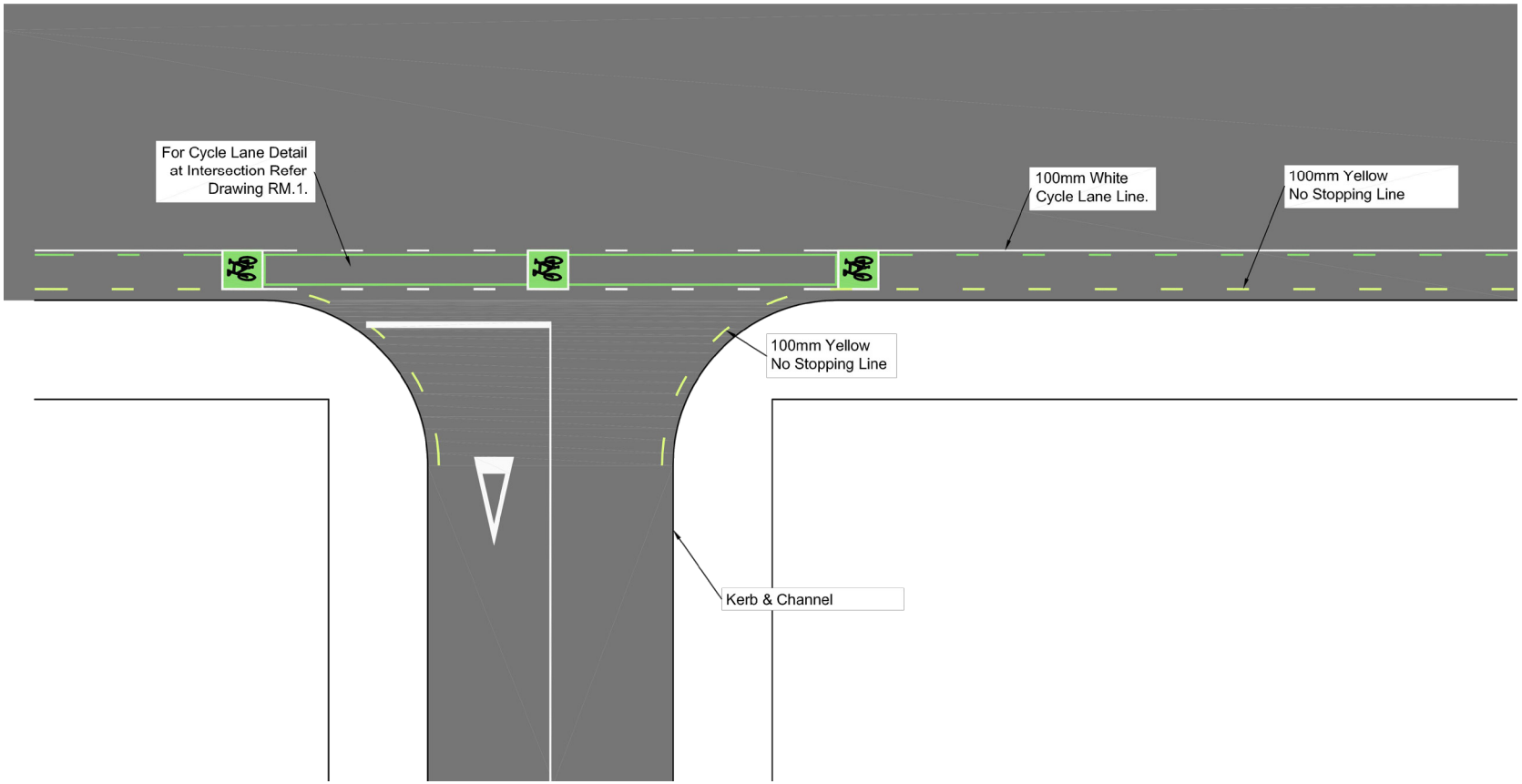


CYCLE LANE

NOTES

1. All road markings are to comply with MOTSAM.
2. The Green No Stopping Line in the Cycle Lane is to be the following:
   - 1.0m Line with 3.0m Gap in <60 Km/Hr. Area.
   - 1.0m Line with 5.0m Gap in >60 Km/Hr. Area.

WAIROA DISTRICT COUNCIL	ROAD CONTROLLING AUTHORITY	Scale N.T.S	Drawing No. RM 1
	ROAD MARKING CYCLE LANE	Issue JULY 2011	
		Trim Reference Manuals\CoP	



WAIROA DISTRICT COUNCIL

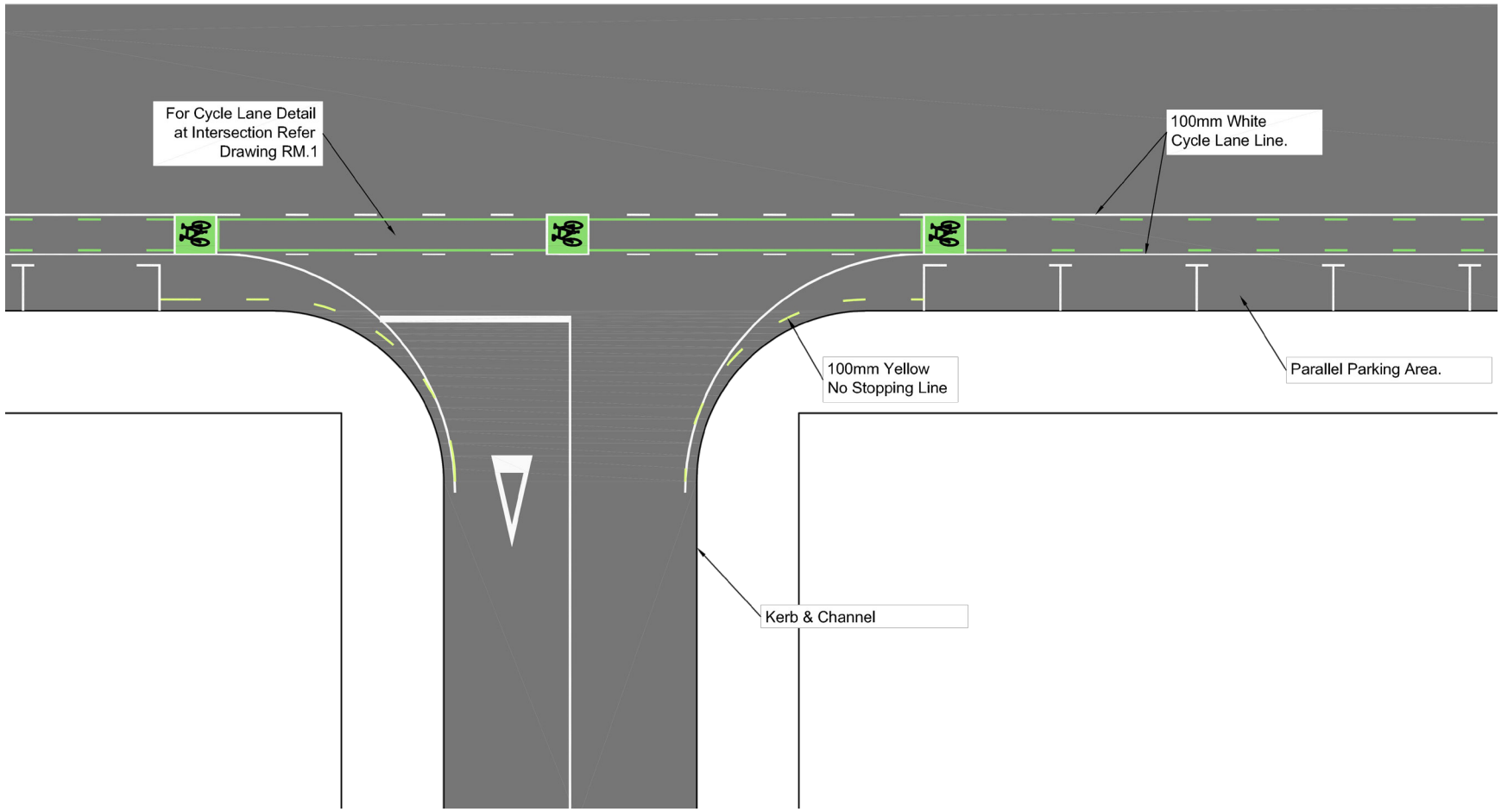
ROAD CONTROLLING AUTHORITY

ROAD MARKING
CYCLE LANE WITHOUT PARKING

Scale	Drawing No.
N.T.S	RM2

Issue JULY 2011

Trim Reference
Manuals\CoP



WAIROA DISTRICT COUNCIL

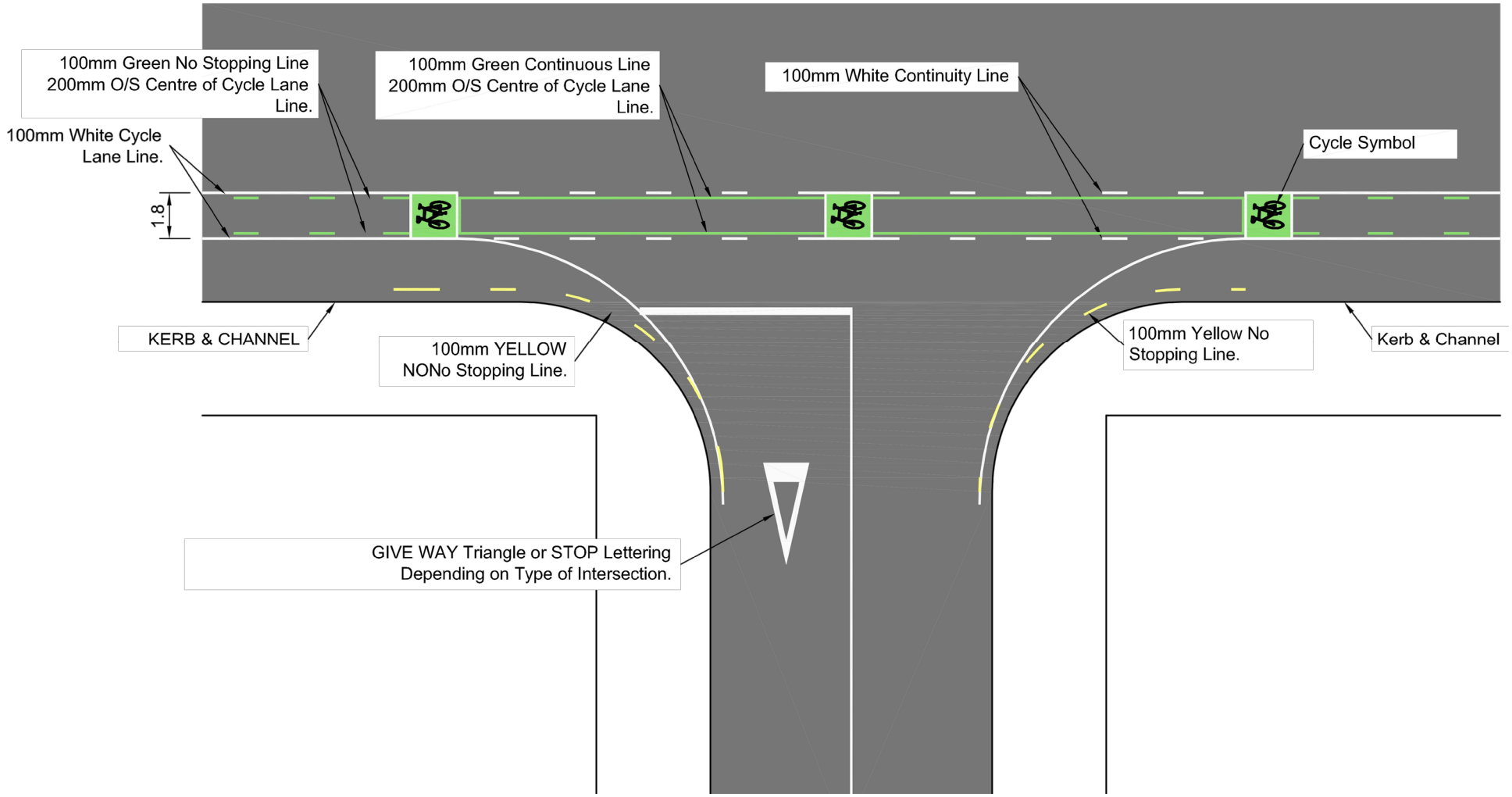
ROAD CONTROLLING AUTHORITY

ROAD MARKING
CYCLE LANE WITH PARKING

Scale	Drawing No.
N.T.S	RM3

Issue JULY 2011

Trim Reference Manuals\CoP



WAIROA DISTRICT COUNCIL

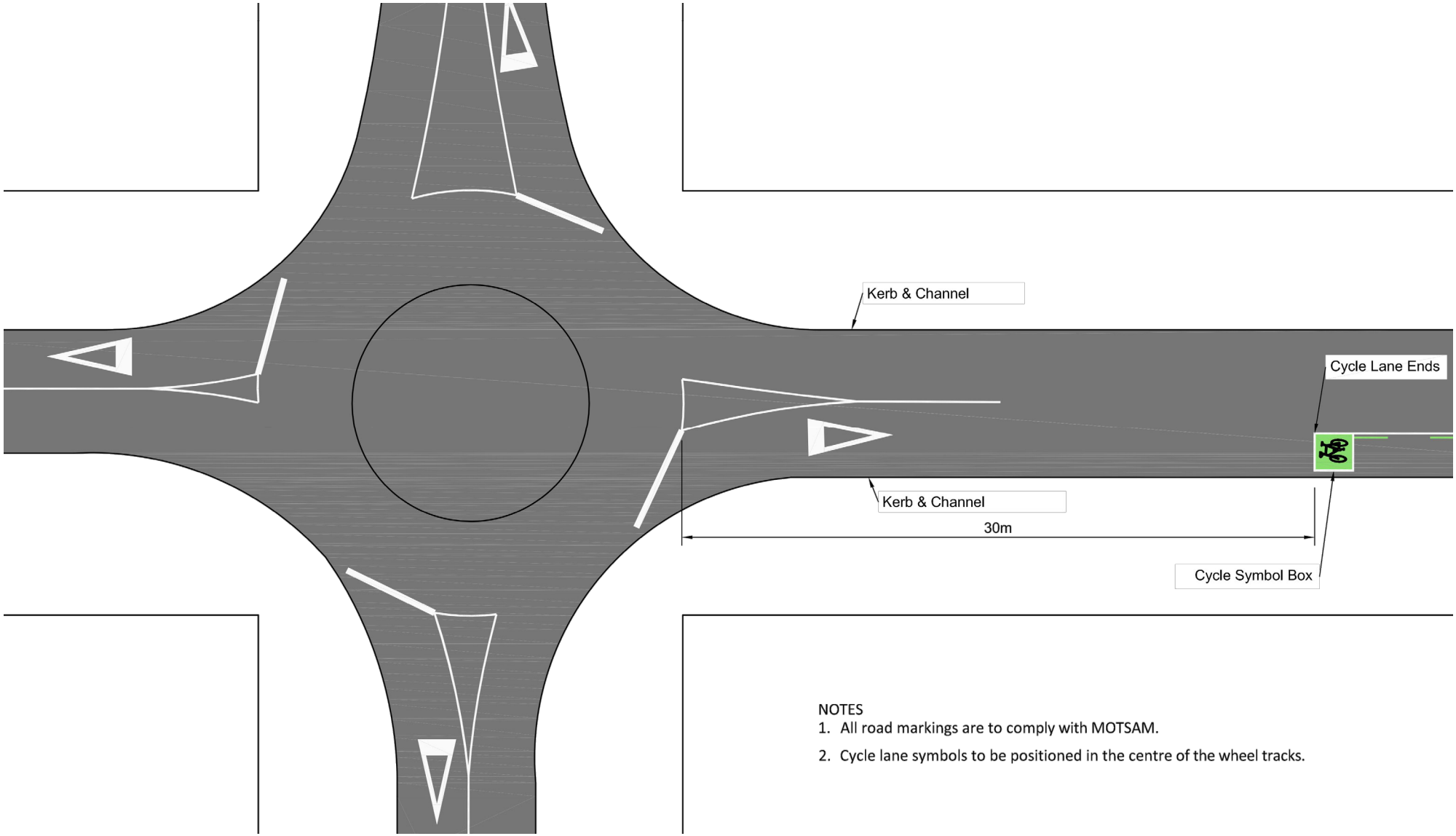
ROAD CONTROLLING AUTHORITY

ROAD MARKING
GIVEWAY / STOP INTERSECTION

Scale	Drawing No.
N.T.S	RM4

Issue JULY 2011

Trim Reference
Manuals\CoP



NOTES
1. All road markings are to comply with MOTSAM.
2. Cycle lane symbols to be positioned in the centre of the wheel tracks.

WAIROA DISTRICT COUNCIL

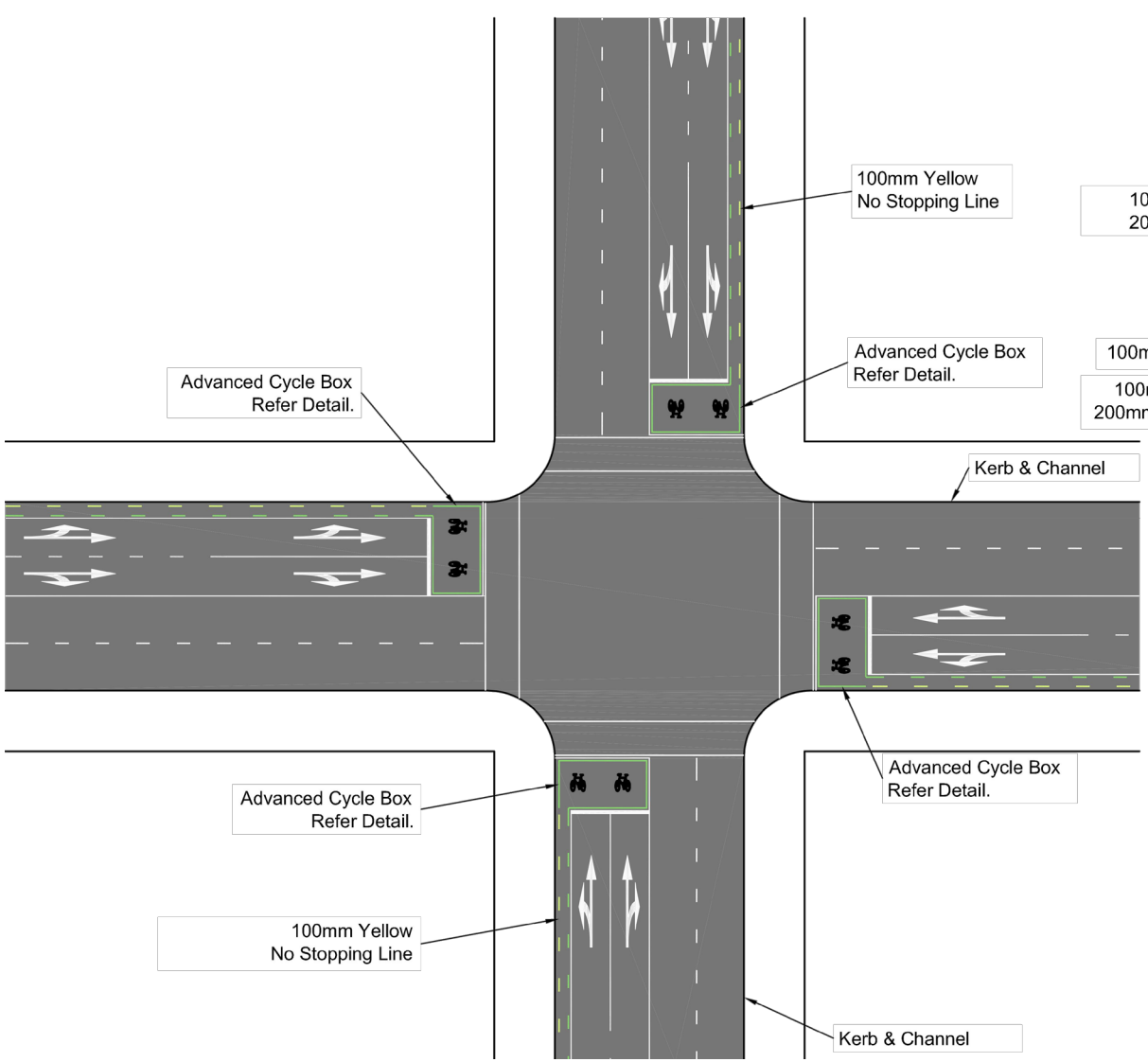
ROAD CONTROLLING AUTHORITY

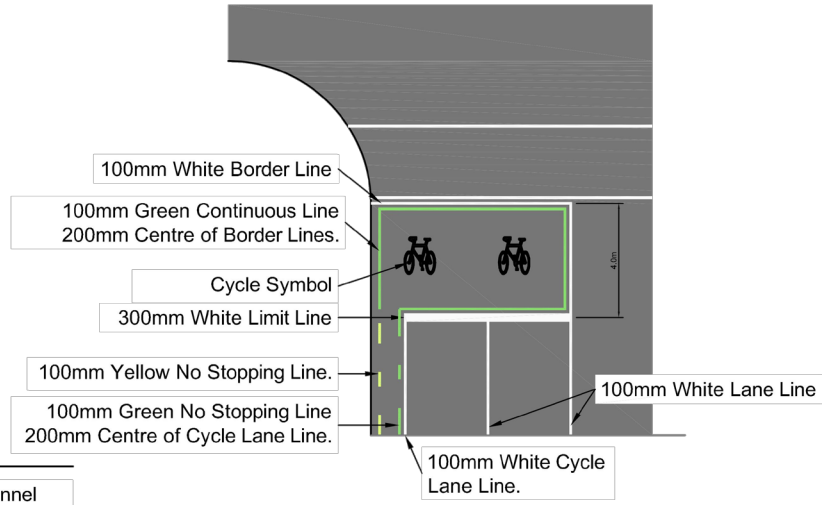
ROAD MARKING
ROUNDABOUT

Scale	Drawing No.
N.T.S	RM5

Issue JULY 2011

Trim Reference
Manuals\CoP





ADVANCED CYCLE BOX DETAIL

WAIROA DISTRICT COUNCIL

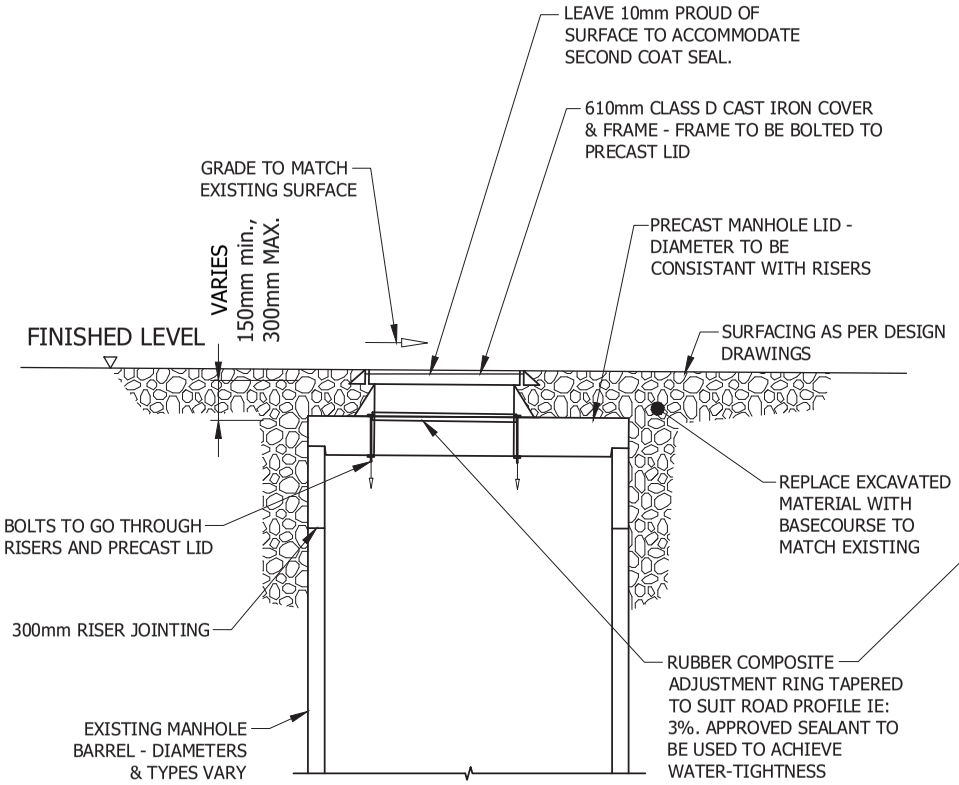
ROAD CONTROLLING AUTHORITY

ROAD MARKING
TRAFFIC SIGNALISED INTERSECTION

Scale	Drawing No.
N.T.S	RM6

Issue JULY 2011

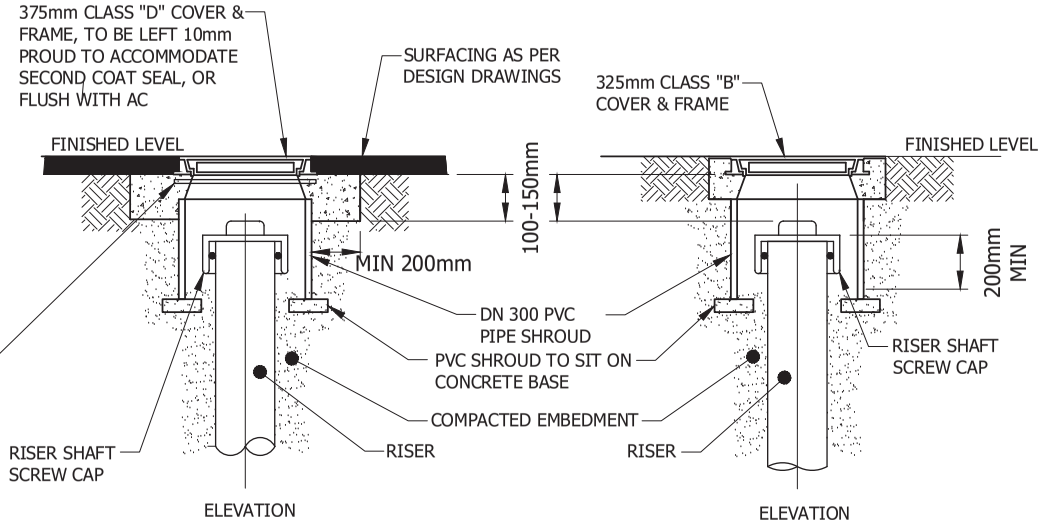
Trim Reference
Manuals\CoP



STANDARD TYPE MANHOLE

N.T.S

(MINIMUM 1050mmØ PRECAST MANHOLE)



