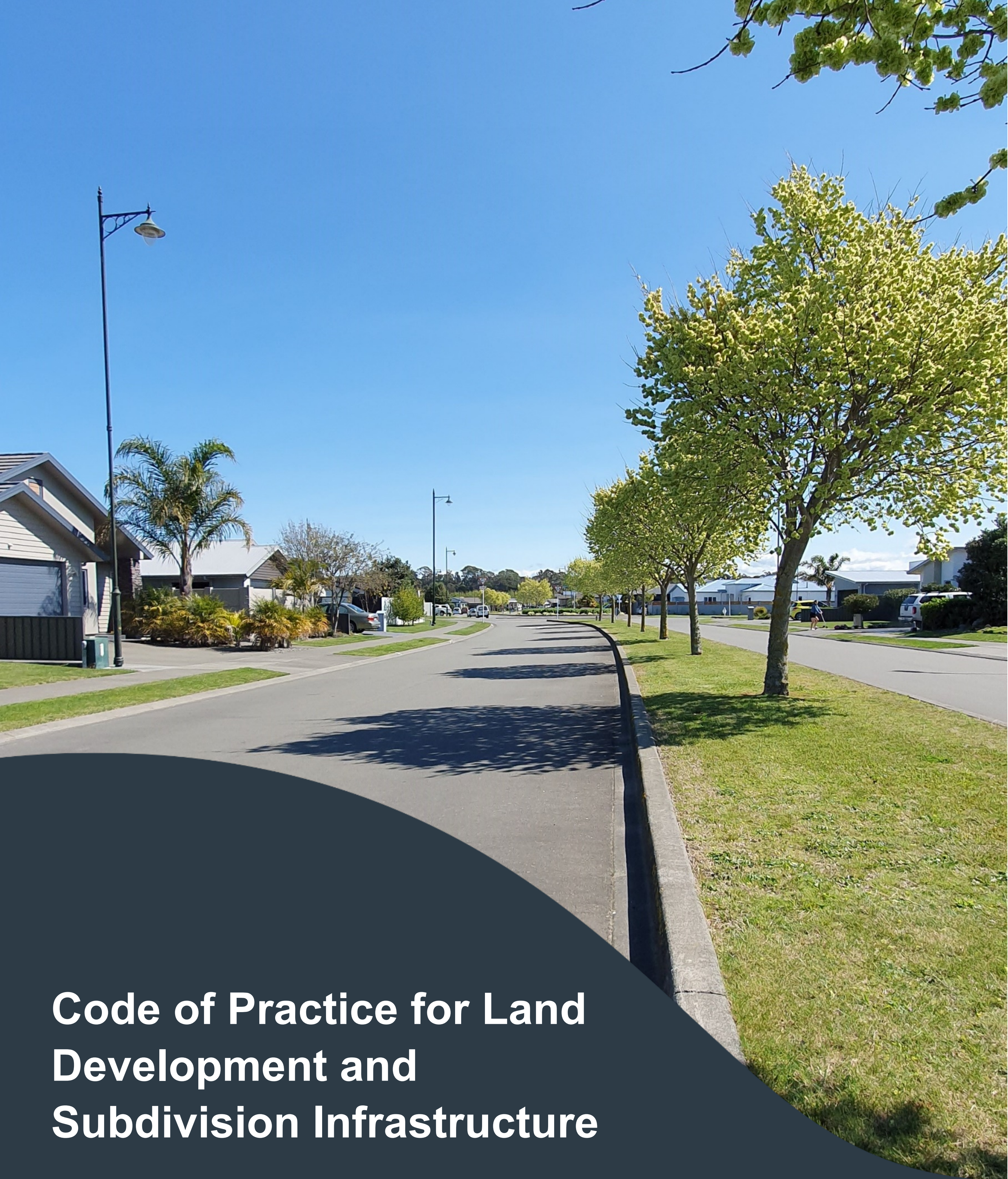

Code of Practice for Land Development and Subdivision Infrastructure

2021

NAPIER
CITY COUNCIL
Te Kaunihera o Ahuriri

Code or Practice for Land Development and Subdivision Infrastructure

Approved By			
Department	NCC Infrastructure		
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For information all administrative aspects of reviewing policy, please refer to Policy Review Procedure, document ID 667482

Document History

Version	Reviewer	Change Detail	Date
1	Asset Management	First Draft Published	June 2021

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NAPIER CITY COUNCIL
Te Kaunihera o Ahuriri

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CODE OVERVIEW

The Napier City Council Code of Practice for Land Development and Subdivision Infrastructure (The Code) sets the standard for design and construction of public infrastructure within the Napier City territorial boundary. The Code sets out performance criteria for Land Development and Subdivision Infrastructure and provides a means of compliance with the obligatory requirements of the Napier City Council District Plan and the Resource Management Act 1991.

This Code is based on the requirements of NZS 4404: 2010, the New Zealand Standard for Land Development and Subdivision Infrastructure and sets out acceptable design and construction standards. The Code has been developed to have the same layout, numbering, and formatting as NZS 4404: 2010. Where NCC's requirements differ from or add to NZS 4404: 2010 these are stated. Where this is a conflict between the Code and NZS 4404: 2010, the Code shall prevail. **It is expected that the Code is read alongside NZS 4404: 2010.**

The Code has been significantly restructured from the pre-existing *"Code of Practice for Subdivision and Land Development – Parts A, B, C and D to M"* dated March 2019. These parts have been reviewed and incorporated into this document and/or the District Plan as follows:

- Part A Resource Management Requirements – are almost entirely contained within the District Plan, except for Section 7.2 and most of the Appendices which form part of the Code
- Part B Engineering Performance Criteria – which set minimum criteria, are now integrated throughout the Code.
- Part C Engineering Standards – which set the mandatory requirements, are now located in Sections 2.1.1, 3.1.1, 4.1.1, 5.1.1, 6.1.1 and 7.1.1 of the Code
- Parts D to M Design and Construction (a Means of Compliance) – is integrated throughout the Code.

The philosophy underpinning The Code is to:

a) Maximise the efficient use of infrastructural resources to ensure that any infrastructural development work is cost effective and appropriate for the long term.
b) Provide a means to achieve requirements set down in the relevant district plan, resource consent(s), or contract when specified.
c) Provide a means for alternative/innovative design and construction to be considered when undertaking infrastructure development or development works.
d) Provide context and support to urban design when considering development works proposals.
e) Be a "living" document that is easily updated as standards, construction or materials change as well as respond to matters amended in the relevant District Plan via plan change processes or similar.
f) Be used for the design and construction of new infrastructure and for maintenance of existing infrastructure, including asset renewal, unless the standards are not compatible with the existing assets.

The Code is the Council's acceptable technical specification. Some works will require specific design/specification i.e. large scale works.

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DEFINITIONS

The following definitions apply to the Code.

Term	Definition
Access Way	As defined in s315(1) of the Local Government Act 1974.
Applicant	The person or company that submits the fully completed application to Council for the purposes of receiving Council's consent to subdivide land.
As-built Plan	A plan that depicts the final installed configuration and highlights any departures from the approved design.
Backflow	The unplanned reversal flow of water, or mixtures of water and contaminants into the water supply system.
Berm	A piece of land between the trafficable road surface and the road legal boundary. These areas may be grassed and contain a footpath, signs, streetlights, drainage, bunds or other street furniture.
Bulk Earthworks	Removal, moving or adding large quantities of soil (>50 m^3) from one area to another
Carriageway	An area of road reserve provided for the movement of vehicles and cycles or parking of vehicles.
Connection	Wastewater and Stormwater Connection – also known as a lateral. A pipeline branch which has no terminal manhole structure which terminates in a private area for the purpose of connecting a premise. Water Connection – also known as service pipe. The section of water pipe between a water main and the point of supply.
Contractor	The company engaged to undertake the physical works on behalf of the council only, it does not relate to an applicant's/developer's contractor. The Contractor's responsibility shall be as defined by the General Conditions of Contract for the works.
Cycle Lane	A longitudinal strip within a roadway reserved by a marking or sign for the use of cycles.
Cycle Path	A part of the road that is physically separated from the roadway that is intended for the use of cyclists, but which may be used also by pedestrians.
Developer	The company or person who has been granted or holds planning consent for the land being subdivided or is responsible for the consent application. The Developer shall ensure that only suitably qualified and experienced professionals are appointed to undertake the design and supervision of the development works.
Drain (Private Drain)	Refers to the private wastewater or stormwater systems that connect the premise at the point of discharge. This section of drain is owned and maintained by the customer or group of customers.
Footpath	A portion of any road, pedestrian accessway or public reserve that is laid out or constructed by authority of the Council primarily for pedestrians; and may include the edging, kerbing and channelling thereof
Fully Serviced Site	See "Serviced Site"
Gated Community	The development has a fence, wall or natural feature entirely surrounding it, with restricted access
Geo-professional	A suitably qualified and experienced Geotechnical Engineer, Engineering Geologist or Hydrogeologist holding membership with the Institution of Professional Engineers New Zealand (IPENZ) or equivalent professional body, including a current Professional Indemnity Insurance Policy acceptable to the Council
Greenfield Development	Development within the council's growth cells characterised by creating of new sections, roading and associated servicing infrastructure. Means subdivision and/or urban development of previously undeveloped rural land.
Gully Trap	Fitting designed to prevent foul air escaping from the drainage system and used to receive the discharge from private internal waste pipes.
Infill Development	Redevelopment of urban land through either subdivision or Building Consent
Infiltration	Groundwater entering a public sewer or private drain through defects such as poor joints and cracks in pipes or manholes. It does not include inflow.
Inflow	Water discharged into private drains from non-complying connections or other drain laying faults. It includes stormwater entering through illegal downpipe connections or from low gully traps.
Land Development	See "Subdivision"
Land Drainage	The flow of stormwater and groundwater focussing on the control of peak surface water runoff, sediments and water quality for such discharges and their reticulation under urban conditions.

Term	Definition
Level of Service	The expected performance level of infrastructure.
Local Authority	A regional council or territorial authority as defined in the Local Government Act 2002.
Manhole	Service opening which allows access for inspection, cleaning or maintenance of a public wastewater or stormwater system.
Means of Compliance	The method by which the requirements of the relevant District Plan may be complied with. It implies that there may be other methods which may meet the requirement, but which may be subject to specific consideration or approval.
Multi-Unit Development	A property with two or more household units in the Urban Area i.e. building three townhouses on a single site, or adding a house to a site (including a granny flat or a tiny home), or altering an existing house to create and additional unit on the property.
Natural Hazard	Any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.
Owner	The owner of the land being subdivided (may or may not be the Developer).
Parking Bays	The parking spaces and associated manoeuvring areas of a road or proposed road (as defined by the kerb) which are accessed directly from the road
Point of Supply	The point on the water pipe leading from the water main to the premises, which marks the boundary of responsibility between the customer and the Council, irrespective of property boundaries.
Potable	In relation to drinking water, means water that does not contain or exhibit any determinants to any extent that exceeds the maximum acceptable values (other than aesthetic guideline values) specified in the drinking-water standards applicable at the time.
Primary System (Stormwater)	The primary stormwater system is to accommodate a specified design rainfall event appropriate for the zone.
Principal Main	A water main of a minimum of 100mm internal diameter (DN 100) fitted with fire hydrants.
Private Road	Any roadway, place, or arcade laid out or formed within a district on private land, whether before or after the commencement of Part 315 of the Local Government Act 1974, by the owner thereof, but intended for the use of the public generally.
Private Way	Has the meaning ascribed to it in Section 315 of the Local Government Act 1974. A private way is designed to provide vehicular and/or pedestrian access to a public street, and may comprise separately owned entrance strips subject to rights-of-way or a separate lot (access lot) which is jointly owned and used by adjacent lots. It includes any common area defined for the purposes of providing the vehicular access for cross-lease or unit title subdivision.
Professionals	Suitably qualified and experienced persons capable of undertaking the various activities associated with the planning and design phases of the project.
Public Infrastructure	Infrastructure owned and operated by the Council.
Resource Consent	An authorisation given to certain activities or uses of natural and physical resources required under the Resource Management Act (the RMA) by the Council and/or Regional Council.
Rider Main	A water main of a minimum of 50 mm internal diameter (DN 50) up to DN 100
Right of Way (ROW)	A piece of land for vehicular access and with rights as defined in the Property Law Act 2007.
Rising Main	A pressure main through which wastewater is pumped.
Road	Means all land comprising formed and unformed roads as defined in section 315(1) of the Local Government Act 1974.
Road Controlling Authority	The party that controls the road and is responsible for its operation and maintenance. This is typically the NZ Transport Agency for State Highways and the Territorial Authority for other public roads. Means the territorial local authority, agency or approved organisation in control of roads in accordance with section 317 Control of Roads of the Local Government Act 1974. Approved organisation is defined in the Land Transport Management Act 2003.
Road Culvert	A structure that allows water to flow from one side of the road to the other but does not connect to the council stormwater system. Typically embedded so as to be surrounded by soil, a culvert may be made from a pipe, reinforced concrete or other material.
Rural Water Supply	An area formally identified by the Council as an area serviced by a reticulated water supply system that is intended to supply water for specified purposes via restricted flow supplies and/or on demand supplies but not necessarily with a fire fighting capability - discussion required with Council.

Term	Definition
Secondary Flow Path	The path taken by stormwater runoff in excess of the primary design flow. Capable of providing protection to the surrounding buildings for a once in 50 (2% AEP) years return period rain event for commercial, industrial, and habitable residential floor levels.
Service Lane	Any lane laid out or constructed either by the authority of the Council or the Minister of Works and Development or, on or after 1 April 1988, the Minister of Lands for the purpose of providing the public with a side or rear access for vehicular traffic to any land. Means land dedicated as service lane which is used from time to time for the vehicular servicing of adjacent properties
Service Pipe	See 'Connection'
Serviced Site	A site with reticulated water, wastewater, stormwater and roading (roads, footpath, and kerb and channel) infrastructure constructed to CoP requirements
Service Vehicles	Vehicles that are used to service the needs of the residences, and undertake operation and maintenance activities on the infrastructure.
Sewer / public sewer	See 'Wastewater System'
Shoulder	The portion of the side of the road that is not normally trafficked and resides between the solid white edge line and the edge of seal.
Subdivision	As described in section 218 of the Resource Management Act 1991. Has the same meaning as contained within section 218 of the Resource Management Act 1991 which means: a) The division of an allotment: i. By an application to a District Land Registrar for the issue of a separate certificate of title for any part of the allotment. ii. By the disposition by way of sale or offer for sale of the fee simple to part of the allotment. iii. By a lease of part of the allotment which, including renewals, is or could be for a term of more than 35 years. iv. By the grant of a company lease or cross-lease in respect of any part of the allotment. v. By the deposit of a unit plan, or an application to a District Land Registrar for the issue of a separate certificate of title for any part of a unit on a unit plan. b) An application to a District Land Registrar for the issue of a separate certificate of title in circumstances where the issue of that certificate of title is prohibited by section 226. The term subdivide land has a corresponding meaning.
Survey plan	As described in Section 2 of the Resource Management Act 1991
Trade Waste	Is any liquid, with or without matter in suspension or solution, that is or may be discharged from a trade premises to the Council's wastewater system in the course of any trade or industrial process or operation, or in the course of any activity or operation of a like nature; and may include condensing or cooling water or stormwater which cannot be practically separated.
Urban Water Supply Area	An area formally designated by the council as an area serviced by a reticulated water supply system with a fire fighting capability, that is intended to supply water to customers via on demand supplies. (Refer to councils Water Supply Bylaw).
Wastewater (sewage)	Water or other liquid, including waste matter in solution or suspension, discharged from a premises to the wastewater system.
Wastewater System	The collection, treatment and disposal of wastewater and trade wastes, including all sewers, pumping stations, storage tanks, wastewater treatment plant, outfall and other related structures operated by Council and used for the reception, treatment and disposal of wastewater and trade wastes.
Watercourse	A watercourse is a natural or artificial channel that a flowing body of water follows. These include rivers, streams, branches and canals.

1 GENERAL REQUIREMENTS AND PROCEDURES

1.1 Scope (additional to NZS 4404: 2010)

This Code sets out the Council's performance criteria for all Land Development and Subdivision Infrastructure as well as the minimum requirements for compliance where there are consent conditions imposed or where the district plan contains provisions that must be met. The Code contains requirements for the design and construction of earthworks, roads, stormwater drainage, wastewater systems, water supply, reserves and other utility services that are to be designed and constructed as part of land development works. The requirements in The Code apply to both urban and rural situations.

The Council supports and encourages innovation and specifications/designs which add long term value. Where the outcome will be a better quality living environment, proposed alternative solutions for infrastructure design, other than for water supply and wastewater, may be considered by the Council to ensure that the requirements in The Code are met. Alternative designs/specifications can be submitted provided the alternative specification meets or exceeds the Code and addresses any operational and maintenance aspects. Reference shall be made to Section 1.8.3.

1.2 Interpretation (as per NZS 4404: 2010)

1.3 Context

1.3.1 Resource Management Act (additional to NZS 4404: 2010)

The District Plan provides the overall regulatory framework within which subdivision and land development occurs. It is a statutory document, prepared under the Resource Management Act 1991 that controls subdivision and land use in accordance with the purpose and principles of the Act.

1.3.2 Historic Places Act (as per NZS 4404: 2010)

1.3.3 Building Act (as per NZS 4404: 2010)

1.3.4 Other legislation (as per NZS 4404: 2010)

1.4 Low impact design (additional to NZS 4404: 2010)

The utilisation of the natural process and the environment in development to provide more attractive, multifunctional landscapes is the preferred approach of Council. Reference shall be made to the relevant sections of this Code (including Section 4.3.7) for guidance on low impact design.

1.5 Climate change (as per NZS 4404: 2010)

1.6 Urban design protocol (as per NZS 4404: 2010)

1.7 Requirements for design and construction (replaces NZS 4404: 2010 section)

1.7.1 Investigation and design

1.7.1.1 Appointment

The Developer will appoint:

(a) A Representative to be known as the "Developer's Representative" to provide a point of communication with the Council; and
(b) A "Design Co-ordinator" to take responsibility for engineering design and design of the development up until and including the granting of the Resource Consent; and
(c) A "Construction Co-ordinator" to take responsibility for the supervision of the works from the granting of Resource Consent to and including the final certification of works.

The name, address, email and telephone of the Developer's Representative, the Design Co-ordinator and the Construction Co-ordinator will be provided to Council no later than the date that the application for consent is lodged. The same person may hold any one or more of the positions of Developer's Representative, Design Co-ordinator and Construction Co-ordinator. Where the people so appointed are not signatories to the Application, a signed acknowledgement of their willingness to act in the role to be given to them will be provided at the time of the Application.

If the Developer wishes to change any of the above named people, any replacement must be approved by Council prior to any change being made.

For the avoidance of doubt, Council will deal with the Design Co-ordinator and the Developer's Representative up to the point of Resource Consent being granted and thereafter Council will deal with the Construction Co-ordinator and the Developer's Representative.

1.7.1.2 Design Objectives

Designs shall provide a sound technical standard for the work thereby providing an assurance that the work will be suitable for its purpose over its intended lifetime, to provide a clear definition of the physical works and to achieve the specified environmental results.

The design shall:

(a) Clearly define the extent of the Works.
(b) Be carried out in accordance with the requirements of this Code, and in accordance with recognised design codes and engineering practice.
(c) Incorporate all the requirements of the Performance Criteria relevant to the intended project.
(d) Be legible and easily understood and supported by sufficient drawings, calculations and background information to allow assessment and review.
(e) Consider the proposal in terms of impact on the existing infrastructure and address such impacts both technically and environmentally.
(f) Provide supporting information in the form of specialist reports and calculations.
(g) Take into consideration the effects of sudden or catastrophic failure of any component or portion of the project.
(h) Ensure that safety of construction, operation and maintenance is maximised and documented and include safety in design principles through the use of Napier City Council's Safety in Design Guide (Version 1.0 or more recent version) where appropriate.
(i) Ensure that, and provide supporting evidence and calculations to show that, all conditions of any Resource Consent will be complied with.
(j) Avoid, remedy or mitigate any adverse effects on amenity value.
(k) Components of the engineering infrastructure shall be designed to provide the minimum asset life set out for each service or utility. For individual components of that facility where the state of the art is such that it is generally accepted that these design lives cannot be achieved (e.g. some electronic and mechanical equipment) a design life appropriate to the state of the art shall be specified by the Design Co-ordinator and provision made for easy maintenance and replacement of the subject componentry so that the required design life of the total facility can be achieved.
(l) Consider system resilience (to natural events, or otherwise). Infrastructure shall be designed to resist the effects of liquefaction, lateral spreading, slope failure, flood events and tsunami.

1.7.1.3 Provision for Services in the Lot/Road Layout

Minimum road widths and service locations within the road corridor are shown in the Standard Drawings. Additional provision shall be made through local widening of the road corridor and/or setting back of property boundaries for large standalone infrastructure such as:

- Wastewater pump stations (to be located on their own lot, refer to Section 5.3.11)
- Electrical transformers
- Large telecommunication chambers
- Above ground backflow protection (when DN50 or larger)
- Large water meters (when DN50 or larger)

Positioning and design of this infrastructure shall consider maintenance access. Concrete mowing strips shall be provided where applicable.

1.7.2 Construction

1.7.2.1 Construction Objectives

Construction objectives are to complete the physical works to the definition and technical standards specified in the design and to achieve the environmental results required under these Criteria.

The functional requirements of construction are to achieve the specified technical and environmental standards whilst constructing the works in a safe and efficient manner.

Construction shall:

(a) Ensure that performance in terms of the approved design and design intent is achieved.
(b) Be undertaken in accordance with good engineering practice.
(c) Be carried out in accordance with the approved plans and specifications.
(d) Be carried out with due consideration for the safety of both work site personnel and the general public.
(e) Be carried out taking all reasonable steps (as determined by Council) to prevent any degradation of materials and systems being used in the works.
(f) Minimise any disruption or nuisance to neighbours, the general public, vehicular and pedestrian traffic.
(g) Avoid, remedy or mitigate any adverse effects on surrounding land, vegetation and facilities.
(h) Promote where required the reinstatement of grass and vegetation growth.
(i) Ensure that temporary and permanent earthworks and land slopes are adequately stable.
(j) Avoid, remedy or mitigate the adverse effects of the spread of dust, soil, mud or silt and take any measures to achieve this as necessary.
(k) Restore all surfaces and services to not less than their pre-existing condition where affected by the construction.
(l) Comply with all relevant standards, consents, permits and controls, such as resource consents, district plan, traffic management, by-laws, WorkSafe requirements etc.
(m) Provide, to the Council Standard, true and accurate as-builts of the constructed works.

1.7.3 Environmental Outcomes

The environmental outcomes resulting from the objective and performance criteria of the Code shall:

(a) Achieve the utilisation of natural and physical resources in a safe and efficient manner which will enhance or minimise reduction of amenity values and avoid, remedy or mitigate any adverse effects.
(b) Minimise the discharge of dust or vapour into the air, minimise noise and health risk, effect protective measures to reduce the adverse consequences of changes in surface, ground and road surface water runoff and reduce the consequences of migration of salt, soil and road surface material.
(c) Minimise the likelihood of erosion, slippage or subsidence, effect protective measures to reduce the adverse consequences of erosion, slippage and subsidence, minimise alteration of the natural landscape, and take protective measures to reduce the adverse consequences of groundwater flows on the land and neighbouring environment.
(d) Minimise the risk of flooding on developed (and surrounding) land and infrastructure, the silting of waterways through soil carried in surface water runoff, the likelihood of erosion, slippage, subsidence and inundation caused by surface water runoff or groundwater flows and the likelihood of contaminants entering the stormwater system with consequent effects on the environment.
(e) Minimise the risk of contamination of the environment by wastewater discharge and the consequent effect on the ecosystem, minimise the risk of contamination of groundwater by seepage of pollutants, minimise the likelihood of wastewater spills through wastewater network breakdowns and minimise the volume of wastewater discharge through preventing inflow of ground and surface water.
(f) Protect potable water supplies from contamination, minimise the likelihood of surface or groundwater contamination due to leakage of any liquid reticulation network and help in containing the environmental damage caused by fire or explosion.

1.7.4 Easements

Where utility services must cross one allotment to service another or others or where such services are under the control of a Local Authority, a network utility operator, an ad hoc body, or a Government Department, there shall be shown on the scheme plan and created on the survey plan such easements as are required to reserve the rights over that allotment in favour of the other or others or the Local Authority, network utility operator, ad hoc body or Government Department as the case may be, and the easements shall be registered against the title to that allotment at the subdivider's expense.

Easements for Council services shall, where practical, be in access allotments or right of ways or similar. Easement or reserve widths for pipes shall be as shown on Standard Drawing D22, namely:

(a) A width equal to twice the depth to invert plus the diameter of the pipe plus 0.4 metres with the service laid in the centre. The minimum width shall be 3 metres.
(b) Easements for privately owned service connections that pass from one allotment to another may be reduced to 2 metres where the service (water, sewer or stormwater) is less than 1 metre to invert.
(c) Easement widths shall consider the practical access and health and safety requirements for the maintenance and replacement of services. In particular, this shall consider whether trench shields are required for the depth, location and type of service and if so, demonstrate that the easement width is sufficient.

Permanent structures such as buildings, garages, pools etc shall not be constructed within easements.

1.8 Approval of design and construction

1.8.1 Documents to be submitted for design approval (additional to NZS 4404: 2010)

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. Applications for Engineering Approval must be submitted on a fully competed Engineering Approval Application Form (available from https://www.napier.govt.nz/documents-and-forms/forms/, search "Engineering Approval", together with the following minimum documentation:

(a) A copy of the Scheme plan approval and all resource consents required and/or obtained for the project.
(b) Geotechnical reports covering the suitability of the land for earthworks and geotechnical design information including any predesign investigations and recommendations (along with justification) on batter slopes, fill requirements and compaction standards, subsoil drainage, suitable foundation types, and any other relevant design matters. The reports shall cover the whole development site.

Geotechnical reports will be required unless approved otherwise by the Council. Note: Information on geotechnical reports may be found in Section 1.8.10.3.

(c) Design drawings of adequate detail (see Section 1.8.2) to enable easy assessment of the project's impact, to show that its technical standards satisfy the requirements of this Code and to ensure accurate construction. (Note: costs incurred by Council for printing from electronic files, will be payable by the applicant).
(d) Calculations to support the design and show its compliance with standards set by the Code.
(e) All conflicts between new and existing services need to be established and detailed, together with the proposed methods for mitigating the conflicts.
(f) Contract specifications to ensure that construction details satisfy the standards required by the design and the Code. The Code shall take precedence over the specification unless explicitly agreed.
(g) An Erosion and Sediment Control Plan is to be finalised by the contractor and approved by Council prior to construction. The plan shall have consideration for the construction site, staging, whole catchment, flow paths and ultimate receiving environment.
(h) Other technical reports as appropriate to the nature and complexity of the project.
(i) Safety in Design documentation appropriate to the nature and complexity of the project.

(j) Applications to Council for new connections to existing service mains.
(k) Design documentation from relevant utility services not controlled by Council i.e. power, telecommunications, gas etc.
(l) A schedule documenting the design exceptions from the Code.
(m) A copy of the Ownership Transfer Agreement (Appendix B6), signed by the Developer, to acknowledge his responsibilities regarding all assets to be vested in Council.

***Note*: Applications that do not include all of the above (as applicable to the application), will not be accepted for processing. The application must also be accompanied by the required non-refundable administration fee, as set annually and detailed in the Council's Schedule of Fees and Charges.**

When the application satisfies the requirements, the applicant will be advised to provide three A1 copies of all plans (or a digital copy in A1), together with any other relevant information. The plans will then be stamped, and distributed to the applicant, inspection team, and Council's files.

A package will be prepared by NCC, 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.

1.8.2 **Drawings** (additional to NZS 4404: 2010)

Drawings for design approval shall meet the following requirements and additional requirements outlined in Appendix B1.

Note: the Horizontal Datum is to be in in terms of NZGD2000 (Hawke's Bay Circuit 2000) and the origin of the vertical datum in terms of NZVD2016 (or Hawkes Bay Datum 1972 / Napier 2014 Benchmark Network).

1.8.2.1 **General** (as per NZS 4404: 2010)

1.8.2.2 **Composition of Drawings** (additional to NZS 4404: 2010)

The following minimum drawings shall be prepared for land development works involving roads/private ways/access and utility services:

(a) Earthworks drawings showing cross sections, existing contours, proposed finished contours, batter slopes, subsoil drainage, retaining walls, total area of earthworks and proximity to any stop banks, open drains, water bodies or significant natural areas.
(b) Road plans and long sections showing detailed horizontal geometrics and road levels, typical cross-sections, road marking and signals, signs, and location of permanent survey marks.
(c) Overall service plans showing all services and stormwater overland flow paths.
(d) Plans and longitudinal sections showing wastewater and stormwater drainage, including long sections.
(e) Plans showing water supply reticulation layout, including long sections.
(f) Details of all joints, valves, bends and tee's etc.
(g) Plans showing telecommunication, electricity and road lighting layout.
(h) Plans showing gas and communication cable layouts where these services are to be provided.
(i) Plans of all reserves and other landscape areas showing all equipment and other fixtures complete with a landscape plan detailing tree, shrub and plant layout.
(j) Detail drawings or references to NCC standard drawings necessary to ensure clear understanding of the project, its compliance with the Code and the ability for the works to be undertaken as shown on the plans.
(k) Plans showing non-public access including levels, grades and typical cross-sections.

1.8.2.3 **Scale** (additional to NZS 4404: 2010)

Drawings in support of land development projects shall be submitted on A1 sheets (original size) or electronically as A1 sized Adobe Acrobat files (see Appendix B1 for pdf requirements).

Standard scales as detailed below shall be used:

Road plans	1:500 or 1:250
Utility service plans	1:500 or 1:250
Reserve Plans	1:500 or 1:250
Road longitudinal sections	1:500 or 1:250 longitudinal with a distortion of 5 or 10 longitudinal to vertical scales
Service longitudinal sections	1:500 or 1:250 longitudinal with a distortion of 5 or 10 longitudinal to vertical scales
Road cross-sections	1:100 distorted 5 or 10 urban, 1:100 true scale rural

Detail drawings shall utilise appropriate scales selected from any of the above or at 1:100, 1:50, 1:20, or 1:10. Scales of 1:100 and 1:200 may be used for any of the above provided it does not cause the work to be spread to multiple sheets.

Line style and weight together with letter size and density shall be such that good quality prints can be produced and that the plans are suitable for scanning for computer archiving.

1.8.2.4 **Content of drawings** (as per NZS 4404: 2010)

1.8.3 Design basis for documents submitted for approval

1.8.3.1 **Standard design basis** (as per NZS 4404: 2010)

1.8.3.2 **Alternative design basis** (additional to NZS 4404: 2010)

It is not Council policy to approve the design and installation of any infrastructure that does not comply with this Code. However, if circumstances prevail which require an engineering solution that is non-compliant, then an application for a dispensation must be submitted to Council for approval.

No dispensation will be considered, unless substantive reasoning is put forward in support of the non-compliance and has approval in principle from the relevant Asset Manager(s), and/or Director Infrastructure. The application seeking dispensation must demonstrate that the alternative approach will achieve the same, or better, environmental outcomes as The Code.

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 B2. Alternatively, for internal (NCC) requests, applications may be submitted by memo.

Any proposed recommendations shall be approved / rejected by the relevant authority (e.g. Asset Manager or Director: Infrastructure) and be acknowledged by the Services Engineer.

Consideration of the dispensation may also be subject to approval by Council's Planning and By-Laws Committee.

1.8.3.3 Life-cycle costing (as per NZS 4404: 2010)

1.8.4 Approval of design (as per NZS 4404: 2010)

1.8.5 Notification of contracts and phases of construction (as per NZS 4404: 2010)

1.8.6 Supervision of construction (additional clauses to NZS 4404: 2010)

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 Code 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, 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.

1.8.6.2 Council Inspections (additional subsection to NZS 4404: 2010)

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 B4.

The Construction Co-ordinator shall ensure the Contractor is aware of such inspection requirements. The Construction Co-ordinator shall ensure the Council is given at least one working day's 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.

Re-inspections are required until all work is approved.

1.8.7 **Connecting to existing services** (as per NZS 4404: 2010)

1.8.8 **Testing** (as per NZS 4404: 2010)

1.8.9 **Maintenance** (as per NZS 4404: 2010)

1.8.10 **Completion documentation** (replaces NZS 4404: 2010 section)

1.8.10.1 Completion report

On completion of the works the Construction Co-ordinator shall prepare and lodge a written completion report with Council which shall include the following:

(a) The results of all testing required by this Code.
(b) Completed "As Built" drawings and associated information (see Section 1.8.10.4)
(c) Any geotechnical reports required by the Code (see Section 1.8.10.3).
(d) A set of Asset Valuation Forms (see Appendix B8) for each type of service that is to be vested in Council.
(e) A set of check sheets for each type of service that is to be vested in Council. The check sheets shall have been signed off for final inspection. In the case of wastewater and stormwater drainage, the Registered Drain layer has entered their name and registration number and signed. Examples are provided in Appendix B9.
(f) RAMM data sheets are to be supplied for surfacing, pavement and road marking as per Appendix B10.
(g) Weed control and re-planting of slopes

This information shall be accompanied by the signed form in Appendix B5.

1.8.10.2 Resource Consents

Full copies of all Certificates of Compliance or resource consents issued under the Resource Management Act. All Consents shall be issued in the name of the Napier City Council.

1.8.10.3 Geotechnical Reports and Test Results

Reports covering the design and construction phases of the project shall be submitted covering, but not necessarily limited to, the following matters:

(a) Predevelopment report (as detailed in Section 2.2.4) covering the suitability of the land for the proposed development
(b) Geotechnical design report (as detailed in Section 2.2.4) covering any predesign investigations and recommendations (along with justification) on batter slopes, fill requirements and compaction standards, subsoil drainage, foundation types and any other relevant design matters. This report shall include seismic assessment to determine liquefaction / settlement / lateral spread potential and subsequent mitigation measures.
(c) Construction report covering the record of earthworks monitoring and compaction testing.

The reports shall cover earthworks whether or not on areas of potential building sites.

1.8.10.4 As-built information

Detail on the requirements for as-builts is provided in Appendix B1.

Note: “As Built” information is required before a section 224(c) subdivision certificate will be issued. Diagrams and guideline notes to assist with the production of as-built plans, can be found in the Standard Drawings and Appendix B1.

1.8.10.5 Operation and Maintenance Manuals

Operation and Maintenance Manuals shall be provided for all facilities involving electrical or mechanical plant, stormwater attenuation and treatment devices, and any other features as required by Council. The manual shall include the following information as a minimum:

(a) System schematic layout including wiring diagrams.
(b) Process and Instrumentation Diagrams (P&IDs)
(c) Make and model of all plant.
(d) Manufacturers' specifications and performance data for all plant.
(e) The name of the plant supplier and nearest authorised maintenance agency.

(f) The date on which the system was formally commissioned and a summary of any problems and measures taken to remedy them.
(g) Commissioning plan and report including actual plant performance results as measured during commissioning and explanation where they differ from the specified standards.
(h) Maintenance schedule showing maintenance tasks and frequency.
(i) For stormwater this shall include but not be limited to; maintenance tasks, frequency, personnel responsibilities, treatment method(s), treatment requirements, mitigation of pollutants (gross, soluble and suspended) and location of treatment and conveyance systems.

1.8.10.6 Warranties

Warranties are required by Council for all mechanical and electrical plant. Warranties shall be issued in the name of the Council by the plant supplier, and shall apply for a period of not less than 12 months from the date of Council's takeover of the facility. No mechanical or electrical plant shall be taken over by Council before the plant is satisfactorily commissioned or before all other parts of a total development have been taken over. Where warranties are unable to be provided, Council require the placing of a Bond with Council for the 12-month minimum period.

1.8.10.7 Certificates from Service Controlling Authorities

Letters are required from all non-Council controlled service authorities advising that reticulation and plant to be taken over by them has been installed to their standards and they have undertaken to take over its operation and maintenance at no cost to Council.

1.8.10.8 Asset valuation

An asset valuation is required covering all infrastructure work incorporated in a development. This includes vested land, roads and utility services along with earthworks associated with roads (Appendix B8). The cost is to include all overheads (Design, supervision, As Built etc.).

1.8.10.9 Asset compliance certificate

On satisfactory completion of the construction work, an Asset Compliance Certificate will be issued by the Services Engineer, upon receipt and approval of the following documentation from the Construction Co-ordinator:

(a) All as-built drawings, as detailed in Section 1.8.10.4 and Appendix B1.
(b) Completed inspection check-sheets for each asset type. Examples are provided in Appendix B9.
(c) Asset Valuation Forms, as detailed in Section 1.8.10.8 and Appendix B8.
(d) Project Completion Report, signed by the Construction Co-ordinator.
(e) Water meter cards (if applicable).

1.8.10.10 Ownership transfer agreement

An ownership transfer of the form shown in Appendix B6 shall be signed by the Developer. This will be countersigned by Council only after it is satisfied that the works have been constructed in accordance with the approved engineering plans and specifications (including any approved variation) and that all inspections have been made, completion documents provided and outstanding maintenance matters attended to. Council's signing of the ownership transfer represents the time at which Council accepts ownership of the public parts of the development.

1.8.11 **Approval of uncompleted work** (as per NZS 4404: 2010)

1.9 **Bonds and charges** (additional to NZS 4404: 2010 section)

A cash deposit or 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 sections.

1.9.1 Incomplete Works

Consideration will be given to the execution of a bond relating to the works that have not been completed due to it being out of season or else beyond the Developers control. Any bond for completion of such works will be at Council's discretion.

When applying for approval for such consideration, the Developer shall supply an accurate estimate of value of the work to be completed and an estimate of the time required for final completion. The Manager will make arrangements for the Council's Solicitor to prepare the Deed at the Developer's expense and as security for the carrying out and completing the works. A cash deposit or an approved indemnifier, or both, will be required for an amount to be one and a quarter times the sum required to complete the works.

The date for the release of the bond and the date for Council, if necessary to commence completion of the works, will be by agreement between the Manager and the Developer, however it will not exceed a timeframe of two years.

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.

1.10 Design criteria for residential subdivisions of up to three lots (additional section to NZS 4404: 2010)

For small residential subdivisions or multi-unit residential developments of up to 3 lots or units with no requirement for bulk earthworks or construction of new public roads or network utility services, the Developer (at the discretion of Council) may carry out a basic design without the use of a professionally qualified Design Co-ordinator. The person providing the subdivisional design drawings whilst not being required to be a fully professionally qualified person shall be able to show some experience in the area of small subdivisional development.

Variations to these expedited requirements may only be addressed by the Developer engaging a Design Co-ordinator to address the project in terms of the full requirements of this Code.

1.11 Design criteria for multi-storey buildings / apartment complexes (additional section to NZS 4404: 2010)

For multi-storey buildings or apartment complexes, connections for water supply, sewerage and stormwater will be provided to a point just inside the development boundary. All service provision and maintenance from this point will be the responsibility of the development/corporate body and must comply with the requirements of the Building Act 2004.

1.11.1 Water Supply (additional section to NZS4404: 2010)

A single connection shall be made to the Council main.

Individual tobies shall be provided for each unit, to enable the water supply to be isolated for maintenance and repair. These shall be located in an accessible location as close as possible to the boundary of each unit.

Meters and backflow preventers, where required, shall be located above ground, for easy access by Council Staff.

1.11.2 **Sewerage** (additional section to NZS 4404: 2010)

150mm pipe work is recommended for common drain stacks between floors. This reduces the risk of potential blockages.

Each unit should have an individual 100mm connection into the common stack, with provision for rodding and maintenance.

1.11.3 **Stormwater** (additional section to NZS 4404: 2010)

Provision shall be made for all impermeable areas to be drained adequately to the reticulated stormwater network connection.

1.11.4 **Solid Waste Management** (additional section to NZS 4404: 2010)

For all multi-unit developments, single-entry subdivisions, and apartment complexes, provision shall be made for:

- Adequate storage and collection of domestic refuse and recyclable materials. Sizing shall (as a minimum), be equivalent space for the normal household allowances for refuse and recyclable materials, per unit.
- Secure provision to minimise access by vermin, and odorous discharges to the air
- Where subdivision design creates a private access, provision of a suitable collection area at the road or kerbside must be provided.
- Storage areas must be screened from public view. The area must be sited to allow ease of access for collection services, and to minimise odour and vermin issues for neighbouring properties.

1.11.5 **Mail Boxes** (additional section to NZS 4404: 2010)

Provision for mail deliveries to each unit must be located at the front boundary. They shall not be located within any rubbish collection / storage area.

1.12 **Design criteria for lifestyle villages / rest homes / gated communities** (additional section to NZS 4404: 2010)

All services and roads within lifestyle villages / rest homes / gated communities shall be constructed to Code requirements.

Council will not accept public infrastructure that is located in gated communities.

2 EARTHWORKS AND GEOTECHNICAL REQUIREMENTS

2.1 Scope (additional to NZS 4404: 2010)

This section shall be read in conjunction with the Earthworks Chapter of the proposed and operative District Plan, which contains the objectives, policies and methods relating to earthworks associated with land development.

2.1.1 **Mandatory Requirements and Performance Criteria** (additional section to NZS 4404: 2010)

Earthworks for all land and infrastructure development shall be designed to ensure stable and environmentally acceptable land forms and safe, stable platforms for buildings, roads and network utility services.

Earthworks shall be designed and constructed to appropriate engineering and technical standards and codes and shall achieve the following minimum performance criteria:

(a) Provide safe stable lots with safe stable vehicular access onto each allotment.
(b) Provide urban and rural lots with a building site free of inundation in a storm having a 10% probability of occurring annually and providing for adequate control of stormwater.
(c) Provide roads free of inundation in a storm having a 10% probability of occurring annually.
(d) Avoid the potential for erosion and instability.
(e) Not unnecessarily alter the natural contours or landscape.
(f) Where altering the natural contour, blend sympathetically with the abutting natural land.
(g) Remain safe and stable for the duration of the intended land use.
(h) Take into consideration and state mitigation measures associated with the hazard maps prepared by the Hawkes Bay Regional Council and the Napier City Council.
(i) Cater for the natural groundwater flows.
(j) Be geotechnically sound.
(k) Provide batters that are stable in seismic or saturated conditions. Note:
    i. Seismic coefficients, factors of safety and perceived risk shall be stated.
    ii. Saturated conditions need to be considered where groundwater variations and/or poor drainage are likely to be present.
(l) Minimise reliance on structural devices for stability.
(m) Ensure that any structures, associated with earthworks remain safe and stable for the duration of the intended land use.
(n) Complies with the Stormwater by-law.

2.2 General

2.2.1 **Objective** (additional to NZS 4404: 2010)

In addition to NZS 4404: 2010, reference shall be made to the Objectives and Policies in the District Plan.

2.2.2 **Referenced documents** (additional to NZS 4404: 2010)

The following is a selection of relevant standards and related documents. The list is not exclusive and other appropriate standards and guides currently accepted by the engineering profession may be used.

(a) GD05 Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region. Guideline Document 2016/005.
(b) NZS 4402: “Methods of testing soils for civil engineering purposes”.
(c) NZS 4431: “Code of practice for earth fill for residential development”.
(d) New Zealand Building Code Clause B1, B1/VM4 and B1/AS4.
(e) NZTA Technical Advice Note TNZ/F1: Specification for Earthworks Construction.

2.2.3 **Local authorities’ requirements** (as per NZS 4404: 2010)

2.2.4 **Geotechnical requirements** (additional to NZS 4404: 2010)

Except for small scale earthworks involving cuts or fills less than 2.5 metres height on sites or hillsides with slopes of less than 2.5 horizontal to 1 vertical (22^0), or fills less than 0.5 metres depth in areas of known soil conditions, geotechnical reports are not required. All cut and fill shall comply with the requirements of this Code and the necessary certification shall be provided on completion of construction.

For all other earthworks, a minimum of three geotechnical reports are required, as follows:

1. Pre-development Geotechnical Report see Section 2.3.2.
2. Geotechnical Design Report see below paragraph.
3. Geotechnical Completion Report see Section 2.6.1.

For purposes of Engineering Approval, and as part of the development of detailed design drawings, detailed geotechnical investigations and analysis shall be carried out, where these are identified as being necessary in the Pre-development Geotechnical Report, or where they are considered necessary to address issues arising during the detailed design. The Geotechnical Design Report shall detail all investigations carried out, the conclusions reached and requirements for the detailed design and construction. This report shall include seismic assessment to determine liquefaction / settlement / lateral spread potential.

2.3 Design

2.3.1 **Design factors** (as per NZS 4404: 2010)

2.3.2 **Preliminary site evaluation** (additional to NZS 4404: 2010)

After the development of preliminary earthworks plans, and prior to any detailed planning or design, a suitably qualified geotechnical engineer, engaged by the Design Co-ordinator, shall undertake a preliminary evaluation of the general nature and character of the site.

This evaluation shall be presented to Council in a Pre-development Geotechnical Report.

The evaluation shall be undertaken to determine the likely requirements for earthworks, any need for further investigations into the suitability of foundation conditions, and the stability of the natural ground and identification of seismic hazards. The evaluation shall identify any geotechnical testing or analysis required to confirm the suitability of the site for the earthworks proposed. Any such testing or analysis shall be carried out under the control of a suitably qualified person and, where appropriate, the testing laboratory shall have a recognised registration or quality assurance qualifications.

The Pre-development report shall be accompanied by a statement of 'professional opinion' as to the suitability of the land for subdivision and including any specific requirements or conditions (see Appendix B3).

Attention will need to be given to the following matters, as appropriate, for consideration:

(a) Low impact design factors

As outlined in Section 4.3.7.

(b) Drainage

Where natural drainage paths are to be interfered with by the proposed land development, sufficient alternative drainage facilities shall be provided to the standards required by Part I, (Stormwater), of this Code. Natural springs and seepage shall be located in situ and catered for in the design; or a resource consent obtained from the regional council shall be provided.

Subsoil drainage requirements shall also be considered.

(c) Slope stability

The stability of the entire site, and its expected performance under the seismic conditions considered.

(d) Foundation stability

The extent of unsuitable materials and how they are to be treated or disposed of.

Materials to be used as fills, their suitability for the subject fills and any special requirements for their use as fills to achieve the required strengths and densities.

Confirmation that a suitable stable building site will be available on each lot along with a feasible and stable access drive, of grade as specified in Section 3. Where the building site proposed does not satisfy the requirements of "good ground" (NZBC B1/AS4) a description of feasible founding methods necessary to enable a building to be built on the site shall be included in the report.

Batter slopes, fill types and compaction specifications

(e) Stream instability

Subsoil drainage systems shall be provided in valley floors and in other situations where required to intercept groundwater and minimise problems of soil piping, softening and reduction in stability. Drains shall be sized to cope with anticipated flows and superimposed loads.

(f) Local conditions

Confirmation is required from the Hawke's Bay Regional Council (HBRC) that the discharge of stormwater is in conformity with the HBRC Regional Plan. An erosion control plan shall be submitted as part of the engineering plan approval, prior to the commencement of earthworks.

2.3.3 **Landform selection** (additional to NZS 4404: 2010)

The formations to be constructed shall be suitable for residential development. In particular, attention shall be given to slope stability, drainage, minimising differential settlement, aesthetic values, and how the fill may perform under seismic conditions.

The extent of mass earth fills shall be clearly defined in the design documentation, and shall include plans and drawings, including appropriate contours and cross sections, showing:

(a) The extent of cut and fill, batter slopes and heights and the extent and nature of all subsoil drainage systems.
(b) The pre-existing contours including the extent of upstream or downstream catchments affected by the earthworks.
(c) Details of all culverts including alignment sizes and type of culverts, inlet and outlet details. These shall include details of temporary or long term silt control or runoff attenuation where required.

The design shall include a construction specification covering earthworks standards, materials, testing methods to be used, and the systems of quality checking to be employed.

As a minimum, the specification shall include:

(a) Standards for preparation of the existing ground and removal of unsuitable materials.
(b) Standards for placing and control of the fill including control of the quality of the fill material being used.
(c) Compaction standards and moisture content control.
(d) Control of finished levels and position, including batter slopes and compaction.

2.3.4 **Stability criteria** (additional to NZS 4404: 2010)

2.3.4.1 **Retaining Walls** (additional to NZS 4404: 2010)

Any earth retaining structures require specific approval from Council.

2.3.4.2 **Batters** (additional to NZS 4404: 2010)

Slopes for fill batters of height greater than 0.5 metres shall be as specified in the Geotechnical Design Report. To allow for maintenance, fill batters shall be not steeper than two horizontal to one vertical.

Where slopes are more than 2.5 metres high, steeper than 220 (2.5 horizontal to 1 vertical), and where cuts are 2.5H:1V or steeper, then slopes for cut batters shall be specified in the Geotechnical Design Report.

Cut batters should be sloped depending on the type of country and materials involved, however, slopes shall generally be no steeper than ½ horizontal to 1 vertical, and preferably 1 to 1 or flatter. Benches should be provided as for fill batters above.

The top or toe of a cut batter shall be at least 2 metres from a boundary or building. The toe of a cut batter shall also be at least 1 metre from the kerb face or back edge of any footpath but additional allowance may be required to be made for sight distance on a curve or where a high or low level path is required. Cut batters shall not be higher than 2.5 metres.

Cut and fill batters shall be rolled over at the top to blend as well as possible with the natural land contour.

Appropriate batter surface protection shall be provided as described in Section 6.3 of NZS 4431. All batters within actual or designated legal road shall be re-vegetated in accordance with TNZ F/1.

2.3.5 **Special soil types** (as per NZS 4404: 2010)

2.3.6 **Compaction standards for fill material** (replaces NZS 4404: 2010 section)

The following requirements shall apply unless superseded by any compaction standards specified by the geotechnical report:

(a) Compaction of the road subgrade layer shall comply with TNZ F/1. Subgrade is defined as that layer of material in the top 1.0 metre of the construction measured down from the underside of the subbase course in both cut and fill situations. Note that cut areas may require undercutting to ensure uniform subgrade construction.
(b) For all other fills the compaction achieved shall comply with NZS 4431 (refer to clauses 7.4.2.1 and 7.4.3.2).

2.3.7 **Erosion, sediment, and dust control** (additional to NZS 4404: 2010)

All works shall be designed to allow for adequate drainage and silt control during the construction phase and the post construction phase as outlined in Section 2.5.5.

The main document for compliance with appropriate erosion and sediment control measures is *GD05: Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region.*

Council reserves the right to require an Erosion and Sediment Control Plan for any development. This will depend on the extent and risk of the earthworks to be undertaken.

Dust control measures are outlined in Section 2.5.6.

2.3.8 **Seismic considerations** (as per NZS 4404: 2010)

2.3.9 **Stormwater control** (additional section to NZS 4404: 2010)

All new lots shall be able to be drained to the stormwater outlet provided. Where the kerb is the outlet the lot shall be at a level that provides the required drainage and cover to pipes.

In all cases, sections shall be shaped so that no surface water flows across adjacent section boundaries. Unless approved otherwise, all new sections shall have a minimum cross fall of 0.6% towards the road boundary, and prevent surface water ponding on the section.

Reference is to be made to Section 4.3.4 for flood level protection levels of service.

2.4 **Approval of proposed works** (additional to NZS 4404: 2010)

All earthworks related to subdivision and land development will be subject to NCC Regulatory and Engineering approval processes.

Approval is required for any earth retaining structure.

2.5 **Construction** (additional to NZS 4404: 2010)

This section shall be read in conjunction with the Earthworks Section of the District Plan, which addresses objectives, policies and methods relating to earthworks associated with land development.

2.5.1 **General** (additional section to NZS 4404: 2010)

All earthworks shall be carried out to the levels, positions and batter slopes detailed on the approved drawings so as to provide stable land of the form intended by the design. Methods used shall be appropriate to achieve the geometric and compaction standards required by the design and relevant controlling codes and standards.

This work shall include where relevant:

- Clearing, including removal of all vegetation and obstructions within the earthworks limits;
- Construction of temporary and permanent silt retention dams, run-off controls and erosion control devices;
- Stripping and stockpiling of topsoil within the earthworks limits;
- Preparation of fill areas including benching, removal of unsuitable materials, and subsoil drainage;
- Excavation of all cuts, including subgrade undercutting;
- Carting, placing and compacting the excavated material in bulk fills and road subgrades;
- Carting to waste of cut materials unsuitable for use in fills;
- Preparation of subgrade areas for road construction;
- Trimming final surfaces to shape, re-spreading topsoil and grassing, and maintenance of the works for the required period.

All of the above works shall be in accordance with the drawings and specifications.

2.5.2 **Application of specifications** (additional section to NZS 4404: 2010)

The construction of all bulk fills shall be carried out in accordance with NZS 4431 and this Code.

The construction of road subgrades shall be carried out in accordance with TNZ F/1.

All other aspects of the earthworks, including temporary works to control erosion and siltation, shall be carried out in accordance with the Contract Specification and this Code and its associated guides and specifications.

2.5.3 **Unexpected conditions** (additional section to NZS 4404: 2010)

Where conditions exposed on opening up the land are different from those envisaged during design, the Construction Co-ordinator shall report to the Design Co-ordinator who shall review the design and modify and adapt the design as necessary. The Council shall be advised of such situations and design modifications shall be fully documented and submitted for approval prior to recommencing work on the affected areas.

2.5.4 **Geotechnical monitoring of earthworks** (additional section to NZS 4404: 2010)

The control of moisture content and compaction of fill material, the accurate laying of cut and fill batters, and silt control are the most important aspects of bulk earthworks projects. To ensure proper control of the works the Construction Co-ordinator, through an experienced geotechnical engineer, shall monitor the works and carry out adequate inspections and testing to enable a proper evaluation of the standard of the works and to prepare a report as to the compliance of the works with the specification. The geotechnical engineer shall be fully familiar with previous reports and the project specification.

Where necessary, work shall be stopped until the geotechnical engineer has completed such tests as are required, and has authorised continuation of work. In the event of any test results not meeting the specified standards, further compaction or other appropriate remedial action to the satisfaction of the geotechnical engineer shall be carried out until the desired strengths, void ratios and/or densities are achieved.

2.5.5 **Stormwater drainage and silt control** (additional section to NZS 4404: 2010)

Adequate drainage and silt control shall be provided during construction. A discharge consent may be required from the Hawkes Bay Regional Council for the discharge of stormwater from the site while the earthworks are being carried out.

The surfaces of all cuts and fills shall be kept adequately drained at all times, and revegetated as soon as possible.

Temporary drains and ditches shall be dug to remove water from the surface during and on completion of the work. All temporary drains shall be maintained in a clean and tidy condition so that they function satisfactorily until the works are taken over by the Council.

All necessary interception devices and settlement traps shall be constructed taking all reasonable steps to prevent the deposition of silt or other deleterious material on land outside the earthworks area by the action of water or any other cause. Such facilities shall be maintained during the works and until such time as the land becomes stabilised to the satisfaction of the Council. Any damages within or outside the earthworks area caused by inefficient or insufficient drainage or any other reasons shall be made good by the developer.

The requirements of any resource consent shall be complied with.

2.5.6 **Dust control** (additional section to NZS 4404: 2010)

The best practical means shall be employed to ensure that windblown dust and soil and associated wind erosion is minimised during and following the earthworks operations. Dust can be a specific problem in Hawke's Bay due to a combination of fine silts and strong winds (particularly westerlies).

The developer shall prevent, remedy or mitigate by suitable means to the satisfaction of the NCC the discharge of dust emanating from the construction of the works. The developer shall be responsible for ensuring that the Principal, adjacent residents, property owners or other members of the public, suffer no undue inconvenience or hardship from dust arising from the works during the course of the project. Suitable means may include:

- Fixed water spraying.
- Water spray trucks.
- Screen cloth fences.
- Re-grassing or covering cut and fill earthwork areas.
- Hydro seeding.
- Limiting construction work and disruption through individual properties to the shortest practical time.
- Washing/cleaning of trucks before entry onto public roads.
- Stopping construction activities and vehicular movement that raise dust during strong wind periods.
- Cleaning and removal on a regular basis material off sealed roads that give rise to dust.

Dust control activities shall not be limited only to periods of active construction but shall be available on a seven-day, twenty-four-hour basis for the duration of the project. On that basis the developer shall supply a contact name and phone number for both working, and out-of-hours callouts. The developer shall be responsible for dust control from the action of all activities on the site including those of subcontractors and/or service authorities that enter the site.