TRAFFICABLE COVER

(CLASS D)

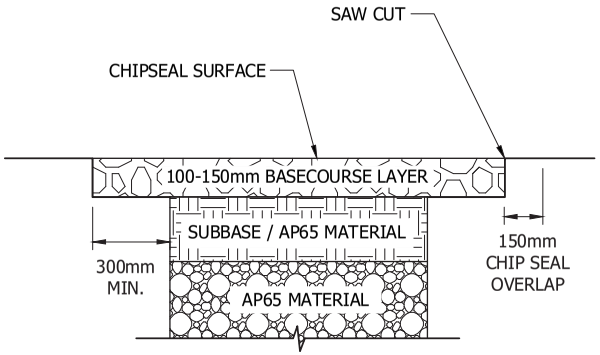
NON TRAFFICABLE COVER

(CLASS B)

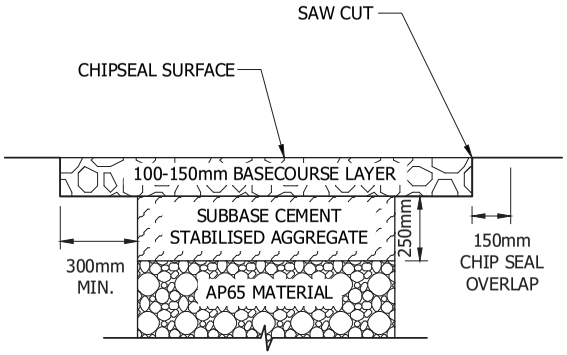
MAINTENANCE SHAFT + TERMINAL MAINTENANCE SHAFT

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL MANHOLE COVER ADJUSTMENT AND ARRANGEMENT	WS 103
		DEC 2018

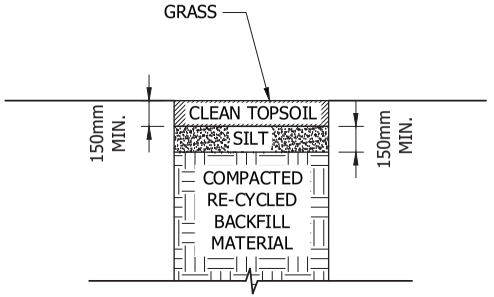


TYPICAL CHIP SEAL REINSTATEMENT

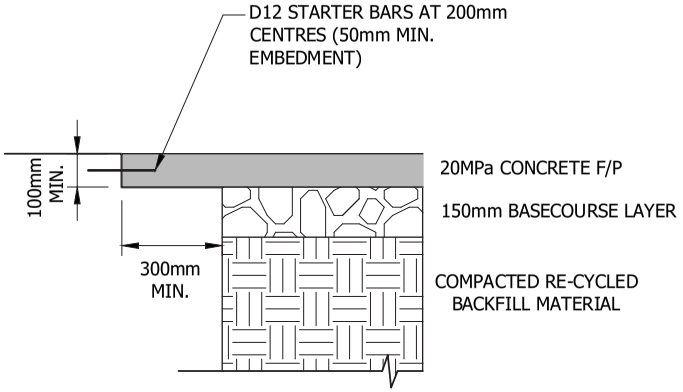


NOTE: SEE CONTRACT PAVEMENT SPECIFICATION FOR CEMENT APPLICATION RATE

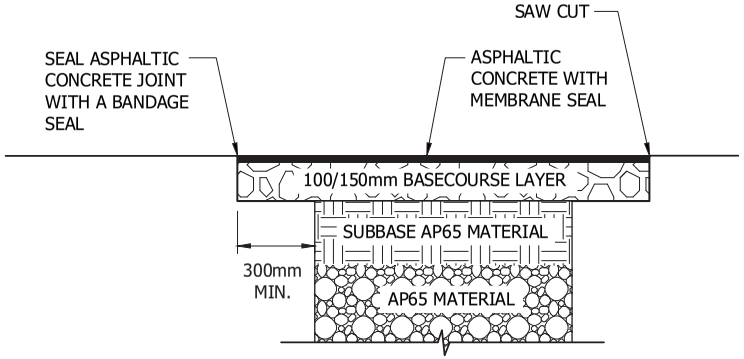
STABILISED TRENCH AND CHIPSEAL SURFACE REINSTATEMENT



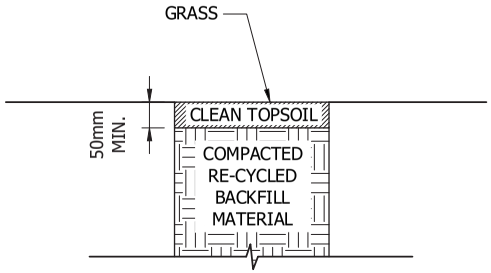
TYPICAL URBAN BERM REINSTATEMENT



CONCRETE FOOTPATH REINSTATEMENT



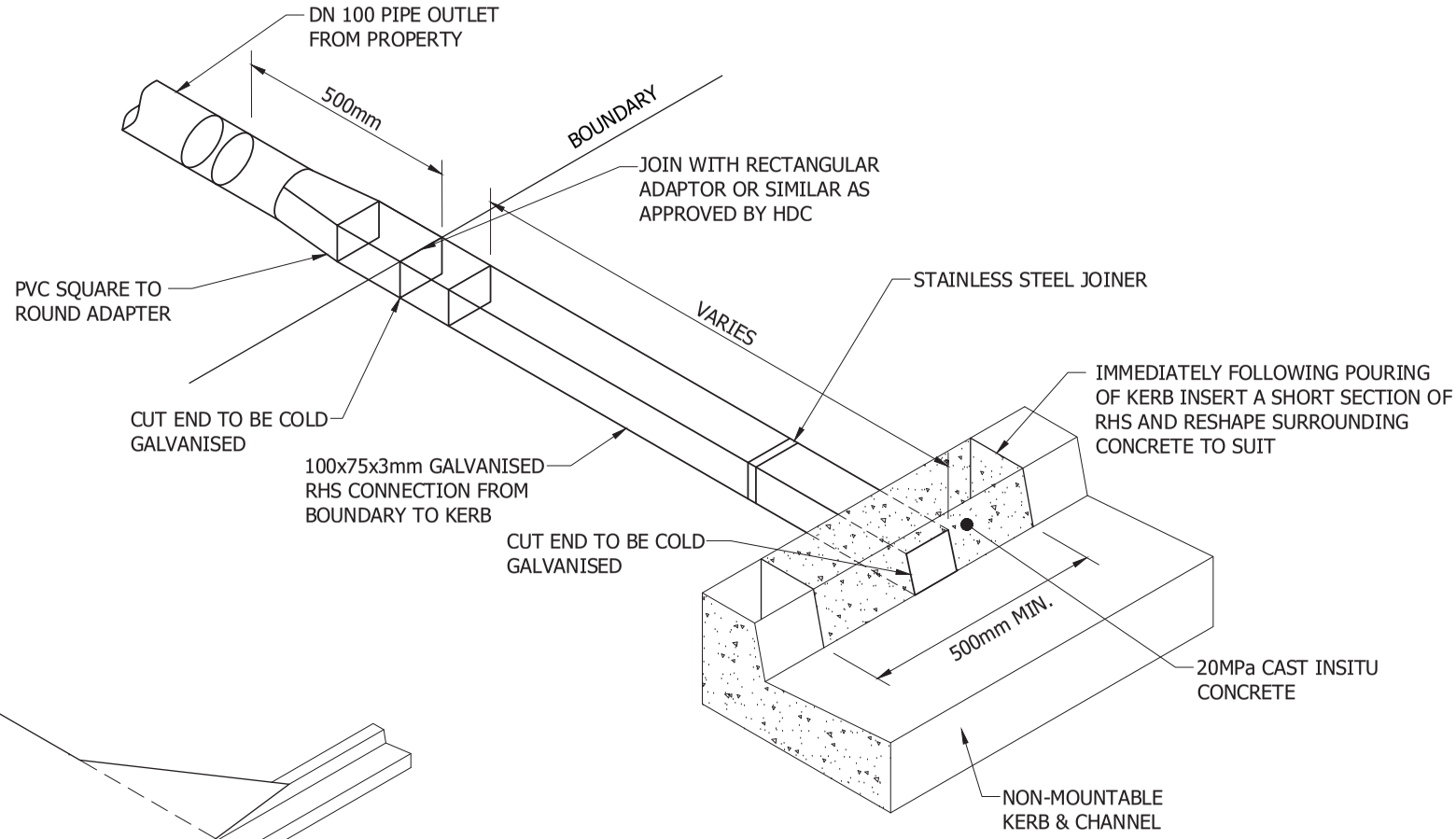
ASPHALTIC CONCRETE REINSTATEMENT



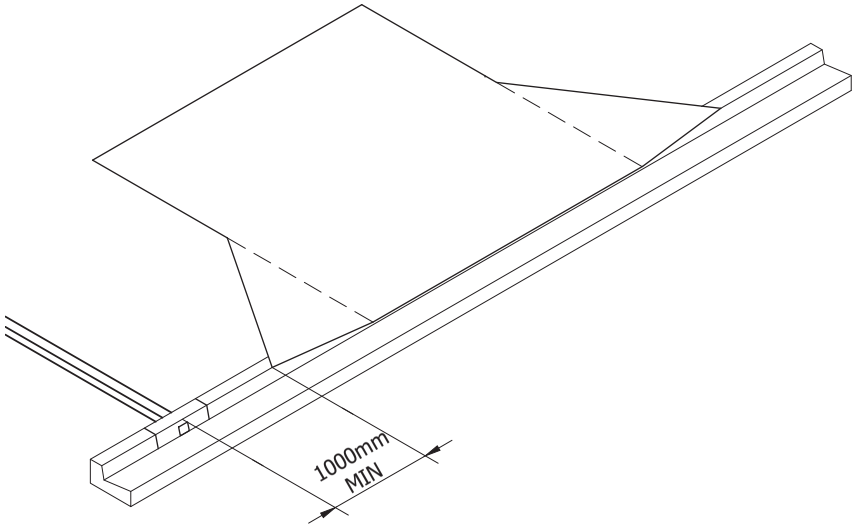
TYPICAL RURAL BERM REINSTATEMENT

GENERAL NOTE:
WHEN SEALING WITH ASPHALTIC CONCRETE AGAINST AN EXISTING KERB AND CHANNEL ENSURE TACK COAT OR BITUMEN IS SPRAYED UP THE FACE OF THE CHANNEL.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL TRENCH REINSTATEMENT AND SURFACING DETAILS	WS 104
		DEC 2018

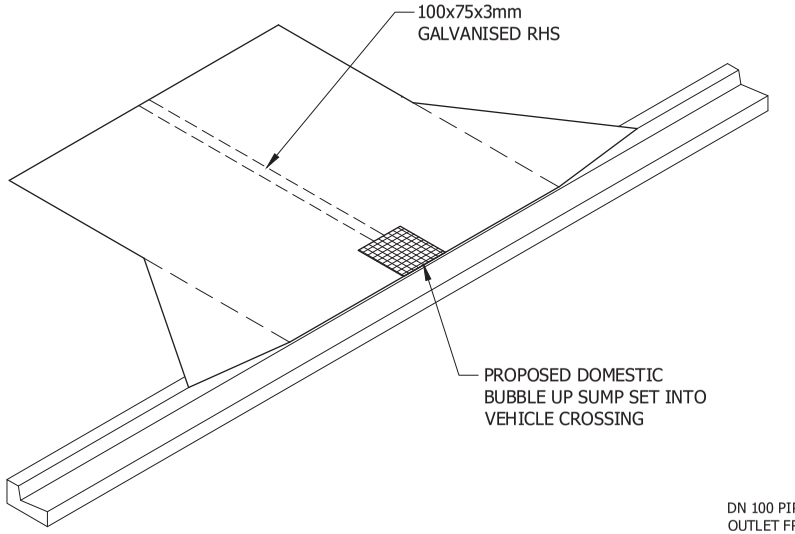


STORMWATER DISCHARGE DETAIL
FROM PROPERTY BOUNDARY TO KERB

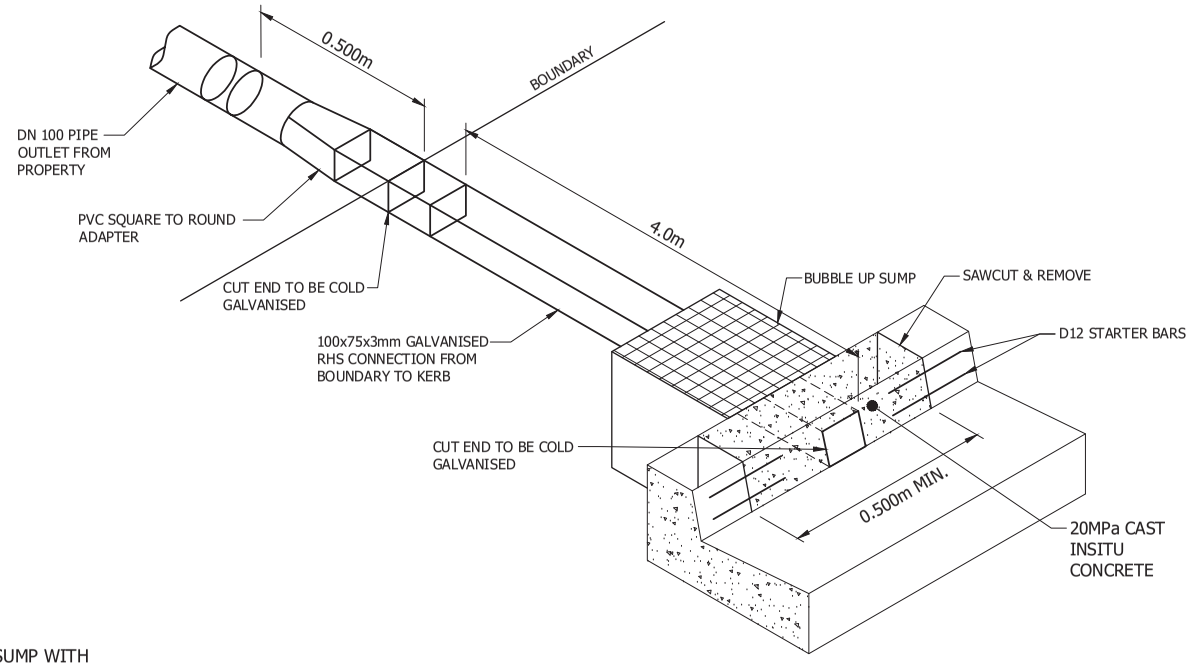


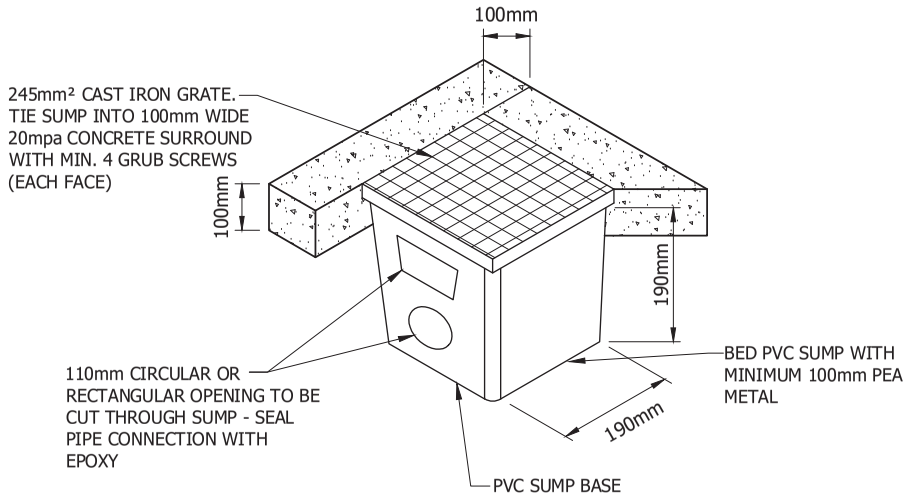
STORMWATER DISCHARGE TO KERB AT
VEHICLE CROSSING - ISOMETRIC VIEW

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	STORMWATER PROPERTY DISCHARGE TO KERB	WS 105
		DEC 2018



DOMESTIC BUBBLE UP SUMP AT VEHICLE CROSSING

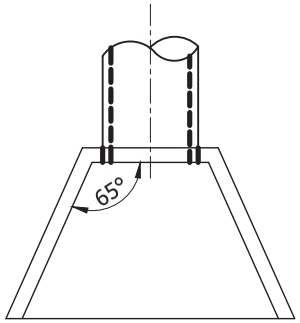




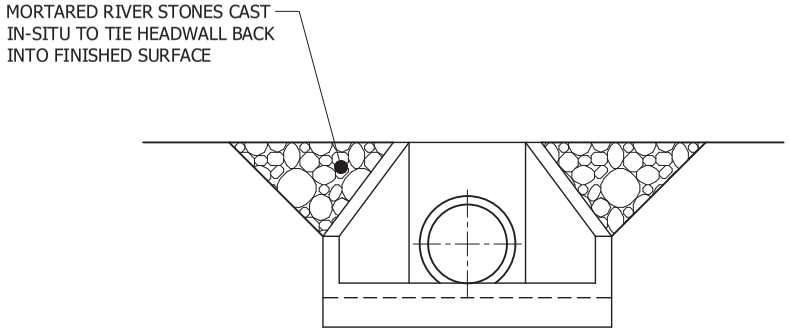
DOMESTIC BUBBLE UP SUMP

GENERAL NOTE:
THIS DETAIL IS ONLY TO BE USED WHERE DISCHARGE TO KERB BEYOND VEHICLE CROSSING IS NOT PRACTICAL

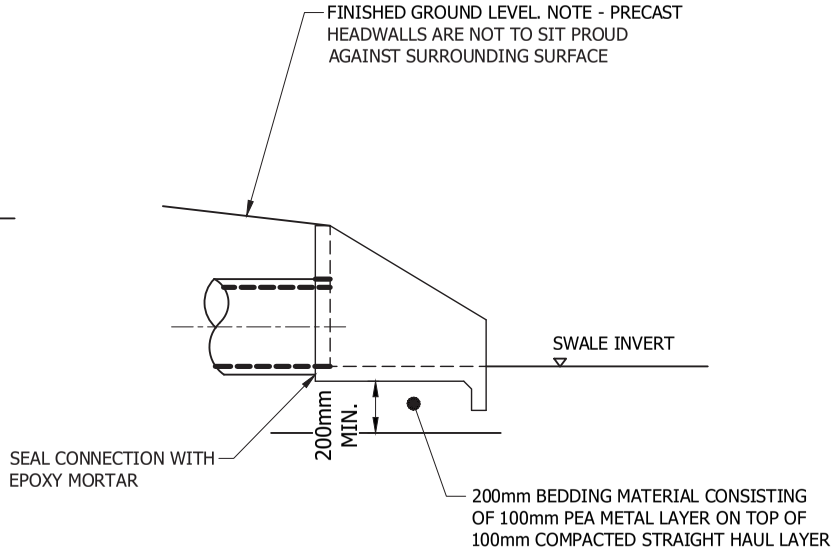
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	DOMESTIC PROPERTY DISCHARGE BUBBLE UP SUMP	WS 106
		DEC 2018



TOP



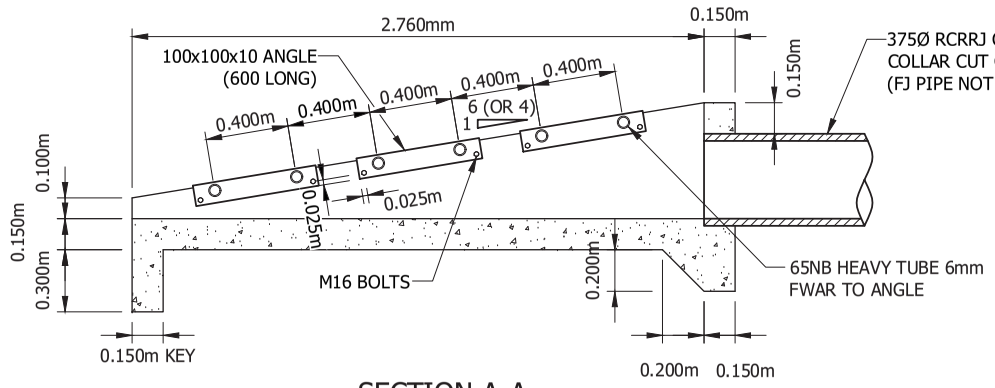
FRONT



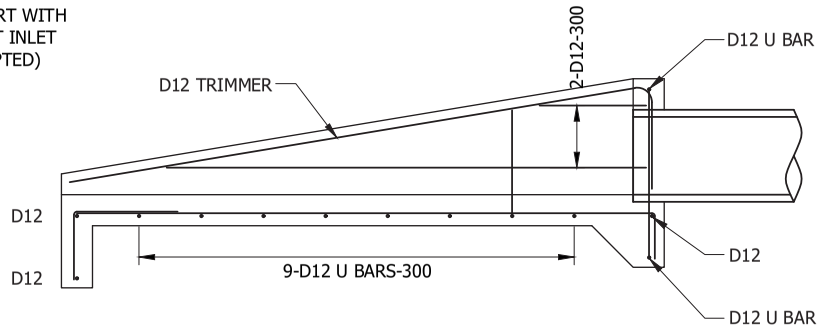
SIDE

GENERAL NOTES:
1. REFER TO MANUFACTURERS SPECIFICATION FOR DIMENSIONS

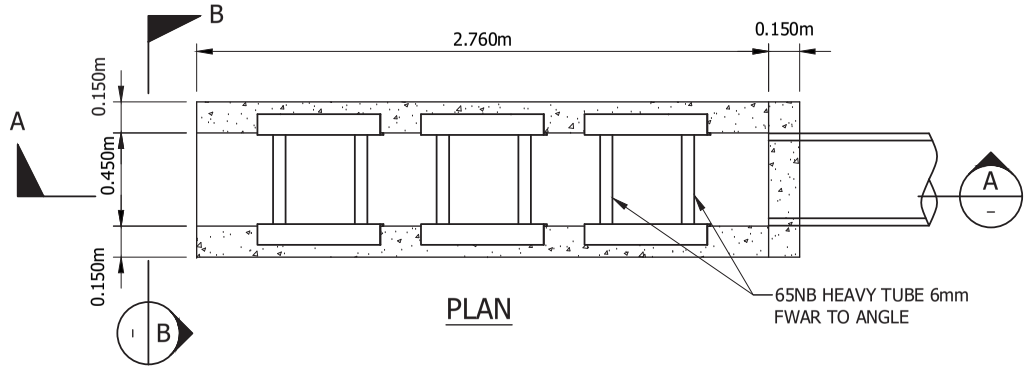
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL CULVERT HEADWALL DETAILS	WS 107
		DEC 2018



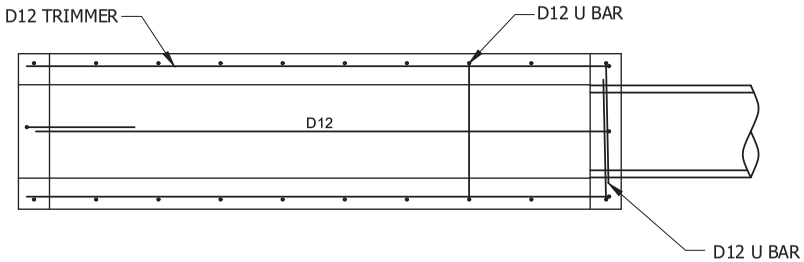
SECTION A-A



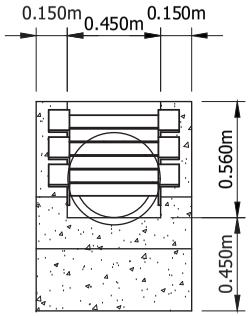
SECTION A-A



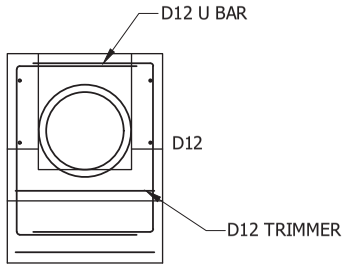
PLAN



PLAN



END ELEVATION B-B



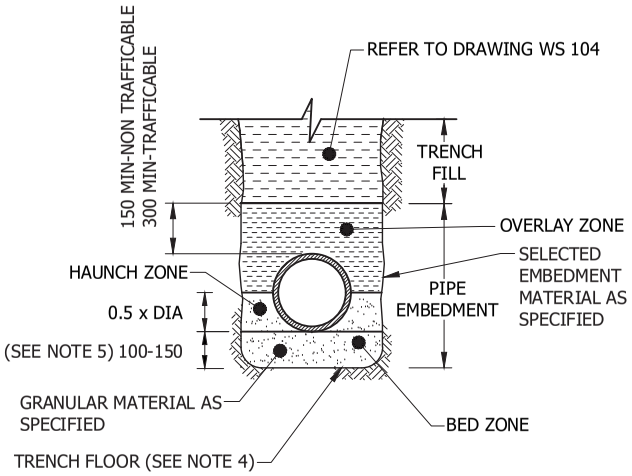
END ELEVATION B-B

TO BE USED TO TREAT PIPE ENDS LOCATED ADJACENT TO AND RUNNING PARALLEL WITH THE TRAFFIC LANE WITH SPEEDS 80km/h OR GREATER

NOTES:-

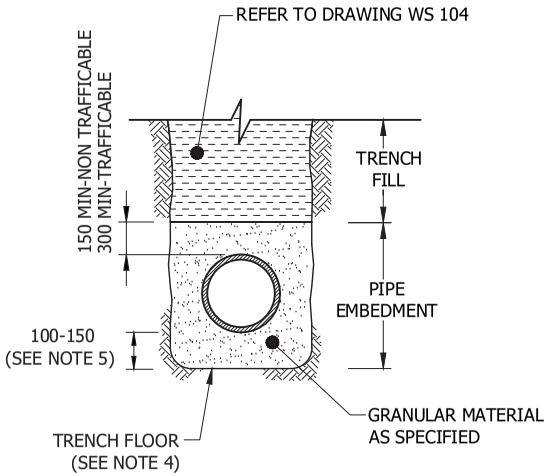
1. UNIT MAY BE PRECAST.
2. ALL STEELWORK (INCL. FITTINGS) TO BE HOT DIP GALVANISED AFTER FABRICATION.
3. BOLTS TO SCREW INTO CAST-IN INSERTS.
4. GRADE 300 REINFORCING STEEL. LAP LENGTH FOR D12 BAR ~ 500mm MIN.
5. CONCRETE STRENGTH 25MPa.
6. BAR SPACING GENERALLY AT 300mm CRS. IN BOTH DIRECTIONS.
7. ALL EXPOSED CONCRETE CORNERS ARE TO HAVE 25x25 CHAMFERS OR FILLETS.
8. 40mm MIN. REINF. COVER TO WALL EARTH FACES & UNDERSIDE OF APRON FOR PRECAST UNIT.
9. INCREASE WIDTH OF KEY TO 200mm AND COVER TO 75mm WHERE CAST AGAINST EARTH.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL CULVERT SAFETY HEADWALL	WS 108
		DEC 2018



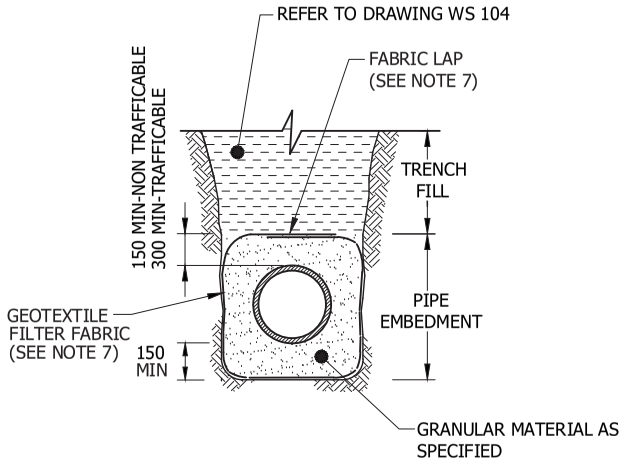
TYPE HS2 SUPPORT

FOR RIGID PIPES ONLY (SEE NOTE 2)



TYPE 3 SUPPORT

FOR FLEXIBLE & RIGID PIPES (SEE NOTE 2)



TYPE 4 SUPPORT

WITH GEOTEXTILE FOR FLEXIBLE & RIGID PIPES (SEE NOTE 2)

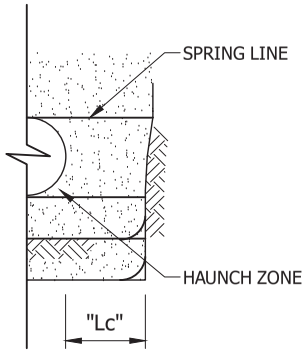
NOTE:
GEOTEXTILE EMBEDMENT TO BE USED WHEN THERE IS A RISK OF FINES MIGRATION FROM THE TRENCH. MIGRATION LIKELY TO OCCUR DUE TO PRESENCE OF GROUND WATER

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. PIPE CLASSIFICATION:
   a) RIGID PIPES: REINFORCED CONCRETE
   b) FLEXIBLE PIPES: PVC, GRP, STEEL, DI AND PE.
3. PLACEMENT OF EMBEDMENT, TRENCHFILL AND COMPACTION TO MEET THE REQUIREMENTS OF THE CONTRACT SPECIFICATIONS
4. EXCAVATE OR COMPACT TRENCH FLOOR TO PROVIDE A FIRM BASE (min. 50KPa) TO SUPPORT BEDDING MATERIAL AND MINIMISE PIPELINE SETTLEMENT.5. ENSURE BEDDING IS DEEP ENOUGH THAT PIPE JOINT PROJECTIONS (SOCKETS, FLANGES) DO NOT TOUCH THE TRENCH FLOOR.
6. TYPE 4 SUPPORT TO BE USED WHERE MIGRATORY NATIVE SOILS (SANDS, CLAYS) ARE ENCOUNTERED ADJACENT TO THE EMBEDMENT ZONE AND SINGLE SIZE AGGREGATE IS USED.
7. GEOTEXTILE OVERLAY IS REQUIRED FOR COARSE AGGREGATE EMBEDMENT > 5mm.
   LAY GEOTEXTILE FILTER FABRIC AGAINST TRENCH FLOOR AND WALLS SUCH THAT IT FULLY ENCASES THE EMBEDMENT
   - PRESS FILTER FABRIC INTO THE VOIDS BEFORE INSTALLING EMBEDMENT TO PREVENT FABRIC TEARING.
   - PROVIDE A MINIMUM OF 250mm OVERLAP AT ALL FILTER FABRIC JOINTS.

SPRING LINE TRENCH CLEARANCE

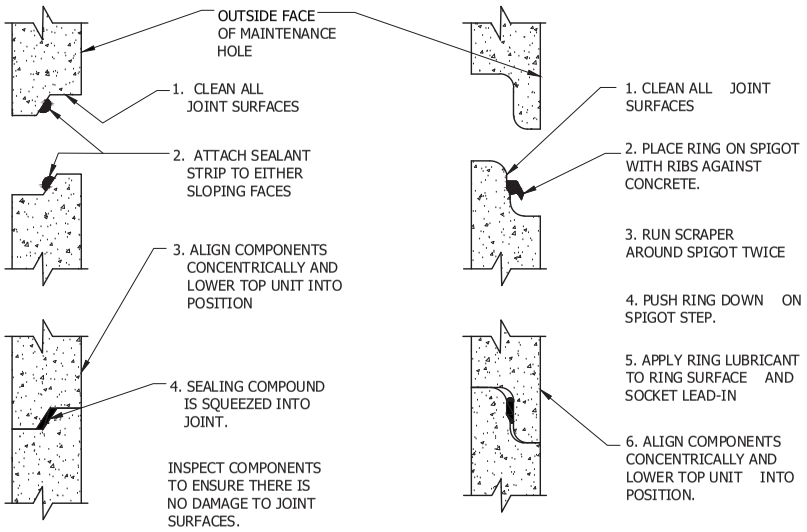
NOMINAL DIAMETER DN	MINIMUM CLEARANCE "Lc"
<150	100
>150-<300	150
>300-<450	200
>450-<900	300
>900-<1500	350

TRENCH WIDTH TO BE SUFFICIENT TO SAFELY LAY PIPE AND COMPACT THE SIDE SUPPORT ZONE.



MINIMUM TRENCH WIDTH

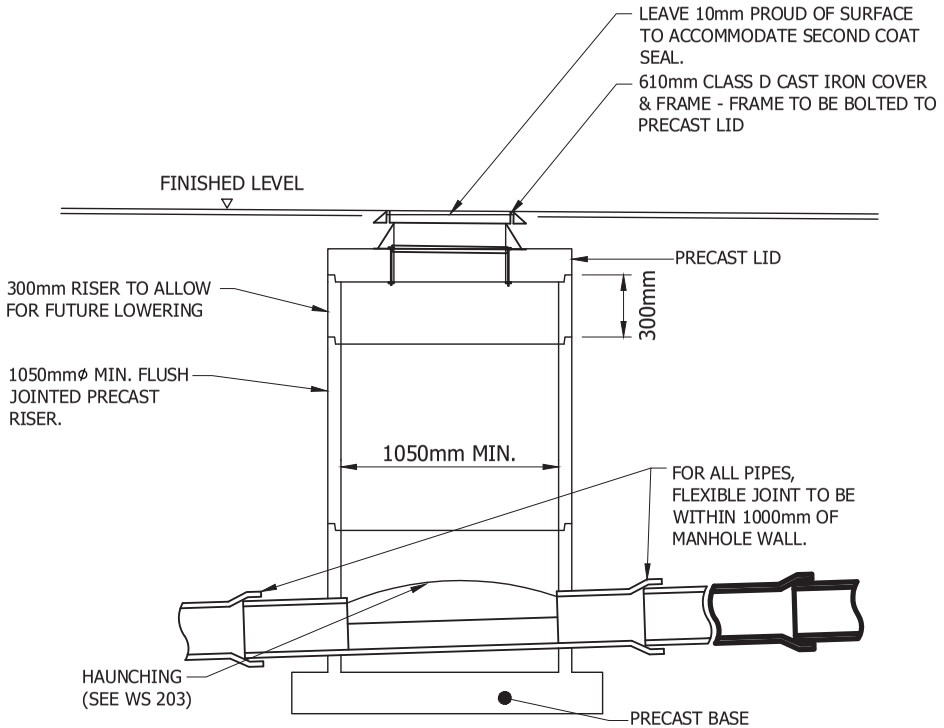
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	STANDARD EMBEDMENT DETAIL FLEXIBLE AND RIGID PIPES	WS 201
		DEC 2018



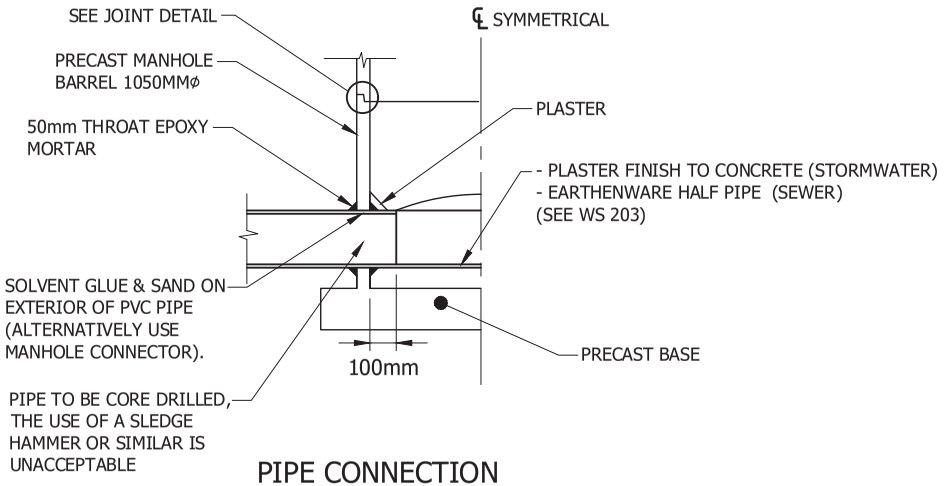
MASTIC JOINT DETAILS

RUBBER RING JOINT DETAILS

MANHOLE RISER DETAIL



ELEVATION

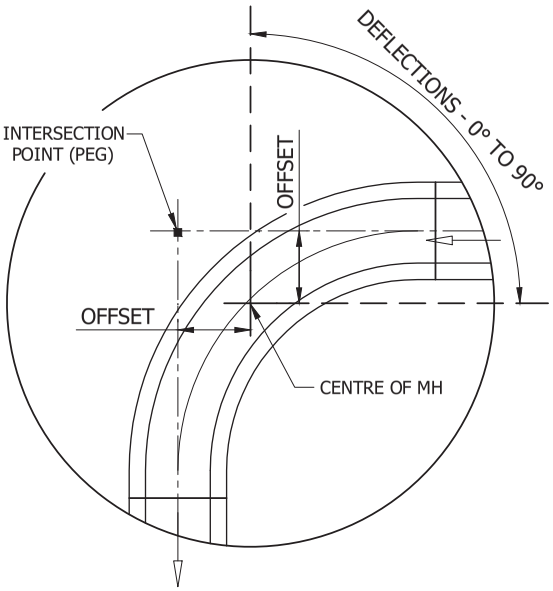


PIPE CONNECTION

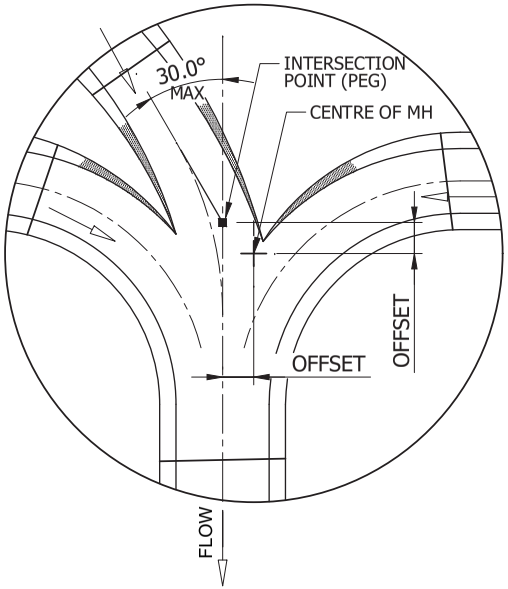
GENERAL NOTES:

1. MAKE-UP RINGS:
   USE MINIMUM OF ONE 300mm RISER AT TOP PER MANHOLE DURING CONSTRUCTION TO ALLOW FOR FUTURE SURFACE ADJUSTMENT WITHOUT AFFECTING THE SHAFT SECTIONS.
2. WHERE THERE IS SIGNIFICANT RISK OF INFILTRATION OR TREE ROOT INTRUSION APPLY AN EXTERNAL BITUMASTIC SEAL TAPE 150mm WIDE OVER A COAT OF MANUFACTURERS RECOMMENDED PRIME SEAL TO ALL JOINTS.

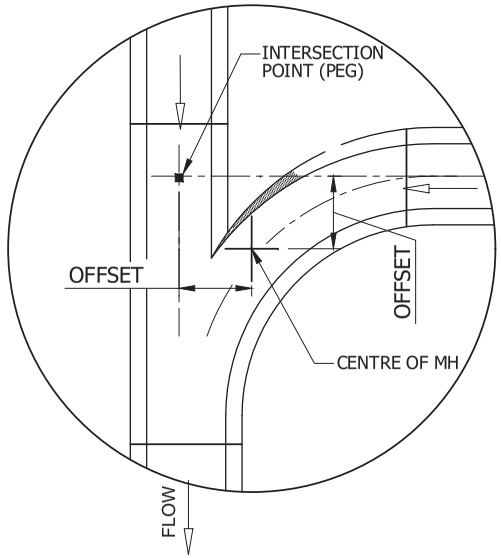
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	STANDARD MANHOLE AND PIPE CONNECTION	WS 202
		DEC 2018



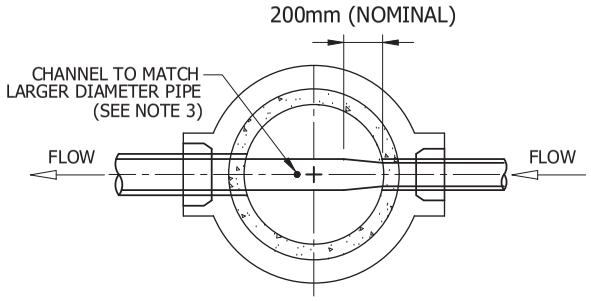
CHANGE IN DIRECTION



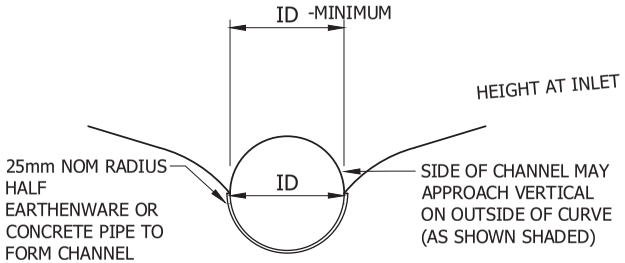
MULTIPLE INCOMING PIPES



STRAIGHT THROUGH & 90° INLET



CHANGE IN DIAMETER



TYPICAL CHANNEL DETAILS

NOTE:
BENCHING WITHIN MANHOLES IS REQUIRED FOR ALL STORMWATER APPLICATIONS UNLESS OTHERWISE APPROVED BY HASTINGS DISTRICT COUNCIL

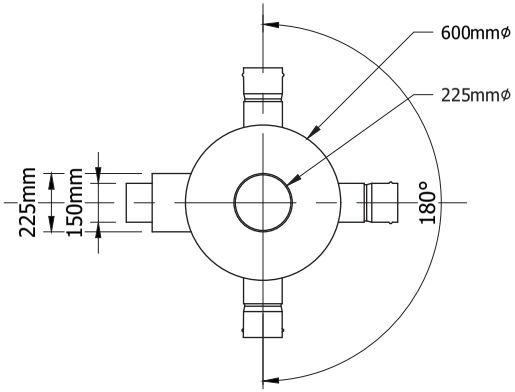
GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. PROVIDE ROUNDED NOSING ON INLET AND OUTLET PIPE TO PREVENT DAMAGE TO JETTING EQUIPMENT AND CCTV GUIDES AND CABLES
3. CONSTRUCTION MAY BE A COMBINATION OF PRECAST AND IN-SITU TO SUIT APPLICATION
4. WHERE NECESSARY PULL MANHOLE OFF CENTRELINE OF STORMWATER / SEWER (MAX 200mm) TO IMPROVE FLOW AND ACCESSIBILITY PROVIDED THE FOLLOWING CONDITIONS ARE MET:
   - ALL TANGENT POINTS TO BE CONTAINED WITHIN MANHOLE.
   - SUFFICIENT WORK AREA AVAILABLE.
   - MAINTENANCE EQUIPMENT CAN BE USED IN ALL MAINS.
   - OFFSET AS SPECIFIED

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	MANHOLE - TYPICAL CHANNEL ARRANGEMENTS	WS 203
		DEC 2018

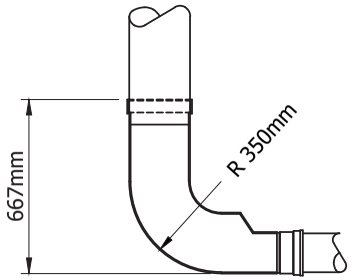
GRADE AND ANGLE OF UPSTREAM AND DOWNSTREAM LINES IS ACCOMMODATED IN CUSTOM BUILD OF EACH UNIT

FLOW

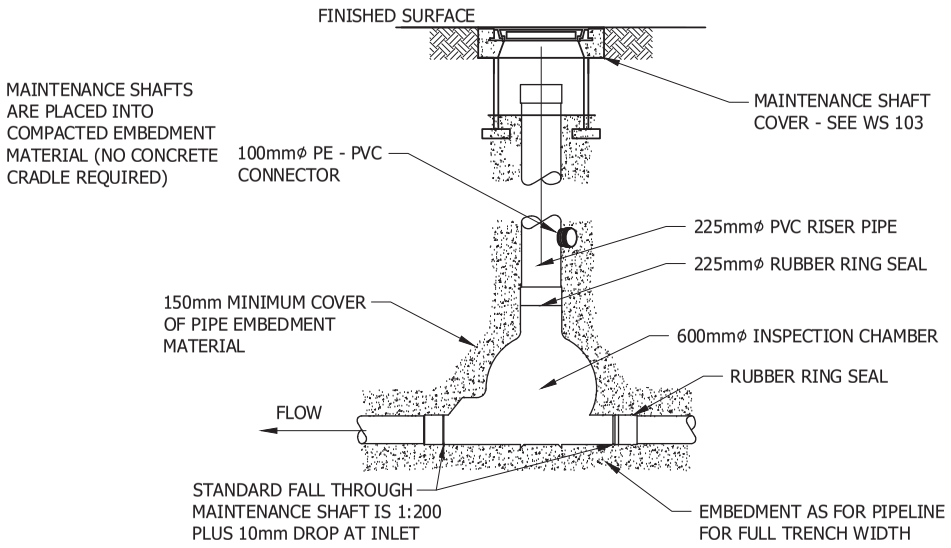
UPSTREAM LINES CAN BE POSITIONED AT ANY ANGLE BETWEEN 45° & 315° FROM THE DOWNSTREAM FOR 150ø LINES (SHOWN) AND BETWEEN 65° & 295° FOR 225ø LINES