Site management is the key to dust control, and proactive steps should be taken to ensure adequate dust control measures are implemented at all times. Repeated failure to adequately control dust will result in appropriate action being taken by the Construction Co-ordinator to prevent recurrence.

2.5.7 **Excavation** (additional section to NZS 4404: 2010)

2.5.7.1 **Cut batters** (additional section to NZS 4404: 2010)

Cut batters and benches shall be laid accurately to line and level.

Survey position checks shall be made at the position of each bench or in 8 metre vertical height steps whichever is the more frequent. At no point shall cut batters deviate from design position by more than ±300 mm. Where such deviations have occurred measures shall be taken to adjust positions by adjustment of bench width rather than steepening of batters. If the error is large the batter top may need to be repositioned in which case consequential adjustment will need to be made to land areas and facilities at the top of the batter. In this situation the Design Co-ordinator shall be recalled to review the changes required.

The edges and top of cut batters shall be rounded to minimise sudden changes of contour where the batter abuts the natural contours.

2.5.7.2 **Slips** (additional section to NZS 4404: 2010)

Should any earth fall or slip occur in the batter of any cutting or fill either during or after excavation but before the completed work has been vested in Council, the Construction Co-ordinator shall arrange for the removal of the material brought down by such an earth fall or slip, and to make good the damage caused, to the satisfaction of the Council.

The Design Co-ordinator should be advised of any earth fall or slip.

2.5.7.3 **Explosives** (additional section to NZS 4404: 2010)

If the use of explosives is necessary, blasting operations and the storing of explosives shall be carried out in compliance with the appropriate laws, bylaws and regulations.

2.5.8 **Construction of fills** (additional section to NZS 4404: 2010)

2.5.8.1 **Protection of existing structures** (additional section to NZS 4404: 2010)

Any utility service or other structure located under a proposed fill or embankment shall be protected during the earthworks construction.

Any utility service or other structure located during the earthworks operation which is not shown on the plans shall be reported to the Council's Works Asset Department immediately.

Any damage to any pipeline or other structure shall be made good to the standards required by Council's Works Asset Department or the utility operator responsible for the structure.

2.5.8.2 **Preparation for filling** (additional section to NZS 4404: 2010)

For all fills on sloping ground an initial bench at least 3.5 metres wide shall be formed at the toe of the fill embankment. On all original ground steeper than 1 vertical to 4 horizontal, benches shall be continued at vertical intervals not greater than 2 metres.

2.5.8.3 **Subsoil drains** (additional section to NZS 4404: 2010)

Where any moisture seepages or potential seepages are encountered during clearing, stripping or benching operations, suitable subsoil drainage systems shall be installed. Details of such appropriate systems shall be provided by the Design Co-ordinator.

TNZ F/2 "Pipe Subsoil Drain Construction" 2000 is a suitable specification for the construction of subsoil drainage systems.

2.5.8.4 **Fill materials** (additional section to NZS 4404: 2010)

Highly plastic clay, peat or any other material containing organic matter shall not be placed in any fill.

The maximum particle size shall be no greater than half the loose layer depth (refer to NZS 4431 for the maximum layer depths permitted).

2.5.8.5 **Subgrade construction** (additional section to NZS 4404: 2010)

The subgrade layer shall be constructed in accordance with the relevant clauses of TNZ F/1, "Earthworks Construction", including undercutting requirements. For the purposes of this Code the Engineer as referred to in TNZ F/1 shall refer to the Geotechnical Engineer.

2.5.8.6 **Compaction standards** (additional section to NZS 4404: 2010)

The compaction standards for all bulk fills shall comply with the more stringent of the specified standards, or the minimum requirements of NZS 4431 "Code of Practice for Earthfill for Residential Development" and shall also extend to bulk fills, including those in industrial, commercial and rural locations.

2.5.8.7 **Trafficking of fills** (additional section to NZS 4404: 2010)

The traversing of fills and subgrade shall be restricted to construction plant required to construct the fills and shall be strictly controlled. The construction traffic shall be distributed evenly across the area of fill and shall not be allowed to form defined tracks.

2.5.8.8 **Fill batter slopes** (additional section to NZS 4404: 2010)

Fill batter slopes shall be checked for accuracy at 4 metre height intervals and where position has deviated from design by 500 mm or more measures shall be taken to correct the problem. At no point on any fill batters shall position deviate from design by more than 500 mm in any direction. Fill batters shall be contoured into the adjacent natural land at each end and at the base of the fill.

2.5.9 **Completion of earthworks** (additional section to NZS 4404: 2010)

On completion of the earthworks, the road subgrade surfaces, all batters and earth worked areas shall be cleaned of all debris and surplus materials. Earth worked surfaces shall be left with a firm smooth surface true to line and cross fall and properly drained, and ready to receive further construction or landscaping.

2.6 Final documentation

2.6.1 **Geotechnical completion report** (additional to NZS 4404: 2010)

On completion of earthworks construction, a construction report (Geotechnical Completion Report) shall be forwarded to Napier City Council by the Construction Co-ordinator. The construction report shall be prepared by the Geotechnical Engineer.

(a) Matters covered by the report shall include, but shall not be limited to:
(b) Documentation of earthworks monitoring and compaction testing carried out.
(c) Confirmation that the fill bases have been placed on clean soils of suitable strength and that unsuitable soils have been stripped and not used in structural fills.

(d) Confirmation that batters have been constructed as designed or modified by the Design Co-ordinator on site and explanations for any such changes.
(e) Confirmation that subsoil drains have been placed as required and that any surface drainage required as part of the earthworks has been installed.
(f) Where any filled or any natural ground is deemed suitable for the erection of residential buildings, confirmation incorporating the use of the form “Statement of Professional Opinion as to Suitability of Land for Residential Buildings” – as set out in Appendix B3 – is required. This is in substitution for Appendix A to NZS 4431.

Where any filled or any natural ground is identified as not being “good ground” as specified in NZBC B1/AS4, details shall be required identifying those lots which are affected, and the specific design requirements for the various acceptable foundation options.

2.6.2 **As-built drawings for earthworks and subsoil drains** (additional to NZS 4404: 2010)

As-built drawings of all earthworks and subsoil drains, shall be forwarded to Napier City Council as part of the project completion documentation. Refer to Appendix B1.

2.6.3 **Other Reports** (additional section to NZS 4404: 2010)

The Pre-Development Geotechnical Report and the Geotechnical Design Report (if applicable) shall be forwarded to Napier City Council.

3 ROADS

3.1 Scope (additional to NZS 4404: 2010)

This section shall be read in conjunction with the Transportation Section of the District Plan, which addresses objectives, policies and methods relating to roads and accessways associated with land development and subdivision.

The design of roads shall recognise the various components of roading infrastructure including:

(a) Earthworks (described in Section 2)
(b) Traffic pavements
(c) Pedestrian pavements including footpaths, accessways, steps and ramps
(d) Drainage facilities including kerbs, channels, catchpits, catchpit leads and culverts, and the subsequent effects on stormwater capacity
(e) Bridges
(f) Street lighting
(g) Traffic services including signs, road name plates, pavement markings, traffic aids and safety barriers
(h) Street furniture and amenities
(i) Cycleways and shared cycle/pedestrian pathways

3.1.1 Mandatory Requirements and Performance Criteria (additional section to NZS 4404: 2010)

Roads shall be of appropriate geometric and structural standards for their position in the road network hierarchy. They shall be designed to appropriate engineering and technical standards and codes and shall achieve the following minimum performance criteria:

(a) Adequately and safely service the needs of all road users expected during their design life.
(b) Provide adequate space, as determined in specific instances by the relevant network utility operator, for all utility services placed in locations as approved by the Council and the relevant network utility operator.
(c) Provide adequate vehicular access to each lot (legal access from a legal road).
(d) Link and be compatible with the existing road and pathway network and be in keeping with the existing/future road hierarchy.
(e) Provide adequate access for emergency vehicles.
(f) Be free of inundation in a storm as defined in Section 4.
(g) Withstand the expected loads for the design life of the road.
(h) Transfer applied loads so as not to adversely affect the underlying subgrade, utility services, other road facilities, or abutting properties.
(i) Be constructed from materials suitable for the intended use and with a proven record of performance recognised as such by the engineering profession.
(j) Not undergo excessive deflection or surface deformation such that ride or pedestrian use are adversely affected, stormwater disposal is compromised or the pavement surface or under layers are put at risk of premature failure.
(k) Be protected from the adverse effects of surface water and/or groundwater.

Non-public accessways shall be designed and constructed to:

(a) Provide adequate vehicular access to each lot
(b) Provide adequate access for emergency vehicles
(c) Minimise the visual effects of the accessway formation
(d) Non-public accessways shall:
(e) Withstand the expected loads for the required design life period of 20 years.
(f) Ensure there are no adverse effects on any underlying utility services or on adjacent and abutting properties.
(g) Intersect safely and efficiently with the road network.
(h) Be protected from the adverse effects of surface or groundwater.

Vehicle crossings shall be designed and constructed to:

(a) Ensure adequate distance is maintained from road intersections
(b) Ensure adequate pedestrian refuge is provided between crossings
(c) Provide safe sight distances for the prevailing speed environment

(d) Meet minimum geometric standards
(e) Adequate width is available to safely accommodate the expected volume and type of vehicles
(f) Limited in width having regard for pedestrian safety and to conserve on-road parking
(a) Withstand the expected traffic loadings
(b) Comply with the specified standards relating to surfacing type and vehicle types.
(c) Prevent discharge of loose aggregate or other detritus onto road surfaces or into drainage facilities
(d) Have a design drainage capacity to ensure that any restriction to the road or land drainage system is minimised.

3.2 General

3.2.1 **Objective** (additional to NZS 4404: 2010)

In addition to NZS 4404: 2010, reference shall be made to the Objectives and Policies of the Transportation Chapter and the relevant zone in the proposed and operative District Plan.

3.2.2 **Related standards and guidelines** (additional to NZS 4404: 2010)

Road designs shall be based on the requirements of the performance criteria of this Code, Council's typical cross sections and details, and the most appropriate codes and guidelines applicable at the time of the project. The following is a selection of relevant standards and related documents which shall be used where applicable. The list is not exclusive and other standards and guides accepted by the engineering profession at the time may be used where appropriate.

It shall be the Design Co-ordinator's responsibility to determine the current versions at the time development takes place.

- Napier City Council's Safety in Design Guide (Version 1.0 or any more recent version).
- Austroads Traffic Management Guides.
- Austroads Road Design Guides
- The Sealed Local Roads Manual published by Australian Road Research Board (ARRB).
- Austroads Pavement Design: A Guide to the Structural Design of Road Pavements (2004) and the New Zealand Supplement of 2007.
- A Supplement to Austroads Pavement Design, A Guide to the Design of New Pavements for Light Traffic.
- Austroads Waterway Design: A guide to the Hydraulic Design of Bridges, Culverts and Floodways.
- Transit New Zealand approved design guides.
- Transit New Zealand standard specifications.
- State Highway Geometric Design Manual.
- NZTA Manual of Traffic Signs and Markings (MOTSAM) Part 1 & 2..
- Transit New Zealand Planning Policy Manual
- The Land Transport New Zealand's Road and Traffic Standards (RTS) guides.
- The Land Transport New Zealand's Road and Traffic Standards RTS18 – New Zealand on road tracking curves for heavy vehicles (August 2007)
- NZS 3116: Interlocking Concrete Block Paving (Part 2 superseded by AS/NZS 4455)
- NZS 4121: Design for Access and Mobility – Buildings and Associated Facilities
- AS/NZS 1158: Road Lighting
- AS/NZS 4455: Masonry Units and Segmental Pavers
- Standard for the Manufacture and Maintenance of Traffic Signs, Posts and Fittings: (published by Transit New Zealand and the Road Safety Manufacturers Association).
- AS/NZS 2890.1: Parking Facilities, Part 1: Off street car parking.
- New Zealand Building Code.

- Lighting for Roads and Public Spaces Infrastructure Design Guide, produced by the Energy and Efficiency Conservation Authority (EECA).
- National Code of Practice for Utility Operators Access to Transport Corridor

3.2.3 **Road purpose** (as per NZS 4404: 2010)

3.2.4 Place and link context

3.2.4.1 **Place Context** (as per NZS 4404: 2010)

3.2.4.2 **Link Context** (replaces NZS 4404: 2010)

Napier City Council Uses the NZTA One Network Road Classification (ONRC) system to define road hierarchy, this functional based system has four classifications, these are shown below in Table 1, Classifications are shown in more detail in Tables 2 and 3

Classification	**Description**	**Roads included**	**Typical Annual Daily Traffic (AADT) in Vehicles per day (vpd)**	
			Urban	Rural
Arterial	Roads of strategic regional importance and contributing significantly to the regional economy. Linking regionally significant places, industries, ports or airports. Additionally may perform a 'lifeline' function.	State Highways (not managed by Council) and major local roads that are of an inter-regional nature and provide links between significant areas of population and other inter-urban links.	>5000	> 3000
Primary Collector	Roads of strategic importance which provide significant links within the local economy. Links to arterials or state highways.	Links between areas of activity within a community, providing alternative links between centres of population and contributing significantly to the movement of goods or produce.	3000 – 5000	1000 – 3000
Secondary Collector	These roads link population and economic sites. Locally preferred routes or within areas of population and activities.	Road giving connectivity between local populations areas and places of interest.	These roads link population and economic sites. Locally preferred routes or within areas of population and activities.	Road giving connectivity between local populations areas and places of interest.
Access **(Low Volume)**	These roads provide access and connectivity. Roads whose primary function is a street for people, public space, meeting, gathering as well as accessing property. These also provide access to the wider network.	All Council roads not categorised in the above hierarchies and servicing land use activities including cul-de-sacs.	200 – 1000	50 – 200 (0-50)

Table 1 Napier City ONRC Road Hierarchy

To encourage a more appropriate use of the ONRC road hierarchy, both urban and rural roads have been classified based on characteristics of traffic volumes and use/purpose factors.

Tables 2 and 3 provide more description of how the ONRC hierarchy is intended to operate in the City's urban and rural areas. State Highways, Motorways and Expressways have not been included as these are managed nationally.

Road Class – Urban Roads				
Criteria	**Access (Low Volume)**	**Secondary Collector**	**Primary Collector**	**Arterial**
Traffic versus Land Access Function	Land access primary function	Land access and traffic movement of equal importance	Traffic movement primary function; some land access control	Traffic movement primary function; subject to land access control
Typical Two Way AADT (vpd)	200 – 1000 (0-200)	1000 – 3000	3000 – 5000	> 5000
Flow Characteristics	Interrupted flow		Generally uninterrupted flow with at grade intersections	
Desirable Operating Speed (km/h)	30 – 50	40 – 50	45 – 70	50 – 70
User Types	Pedestrians, cyclists, all motor vehicle types, except restrictions on use by heavy vehicles may be necessary		Pedestrians, cyclists, all motor vehicle types.	Some restriction may apply to pedestrians and cyclists
Accommodation for Public Transport	Limited	Preferred	Preferred	Preferred
Allowable connections for new roads	Access (Low Volume) , collectors	Access , collectors, arterials	Collectors, arterials	Arterials
Provision of Landscaping / LIUD	Preferred	Preferred	Limited	Limited

Table 2 Characteristics Urban Roads (Posted Speed Limits < 70Km/hr)

Urban roads are those which have posted speed limits of < 70 km/h. These can exist within established urban areas (e.g. Napier) and also within smaller urban areas in generally rural zones, such as smaller coastal settlements (e.g. Bay View, Awatoto, Meeanee)

Road Class – Rural Roads				
Criteria	**Access (Low Volume)**	**Secondary Collector**	**Primary Collector**	**Arterial**
Traffic versus Land Access Function	Land access primary function		Land access and traffic movement of equal importance	Traffic movement primary function; some land access control
Typical Two Way AADT (vpd)	0 – 200 (0-50)	200 – 1000	1000 – 3000	> 3000

Criteria	Access (Low Volume)	Secondary Collector	Primary Collector	Arterial
Flow Characteristics	Interrupted flow		Generally uninterrupted flow	
Desirable Operating Speed (km/h)	60 – 80		70 – 100	80 – 100
User Types	Pedestrians, cyclists, all motor vehicle types			
Accommodation of Pedestrians	Footpaths generally not required, except for safety provisions to support adjoining communities			
Accommodation of Cyclists	Cycle lanes or sealed shoulders desirable on sealed roads		Separate cycle lanes or sealed shoulders recommended	
Allowable connections level (new roads only)	Access , Collectors		Access , Collectors, Arterial	Collectors, Arterials

Table 3 Characteristics Rural Roads (Posted Speed Limits > 70Km/hr)

Rural roads are those which have posted speed limits greater than 70 km/hr.

For both urban and rural roads, where additional traffic from a new development is likely to have an adverse effect on the agreed Level of Service (LoS) of the existing adjoining network, Council may require the developer to commission a traffic study to determine the effects, and possible mitigation options. Levels of Services are defined in the Austroads Traffic Management Volumes.

3.2.5 **Network connectivity** (as per NZS 4404: 2010)

3.2.6 **Design and access statement** (as per NZS 4404: 2010)

3.2.7 **Road safety audit** (consistent with NZS 4404: 2010)

A safety audit for all new roading, pedestrian and cycle facilities shall be undertaken by an independent qualified safety auditor unless the Council decides that audits are not required at any or all the stages of the project.

The safety audits shall be in accordance with NZTA Road Safety Audit Procedures for Projects Guidelines and Austroads Road Safety Guides.

3.3 Design

3.3.1 **Design requirements** (additional to NZS 4404: 2010)

Road design shall:

(a) Conform to Council's road hierarchy, as set out in the District Plan.
(b) Comply with the standards set out in Table 4.
(c) Include geometric and structural design of traffic pavements, footpaths, road markings, lighting, signs and all road furniture (such as seating).
(d) Include the intersections of new roads and accessways with the existing road network and, where necessary, this shall include widening or other modification of the existing road to accommodate turning traffic.

All urban areas shall have road lighting installed using separate underground cables, lighting poles and lamps.

Each proposed road shall be designed both in layout and structural strength to cope with the frequency and weight of traffic likely to use it. Through-traffic roads will be wider, straighter and more heavily constructed than those for local traffic. The objective of road layouts in residential areas is to provide for the safe circulation of vehicles, including cycles, whilst maintaining a safe and attractive environment which provides for the safety of pedestrians and the requirements of access to residential properties. The Council's aim is to encourage subdivision layouts in which the function of each road is clearly expressed by its location and alignment and its relation to other roads.

Road standards as defined in Table 4 shall be used as the basis for road design.

Urban roads shall be provided with kerb and channel and be adequately drained. Subsoil drains under pavement/kerb edges may be required. (See Standard Drawing R19)

Footpaths in urban areas shall be provided on both sides of all major local roads and above and on not less than one side of minor local roads. Pedestrian accessways and cycle ways shall be provided where necessary to provide continuity of access to specially identified amenities.

In rural roads shoulders and berms shall be provided to carry pedestrian, cycle and stock traffic, and to provide off-carriageway parking. Grassed swales or other flood flow paths (including drains) shall be provided to carry stormwater and to keep potential groundwater levels below the structural pavement layers.

Pavement structural standards shall be based on not less than a 50-year design life using the predicted traffic loadings.

Roads may be surfaced with chip seal, asphaltic concrete or concrete pavers subject to them providing acceptable weatherproofing, wearing and friction standards.

Grades for all roads shall be as set out on Table 4.

3.3.2 Road geometric design

3.3.2.1 **Design parameters** (replaces NZS 4404: 2010 section)

Road standards as defined in Table 4 shall be used as the basis for road design and supplemented by NZS 4404: 2010 where necessary.

3.3.2.2 **Sight distance** (additional to NZS 4404: 2010)

Sight distances at vehicle crossings shown on Standard Drawing R10 to R13.

3.3.2.3 **Widening on horizontal curves** (additional to NZS 4404: 2010)

Geometric design of primary and rural roads shall be in accordance with the Austroads Road Design Guides. All other urban road designs shall be in terms of Table 4.

Table 4 Minimum Road Design Standards – Rural, Urban and CBD

PLACE CONTEXT			DESIGN ENVIRONMENT				LINK CONTEXT			
Area	Land Use	Hierarchy Classification Traffic Volume (Max vpd)	Locality Served	Target Operating Speed (km/h)	Min Road Reserve Width (m)	Max Grade	Pedestrians	Passing, Parking, Loading & Shoulder	Cyclists	Min Movement Lane Widths (Excluding Shoulder)
Notes										
Rural	Residential & Home Occupation	Access 100 vpd	1-6 du (Public or Private)	20	6	20%	Shared (on Shoulder and berm)	Allow for passing up to every 50m, Total sealed shoulder 0.5m	Shared (in movement lane)	3.0
Rural	Residential & Home Occupation	Access 200 vpd	7-20 du	30	9	16%	Shared (on Shoulder and berm)	Total sealed shoulder 0.5m	Shared (in movement lane)	2 x 2.75
Rural	Residential & Home Occupation	Collector/ Arterial 3000 vpd	21-150 du	70	15	12.50%	Shared (on Shoulder and berm)	Sealed shoulder 2 x 0.75m	Preferred on sealed shoulder	2 x 3.5
Rural	Make, Grow and Move	Access 200 vpd	Low level agricultural activity	Up to 100	20	10%	Shared (on Shoulder and berm)	Sealed shoulder n/a	Shared (in movement lane)	2 x 3.0
Rural	Make, Grow and Move	Secondary Collector 1000 vpd	Medium level agricultural activity	Up to 100	20	10%	Shared (on Shoulder and berm)	Sealed shoulder 2 x 0.75m	Preferred on sealed shoulder	2 x 3.5
Rural	Make, Grow and Move	Primary Collector > 3000 vpd	Medium/High level agricultural activity + medium level through traffic	Up to 100	20	10%	Shared (on Shoulder and berm)	Sealed shoulder 2 x 1.5m	Preferred on sealed shoulder	2 x 3.5
Rural	Make, Grow and Move	Arterial >3000 vpd	Medium/High level agricultural activity + high level through traffic	Up to 100	20	10%	Shared (on Shoulder and berm)	Sealed shoulder 2 x 1.5m	Preferred on sealed shoulder	2 x 3.5

PLACE CONTEXT			DESIGN ENVIRONMENT				LINK CONTEXT			
Area	Land Use	Hierarchy Classification Traffic Volume (Max vpd)	Locality Served	Target Operating Speed (km/h)	Min Road Reserve Width (m)	Max Grade	Pedestrians	Passing, Parking, Loading & Shoulder	Cyclists	Min Movement Lane Widths (Excluding Shoulder)
Notes										
Urban	Residential & Home Occupation	Access 100 vpd	1-6 du (Public or Private)	10	4.5	20%	Shared (in movement lane)	Allow for passing up to every 50m	Shared (in movement lane)	2.75
Urban	Residential & Home Occupation	Access 200 vpd	Side or rear service lane up to 100m in length (1 to 20 Lots)	10	6	12.5%	Shared (in movement lane)	Shared parking in the movement lane	Shared (in movement lane)	2 x 2.75
Urban	Residential & Home Occupation	Access 200 vpd	7-20 du	20	15	16%	1.5m one side where more than 100m in length	Parking is required and shall be separate and recessed	Shared (in movement lane)	2 x 2.75
Urban	Residential & Home Occupation	Access 1000 vpd	21-200 du	40	15	12.5%	1.5m one side or 1.5m both sides where more than 100m in length	Parking is required and shall be separate and recessed	Shared (in movement lane)	2 x 3.0
Urban	Residential & Home Occupation	Collector/ Arterial 8000 vpd	All other intergrated activities in this land use not specified in this table	50	20	10%	1.5m each side	Parking, Public Transport, Turning	1.8m	2 x 3.5
Urban	Shop & Trade Commercial & Industrial	Access 200 vpd	Side or rear service lane access (1 to 20 Lots)	10	6	10%	Shared (in movement lane)	Loading bays	Shared (in movement lane)	3.0
Urban	Shop & Trade Commercial & Industrial	Access 200 vpd	1 to 20 Lots	10	17	10%	1.5 each side	Parking	Shared (in movement lane)	2 x 3.0
Urban	Shop & Trade Commercial & Industrial	Access 1000 vpd	21-200 Lots	30	20	10%	3m each side	Parking & Loading Bays	Shared (in movement lane)	2 x 3.5

PLACE CONTEXT			DESIGN ENVIRONMENT				LINK CONTEXT			
Area	**Land Use**	**Hierarchy Classification Traffic Volume (Max vpd)**	**Locality Served**	**Target Operating Speed (km/h)**	**Min Road Reserve Width (m)**	**Max Grade**	**Pedestrians**	**Passing, Parking, Loading & Shoulder**	**Cyclists**	**Min Movement Lane Widths (Excluding Shoulder)**
Notes										
Urban Continued	Work & Learn	**Access 200 vpd**	Side or rear sevice lane access (1-20 Lots)	10	6	12.5%	Shared (in movement lane)	Loading bays	Shared (in movement lane)	2 x 2.75
		Access 200 vpd	1-20 Lots	10	15	10%	1.5m one side or 1.5m both sides where more than 100m in length	Parking	Shared (in movement lane)	2 x 2.75
		Access 1000 vpd	21-200 Lots	30	20	10%	1.5m each side	Loading bays	Shared (in movement lane)	2 x 3.0
	Mixed Use	**Access 1000 vpd**	1-200 Lots	30	20	10%	1.5m each side	Parking	Shared (in movement lane)	2 x 3.0
		Collector/ Arterial 8000 vpd	Neighbourhood Centre, 200-800 Lots	50	20	10%	2.0m each side	Parking, Public Transport, Turning	1.8m	2 x 3.5

CBD / Shopping Centre	Mixed Use	**Access 200vpd**	Side or rear sevice lane access (1-20 Lots)	10	6	10%	Shared (in movement lane)	Loading bays (shared in movement lane)	Shared (in movement lane)	5.0
		Access 200 vpd	1-20 Lots	20	15	10%	2.5m each side	Parking	Shared (in movement lane)	2 x 2.75
		Access 1000 vpd	1-200 Lots	30	20	10%	3m each side	Parking	Shared (in movement lane)	2 x 3.0
		Collector/ Arterial 8000 vpd	Urban Street, 200-800 Lots	50	20	10%	3.0-3.5m each side	Parking	1.8m	2 x 3.5

Note #	Minimum Road Design Standards Ref TABLE 4
A	Provision will be in accordance with Napier City Council's Transportation Strategy (DRAFT [date] and final [date])
B	Minimum perpendicular parking should be 2.5 x 5m, parallel parking should be 2.1 x 6.0m
C	Where not shown in the table, cyclists shall be provided with separate movement lanes if identified in a local or regional cycle network
D	A full safety audit process will be required to accompany these designs
E	The movement lane can be reduced at intervals to provide for increased amenity and greening of the street and/or traffic calming based on the Napier City Council Subdivision Design Guidelines (DRAFT)
F	It may be appropriate to consider an alternative to this design table however this will require discussion with Council (prior to design is preferable).
G	Any private road or lane serving greater than 6 sites shall be offered as public road to be vested by Council.
H	Link Context in Rural areas will only apply where residential activities are located within 800m of the subject site.
I	For carriageway widening of the curves refer to Clause 3.3.2.3 of NZS 4404: 2010:2010.

3.3.3 **Pavement structural design** (replaces NSZ 4404: 2010 section)

The design life for the structure of a road, footpath or cycleway shall be 50 years based on asphalt surfacing needing protection within this timeframe.

The design life of all bridges and culverts shall be 80 years.

3.3.3.1 **CBR design methods for rigid and flexible pavements** (replaces NZS 4404: 2010 section)

The following provides an acceptable design basis for flexible pavements with thin surface coatings (e.g. chipseal, asphaltic concrete of 40 mm or less, and concrete pavers). Designs for any other form of pavement shall be fully engineered based on appropriate design codes and guidelines.

All CBR testing shall be carried out by a laboratory with recognised registration or quality assurance qualifications.

For roads with a design loading of up to 105 EDA/ESAs pavement design may be based on Part B of the ARRB Sealed Local Roads Manual, or Austroads pavement design guides for light traffic. The pavement thickness shall be computed from the pavement design curves provided for a 95% confidence limit. Soaked CBR values of the pavement subgrade and subbase materials shall be used and the pavement designed for the estimated number of EDAs (NZ) or ESAs (Aust.) over **a 50-year design life**. Thin bituminous surfacings shall not be considered part of the pavement depth.

Pavements subject to design loadings in excess of 105 EDA/ESA shall be designed using the full mechanistic process contained in the Austroads Pavement Design Guide, including the New Zealand Supplement.

Regardless of the design procedure all public roads shall not have less than 300 mm total pavement thickness.

3.3.3.2 **CBR tests** (replaces NZS 4404: 2010 section)

CBR values shall be determined in the laboratory to test 6.1.1 or 6.1.2 of NZS 4402: Part 6 as appropriate. For subgrade material which is sensitive to remoulding but will not be disturbed during construction undisturbed samples may be used for CBR testing (test 6.1.2). Otherwise samples shall be manufactured in the laboratory at a water content equal to that in the field. The CBR values used in the pavement design shall be soaked values.

A selection of samples for subgrade CBR testing shall be taken at various depths of between 150 mm and 450 mm below the estimated subgrade surface level. All CBR values used shall be the lower 10th percentile of the tests taken and where this value exceeds 15 a CBR value of 15 shall be used.

In areas of extremely poor subgrade, material replacement or modification to improve the subgrade performance will be required. Options also include stabilised subgrade, undercutting of the subgrade and increasing the depth of the subbase layer, and the use of geotextile materials. Any such techniques shall be identified and designed on an individual basis.

Aggregate CBR tests shall be taken as soaked, and the results shall be used with caution and with due consideration to the stiffness of the underlying layers.

For local roads, an alternative method of determining subgrade CBR in non-granular materials by using a Scala Penetrometer, may be approved by the Council. This must be discussed with the Council before use.

Confirmation that subgrade strength equals or exceeds the design value shall be provided prior to the construction of the pavement layers. This is covered in detail in Section 3.4.5 and 3.4.7 of this Code.

3.3.3.3 **Determination of Traffic Loading** (additional section to NZS 4404: 2010)

The design life traffic loading shall be calculated using an appropriate recognised method. Both the ARRB sealed local roads manual, and the Austroads Pavement Design Guides, contain suitable methodologies. The minimum EDA to be used is 3 x 104 For new subdivisions and areas identified for future development or redevelopment, the design traffic shall take account of both the construction traffic associated with the developments and the in service traffic for the subdivisions and any future developments within the likely traffic catchment for the road.

3.3.4 **Safety barrier provisions** (additional to NZS 4404: 2010)

Where roads, private ways or other vehicular or pedestrian access, whether public or private, run parallel with land which drops away to a height of greater than 1 metre at an angle of greater than 45 degrees within 2 metres of the edge of the road or footpath, the side shall be provided with safety barriers to protect pedestrian and vehicular traffic.

3.3.4.1 **Pedestrian and cycle barriers** (additional to NZS 4404: 2010)

Safety barriers for pedestrian and cycle access shall comply with the design requirements of the New Zealand Building Code (NZBC) Document D1, and NZS/AS 1657

3.3.4.2 **Urban vehicle barriers** (consistent to NZS 4404: 2010)

Safety barriers for vehicular traffic in urban areas shall comply with the requirements of NZTA RTS/11 “Urban Roadside Barriers and Alternative Treatments”.

3.3.4.3 **Rural vehicle barriers** (additional to NZS 4404: 2010)

Vehicle safety barriers in rural areas shall comply with AS/NZS 3845, TNZ M/17P, and NZTA M/23,

3.3.5 **Target operating speed** (additional to NZS 4404: 2010)

The design speed should be not less than the 85th percentile speed. (The 85th percentile speed is the speed that is not exceeded by 85% of the vehicles travelling on a section of road in a given time period).

The design speed used for the geometric design of urban roads shall be taken from Table 4.

Rural roads shall be designed to speed guidelines in accordance with Austroads Road Design Guides.

3.3.5.1 **Traffic Calming** (additional section to NZS 4404: 2010)

Traffic calming measures may be required to ensure that the design speed regime cannot be significantly exceeded and to create safe crossing points for pedestrians and cyclists.

These may include, but are not limited to, threshold treatment using ramps, changes in road textures, localized road narrowing and landscaped medians.

For details, refer to Standard Drawing R22 to 24 and Austroads Road Design Guides.

3.3.6 **Parking, passing, and loading** (additional to NZS 4404: 2010)

The design of on-street and off-street parking facilities shall be in accordance with the District Plan, and AS/NZS 2890: Parking Facilities.

3.3.7 **Intersection and alignment design** (consistent with and additional to NZS 4404: 2010)

All intersections shall be designed in accordance with Austroads guidelines for intersections at grade, roundabouts, traffic signals and local area traffic management.

The preferred angle of intersection is 90° although for secondary roads a minimum angle of 70° may be justified by other constraints. Carriageway alignment may be offset within the road reserve to improve the intersection.

All residential and commercial road intersections of collector/collector status and below shall have a minimum kerb radius at intersections of 8 metres. Such intersections shall also have the allotment corners splayed by a minimum of 3.0 metres along both boundaries. When the berm width from the property boundary to the kerb becomes inadequate to accommodate the elements normally sited in the road reserve, specific intersection design will be required.

All road intersections above collector/collector status as well as any intersection within industrial zoning shall have a minimum kerb radius of 13.5 metres and shall have corner splays of 6 metres along both boundaries.

The distance between the legs of a “staggered tee” intersection on arterial, principal, and collector roads shall be in accordance with the Austroads Road Design Guides.

The separation distance between adjacent intersections on any road shall be at least 40 metres centreline to centreline.

Intersection gradients shall be as described in Austroads Road Design Guides.

Revised Pavement Thresholds at intersections will be approved at the Road Asset Manager’s discretion.

3.3.7.1 **Roundabouts** (additional section to NZS 4404: 2010)

Roundabouts shall be designed in accordance with Austroads Traffic Management and Road Design Guides.

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.

3.3.8 **No-exit roads** (additional to NZS 4404: 2010)

NCC discourages no-exit roads. Connectivity to the wider road network is required where practicable. Where no exist roads and lanes are approved, they shall provide for road turning at the end of the road, in the form of cul-de-sac heads.

Cul-de-sac heads shall have a minimum kerb radius of 8 metres in residential and rural areas and 15 metres in industrial and commercial areas.

A central area may be provided for parking or beautification in a cul-de-sac head as shown on Standard Drawing R29. Alternative designs may be considered (e.g. as per Standard Drawing R30), provided they are shown to have equivalent parking or turning provisions.

All rural cul-de-sac heads shall have the seal edge protected by a solid kerb and channel or flush nib.

All cul-de-sac heads shall have a longitudinal kerb and channel gradient of 0.3% minimum, 3.0% maximum. The standard 3% carriageway crossfall may be reduced to 2% within the cul-de-sac head.

3.3.9 **Bus stops** (additional to NZS 4404: 2010)

Local widening of the carriageway shall be provided as required at bus stops on all roads carrying public transport. Standard Drawing R27 shows the standard layout.

Pavement strengthening shall be applied at bus bays to resist the effects of the concentrated heavy vehicle braking and acceleration forces which are a feature of bus stop usage. This shall include reinforcing of any concrete channels in the trafficked area.

3.3.10 **Special road and footpath provisions near places of assembly** (as per 4404: 2010)

3.3.11 **Footpaths, accessways, cycle paths, and berms** (replaces NZS 4404: 2010)

Cross falls on footpaths, pedestrian accesses and cycleways shall be 2%. Concrete thickness shall be not less than 100 mm over suitable basecourse (minimum 100 mm compacted thickness).

3.3.11.1 **Footpaths and accessways** (replaces NZS 4404: 2010)

Footpaths shall be concrete except that in retail/commercial areas concrete pavers may be approved provided evidence of their expected longevity and safety can be shown.

The standard minimum footpath width in residential areas shall be 1.5 metres. (See Standard Drawing R02 and R04). In residential areas footpaths shall be separated from the kerb, as set out in Standard Drawing R04 except for 8-metre-wide roads, where the path shall be 1 metre wide, constructed against the kerb.

Minimum footpath widths and configurations in commercial and industrial areas shall be as shown in Table 4. The footpath shall be constructed against the kerb, and be 1.8 metres wide in industrial areas, and 3.0 metres wide in commercial areas.

All pram crossings on public footpaths are to have tactile pavers installed to cater for vision-impaired pedestrians in accordance with RTS14.

Footpaths in shopping areas (District Plan – Centre Zones, Mixed Use Zones and Large Format Retail Zones) shall be designed and constructed for the circumstances which apply as to dimensions, quality, durability, appearance, finish and other relevant factors. The minimum standard width shall be 3 metres.

Non-vehicular accessways comprise pedestrian accessways (including steps and ramps), cycleways and combined cycle and pedestrian accessways. All non-vehicular accessway pavements shall be concrete surfaced and constructed to the standards specified for footpaths. Provision shall be made for stormwater disposal, fencing, handrails and lighting as appropriate. They shall be a designed to a width appropriate for the intended use.

Pedestrian and cycle accessways are best provided by an integrated local network of landscaped open space areas. These accessway areas may be on reserve land rather than legal road and may constitute part of the public reserve requirements of subdivision and land development. Narrow-width accessways compromise user safety and are to be avoided. The minimum width of a pedestrian and cycle access reserve at any point shall be 20 metres. The sides of accessways shall be fenced where appropriate and the road frontages shall be provided with suitable vehicle barriers.   Motor-vehicle rail barriers (see Standard Drawing R37) shall be provided at both ends of all pedestrian accessway pavements

3.3.11.2 Cycle paths (replaces NZS 4404: 2010)

Provision for cyclists on and off the carriageway shall be subject to scheme plan approvals and designed in consultation with the Transportation Asset Manager and, where appropriate, the Parks and Reserves Asset Manager. Where cycle lanes on a carriageway are not required, the Transportation Asset Manager may reduce the width of the road.

Provision for cyclists on the carriageway shall be in line with "engineering best practice" and generally in accordance with Austroads Traffic Management and Design Guides.

Cycle access is best provided by an integrated city wide network of inter-linked or continuous cycleways. Crossings constructed at time of subdivision shall be heavy duty. The inclusion of cycleways, either on road cycle lanes, exclusive off road cycle tracks or shared off-road cycle and pedestrian paths, shall be considered with each new road construction. The type of facility is dictated by the traffic volumes which are shown on Standard Drawing R38. The routes are to comply with the Napier City Council's Cycle Strategy. Dedicated cycleways shall be designed in accordance with the relevant Austroads Design Guides, and with the New Zealand Traffic Regulations. Where accessways are intended to accommodate both cycles and pedestrians they shall be designed as shared cycle/pedestrian accessways in accordance with Austroads guides.

3.3.11.3 Footpath and cycle path surfacing (delete NZS 4404: 2010)

3.3.11.4 Berms (additional to NZS 4404: 2010)

All roads shall have a grass berm of not less than 1.5 metres wide on both sides except where the road is in cut of at least 4 metres high. The berms may be formed on the 1 in 5 side slopes, or they may be formed on the road boundary side of the side drains.

Berms shall be constructed utilising not less than 100mm lightly compacted thickness of loam topsoil placed over a base material capable of allowing root penetration and sustaining growth. All topsoil shall be free of oxalis, couch and other persistent or noxious weeds. Berm dimensions and crossfalls (4%) shall comply with the details set out in Standard Drawing R04.

Grassed areas for tree planting and landscape planted areas which are within the road reserve and additional to the minimum berm width shall be specifically designed, and in these areas steeper gradients may be permitted to a maximum of 20% providing the area can be mown or otherwise maintained. Where a berm crossfall greater than 8% is proposed, the Design Co-ordinator shall produce a cross-section along the individual property accesses to show that the sag or summit curves at vehicle crossings can be satisfactorily negotiated by a 90th percentile car.

Road shoulders and berms shall provide for parking, pedestrian and stock movement.

All roads shall have shoulders and side slopes between the carriageway and side drains/water tables as detailed in Standard Drawing R01.

All cut or fill road batters shall be stabilised following completion of earthworks to establish a uniform and permanent vegetation cover over the whole area. Council approval of the proposed stabilisation method is required at design stage.

Options for stabilisation include sowing of grass seed, hydro-seeding, mulching or benching with planting and grass seeding on the batter slopes.

Rural berms shall be topsoiled to the same standards as for urban berms.

3.3.12 **Traffic signs, marking, and road furniture** (additional to NZS 4404: 2010)

Roading design shall incorporate all road marking, road signs, edge markers, road name plates and other facilities appropriate to the road type and its position in the road hierarchy.

All traffic signs shall be specified and located in accordance with Part 1 of the NZTA Manual of Traffic Signs and Markings (MOTSAM), current at the time of construction.

All materials for signs shall comply with the "Standard for the Manufacture and Maintenance of Traffic Signs, Posts and Fittings" published by NZTA and the Road Safety Manufacturers Association. Further to this specification, no timber posts, plates or blades shall be used.

Road name plates shall be specified and located in accordance with Standard Drawings R33 and R34.

All pavement markings shall be specified and located in accordance with Part 2 of the NZTA Manual of Traffic Signs and Markings (MOTSAM), and in accordance with TNZ P/12.

Road marking paint shall comply with TNZ M/7: Road Marking Paints.

All above ground facilities other than essential items shall be located a minimum of 1.5 metres from the carriageway. All road furniture items shall be constructed as shown on the approved construction drawings.

Benchmarks shall be provided at no more than 1 kilometre centres on all roads as required by the District Plan.

Benchmarks shall be provided with levels in terms of New Zealand Vertical Datum 2016 (NZVD2016). The benchmark surveying shall be carried out by a Registered Surveyor and the integrity of the origin used shall be proven.

All urban, industrial and commercial accessways serving four or more lots shall have a road name plate erected with the street name and numbers of the properties contained in the accessway.

3.3.13 **Trees and landscaping** (additional to NZS 4404: 2010)

Trees shall be planted in all residential road reserves. A tree planting plan shall be provided with the design documentation. Selection of tree type, planting location and patterns, shall be undertaken by a suitably qualified person, in consultation with the Council Parks and Reserves Asset Manager, with due regard being given to maintenance requirements and to mitigate future damage to roadscape, utility services, and private property.

Provision shall be made for not less than one tree for each alternate lot frontage, on average. Trees shall be identified by scientific name and planted in locations in which topsoil has been locally deepened to not less than 450 mm deep by 450 mm diameter.

Consideration should also be given to the effect of a mature canopy on street lighting, daylight, access to buildings and footpaths, and property views.

3.3.14 **Road lighting** (additional to NZS 4404: 2010)

Road lighting is provided for traffic safety and public amenity value only. Council does not intend that roadway lighting be provided for security purposes, although there will obviously be some mutual benefit and lighting design for roads lit to AS/NZS 1158 LIGHTING FOR ROADS AND PUBLIC SPACES SET will take security into consideration, in line with the standard.

The Napier City Council Street Lighting Code of Practice is provided as a separate appendix to this Engineering Code of Practice. The current version of this document is dated November 2020.

Approvals for the Street Lighting are based on the process in Sections 2.10 and 2.11 of the Napier City Council Street Lighting Code of Practice. Designers shall provide full lighting design documentation for approval along with related traffic safety analysis following the process in Sections 2.10 and 2.11. Luminaries shall be provided that have at least a minimum ten years manufacturer's guarantee and shall be on the Auckland Transport (AT) approved luminaire list, Reference the NCC Street Lighting Code of Practice.

Street Light Columns installed in the road reserve must comply with the design performance standards and types as detailed in the NCC Street Lighting Code of Practice, with column types as per Auckland Transport (AT) approved column list.

Lighting categories shall conform to the Table 1 of the Napier City Council Street Lighting Code of Practice.

All Luminaires shall be equipped with a Nema socket and Light Control Unit to communicate with a **Future** Council central management system. Details to be supplied on request.

3.3.14.1 **Urban Roadway Lighting Design** (additional section to NZS 4404: 2010)

The lighting of urban roads shall 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.

Pedestrian crossings shall be evaluated in line with TRAFFIC REGULATIONS 1976 and TRAFFIC AMENDMENT REGULATIONS 1998. Should the crossing be used at night, lighting to AS/NZS 1158 LIGHTING FOR ROADS AND PUBLIC SPACES should be provided. Refer to section 1.6.8 of the Napier City Council Street Lighting Code of Practice for more information.

3.3.14.2 **Rural Roadway Lighting Design** (additional section to NZS 4404: 2010)

Lighting on rural roads is provided for vehicle safety in hazardous areas such as intersections. Rural road lighting shall comply in particular with Clauses 3.4 “Intersections, Junctions and other specified locations” and 3.5 “Isolated Intersections and junctions” of AS/NZS 1158 LIGHTING FOR ROADS AND PUBLIC SPACES SET, Part 1.1 – Vehicular traffic (Category V) lighting – Performance and design requirements.

Where an unlit road fitting Category V meets a road lit to Category V, full intersection lighting shall be provided. Where an unlit road fitting category P intersects a road lit to Category V, full intersection lighting is only required if there is channelization or a possible safety risk.

At unlit intersections full intersection lighting is only required if there are high traffic volumes or a possible safety risk. In other cases, strategically placed lighting (“flag lighting”) shall be used or the intersection shall be designed in such a way that lighting is not required (refer to Clause 3.5.2 (a) of the standard).

Where flag lighting is appropriate, a minimum of two fittings shall be used for those new roads intersecting with a Rural Arterial or Collector road. In this case one light on the opposite side of the main road, and one on the side road will be required.

3.3.14.3 **Suburban Development Considerations in Areas of Significance**

Lighting designs for areas that are in the central CBD and/or noted in the District Plan as having heritage, cultural or similar significance, shall be submitted to the City Strategy Team for comment prior to the Consent application being submitted.

Lighting designs for special features such as sculptures or memorials should take the effect on any surrounding traffic into consideration. In particular, designs for any special lighting abutting State Highways shall be submitted to New Zealand Transport Agency for approval.

3.3.15 **Bridges and culverts** (additional to NZS 4404: 2010)

This clause shall be read in conjunction with Part 4 (Stormwater) of NZS 4404: 2010, and Part 4 of this Code. In addition to those requirements the following shall apply:

(a) The minimum diameter of culverts under roads shall be 375 mm.
(b) On rural roads catchpits and other types of drop structure shall only be used where specifically required.
(c) All bridges shall be subject to specific design.
(d) All road bridges shall be designed for the appropriate Class 1 loadings regardless of the location in the road network.
(e) All bridges shall conform to the technical requirements of the New Zealand Transport Agency's Bridge Manual.
(f) The design life of all bridges and culverts shall be 100 years.

3.3.16 **Private way, private roads, and other private accesses** (additional to NZS 4404: 2010)

Reference shall be made to Section 3.1.1. for mandatory requirements and performance criteria.

Accesses onto all rural sites, and onto any urban site with access off an arterial road or state highway, must be provided with enough space to ensure that no reverse manoeuvring is necessary, onto or off the road.

Access to and from service stations shall be designed using the LTSA "Road Safety Guidelines for Service Stations" RTS 13, March 1996. The design of service station layouts shall be carried out by persons with recognisFed traffic engineering credentials.

The vehicle crossing (driveway) widths recommended by RTS 13 shall apply as the minimum requirements of this Code.

3.3.16.1 **Plan and gradient design** (additional to NZS 4404: 2010)

Non-public accessways include all roads and accessways that remain in private ownership after completion of any development other than a front allotment.

The standards described in this section apply to the length of accessway on private land. The length between the road carriageway to the road boundary is controlled by Section 3.3.17 of this Code. This Section includes controls on the location of vehicle crossings which, in turn, affect the location of accessways.

In all cases where the access is to be used or shared by more than a single allotment or dwelling unit, it shall be formed at the time of subdivision or land development. Where urban accessways could be damaged by the subsequent development of the allotments, Council may defer the requirement to complete the pavement construction for a specified period.

Minimum formed and legal widths and other relevant standards shall be as detailed in Table 5.

	Urban Residential DUs (*for infill only, ** for greenfields only)			Rural Residential DUs (*Kerb and channel provided)			Urban Commercial & Industrial Lots	
Number of DUs/Lots	1-2	3	4-6	1-2	3-6	7-20	1-2	3-6
Accessway width[1]	3.0m	3.6 m	4.5m	4 m	6.0 m	9 m	6.0 m	15 m
All weather surface	Full length	N/A	N/A	First 5m	Full length	Full length	NA	NA
Permanent surface	N/A	Full Length	Full Length	No	First 5m	First 5m	Full length	Full length
Edge control	No	Full Length	Full Length	No	No	No	Full length	Full length
Road lighting[2]	No	No	Recommended	No	No	No	No	Recommended
Drainage[3]	First 5m	Full Length	Full length	First 5m	Full length	Full length	Full length	Full length
Manoeuvring[4]	No	Yes	Yes	Yes	Yes	Yes	Refer Note 5	Refer Note 5

Notes:
1. Property developers should be aware that the New Zealand Fire Service Firefighting Water Supplies Code of Practice SNZ PAS 4509:2008 contains information and standards in relation to access and provision for storage of water for fire fighting purposes that differ from the District Plan and Code of Practice for Subdivision and Land Development. Accessway width is the minimum width available for use by vehicles. To determine the minimum legal access (boundary to boundary) width a minimum of 250 mm, shall be added to any side where kerbing is used, and where open side drains are used the actual width of the drain(s) shall be added.
2. Road lighting means lighting in accordance with AS/NZS 1158. Road lighting installed on private property may be transferred to Council ownership. If so the Developer will be required to pay to Council a capitalised 50-year life maintenance cost, and create easements in favour of Council to access and right to occupy. The capitalised cost will be calculated by the Team Leader Transportation and will be paid to Council prior to issuing the section 224 certificate.
3. Drainage includes all features required to intercept and control all run-off and discharge it into the nearest approved stormwater system in accordance with this Code. Further drainage may be required by the building consent approval.
4. Manoeuvring means the provision of a turning space sufficient to enable vehicles to turn around within the accessway with reasonable facility. n.b. For 1-2 lots, turning will be permitted within the lot, or right-of-way, for 4-6 lots, a specifically designed turning head must be included within the right-of-way. (Standard Drawing R31 refers).
5. No reverse manoeuvring permitted onto or off any road.
6. For Further Advice on Non-Public Access Minimum Requirements Refer to the District Plan

Table 5 Non-Public Access Minimum Requirements other than front Lots

In addition to Table requirements, the following geometric and drainage requirements shall apply:

(a) All changes in horizontal alignment shall be formed by use of circular curves.
(b) For all accessways other than commercial and industrial accessways, no curve radius shall be smaller than that required for the passage of a medium rigid truck as defined in RTS 18 New Zealand On-Road Tracking Curves published by Land Transport New Zealand.
(c) For commercial and industrial accessways, no curve radius shall be smaller than that required for the passage of a semi-trailer as defined in RTS 18, the New Zealand On-Road Tracking Curves published by Land Transport New Zealand.
(d) To ensure adequate manoeuvring space corner splays shall be provided at all corners other than road frontages. For industrial and commercial accessways corner splays shall be at least 5 metres x 5 metres and for residential and rural accessways corner splays shall be at least 3 metres x 3 metres.
(e) A turning head in the common area shall be provided at the end of all accessways serving four or more allotments or dwelling units and on all commercial and industrial accessways. Acceptable T & Y shaped turning heads are shown in Standard Drawing R31.
(f) For accessways serving up to 3 allotments or dwelling units, turning heads in the common area are not required where it can be shown that adequate turning area is available within each allotment, or within the private areas in the case of multi-unit development.
(g) Centreline grades shall be:
   - Not steeper than 1 in 5 except that grades of 1 in 4.5 may be used on straight lengths of accessway over distances of up to 20 metres. However, the first 6 metres of any access shall be not steeper than 1 in 8.
   - Not less than 1 in 400.
(h) Urban shared accessways and commercial and industrial accessways less than 4.5 metres wide shall be widened to at least 4.5 metres at 50 metre maximum intervals to

allow vehicles to pass. Rural accessways shall have passing bays at 100 metre maximum intervals with driver inter-visibility between adjacent bays.

3.3.16.2 Stormwater design

Stormwater design for private access shall consider the following:

(a) All accessways shall be shaped with suitable falls for adequate drainage.
(b) All urban shared accessways and all industrial and commercial accessways shall have edge control consisting of kerb and channel, dish drain or concrete nib which shall constrain and protect the pavement and provide for collection and disposal of stormwater run-off.
(c) Rural accessways shall have adequate width to accommodate side drains clear of each side of the carriageway.
(d) All urban and all commercial and industrial accessways shall drain to catchpits on the private side of the road boundary except that a catchpit is not required where a residential driveway slopes to the road and the catchment area does not exceed 60 m^2. With such direct discharge to the roadside channel the accessway shall be formed so that the run-off from a storm having a 10% probability of occurring annually will not cause any nuisance to any other property. This provision may also be used in the rural areas where the road is formed with kerb and channel and no other roadside drain exists.
(e) The size of any discharge pipe required shall be determined in accordance with the New Zealand Building Code document E1 Surface Water, using verification method E1/VM1 or E1/AS1. Where the discharge is less than or equal to that of a pipe with a nominal diameter of 150 mm (DN 150) pipe then this may be connected to the kerb from the catchpit, via one or two kerb connections as required. However, the kerb may not always be an approved outlet point.
(f) Where the discharge is equivalent to a DN 200 pipe or larger, or when the kerb is not the approved outlet point for a smaller discharge, then the pipe(s) shall be connected to an approved outlet other than the kerb. The discharges shall be equated to DN 150 at a grade of 1 in 120 and DN 200 at 1 in 180.
(g) Rural side drains may discharge directly to the road side drain and where accesses pass over stormwater drains they shall be provided with a culvert of size appropriate for the design flow of the drain but not less than DN 375.

3.3.16.3 Pavement design (additional to NZS 4404: 2010)

Shared accessway pavements shall have a minimum design life of 20 years with appropriate maintenance for the type of surfacing constructed.

Private roads shall be constructed to the same standard as public roads.

3.3.17 Crossings (additional to NZS 4404: 2010)

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.

Vehicle crossings shall be located so that:

(g) Adequate distance is maintained from road intersections
(h) Adequate pedestrian refuge is provided between crossings
(i) Safe sight distance is provided for the prevailing speed environment
(j) Minimum geometric standards are met
(k) Adequate width is available to safely accommodate the expected volume and type of vehicles
(l) 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.

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(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.

Each allotment shall be provided with a minimum of one vehicle crossing which shall be located, designed and constructed in accordance with this Code.

For access to land with an urban zoning, subject to the speed limit being 70 kilometres per hour or less, additional vehicle crossings may be permitted for road frontage lengths as follows:

(a) A property having a road frontage greater than 15 metres may have two vehicle crossings.
(b) A property with a road frontage greater than 60 metres may have three vehicle crossings.
(c) For each 30 metres of frontage in excess of 60 metres an additional vehicle crossing may be installed.

For access to land within a rural zone, or land within an urban zone and a speed limit above 70 kilometres per hour, each additional vehicle crossing shall be subject to the written approval of the Works Asset Manager.

Vehicle crossing(s) shall also be provided in accordance with this Code where any land development is undertaken and any vehicles are being taken, or are likely to be taken, onto the land from a public road.

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

All vehicle crossings on Napier City Council roads shall be located, designed and constructed to comply with this Code.

All vehicle crossings to land within a non-rural zone shall be constructed of concrete. Concrete vehicle crossings shall be laid on a bound AP40 basecourse layer and shall be compacted to achieve a minimum Clegg hammer reading of 25 on the 4th drop. Any concrete vehicle crossing shall have expansion / contraction joints positioned as required to protect the integrity of the crossing.

All redundant vehicle crossings shall be removed when land development is carried out.

3.3.17.1 **Urban Vehicle Crossings** (additional to NZS 4404: 2010)

Crossings shall be provided between the kerb line or carriageway edge and the road boundary at the entrance to all private-ways and service lanes and to any lots, front or rear where access points are clearly identifiable at the subdivision stage. The number of crossings shall be in sufficient detail to allow an assessment of compliance with the district plan, and the standard detailed in Table 6 below.