PLAN VIEW
(SHOWS RANGE OF UPSTREAM ANGLES)

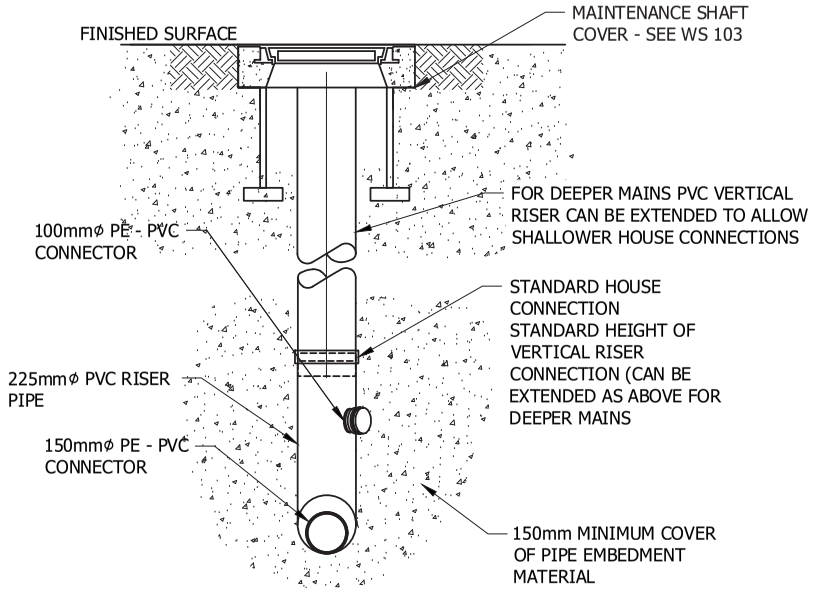


TERMINAL SHAFT SECTION
(SHOWN WITH 150mmø AKATHERM FITTING)



SIDE ELEVATION

MAINTENANCE SHAFT
(POO PIT) - TYPICAL INSTALLATION

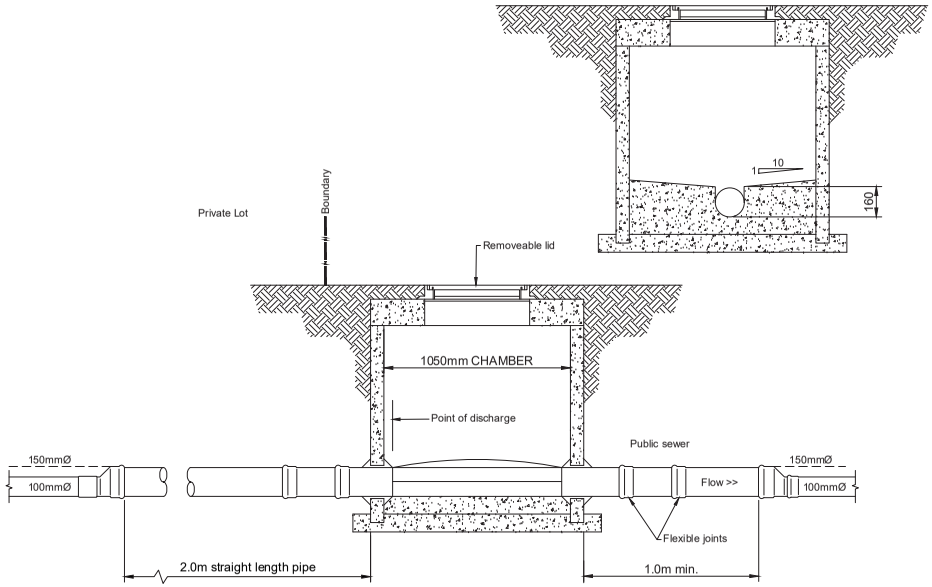


FRONT VIEW

TYPICAL TERMINAL SHAFT (J-PIT)
- TYPICAL INSTALLATION

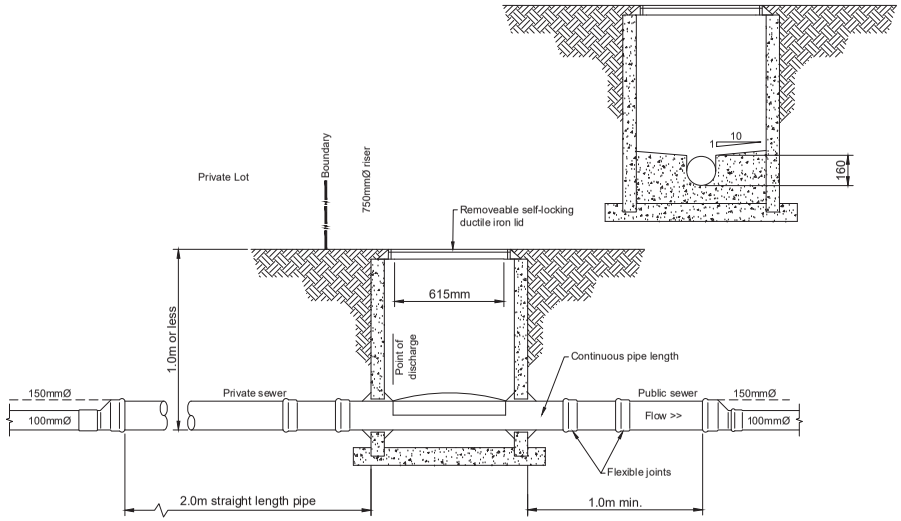
GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL MAINTENANCE SHAFT DETAILS	WS 204
		DEC 2018



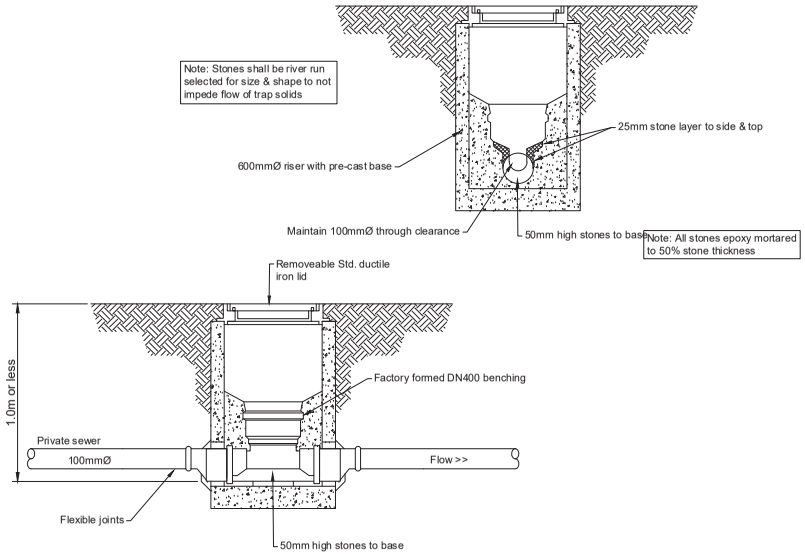
INSTALLATION OR WTA MONITORING MANHOLE IN 100mm PIPELINE
(Note: No rodding eye at boundary required)

TRADE WASTE - MONITORING CHAMBER - ALTERNATIVE A



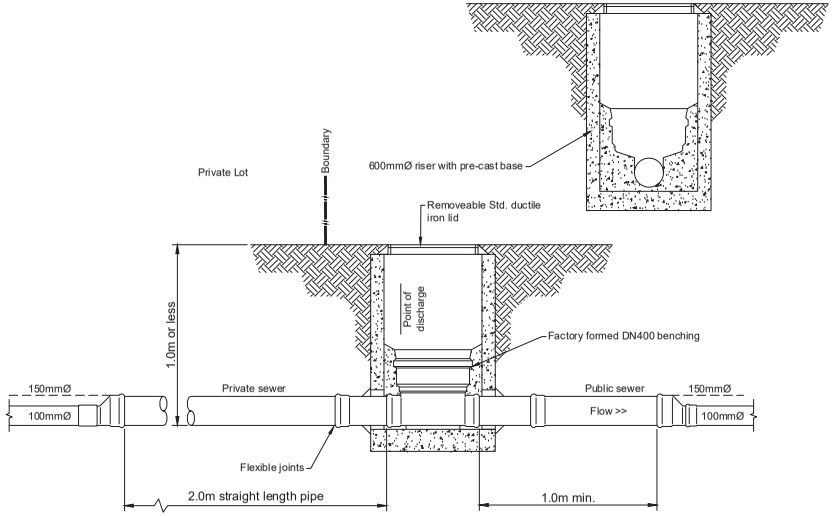
CONDITIONAL TRADE WASTE DISCHARGES,
NOT GREATER THAN 1.0 METRE DEEP
(Note: No rodding eye at boundary required)

TRADE WASTE - MONITORING CHAMBER - ALTERNATIVE B



ROCK CONTACT CHAMBER,
NOT GREATER THAN 1.0 METRE DEEP
(Note: stone lining of chamber by factory supplier)

CULTURALLY SENSITIVE WASTE CHAMBER

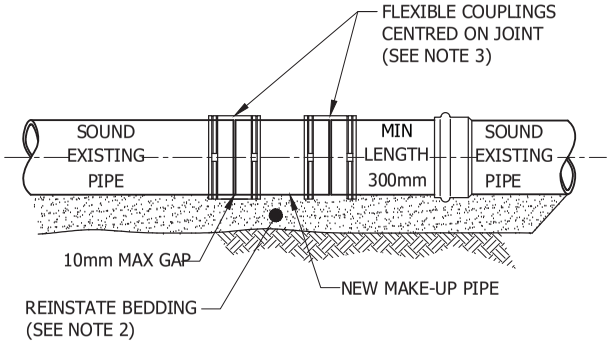


ALTERNATIVE CONDITIONAL TRADE WASTE DISCHARGES,
NOT GREATER THAN 1.0 METRE DEEP
(Note: No rodding eye at boundary required)

TRADE WASTE - MONITORING CHAMBER - ALTERNATIVE C

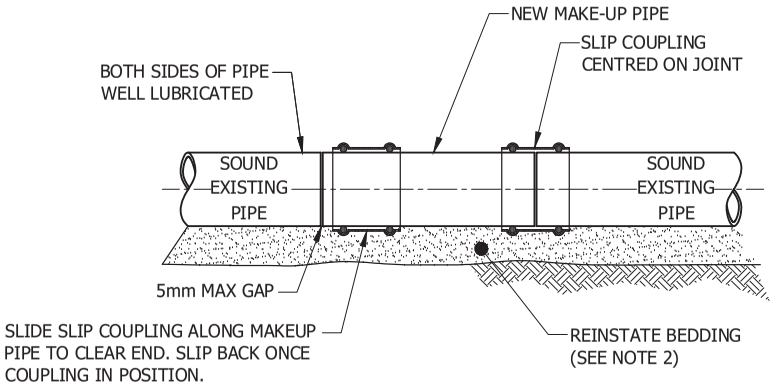
GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TRADE WASTE CHAMBER DETAILS	WS 204A
		JAN 2019

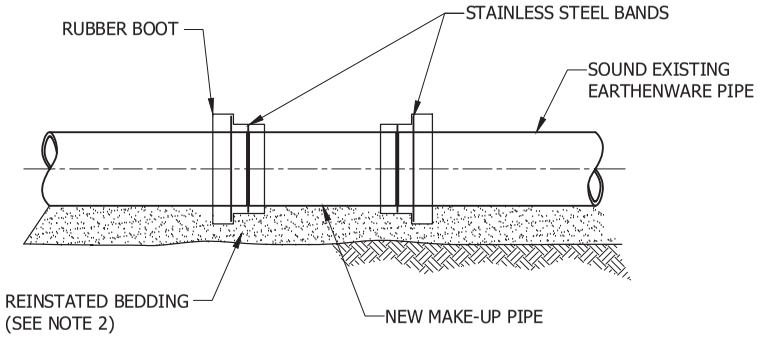


FLEXIBLE COUPLING METHOD

SS WRAP AROUND CLAMPS	
DN	MIN CLAMP LENGTH EITHER SIDE OF PIPE CUT OR DAMAGE
100 - <200	75
>200 - <300	100
>300 - 600	150

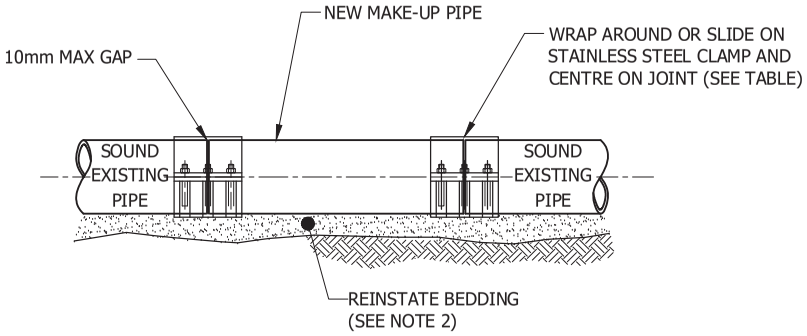


SLIP COUPLING METHOD



FLEXIBLE COUPLING METHOD

EARTHENWARE PIPES

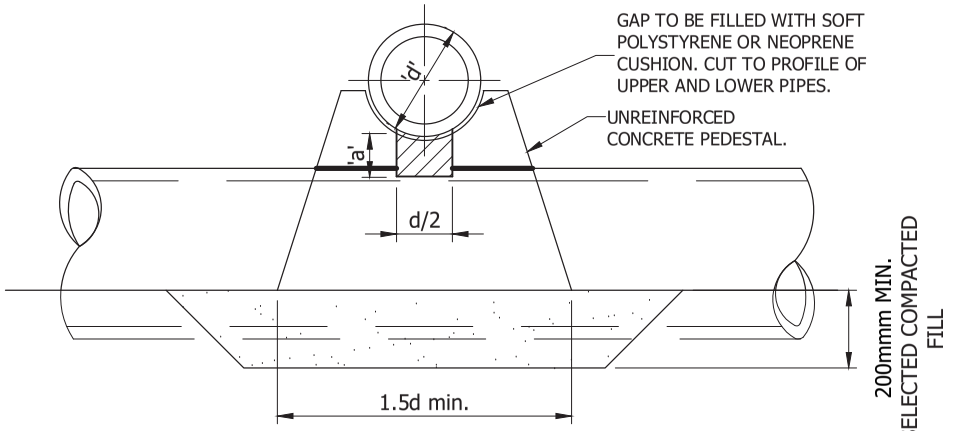


STAINLESS STEEL REPAIR CLAMP METHOD

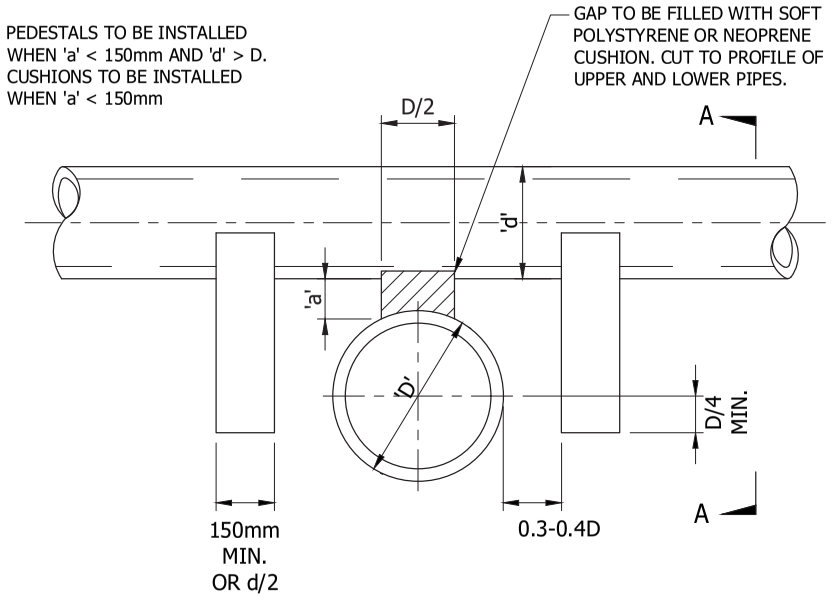
GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. PLACE EMBEDMENT UNDER AND AROUND ALL INSTALLED PIPE SECTIONS AND SPACERS AND COMPACT TO MAINTAIN GRADE AND MINIMISE SETTLEMENT.
3. FLEXIBLE COUPLINGS TO HAVE GRADE 316 SS CLAMPS AND SHEAR BANDS TO BE IN ACCORDANCE WITH AS 4327
4. SLIP COUPLINGS TO BE AS SPECIFIED BY PIPE MANUFACTURER.
5. A SINGLE REPAIR CLAMP MAY BE USED FOR REPAIR WHERE APPROVED. MINIMUM CLAMP LENGTH EITHER SIDE OF THE DAMAGE AS SHOWN ON THE TABLE.
6. FLEXIBLE COUPLINGS AND STAINLESS REPAIR CLAMPS ARE NOT APPLICABLE TO RIBBED PIPE.
7. THOROUGHLY CLEAN SURFACE OF EXISTING PIPE BEFORE INSTALLING CLAMPS OR COUPLINGS

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	FIELD JOINT / REPAIR DETAILS - GRAVITY PIPES	WS 205
		DEC 2018

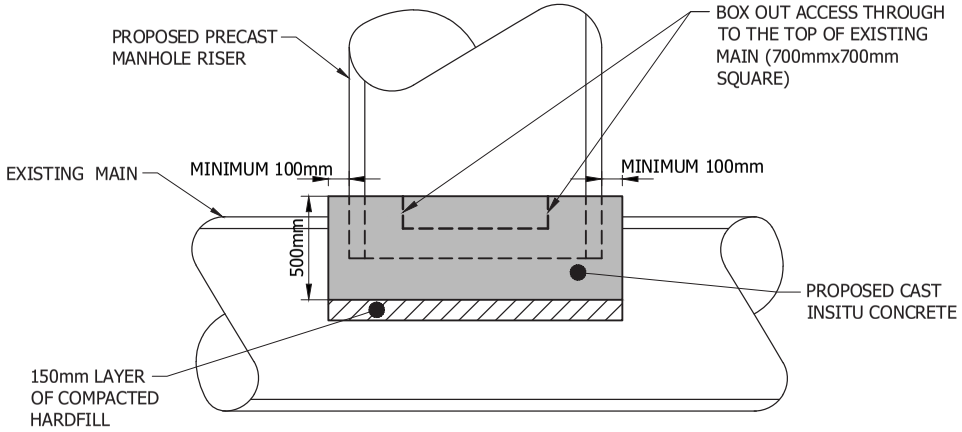


SECTION A-A

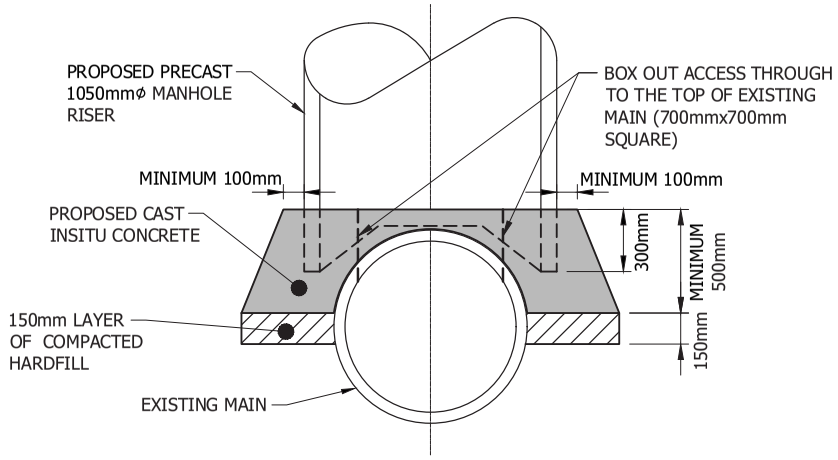


ELEVATION

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	CLOSE PIPE CROSSING SUPPORT DETAIL	WS 206
		DEC 2018



SIDE ELEVATION

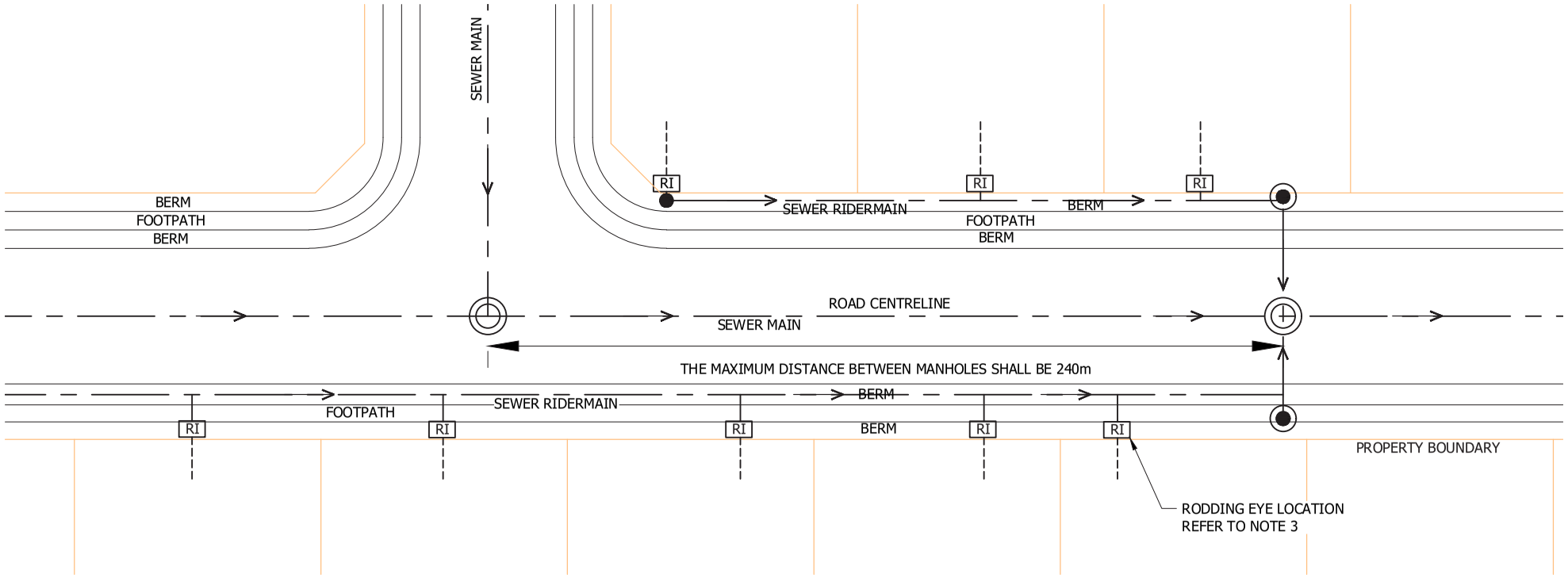


FRONT ELEVATION

PIPE TO RISER SIZE RANGE	
PIPE SIZE	RISER SIZE
600ø TO 825ø	1050ø MANHOLE
900ø TO 1200ø	1200ø MANHOLE
1200ø	1350ø MANHOLE
1350ø +	1050ø MANHOLE CAST INTO PIPE