Type	Existing Road Standard	Crossing Standard Required
A	Roads formed to Code standards	Concrete crossing from kerb to boundary. Refer to Standard Drawings R03 to R07
B	Roads partly formed to Code standards with grass berm between kerb and seal edge.	Concrete crossing from kerb to boundary. Tightly bound all weather surface between kerb and seal edge. Permanent surfacing required for all crossings
C	Roads without kerb and channel	Tightly bound all weather surface with permanent surface. Open drains piped or traversed as for rural crossings.
D	Roads formed to A or B above but with high kerbs and/or steep crossfalls causing vehicle overhang problems.	As for A or B above as appropriate but with chequer plate crossing. Specific approval of the Road Asset Manager required. Refer to Standard Drawing R08

Table 6 Urban Vehicle Crossing Standards

The location of a vehicle access from a State Highway requires approval from New Zealand Transport Agency.

All crossings shall be designed to relevant traffic loading and slip resistance standards, and as detailed in the Standard Drawings R05 to R08.

Vehicle crossings shall be constructed at 90 degrees to the road centreline wherever practical. Crossing angles less than 70 degrees will only be approved in exceptional circumstances.

The visibility requirements for all vehicle crossings shall be in accordance with the Land Transport Safety Authority publication 'RTS 6 "Guidelines for Visibility at Driveways".

Areas with high pedestrian flows and more than 200 expected daily vehicle access manoeuvres should provide a 'visibility splay' in accordance with New Zealand Transport Agency's "Pedestrian planning and design guide Oct 2009". Below this threshold a 'visibility splay' should be provided on each side of the access. This area shall be kept clear of visibility obstructions, with planting below 500mm high, and shall measure 1.0m along the back of footpath and 2.5m along the access into the property. Residential developments of three or less dwelling units with access onto a Local Road are exempt from this requirement.

The vehicular driveway profile shall be designed to prevent vehicles from scraping. Maximum allowable limits and vertical transitions must comply with council's Standard Drawing R09.

Pram and wheelchair crossings shall be provided at all road intersections as detailed in Standard Drawing R15.

3.3.17.1.1. Location of Urban Vehicle Crossings (additional section to NZS 4404: 2010)

Refer to Standard Drawing R26.

For single dwelling accesses, no crossing shall be located:

(a) On corners of local roads: closer than 7 metres to the intersection of the street boundary lines.
(b) On corners of collector, principal and arterial roads: closer than 15 metres to the intersection of the street boundary lines or in conflict with any traffic control devices.

For multi-unit developments with 2 or more dwellings, no crossing shall be located:

(a) Opposite the corner on local roads, closer than 7 metres to the intersection of the street boundary lines.
(b) Opposite the corners of collector, principal and arterial roads, closer than 15 metres to the intersection of the street boundary lines.

For any development, no crossing shall be located:

(a) Within the kerb radius at intersections.
(b) Over any drainage catchpit.
(c) Within 3.0 metres of trees.
(d) In conflict with any other public infrastructure and street elements.
(e) Where the visibility requirements contained in the Land Transport Safety Authority publication RTS 6 "Guidelines for Visibility at Driveways", May 1993 cannot be achieved.

Where the proposed vehicle crossing is in conflict with an existing drainage structure and/or other utility authority structures in the street, the applicant must bear all costs associated with adjusting such structures, provided the relevant authority has given approval.

3.3.17.1.2. **Width of Urban Vehicle Crossings** (additional section to NZS 4404: 2010)

Vehicle crossing is to be sized and located to maximise the retention of on street parking. Maximum size is dependent on providing at least 6 metres separation between wings, at the kerb, to an adjoining vehicle crossing. Minimum widths will apply in areas with high on street parking demands, and where on street time restrictions are in place.

The following widths shall apply:

(a) The maximum width of residential vehicle crossing at the boundary and at the kerb line, not including splays, shall be 6 metres. The minimum width of the crossing at the boundary shall be 3.0 metres.
(b) Where two residential vehicle crossings are combined the maximum total width at the boundary and at the kerb line, not including splays, shall be 9 metres.
(c) The maximum width of commercial vehicle crossings at the boundary and at the kerb line, not including splays, shall be 6 metres. The minimum width of the crossing at the boundary shall be 3.5 metres.
(d) The maximum width of industrial vehicle crossings at the boundary and at the kerb line, not including splays, shall be 9 metres. The minimum width of the crossing at the boundary shall be 3.5 metres.

Council may approve wider vehicle crossings where special circumstances exist.

3.3.17.1.3. **Pedestrian Safety Refuges** (additional section to NZS 4404: 2010)

To provide a safe refuge on footpaths, for pedestrians, and the users of wheelchairs or mobility scooters, the minimum distance between any 2 crossings (including splays), shall be 2 metres.

3.3.17.2 **Rural Crossings** (additional to NZS 4404: 2010)

New Zealand Transport Agency is the road controlling authority for State Highway 2, State Highway 5 and State Highway 50 within the Napier City Council boundaries and retains control of the location, design and construction standards of crossing places and road intersections within those state highways.

Vehicle crossings shall be provided between the sealed road edge and the road boundary at a defined and formed access point to every rural lot.

Any vehicle access from a State Highway requires specific approval from New Zealand Transport Agency (NZTA).

State Highway vehicle crossing standards are contained in the New Zealand Transport Agency Planning Policy Manual, and as far as practical this Code is consistent with the manual current at the time of preparation. NZTA's policies are modified from time to time and shall take precedence over this Code.

NZTA's standards differ from this Code in several respects. In particular, NZTA applies the concept of "effective car movements" to determine the appropriate crossing detail while Napier City Council applies standards according to the land use the crossing is intended to serve.

3.3.17.2.1. **Rural Vehicle Crossing Standards** (additional section to NZS 4404: 2010)

The locations, widths, grades and other details such as culverts, headwalls, tapers and widening shall be designed according to Standard Drawings R10 to R13, and the latest versions of the following design guides published by the Land Transport Safety Authority:

- RTS 6 "Guidelines for Visibility at Driveways"
- RTS 3, "Guidelines for Establishing Rural Selling Places"

All crossings shall be formed with a permanent surface appropriate for the intended use.

Vehicle crossings shall be constructed at 90 degrees to the road centreline wherever practical. Crossing angles less than 70 degrees will only be approved in exceptional circumstances.

Where an accessway then turns, a minimum 8-metre-long straight shall be provided from the edge of the carriageway.

The gradient of entrances shall not be steeper than +5% or –5% over the distance from the carriageway to the boundary and shall have adequate crossfall to prevent water flowing onto the road.

Culvert diameter shall be such that the capacity of the drain is not reduced. No culvert shall have an internal diameter of less than 375 mm. The culvert diameter must be approved by the relevant drainage authority.

The approval of the Hawke's Bay Regional Council is required for all culverts crossing HBRC drains. It shall be the developer's responsibility to determine if the drain is part of the Regional Council's drainage network.

Headwalls shall be provided at all culvert inlets and outlets, using concrete headwall, or bevelled pipe headwalls as per Standard Drawing R51.

In low-speed environments, headwalls may be constructed with in-situ concrete, or ground-treated timber with timber or steel piles. For walls less than 1 metre high, rock and concrete mortar or bagged lean-mix concrete may be used and sloped back at 3:1. Road Asset approval is required to install these alternative headwalls.

For each use of a culvert headwall on a rural road, a site-specific risk assessment shall be undertaken, to determine if the headwall meets current safety requirements. Where protection is necessary, traversable and mountable grates for precast headwalls shall be used in accordance with TNZ technical memorandum NO. TM 4006, to mitigate the hazards.

3.3.17.2.2. **Application of Rural Crossing Standards** (additional section to NZS 4404: 2010)

The standards described in Standard Drawings R10 to R13, and the RTS guidelines are applied in accordance with the hierarchy and speed environment of the road and the type and volume of vehicles using the crossing. For all Napier City Council roads, the type and volume of vehicles are determined by the land use.

Table 7 sets out the type of crossing (with reference to the associated Standard Drawing), which shall be used for various land uses, road hierarchies, and speed environments.

Conditions A or B detailed below, determine which sight-line scenarios must be adopted.

Crossing Classification	Road Classification				
	Minor Local	Major Local	Collector	Arterial and Principal	State Highway[6]
Low Volume Residential (1 to 4 dwellings)	R10 (Condition A)	R10 (Condition A)	R10 (Condition A)	R10 (Condition B)	R10 [<10,000 vpd] R12 [>10,000 vpd] (Condition B)
Low Volume Residential (5 to 6 Dwellings and low-volume commercial)[2]	R10 (Condition A)	R10 (Condition A)	R11 (Condition A)	R11 (Condition B)	R12 [<10,000 vpd] R13 [>10,000 vpd] (Condition B)
Low Volume with Heavy Vehicles[3]	R10 (Condition A)	R11 (Condition A)	R12 (Condition A)	R12 (Condition B)	R12 (Condition B)
High Volume[4]	R10 (Condition A)	R11[5] R12 (Condition A)	R12[5] R13 (Condition B)	R12[5] R13 (Condition B)	R13 (Condition B)
Condition A	RTS 6 CA & BD sight lines required		**Condition B**	RTS 6 CA & BD, CE & DE sight lines required	

Notes:
1. NZTA determines crossing requirements according to the number of effective car movements (ECMs) e.g. one truck movement may equal three car movements. The method of calculating ECMs must be obtained from NZTA.
2. Low volume commercial crossings serve agricultural, commercial and other non-residential activities generating less than 60 light vehicle movements per day.
3. Low volumes of heavy vehicles such as dairy collection.
4. High volume crossings serve commercial premises such as roadside stalls, wineries and fruit packing operations, and non-commercial activities generating more than 60 light vehicle movements per day.
5. The higher standard shall generally apply where the speed environment (the 85th percentile speed) is greater than the posted speed limit. Some flexibility is required because of the variable nature of rural collector and arterial roads. Independent traffic engineering opinion may be required in cases where there is doubt about the appropriate configuration to employ.
6. The rural crossings listed under State Highway are for guidance only. Confirmation of which type of rural crossing to be used is required from NZTA.

Table 7 Vehicle Crossing Classifications

3.3.18 **Fencing** (additional to NZS 4404: 2010)

Appropriate fencing shall be provided on all road boundaries in rural environments. Boundary fences shall be constructed to satisfy the minimum standards described in the second schedule of the Fencing Act or to an alternative standard described in a written agreement with the adjacent landowner.

Road boundary fences shall be located on the legal road boundary. Subject to the minimum legal road widths in Table 4, road boundaries shall be determined with practical fence alignments in mind. The relevant road controlling authority shall be consulted where the maintenance of batters and drainage facilities may be affected by the boundary fence alignment.

3.3.19 Road run-off

3.3.19.1 **Integration of road run-off with development stormwater system** (consistent with NZS 4404: 2010)

The design of roads within developments and subdivisions, shall recognise the various components of roading infrastructure including drainage facilities such as kerbs, channels, catchpits, catchpit leads and culverts, and the subsequent effects on stormwater capacity.

New roads planning needs to integrate the control of stormwater peak flows and pollutant removal, to minimise negative downstream effects, and to mitigate any road instability and erosion risks.

3.3.19.2 **Design** (consistent with NZS 4404: 2010)

Stormwater run-off design is addressed within Section 4.

3.3.19.3 **Subsurface drains** (additional to NZS 4404: 2010)

Piped subsurface drainage shall be provided in high water table areas to protect road formations from deterioration or loss of strength.

Where considered necessary, piped subsurface drainage shall be provided on the upslope side of roads in hill areas and on the downslope side where the downslope side is in cut.

Subsoil drainage shall be provided in all medians/traffic islands, etc where surface treatment other than concrete has been provided.

All piped subsurface drains shall discharge by gravity into catchpits or manholes of the public stormwater drainage system.

Subsurface drains shall be subject to specific design. Typical subsurface drain details are shown on Standard Drawing R19.

3.3.19.4 **Side drains / water tables** (additional to NZS 4404: 2010)

All rural roads shall have feather edges and berms sloped at 5 horizontal to 1 vertical leading to side drains or water tables of sufficient depth to ensure drainage of the road subgrade on both sides of the carriageway.

To minimise earthworks in major cuts side drains may be replaced by suitable deep subsoil drains. Side drains may also be omitted where the carriageway is on an embankment above land without available channelled drains. In such cases the road may be designed so as to provide for sheet runoff to the adjacent land surface, providing the natural pre-existing drainage patterns are not altered. Where side drains are required they shall be sized to suit the flows discharging to them. Side drains shall be intercepted at regular intervals and discharged to the nearest available watercourse, gully or natural drainage path. All discharge points shall have outlets protected from scour and shall be located to minimise the risk of slope instability.

Such discharges shall be subject to the approval of affected property owners and be shown to be neither diverting catchments or significantly changing peak flows or flow patterns.

3.3.19.5 **Swales** (consistent with NZS 4404: 2010)

Swales shall be introduced wherever appropriate, to allow for infiltration to reduce peak discharge flows and to provide stormwater treatment.

Where swales are used, they shall be designed by a suitably qualified person.

3.3.19.6 **Kerbs and channels**

3.3.19.6.1. **Concrete Kerbs and Channels** (additional to NZS 4404: 2010)

Concrete kerbs and channels shall be provided on both sides of all urban carriageways. Rural cul-de-sac heads shall have kerb and channel or flush nib to protect the seal edge. Dimensions shall comply with Standard Drawing R17 and gradients shall not be flatter than 1 in 400. Vertical faced kerbs shall be constructed in all arterial, principal and collector roads and all traffic islands. Mountable kerbs may be constructed in roads classified below that of collector status.

Where widths and crossfall are such that stormwater control is required on one side only of the carriageway, the channel may be replaced by a nib or kerb on the higher side (refer Standard Drawing R17 to R18). Special provision for roof water drainage shall be made.

In cases where roof stormwater is to discharge into vertical faced kerbs, standard kerb adaptors shall be installed for a connection (see Standard Drawing D15 to D16). Where mountable kerb and channel is used, or where the site is below kerb level, a direct connection to the public stormwater drainage system shall be provided

3.3.19.6.2. **Dished Channels** (new section to NZS 4404: 2010)

Dished channels complying with Standard Drawing R18 may be used where specifically approved by Council. Examples of possible uses include:

(a) Dished channels in carriageways and parking bays (including bus bays), where it is not possible to provide for the parking bay camber to be a continuation of the road crossfall.
(b) On footpaths or accessways.

Where the contour of the finished ground level is such that a low level footpath is the only practical option, a channel shall be provided. This shall follow the same gradient as the footpath. Catchpits shall be constructed to collect the surface water. Where a significant amount of surface water will be concentrated and adjacent to a footpath in a pedestrian accessway, it shall be collected by a dished channel and disposed of through a catchpit.

In other situations, where a lined side drain is required for grade control or because of limited berm width, a precast or in-situ concrete channel of appropriate capacity and profile shall be used.

The capacity of the dish channel on all sections shall be determined to meet the stormwater discharge.

A 300 mm wide dish channel may be used in car parks with smaller catchment areas.

3.3.19.7 **Catchpits** (additional to NZS 4404: 2010)

All catchpits that will become Council assets shall:

(a) Connect into access chambers, except when connecting into pipes which are three times the diameter of the connection or larger, with access chambers within 40 metres, in which cases soffit to soffit connection using a saddle or prefabricated junction may be acceptable.
(b) Discharge into an open watercourse where no piped stormwater system is available.
(c) Comply with typical catchpit details as shown in Standard Drawings R39 to R49.

Catchpits and leads in private property or private ways will not generally be taken over by the Council. However, catchpits in private property shall satisfy the requirements of the Building Act whilst also satisfying the total stormwater design needs of the subdivision.

3.3.19.7.1. **Catchpit location** (additional to NZS 4404: 2010)

Catchpits shall be located in private or public property as necessary, and provided at spacings to cope with design rainfall intensities, at all low points, at all intersections, and at any other locations required to stop ponding, and adequately allow entry of the total design flows to enter the main stormwater drainage system.

For systems designed to carry low frequency events (ie. large flows) catchpit spacings may need to be significantly closer than the minimum number noted hereafter. Catchpit spacings for all roads shall recognise the requirement of the road having no surcharge above the catchpit grate in the event of a storm having a 10% probability of occurring annually.

Catchpits shall be located at a maximum spacing of:

- 90 metres when collecting surface runoff from single lanes (4.0 metres wide).
- 60 metres where collecting stormwater over two or more lanes, or on any roads where the adjacent properties discharge stormwater to the street kerb and channel.

Catchpits shall:

- Be provided as double catchpits where channel slopes are steeper than 1 in 20 or at the lowest point of sag in a vertical curve where the distance of catchment exceeds 90 metres.
- Be required at all points in a channel where a change in gradient is liable to result in ponding due to changes in flow, velocity changes, or on bends where there may be a tendency for water to leave the kerb and channel.
- Be sited at the kerb line tangent points or low points clear of pram crossings at intersections, to ensure minimal flows occur across the pram crossing.
- With the exception of cul-de-sac heads, catchpits shall generally be located close to section boundaries, where practicable, and clear of potential accessways or vehicle crossings.
- Not normally be constructed in rural areas other than in kerb or concrete channel situations.

3.3.19.7.2. **Catchpit design** (additional to NZS 4404: 2010)

For design purposes the intake capacity of a road catchpit with grating and rear entry and acceptable ponding at inlet is 28 litres/s.

3.3.19.7.3. **Catchpit gratings** (additional to NZS 4404: 2010)

All new catchpits shall incorporate cycle-friendly gratings, as detailed on Standard Drawings R39 to R46, using rectangular barrels for outlets perpendicular to the kerb, and round barrels where the outlet is oblique to the kerb.

3.3.19.7.4. **Catchpit leads** (consistent with NZS 4404: 2010)

Catchpits shall discharge via catchpit leads of minimum DN200 for a single catchpit and DN 300 for a double catchpit.

Where the hydraulic gradient of a catchpit lead is affected by pipe full conditions in the main drain or drowned outlets, specific design calculations to determine catchpit lead sizes will be required.

3.3.19.7.5. **Secondary flow provisions** (additional to NZS 4404: 2010)

The second level of stormwater protection involves an evaluation of what would happen under major storm flows. It entails providing for such an event in a manner to avoid major hazard or property damage.

Design of secondary flow paths shall include an assessment of the potential for damage in flood conditions.

(a) Secondary flow paths should where possible be provided over public facilities such as parks, roads, paths, and drainage reserves.
(b) Stormwater runoff from all developed areas and driveways shall be collected and drained in accordance with the Building Act so that no nuisance is created.
(c) Any secondary flow path that is recognised as taking excess flow shall be protected by easement where it is not included in (a) above.
(d) Natural flow channels that are used for the discharge of primary and/or secondary flows shall be protected by easement to ensure that they are not built on or disturbed in a manner that might create a nuisance should water become diverted. See Section 1.7.4 for easement requirements.
(e) Buildings shall be located to preserve the secondary flow path and designed with adequate freeboard.
(f) Where grades are likely to induce erosion, protection measures shall be incorporated in the design.
(g) Flow paths shall not be restricted by structures such as fences or hedges.

3.4 Construction

3.4.1 **Introduction** (additional to NZS 4404: 2010)

Roads shall be constructed to the alignment, levels and standards detailed in the approved drawings and specifications using the specified materials to achieve the intended design life.

This work may include the following:

- Traffic pavements.
- Pedestrian pavements including footpaths, accessways, steps and ramps.
- Cycleways.
- Drainage facilities including kerbs, channels, catchpits, catchpit leads and culverts.
- Bridges.
- Street lighting.
- Traffic services including signs, road name plates, pavement markings, traffic aids and safety barriers.
- Street furniture and amenities including landscaping and tree planting.

3.4.2 **Materials for flexible pavements** (additional to NZS 4404: 2010)

All appropriate material testing shall be carried out by testing laboratories with recognised registration or quality assurance qualifications.

3.4.2.1 **Transition layer** (consistent with and additional to NZS 4404: 2010)

Any required transition layer shall be included in the approved pavement design. A transition layer may be required for traffic loading in excess of 1 x 105 ESA where the subgrade is soft. The transition layer material may be a filter aggregate complying with TNZ F/2 or an approved geotextile filter fabric.

3.4.2.2 **Sub-base** (replaces NZS 4404: 2010 section)

A variety of materials may provide satisfactory performance in the subbase layer providing the pavement layer depths are designed accordingly. The pavement design shall specify the subbase material to be used and provide soaked CBR test results confirming that the material is compatible with the design. The aggregate shall have a minimum crushing resistance of 100 KN when tested in accordance with NZS 4407: 1991 Test 3.10, and shall produce a minimum CBR of 40 when tested in accordance with NZS 4407:1991 Test 3.15 after compaction.

The minimum subbase aggregate requirements are that the material shall be able to be constructed in accordance with TNZ B/2 including compaction standards and surface shape tolerances. The maximum particle size shall be the lesser of 80 mm or 40% of the layer depth in accordance with B/2.

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

The TNZ M/3 “Notes on Subbase Aggregate” is useful in specifying subbase aggregates.

3.4.2.3 **Basecourse** (additional to NZS 4404: 2010)

Basecourse aggregate shall comply with TNZ M/4.

The basecourse layer shall be constructed in accordance with TNZ B/2. Council inspection of this layer will be carried out jointly with the Construction Co-ordinator.

Refer to Table 5 in the M/4 specification for details of the “Napier River Gravel” regional variant.

3.4.3 **Road surfacing** (additional to NZS 4404: 2010)

All roads both urban and rural shall be surfaced with an impermeable surfacing. Suitable options include:

(a) Hot laid asphaltic concrete of minimum thickness 25 mm.
(b) Chip seals.
(c) Interlocking.

Council inspection of the basecourse is required prior to the construction of the surfacing. Pavement deflections shall be satisfactory prior to this inspection.

3.4.3.1 **Acceptable surfacing materials** (additional to NZS 4404: 2010)

Acceptable road surfacing materials shall comply with the following:

(a) Asphaltic Bitumen shall comply with TNZ M/1.
(b) Sealing Chip shall comply with TNZ M/6.
(c) Asphaltic Concrete shall comply with TNZ M/10.
(d) AS/NZS 4455: Masonry Units, Pavers, flags and segmental retaining wall units.

3.4.4 Road surfacing materials

3.4.4.1 **1st and 2nd coat chip seals** (additional to NZS 4404: 2010)

All first coat chip seals shall be either a double-coat wet lock seal, or racked–in seal, except that racked-in seals may not be used in commercial or industrial cul-de-sacs, or in other areas where manoeuvring of heavy vehicles can be expected.

Seals shall be carried out in accordance with TNZ P/3.

The sealing chip sizes shall be grades 4 and 6 on urban roads below arterial status, and grades 3 and 5 on arterial and above urban roads, and on all rural roads.

All binder compositions and binder and sealing chip application rates shall be determined in accordance with the relevant specifications and guidelines.

3.4.4.2 **Double wet lock coat** (as per NZS 4404: 2010)

3.4.4.3 **Hot laid asphaltic concrete surfacing** (additional to NZS 4404: 2010)

Cul-de-sacs, residential roads, service lanes, industrial / commercial roads, and rights-of-way, may be surfaced with a minimum compacted thickness 25 mm of asphaltic concrete, complying with the TNZ Specification M/10.

A waterproofing prime coat or first coat seal shall be constructed prior to the laying of all asphaltic concrete surfacings of 40 mm or less thickness. The seal coat shall consist of a minimum residual binder application of 1.0 litres per m^2 of penetration grade bitumen and the minimum chip size shall be grade 5. No cut back shall be used in such seal coats.

All asphaltic concrete construction shall be carried out in accordance with TNZ P/9.

3.4.4.4 **Concrete** (additional to NZS 4404: 2010)

All concrete shall be ready mix concrete supplied from an approved ready mix plant and conform with NZS 3109. Extruded and in-situ kerb and channel and dish channels, catchpits, footpaths, residential crossings and commercial / industrial crossings shall have a minimum 28-day compressive strength of 20 MPa.

3.4.4.5 **Concrete pavers** (additional to NZS 4404: 2010)

Concrete block paver construction shall be carried out in accordance with NZS 3116 “Concrete Segmental and Flagstone Paving”.

Concrete paver block surfacings are classified as thin surfacings. In designing pavements with concrete paver surfacings no residual strength may be assumed from the paver blocks themselves. Further to this, the pavement design shall also recognise the lower standard of surface waterproofing typical of paver block surfacings.

3.4.4.6 **Surfacing of industrial and commercial roads** (additional section to NZS 4404: 2010)

Surfacing of industrial/commercial roads and cul-de-sacs, where manoeuvring of heavy vehicles can be expected shall utilize asphaltic concrete specifically designed of minimum compacted thickness 40 mm.

3.4.5 **Subgrade checking** (additional to NZS 4404: 2010)

The subgrade materials shall be checked for conformance with the assumptions made during the Geotechnical Investigation as soon as they are exposed during the earthworks and, if necessary, the materials shall be re-tested.

Where the soaked CBR results differ from the initial testing or assumpitons then a design review shall be carried out. The design review and any adjustments to the pavement design shall be approved by Council before road pavement construction commences.

Where there is any remaining variability in the subgrade the pavement design shall be based on the subgrade material with the lowest soaked CBR value.

Subgrade surface finishing shall be in accordance with TNZ F/1.

3.4.6 **Spreading and compaction of metal course aggregates** (as per NZS 4404: 2010)

3.4.7 **Sub-base** (additional to NZS 4404: 2010)

Council inspection of the subgrade is required prior to the commencement of pavement construction. Inspection requirements may include proof rolling at an appropriate loading and confirmation that the subgrade surface is within the specified tolerances for line and level.

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

The subbase layer shall be constructed in accordance with TNZ B/2.

3.4.8 **Basecourse** (additional to NZS 4404: 2010)

The basecourse layer shall be constructed in accordance with TNZ B/2. Council inspection of this layer will be carried out jointly with the Construction Co-ordinator

3.4.9 **Maintenance of basecourse** (as per NZS 4404: 2010)

3.4.10 **Basecourse preparation for surfacing** (as per NZS 4404: 2010)

3.4.11 **Deflection testing prior to surfacing** (in addition to NZS 4404: 2010)

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.

3.4.12 **Surfacing specification** (consistent with NZS 4404: 2010)

(a) TNZ P/3: First Coat Sealing
(b) TNZ P/4: Resealing (and second coat sealing)
(c) TNZ P/9: Construction of Asphaltic Concrete Paving

3.4.13 **Bitumen application rate** (as per NZS 4404: 2010)

3.4.14 Footpath and cycle paths

3.4.14.1 **Concrete** (additional to NZS 4404: 2010)

Concrete footpaths shall be constructed on stable platforms on which no further consolidation or movement shall occur. Any organic or unsuitable material shall be removed and replaced with suitable subgrade fill. The whole formation shall be thoroughly compacted and trimmed to the line and levels shown on the drawings, and conform to Part 2, Earthworks of this Code.

The concrete shall be laid on a bound AP40 basecourse layer with a minimum thickness of 100mm. The basecourse shall be compacted to achieve a minimum Clegg hammer reading of 25 on the 4th drop and be trimmed to an even crossfall of 1:50. Council inspection of the basecourse is required prior to the placing of concrete.

Any porous areas shall be blinded with sand and if the foundation is dry it shall be moistened in advance of placing concrete.

100 mm thick concrete paths shall be laid with construction joints at 3 metre centres. If paths are constructed by continuous placement techniques, the joints shall be cut by means of concrete cutting saw at 3 metre intervals to facilitate controlled cracking. The cutting shall be carried out within 48 hours and shall be to a depth of 40 mm. The paths shall be finished with an even, non-skid, brush surface free of holes or protrusions to at least U5 standard in terms of NZS 3114. The surface of paths shall not deviate by more than 6mm from a 3m straight-edge at any point, and must not pond water. Concrete in footpaths shall be cured for at least 7 days during dry weather.

Where required, vehicle and pram crossings shall be constructed in accordance with the Standard Drawings.

All pram crossings on public footpaths are to have tactile pavers installed to cater for vision-impaired pedestrians in accordance with RTS14.

3.4.15 **Kerb and channel** (additional to NZS 4404: 2010)

Kerb and channel and dish channel may be either boxed or extruded and shall be in terms of Standard Drawings R17 and R18. The concrete shall be laid on a 200 mm minimum AP65 subbase layer, and constructed in accordance with TNZ B/2.

Concrete used in kerbs and channels shall be of least 20 MPa, 28-day strength.

The subbase shall be compacted to achieve a minimum Clegg hammer reading of 35 on the 4th drop, and 95% of the maximum density determined by NZS 4402, test 4.1.2. Council inspection of the subbase is required prior to the placing of any concrete.

For boxed channels, formwork shall be clean dressed timber or steel sections adequately oiled or otherwise treated to allow ease of striking without staining or damaging of the stripped concrete surface.

For extruded channels, concrete shall be of such consistency that after extrusion it will maintain the kerb shape without support. The extrusion machine shall be operated to produce a well compacted mass of concrete free from surface pitting.

Construction joints shall be saw cut in all unreinforced kerb and channel at maximum 6 metre centres. Where footpath adjoins kerb, control joints shall coincide with every footpath joint. The concrete in the channels shall be cured for at least 7 days during dry weather.

Where required, vehicle and pram crossings shall be constructed in accordance with the Standard Drawings.

3.4.16 **Berms and landscaping** (additional to NZS 4404: 2010)

Berms shall be formed after all other works have been completed. The berm shall have a minimum topsoil depth of 100mm. The topsoil shall be of good quality, free from weeds, stones, and other foreign matter, and shall be graded to footpath edge and with a finished level 15 mm above the footpath level, to allow for settlement. The cross-fall shall generally be 1 in 25 (4%). After top soiling, the berm shall be sown with a bird repellent coated grass seed mixture of the following proportions:

- 50% Turftype Winter Active Perennial
- 15% Chewing Fescue
- 15% Creeping Red Fescue
- 18% Tall Fescue
- 2% Brown Top

The sowing rate shall be a minimum of 40 grams per square metre.

Berms shall be sown, maintained, mown, be substantially free of weeds, and achieve 90% grass strike prior to either:

(a) The issue of the Defects Liability Certificate.
(b) The time at which Council takes over the development.

Trees shall be planted in accordance with the approved landscape drawings and staked and tied to neatly cut timber stakes capable of providing support to the tree for at least three years. Root directors may be required to be installed with trees adjacent to underground services. For root director installation details, refer to Standard Drawing L01 and L02.

3.4.17 **Surface finish and tolerance on kerbs, paths, and accessways** (as per NZS 4404: 2010)

3.4.18 **Progress inspections** (as per NZS 4404: 2010)

3.4.19 **Installation of traffic services, road furniture, benchmarks** (additional to NZS 4404: 2010)

3.4.19.1 **Benchmark integrity and required information** (additional section to NZS 4404: 2010)

Survey and level marks shall be permanent, and readily accessible.

They shall be installed, surveyed and levelled in accordance with appropriate standards, and achieve the following minimum criteria:

(a) Be constructed of weather resistant non-ferrous metal and be permanently affixed to concrete kerbs (surface to surface gluing is not acceptable).
(b) Have a clearly evident protrusion which shall be the point levelled.
(c) Be located at distances of not more than 1000 metres apart on any road, but all roads shall have at least one marker point.
(d) Have their position co-ordinated, and be precisely levelled to an accuracy of ±0.005 m.
(e) Be located to be clear of likely driveway positions and to minimise risk to pedestrian and cycle traffic.

The following information shall be provided if the proposed subdivision/land development results in the formation of any new urban road is to be vested in Council.

Levelling Sheet

Legible level sheets with the following information shall be provided in either hard copy or digital format;

- Date of survey
- Level Origin
- Proof of double run levelling
- Observations made to a minimum of two existing benchmarks.

- Any mis-closes and subsequent adjustments in the reduced levels shall be highlighted.
- Names and/or codes of new and existing marks observed
- Name, type, serial numbers and calibration expiry dates of survey instrument used
- Type of levelling staff used
- Weather conditions at time of survey including temperature
- Name of surveyor who undertook the survey
- Name and signature of licensed cadastral surveyor responsible for the survey

Levelling Origin

The origin of any levelling run shall be benchmarks whose orthometric height calculation date is no older than January 2014, and have a vertical accuracy of no less than 3rd order (3V) as per Land Information New Zealand (LINZ) specifications.

If the proposed subdivision / land development is staged development, then at each stage, new marks shall be levelled back to 1st, 2nd , or 3rd order vertical benchmarks whose orthometric height calculation date is no older than January 2014. This practice is to ensure that the vertical accuracy of new marks is not progressively declining.

Mark Attribute File

In addition to the levelling sheet a spreadsheet shall be supplied providing all attributes of any marks observed to including the following information. A template for the required information below is provided in Appendix B7. This spread sheet can be submitted in hard copy or digital formats.

- Existing or new mark name and code (Napier City Council Sufi #, Land Information New Zealand code/name, Land on line code/name)
- Existing or new mark horizontal and vertical order
- Hawke's Bay Transverse Mercator co-ordinates if available
- Mark level (orthometric height) as stated in levelling sheet
- Supporting plan numbers for existing marks if available
- Historical level if applicable (where a historical level is proven incorrect)
- Mark Type (Bronze plaque, old iron spike etc.)
- Date of survey
- Positional description
- Lot and DP number mark is adjacent to
- Name, code, vertical order and published height for Level Origin

Protection of Survey Marks

It is an offence to knowingly destroy any survey mark. Survey marks to be protected are outlined in the Land Information New Zealand (LINZ) "Specification for the Protection of Survey Marks". This document is available from LINZ and is also available as a download from:- http://www.linz.govt.nz/geodetic/geodetic-programme

Any survey marks at risk, protected as per the LINZ "Specification for the Protection of Survey Marks", shall be dealt with in accordance with LINZ specifications.

In addition to the LINZ "Specification for the Protection of Survey Marks" the developer shall be responsible for any survey mark with a LINZ order 1V – 4V (1st – 4th order vertical) identified as being at risk due to any proposed works within the survey mark's vicinity, within private or public parcels.

The developer must employ the services of a licensed cadastral surveyor to offset the survey mark before it is disturbed and when appropriate re-instate or replace it once works are completed.

The offset, re-instated or new survey mark shall be installed to the same standards and accuracy as its predecessor and with levelling sheet and mark attribute file as specified in F2.12.4.1, submitted to Napier City Council.

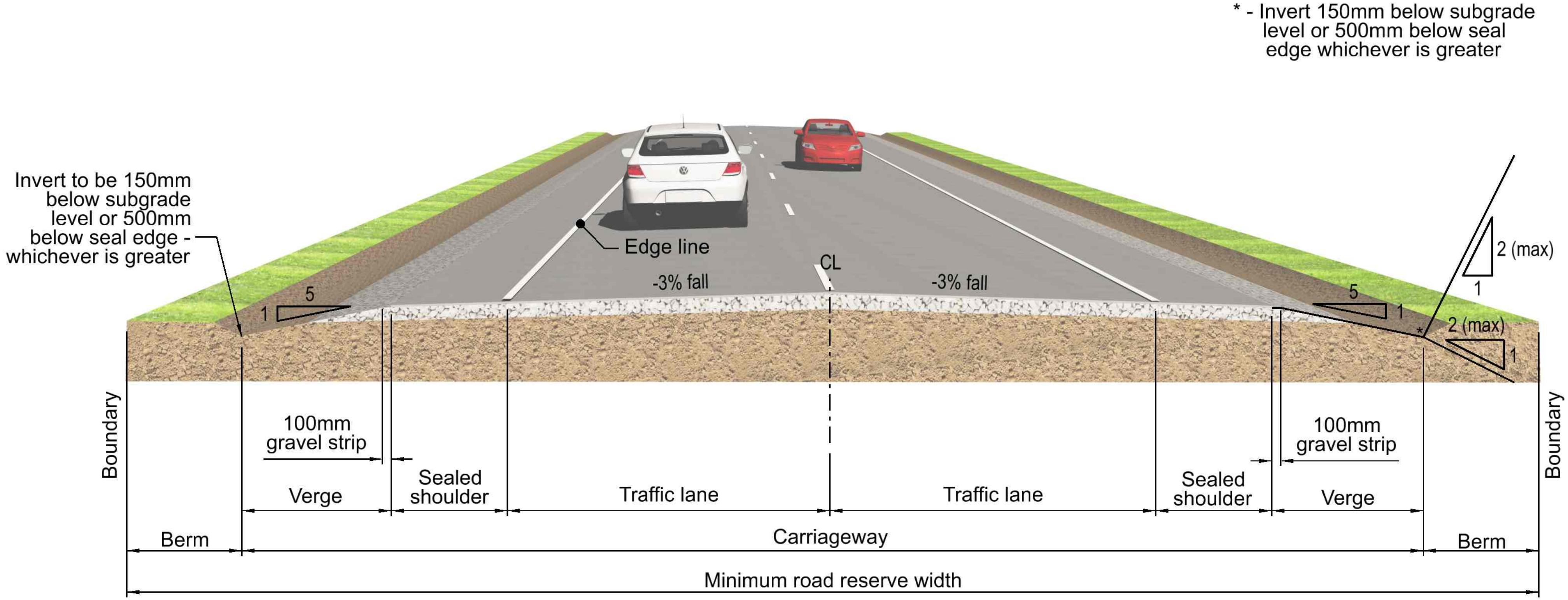
In addition, a diagram of the offset, re-instated or new survey mark must be submitted showing the following:

- The relationship between the offset, re-instated or new survey mark to the destroyed mark.
- Ties to surrounding cadastral survey marks to prove its position.
- Location details with offset distances to surrounding features.

If the existing survey mark (1V – 4V) is part of LINZ geodetic database, appropriate plans and information for the re-instatement or new benchmark instatement shall be provided to LINZ by a licensed cadastral surveyor at the cost of the developer. Marks must be re-instated or replaced to the same standards and accuracy as its predecessor.

3.4.20 As-built and completion documentation

On completion of construction, information and documents as required by Section 1.8.10 shall be provided by the Construction Co-ordinator.



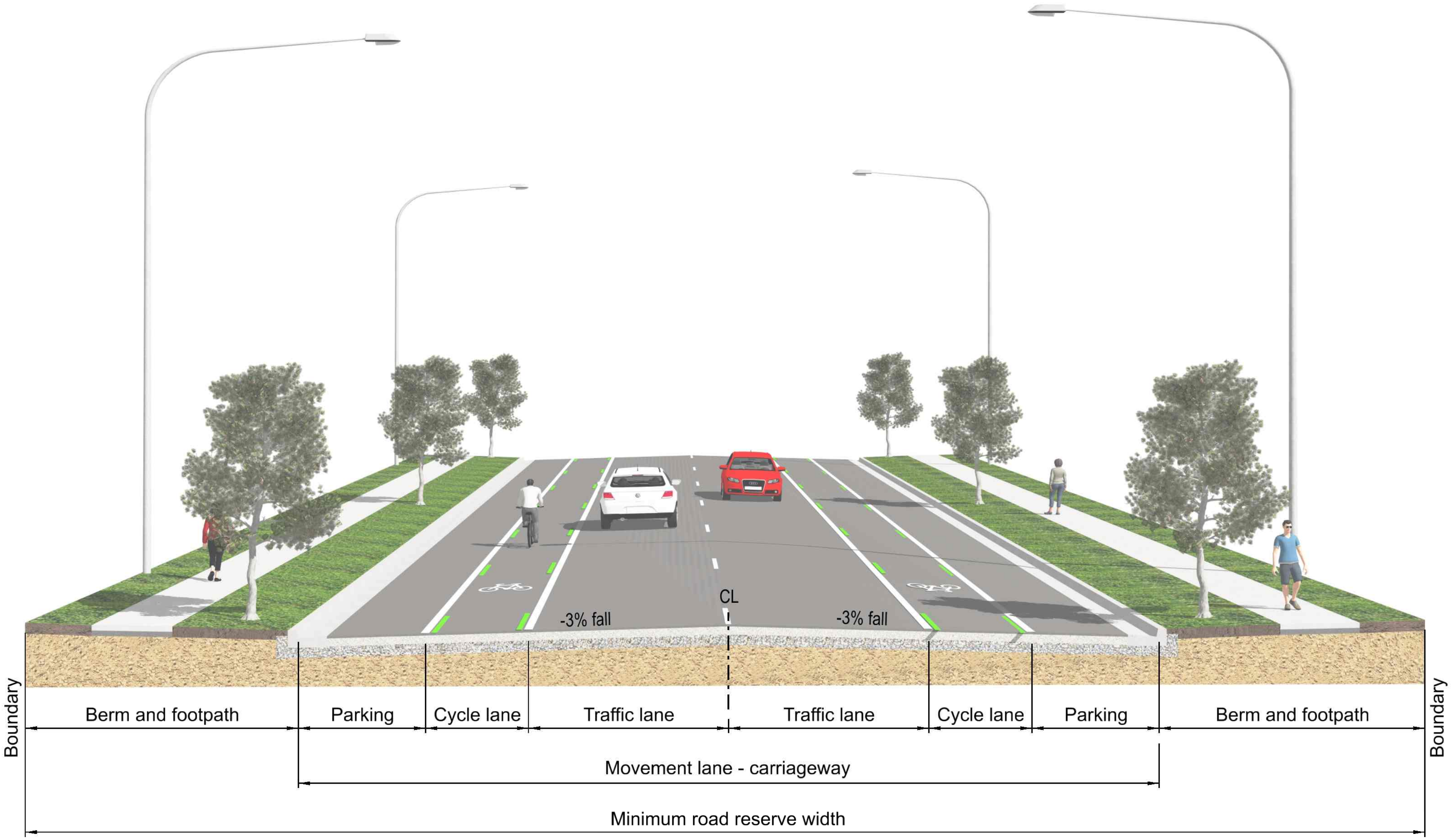
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri

Version: SEPT 2020

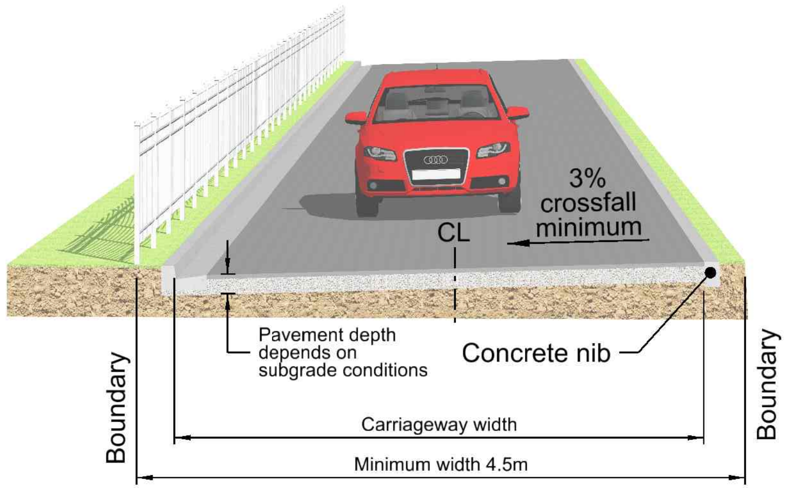
SEALED RURAL ROAD - TYPICAL CROSS SECTION & TERMINOLOGY

NOT TO SCALE

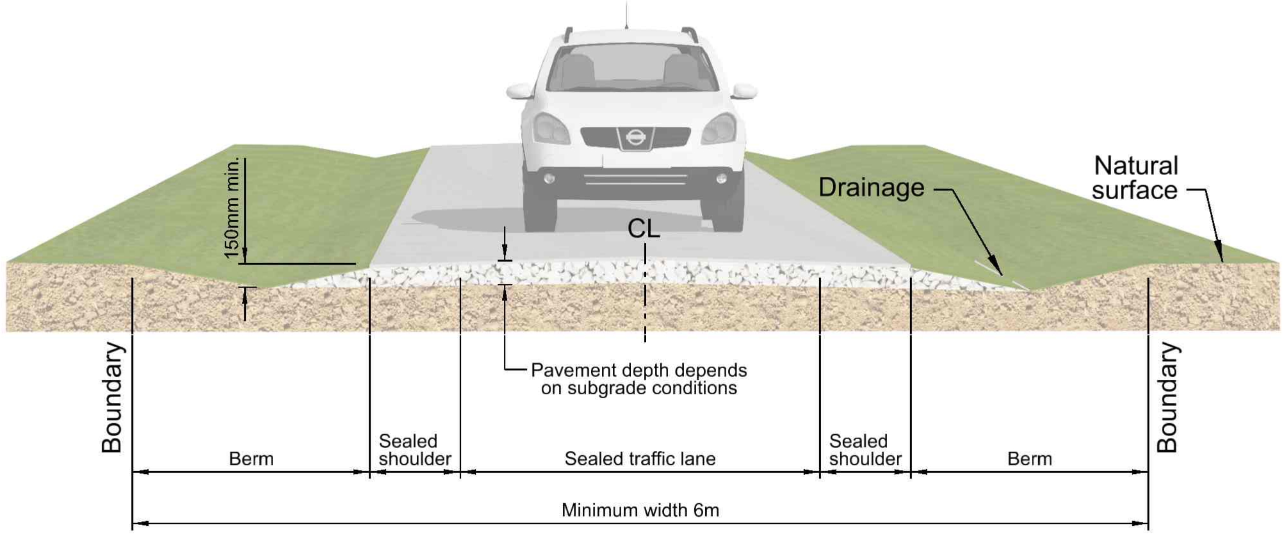
R01



NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	SEALED URBAN ROAD - TYPICAL CROSS SECTION & TERMINOLOGY	NOT TO SCALE	R02



URBAN PRIVATE LANE



RURAL PRIVATE LANE

NOTE: Derived from Hastings District Council ECOP

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	PRIVATE LANES - TYPICAL CROSS SECTION AND TERMINOLOGY	NOT TO SCALE	R03

BERMS

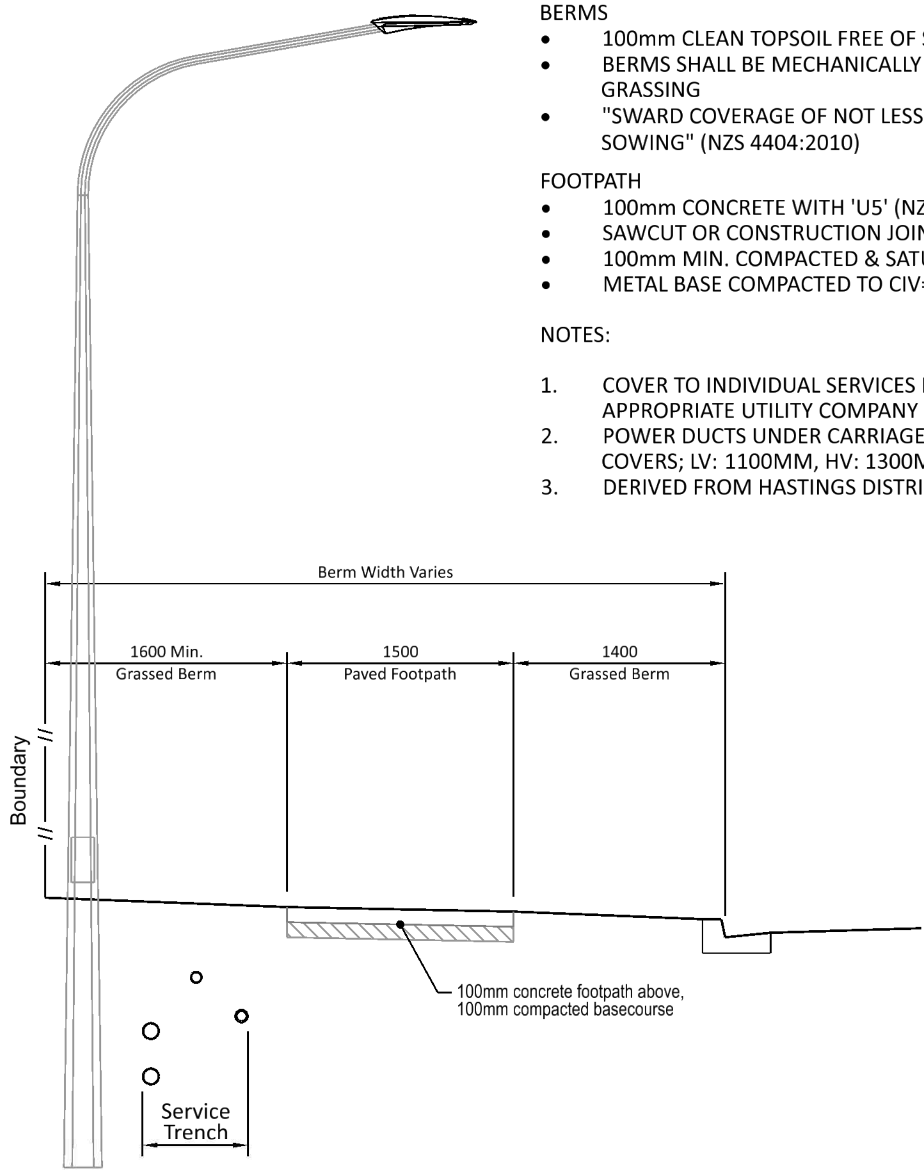
- 100mm CLEAN TOPSOIL FREE OF STONES, FOREIGN MATTER & WEEDS
- BERMS SHALL BE MECHANICALLY TILLED & LIGHTLY ROLLED PRIOR TO GRASSING
- "SWARD COVERAGE OF NOT LESS THAN 90% WITHIN 1 MONTH OF SOWING" (NZS 4404:2010)

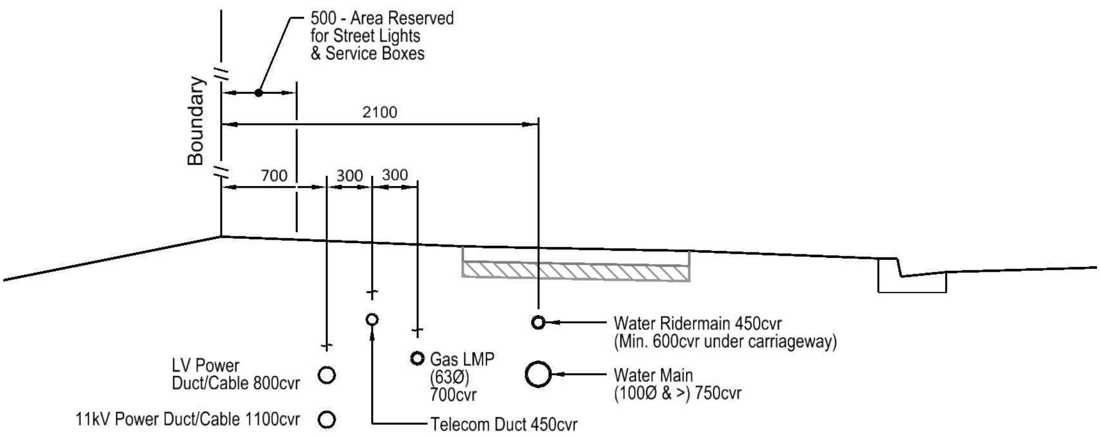
FOOTPATH

- 100mm CONCRETE WITH 'U5' (NZS 3114:1987) LIGHT BROOM FINISH
- SAWCUT OR CONSTRUCTION JOINTS AT 5m CENTERS
- 100mm MIN. COMPACTED & SATURATED AP40 MATERIAL.
- METAL BASE COMPACTED TO CIV=+24

NOTES:

1. COVER TO INDIVIDUAL SERVICES NEEDS TO BE CONFIRMED WITH APPROPRIATE UTILITY COMPANY
2. POWER DUCTS UNDER CARRIAGEWAY SHALL HAVE THE FOLLOWING COVERS; LV: 1100MM, HV: 1300MM
3. DERIVED FROM HASTINGS DISTRICT COUNCIL ECOP, WATER & GAS AMENDED





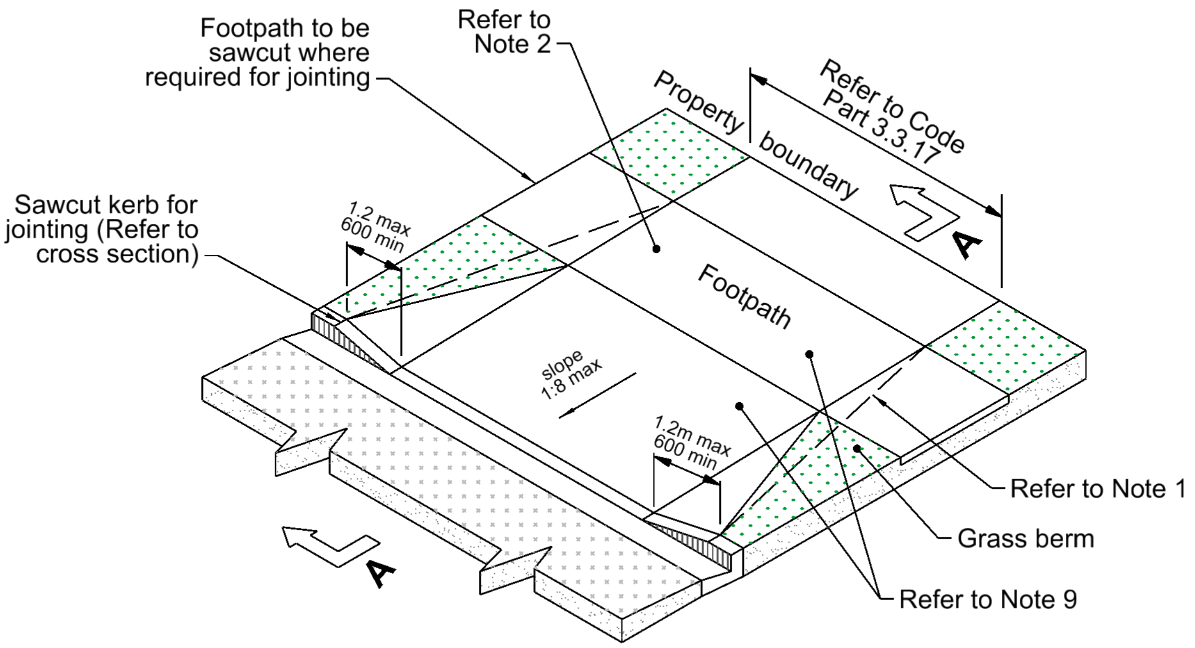
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri