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. CHIMNEY MANHOLES ARE ONLY SUITABLE FOR PIPES 600mmø OR GREATER
3. PIPES SMALLER THAN 1350ø HAVE THE RISER STRADDLING THE PIPE AS DETAILED. PIPES 1350ø AND GREATER HAVE THE RISER CAST INTO THE PIPE SOFFIT

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	STANDARD CHIMNEY MANHOLE DETAIL	WS 207
		DEC 2018

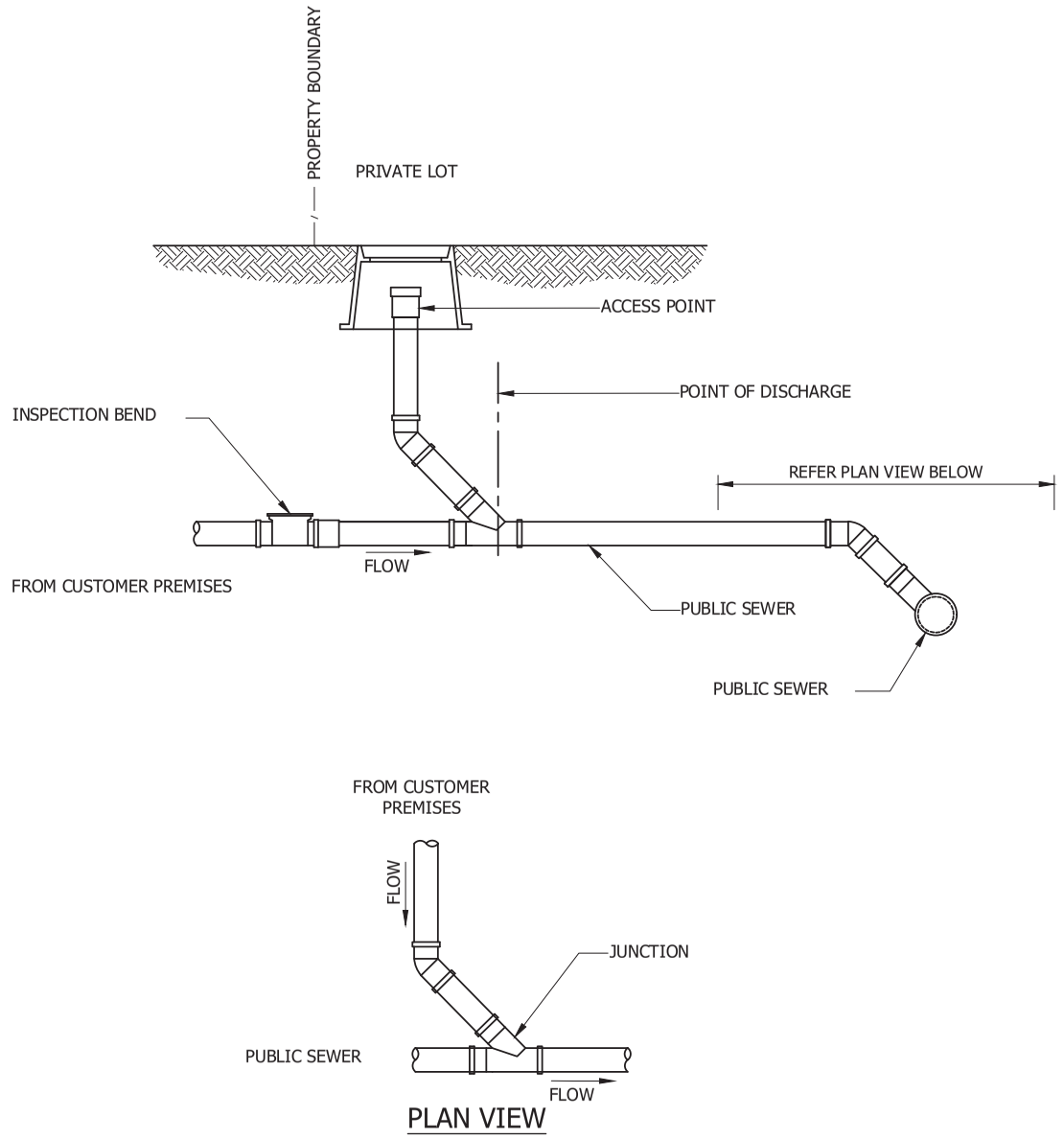


LEGEND

- SEWER MANHOLE
- MAINTENANCE SHAFT (POO PIT)
- TERMINAL MAINTENANCE SHAFT
- RI — RODDING EYE
- SEWER MAIN
- LATERAL CONNECTION
- LATERAL CONNECTION PRIVATE
- FLOW DIRECTION

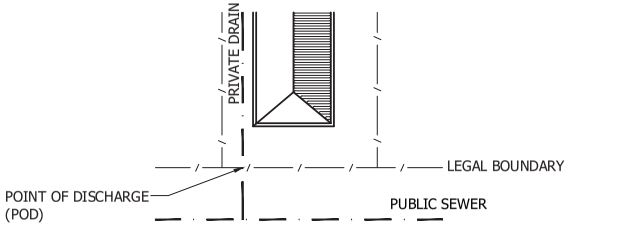
GENERAL NOTES:
1. LOCATE SEWERS AS SHOWN IN DESIGN DRAWINGS. GENERAL POSITION IS ALONG THE CENTRELINE.
2. SEWER RIDERMAINS ARE TO BE INSTALLED WHEN THE SEWER MAIN IS >2.5m DEEP
3. RODDING EYE ACCESS BOXES ARE TO BE INSTALLED AS CLOSE TO THE PROPERTY BOUNDARY AS PRACTICAL AND BE EASILY ACCESSIBLE AT ALL TIMES.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL SEWER RETICULATION LAYOUT	WS 301
		DEC 2018

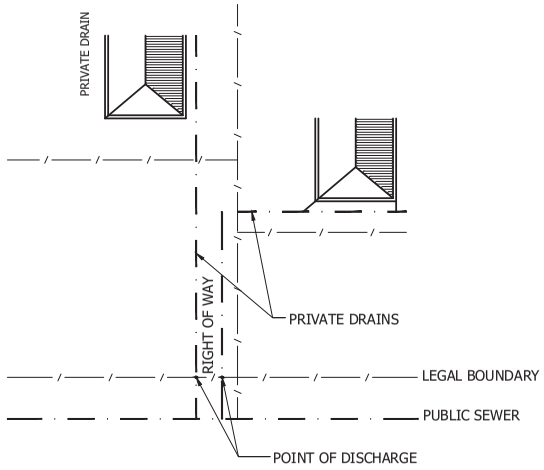


PLAN VIEW

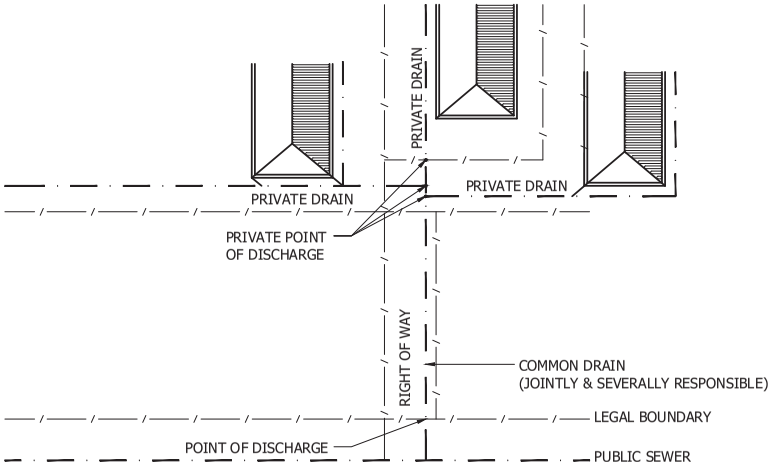
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	SEWER POINT OF DISCHARGE DETAIL	WS 301A
		JAN 2019



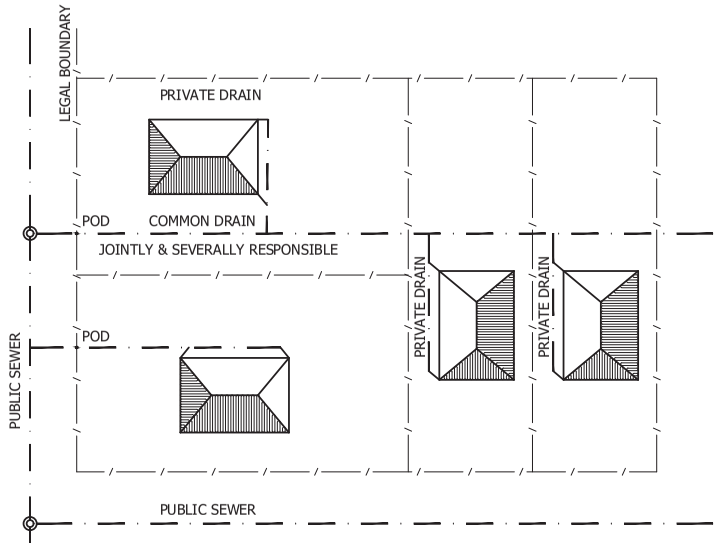
POINT OF DISCHARGE - STREET FRONTAGE LOTS



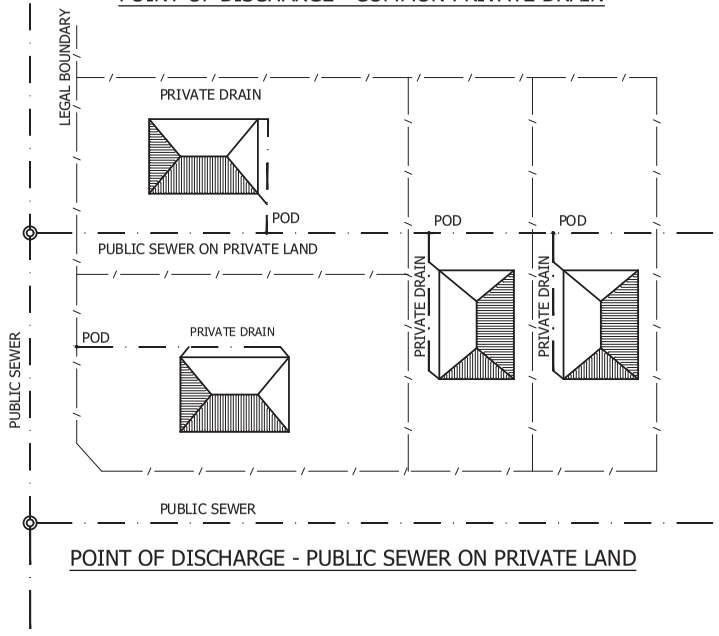
POINT OF DISCHARGE - 2 OR LESS REAR LOTS ON RIGHT OF WAY



POINT OF DISCHARGE - 3 OR MORE REAR LOTS ON RIGHT OF WAY

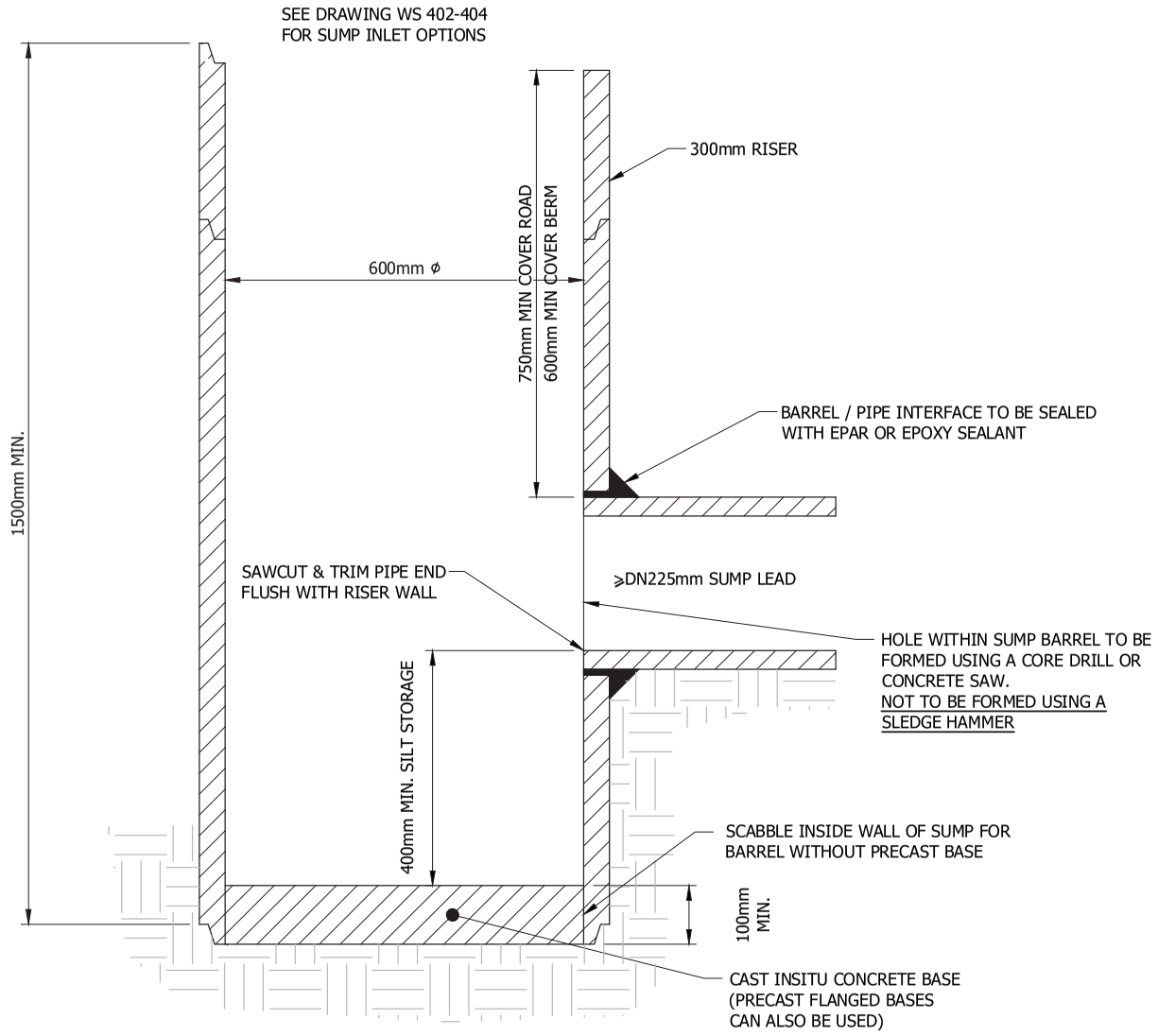


POINT OF DISCHARGE - COMMON PRIVATE DRAIN



POINT OF DISCHARGE - PUBLIC SEWER ON PRIVATE LAND

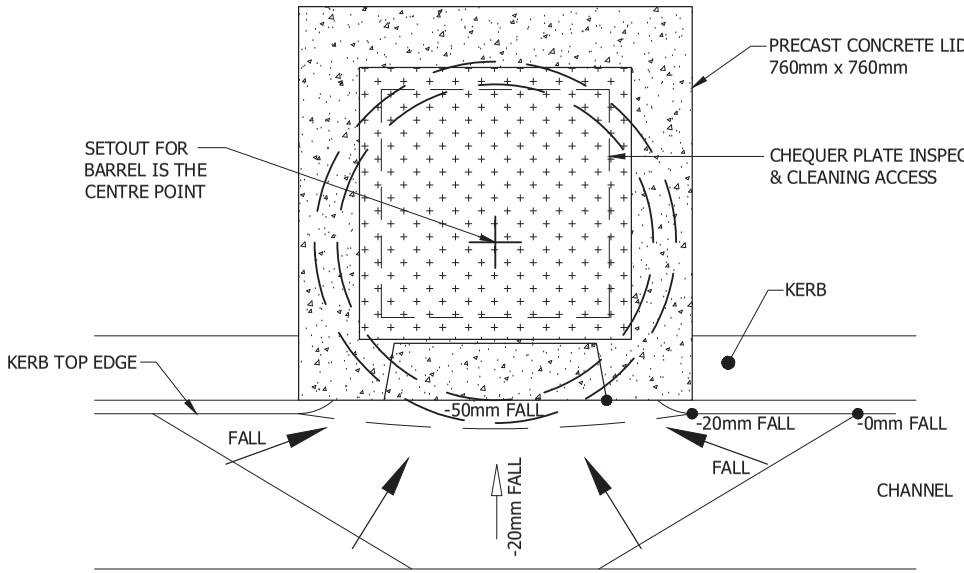
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL SEWER RETICULATION CONNECTION LAYOUTS	WS 301B
		JAN 2019



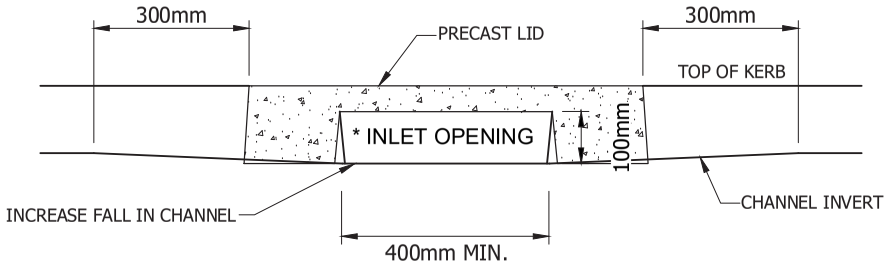
TYPICAL SUMP BARREL AND OUTLET PIPE

NOTE:
1. ONLY FACTORY FORMED RISERS WITH INTERLOCKING RINGS SHALL BE USED
2. ENSURE ALL REINFORCEMENT EXPOSED AS A RESULT OF MAKING THE PENETRATION IS COVERED AND PROTECTED AGAINST CORROSION.
3. SUMP LEADS TO BE EQUAL TO OR GREATER THAN 225mm AT 1:200 UNLESS OTHERWISE SPECIFIED.

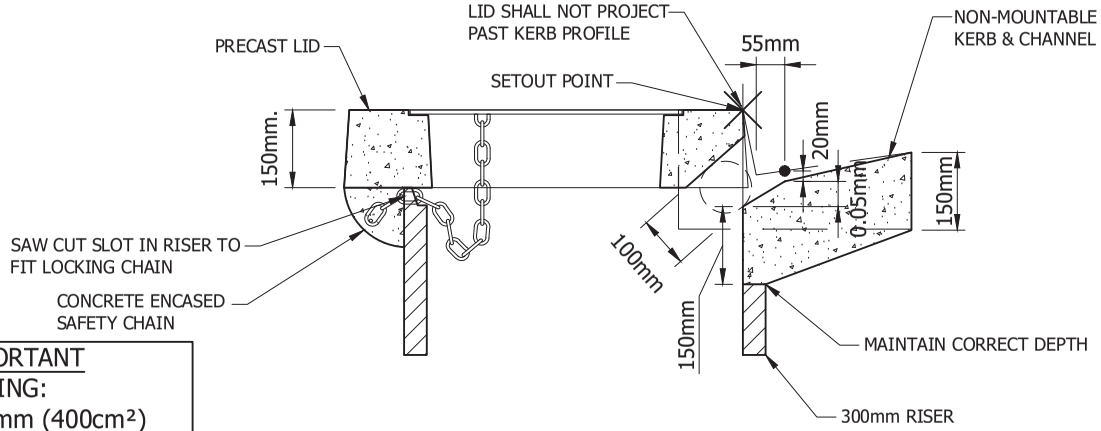
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL SUMP BARREL AND OUTLET PIPE	WS 401
		DEC 2018



PLAN



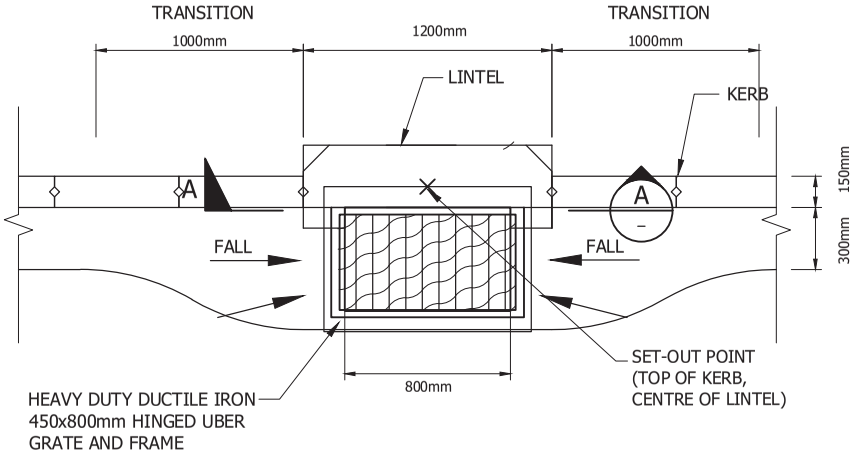
FRONT ELEVATION



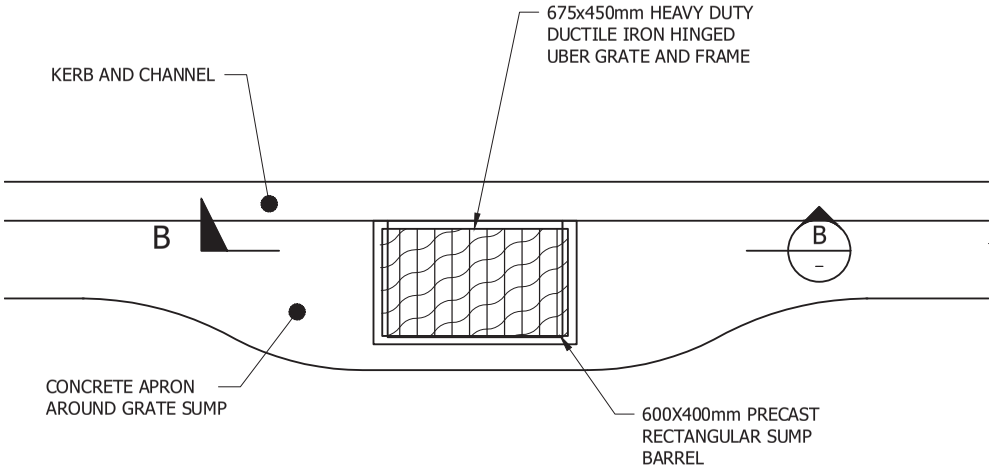
SECTION

IMPORTANT
* INLET OPENING:
MIN. 100x400mm (400cm²)
OPENING ,SAWCUT SUMP
BARREL TO ACHIEVE CORRECT
OPENING & SMOOTH OFF
WITH CONCRETE

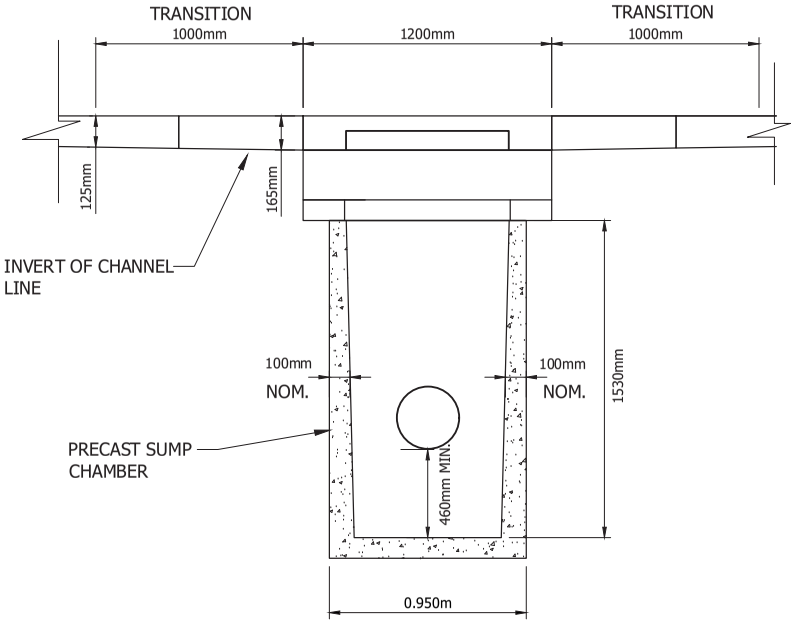
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	BACK SUMP LID DETAIL	WS 402
		DEC 2018



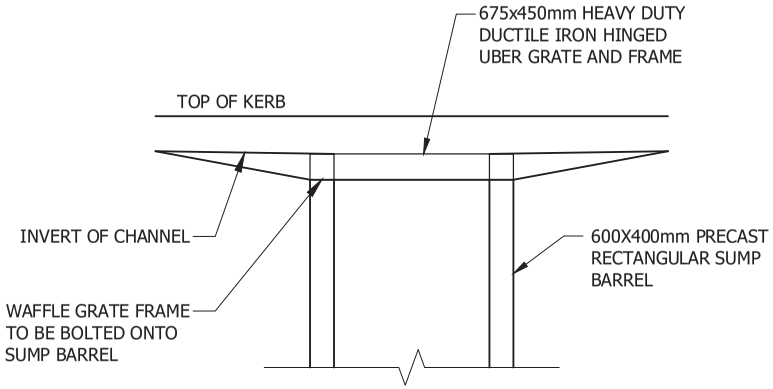
PLAN - TYPICAL HIGH CAPACITY GRATE SUMP WITH BACK ENTRY LINTEL



PLAN - STANDARD UBER SUMP GRATE



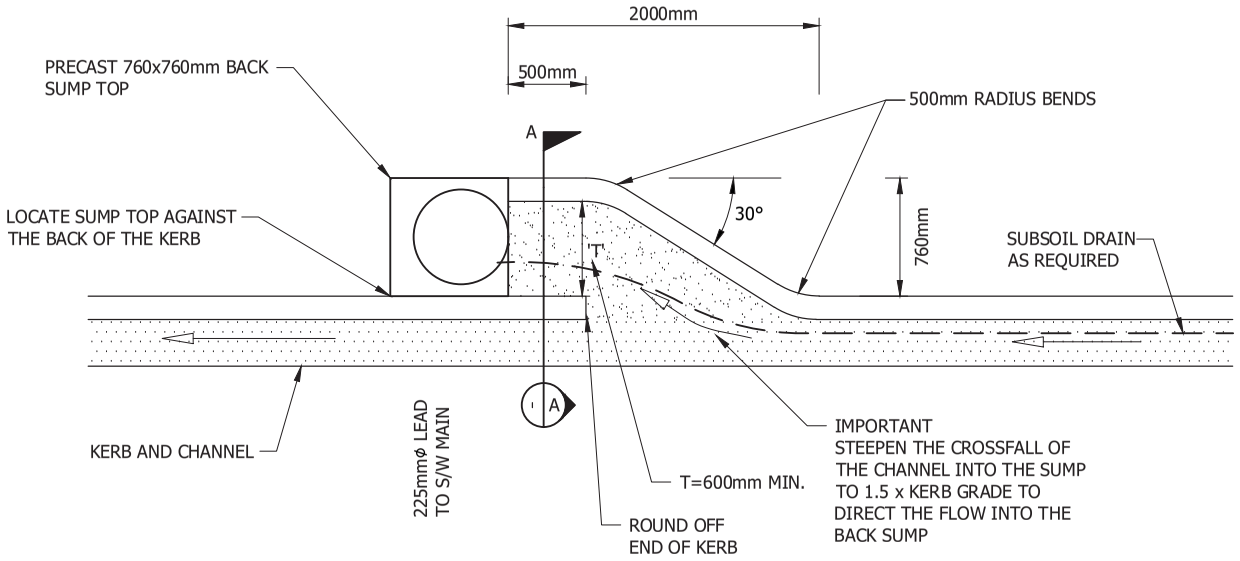
SECTION A-A



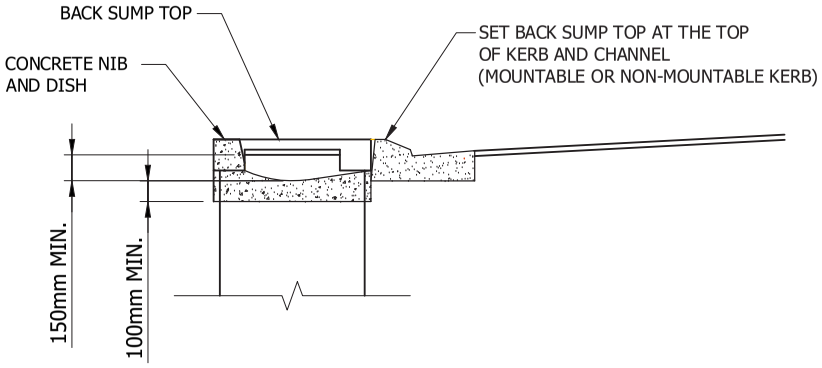
SECTION B-B

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. SEE WS 401 FOR PIPE CONNECTIONS AND MINIMUM SUMP DEPTHS
3. TRANSITION LENGTH MAY VARY

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	GRATE SUMP LID DETAIL STANDARD AND HIGH CAPACITY	WS 403
		DEC 2018



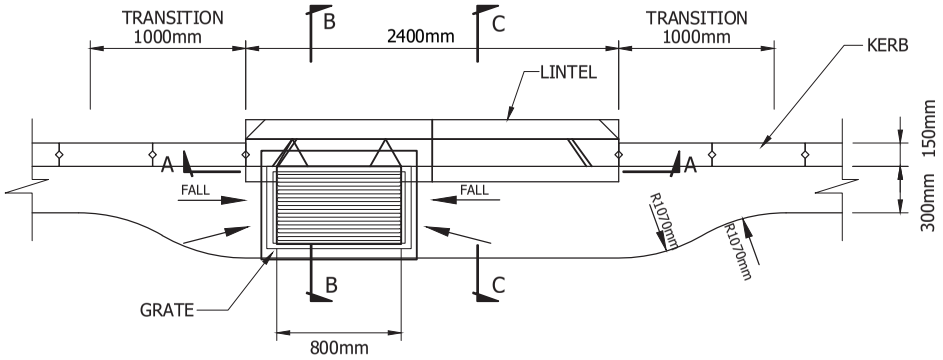
PLAN - RHS



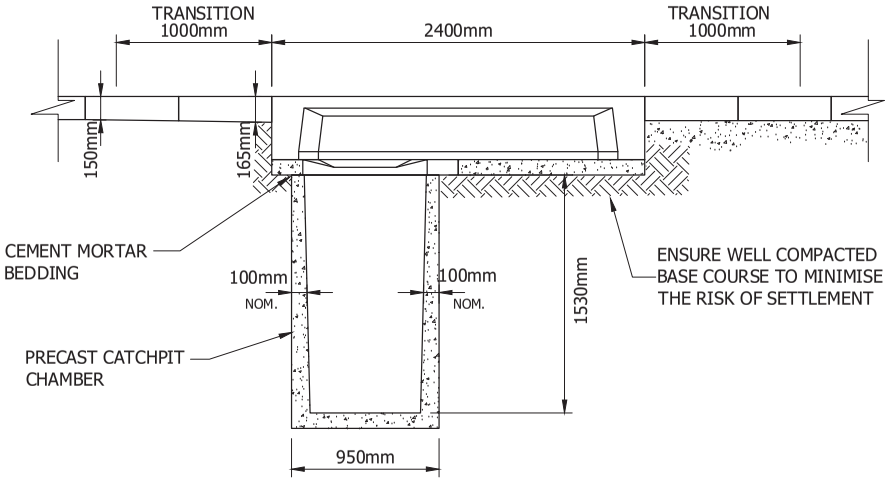
SECTION A-A

GENERAL NOTES:
1. DIVERTED BACK SUMPS ARE TO BE USED WHEN THE LONGITUDINAL GRADE ALONG THE KERB AND CHANNEL IS 5% OR GREATER
2. THE DIVERTED BACK SUMP CAN BE INSTALLED ON THE LEFT OR RIGHT-HAND SIDE OF THE ROAD. FOR THE LEFT-HAND INSTALLATIONS THE STANDARD DETAIL IS TO BE MIRRORED.
3. REFER TO WS 401 & WS 402 FOR SUMP INLET BARREL AND PIPE CONNECTION DETAILS

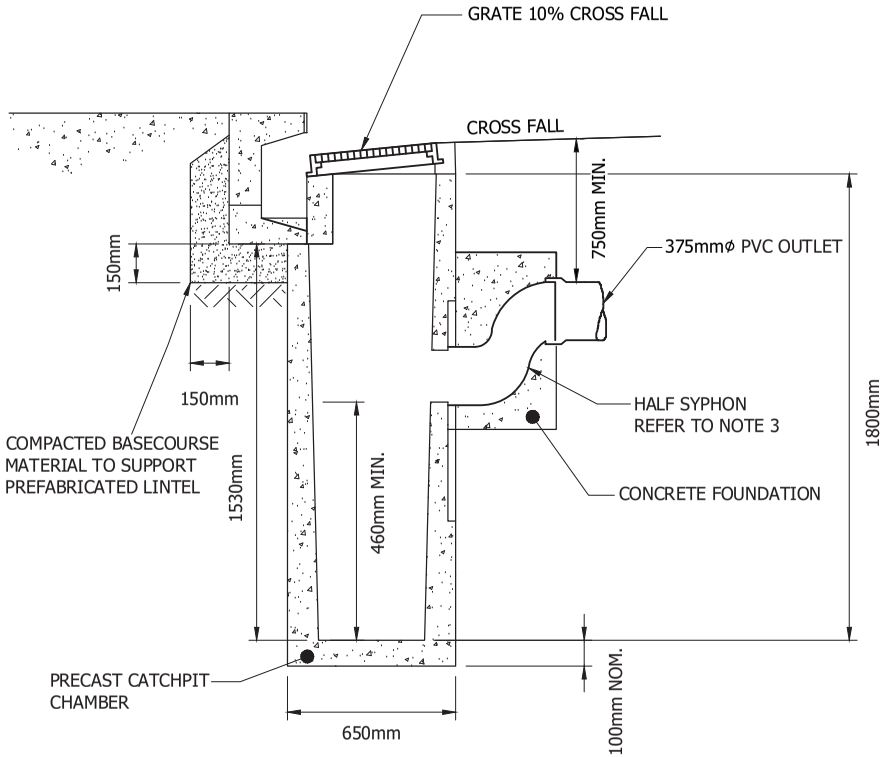
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	DIRVERTED BACKSUMP DETAIL	WS 404
		DEC 2018



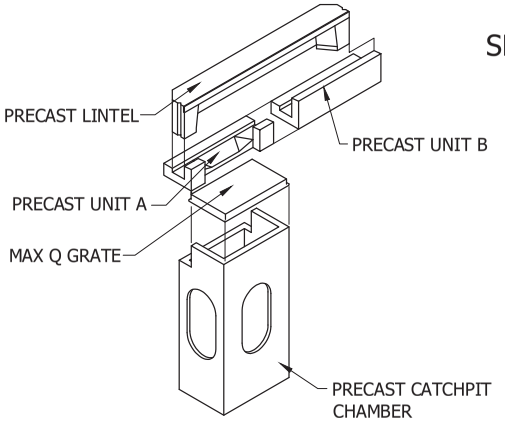
PLAN



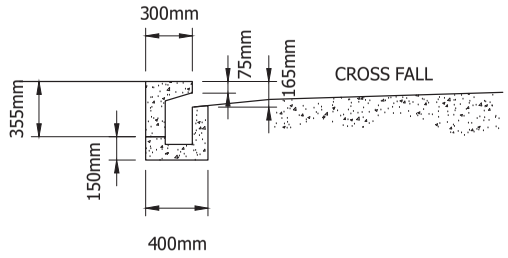
SECTION A-A



SECTION B-B



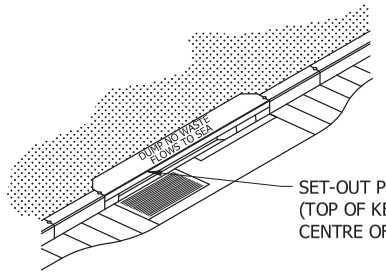
PRECAST COMPONENT
GENERAL ARRANGEMENT



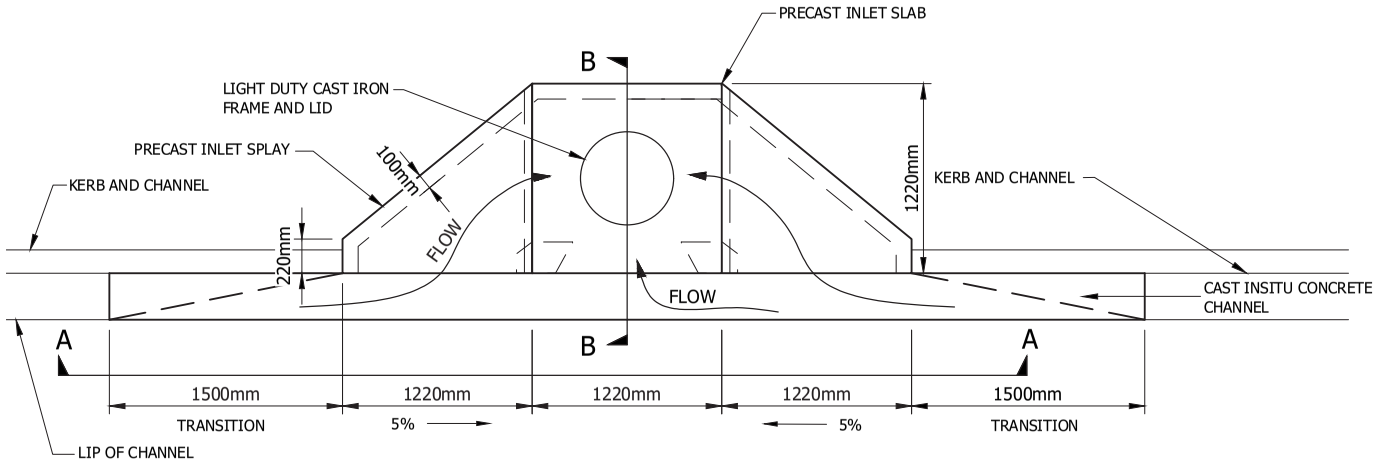
SECTION C-C

MAX PIT NOTES

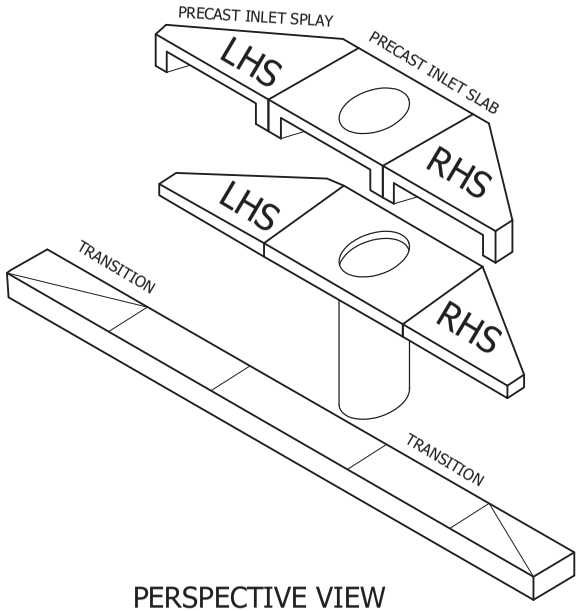
1. CONCRETE TO 20MPA
2. CATCHPIT TO BE 1.8M DEEP
3. HALF SYPHON TO BE USED AS DIRECTED BY THE ENGINEER
4. GRATES SHALL BE MAX Q 800X500
5. TRANSITION - KERB HEIGHT CHANGES FROM 125 TO 165
6. PRECAST UNITS A AND B WITH LINTEL CAN BE RETROFITTED TO EXISTING CATCHPIT
7. TRANISTION LENGTH MAY VARY



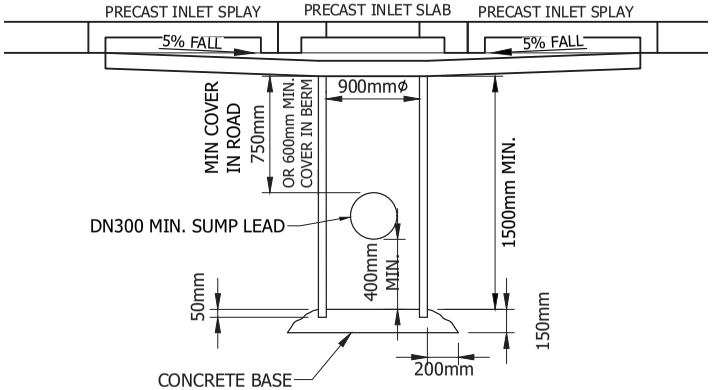
WAIROA DISTRICT COUNCIL		NOT TO SCALE
STANDARD MAX-PIT DETAIL		WS 405
		DEC 2018



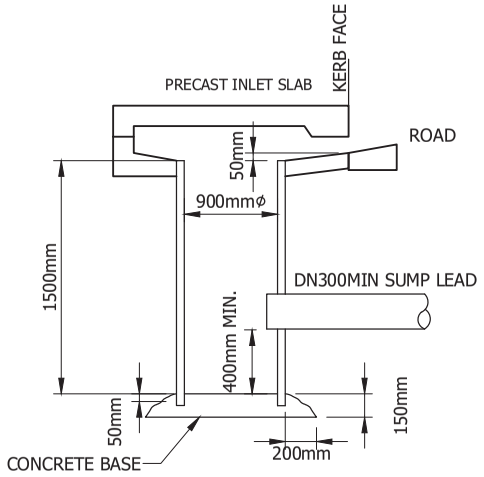
PLAN - TYPICAL DOUBLE SPLAY SUMP



PERSPECTIVE VIEW



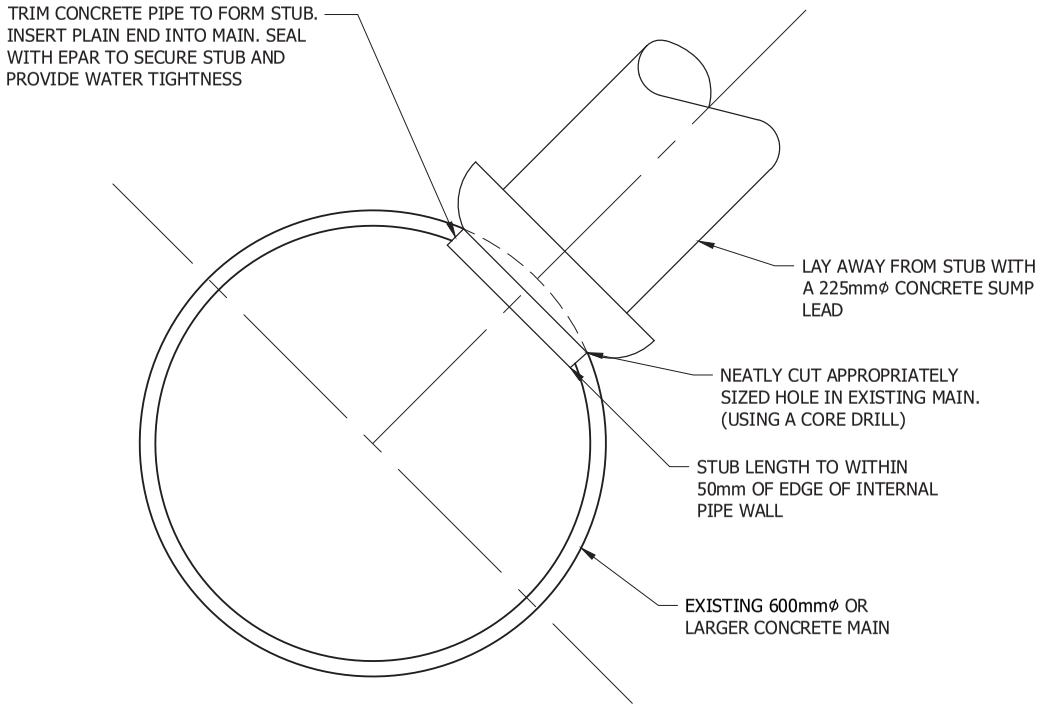
SECTION A-A



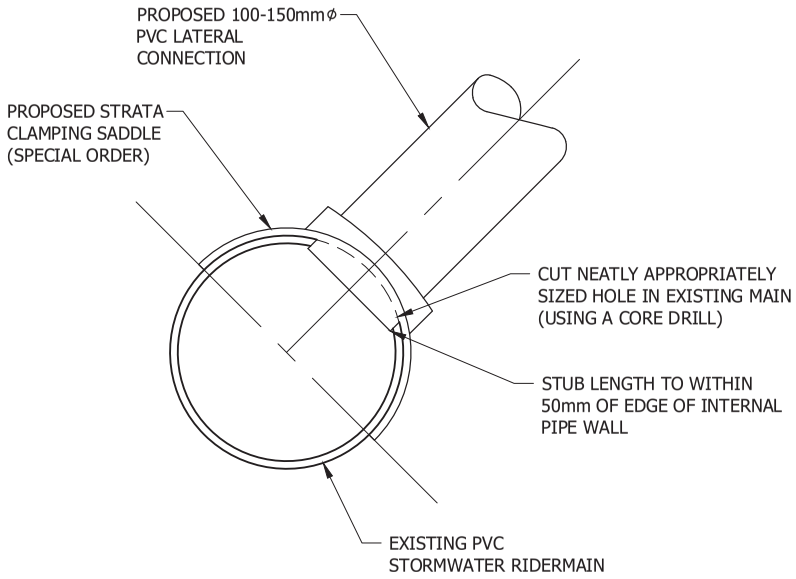
SECTION B-B

NOTE:
SPLAY SUMPS MAY BE INSTALLED USING SINGLE LHS SPLAY, SINGLE RHS SPLAY OR DOUBLE SPLAY. THE SPLAY ARRANGEMENT REQUIRED IS BASED ON INLET REQUIREMENTS AND ROAD PROFILE.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	STANDARD SPLAY SUMP DETAILS	WS 406
		DEC 2018