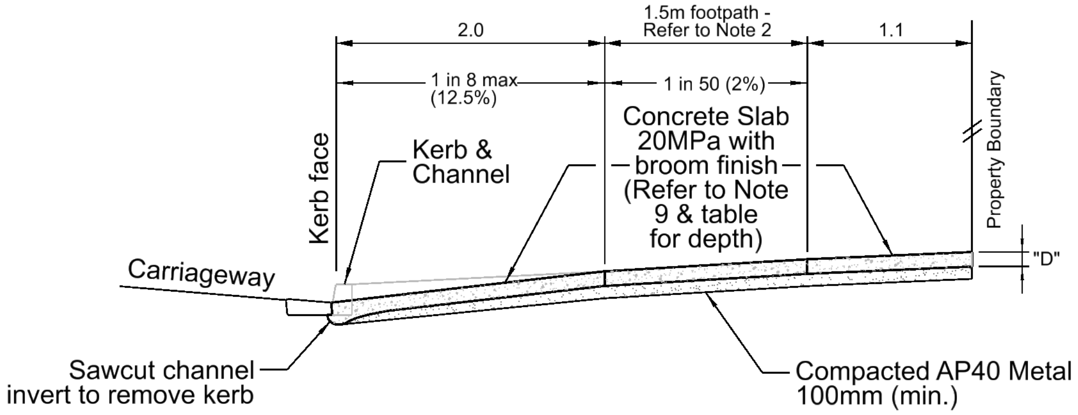
Version: SEPT 2020

INDICATIVE LOCATION OF SERVICES IN BERM

1:50

R04





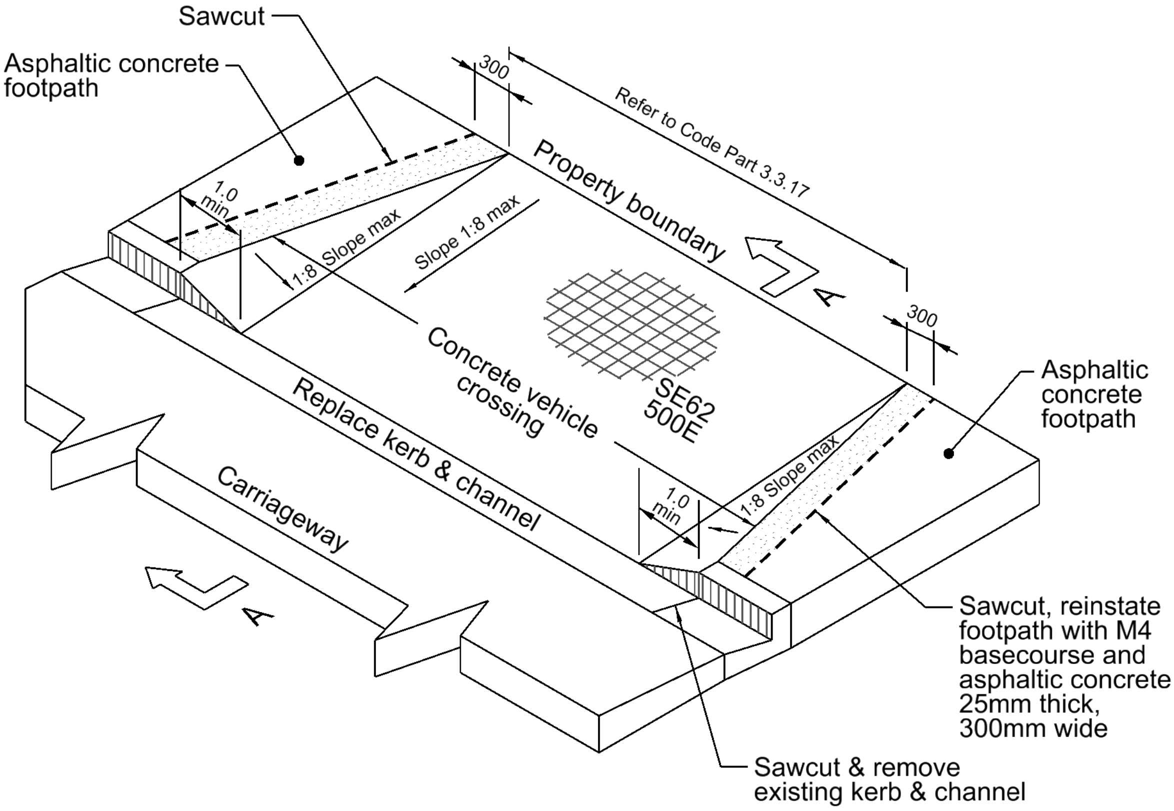
CROSS SECTION A-A

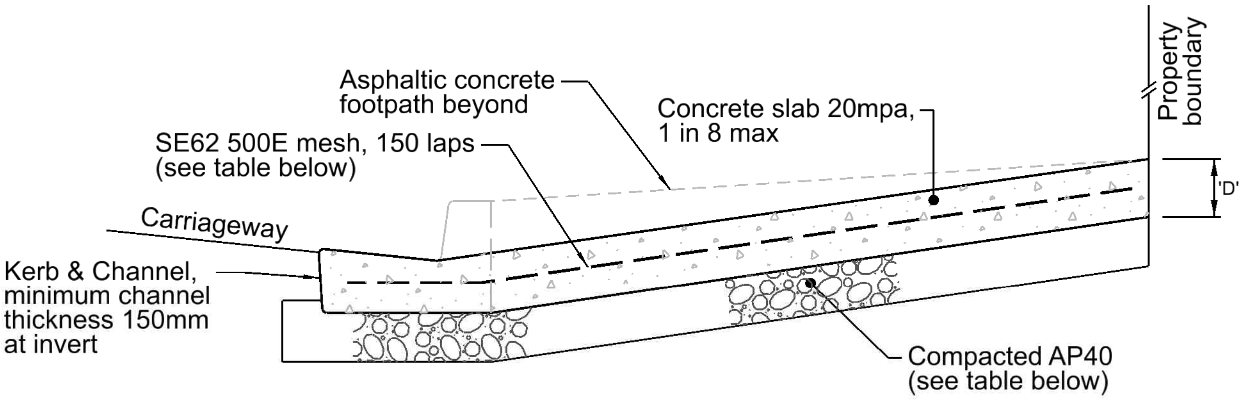
TYPE	DESCRIPTION	CONCRETE DEPTH "D"	REINFORCING
VC 1	1 Dwelling	100mm	NO
VC 2	2 to 3 Dwellings	125mm	NO

NOTES:

1. Where the distance between the kerb and path is less than 1 metre, the crossing grade from the kerb should extend to the boundary side of the path, altered to suit
2. The existing footpath may be retained where it is in good order and the maximum grade requirements are not exceeded
3. The splay width may be reduced to 600mm where the ramp does not encroach into the footpath
4. The splay on residential crossings within full width grass berms shall have a splay angle of 1:4, splay widths shall be 1.2m max
5. Where the footpath abuts the back of kerb, the splay angles shall be 45°
6. Where the footpath is full width (boundary to kerb) a 1.2m concrete ramp may be installed provided the balance of the footpath is capable of withstanding vehicular traffic. Splay angles shall be 45°
7. Where the adjacent property is below the road level, the crossing shall ramp up at least 130mm above the invert of the channel to control stormwater
8. Refer to Drg. No. R09 for driveway profile limits
9. A broom finish is required, in accordance with AS 4663:2013
10. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	URBAN VEHICLE CROSSING VC1 AND VC2 - RESIDENTIAL	NOT TO SCALE	R05





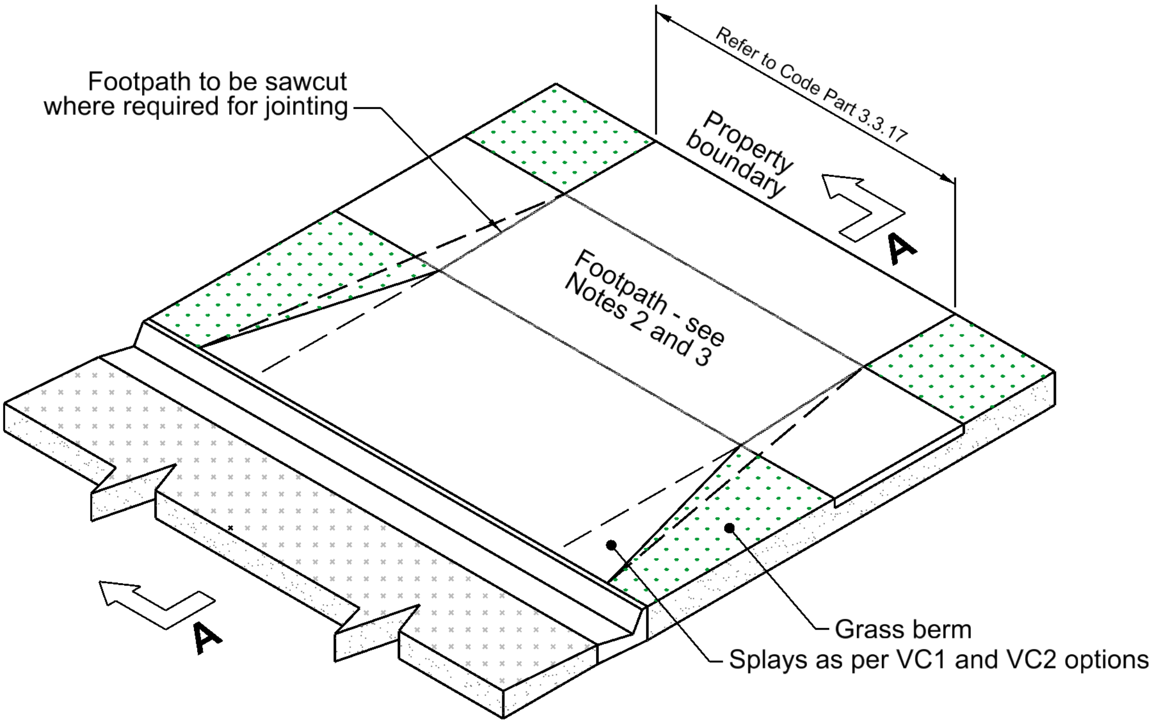
CROSS SECTION A-A

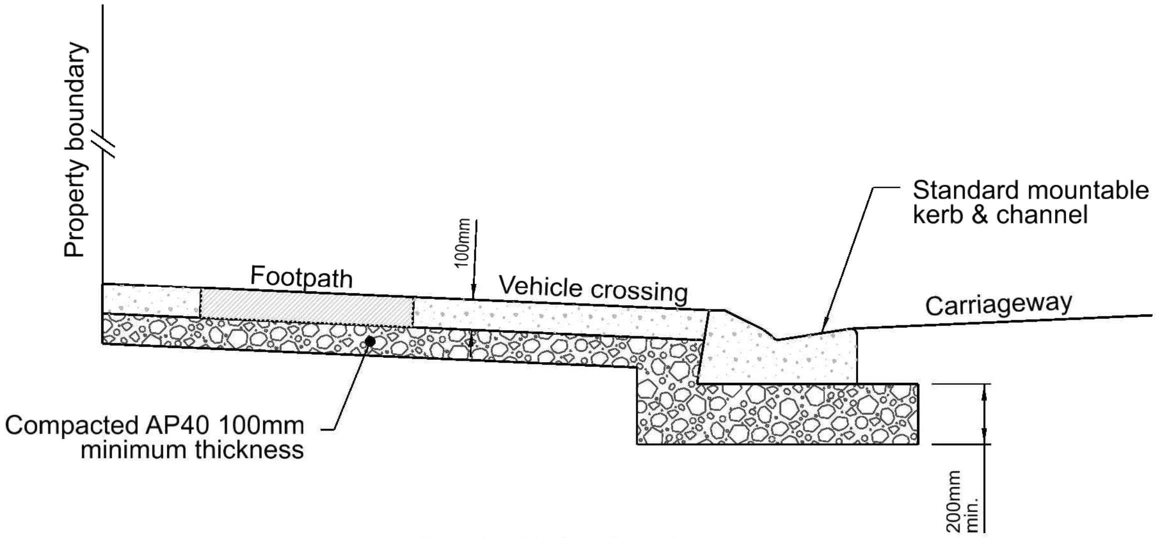
TYPE	DESCRIPTION	CONCRETE DEPTH 'D'	REINFORCING	SUB-BASE DEPTH
VC3	4 or more Dwellings/ Normal Commercial	150mm	1 layer SE62 500E mesh	125mm
VC4	High Commercial/ Industrial use	Specific design (150 mm min)	2 layers SE62 500E mesh	150mm

NOTES:

1. Mechanical compaction required
2. Reinforcing to be SE62 500E
3. Refer to standard drawing R09 for driveway profile limits
4. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	URBAN VEHICLE CROSSING VC3 AND VC4 - COMMERCIAL AND INDUSTRIAL.	NOT TO SCALE	R06



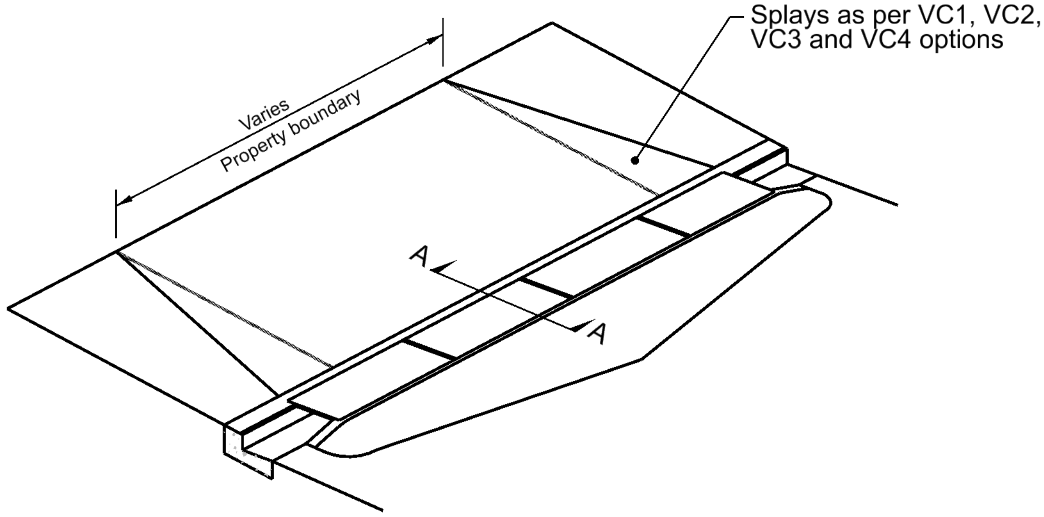


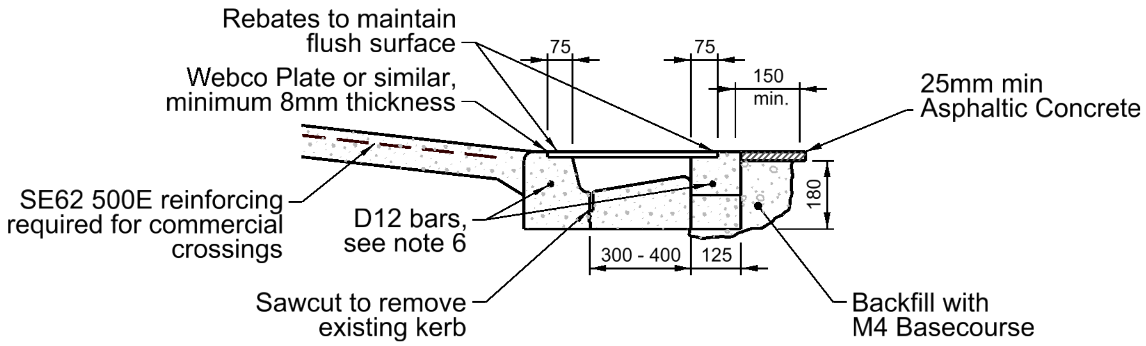
CROSS SECTION A-A

NOTES:

1. Refer to Standard Drawing R09 for driveway profile limits
2. Existing footpath may be retained where it is in good order and the maximum grade requirements are not exceeded
3. A broom finish is required to new concrete, in accordance with AS 4663:2013
4. Ashpalt footpaths are to be constructed of 25mm DG7 or DG10 ashpalt.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	MOUNTABLE KERB VEHICLE CROSSING VC5	NOT TO SCALE	R07



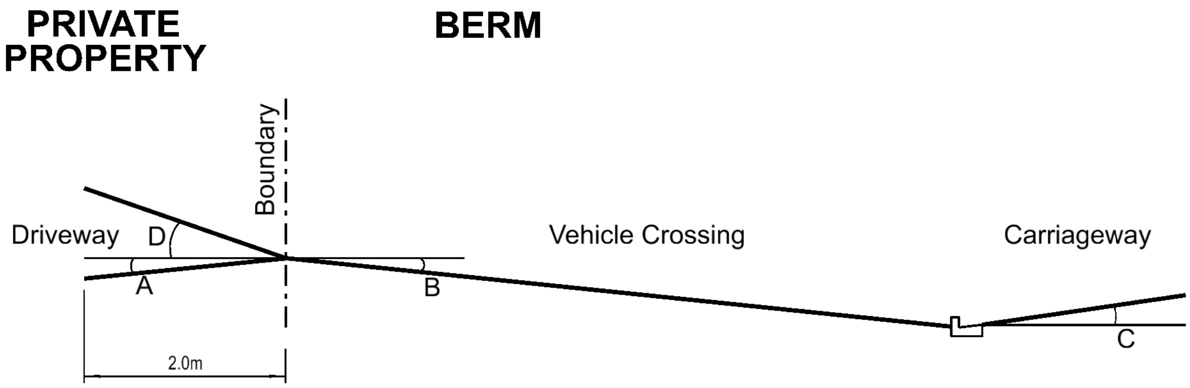


SECTION A-A

NOTES:

1. Chequer plate crossings may only be installed with the approval of the Infrastructure Services Department
2. Specific design is required for industrial chequer plate crossings
3. Existing seal/asphalt to be sawcut at appropriate position
4. Taper ramp as shown to prevent ponding. Maximum length of chequer plates to be 1.5m
5. Existing kerb to be sawcut prior to any removal
6. Minimum 50mm cover (horizontal and vertical) to reinforcement
7. Steel plates shall be securely fastened, easily removed for maintenance and they shall not rattle
8. Refer to Std Dwg R09 for driveway profile limits
9. Refer to Std Dwg R05 for stormwater control
10. All measurements are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	CHEQUER PLATE CROSSING VC6	NOT TO SCALE	R08

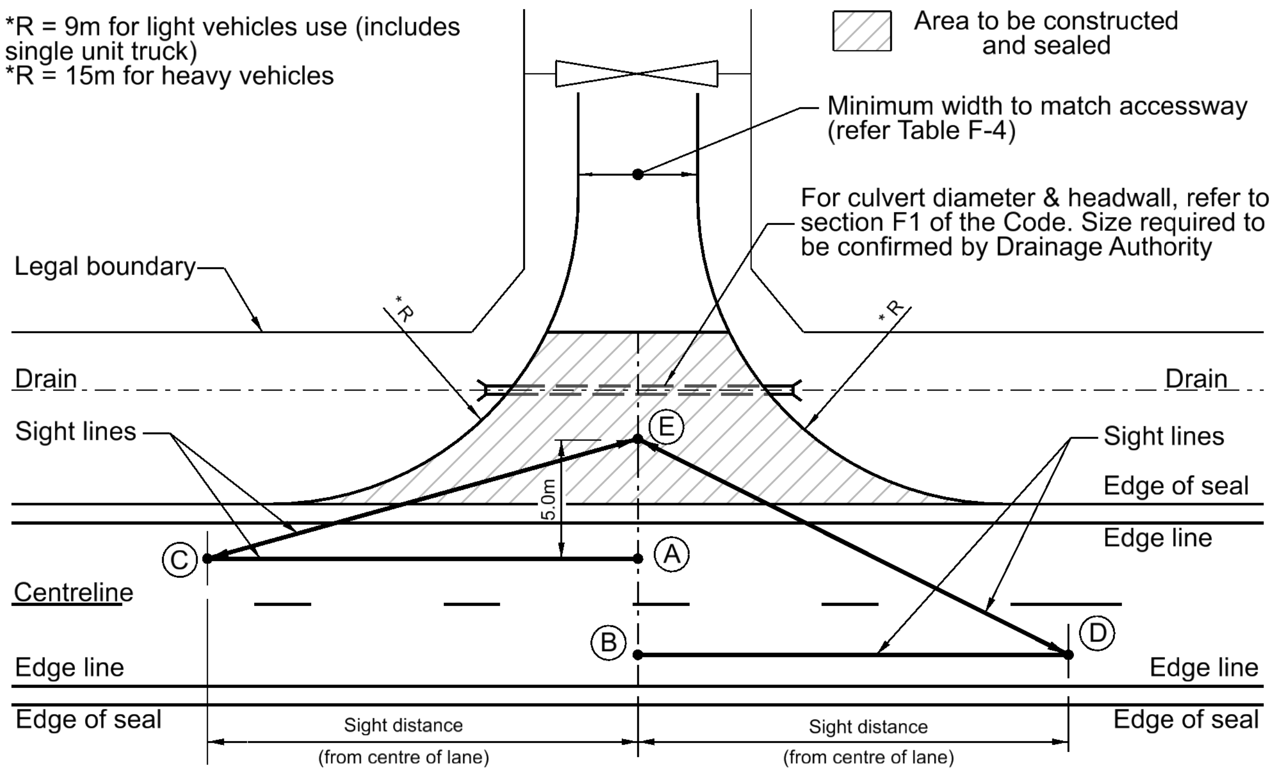


MAXIMUM CHANGE OF GRADE:	A + B ≤ 10% (or 5.7°)
	D - B ≤ 17% (or 9.6°)
	B + C ≤ 17% (or 9.6°)

NOTES:

1. For A, B, C and D, refer to the gradients expressed either as a percentage or in degrees
2. Where the adjacent property boundary is below road level, the crossing shall ramp up at least 130mm above the invert of the channel to control stormwater
3. Based on 90th percentile car as at 1990
4. Buses are permitted lower clearance value of (A + B) of 6% or 3.4°.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**MAXIMUM BREAK OVER ANGLES FOR VEHICLE CROSSINGS**	NOT TO SCALE	**R09**



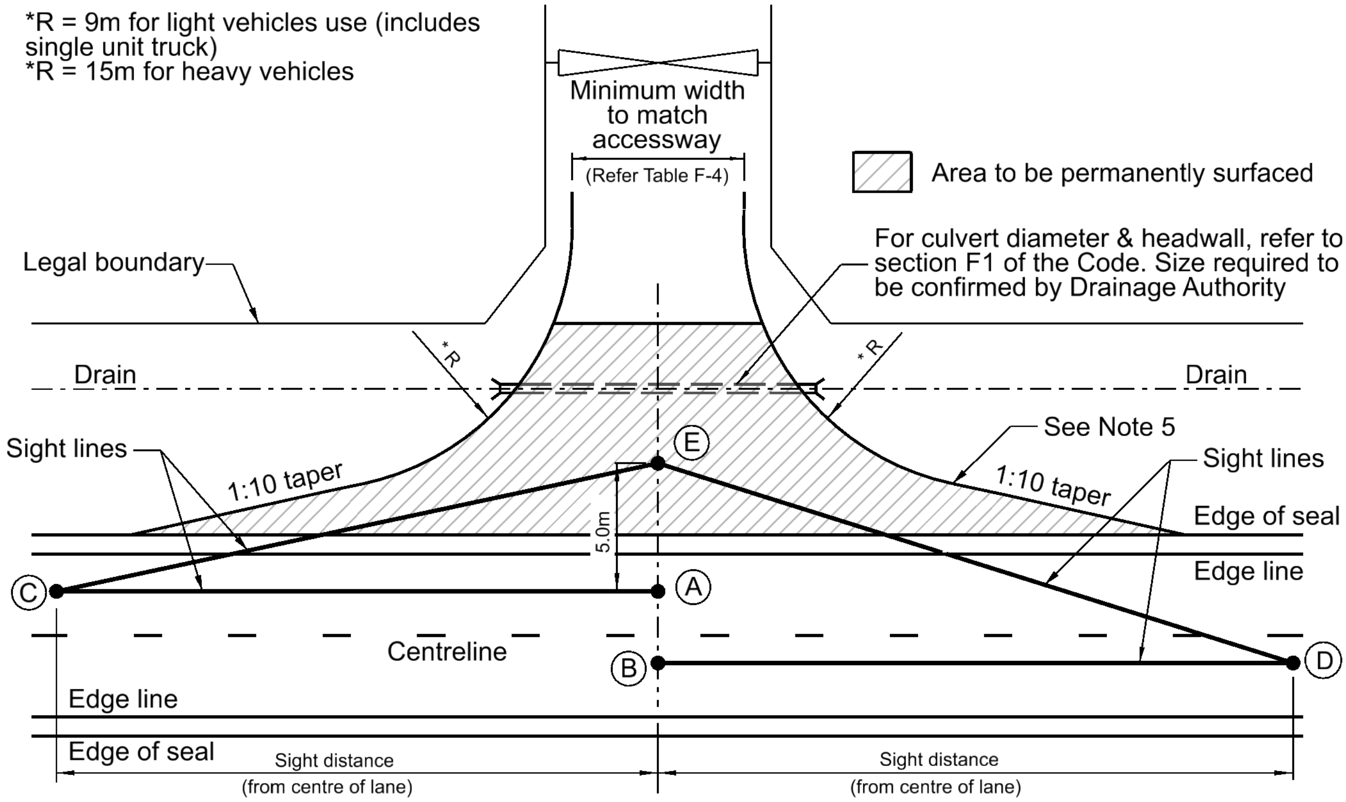
MINIMUM SIGHT DISTANCES (ref. Land Transport - RTS6)

Council Roads			
Operating Speed (KPH)	Minimum Sight Distance (metres)		
	Frontage Road Classification		
	Local Roads Low & high volume driveways	Collectors Low volume driveways	Arterial / Principal Low volume driveways
40	30	35	70
50	40	45	90
60	55	65	115
70	85	85	140
80	105	105	175
90	130	130	210
100	160	160	250

State Highways	
Operating Speed (KPH)	Minimum Sight Distance (metres)
70	140
80	170
100	240

NOTES:

1. Point A, B, C & D shall be on the centre of the lane
2. Sight distances shall be measured from a point 1.15 m above the ends of each sight line
3. Sight lines AC & BD: No obstuctions allowed within these sightlines
   Sight lines CE & DE:
   a) High volume driveways on collector roads, no permanent obstructions allowed within these sight lines (excluding occassional parked vehicles)
   b) Low and high volume driveways on arterial roads, no obstructions allowed within these sightlines (parked vehicles not excluded)
4. The operating speed shall be the 85th percentile speed on the road frontage (refer Part F1.6.15.4)
5. Any gate shall be recessed back from carriageway sufficient distance to allow any vehicle likely to be using the driveway to stop clear of the carriageway while the gate is being opened or closed.



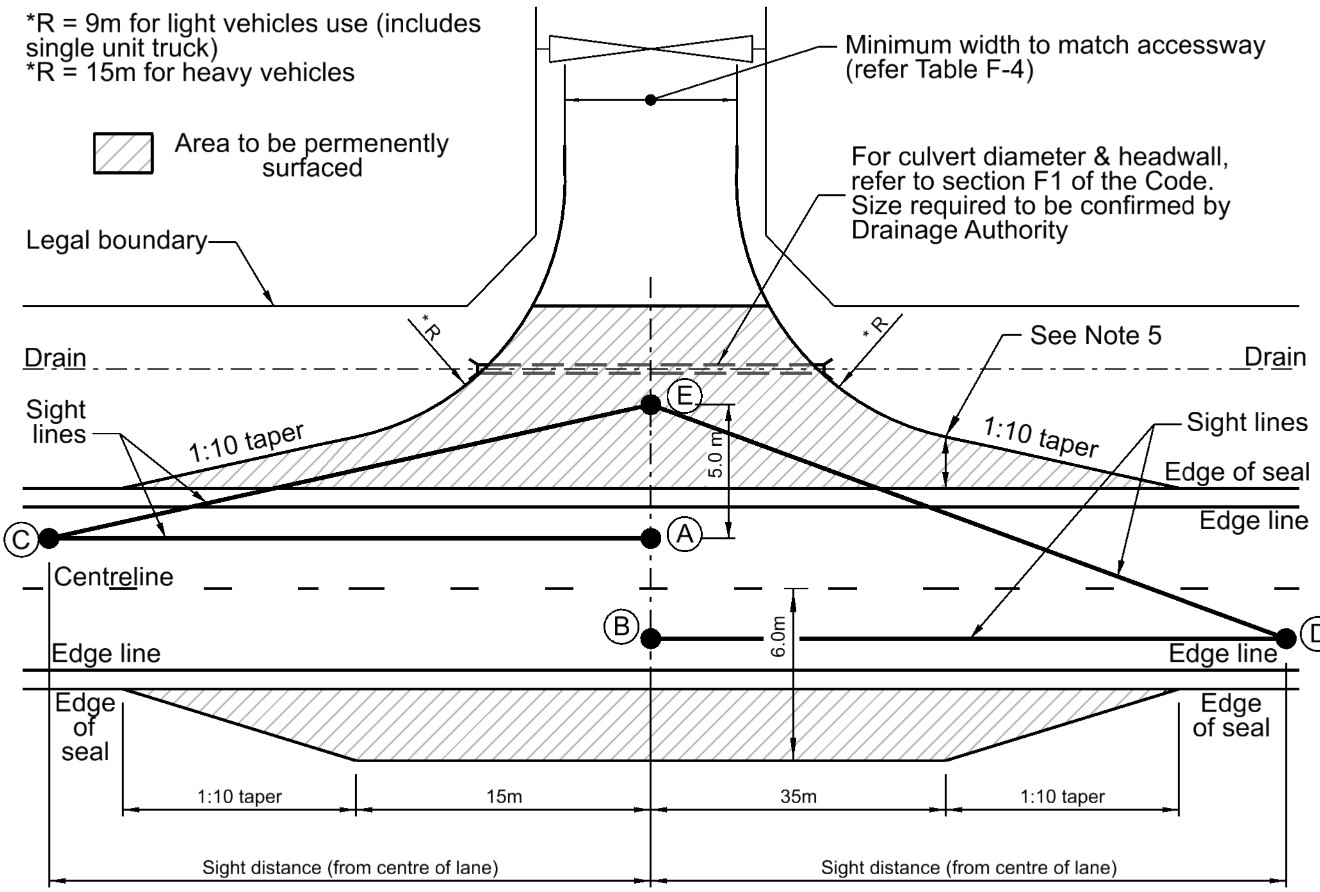
MINIMUM SIGHT DISTANCES (ref. Land Transport-RTS6)

Council Roads			
Operating Speed (KPH)	Minimum Sight Distance (metres)		
	Frontage Road Classification		
	Local Roads Low & high volume driveways	Collectors Low volume driveways	Arterial / Principal Low volume driveways
40	30	35	70
50	40	45	90
60	55	65	115
70	85	85	140
80	105	105	175
90	130	130	210
100	160	160	250

NOTES:

1. Points A, B, C & D shall be on the centre of the lane
2. Sight distances shall be measured from a point 1.15 m above the ends of each sight line
3. Sight lines AC & BD: No obstuctions allowed within these sightlines
   Sight lines CE & DE:
   a) High volume driveways on collector roads, no permanent obstructions allowed within these sight lines (excluding occassional parked vehicles)
   b) Low and high volume driveways on arterial roads, no obstructions allowed within these sightlines (parked vehicles not excluded)
4. The operating speed shall be the 85th percentile speed on the road frontage. (refer Part F1.6.15.4)
5. 1:10 taper from edge of seal meets *R at 6.0m from centreline of the road
6. Any gate shall be recessed back from carriageway sufficient distance to allow any vehicle likey to be using the driveway to stop clear of the carriageway while the gate is being opened or closed.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	RVC 2 - RURAL VEHICLE CROSSING	NOT TO SCALE	R11



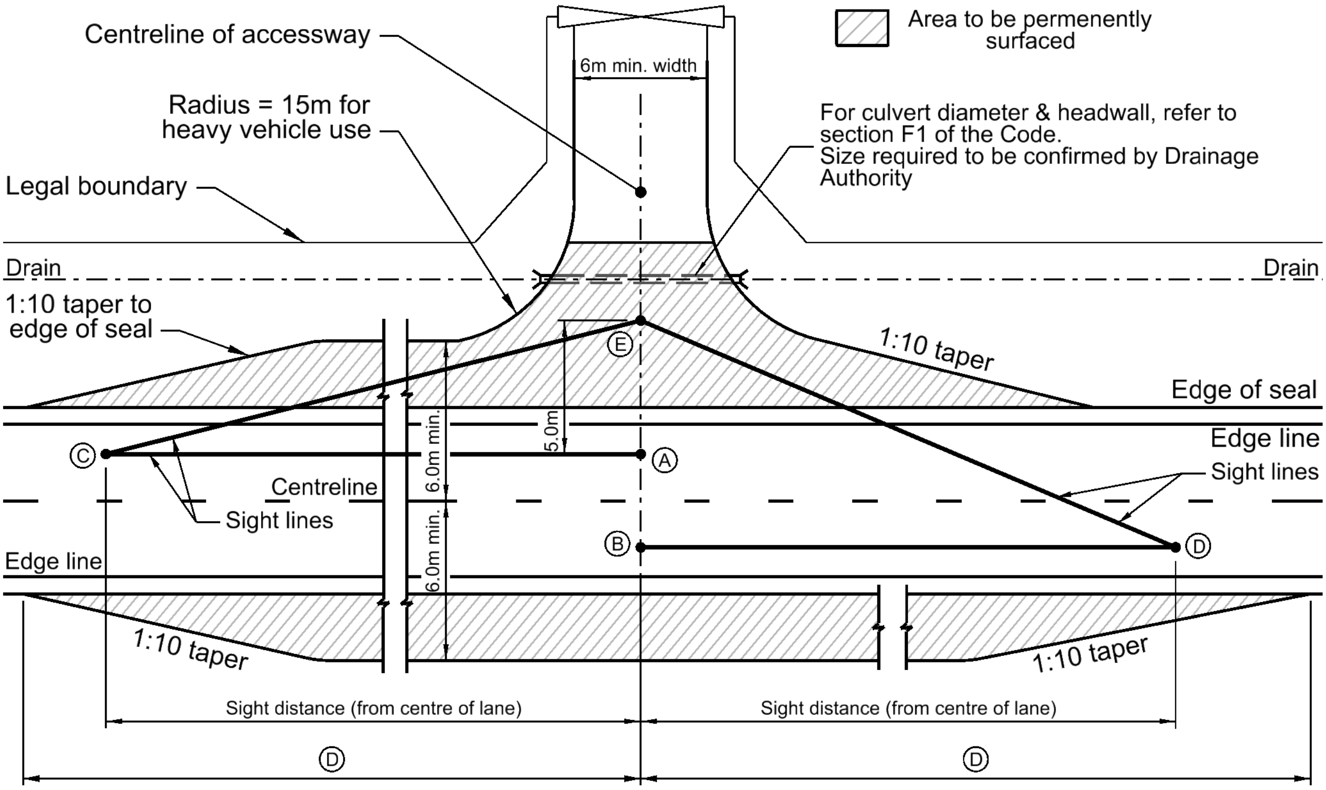
MINIMUM SIGHT DISTANCES (ref. Land Transport - RTS6)

Council Roads				
Operating Speed (KPH)	Minimum Sight Distance (metres) — Frontage Road Classification			
	Local Roads: Low & high volume driveways	Collectors: Low volume driveways	Collectors: High volume driveways	Arterial / Principal: Low volume driveways
40	30	35	70	70
50	40	45	90	90
60	55	65	115	115
70	85	85	140	140
80	105	105	175	175
90	130	130	210	210
100	160	160	250	250

State Highways	
Operating Speed (KPH)	Minimum Sight Distance (metres)
70	140
80	170
100	240

NOTES:

1. Point A, B, C & D shall be on the centre of the lane
2. Sight distances shall be measured from a point 1.15 m above the ends of each sight line
3. Sight lines AC & BD: No obstuctions allowed within these sightlines
   Sight lines CE & DE:
   a) High volume driveways on collector roads, no permanent obstructions allowed within these sight lines (excluding occassional parked vehicles)
   b) Low and high volume driveways on arterial roads, no obstructions allowed within these sightlines (parked vehicles not excluded)
4. The operating speed shall be the 85th percentile speed on the road frontage (refer Part F1.6.15.4)
5. 1:10 taper from edge of seal meets *R at 2.5m from centreline of the road
6. Any gate shall be recessed back from carriageway sufficient distance to allow any vehicle likely to be using the driveway to stop clear of the carriageway while the gate is being opened or closed.



MINIMUM SIGHT DISTANCES (ref. Land Transport - RTS6)

Council Roads	
Operating Speed (KPH)	Minimum Sight Distance (metres)
	Collector, Principal & Arterial High Volume Driveways
70	140
80	175
90	210
100	250

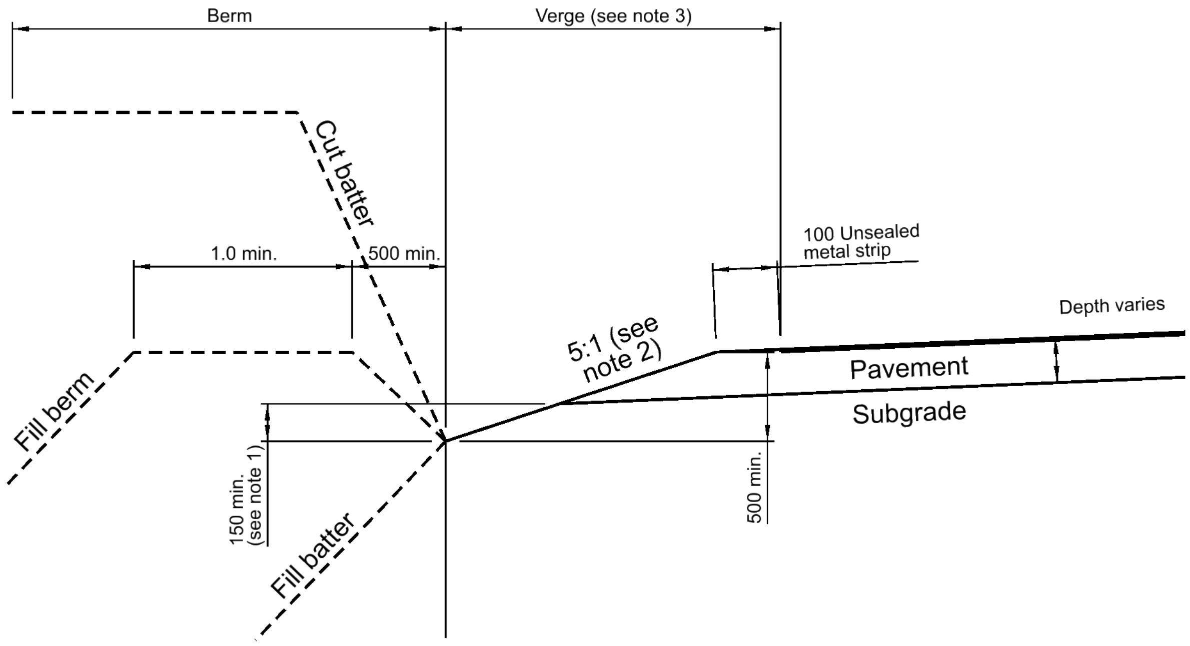
State Highways	
Operating Speed (KPH)	Minimum Sight Distance (metres)
70	140
80	170
100	240

LENGTH OF SHOULDER WIDENING - COUNCIL ROADS & STATE HIGHWAY

Speed Limit (KPH)	Widening Length "d" (m)
70	60
80	70
90	80
100	90

NOTES:

1. Points A, B, C & D shall be on the centre of the lane
2. Sight distances shall be measured from a point 1.15 m above the ends of each sight line
3. Sight lines AC & BD: No obstuctions allowed within these sightlines
   Sight lines CE & DE:
   a) High volume driveways on collector roads, no permanent obstructions allowed within these sight lines (excluding occassional parked vehicles)
   b) Low and high volume driveways on arterial roads, no obstructions allowed within these sightlines (parked vehicles not excluded)
4. The operating speed shall be the 85th percentile speed on the road frontage (refer Part F1.6.15.4)
5. Any gate shall be recessed back from carriageway sufficient distance to allow any vehicle likely to be using the driveway to stop clear of the carriageway while the gate is being opened or closed.

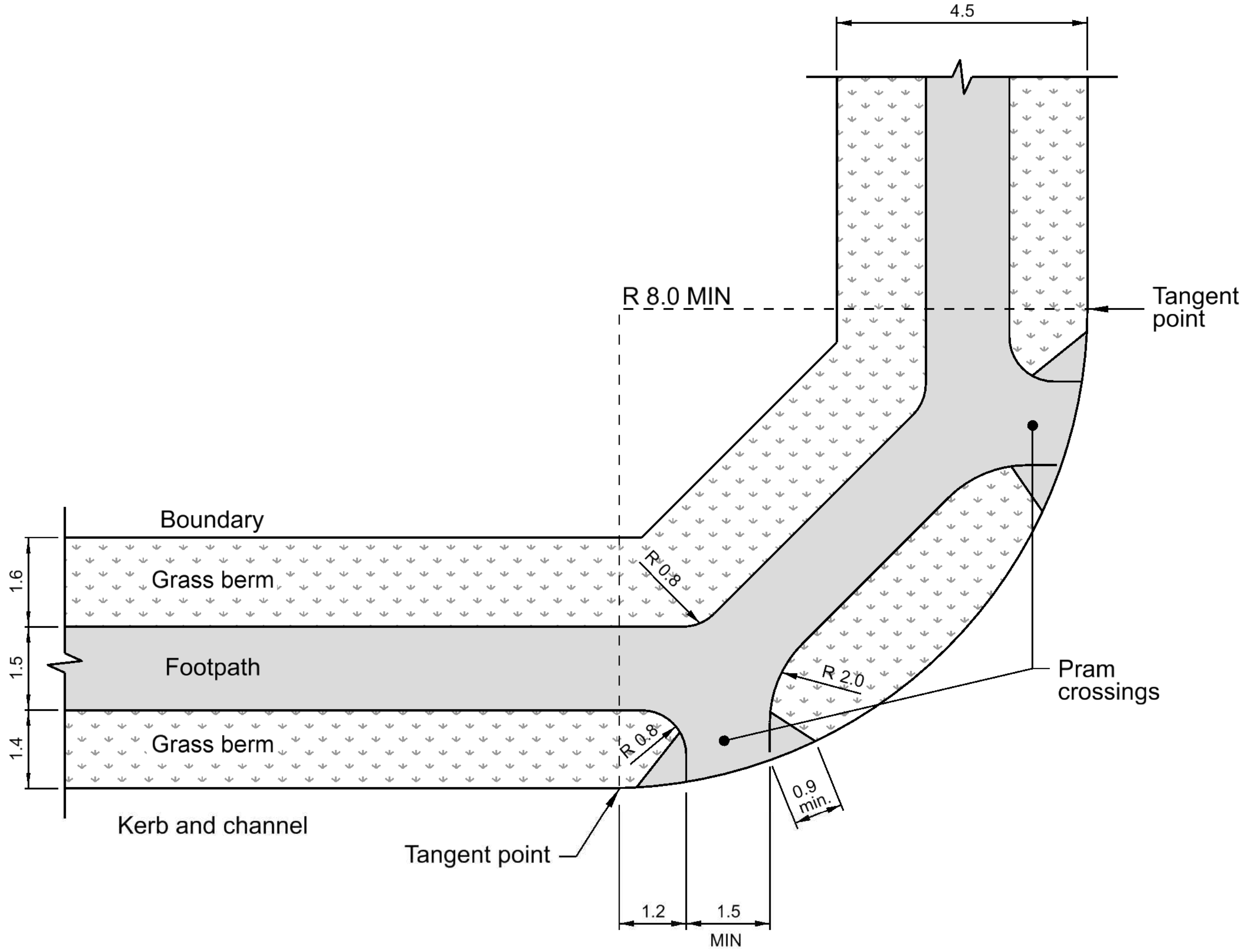


TYPICAL CROSS SECTION GUIDELINES FOR VERGES ON RURAL ROADS

NOTES:

1. Adopt which ever provides the greater depth:
   A - 500mm below the seal edge, or
   B - 150mm below the pavement/subgrade interface
2. 5:1 slopes may be narrowed to an absolute minimum of 4:1 in constrained locations.
   6:1 side slopes are required within 3.0m of topside of curves
3. The verge width is determined by the critical dimensions given in note 1 above, but with minimum width as shown in table F1
4. Whole numbers = mm, decimallised numbers = m.

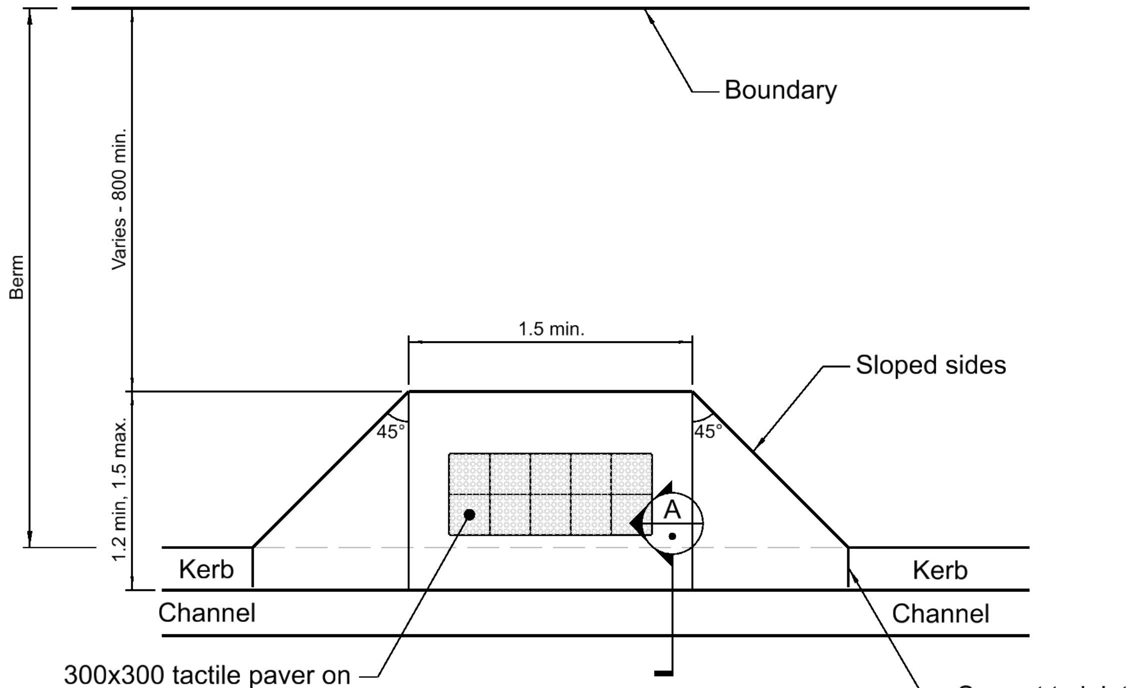
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	CROSS SECTION GUIDELINES FOR VERGES ON RURAL ROADS	NOT TO SCALE	R14



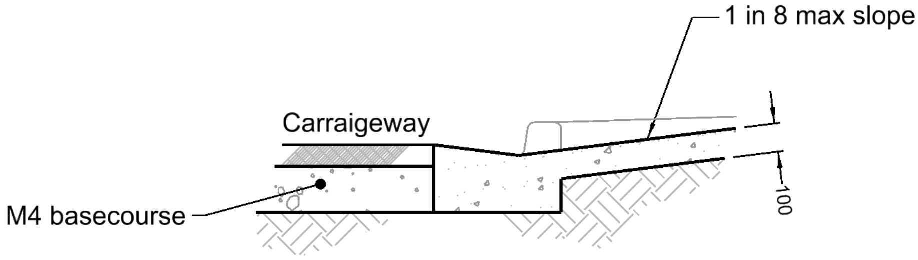
ROAD HIERARCHY	CORNER SPLAYS	KERB RADIUS
Residential & commercial road intersections of collector / collector status & below	3m x 3m	8.0m
Road intersections above collector / collector status & industrial	6m x 6m	13.5m

NOTE: All dimensions in metres.

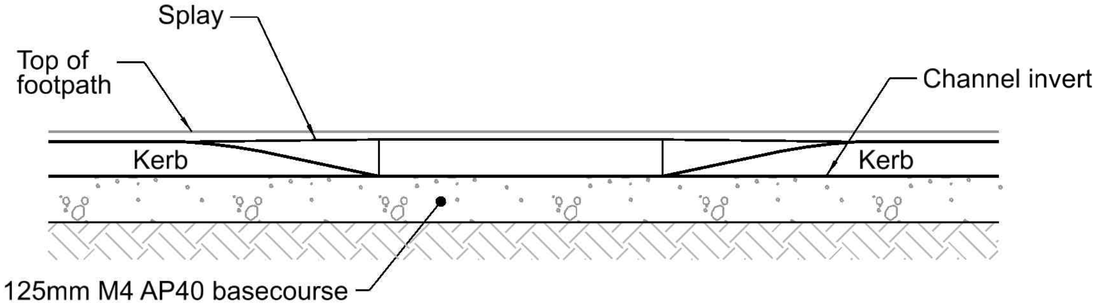
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**STANDARD CORNER LAYOUT WITH PRAM CROSSINGS**	NOT TO SCALE	**R15**



PLAN



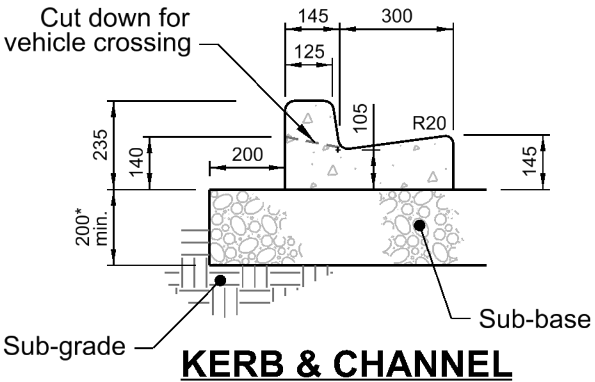
SECTION A-A



FRONT ELEVATION

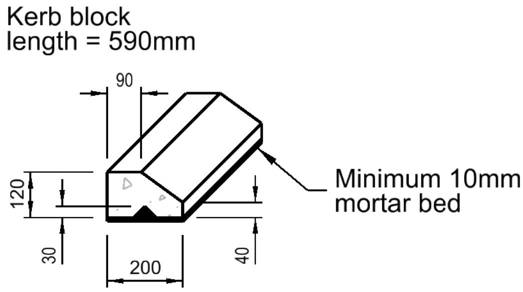
NOTE: Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**STANDARD PRAM CROSSING**	NOT TO SCALE	**R16**



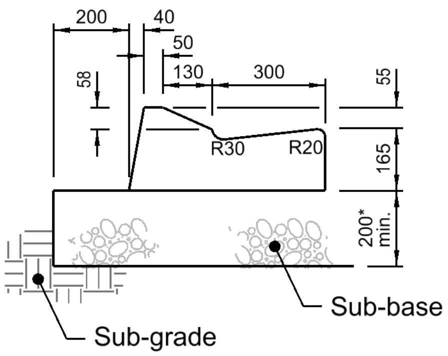
KERB & CHANNEL

* To be increased at locations with high traffic flows/heavy traffic/ weak subgrades. Refer to Part F for CBR design procedures

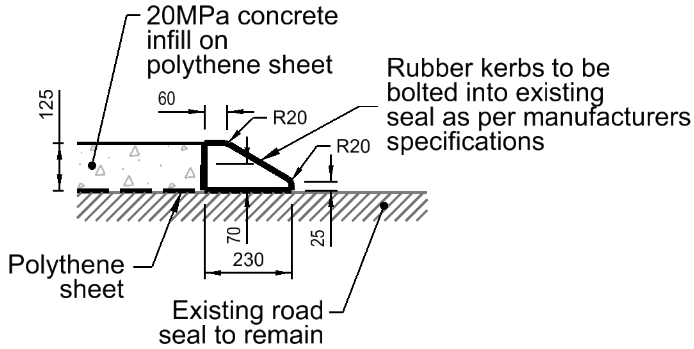


PRECAST, ISLAND KERB BLOCK

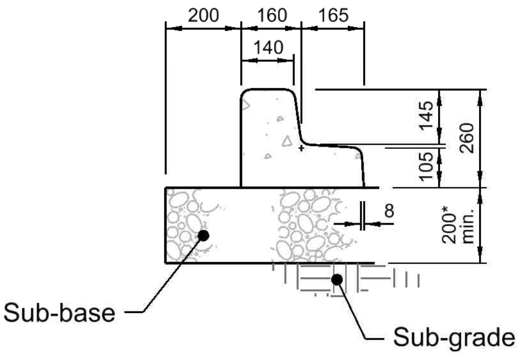
Kerb blocks are only to be used where specifically approved by the Transportation Team Leader



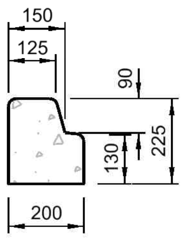
STANDARD MOUNTABLE KERB & CHANNEL DETAIL



RUBBER KERB DETAIL



NIB



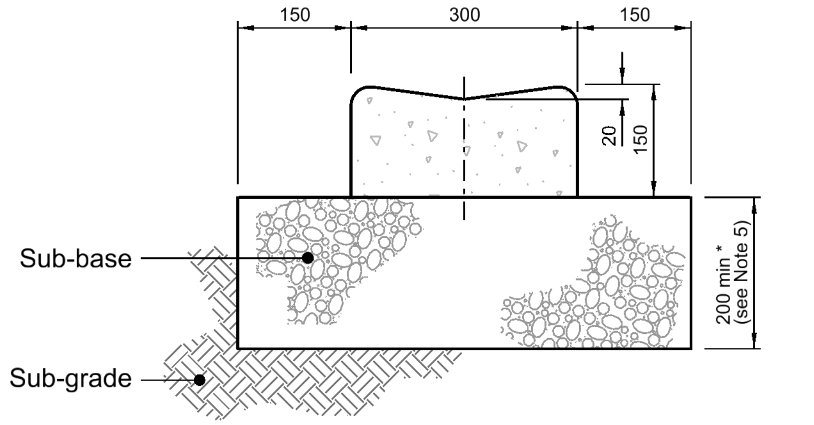
MODIFIED NIB (where required)

For modified nib ONLY; exposed edges to be rounded R = 20mm

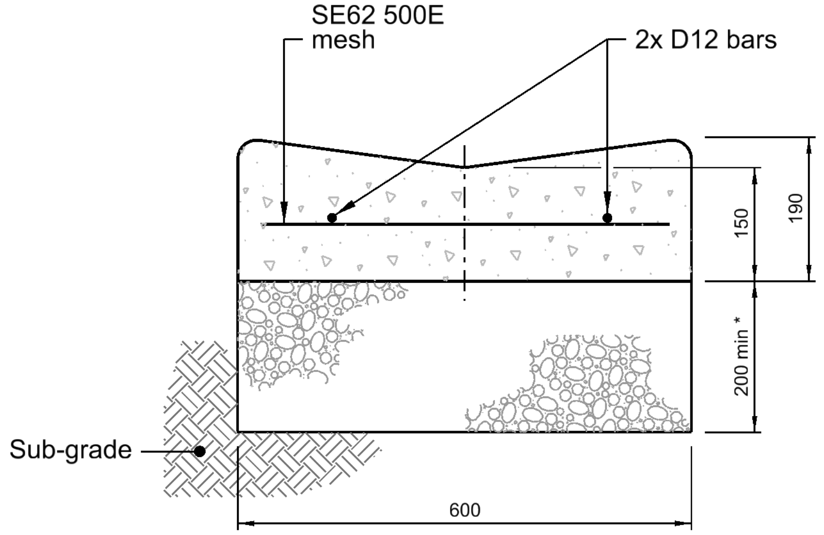
NOTES:

1. Crack control joints shall be sawcut at 6.0m intervals to coincide with every second footpath joint if kerb is adjacent to footpath
2. Minor dimensional variations to kerb & channel may be approved by the Transportation Team Leader
3. Except where noted, exposed edges to be rounded R = 25mm
4. Rubber kerbing can be sourced at www.roadsafetyandrentals.co.nz
   Rubber kerbs shall be approved by the Engineer prior to supply (alternaive products will be considered)
5. All dimensions are in mm.

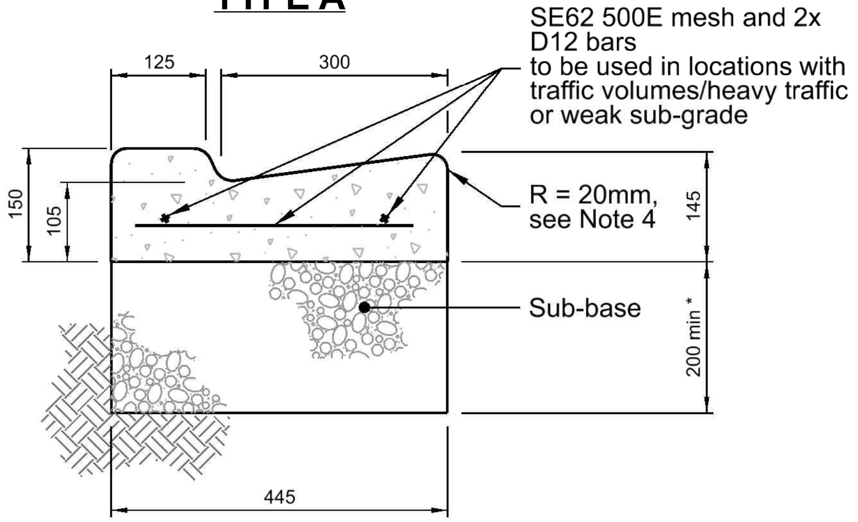
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	STANDARD KERB PROFILES	1:20	R17



300mm DISH CHANNEL



TYPE A

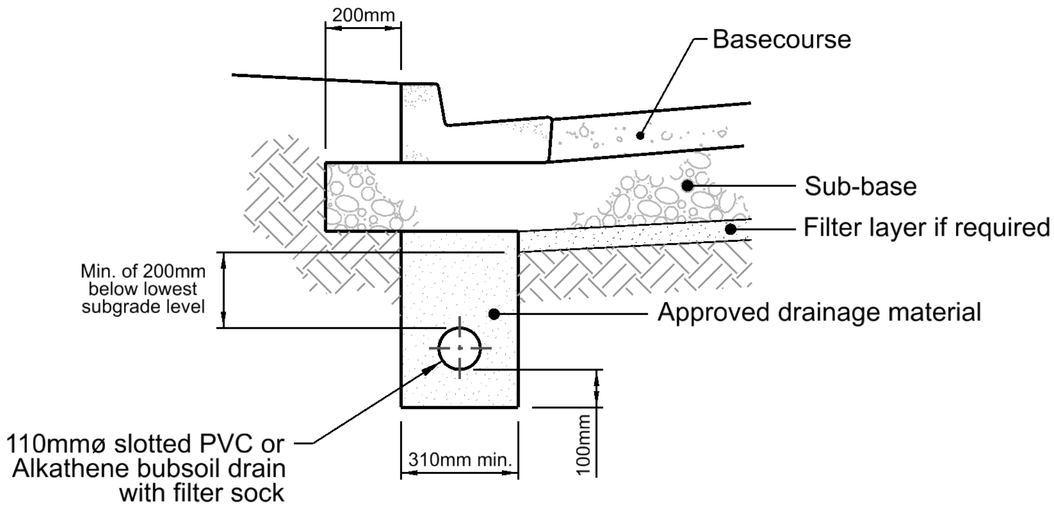


TYPE B

NOTES:

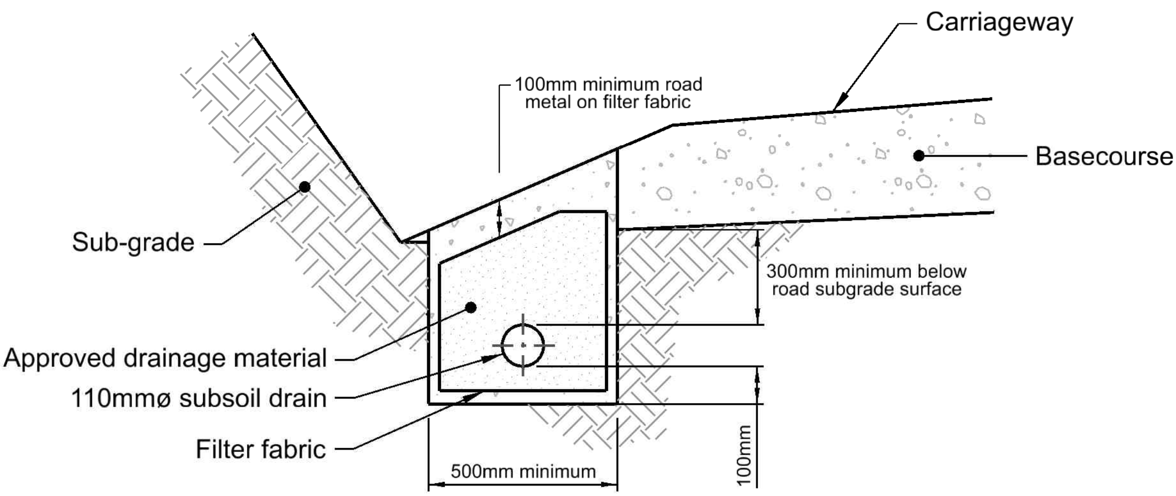
1. Channels in rural areas or in any situation of high velocity and/or high flow require specific design
2. Crack control joints shall be saw cut at 6.0m intervals
3. V channels shall only be used with the approval of Road Asset Manager
4. All exposed edges to be rounded R = 25mm (only exception being one instance in Type B channel)
5. Sub-base depth to be increased at locations with high traffic flows/heavy traffic/weak sub-grades. Refer to Part F for CBR design procedures
6. All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	STANDARD DISH CHANNELS DETAILS	NOT TO SCALE	R18



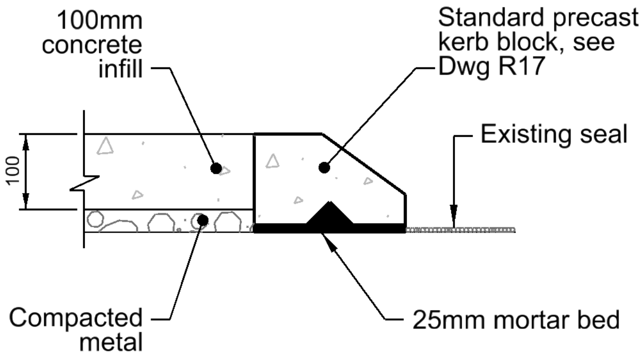
UNDER KERB DRAINAGE

1:20

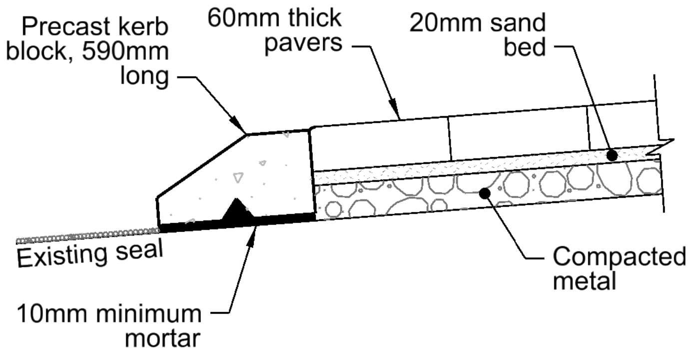


RURAL SUBSOIL DRAINAGE

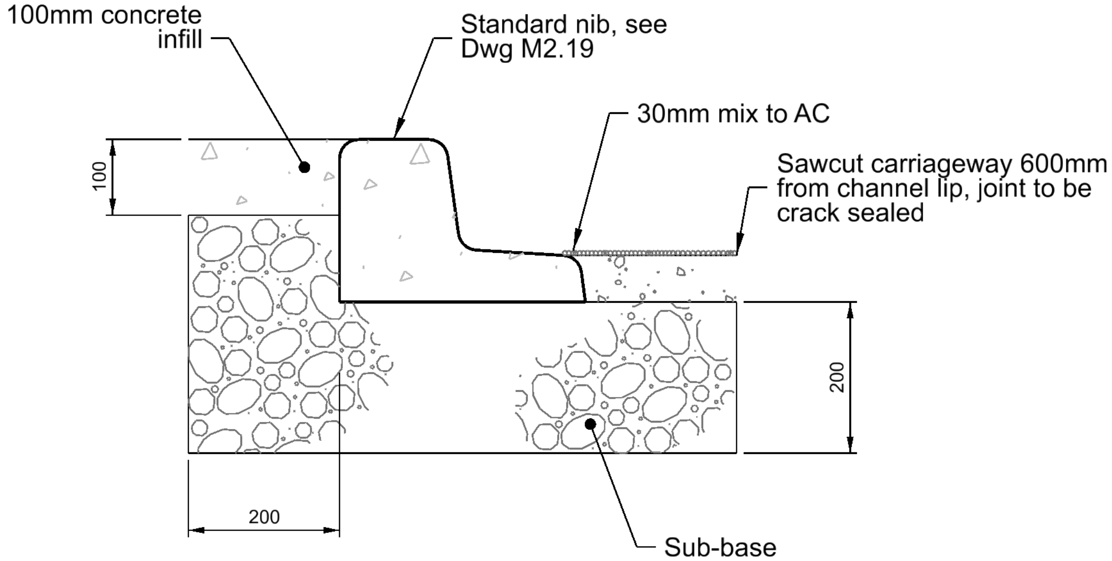
1:20



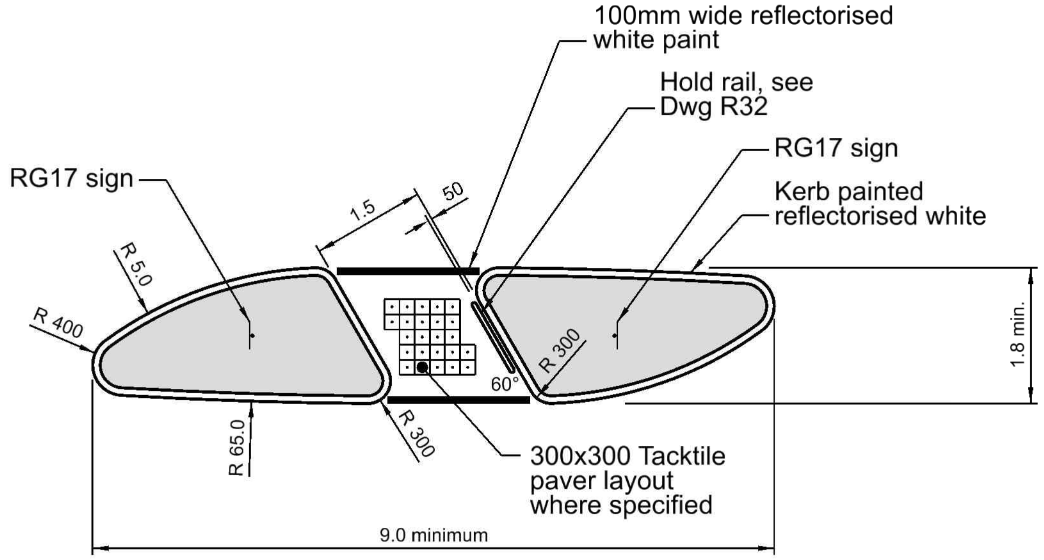
KERB BLOCK
1:10



PART SECTION THROUGH KERB BLOCK ISLAND (PAVER INFILL)
1:10

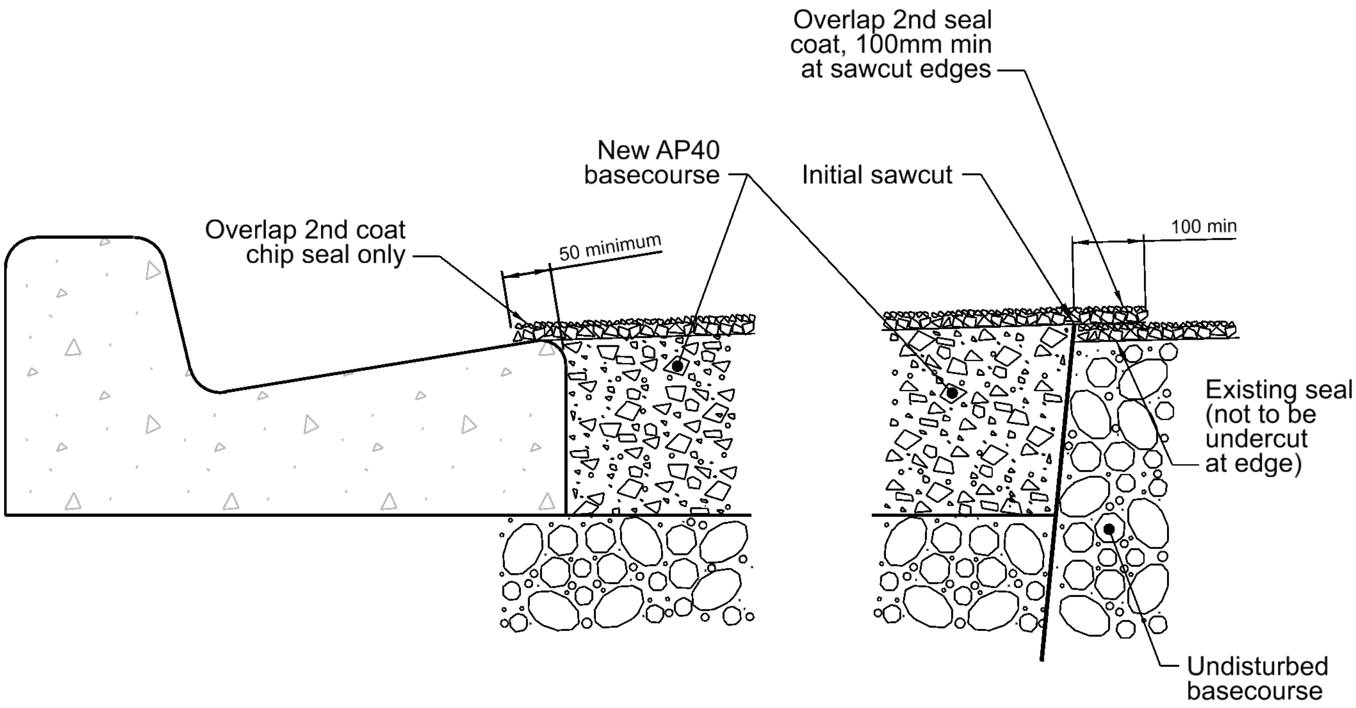


NIB - TRAFFIC ISLAND KERB DETAIL
1:10

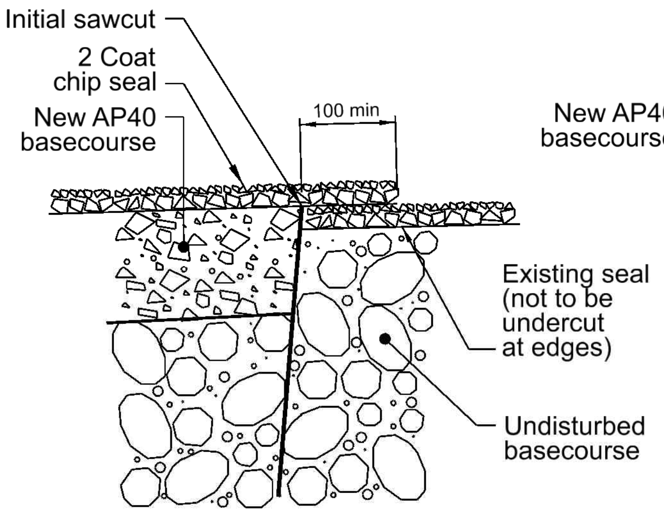


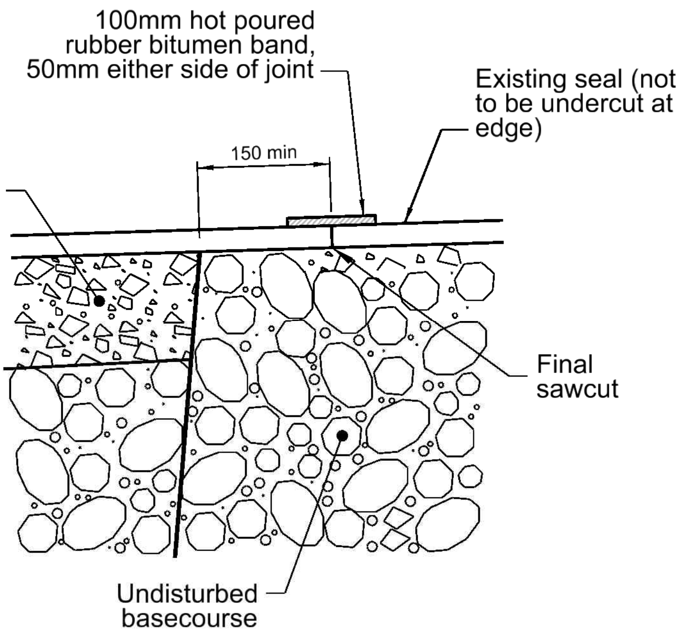
PEDESTRIAN ISLAND WITH 1.5m CROSSING
1:100

NOTE: Whole numbers = mm, decimalised numbers = m.



2 COAT LAPPING SEAL DETAIL





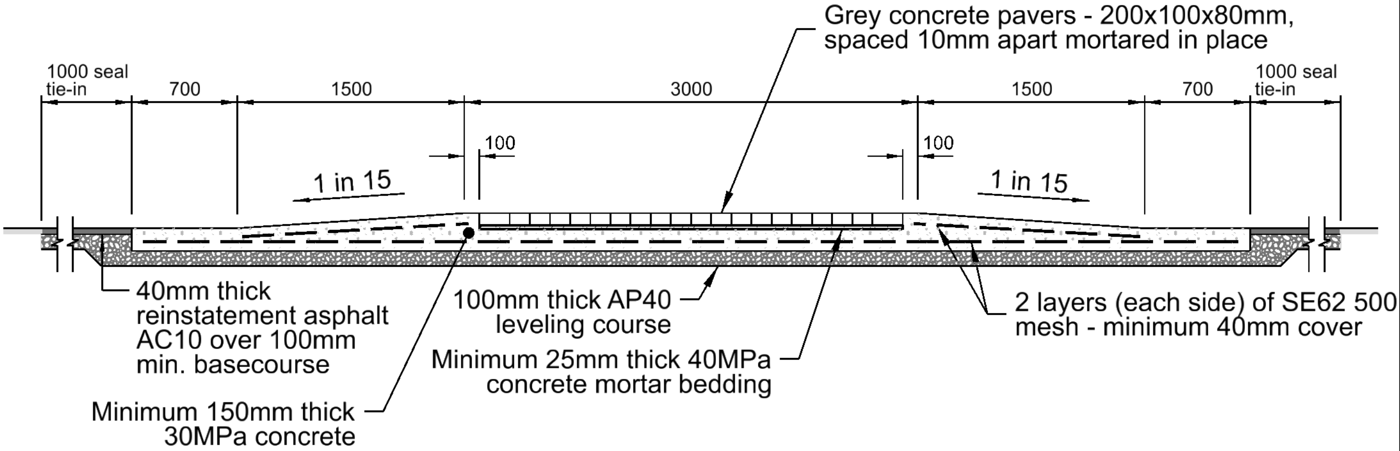
ASPHALTIC CONCRETE JOINING DETAIL

ASPHALTIC CONCRETE JOINING DETAIL

NOTES:

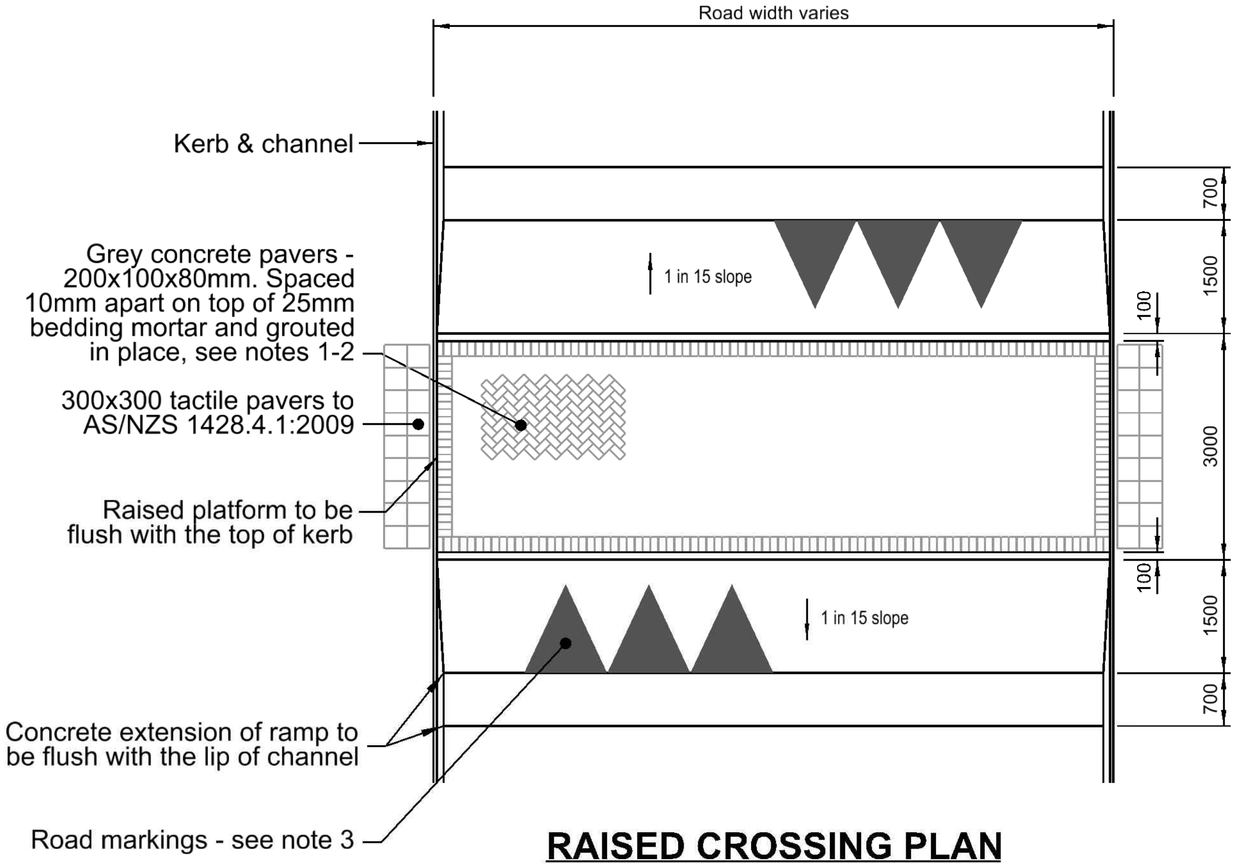
1. All sawcut joints in asphalt pavement must be sealed with approved hot poured rubber bitumen in accordance with NZTA, TNZ C/6
2. Pavement joint construction shall meet the National Code of Practice for utility operators access to transport corridors
3. All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**PAVEMENT JOINT DETAILS**	NOT TO SCALE	**R21**



TYPICAL CROSS SECTION OF 3m PAVED RAISED PLATFORM

1:50



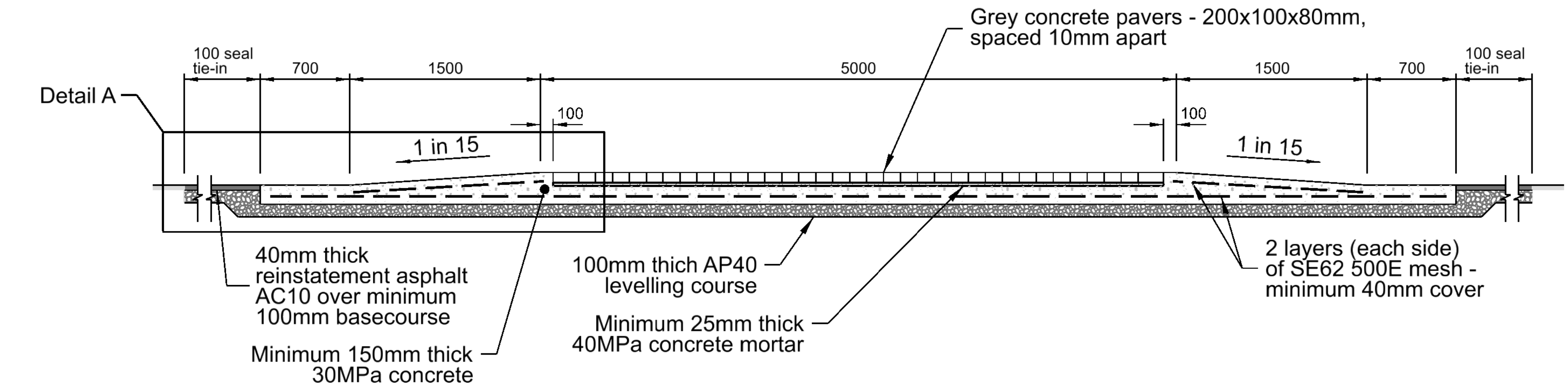
RAISED CROSSING PLAN

1:100

NOTES:

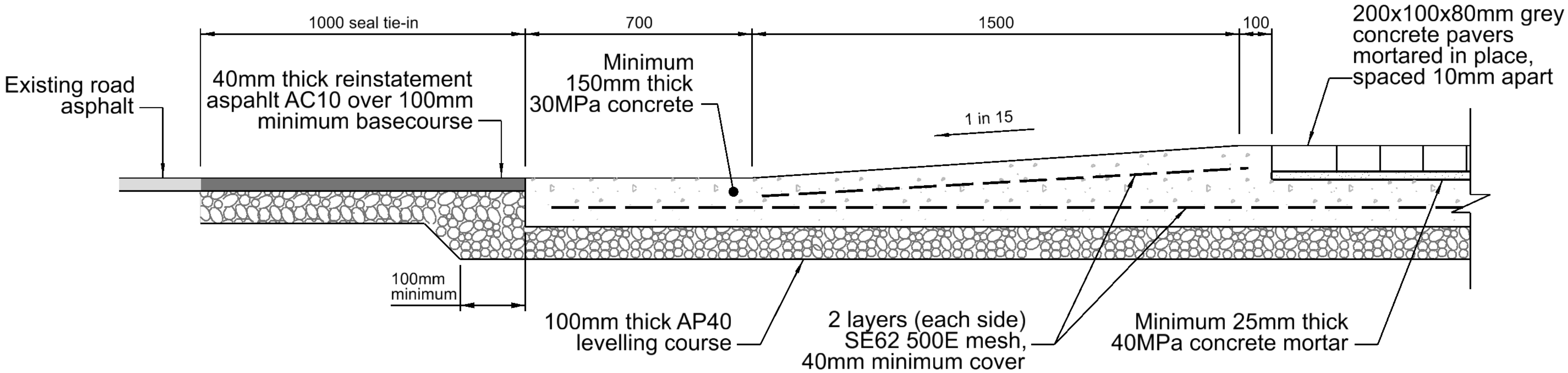
1. 200x100x80mm grey concrete pavers to be laid in a herring bone pattern 45° to traffic direction with a border of soldier course as shown, spaced 10mm apart
2. Pavers are to be laid on 25mm bedding mortar then grouted in place. Recommended bedding mortar is Ultra Scape Pro-Bed HS and for grout is Ultra Scape Flowpoint - both available from Horizon International (or similar approved)
3. White reflectorized painted arrows
4. All dimensions are in mm

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	3.0m PAVED RAISED PLATFORM	1:50, 1:100	R22



TYPICAL CROSS SECTION OF 5m PAVED RAISED PLATFORM

1:50



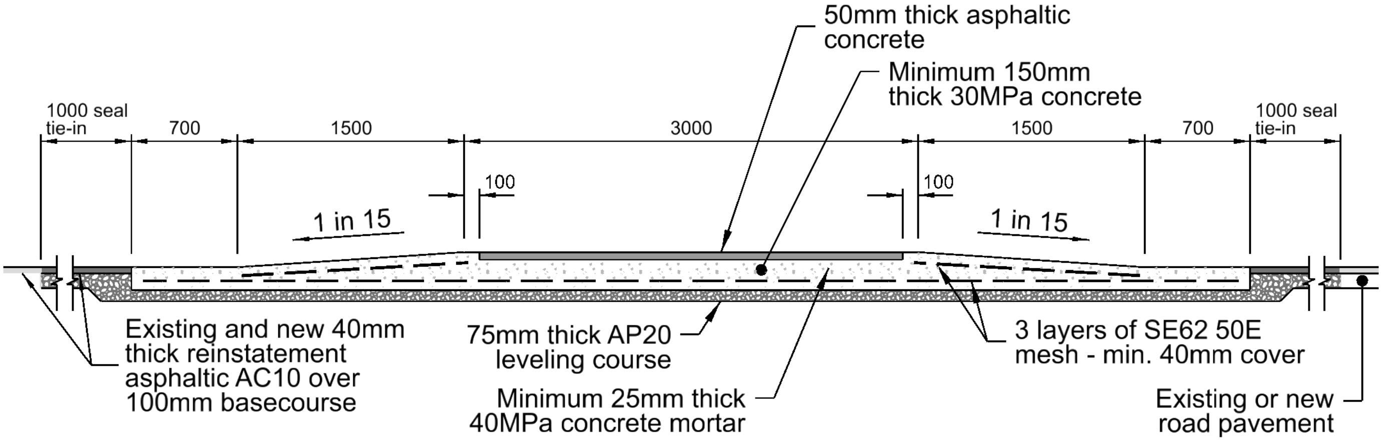
DETAIL A

1:20

NOTES:

1. 200x100x80mm grey concrete pavers to be laid in a herring bone pattern 45° to traffic direction with a border of soldier course as per Dwg R22. Pavers to be spaced 10mm apart
2. Pavers are to be laid on 25mm bedding mortar then grouted in place. Recommended bedding mortar is Ultra Scape Pro-Bed HS and for grout is Ultra Scape Flowpoint - both available from Horizon International (or similar approved)
3. All dimensions are in mm.

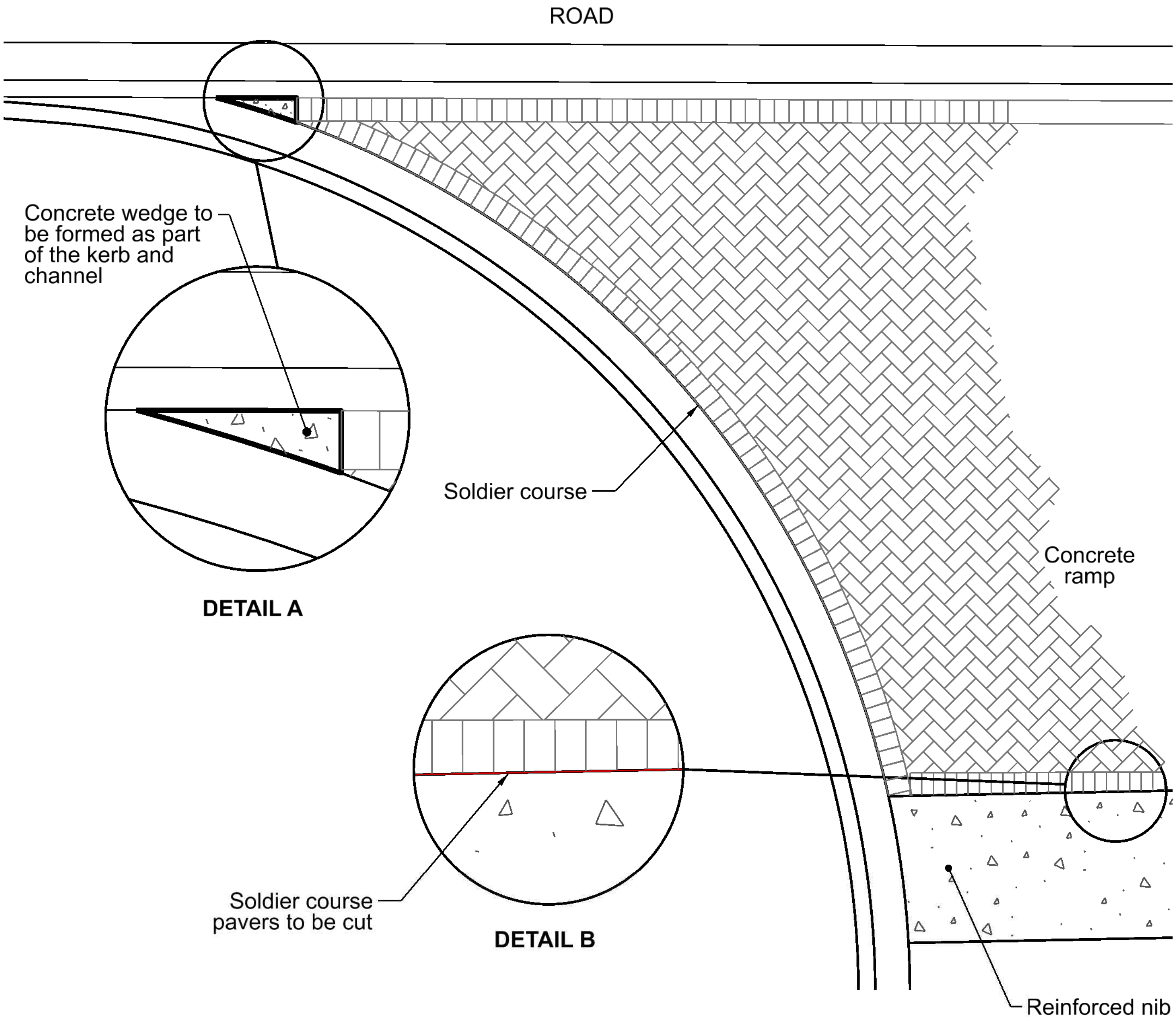
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**5.0m PAVED RAISED PLATFORM**	1:50, 1:20	**R23**



TYPICAL CROSS SECTION OF 3m ASHPALT RAISED PLATFORM

1:50

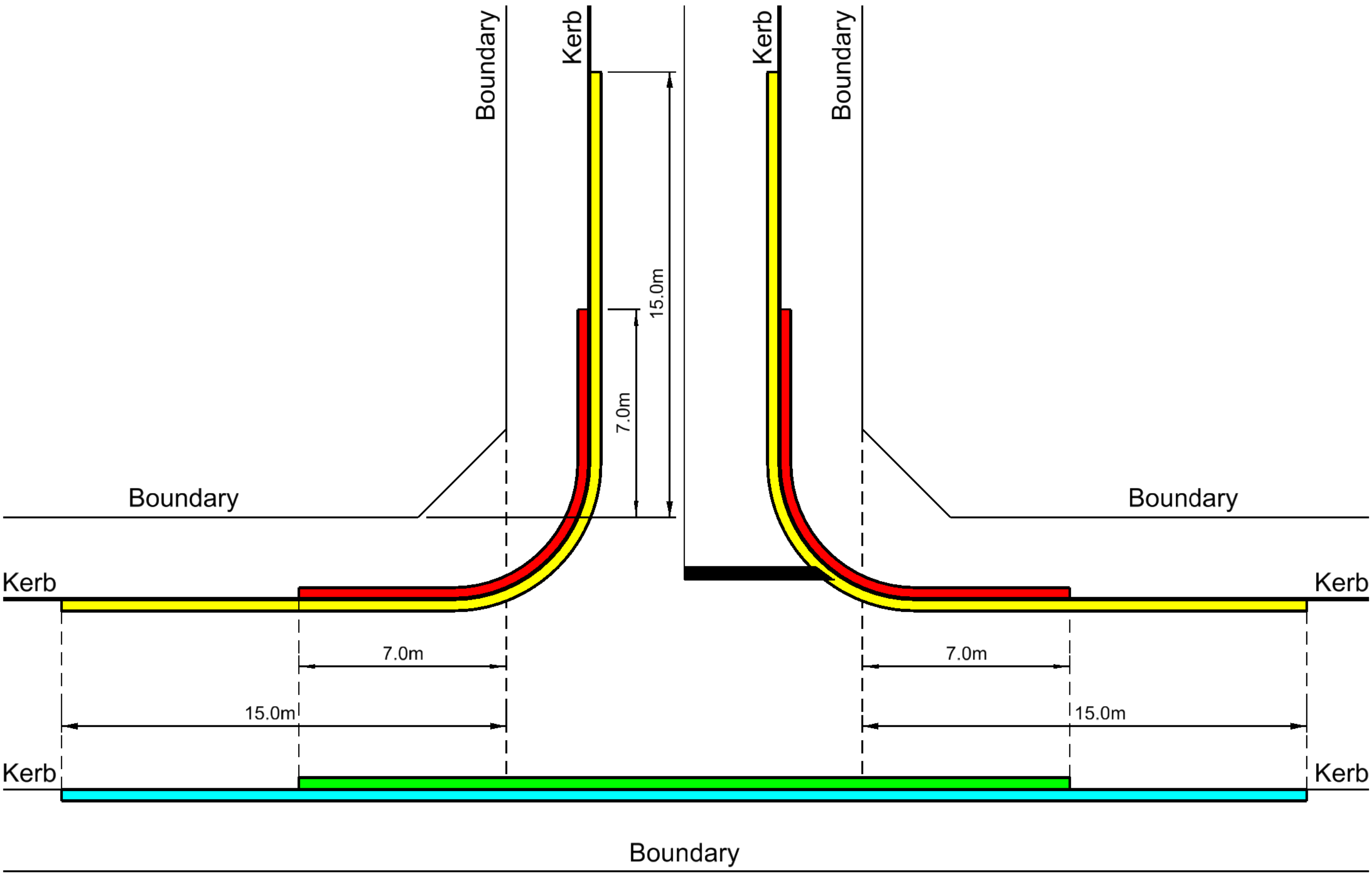
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**3.0m ASPHALT RAISED PLATFORM**	1:50	**R24**



BLOCK PATTERNS AND LAYING METHODS FOR STREET THRESHOLDS, RESIDENTIAL

NOTES:

1. Concrete wedge (Detail A) shall be formed as part of the kerb and channel
2. In order to achieve more than half a paver or no part paver having maximum dimensions in two perpendicular directions not less than 50mm, the herringbone pattern is to be adjusted to suit
3. A soldier course is required around the total perimeter of the paved area. Pavers abutting the concrete ramp shall be cut so as to accommodate minor non-parallel discrepancies (Detail B)
4. The herringbone pattern shall be laid at 45° to the traffic flow.



No vehicle crossings permitted collector, principal and arterial roads

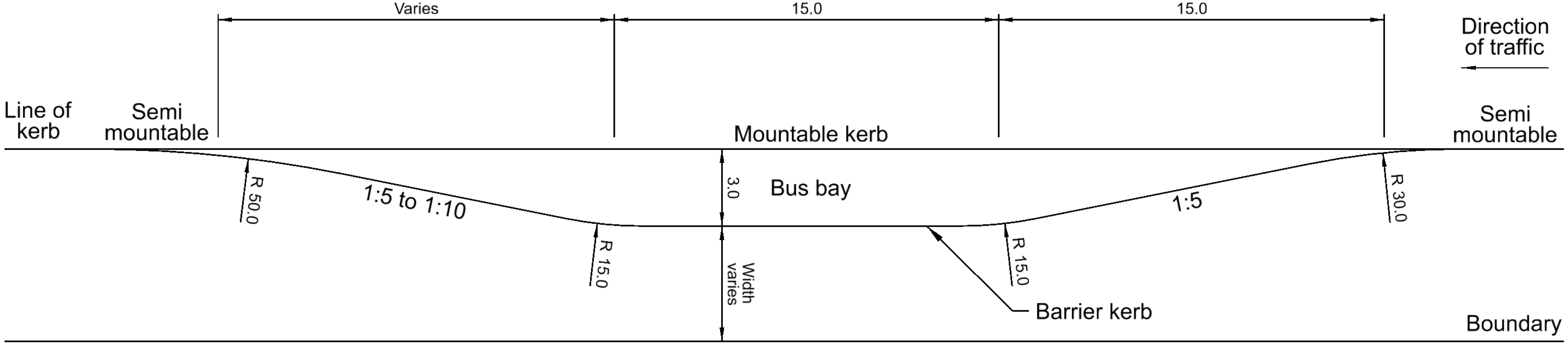
No vehicle crossings permitted local roads

No vehicle crossings permitted for multi unit development with 2 or more dwellings, for collector, principal and arterial roads

No vehicle crossings permitted for multi unit development with 2 or more dwellings, for local roads

NOTE: Refer to section 3.3.17.1.1 - Location of urban vehicle crossings

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**PROHIBITED LOCATIONS OF DRIVEWAYS**	1:250	**R26**



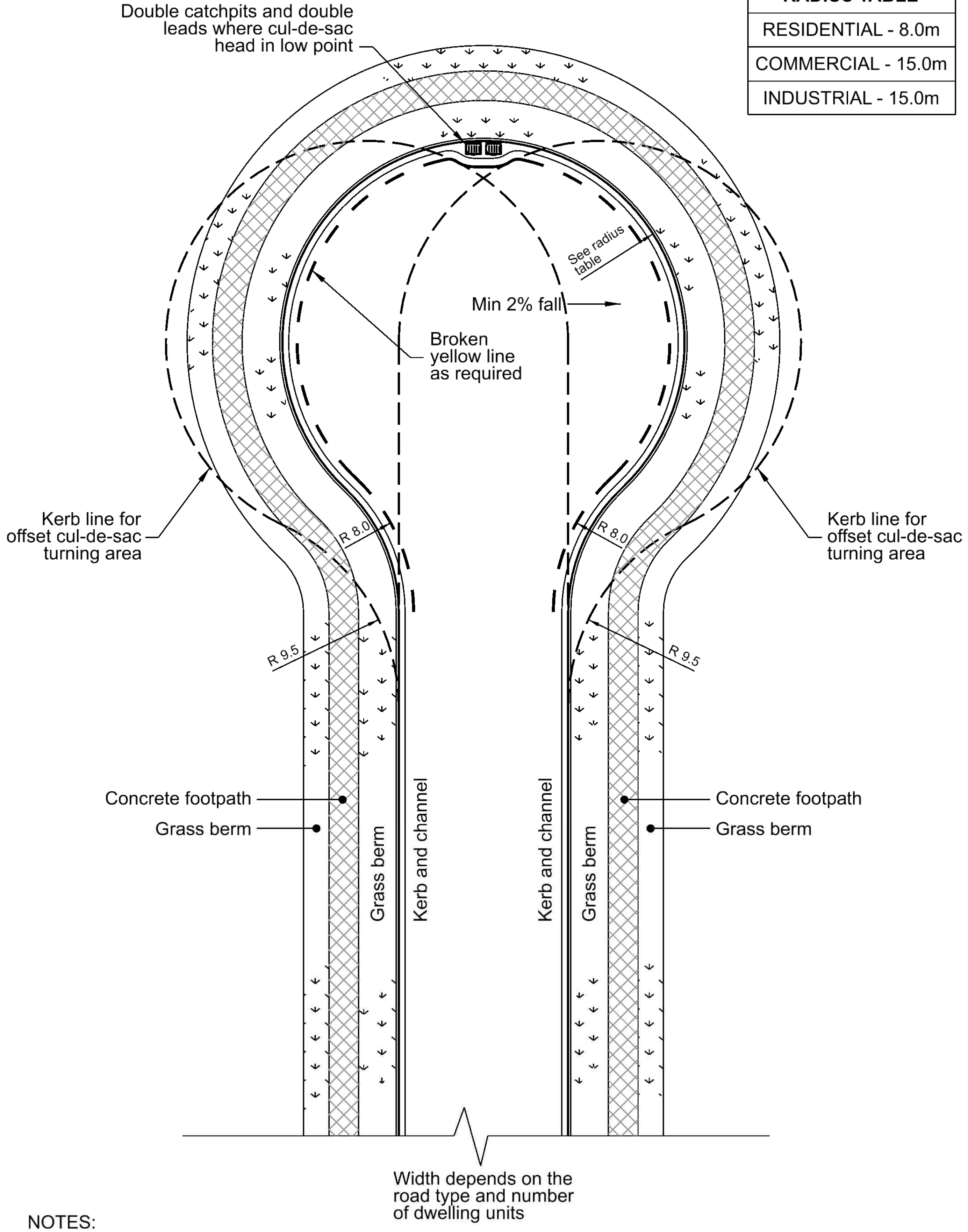
TYPICAL INDENTED 3.0m BUS BAY LAYOUT

1:250

Source:
VicRoads (2002b)

NOTES:

1. This bus bay is suitable for 50kph (or below) zones. NCC are to approve designs for faster zones
2. All measurements in metres.

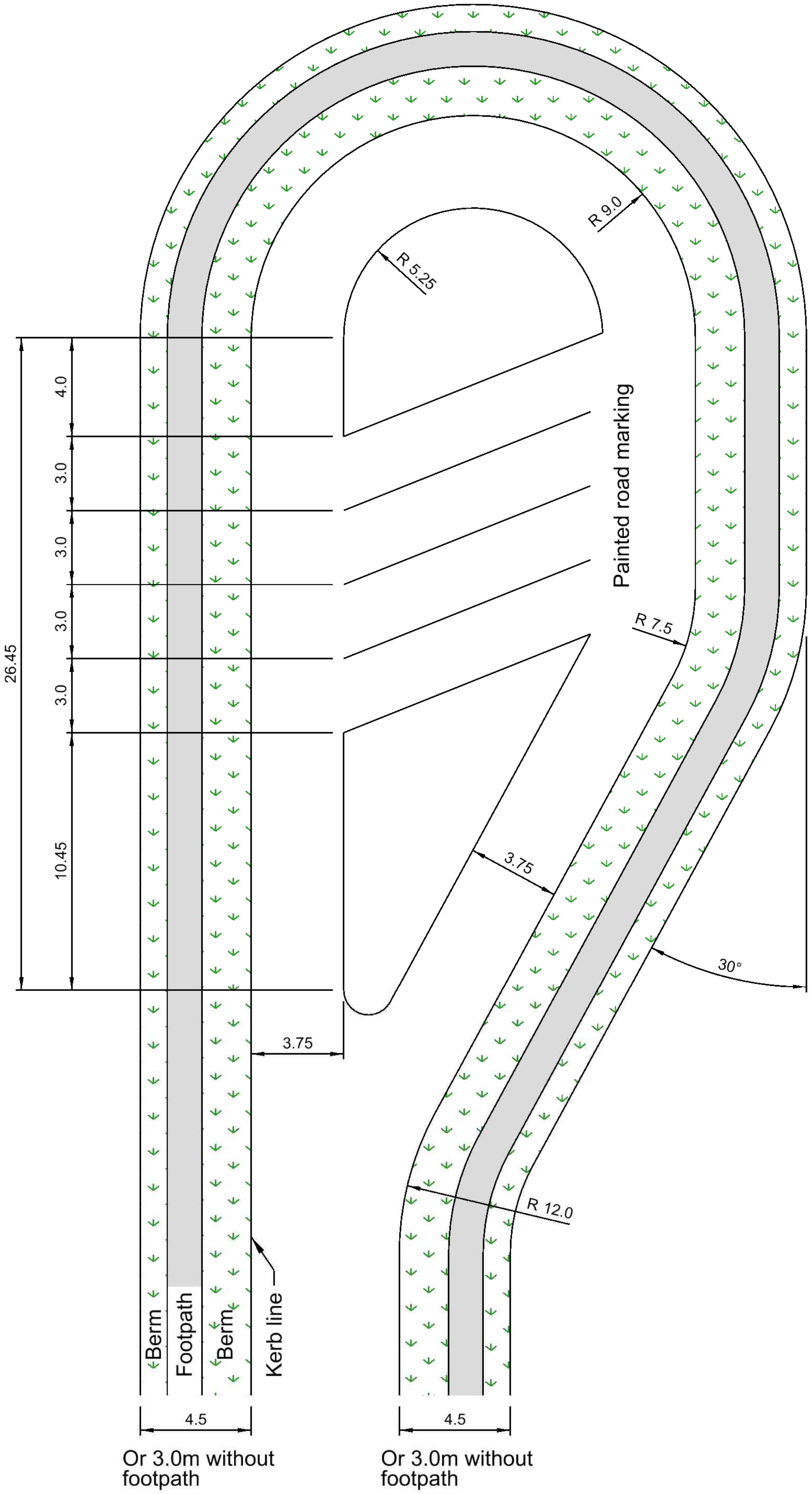


RADIUS TABLE
RESIDENTIAL - 8.0m
COMMERCIAL - 15.0m
INDUSTRIAL - 15.0m

NOTES:

1. Yellow broken lones shall be marked where required
2. Minimum kerb gradient arcs 0.3%
3. All dimensions are in metres.

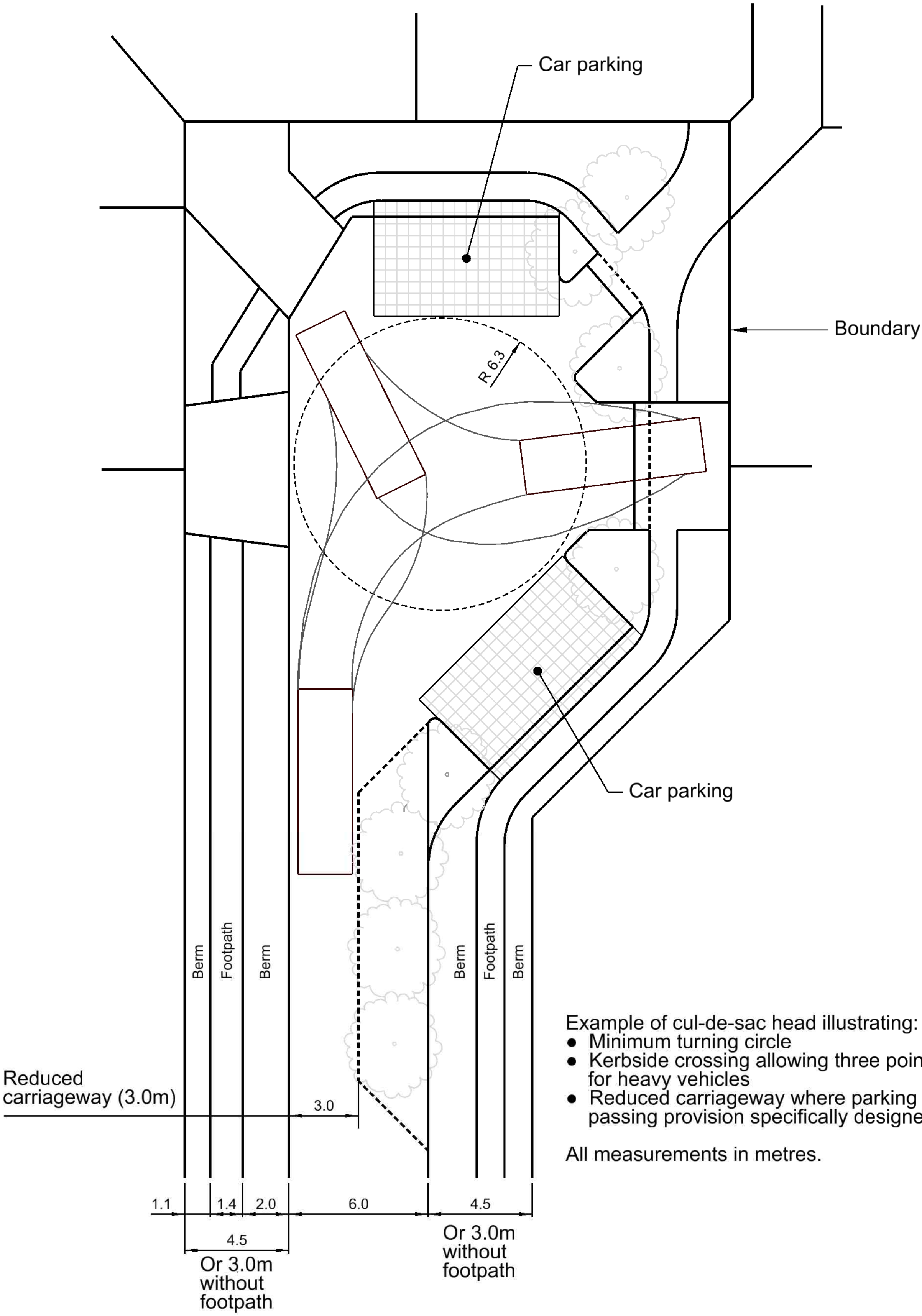
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	DIMENSIONS OF CUL-DE-SAC TURNING AREAS	NOT TO SCALE	R28



NOTES:

1. Design drawings shall clearly indicate the tracking path of the design vehicle
2. All dimensions are in metres.

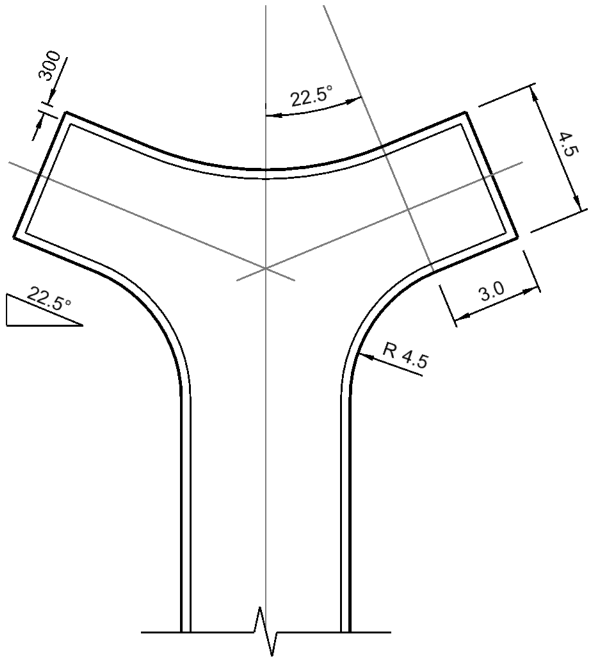
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	ALTERNATIVE RESIDENTIAL CUL-DE-SAC DETAILS	1:250	R29



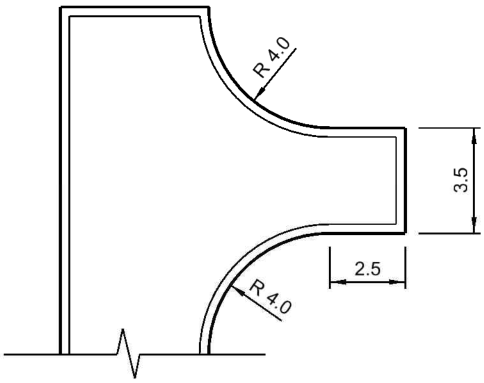
Example of cul-de-sac head illustrating:
- Minimum turning circle
- Kerbside crossing allowing three point turn for heavy vehicles
- Reduced carriageway where parking and passing provision specifically designed

All measurements in metres.

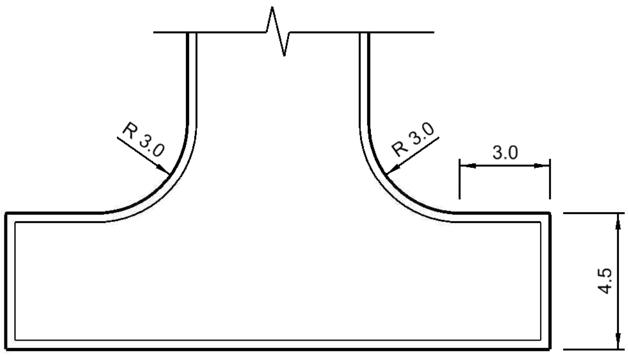
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**T & Y TURNING HEADS**	NOT TO SCALE	**R30**



Y TURNING



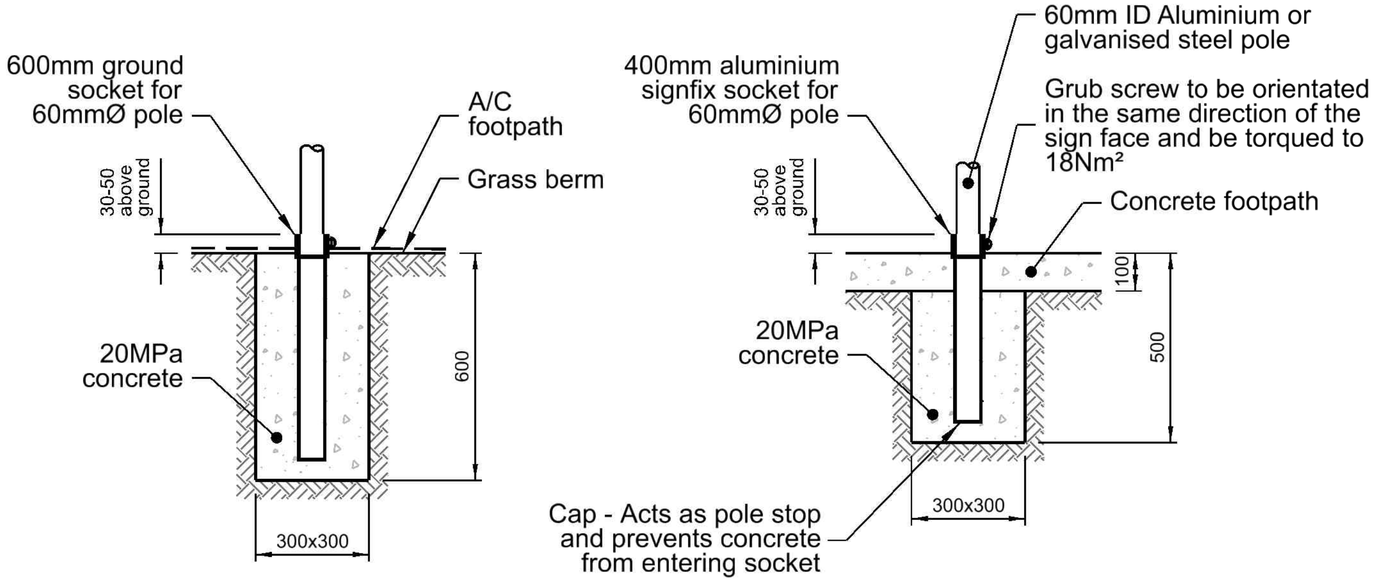
L TURNING



T TURNING

NOTE: Whole numbers = mm, decimalised numbers = m.