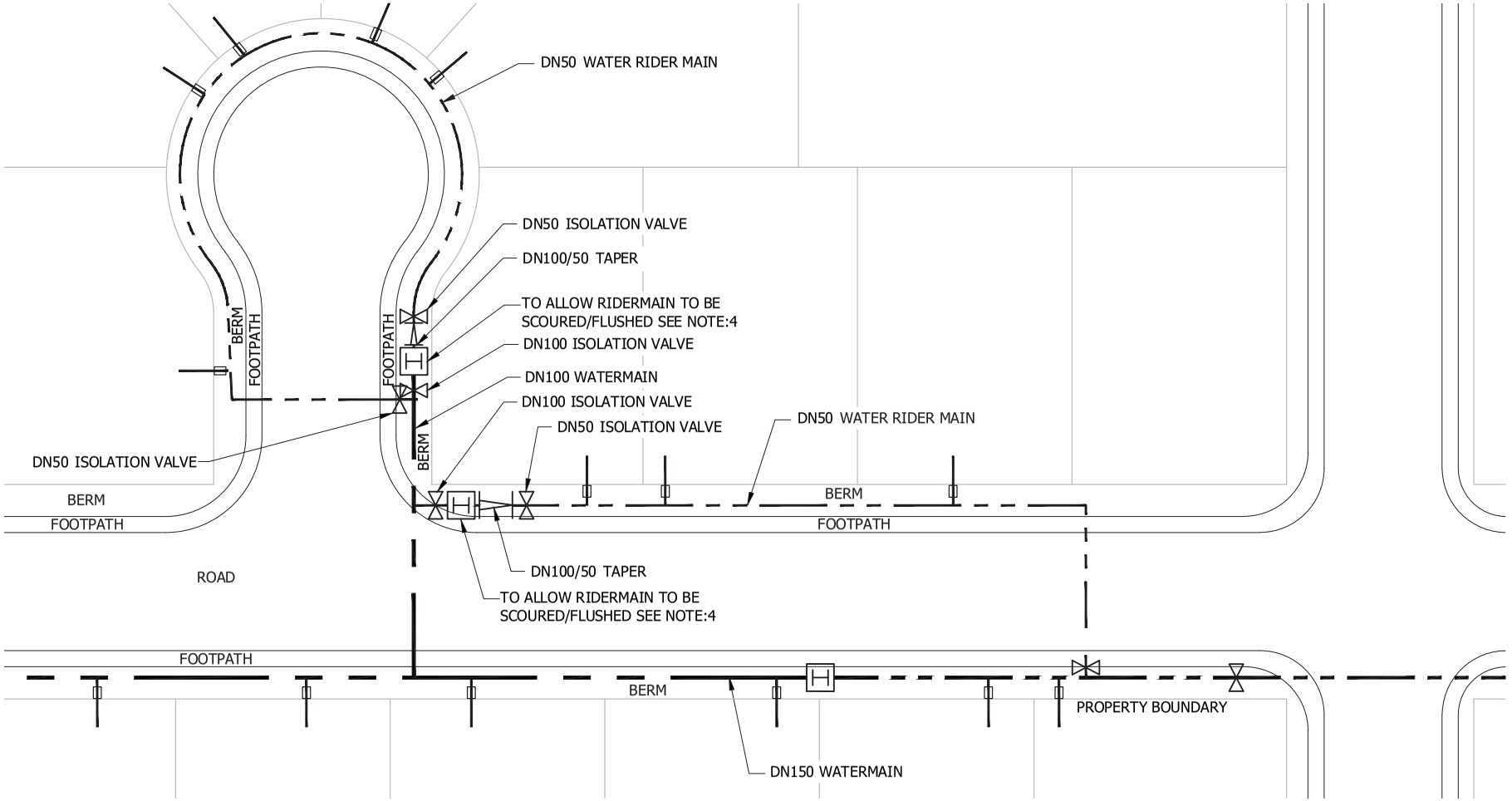
TYPICAL SUMP DETAIL - CONCRETE PIPES
(TRUNK S/W MAIN)



TYPICAL LATERAL DETAIL - PVC PIPE
(STORMWATER RIDERMAIN)

GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. DIRECT CONNECTIONS TO EXISTING STORMWATER MAINS ARE TO ONLY BE MADE ON MAINS THAT ARE 600mmø OR GREATER
3. ENSURE ALL REINFORCEMENT EXPOSED AS A RESULT OF MAKING PENETRATION IS COVERED AND PROTECTED AGAINST CORROSION
4. OTHER DIRECT CONNECTIONS BY APPROVAL AND SPECIFIC DESIGN ONLY

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	DIRECT SUMP/LATERAL CONNECTION	WS 407
		DEC 2018



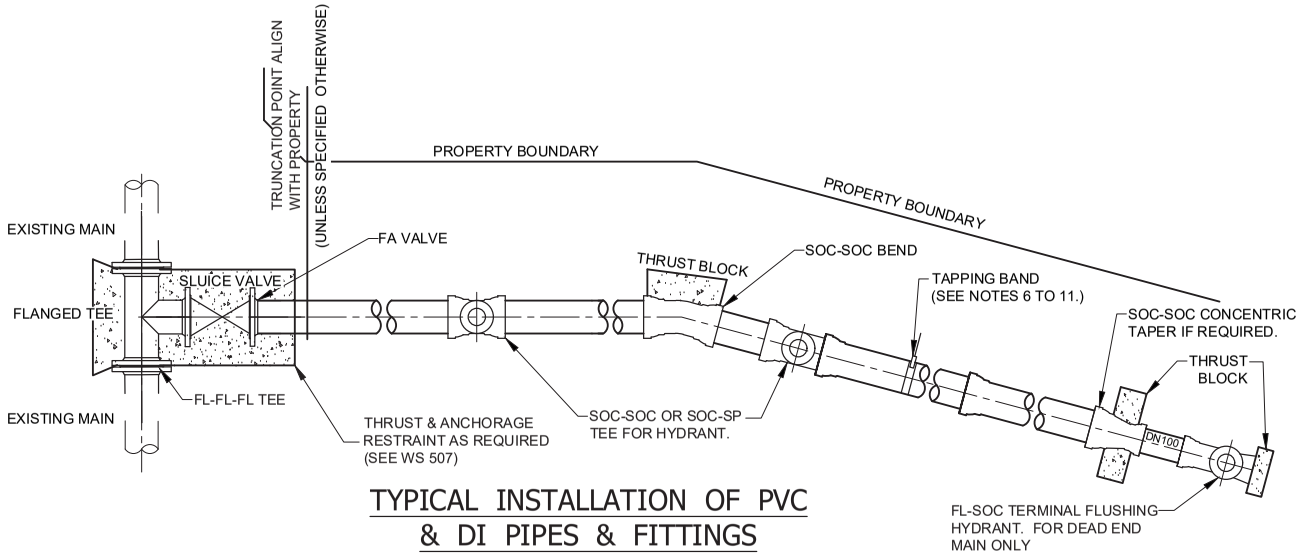
LEGEND

- WATER HYDRANT
- WATER VALVE
- WATERMAINS
- WATER RIDERMAINS
- LATERAL CONNECTIONS WITH DOUBLE CHECK WATER MANIFOLD
- WATER TAPER

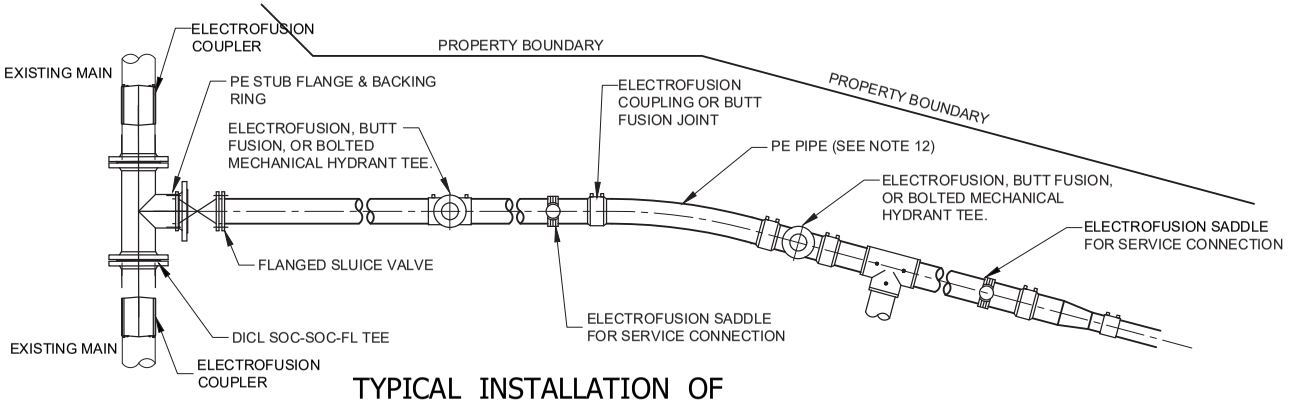
GENERAL NOTES:

1. LOCATE WATERMAINS AS SHOWN IN DESIGN DRAWINGS. PREFERRED ALIGNMENT IS IN THE GRASS BERM.
2. WATER MANIFOLD BOXES ARE TO BE INSTALLED AS CLOSE TO THE PROPERTY BOUNDARY AS PRACTICAL AND BE EASILY ACCESSIBLE AT ALL TIMES.
3. ALL COMMERCIAL AND INDUSTRIAL CONNECTIONS ARE TO BE METERED.
4. VALVES AND HYDRANTS ON WATER RIDER MAINS ARE TO BE LOCATED AS SHOWN WITHIN THE CUL-DE-SAC TO ALLOW FOR FLUSHING
5. FINAL PIPE SIZING AND ARRANGEMENT TO BE IN ACCORDANCE WITH APPROVED DESIGN DRAWINGS

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL WATER RETICULATION LAYOUT PLAN	WS 501
		DEC 2018



TYPICAL INSTALLATION OF PVC & DI PIPES & FITTINGS



TYPICAL INSTALLATION OF PE PIPES & FITTINGS

NOTES:

1. ALL DIMENSIONS IN MILLIMETRES.
2. INSTALL PIPEWORK PARALLEL TO PROPERTY BOUNDARIES.
3. WRAP BOLTED CONNECTIONS WITH A DENSO SYSTEM.
4. WHERE MAINS ARE 300 DIA OR LARGER BYPASSES SHOULD BE INSTALLED FOR ALL MANUAL SLUICE VALVES.

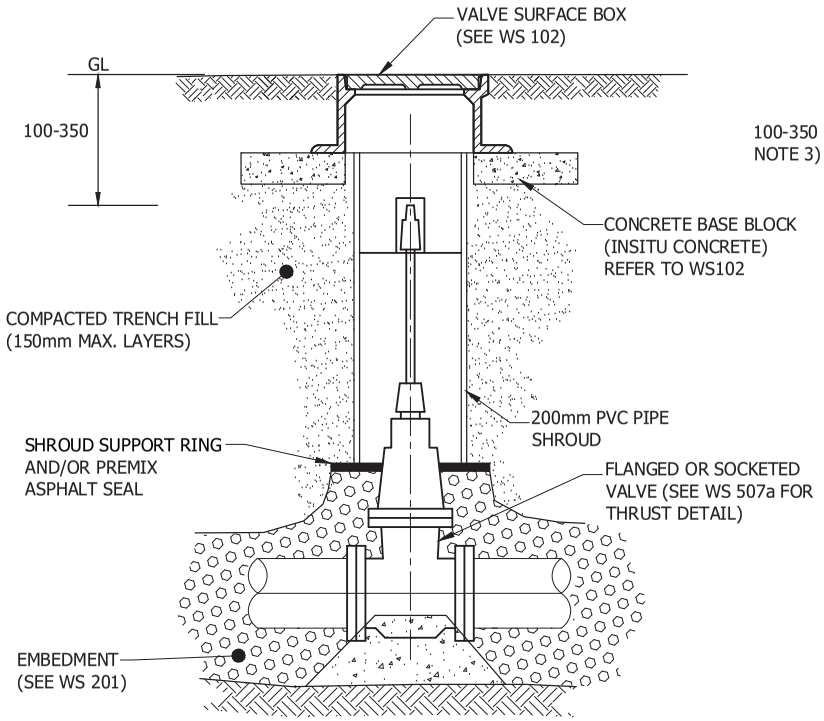
PVC PIPE

6. USE PRE-TAPPED CONNECTORS ON DN 100 & DN 150 NEW MAIN INSTALLATIONS TO AS/NZS4793.
7. USE TAPPING BANDS FOR CONNECTIONS TO EXISTING MAINS AND NEW MAINS >DN 150.
8. SERIES 2 PVC PIPE COMPATIBLE WITH DI FITTINGS.
9. TAPPING BANDS ON PVC PIPE TO BE FULL CIRCLE CLAMPING.
10. WHERE PVC FITTINGS ARE USED, A PROTECTIVE MEMBRANE IS REQUIRED BETWEEN FITTING AND THRUST BLOCK. PVC FITTINGS TO BE USED ONLY ON PVC PIPE. DI SPIGOTS NOT TO BE INSERTED INTO PVC SOCKETS
11. MAXIMUM SIZE OF DRILLED HOLES FOR SERVICE CONNECTIONS IN PVC PIPE TO BE 30% DN OR 50mm (LOWER VALUE TO BE USED) LARGER HOLES CAN BE USED FOR UNDER PRESSURE TAPPING.

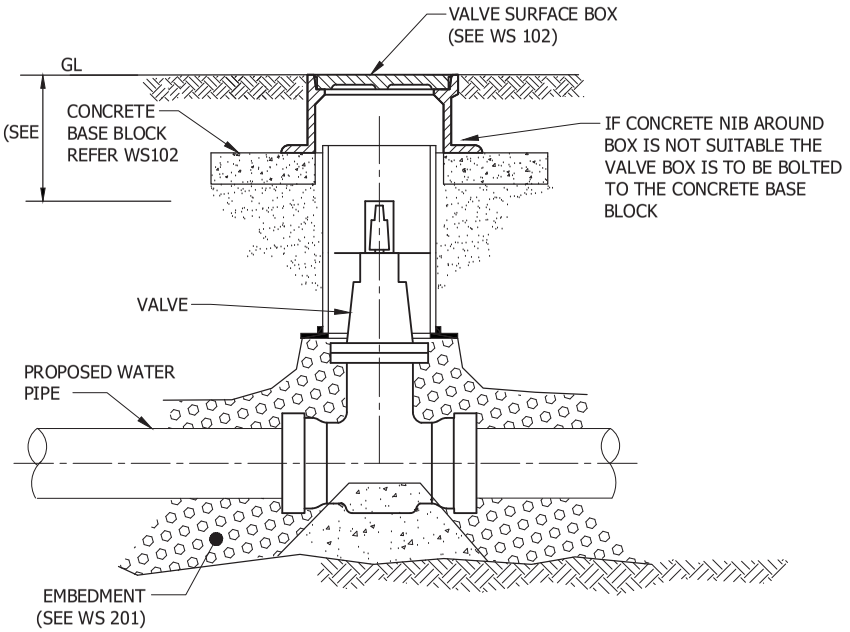
PE PIPE

12. PE PIPE MAY BE COLD BENT TO MINIMUM RADIUS OF 25 x (OD), STAKES OR OTHER SOURCES OF POINT LOADS SHALL NOT BE USED TO ASSIST IN BENDING THE PIPE.
13. MAKE ALLOWANCE DURING CONSTRUCTION FOR EXPANSION AND CONTRACTION OF PE PIPE DUE TO TEMPERATURE CHANGES.
14. BUTT WELDING IN ACCORDANCE WITH AS/NZS2033. BUTT WELDING IN TRENCHES IS NOT PERMITTED.
15. ALL MECHANICAL COUPLINGS TO BE SELF-RESTRAINING.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL PIPE AND FITTING INSULATION	WS 502
		DEC 2018



VALVES DEEPER THAN STANDARD DEPTH

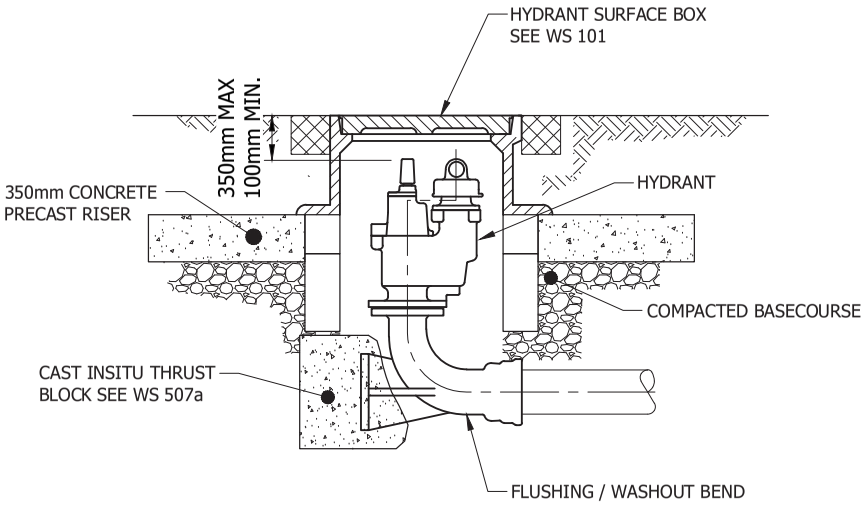


VALVES AT STANDARD DEPTHS

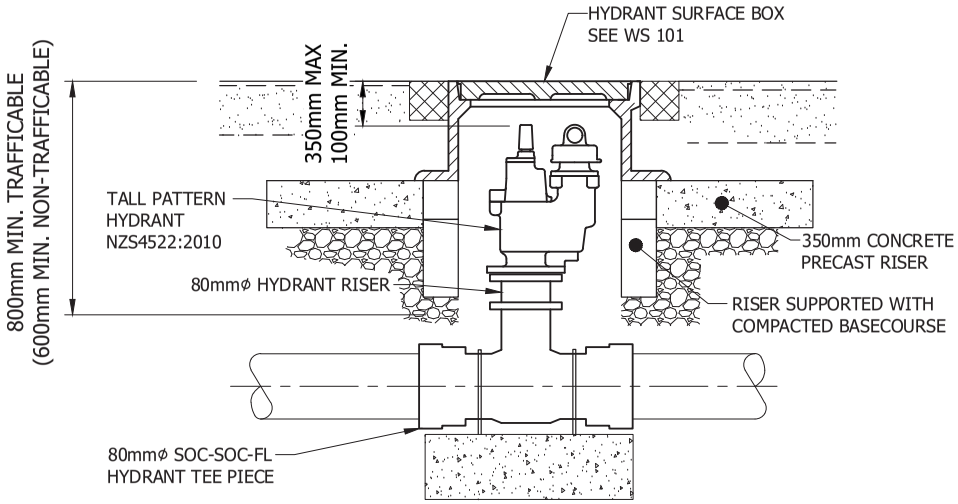
GENERAL NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. TO PREVENT TRANSFER OF TRAFFIC LOADS TO THE MAIN, ENSURE SHROUD AND SUPPORT RINGS DO NOT COME INTO CONTACT WITH THE VALVE.
3. INSTALL AN EXTENSION SPINDLE WHERE DISTANCE FROM THE SURFACE TO THE VALVE SPINDLE EXCEEDS 350mm.
4. VALVES THAT ARE CUT INTO EXISTING PIPELINES WHERE A VALVE AND HYDRANT ARE INSTALLED INLINE WITH EACH OTHER A MINIMUM 600mm LONG SPOOL PIECE IS TO BE INSTALLED BETWEEN THE FITTINGS.

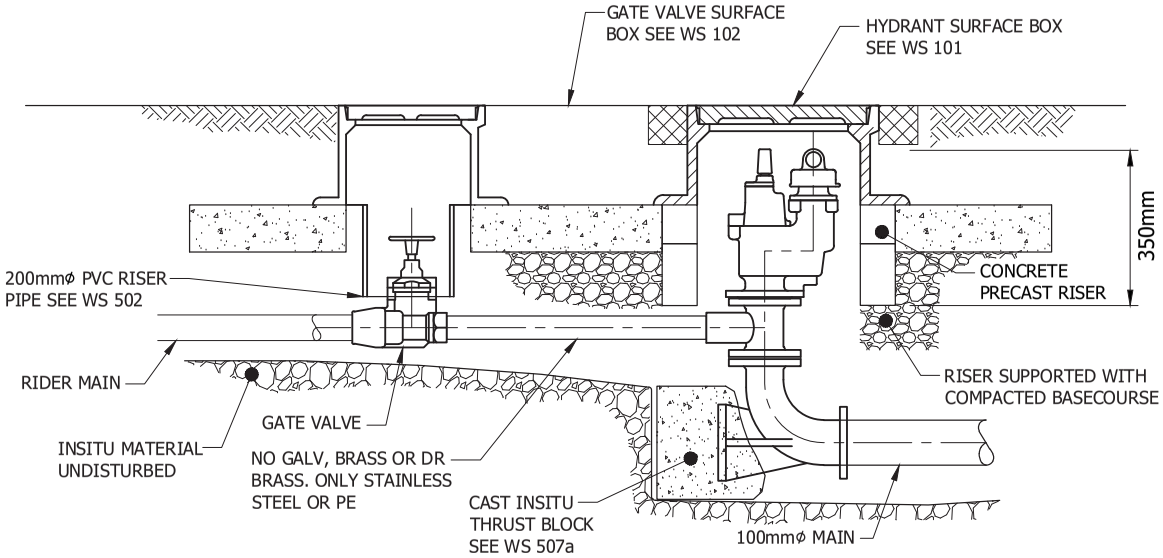
	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL VALVE DETAIL	WS 503
		DEC 2018



TERMINAL HYDRANT DETAIL



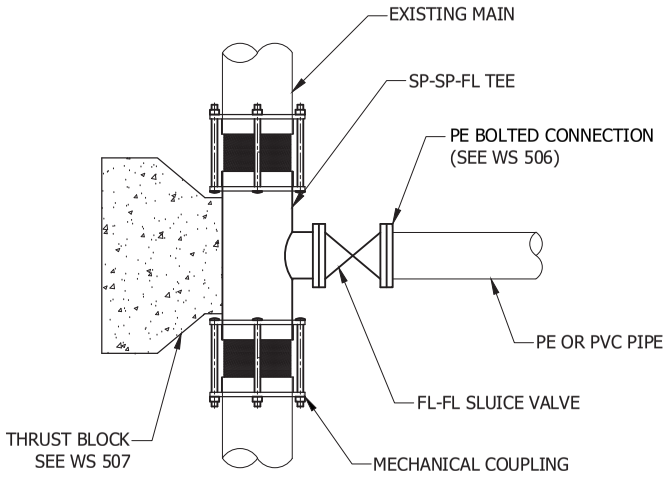
STANDARD HYDRANT DETAIL



TERMINAL HYDRANT DETAIL WITH RIDER MAIN

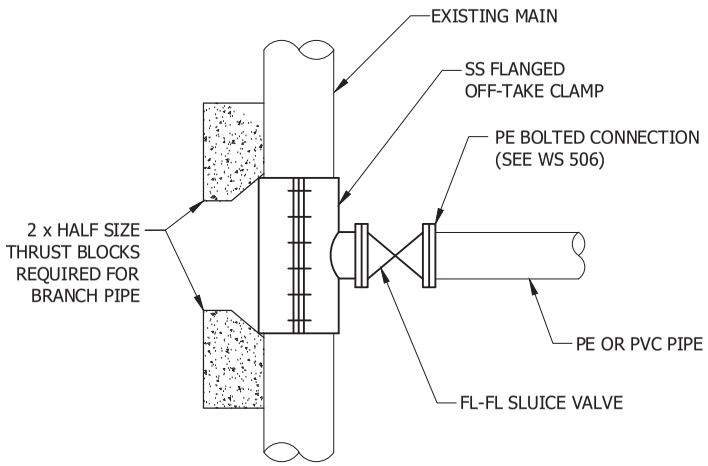
GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. HYDRANT TO BE DN80 UNLESS OTHERWISE SPECIFIED.
3. WHERE A VALVE AND HYDRANT ARE INSTALLED IN LINE WITH EACH OTHER ENSURE A MINIMUM 600mm LONG SHORT IS TO BE INSTALLED BETWEEN THE FITTINGS

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	HYDRANT DETAILS	WS 504
		DEC 2018



CUT-IN CONNECTION METHOD

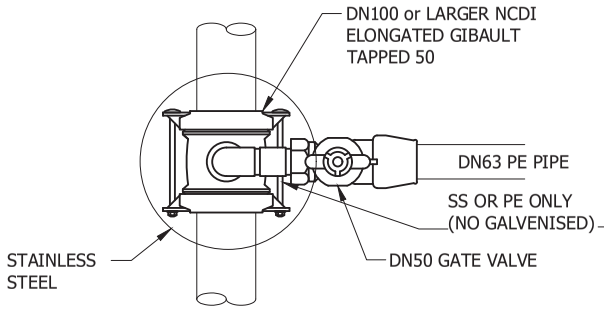
(USING MECHANICAL COUPLINGS)



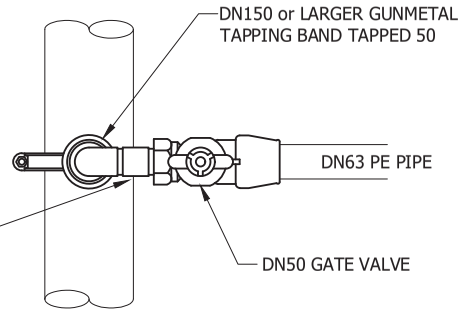
UNDER PRESSURE CONNECTION METHOD

(USING SS FULL WRAP FLANGED OFFTAKE)