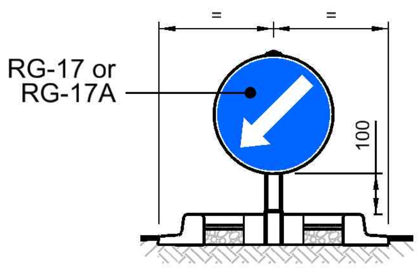
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	TURNING AREA FOR PRIVATE ROADS AND ACCESSWAYS	1:25	R31



A/C FOOTPATH
& GRASS BERM

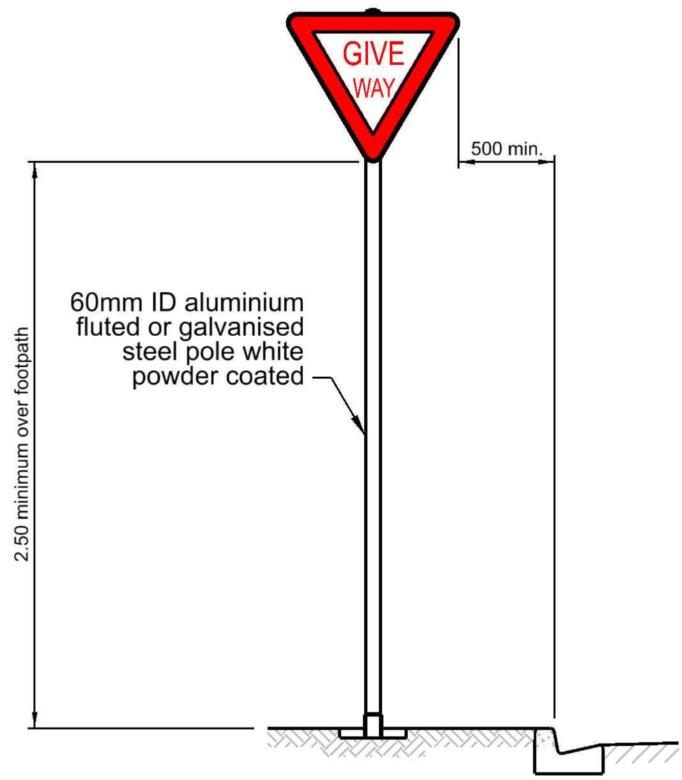
CONCRETE FOOTPATH

GROUND SOCKET FOUNDATION DETAILS



SPLITTER ISLAND

SIGN LOCATIONS



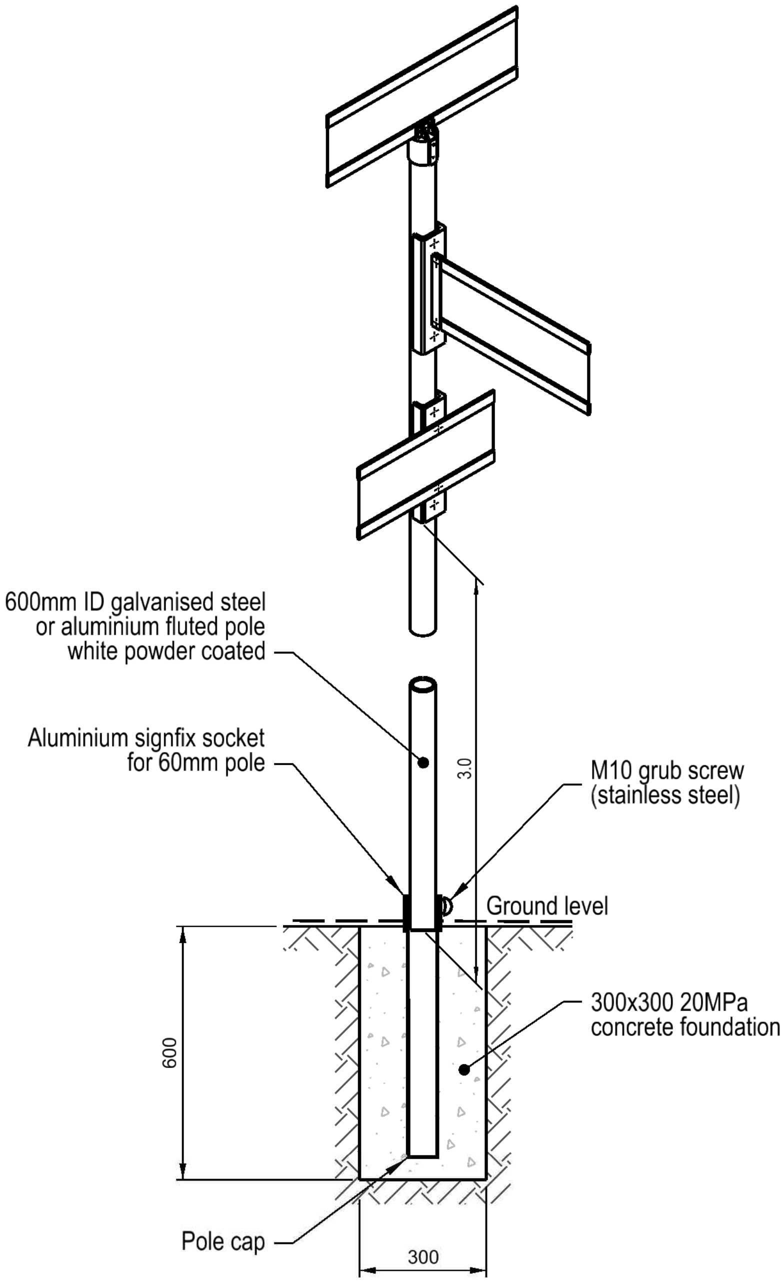
BERM

SIGN LOCATIONS

NOTES:

1. USE OF RAPID SET CONCRETE MIX IS PROHIBITED
2. A plastic cap shall be fitted on the top end of the pole
3. For bus stop signs the spacing between kerb face and pole must be 400mm
4. Also refer to Dwg No. R33 for foundation details
5. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	STANDARD SIGN INSTALLATION	NOT TO SCALE	R32



NOTES:

1. Plate sizes -
   - Not less than 200mm for CBD, Arterials and Principal Roads
   - Not less than 159mm for all others

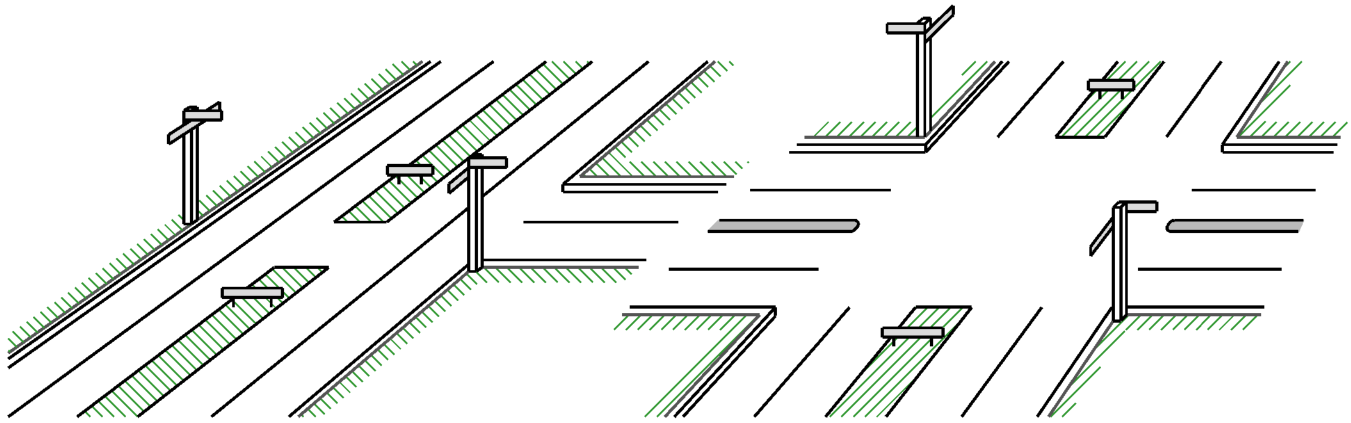
2. Plate specifics -
   - Letter Height: 100mm
   - Letter Style: Series C
   - Letter Spacing: AS 1744:2015 (Medium)
   - Letter Colour: Reflectorised White
   - Blade Depth: 159mm and 200mm
   - Blade Material: Aluminium Extrusion
   - Background Material: Reflectorised Blue

3. A plastic cap shall be fitted on the top end of the pole where no cross road sign is mounted

4. Also refer to Dwg No. R35 for foundation details

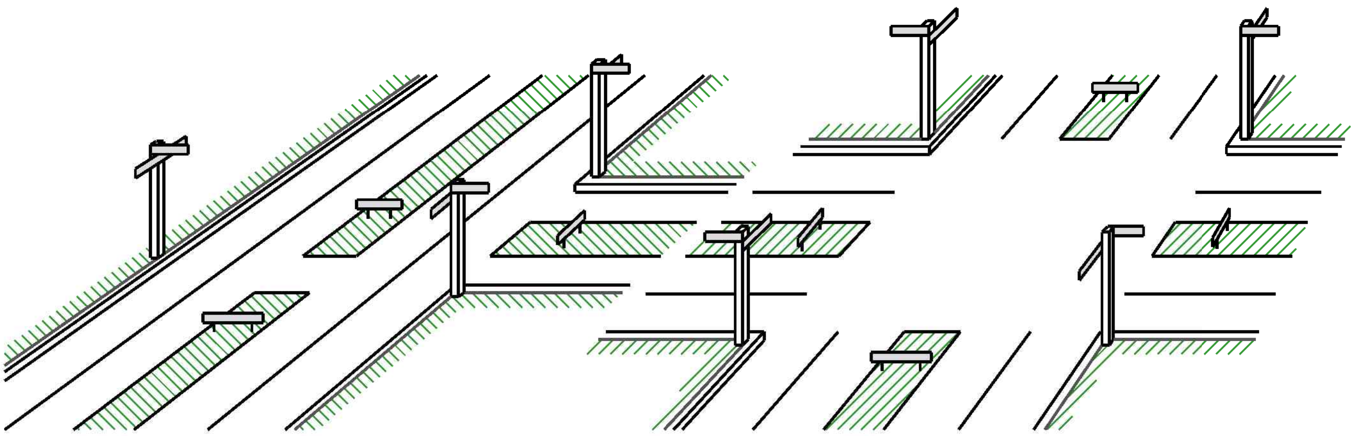
5. Whole numbers to be mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	ROAD NAME PLATE MOUNTING DETAILS	NOT TO SCALE	R33



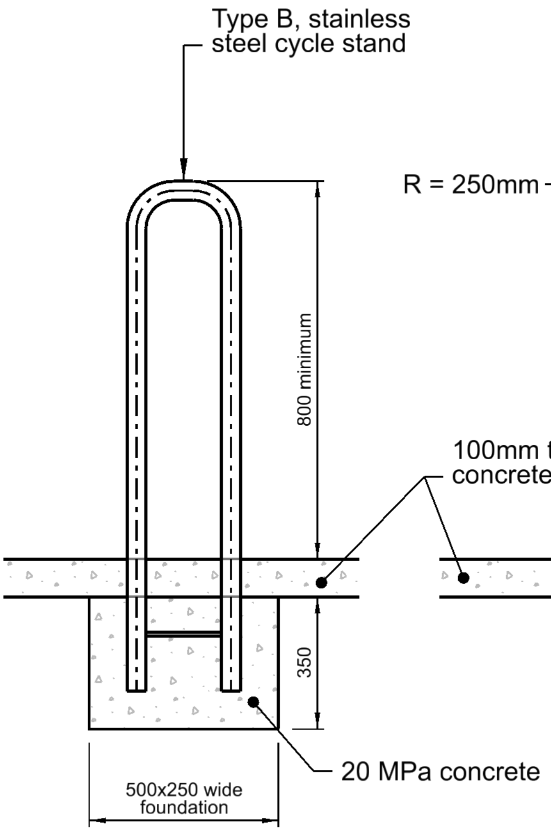
SIGNING FOR ARTERIAL/LOCAL & ARTERIAL/ARTERIAL INTERSECTIONS

(Where one Arterial is Dual Carriageway)

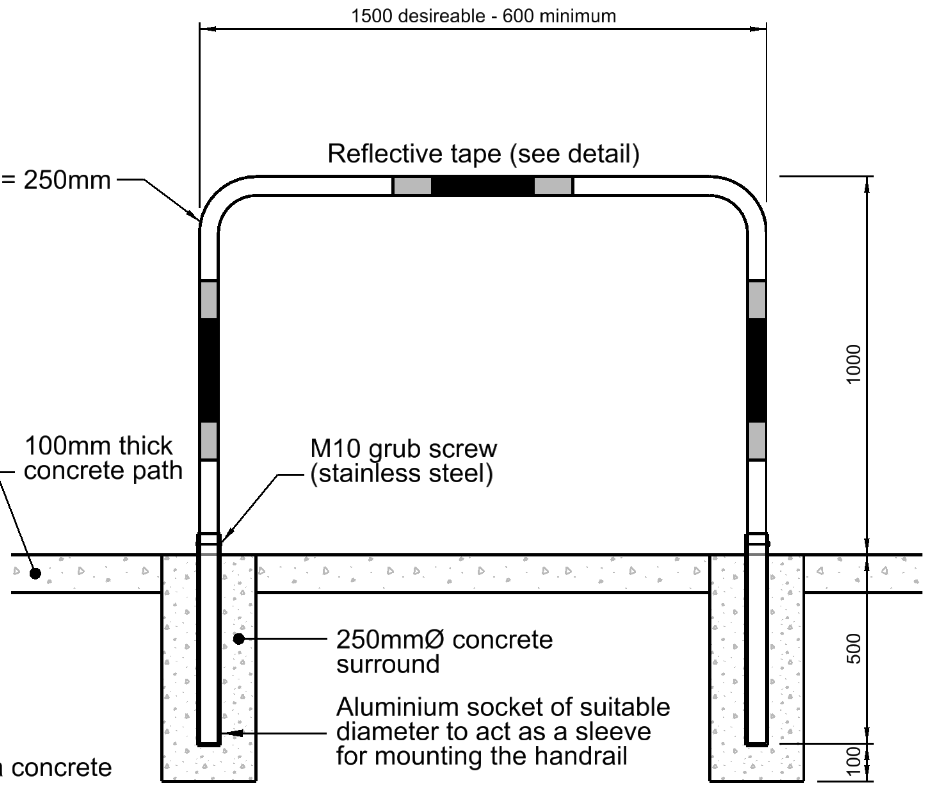


SIGNING FOR ARTERIAL/ARTERIAL INTERSECTIONS

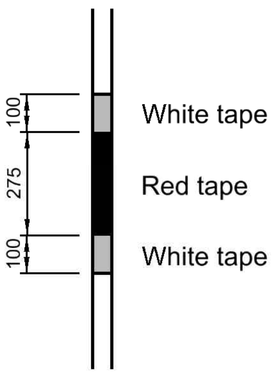
(Where both Arterials are Dual Carriageway)



BIKE STAND DETAIL
1:20

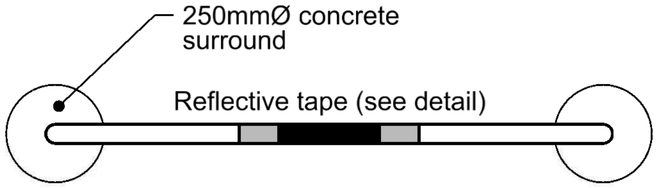


HOLDING RAIL ELEVATION
1:20



Reflective tape to be Class 1 (AS1906.1)

REFLECTIVE TAPE DETAIL
1:20

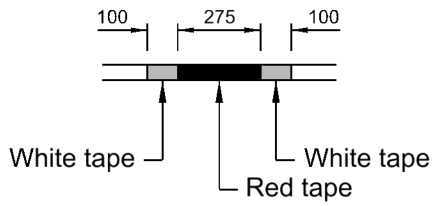


HOLDING RAIL PLAN
1:20

NOTES:

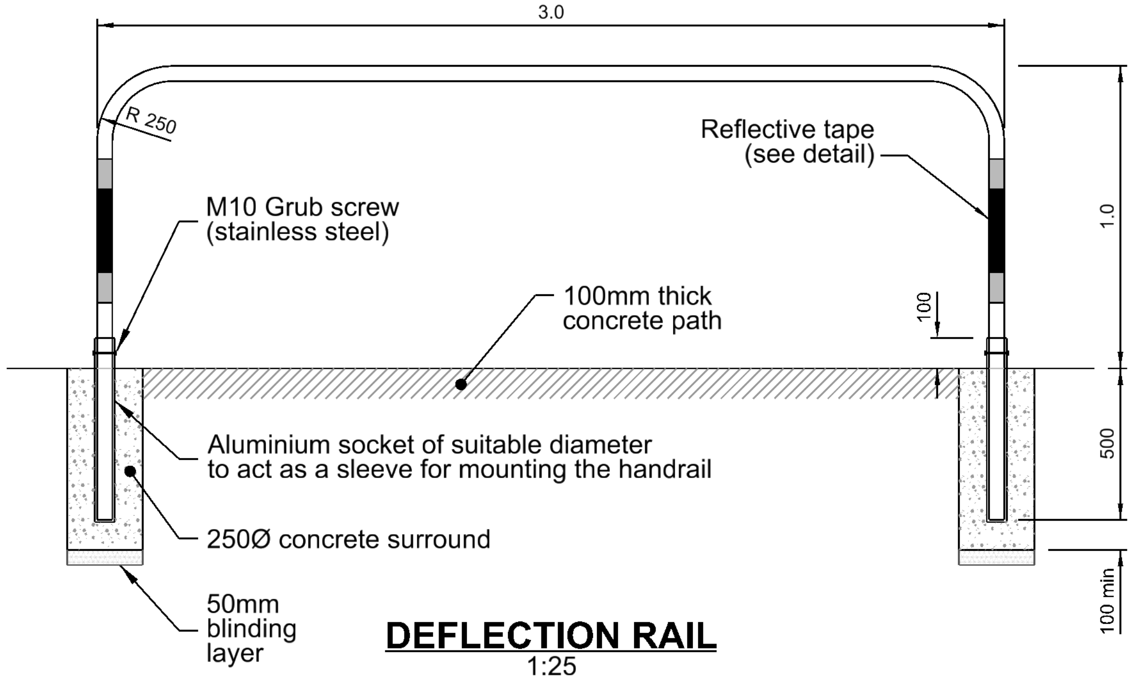
1. Hand rails to be made from 50mmØ medium wall thickness galvanised tube and powder coated white
2. Hold bars are to comply with Austroads Design Guides
3. Reflective tape to be Class 1 (AS/NZS 1906.1:2017)
4. All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	CYCLIST HOLDING RAIL AND BIKE STAND DETAILS	1:20	R35

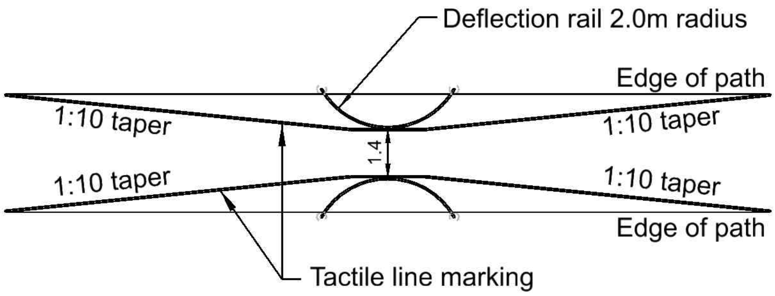


Reflective tape to be
Class 1 (AS 1906.1)

REFLECTIVE TAPE DETAIL
1:25



DEFLECTION RAIL
1:25

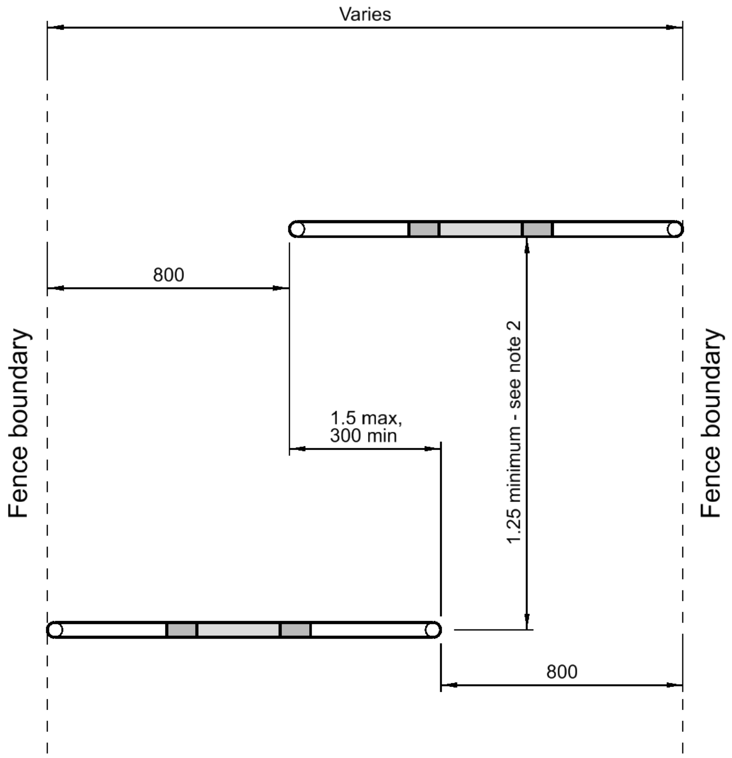


PLAN OF DEFLECTION RAIL SETUP
1:200

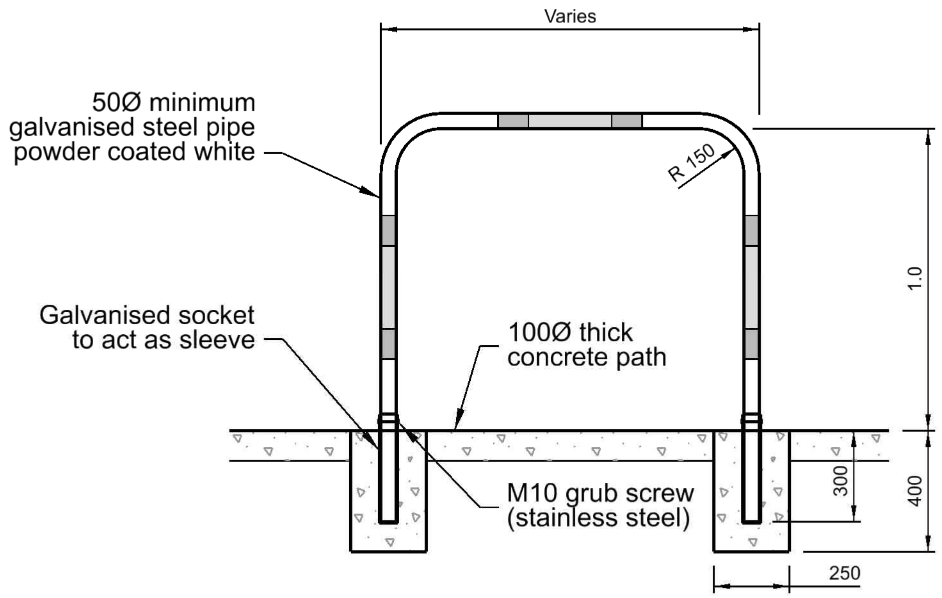
NOTES:

1. Hand rails to be made from 50mmØ medium wall thickness galvanised tube then powder coated white
2. Hold bars are to comply with Austroads "Design Guides"
3. Tape to be Class 1 (AS/NZS 1906.1:2017)
4. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	CYCLIST DEFLECTION RAIL DETAIL	1:25, 1:200	R36



PLAN
1:25



ELEVATION
1:25

NOTES:

1. Refer to Dwg. No. R35 for reflective tape and foundation details
2. 1.25m minimum clearance to allow access by mobility scooters
3. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	MOTOR VEHICLE RAIL BARRIER	NOT TO SCALE	R37

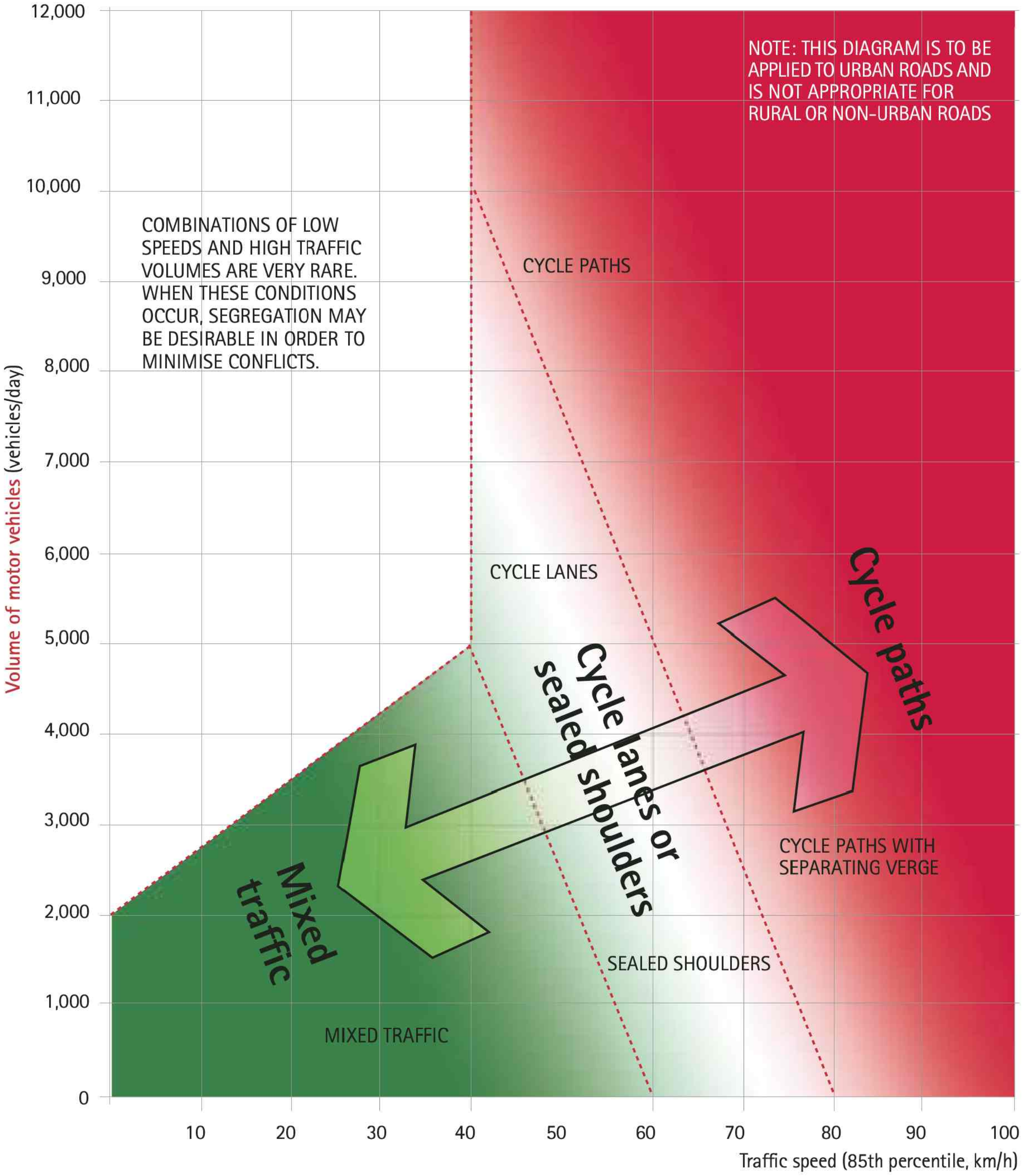


Figure 6.1: Preferred separation of bicycles and motor vehicles according to traffic speed and volume.
This diagram is based on RTA NSW (2003) and Jensen et al (2000), also DELG (1999), Ove Arup and Partners (1997) and CROW 10 (1993).

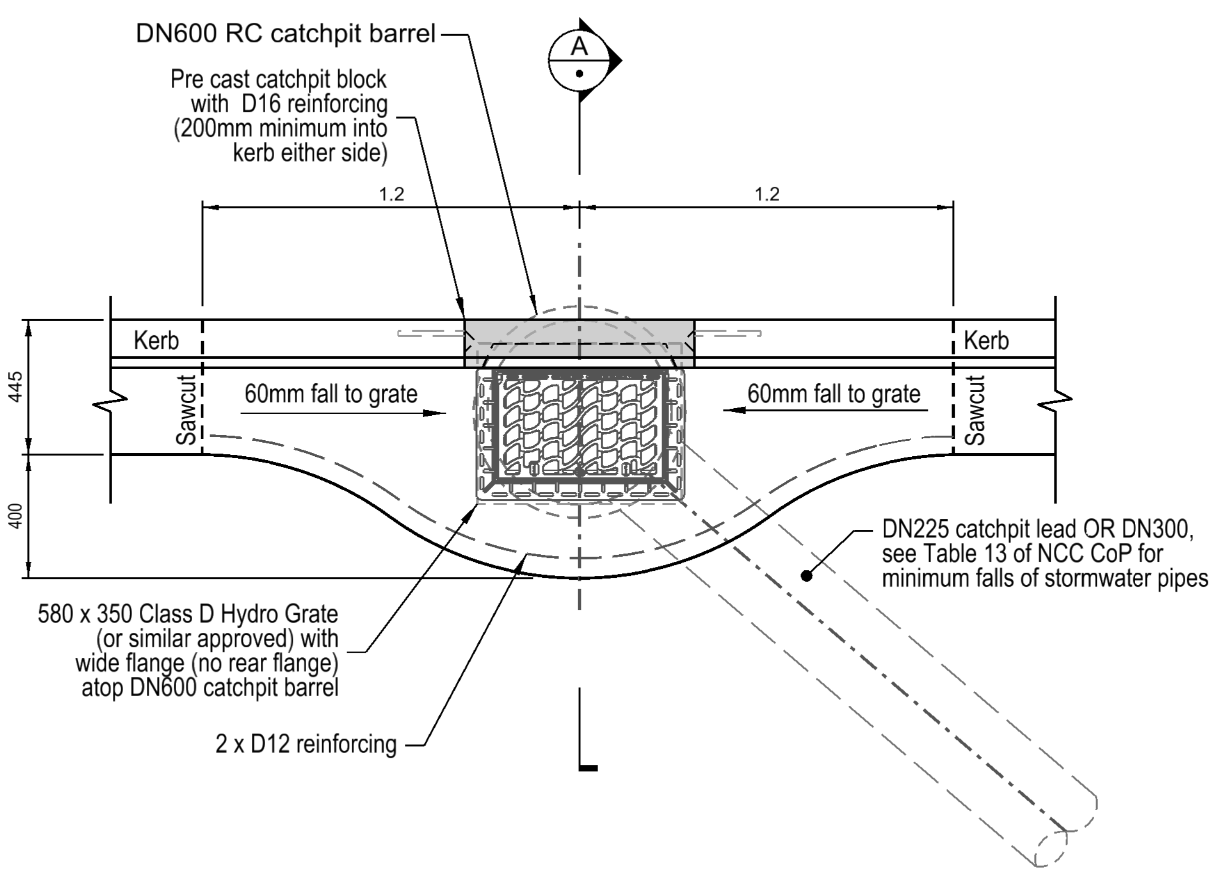
Figure 6.1: Notes

1. In general, roads with higher traffic speed and traffic volumes are more difficult for cyclists to negotiate than roads with lower speeds and volumes. The threshold for comfort and safety for cyclists is a function of both traffic speed and volume, and varies by cyclist experience and trip purpose. Facilities based on this chart will have the broadest appeal.

2. When school cyclists are numerous or the route is primarily used for recreation then path treatments may be preferable to road treatments.

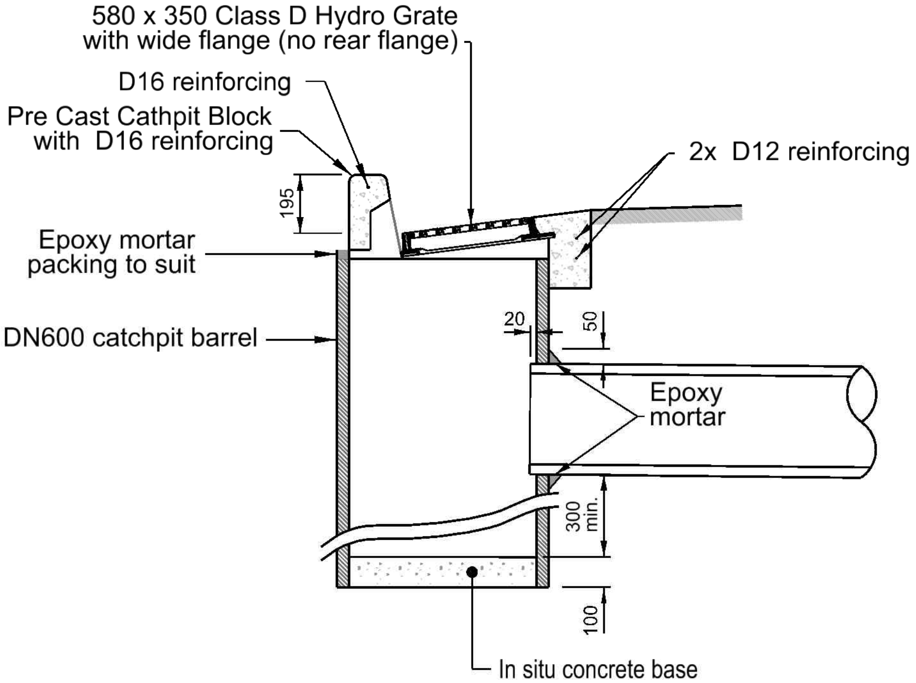
3. Provision of a cycle path does not necessarily imply that an on-road solution would not also be useful, and vice-versa. Different kinds of cyclists have different needs. Family groups may prefer off-road cycle paths while racing or training cyclists, or commuters, tend to prefer cycle lanes or wide sealed shoulders.

REFERENCE: http://www.nzta.govt.nz/assets/resources/cycle-network-and-route-planning/docs/cycle-network-and-route-planning.pdf



PLAN VIEW

Suitable where catchpit lead exits barrel other than perpendicular to grate

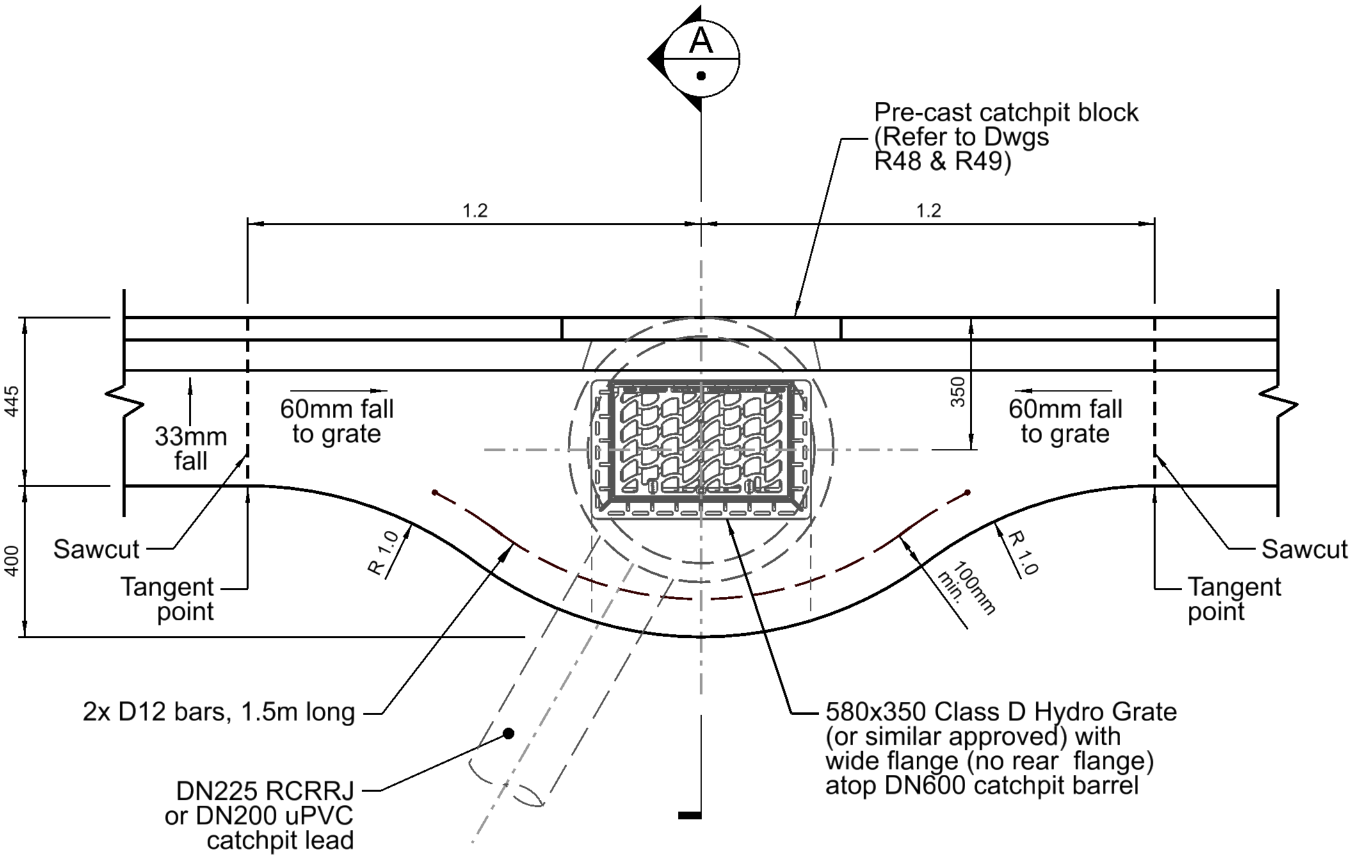


SECTION A-A

NOTES:

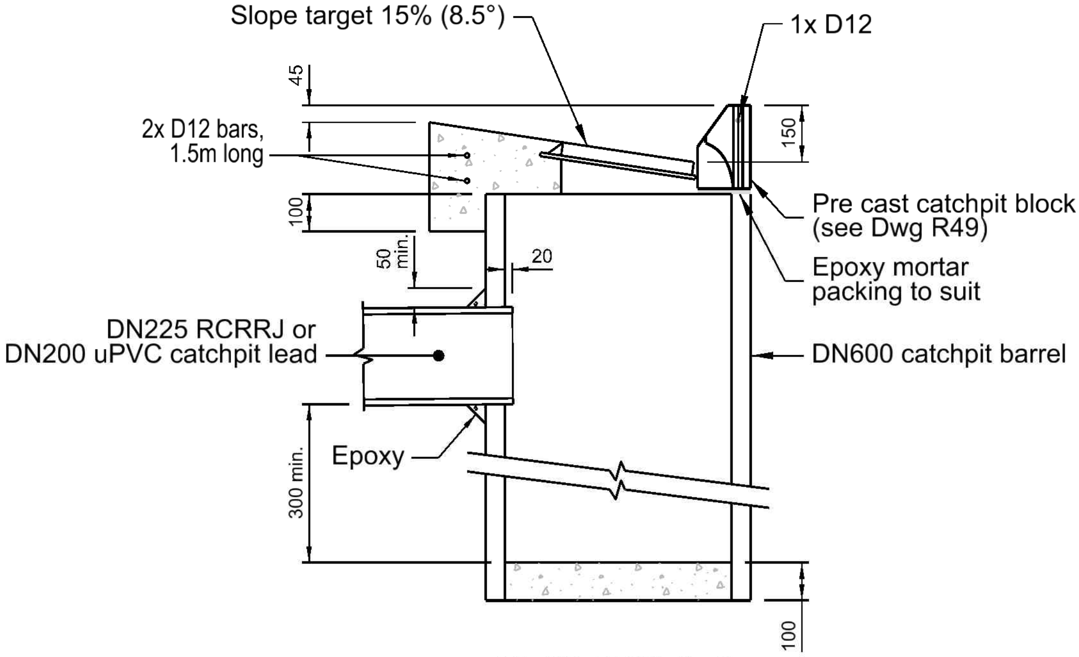
1. Concrete used for the forming of catchpit aprons shall be 20 MPa with a minimum slump value of 90mm unless stated otherwise
2. Where catchpits are situated within extruded kerbs, catchpit surrounds should be wet mix concrete, properly compacted
3. Kerb mix concrete shall NOT be used
4. All reinforcing to have min. 50mm cover
5. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	SINGLE CATCHPIT (CIRCULAR BARREL)	NOT TO SCALE	R39



SINGLE ROAD CATCHPIT

1:20



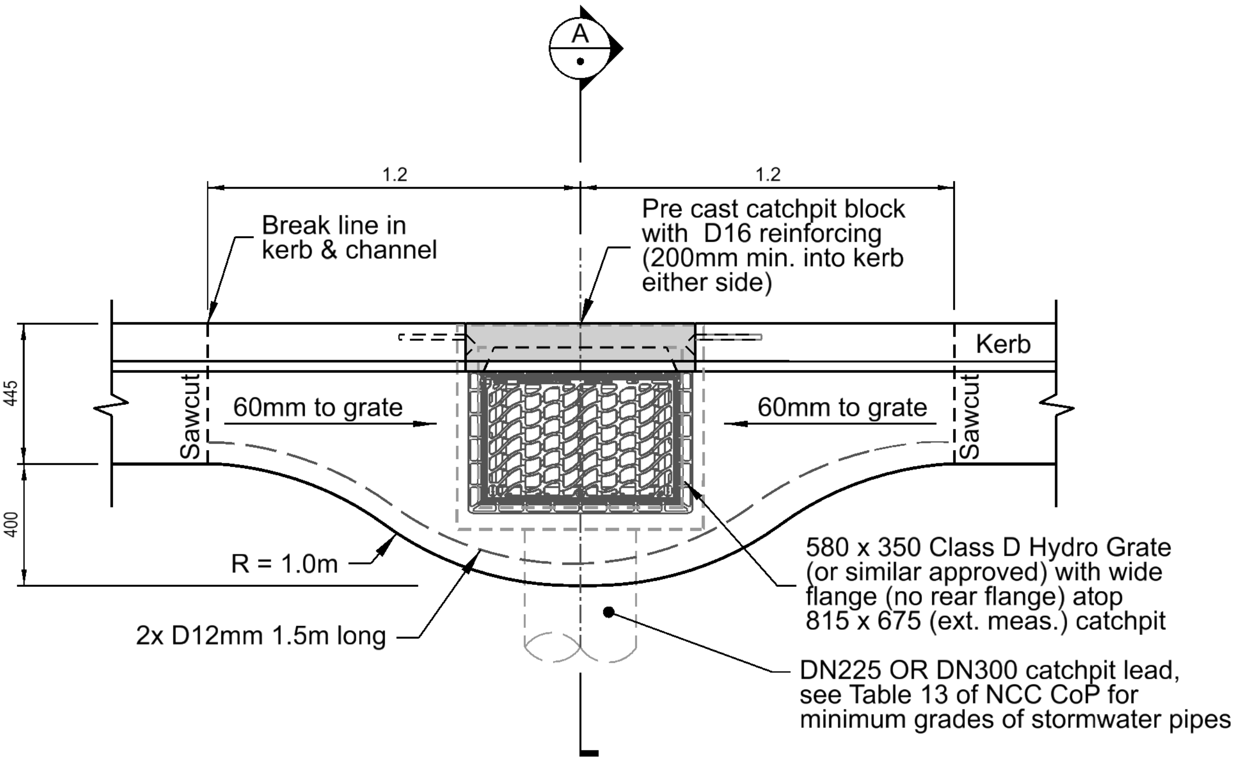
SECTION A-A

1:20

NOTES:

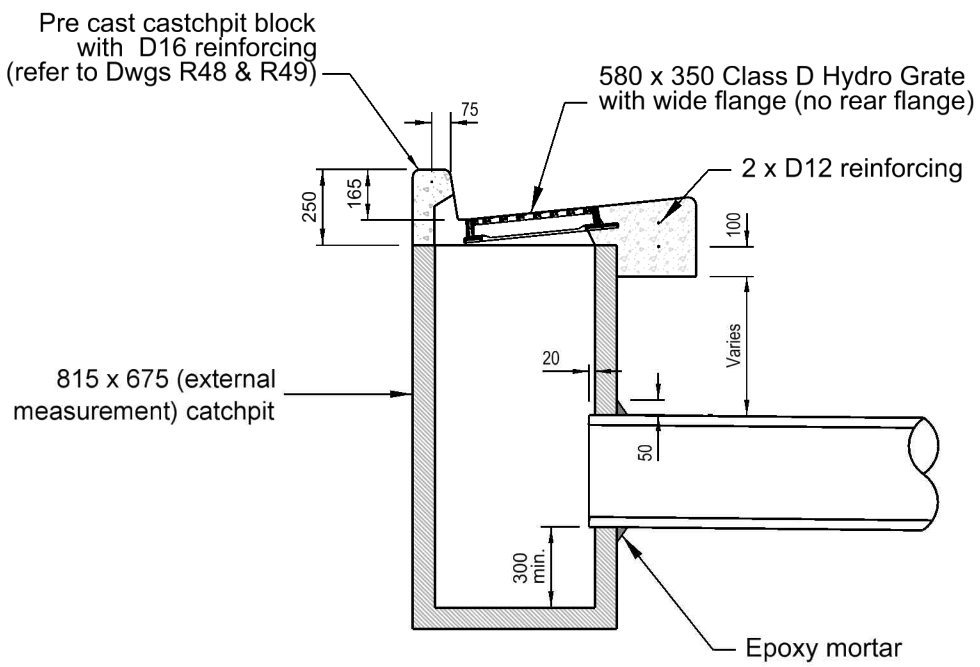
1. Where catchpits are situated within extruded kerbs, catchpit surrounds should be wet mix concrete, properly compacted
2. Concrete to be 20MPa, 90mm slump
3. See Table 13 of NCC CoP for minimum grades of stormwater pipes
4. Whole numbers to be mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	SINGLE CATCHPIT (CIRCULAR BARREL - MOUNTABLE KERB)	1:20	R40



PLAN VIEW

Suitable where catchpit lead exits barrel perpendicular to grate

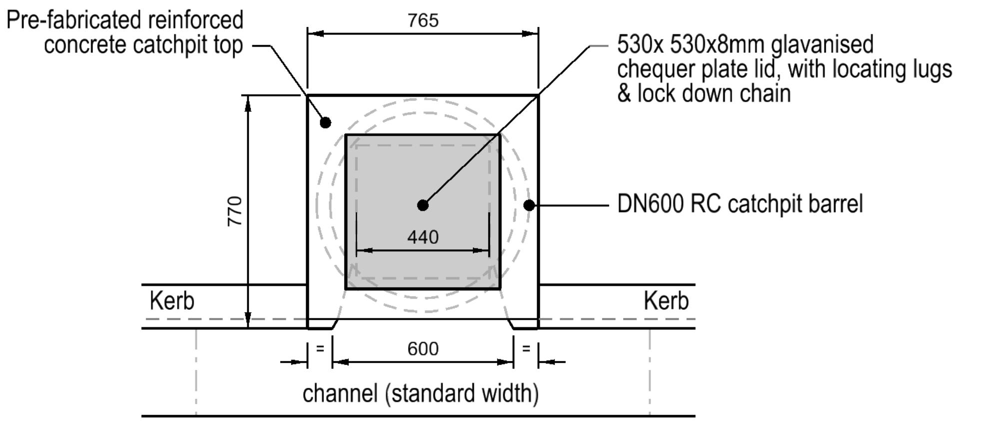


SECTION A-A

NOTES:

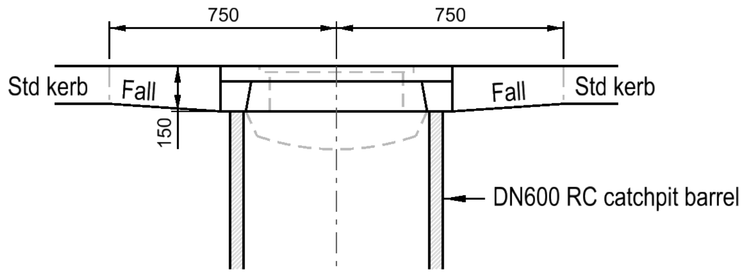
1. Concrete used for the forming of catchpit aprons shall be 20 MPa with a minimum slump value of 90mm unless stated otherwise
2. Where catchpits are situated within extruded kerbs, catchpit surrounds should be wet mix concrete, properly compacted
3. Kerb mix concrete shall NOT be used
4. All reinforcing to have minimum 50mm cover
5. For bedding/trench material, refer to drawings D02 and D03
6. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	SINGLE CATCHPIT (RECETANGULAR BARREL)	NOT TO SCALE	R41



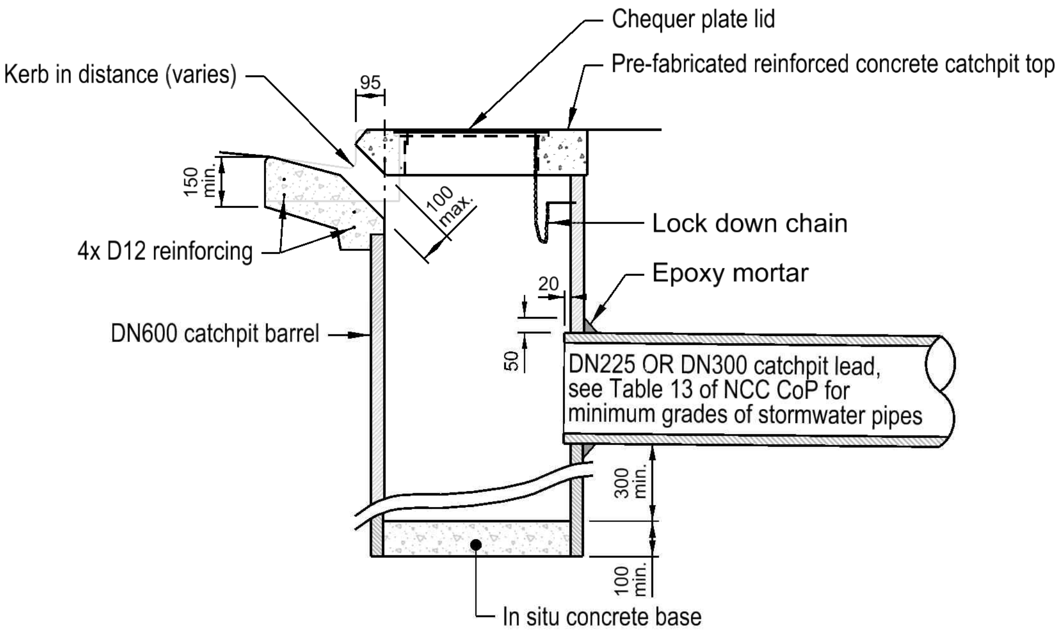
STANDARD RECESSED CATCHPIT

1:25



FRONT ELEVATION

1:25



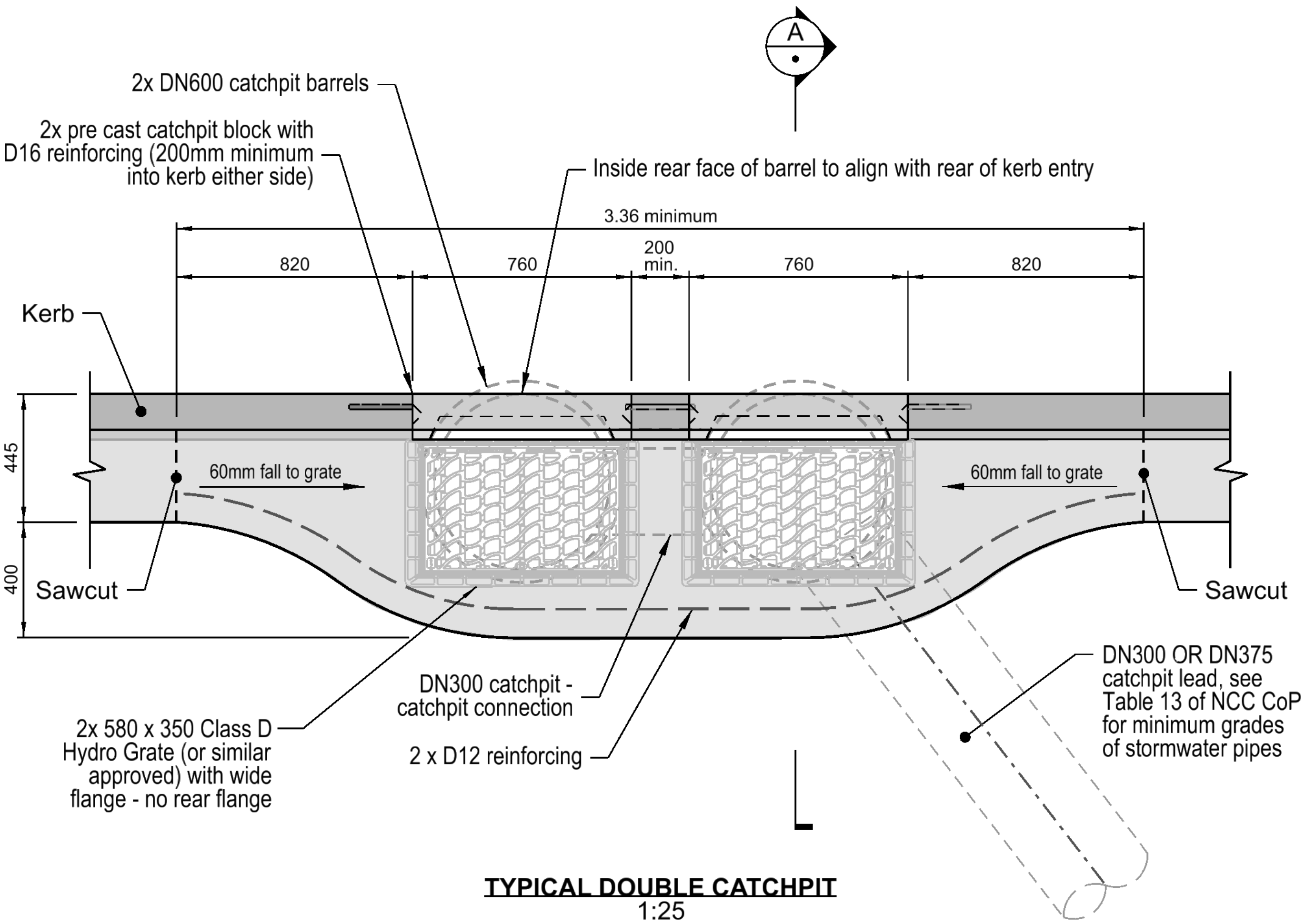
SECTIONAL VIEW

1:25

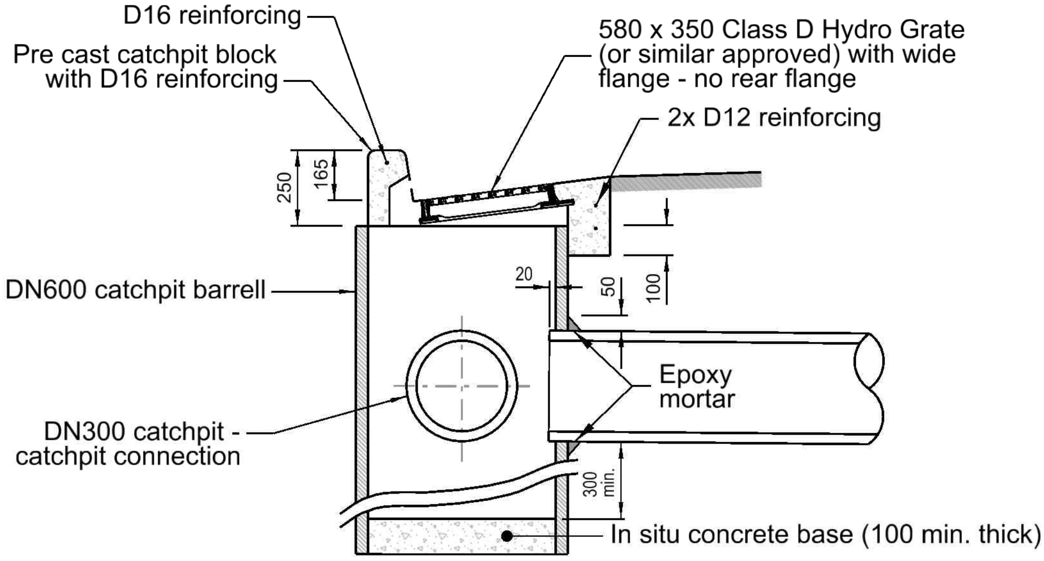
NOTES:

1. Concrete used for the forming of catchpit aprons shall be 20 MPa with a minimum slump value of 90mm unless stated otherwise
2. Where catchpits are situated within extruded kerbs, catchpit surrounds should be wet mix concrete, properly compacted
3. Kerb mix concrete shall NOT be used
4. All reinforcing to have minimum 50mm cover
5. All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	STANDARD RECESSED CATCHPIT	1:25	R42



TYPICAL DOUBLE CATCHPIT
1:25
(with circular catchpit barrels - Suitable where catchpit lead exits barrel other than perpendicular to grate)

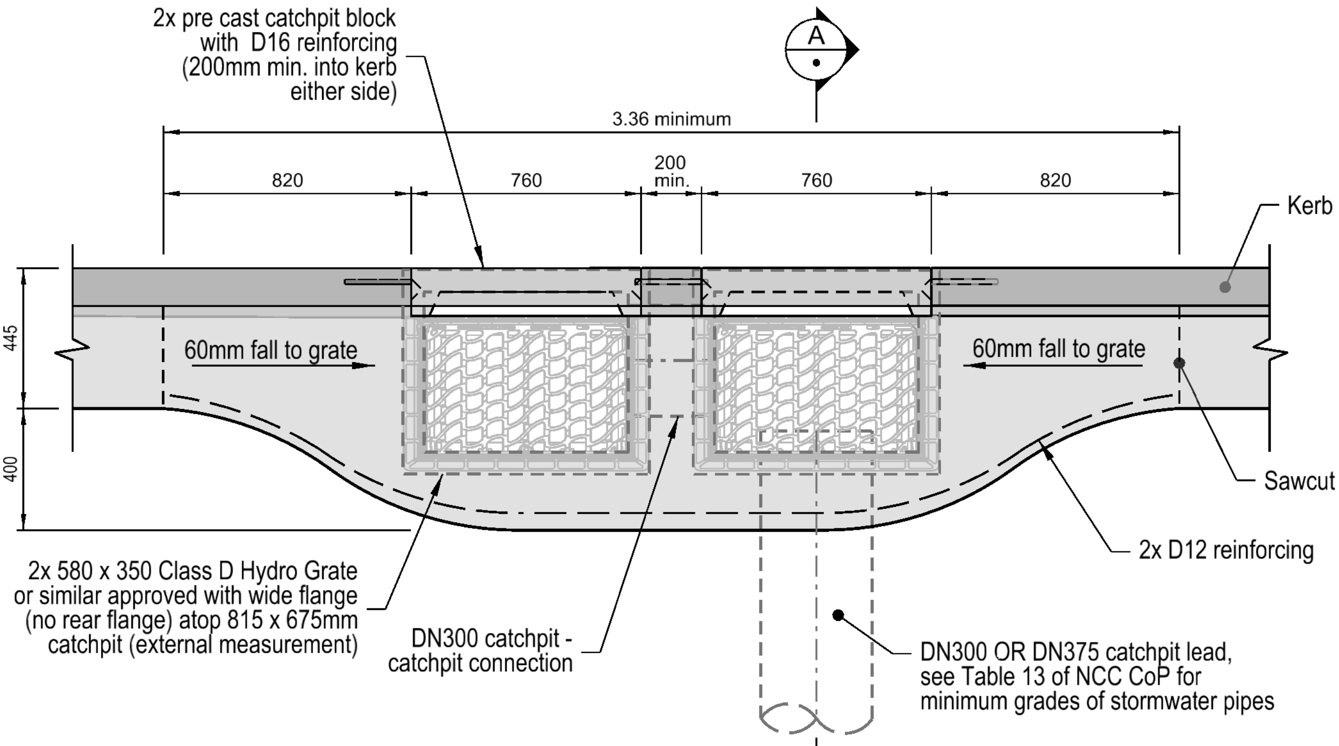


SECTION A -A
1:25

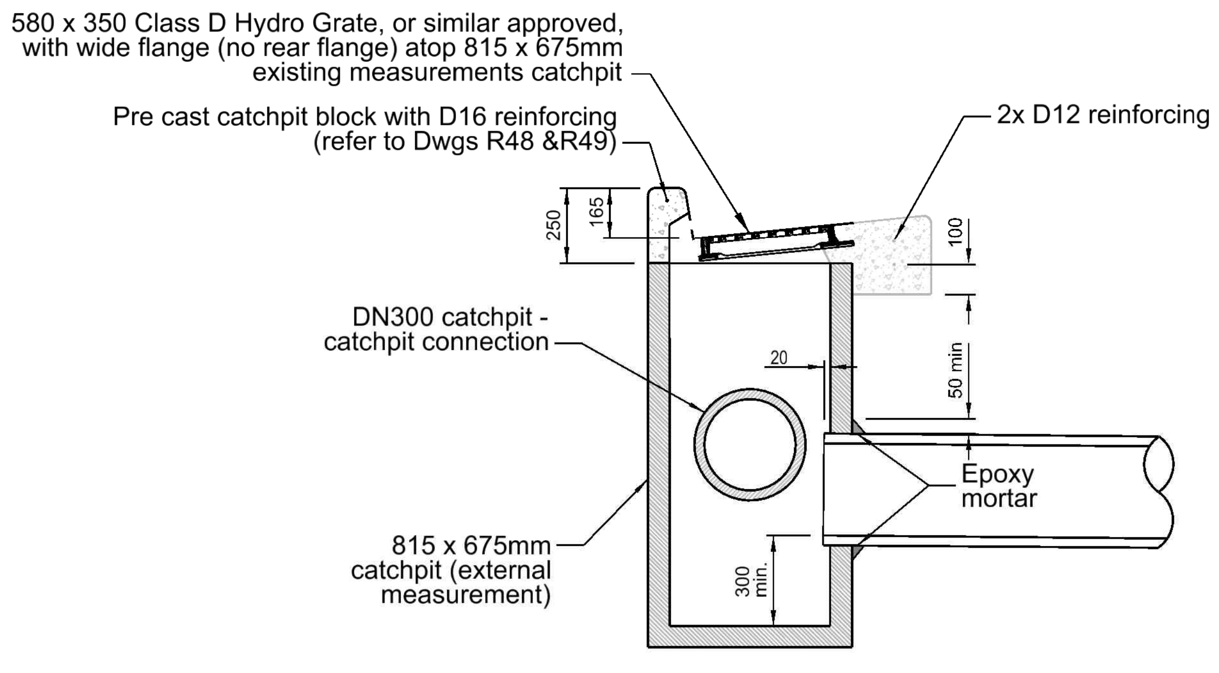
NOTES:

1. Concrete used for the forming of catchpit aprons shall be 20 MPa with a min. slump value of 90mm unless stated otherwise
2. Where catchpits are situated within extruded kerbs, sump surrounds should be wet mix concrete, properly compacted
3. Kerb mix concrete shall NOT be used
4. All reinforcing to have minimum 50mm cover
5. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	DOUBLE CATCHPIT (CIRCULAR BARRELS)	1:25	R43



DOUBLE CATCHPIT
1:25
Typical Installation (with rectangular catchpits)

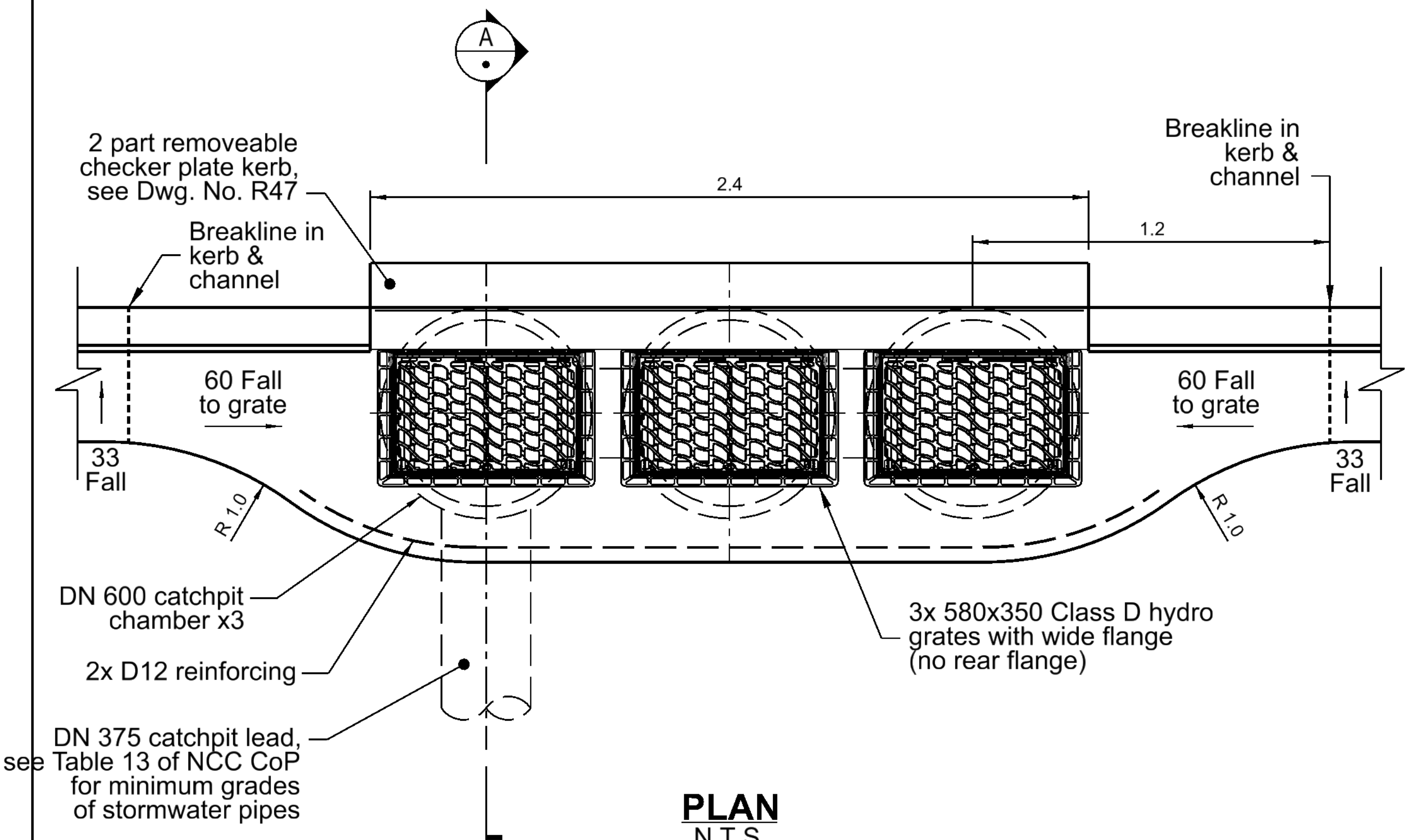


SECTION A-A
1:25

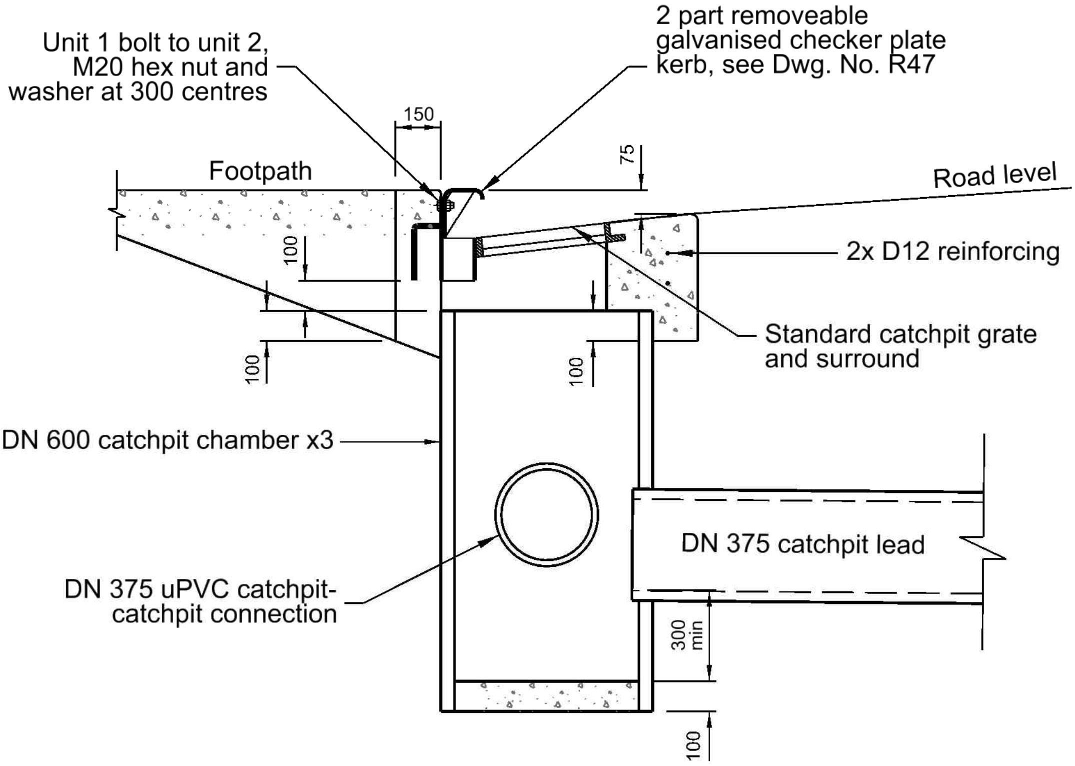
NOTES:

1. Concrete used for the forming of catchpit aprons shall be 20 MPa with a minimum slump value of 90mm unless stated otherwise
2. Where catchpits are situated within extruded kerbs, catchpit surrounds should be wet mix concrete, properly compacted
3. Kerb mix concrete shall NOT be used
4. All reinforcing to have minimum 50mm cover
5. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	DOUBLE CATCHPIT (RECTANGULAR CHAMBERS)	1:25	R44



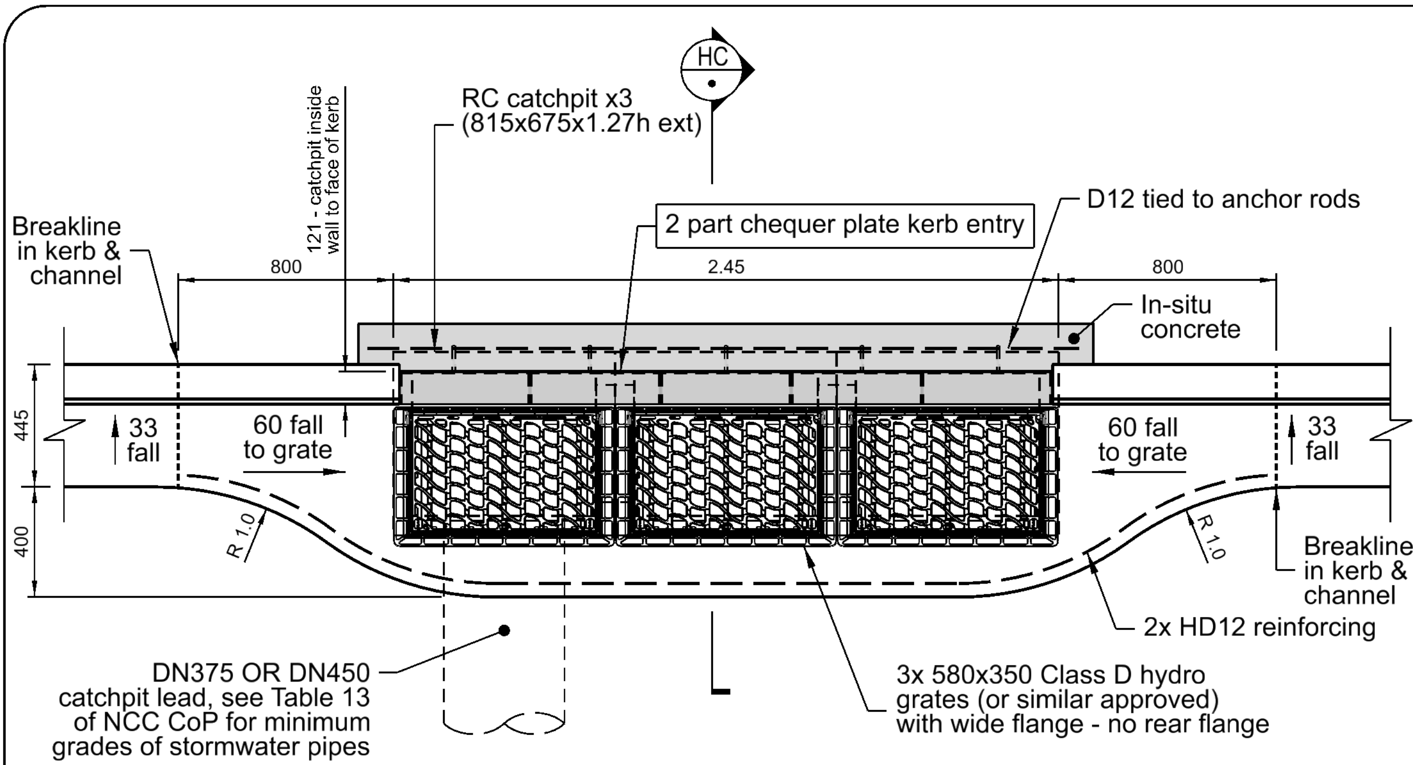
PLAN
N.T.S.



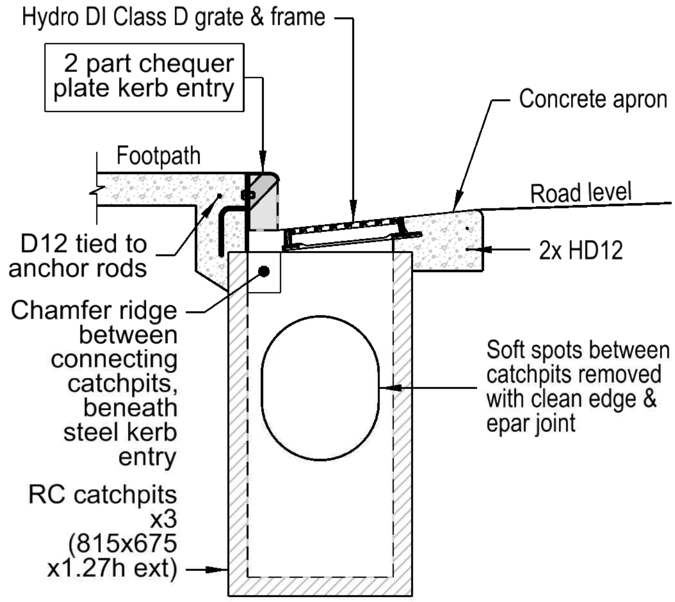
SECTION A-A
N.T.S.

NOTE: Whole numbers = mm, decimalised numbers = m.

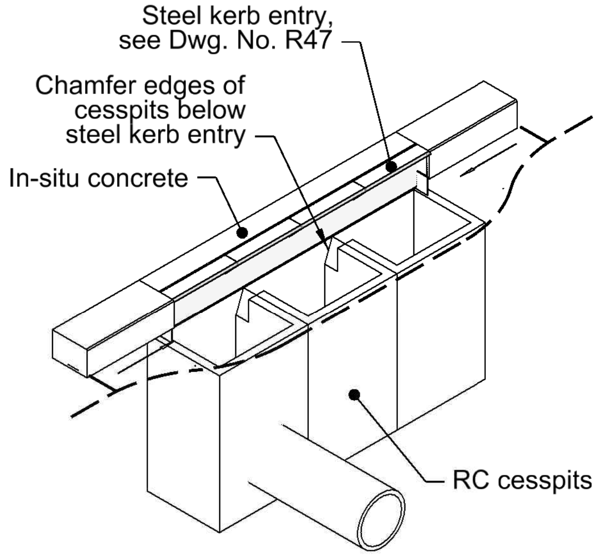
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	HIGH CAPACITY CATCHPIT (CIRCULAR BARRELS)	NOT TO SCALE	R45



GENERAL HIGH CAPACITY CATCHPIT
PLAN VIEW
N.T.S



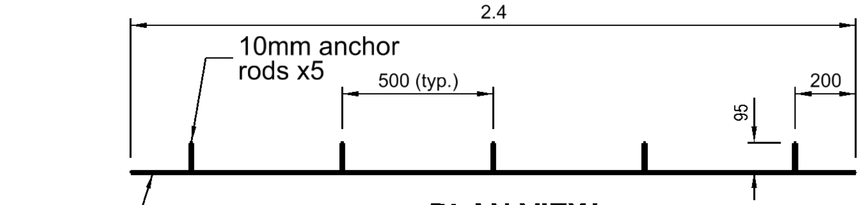
GENERAL HIGH CAPACITY CATCHPIT
SECTION HC-HC
N.T.S



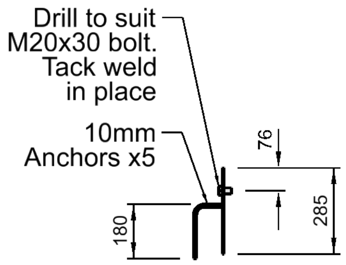
PARTIAL ISOMETRIC
N.T.S.

NOTES:

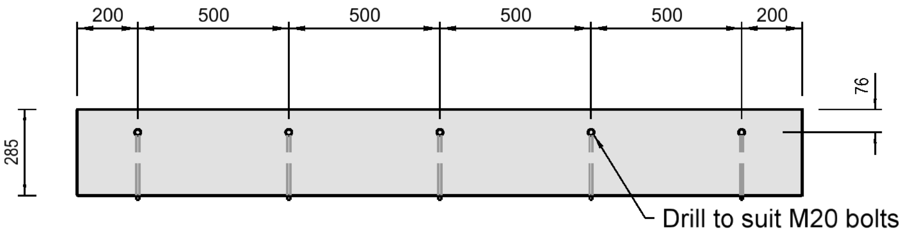
1. Concrete used for the forming of catchpit aprons shall be 20 MPa with a minimum slump value of 90mm unless stated otherwise
2. Where catchpits are situated within extruded kerbs, catchpit surrounds should be wet mix concrete, properly compacted
3. Kerb mix concrete shall NOT be used
4. 50mm min. cover to all reinforcing
5. Whole numbers = mm, decimalised numbers = m.



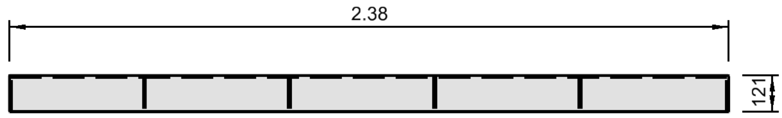
PLAN VIEW
PART A
1:25



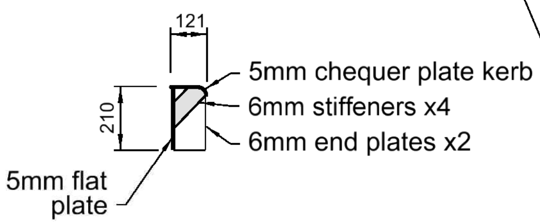
SIDE ELEVATION
PART A
1:25



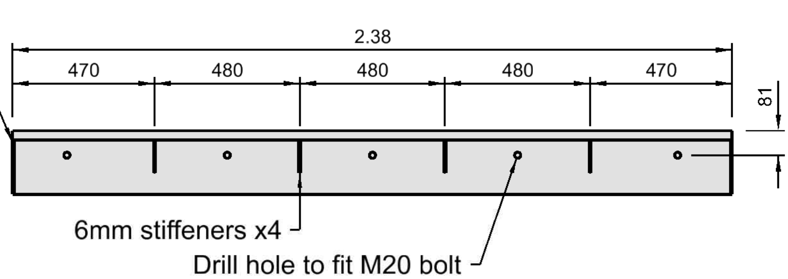
FRONT ELEVATION
PART A
1:25



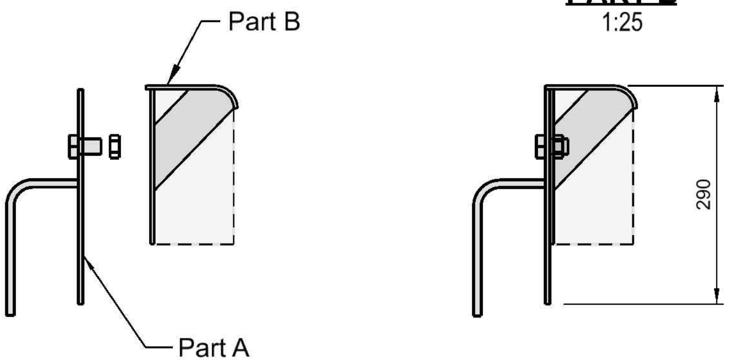
PLAN VIEW
PART B
1:25



SIDE ELEVATION
PART B
1:25



FRONT ELEVATION
PART B
1:25

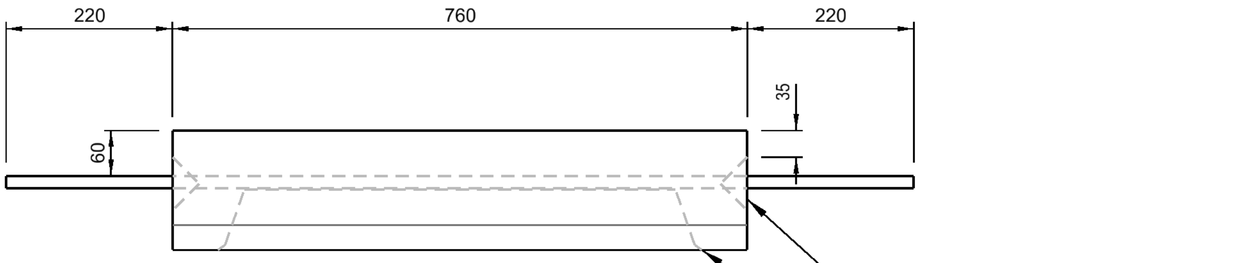


ASSEMBLED STEEL
KERB ENTRY
1:10

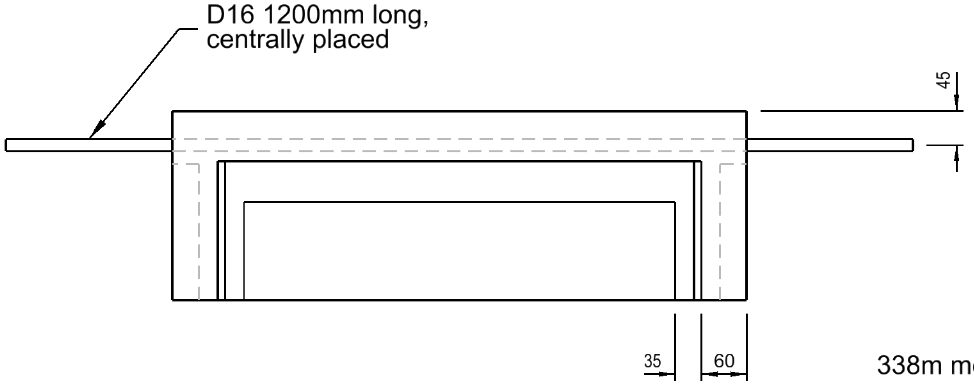
NOTES:

1. All metalwork to be hot-dipped galvanised
2. All whole numbers = mm, decimalised numbers = m.

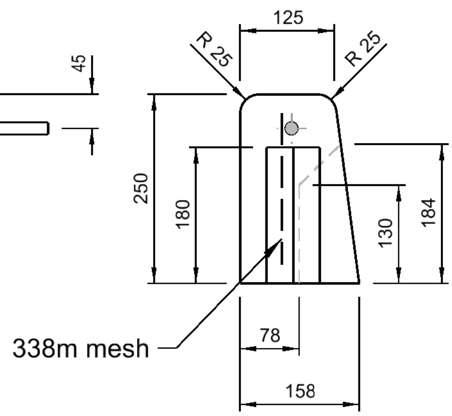
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	HIGH CAPACITY CATCHPIT (STEEL KERB ENTRY DETAILS - DWG 2 OF 2)	1:10, 1:25	R47



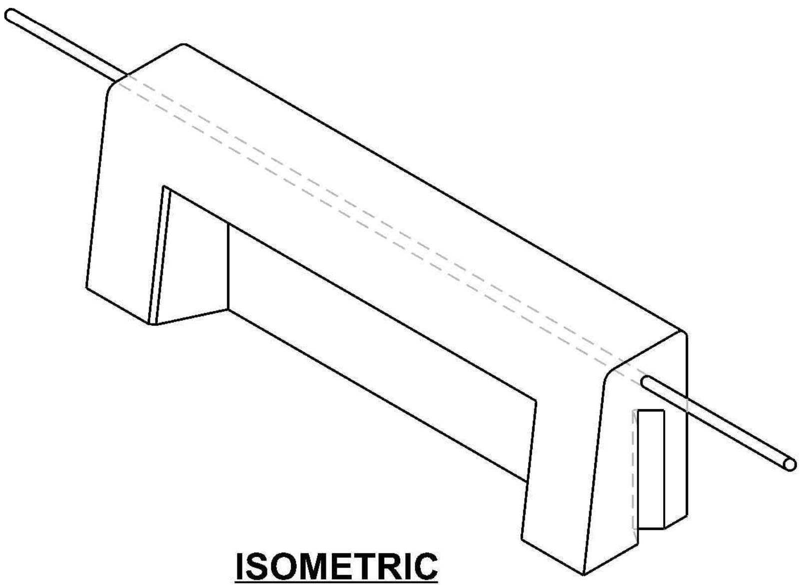
PLAN
1:10



ELEVATION
1:10



END ELEVATION
1:10

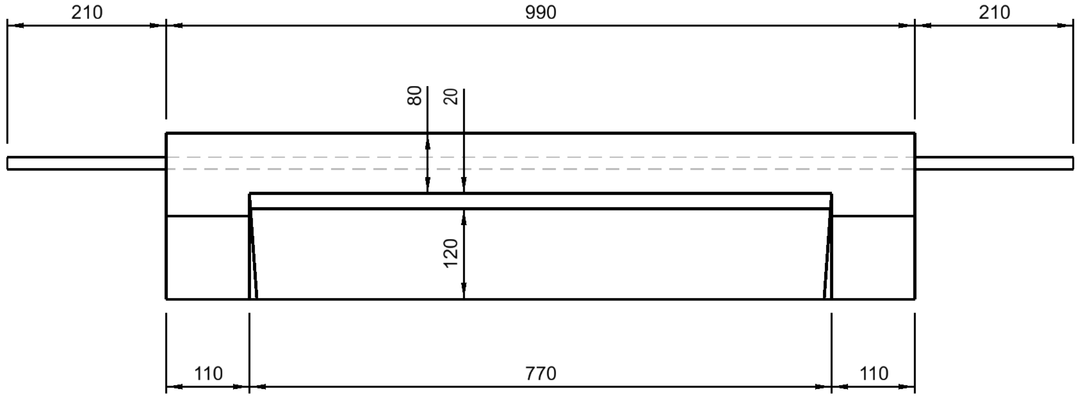


ISOMETRIC
N.T.S.

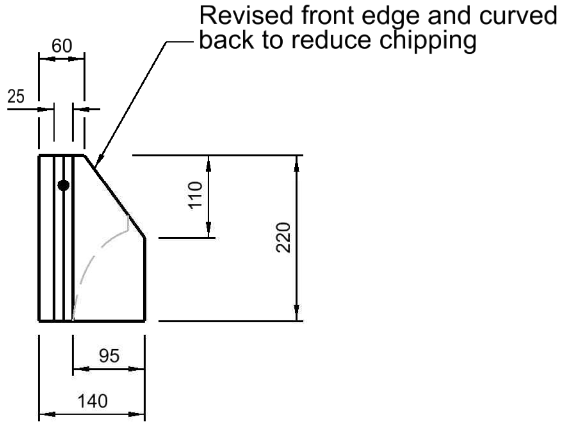
NOTES:

1. Concrete to be 20 MPa
2. All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	PRECAST CATCHPIT BACK BLOCK (NON-MOUNTABLE KERB)	1:10, N.T.S.	R48



FRONT ELEVATION
1:10

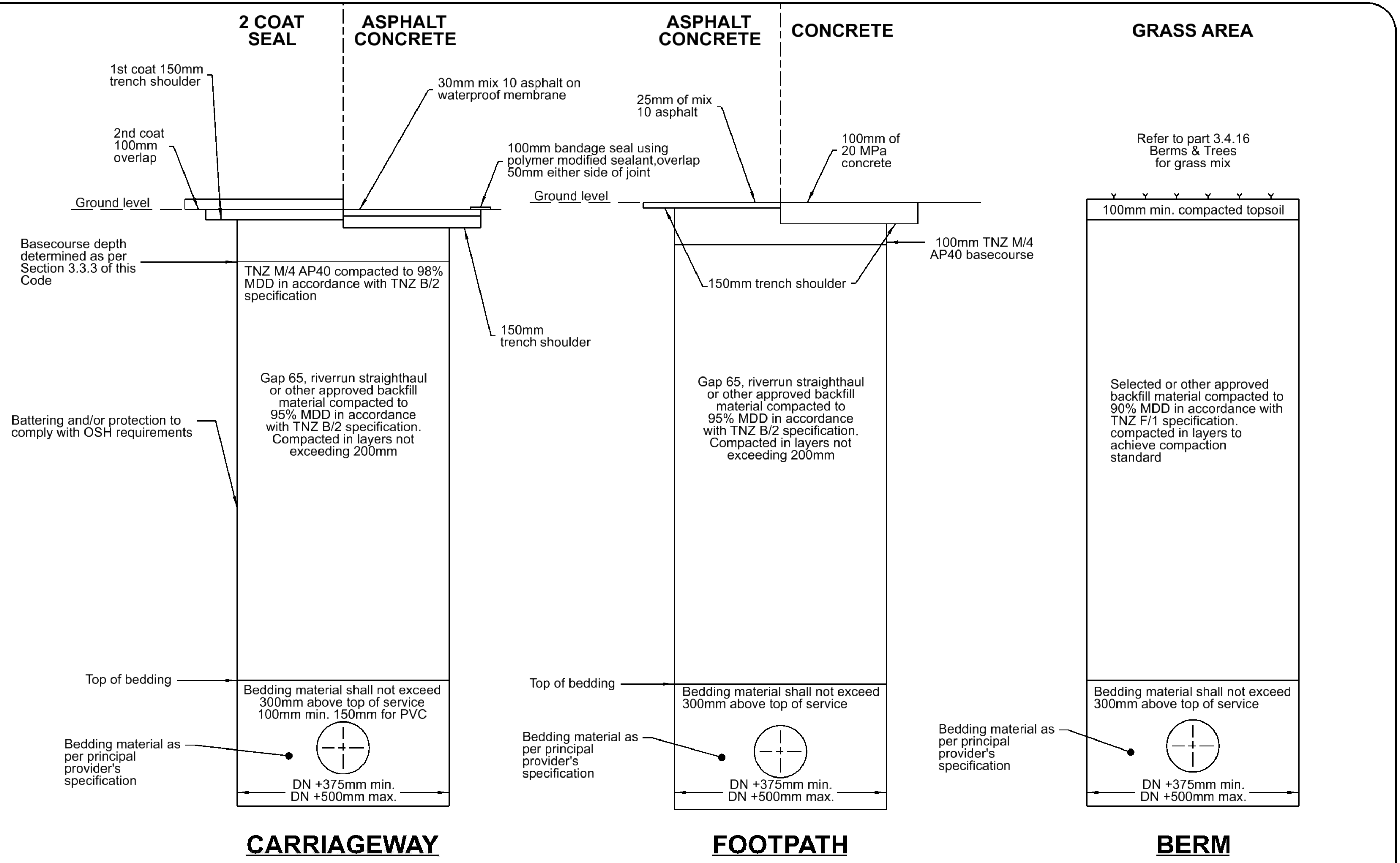


END ELEVATION
1:10

NOTES:

1. All concrete to be 20 MPa
2. All dimensions are in mm.

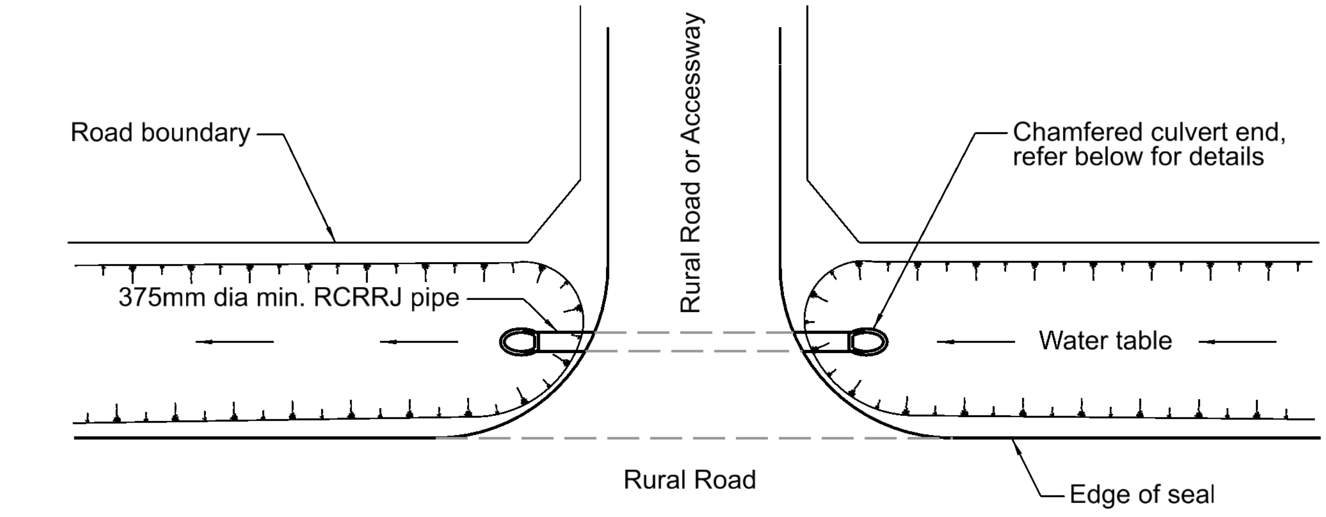
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**PRECAST CATCHPIT BLOCK (MOUNTABLE KERB)**	1:10	**R49**



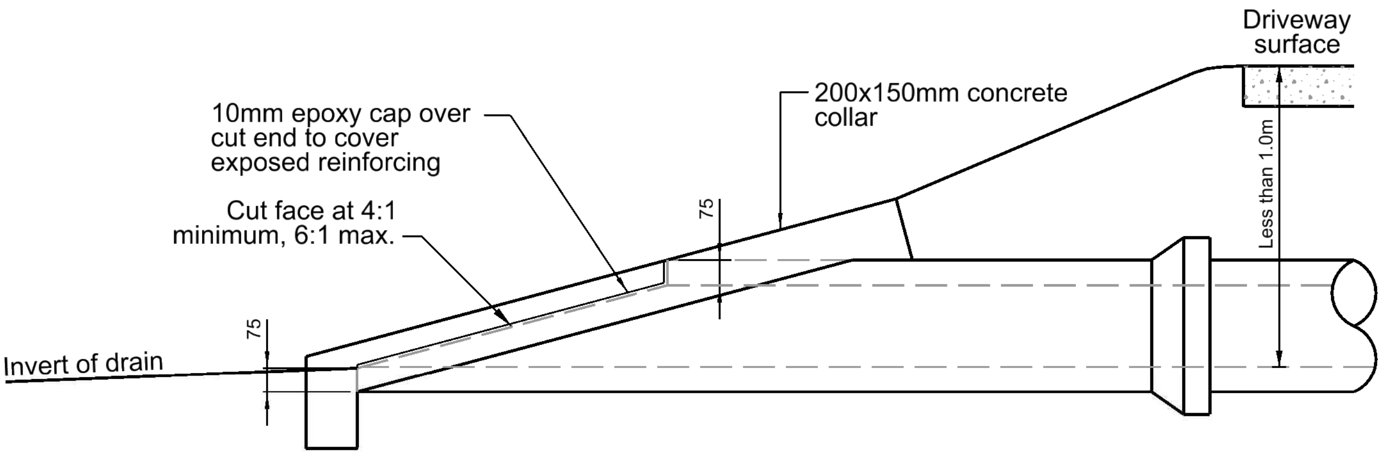
NOTE:

Where trench lies within 1m of kerb, reinstatement of footpath shall be to the kerb

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**STANDARD TRENCH DETAILS**	NOT TO SCALE	**R50**



PLAN

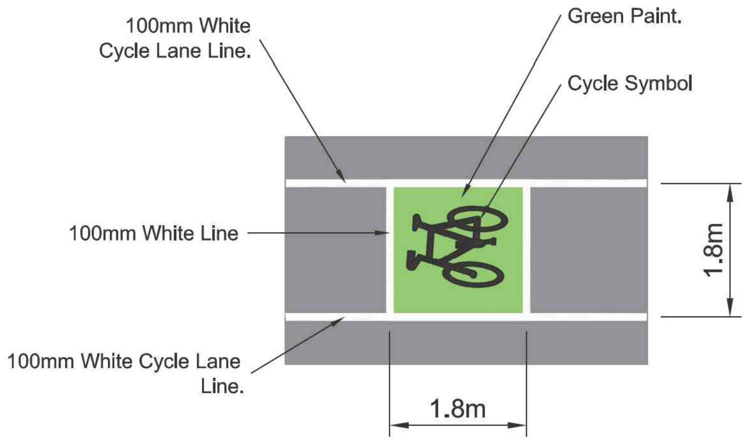


'Z' CLASS PIPE END PROTECTION - SECTION

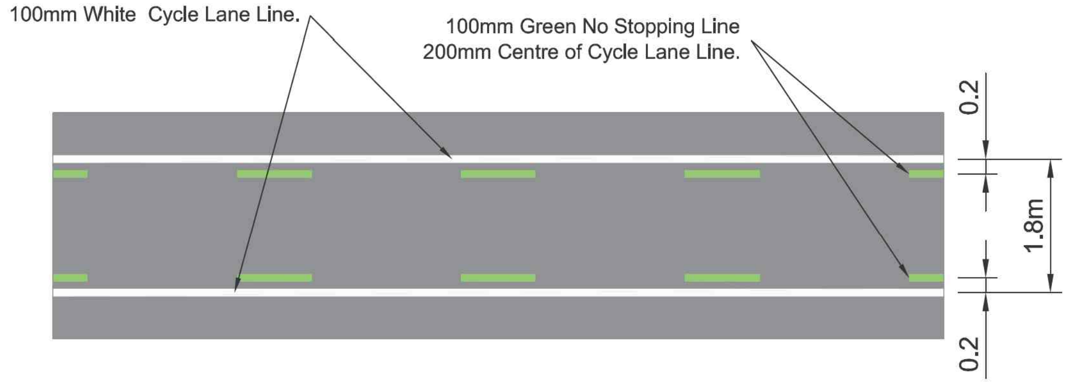
NOTES:

1. Only concrete pipes are to be used, minimum diameter 375mm
2. The exposed end of the pipe is to be encased in 150mm thick by 200mm wide concrete "collar" pipe
3. No concrete filled bags or similar are to be used
4. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	RURAL ROAD / ACCESSWAY ENTRANCE - EDGE PROTECTION FOR DRAIN DEPTH <1.0m	NOT TO SCALE	R51



CYCLE LANE SYMBOL BOX



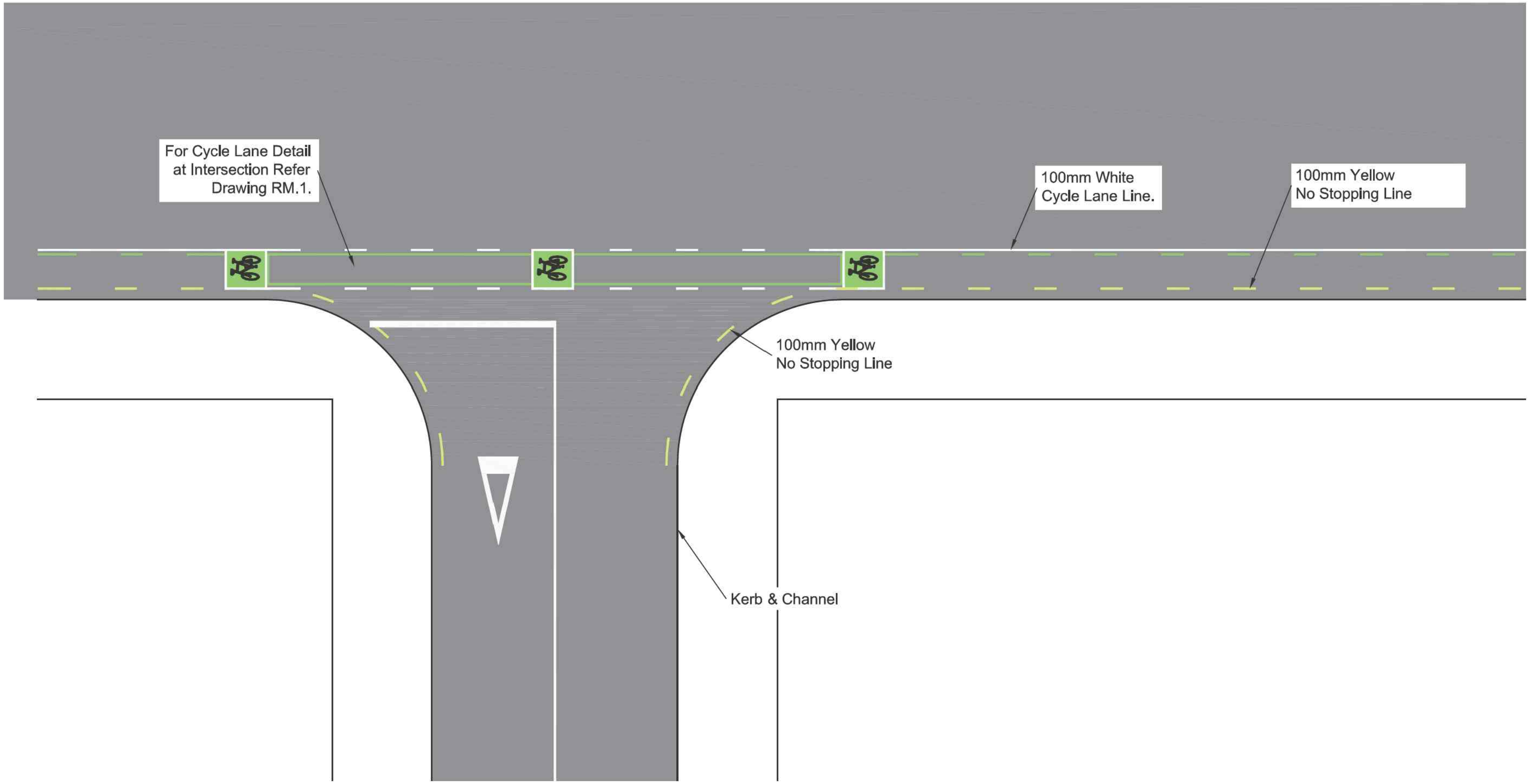
CYCLE LANE

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.

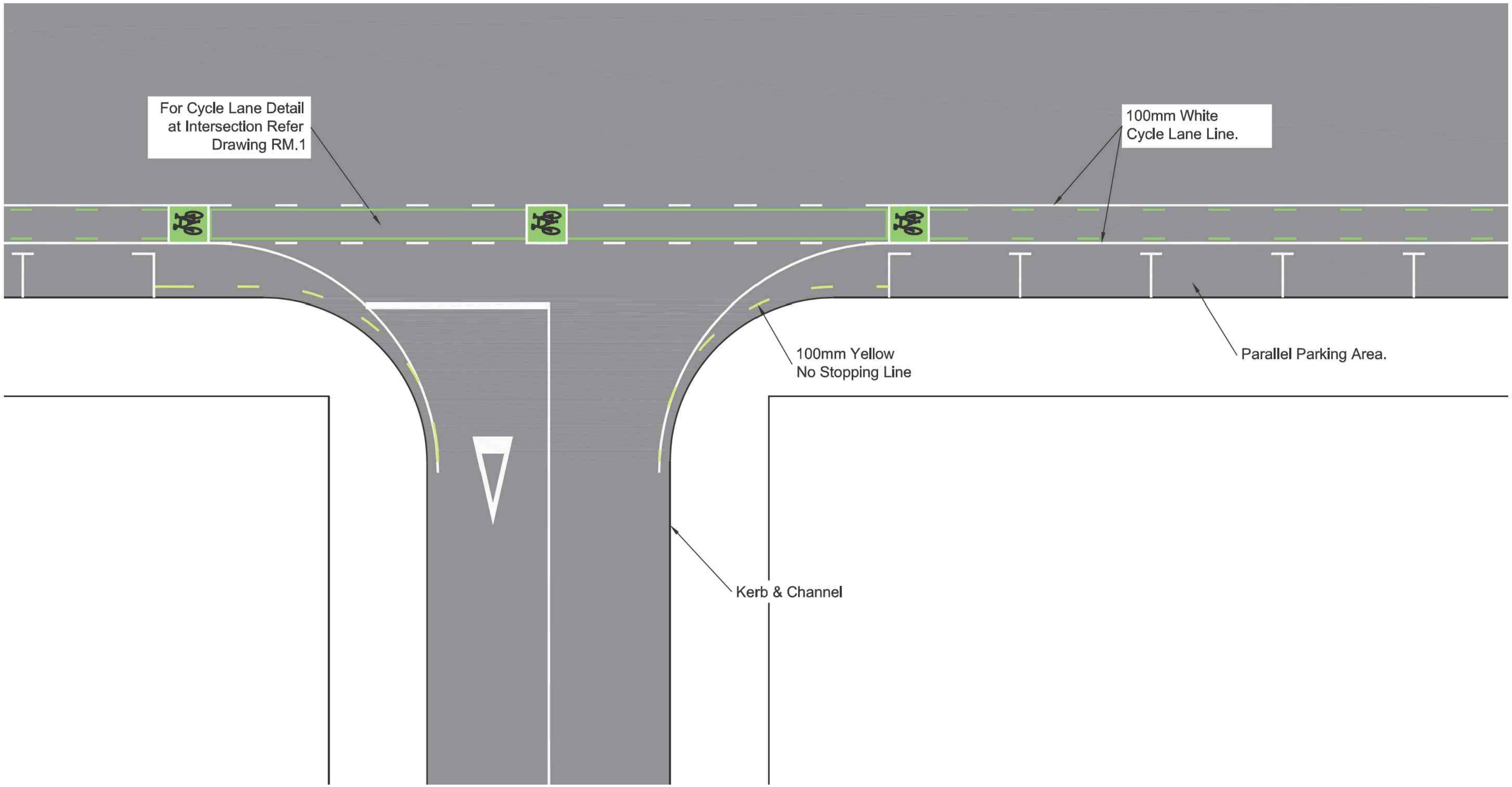
Derived and used with permission from Hastings District Council

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**CYCLE LANE - ROAD MARKINGS**	NOT TO SCALE	**RM01**



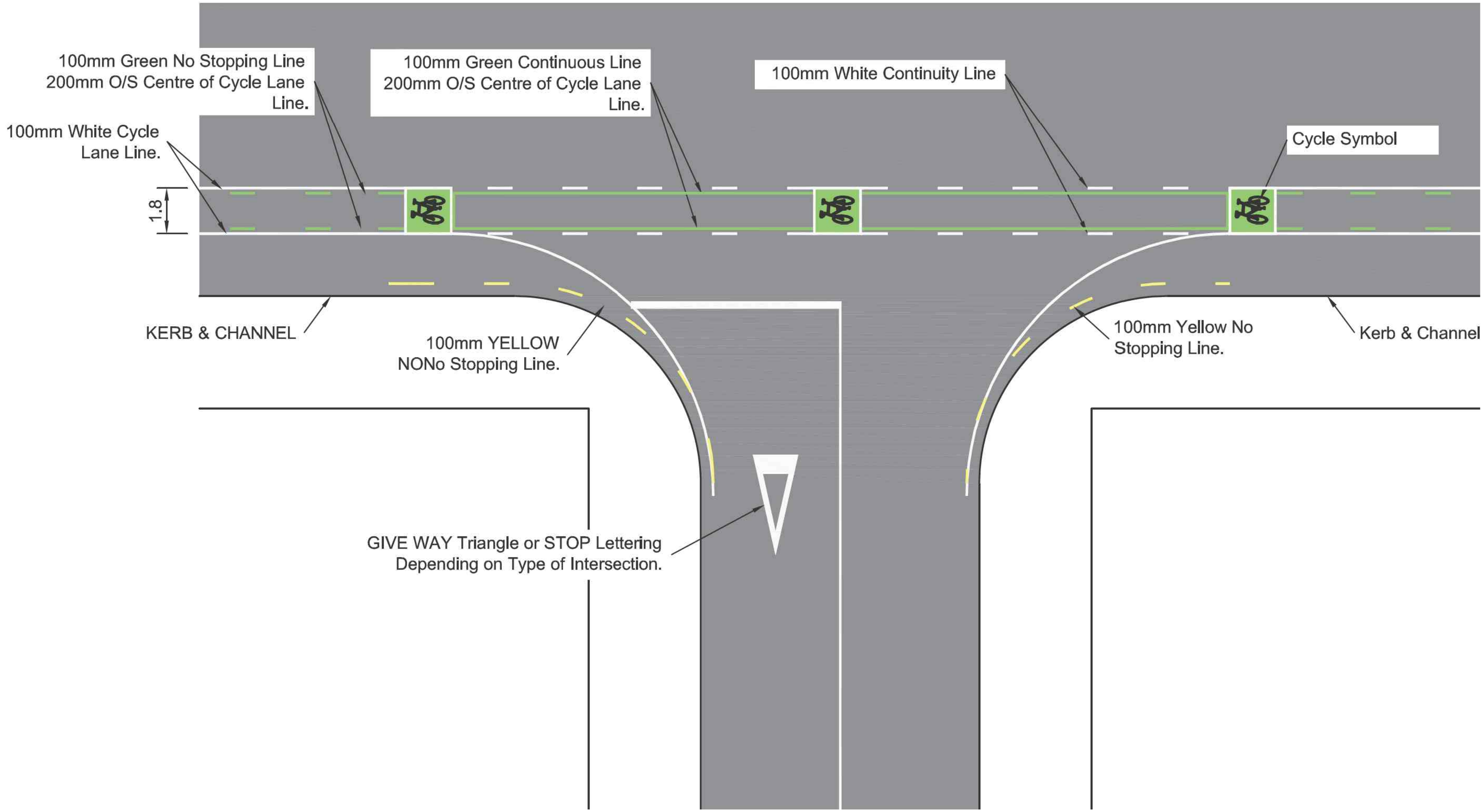
Derived and used with permission from Hastings District Council

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**CYCLE LANE WITHOUT PARKING - ROAD MARKINGS**	NOT TO SCALE	**RM02**



Derived and used with permission from Hastings District Council

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**CYCLE LANE WITH PARKING - ROAD MARKINGS**	NOT TO SCALE	**RM03**



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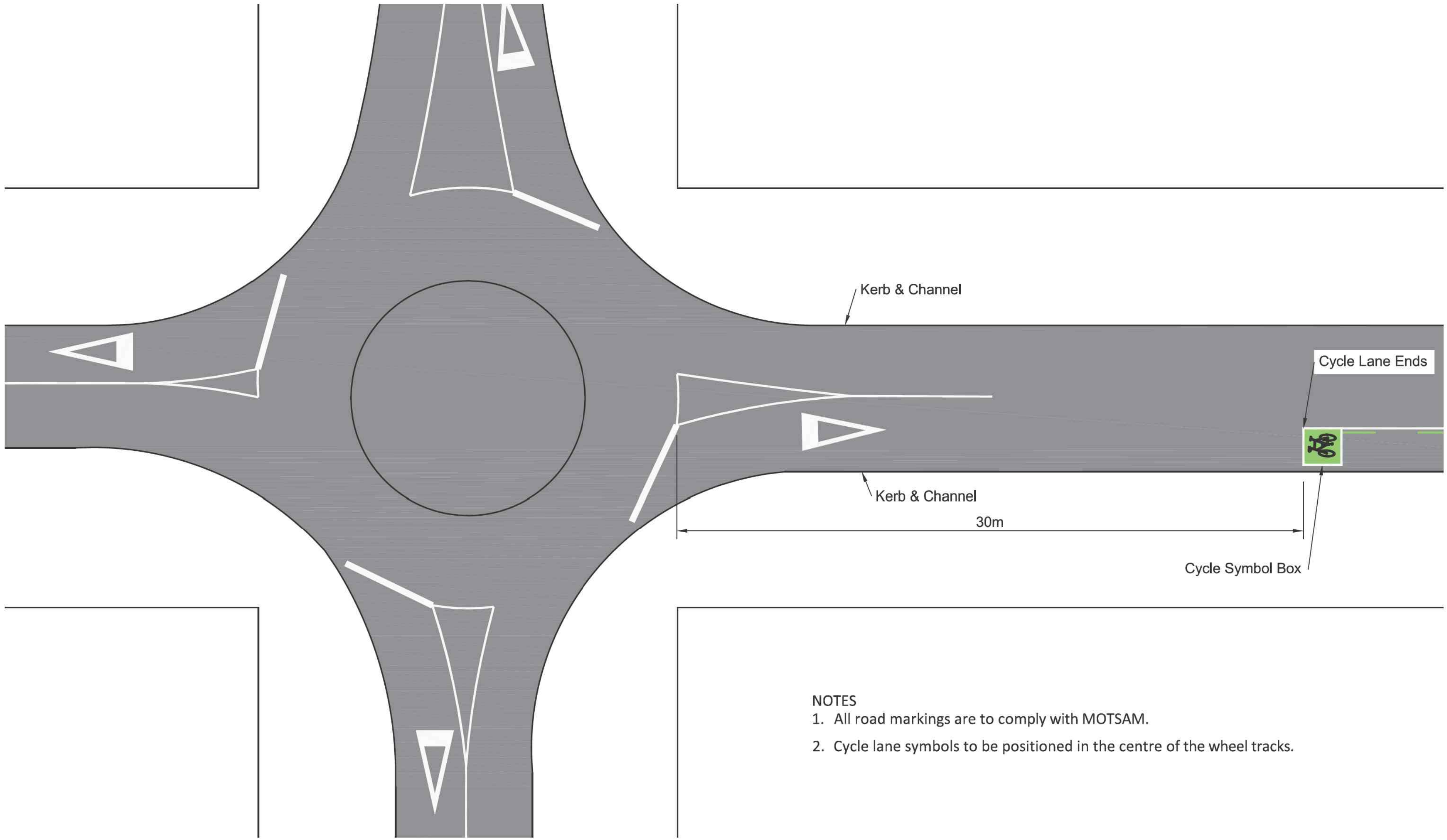
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**GIVEWAY / STOP INTERSECTION - ROAD MARKINGS**	NOT TO SCALE	**RM04**



NOTES
1. All road markings are to comply with MOTSAM.
2. Cycle lane symbols to be positioned in the centre of the wheel tracks.