CONNECTION METHODS FOR OFFTAKE ≥DN 100 DI, PVC AND PE PIPE



DN63 TAKE-OFF ≥100mm

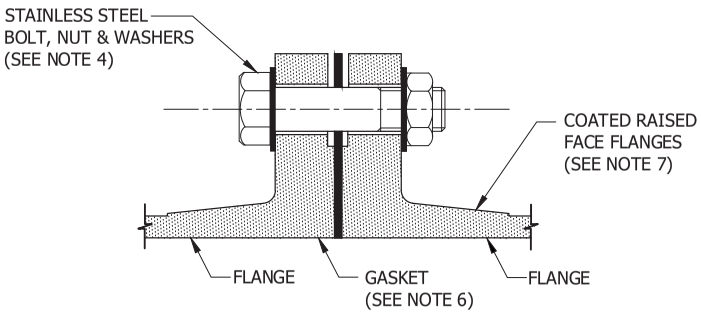


DN63 TAKE-OFF ≥150mm

CONNECTION METHOD FOR DN 63 PE PIPE

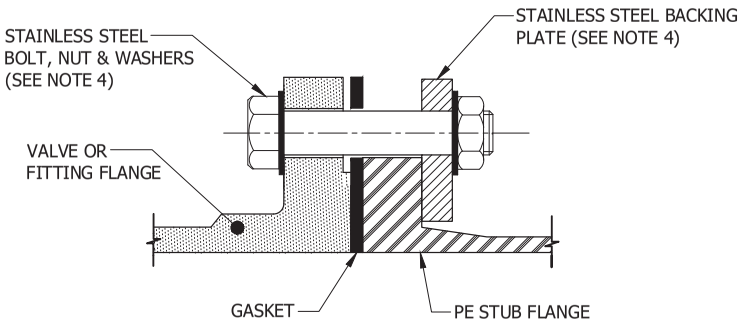
NOTES
1. S/S OFF-TAKE CLAMP TO BE GRADE 316 S/S AND OF FULL WRAP CONFIGURATION.
2. PE ELECTROFUSION (EF) FITTINGS TO BE CLASS PN 16.
3. BACKING FLANGES FOR PE STUB FLANGES TO BE MANUFACTURED FROM 316 SS.BOLTS, NUTS & WASHERS TO BE SS GRADE 316.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL CONNECTIONS TO EXISTING MAINS	WS 505
		DEC 2018

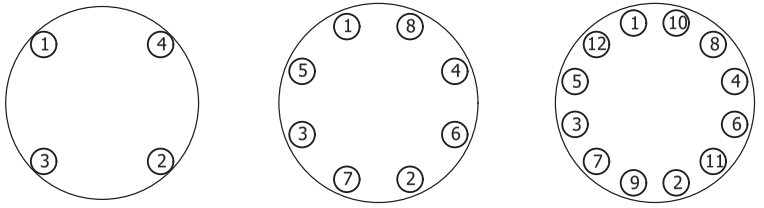


(RAISED FACE FLANGES SHOWN)

CORROSION PROTECTION PROCEDURE FOR FUSION BONDED COATED DUCTILE IRON FLANGES WITH STAINLESS STEEL BOLTS



PE BOLTED CONNECTION DETAIL



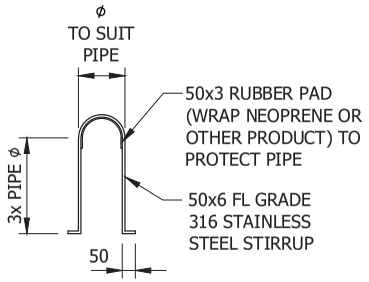
4 BOLTS 8 BOLTS 12 BOLTS

TIGHTENING SEQUENCE

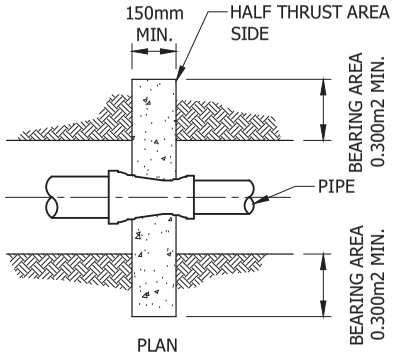
NOTES

1. ALL DIMENSIONS IN MILLIMETRES.
2. SLEEVE UNCOATED DUCTILE IRON FLANGES. USE SS BOLTS (SEE NOTE 4) APPLY TWO LAYERS OF SLEEVING OVER ALL BURIED BITUMEN COATED DUCTILE IRON FLANGES.
3. WHERE FLANGES ARE COATED WITH FUSION BONDED EPOXY OR NYLON THEY DO NOT REQUIRE SLEEVING, USE ONLY STAINLESS STEEL BOLTS (SEE NOTE 4) TAKE CARE TO PREVENT DAMAGE TO THE FLANGES' PROTECTIVE COATING.
4. STAINLESS STEEL BOLT SYSTEM. ALL STAINLESS STEEL BOLTS, NUTS, WASHERS AND BACKING PLATES. TO BE MANUFACTURED FROM 316 GRADE MATERIAL. COAT THE THREADED SECTIONS OF ALL STAINLESS STEEL BOLTS WITH AN ANTI-SIEZE LUBRICANT RECOMMENDED BY THE BOLT MANUFACTURER.
5. VERIFY THE INTEGRITY OF EACH INSULATED FLANGED JOINT AFTER ASSEMBLY.
6. USE SPECIAL HIGH RESISTIVITY (LOW CONDUCTIVITY) GASKET MATERIAL. NOT ALL ELASTOMERS ARE NON CONDUCTIVE.
7. ROUGHEN COATED RAISED FACE FLANGE SURFACES BEFORE ASSEMBLY. PERFORATION OF THE COATING DOES NOT MATTER ON THE CONTACT FLANGE FACES.
8. TIGHTENING SEQUENCE SHOWN FOR AS 4087 FLANGES <DN450, LARGER SIZES TO FOLLOW SIMILAR PRINCIPLE.
9. BOLT TORQUE AS PER MANUFACTURES GUIDELINES.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	FLANGED JOINTS BOLTING DETAIL	WS 506
		DEC 2018

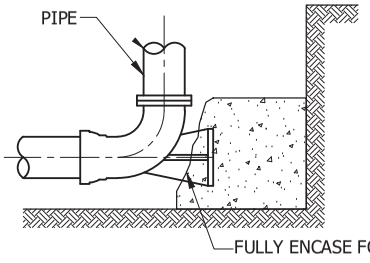


STRAP DETAIL - SOCKETED VALVE RESTRAINT DETAIL



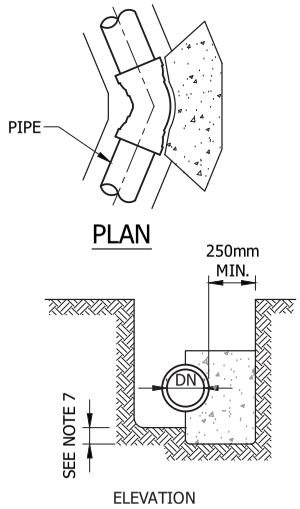
PLAN

TAPER THRUST BLOCK
(FOR HORIZONTAL THRUST)

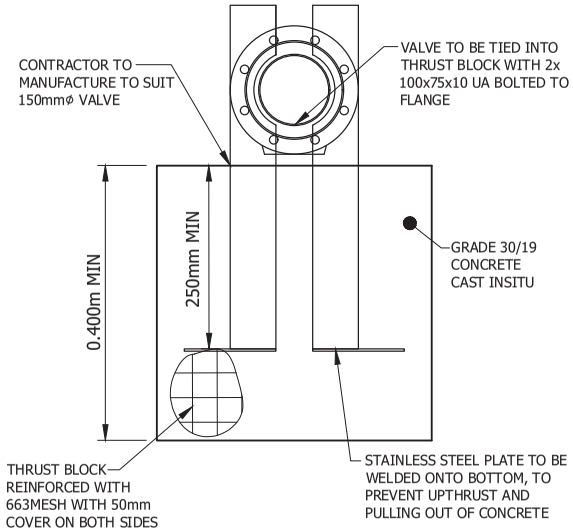


ELEVATION

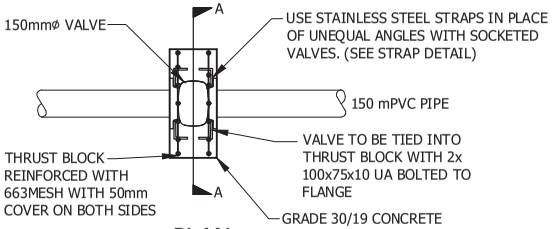
FLUSHING/WASHOUT BEND THRUST BLOCK
(FOR HORIZONTAL THRUST)
(MINIMUM REQUIRED THRUST AREA



THRUST BLOCK FOR BENDS



SECTION AA



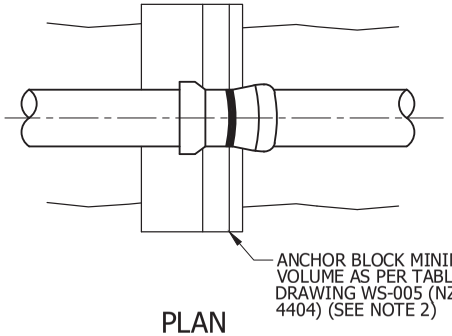
PLAN

GENERAL NOTES:
1. DIMENSIONS ARE ALL IN MILLIMETERS (mm)
2. CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS NOT TO INTERFERE WITH OTHER SERVICES.
3. CONTACT THE ENGINEER IF SOILS ARE:
   - VERY SOFT, SOFT, FIRM CLAY, SILTY CLAY OR SILT.
   - LOOSE CLEAN SAND.
   - UNCOMPACTED FILL OR REFUSE.
   - A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
4. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE, PVC OR FELT BETWEEN THE FITTINGS AND JOINTS TO BE CLEAR OF CONCRETE TO PREVENT DAMAGE TO THE FITTING. JOINTS TO BE CLEAR OF CONCRETE.
5. CONCRETE SHALL BE KEPT CLEAR OF BOLTS AND FLANGES OR GIBAULT JOINTS TO ALLOW FITTINGS TO BE REMOVED WITHOUT INTERFERING WITH ANCHOR BLOCKS.
6. FINISHED THRUST BLOCKS APPROXIMATELY 100mm ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
7. THRUST BLOCK REINFORCEMENT AS SPECIFIED IN DESIGN DRAWINGS.
8. THRUST RESTRAINT DETAILS TO MULTIPLE FITTINGS REQUIRE SPECIFIC DESIGN.
9. THRUST BLOCK SIZING / BEARING AREAS ARE TO BE DETERMINED BY THE ENGINEER.

VALVE THRUST RESTRAINT

NOTE:
- ANGLES AND STRAPS SPECIFIED ARE SUITABLE FOR UP TO ø200 VALVES ONLY. FOR >DN200 REFER TO DESIGN DRAWINGS
- UA HOT DIP GALVANISED
- ALL BOLTS AND ANGLES TO BE STAINLESS STEEL

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL THRUST BLOCK DETAILS SHEET 1	WS 507A
		JAN 2019

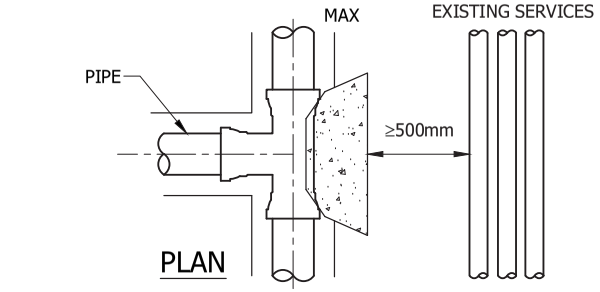


PLAN

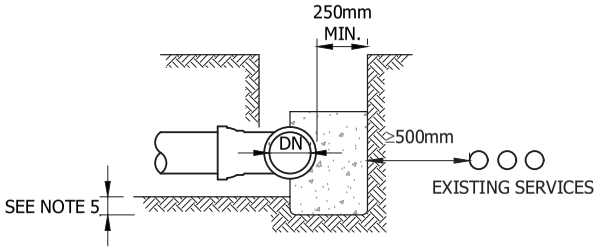
VERTICAL BENDS

GENERAL NOTES:

1. CAST THE THRUST AREA OF ALL THRUST BLOCKS AGAINST A CLEAN FACE OF UNDISTURBED NATURAL SOIL. THRUST BLOCKS NOT TO INTERFERE WITH OTHER SERVICES.
2. CONTACT THE ENGINEER IF SOILS ARE:
   - VERY SOFT, SOFT, FIRM CLAY, SILTY CLAY OR SILT.
   - LOOSE CLEAN SAND.
   - UNCOMPACTED FILL OR REFUSE.
   - A GEOTECHNICAL ASSESSMENT AND INDIVIDUAL DESIGN IS REQUIRED FOR THESE SOILS.
3. WHEN POURING CONCRETE AGAINST FITTINGS PLACE A MEMBRANE OF POLYETHYLENE, PVC OR FELT BETWEEN THE FITTINGS AND JOINTS TO BE CLEAR OF CONCRETE TO PREVENT DAMAGE TO THE FITTING. JOINTS TO BE CLEAR OF CONCRETE.
4. CONCRETE SHALL BE KEPT CLEAR OF BOLTS AND FLANGES OR GIBAULT JOINTS TO ALLOW FITTINGS TO BE REMOVED WITHOUT INTERFERING WITH ANCHOR BLOCKS.
5. FINISHED THRUST BLOCKS APPROXIMATELY 100mm ABOVE THE TOP OF THE FITTING OR BEARING PAD AND EXTEND TO THE FLOOR OF THE TRENCH OR DEEPER IF NECESSARY TO ACHIEVE THE REQUIRED THRUST AREA. MAXIMUM ENCASEMENT TO BE 180°.
6. THRUST BLOCK REINFORCEMENT AS SPECIFIED IN DESIGN DRAWINGS.
7. THRUST RESTRAINT DETAILS TO MULTIPLE FITTINGS REQUIRE SPECIFIC DESIGN.
8. THRUST BLOCK SIZING / BEARING AREAS ARE TO BE DETERMINED BY THE ENGINEER.



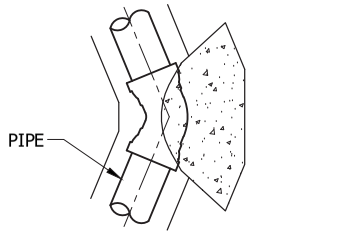
PLAN



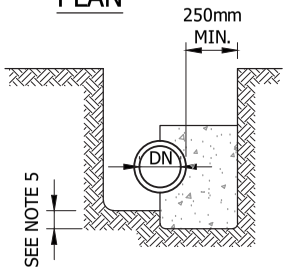
ELEVATION

THRUST BLOCK FOR TEES

(FOR HORIZONTAL THRUST)



PLAN

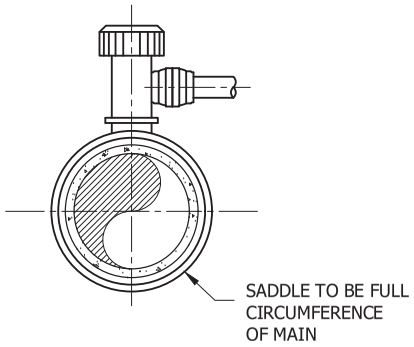


ELEVATION

THRUST BLOCK FOR BENDS

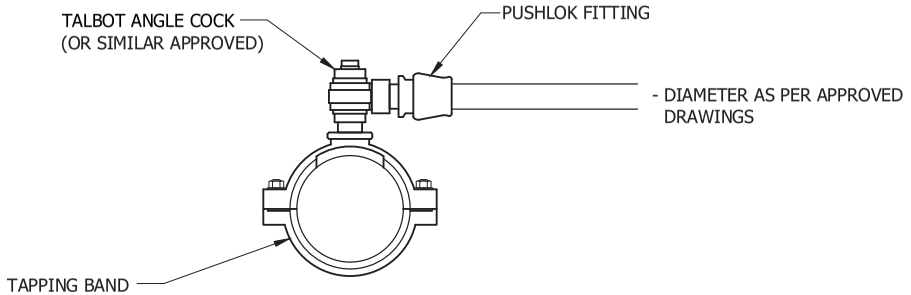
(FOR HORIZONTAL THRUST)

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL THRUST BLOCK DETAILS SHEET 2	WS 507B
		JAN 2019



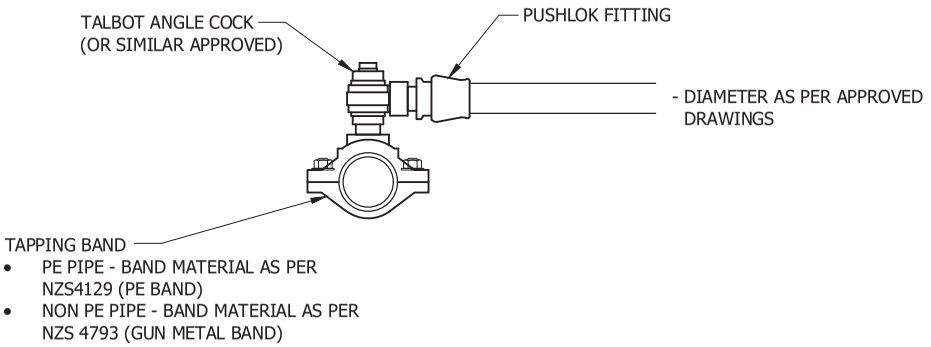
ELECTROFUSION TAPPING SADDLE

(PE PIPE)



TALBOLT FITTINGS

TYPICAL CONNECTIONS OFF 100-200mmϕ WATERMAINS

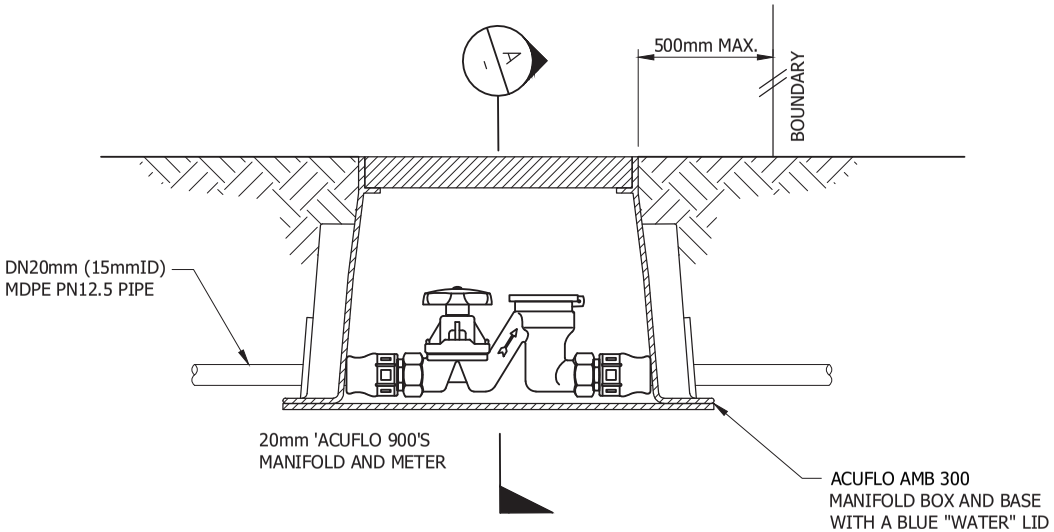


TALBOLT FITTINGS

TYPICAL CONNECTIONS OFF DN50 RIDERMAINS

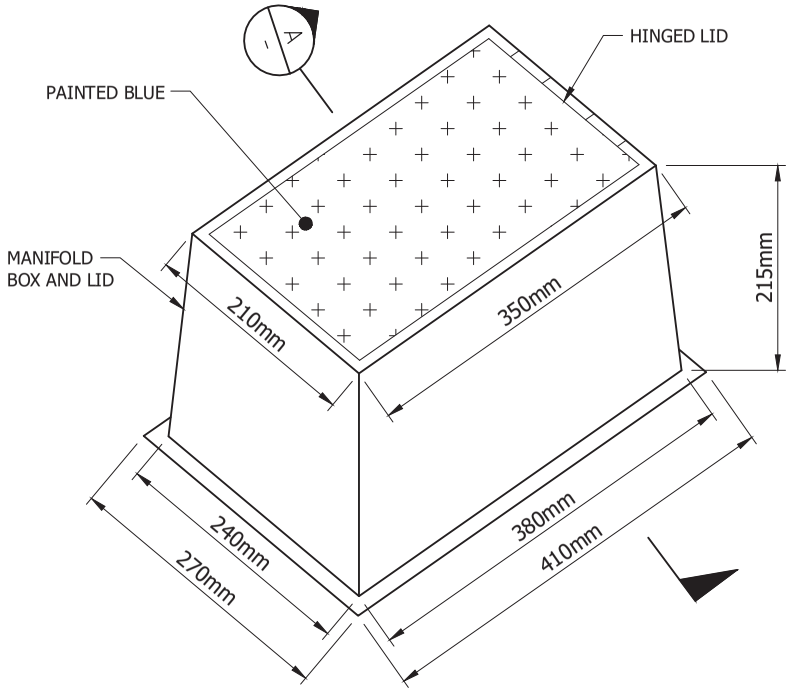
GENERAL NOTES:
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. ALL PRODUCTS TO COMPLY WITH NZS 4129, THIS WILL REQUIRE FULL BODY COMPRESSION FITTINGS FOR PE.
3. MATERIAL FROM THE MAIN TO MANIFOLD - POLYETHYLENE PIPE AS DETAILED IN THE CONTRACT SPECIFICATION.
4. IN-LINE STOP COCK VALVE REQUIRED, TALBOLT PUSHFIT, OR FERRULE TYPE.
5. WHERE POSSIBLE LAY SERVICE CONNECTIONS AT RIGHT ANGLES TO WATER MAIN. WHERE NOT POSSIBLE, LAY MARKING TAPE ON TOP OF THE CONNECTION PIPEWORK, WHERE FEASIBLE.
6. TALBOT ANGLE COCK, FERRAL AND TAPPING BAND SHALL BE GUNMETAL MATERIAL.
7. SELF TAPPING SADDLES ARE NOT PERMITTED.
8. CONNECTIONS OFF TRUNK MAINS ARE NOT PERMITTED. TRUNK MAINS 300mmϕ AND GREATER.
9. ALL CONNECTIONS ARE TO BE CONFIRMED BY WDC.
10. USE HOLE SAWS RATHER THAN DRILL BITS FOR MAKING CONNECTIONS AS PER THE PVC GUIDELINES.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	TYPICAL SERVICE CONNECTIONS FROM MAINS	WS 508
		DEC 2018



STANDARD CONNECTION USING ACUFLO BOX & BASE

ALL CONNECTIONS MUST HAVE A MINIMUM DOUBLE CHECK BACKFLOW. HIGHER RISK PROPERTIES MAY REQUIRE A HIGHER BACKFLOW PROTECTION STANDARD



TRAFFICABLE MANIFOLD BOX AND LID

GENERAL NOTE:
1. WHERE THE PROPOSED MANIFOLD BOX IS POSITIONED WITHIN A VEHICLE CROSSING OR OTHER AREAS THAT ARE LIKELY TO BE TRAFFICKED, THE TRAFFICABLE MANIFOLD BOX AND LID AS DETAILED IS TO BE USED.

	WAIROA DISTRICT COUNCIL	NOT TO SCALE
	MANIFOLD BOX AND FITTINGS	WS 509
		DEC 2018

GETTING IN TOUCH

Your feedback plays a big role in making our district a better place to live, work and play. We are keen to hear from you, and welcome your ideas and comments.

Here's how you can get in touch:

www.wairoadc.govt.nz

@wairoadistrictcouncil

info@wairoadc.govt.nz

(06) 838 7309

97-103 Queen Street,
Wairoa 4108

Wairoa District Council,
P.O. Box 54, Wairoa 4160