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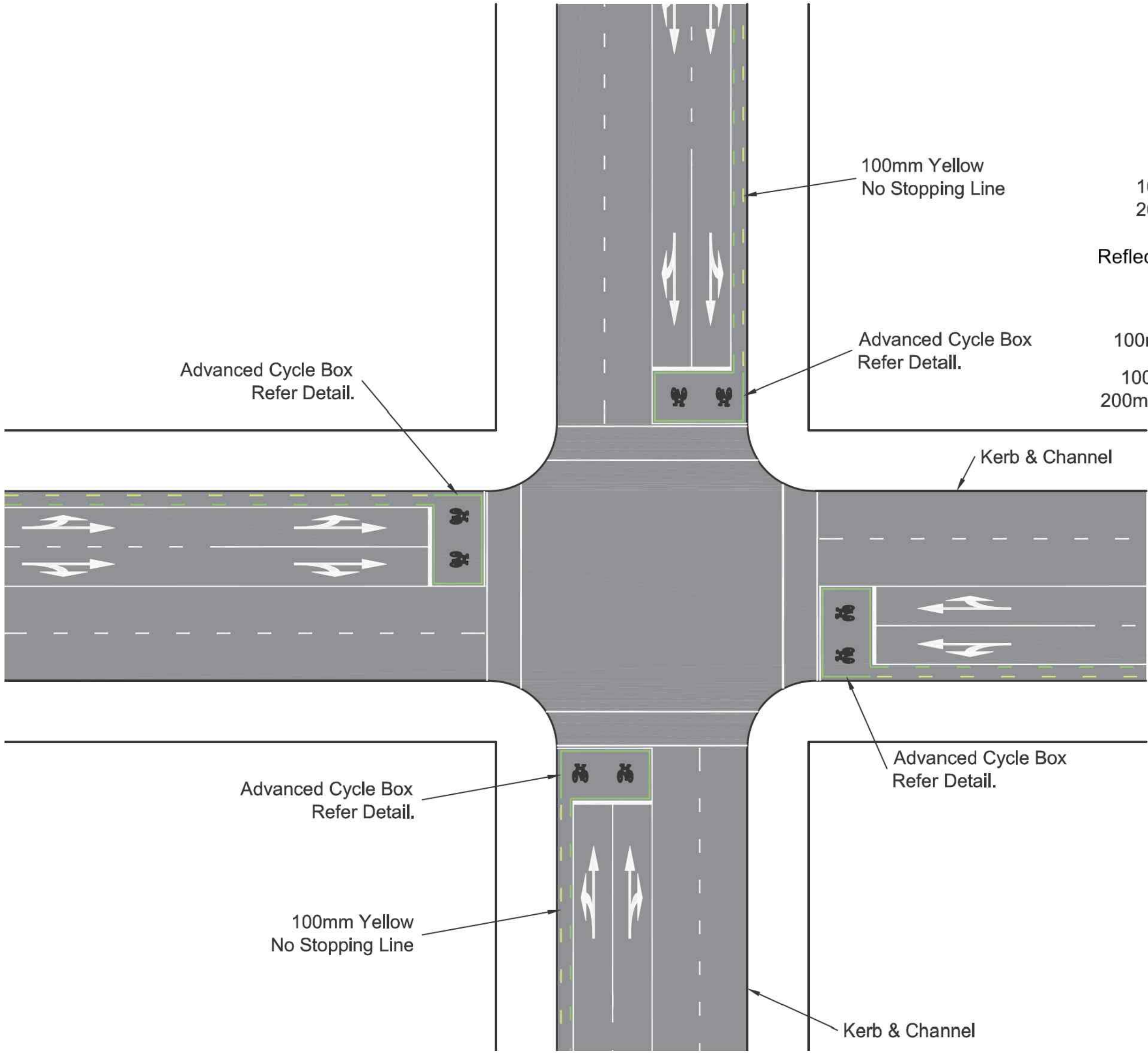
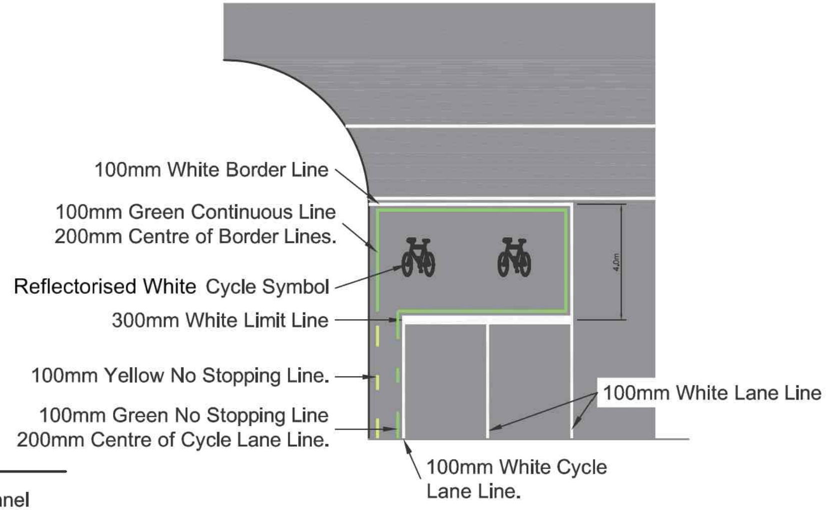
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	ROUNDABOUT - ROAD MARKINGS	NOT TO SCALE	RM05





ADVANCED CYCLE BOX DETAIL

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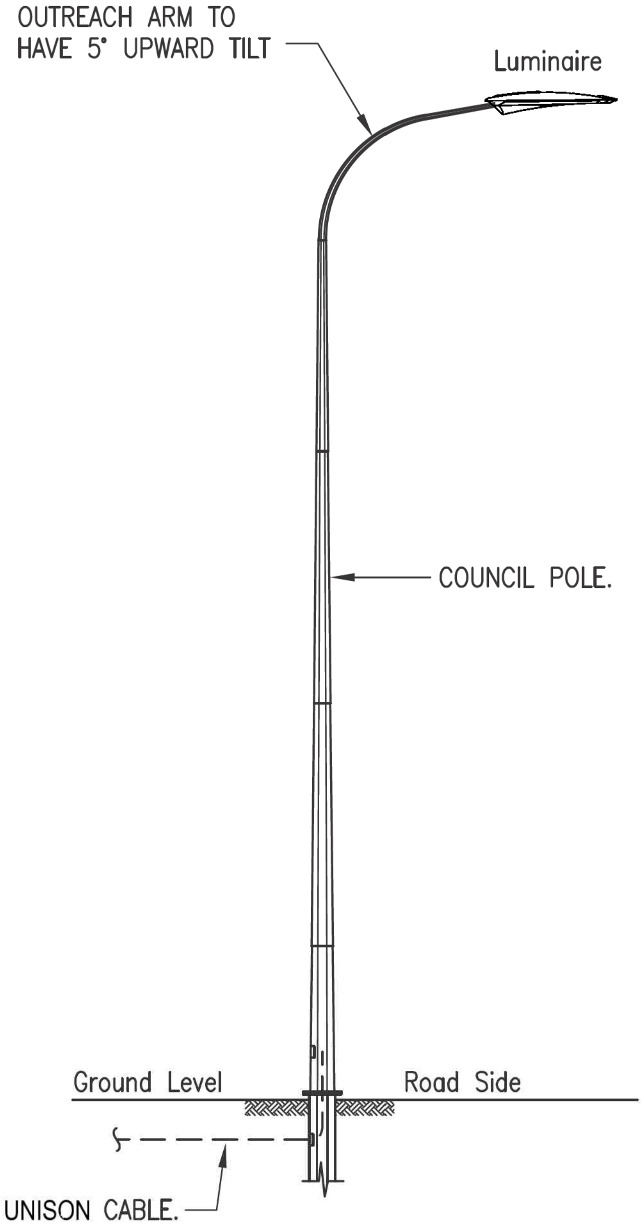
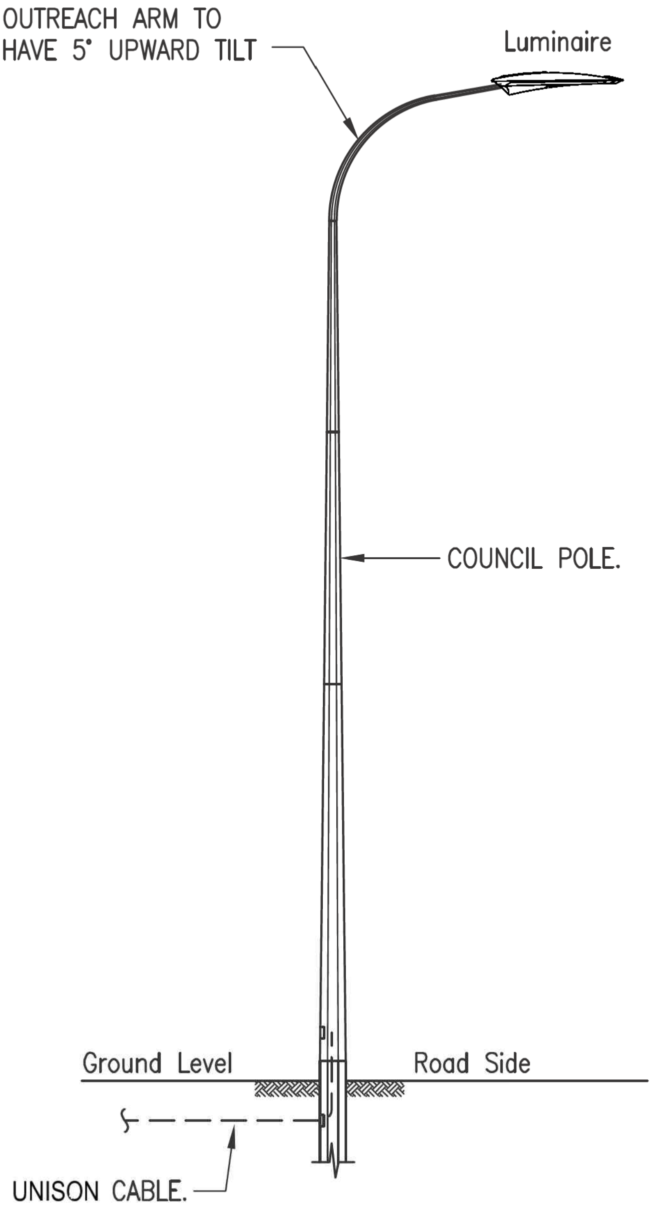
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**TRAFFIC SIGNALISED INTERSECTION - ROAD MARKINGS**	NOT TO SCALE	**RM06**



STREETLIGHTING COLUMN
FLANGE BASE
(Speed limits 70 km/h or less)



STREETLIGHTING COLUMN
GROUND PLANTED
(Speed limits 70 km/h or less)

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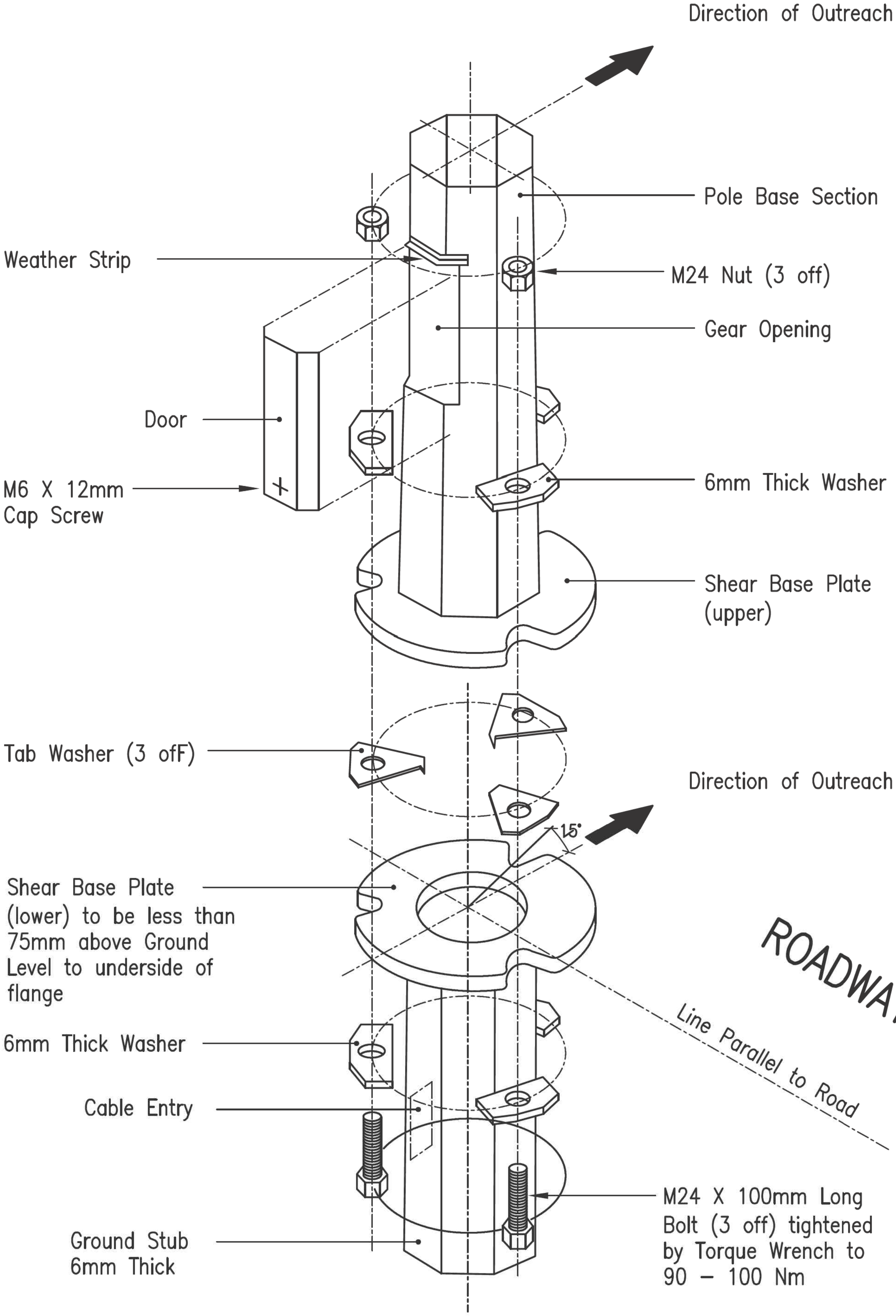
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**STREET LIGHTING - DEMARCATION POINT**	NOT TO SCALE	**SL01**



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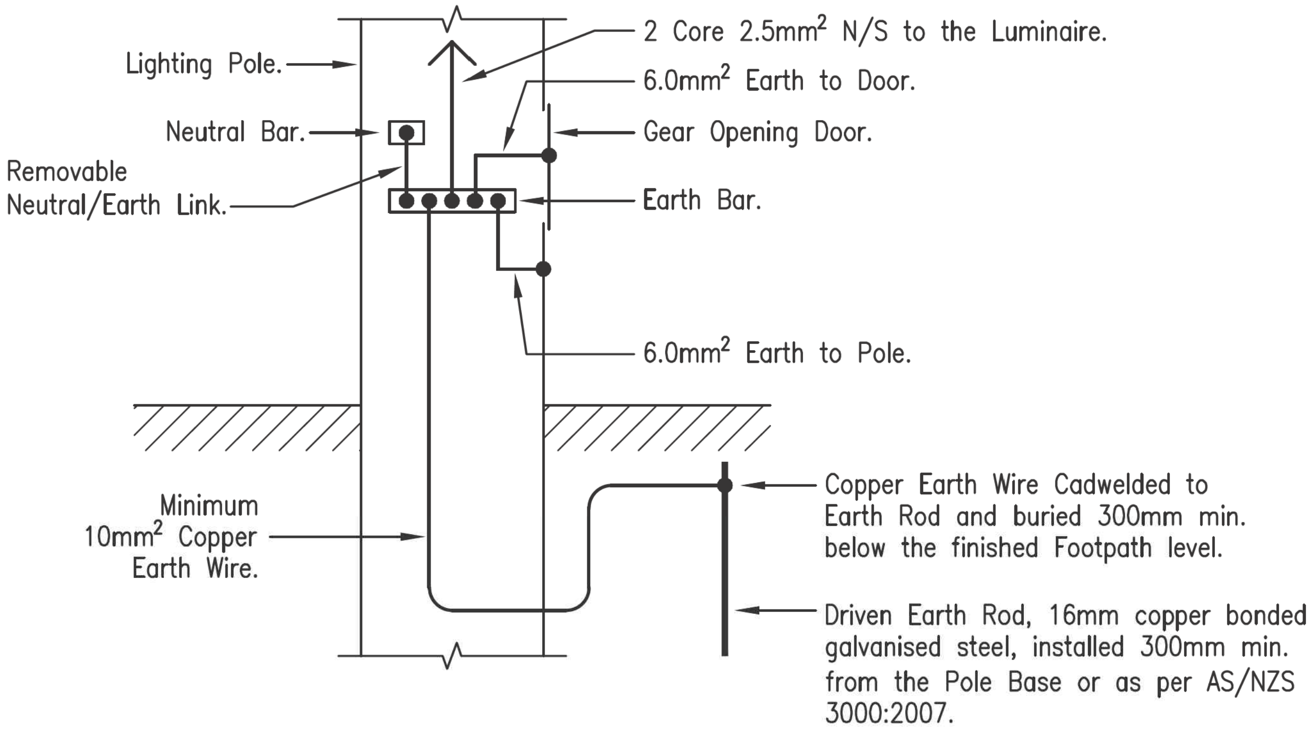
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**TYPICAL SHEAR BASE DETAIL - SPEED LIMIT >70km/hr**	NOT TO SCALE	**SL02**



TYPICAL POLE EARTHING DETAIL

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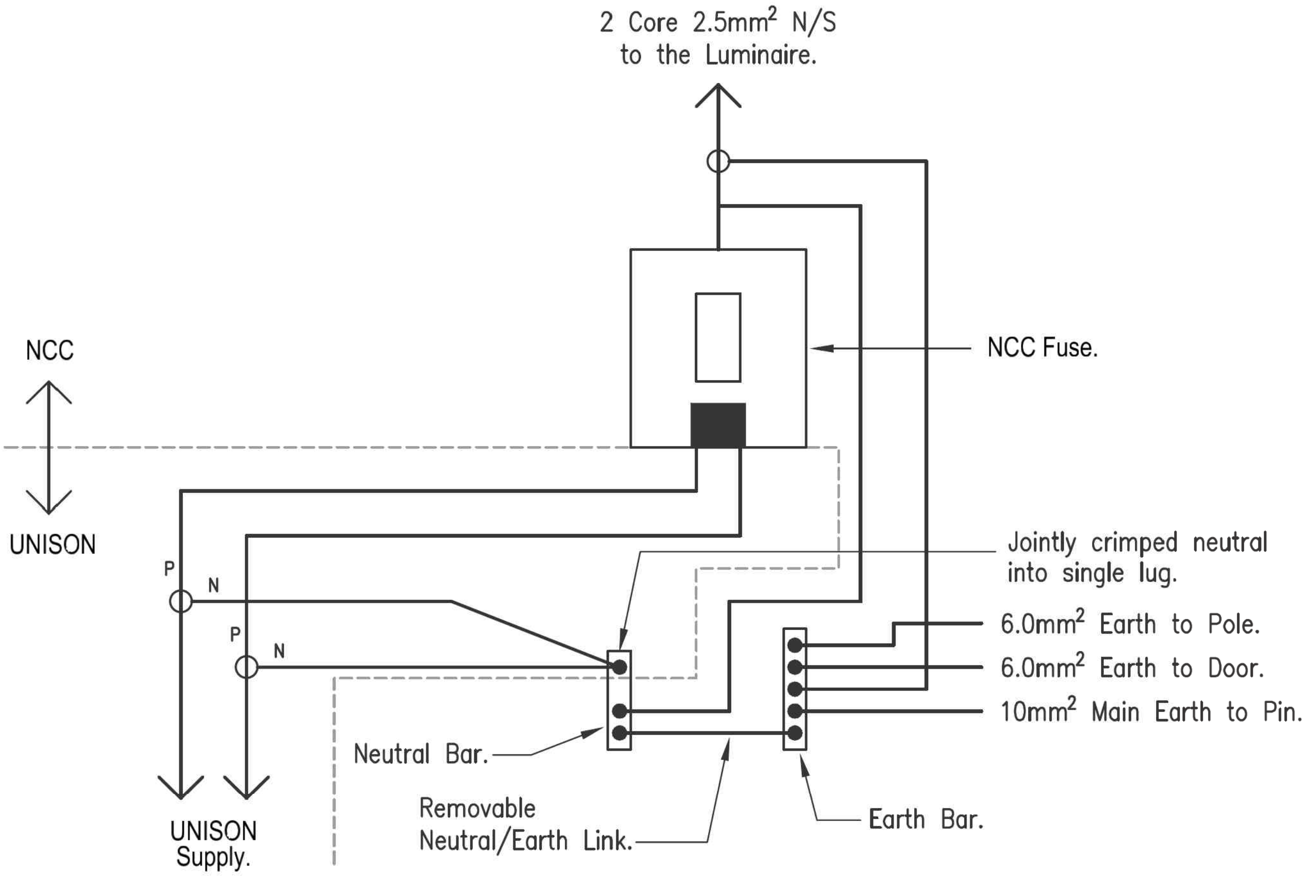
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**STREET LIGHTING - EARTHING DETAIL**	NOT TO SCALE	**SL03**



STANDARD STREETLIGHTING POLE ELECTRICAL CONNECTIONS

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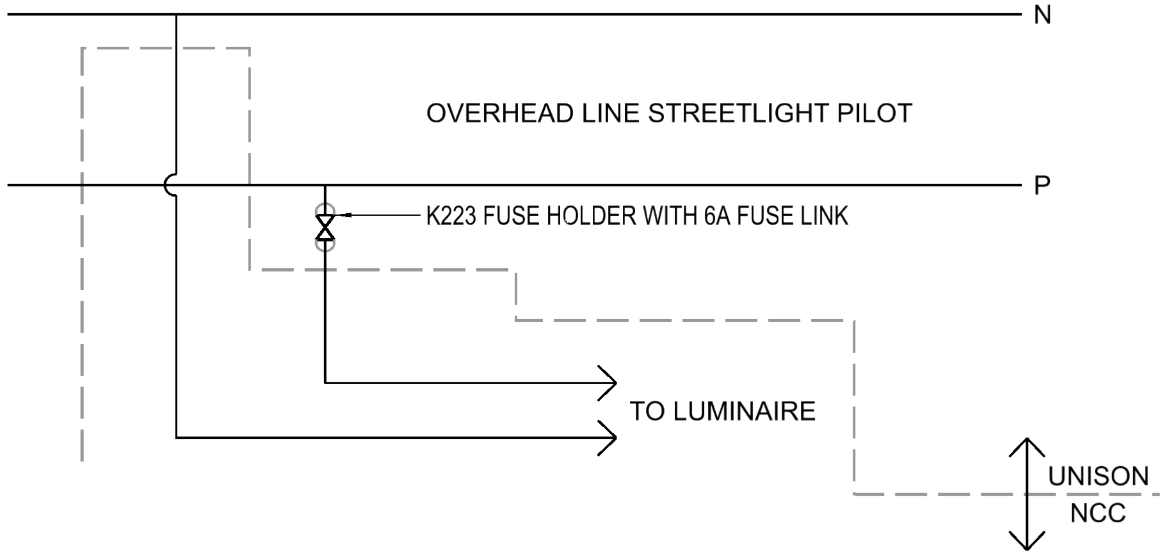
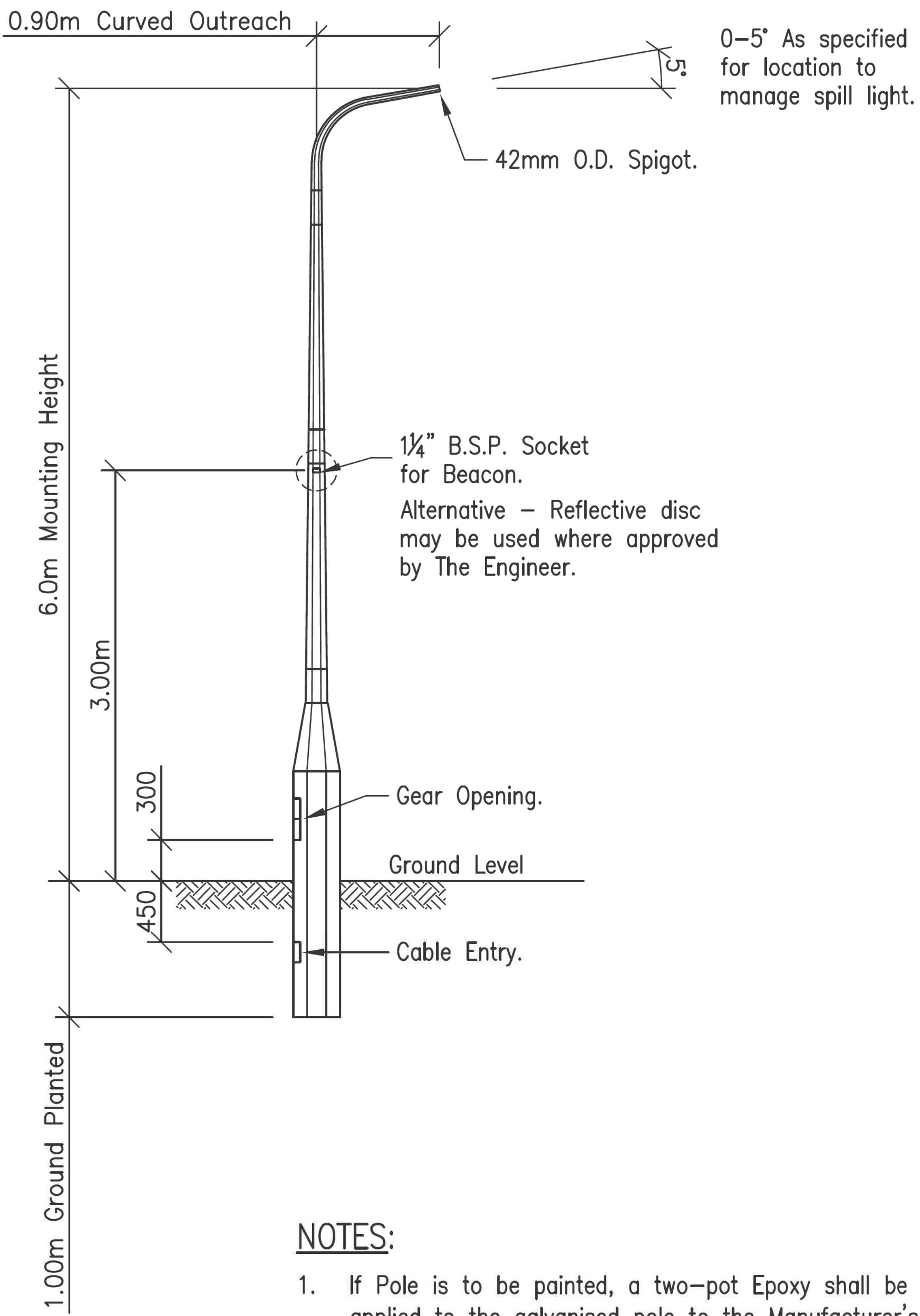
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**STREET LIGHTING - ELECTRICAL CONNECTIONS**	NOT TO SCALE	**SL04**



ELECTRICAL CONNECTION OF STREETLIGHT ON UNISON PLAN

Derived and used with permission from Hastings District Council

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	ELECTRICAL CONNECTIONS OF STREETLIGHT ON UNISON POLE	NOT TO SCALE	SL05



NOTES:

1. If Pole is to be painted, a two–pot Epoxy shall be applied to the galvanised pole to the Manufacturer's Specifications.
2. At zebra crossings poles should be at least 700m offset from kerb face.
3. At zebra crossings the lower 3m of the pole shall be painted with alternative parallel black and white bands 300mm wide.

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NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**STREET LIGHTING - PEDESTRIAN CROSSING POLE**	NOT TO SCALE	**SL06**

4 STORMWATER

4.1 Scope

This section shall be read in conjunction with the Stormwater Section of the District Plan, which addresses objectives, policies and methods relating to earthworks associated with land development.

4.1.1 **Mandatory Requirements and Performance Criteria** (additional section to NZS 4404: 2010)

Stormwater drainage, treatment and flood control facilities shall be designed and constructed to the appropriate engineering and technical standards and codes to achieve the following minimum performance criteria:

(a) Each Lot or separately titled unit / area shall have a separate connection to an approved outlet. Council mains will not be installed within multi-storey buildings.
(b) The minimum connection size to each lot is to be either a double kerb connection, or a 150mm pipe connection to a council-approved main or waterway. Preference is to the kerb and channel in the first instance.
(c) The connection shall be made at the time of subdivision/development and shall be sized allowing for 80% of the site being developed.
(d) Common private stormwater drains are to be generally avoided and will only be accepted for developments where the common private stormwater drain is at least one size larger than any individual connection and meets the design criteria.
(e) Industrial, commercial and other non-residential allotments shall be provided with a stormwater main across the full frontage such that connections can be made at any location.
(f) Provide primary protection to new lots whether urban or rural with building sites against inundation in floods having a 10% probability of occurring annually using a system appropriate to the intended land use and lot size.
(g) Provide secondary protection to all lots with building sites against inundation in floods having 2% probability of occurring annually using a combination of pipes, channels, secondary flood paths and controlled flood plains.
(h) Provide lots in non-wastewater reticulated areas with a site suitable for effluent disposal that is free of inundation from a storm having a 20% probability of occurring annually and which can be shown to not cause a health hazard during any inundation.
(i) Adequately service the catchment and accommodate the design flows.
(j) Adequately service each lot, road area or other land area discharging to an approved outfall.
(k) Generally consist of a piped reticulation system through urban areas.
(l) Be compatible with the existing drainage network.
(m) Not unduly restrict the location of any future building or development.
(n) Not provide an undue risk to the health and safety of persons.
(o) Be laid out in such a way as to facilitate ongoing maintenance.
(p) Provide for efficient and safe water inlet and discharge, minimising risk of debris or sediment blockage, outlet scour or land instability.
(q) Where utilising open channels enhance the amenity value of the channel and its associated flood banks and mitigate any risk of scouring, erosion, or siltation
(r) Not cause adverse effects on upstream or downstream properties.
(s) Comply with any applicable Resource Consent and minimise any adverse effect on the environment.
(t) Ensure that above ground plant and equipment is designed and constructed in such a manner as to be aesthetically acceptable and to minimise visual impact.
(u) Minimise adverse effects on the existing stormwater system.
(v) Be designed with adequate flexibility and provision to minimise the risk of seismic events.
(w) Withstand any anticipated superimposed loads.
(x) Be constructed from materials suitable for the intended use and with a proven, record of performance.
(y) Ensure safety in operation.
(z) In the case of piped systems minimise the penetration by roots.
(aa) In the case of open channels provide bank and batter slopes resistant to erosion, piping or collapse due to saturation, to standards appropriate to the location.
(bb) Ensure that stormwater discharges do not contain any contaminants that may compromise regulatory consents. This may require that stormwater systems include suitable structures, to minimise the release of any contaminants into the network.

(cc) Ensure discharges must with the requirements of the NCC stormwater bylaw.

4.2 General

4.2.1 **Objectives** (additional to NZS 4404: 2010)

In addition to NZS 4404: 2010, reference shall be made to the Objectives in the District Plan.

4.2.2 **Legislation and guidance manuals** (additional to NZS 4404: 2010)

The design of stormwater disposal, treatment and flood protection systems shall be in accordance with the above stated philosophy and to appropriate technical standards and codes.

The following is a selection of currently available relevant standards and guidelines. The list is approved for use, but is not exclusive and other standards and guidelines may be approved.

- Napier City Council's Safety in Design Guide (Version 1.0 or any more recent version).
- TP108 Guidelines for Stormwater Runoff Modelling in the Auckland Region
- GD 01 Stormwater Management Devices in the Auckland Region
- HIRDS - computer rainfall statistics - NIWA
- Resource Management Act 1991 - sets framework of matters to be considered and consents required
- New Zealand Building Code Clause E1 - Surface Water
- Building Code Clause E1 Surface Water: Acceptable Solutions and Verification Methods (1st Edition, amendment 11 or newer)
- "Culvert Manual - Volumes I and II" – MWD
- Guidelines for fish friendly culverts – Greater Wellington Regional Council[1]
- Design guides and charts published by various research and overseas agencies, e.g. "Hydraulics of Precast Concrete Conduits" - Cement & Concrete Association of Australia
- Standards NZ - Standards and Codes covering various pipe types and systems.

4.2.3 **Local authorities' requirements** (additional to NZS 4404: 2010)

Appropriate approvals are required prior to the commencement of any works affecting or being connected to any drainage system which comes under the ownership of the Council and/or the Hawke's Bay Regional Council.

Such approvals shall be based upon the following criteria:

(a) The capacity available within the affected drainage network.
(b) The quality of the water to be discharged.
(c) The potential impact on the environment.

All such works shall comply with the requirements of the Resource Management Act 1991 and any regional or district plan, including obtaining a resource consent if required from the Council and/or the Hawke's Bay Regional Council.

Where the ownership of such works is to be vested with the Council these Consents shall be in the name of the Napier City Council.

The physical connection to piped drains or open drain systems controlled by the Council will be carried out by the Council at the applicant's expense.

[1] https://www.doc.govt.nz/globalassets/documents/conservation/native-animals/fish/fish-passage/fish-friendly-culverts.pdf

4.2.4 **Catchment management planning** (as per NZS 4404: 2010)

4.2.5 **Effects of land use on receiving waters** (as per NZS 4404: 2010)

4.2.6 **System components** (additional to NZS 4404: 2010)

4.2.7 **Catchments and off-site effects** (additional to NZS 4404: 2010)

All stormwater systems shall provide for the collection and controlled disposal of stormwater from within the land being developed together with any runoff from upstream catchments. In designing downstream facilities, the upstream catchment shall be considered as being fully developed to the extent defined in the current District Plan under both present and deferred zonings together with such other District Plans where the catchment may encroach outside of the area of the Council jurisdiction.

Where a developer seeks to develop outside the District Plan Zone then the design may be required to allow for development of the upstream catchment to the same standard as the developer seeks.

All stormwater systems and watercourses shall discharge to open drains, except where Council directs or approves piped drains. Where open drains are retained through a new development, channel upgrading and/or land raising may be required

4.2.8 **Water quality** (additional to NZS 4404: 2010)

Where permanent stormwater quality standards are set under Resource Consents, systems shall be designed to control the discharge of any contaminants. The most current versions of the following design guides (published by Auckland Council) shall be used a basis for design:

- GD 01 Stormwater Management Devices
- GD 05 Erosion and Sediment Control Guide for Land Disturbing Activities.

The Council may require a Developer to construct suitable structures on a stormwater system to minimise the release of any contaminants in order that the Council can comply with its discharge consents / by-law. (See the rules for stormwater discharge in the various zones in the District Plan).

The land use or intended land use will be a consideration in determining the requirement for any structures together with the requirement of the Regional Water Resources Plan and the Regional Coastal Plan or any subsequent Regional Plan.

4.2.9 **Climate change** (as per NZS 4404: 2010)

4.2.10 **Structural integrity requirements** (additional section to NZS 4404: 2010)

All pipes and bedding and surround standards shall be designed to resist future loads (weight of fill and traffic loads) as "pipes under an embankment" as AS/NZS 2566.1 or AS/NZS 3725 Supplement 1 as appropriate.

The minimum pipe strength shall be equivalent to Class 2 concrete OR SN16 PVC.

Generally, all pipes and associated structures within road reserves and all other areas likely to receive traffic shall be designed to HN-HO-72 loading as defined by NZTA.

All design needs to consider system resilience (to natural events, or otherwise). Infrastructure shall be designed to resist the effects of liquefaction, lateral spreading, slope failure, flood events, sea level rise and tsunami. This requires pump stations and critical gravity and pressure pipelines to be designed to Importance Level 4. As a minimum this requires the designer to consider mechanisms to allow pipelines and structures to accommodate (or engineer against) significant movement.

4.3 Design

4.3.1 **Design life** (replaces NZS 4404: 2010 section)

The design life shall be as follows:

- 100 years – pipework, appurtenances, all concrete work, tankage and detention structures
- 20 years – mechanical and electrical plant, with provision made for easy maintenance and replacement
- Agreed life and maintenance schedules for low impact design devices

4.3.2 **Structure plan** (as per NZS 4404: 2010)

4.3.3 **Future development** (additional to NZS 4404: 2010)

Stormwater systems shall be designed to drain the total catchment (road and all other land and improvements) upstream of the point being considered, unless the catchment includes a natural wetland or outstanding water body, in which case the hydraulic functioning of the water body is to be maintained. It shall assume land use and site coverage as defined in the District Plan including both current and deferred land use.

4.3.4 System design

4.3.4.1 **Primary and Secondary Systems** (replaces NZS 4404: 2010 Section)

Stormwater drainage shall be considered as the total system protecting land infrastructure and improvements against flooding. The system will generally consist of a primary drainage system of pipes and open channels, and a secondary system consisting of open channels, controlled flood plains and flow paths.

The design of the stormwater system shall include evaluation of effects on upstream and downstream water levels. Flood levels in upstream / downstream areas shall not be increased by any development.

To satisfy the protection criteria outlined in Sections 4.3.4.1.1 and 4.3.4.1.2, designs shall be carried out to the return periods shown in Table 8.

Function		Probability of Occurring Annually
a)	**Primary protection** - satisfied by an appropriately sized pipe or channel drainage system:	10%
	Rural and Rural Residential	10%
	Residential	10%
	Commercial and Industrial All areas where: i) no secondary flow path is available, or ii) the identified secondary flow path occurs over private property and/or the consequences of failure of a system designed for a 10% p.o.a. would severely impact on properties or assets.	2%
b)	**Secondary protection** - satisfied by appropriately designed channels or pipes, provision of secondary flow paths, controlled flood plains and setting of a flood level based upon an event having a 2% probability of occurring annually from which appropriate floor levels can be established.	2% (based on combined capacity of primary and secondary systems)

Table 8 Minimum Protection Criteria

4.3.4.1.1. Primary protection

Primary protection is to be satisfied by an appropriately sized pipe or channel. This provides for reasonable stormwater protection standards so as to avoid nuisance and meet accepted standards for the convenient use of main access areas. Primary protection is generally provided by stormwater reticulation systems of pipes but for larger flows and rural areas may utilise open channels.

The primary design return period for Napier has been set for a storm having a 10% probability of occurring annually, being kept within the pipe/sump/manhole network. Secondary flow paths may carry water in excess of this design.

4.3.4.1.2. Secondary protection

The second level of stormwater protection involves an evaluation of what would happen under major storm flows. It entails providing for such an event in a manner so as to avoid major hazard or property damage by such steps as:

(a) Providing for controlled stormwater flow via a combination of means including pipes, roads or identified and controlled paths, watercourse flood berms or other identified flood plains.
(b) Avoidance of constrictions to primary and secondary flow paths by buildings or filling or other obstructions, and regular maintenance of secondary flow paths.
(c) Set appropriate floor levels for buildings as set out in the first schedule to the Building Regulations 1992 Building Code E1. (It should be noted that the Council may set higher standards for some of its public facilities.) The floor levels of such buildings shall, in any event, be set no less than that required to cater for a flood level from a storm event having a 2% Annual Exceedance Probability (AEP).

4.3.4.1.3. Secondary Flow Paths (additional section to NZS 4404: 2010)

Design of secondary flow paths shall include an assessment of the potential for damage in flood conditions.

(a) Secondary flow paths should where possible be provided over public facilities such as parks, roads, paths, and drainage reserves.
(b) Stormwater runoff from all developed areas and driveways shall be collected for a 10% AEP storm and drained in accordance with the Building Act so that no nuisance is created.
(c) Any secondary flow path that is recognised as taking excess flow shall be protected by easement where it is not included in (a) above.
(d) Natural flow channels that are used for the discharge of primary and/or secondary flows shall be protected by easement to ensure that they are not built on or disturbed in a manner that might create a nuisance should water become diverted. See Section 1.7.4 for easement requirements.
(e) Buildings shall be located to preserve the secondary flow path and designed with adequate freeboard.
(f) Where grades are likely to induce erosion, protection measures shall be incorporated in the design.
(g) Flow paths shall not be restricted by structures such as fences or hedges.

4.3.4.1.4. Land and Building Sites (additional section to NZS 4404: 2010)

The following criteria shall be followed for the development of land and building sites to ensure that flood risk from a storm having either a 10% or a 2% probability of occurring annually is minimised.

(a) The flood level shall be established for a storm having a 2% probability of occurring annually.
(b) All new lots shall be able to be drained to the stormwater outlet provided. Where the kerb is the outlet the lot shall be at a level that provides the required drainage and cover to pipes.
(c) Kerb connections have limited capacity. Where flows greater than 8 l/s are anticipated, (2x 4l/s max. through a double kerb connection), then a fully-piped system must be designed. (See Section 4.3.11 for further guidance on Stormwater Connections).

(d) For all new and reconstructed roads there shall be no surcharge above catchpit grates for a storm having a 10% probability of occurring annually. For roads being reconstructed where this cannot be achieved with primary protection an alternative design is required.

(e) For all new roads and roads being reconstructed, ponding on roadways shall be limited to 300 mm above the grate at catchpits for a storm having a 2% Probability of Occurring Annually. For roads being reconstructed where this cannot be achieved with secondary protection an alternative design may be required.

4.3.5 Design criteria (as per NZS 4404: 2010)

Stormwater design usually requires estimation of peak flow, total flow or both during a storm event. Peak flows are normally suitable for the sizing of pipes and channels but total flows are required if storage is to be considered.

4.3.5.1 Stormwater Runoff Calculations (replaces NZS 4404: 2010 Design Storms Section)

Rainfall intensities relevant to the Napier City area are shown in Table 9. This Table is obtained from NIWA HIRDS V4 for the Scenario RCP8.5 (2081-2100) retrieved April 2020. Any modelling shall ensure that this information is the most up to date available and as agreed with Council.

Return Period		Duration											
Year	**AEP**	10m	20m	30m	1h	2h	6h	12h	24h	48h	72h	96h	120h
1.58	63.3%	6.8	9.5	11.7	16.9	24.3	42.2	57.7	76.7	96.4	107	114	119
2	50.0%	7.8	10.7	13.2	19.0	27.4	47.4	64.8	85.3	107	119	127	132
5	20.0%	11.1	15.2	18.6	26.7	38.2	65.3	88.8	116	145	160	170	176
10	10.0%	13.8	18.8	23.0	32.7	46.6	79.1	107	139	172	191	201	209
20	5.0%	16.7	22.7	27.6	39.1	55.5	93.6	126	162	201	221	234	241
30	3.3%	18.5	25.1	30.5	43.1	60.9	102	137	176	218	239	253	260
40	2.5%	19.8	26.8	32.5	45.9	64.8	109	145	187	230	253	266	274
50	2.0%	20.9	28.3	34.2	48.3	68.0	114	152	194	239	263	277	285
60	1.7%	21.8	29.4	35.6	50.1	70.6	118	157	201	247	271	285	293
80	1.2%	23.2	31.3	37.9	53.2	74.8	124	165	211	259	284	298	307
100	1.0%	24.4	32.8	39.6	55.6	78.0	130	172	220	269	294	309	318
250	0.4%	29.1	39.0	46.9	65.4	91.2	150	198	251	305	333	349	358

Source: Hirds RCP8.5 Scenario for the period 2081-2100 retrieved April 2020.

Table 9 Rainfall depths (mm)

4.3.5.1.1. Rational Method

For catchments less than 1 hectare, surface water run-off using the Rational Method will generally be accepted.

For larger catchments, or where significant storage elements (such as ponds) are incorporated, surface water run-off shall be determined using an appropriate hydrological and/or hydraulic model.

Flow assessments for stormwater work within the City shall be modelled.

In all cases discussion shall be had with Council to determine appropriate constraints e.g. tailwater levels.

For general urban land use minimum run-off coefficients for use with the Rational Method, are outlined in Table 10.

Time of Concentration	Return Period (Annual Exceedance Probability)	
	1 in 10 year (10%)	1 in 50 year (2%)
30 mins and less	0.55	0.63
1 hour	0.65	0.70
2 hours	0.70	0.74
6 hours and more	0.70	0.75
Notes: *1. Coefficients are based on a 20 mm retention plus a 3 mm/hour infiltration on non-sealed areas (laws, gardens etc)*		

Table 10 Runoff Coefficients

For all other land use types, and including where:

- The impervious surface area does, or will likely exceed 50% of the gross area, or
- The slope of the terrain is, or will, become greater than 5 – 10%,

The coefficient of runoff may be obtained by using Tables 1 & 2 of the New Zealand Building Code E1/VM.

4.3.5.1.2. Hydrograph Estimation Methods

Hydrograph methods provide both peak flows and a model of the flow variations in a watercourse over a period of time from the beginning to the end of a storm.

Their use enables more comprehensive studies of options for major waterways than does knowledge of peak flow only in that the effects of ponding and flow rates over time can be analysed.

A number of accepted industry standard computer-based hydrograph techniques are available in New Zealand. They are best used where stream flow records are available to enable some degree of calibration, but even without calibration they can still be used to synthesise a catchment based on input of assumed rainfall and runoff data.

The use of an accepted hydrograph technique is considered desirable but not mandatory in studying the effects of changes in land use and flood attenuation either within channels or storage areas.

Where used the input assumptions shall be clearly identified and peak flows derived and checked against flows derived from well used empirical methods appropriate to similar catchment types.

4.3.5.2 Freeboard (replaces NZS 4404: 2010 section)

4.3.5.2.1. Urban areas

The following freeboard heights are considered ‘mandatory’ in residential areas, and ‘recommended’ in commercial/industrial areas:

- For flood-prone areas, Finished Floor Level (FFL) shall be set 300 mm above anticipated 2% AEP flood level.
- For flood prone areas where there is no secondary flow path at the 2% AEP flood level, then FFL shall be set 400 mm above the 2% AEP flood level.
- For areas which can be shown to be not prone to flooding, the Finished Floor Level will be set at 150 mm minimum above ground level.
- Making adequate provision for public health and safety and for minimising disruption to main transport routes.

4.3.5.2.2. Rural areas

Stormwater and flood mitigation standards for rural developments shall be as covered in the preceding parts of this Code except as extended or modified below.

All new house sites shall either:

(a) Identify a building site that will not be subject to inundation from a storm having a 2% probability of occurring annually; or
(b) Show on the title a level to which habitable floors must be built to be free of flooding from a storm having a 2% probability of occurring annually.

However, in no case shall a building site be selected where ponding on surrounding land from a storm having a 2% probability of occurring annually exceeds 500mm.

Irrespective of previous details it is intended that all roads within the primary road classification shall be designed with stormwater systems capable of ensuring that the running lane of the road is kept free of inundation during a storm having a 10% probability of occurring annually.

Roads and other components of land development work shall be protected by stormwater drainage systems designed to the standards defined in the preceding parts of this Code except that systems may utilise open drains or combination of pipes and open drains where appropriate.

House stormwater connections need not be constructed as part of the land development works where it can be demonstrated that the house site can be drained to ditches or natural drainage paths without risk to land stability. This must be demonstrated even if it is likely that roof water will be collected for water supply.

4.3.5.4 **Hydraulic design of stormwater systems** (replaces NZS 4404: 2010 Section)

All primary systems shall be designed for a storm having a 10% probability of occurring annually without surcharge above the catchpit grates.

4.3.5.4.1. **Catchpits** (new section to NZS4404: 2010)

Catchpits shall be located in private or public property as necessary to ensure drainage is provided for the specified rainfall intensities and to ensure that the total design flow can enter the pipe system. For systems designed to carry low frequency events (ie. large flows) catchpit spacings may need to be significantly closer than the minimum number noted hereafter.

For design purposes, the intake capacity of a road catchpit with grating and rear entry and acceptable ponding at inlet can be assumed to be 28 litres/s.

Catchpit spacings for all roads shall recognise the requirement of the road having no surcharge above the catchpit grate in the event of a storm having a 10% probability of occurring annually.

Catchpits and leads in private property or private ways will not generally be taken over by the Council.

All catchpits that will become Council assets shall:

(a) Connect into access chambers, except when connecting into pipes which are three times the diameter of the connection or larger, with access chambers within 40 metres, in which cases soffit to soffit connection using a saddle or prefabricated junction may be acceptable.
(b) Discharge into an open watercourse where no piped stormwater system is available.
(c) Discharge via catchpit leads of minimum DN225 for a single catchpit and DN300 for a double catchpit. Where the hydraulic gradient of a catchpit lead is affected by pipe full

conditions in the main drain or drowned outlets specific design calculations to determine catchpit lead sizes will be required.

Road catchpits shall also comply with Standard Drawings R39 to R49 and the following:

(a) Be located at a maximum spacing of 90 metres when collecting surface runoff from single lanes (4.0 metres wide).
(b) Be located at a maximum spacing of 60 metres where collecting stormwater over two or more lanes, or on any roads where the adjacent properties discharge stormwater to the street kerb and channel.
(c) Be provided as double catchpits where channel slopes are steeper than 1 in 20 or at the lowest point of sag in a vertical curve where the distance of catchment exceeds 90 metres.
(d) Be required at all points in a channel where a change in gradient is liable to result in ponding due to changes in flow, velocity changes, or on bends where there may be a tendency for water to leave the kerb and channel.
(e) Be sited at the kerb line tangent points or low points clear of pram crossings at intersections, to ensure minimal flows occur across the pram crossing.
(f) With the exception of cul-de-sac heads, catchpits shall generally be located close to section boundaries, where practicable, and clear of potential accessways or vehicle crossings.
(g) Catchpits shall not normally be constructed in rural areas other than in kerb or concrete channel situations.

Catchpits in private property which will not become Council assets shall satisfy the requirements of the Building Act whilst also satisfying the total stormwater design needs of the subdivision.

4.3.5.4.2. **Manholes** (new Section to NZS4404: 2010)

Energy losses through manholes shall be calculated using the energy loss coefficient in Table 11 and the formula in Section 4.3.5.5.

Entrance Type	Coefficient (Ke)
Manhole < 45 deg change in direction	0.25
Manhole > 45 deg change in direction of main flow	0.50
Any manhole with more than one inlet pipe	0.75

Table 11 Benched Manhole Head Loss Coefficients

Reference shall be made to Section 4.3.10 for design related aspects for manholes.

4.3.5.4.3. **Pipes** (new Section to NZS4404: 2010)

The hydraulic design of piped drains shall be based on suitably documented and currently accepted methods. Examples of pipe design formulae include:

- Mannings formula (open channel)
- Colebrook White (full or surcharged pipelines)

The pipe system shall be designed to carry the design peak flow.

Concrete or uPVC stormwater pipes may be designed for roughness coefficients as follows:

Pipe Type	Colebrook White (k, mm) for full pipes	Manning (n) for open channels or part-full pipes
Spun concrete	0.6	0.012
uPVC or HDPE	0.3	0.011

Table 12 Pipe Roughness Coefficients - Stormwater

Normal acceptable minimum gradients for pipelines shall be as detailed below:

Pipe Internal Diameter (DN)	Minimum Grade	
	%	Ratio
100 mm	1.00	1:100
150 mm	0.40	1:250
200 mm	0.30	1:333
225 mm	0.25	1:400
250 mm	0.20	1:500
300 mm	0.167	1:600
375mm	0.125	1:800
450mm (and greater)	0.10	1:1000

Table 13 Minimum Grades for Stormwater Pipes

The minimum design velocity shall be 0.60 metres per second (m/s) based on a storm having a 50% probability of occurring annually and of 30-minute duration, where the grades in Table 13 do not facilitate this requirement, the pipe grade shall be increased. This will require consideration of part flow velocity particularly where pipes have been designed for a storm having a 2% probability of occurring annually.

Pipes shall not be purposely oversized to take advantage of reduced grade without prior approval of Council.

Reference shall be made to Section 4.3.9 for design related aspects for pipes including locations and minimum pipe sizes.

4.3.5.4.4. **Open Channels** (new Section to NZS4404: 2010)

Open channels shall be designed based on currently accepted methods such as the Mannings formula or "industry standard" software packages. All design assumptions shall be documented and made available to the Council for review.

4.3.5.4.5. **Culverts** (new Section to NZS4404: 2010)

Culverts under fills shall be of ample capacity to cope with a design storm having a 10% probability of occurring annually with no surcharge at the inlet. They shall be designed to carry the flow from a storm with a 2% probability of occurring annually under surcharge provided the surcharge will not risk the stability of the adjacent embankments.

All culverts shall be provided with adequate wingwalls, headwalls, aprons, detritus traps and/or pits to prevent scouring or blocking. Entry losses shall be taken into account. At culvert entries the socket end of the pipe shall generally be laid upstream.

Typical head loss coefficients at culvert entries are:

Entrance Type	Coefficient (K_e)
Headwall with socket end of pipe flush	0.2
Headwall with cut pipe flush or projecting from fill square cut	0.5
Mitred to fill slope	0.7

Table 14 Culvert Head Loss Coefficients

Where the inlet to the stormwater system consists of a pipe and headwall in a watercourse, attention shall be paid to the headwater depth. This shall be done by evaluating the length of pipe to the first access chamber separately as a short culvert. In this case, the "tailwater depth" is the depth of water as it enters the next section of the pipeline, which, if flowing just full, is at the soffit of the pipe.

Pipe systems connecting separate catchment intakes shall be designed taking into account the relevant times of concentration in each catchment.

Reference shall be made to Section 4.3.9.6 for design related aspects for culverts including minimum sizes.

4.3.5.4.6. **Outlets** (new Section to NZS4404: 2010)

When designing pipelines discharging to an open outlet, consideration must be given to the water level of the receiving body at the point of discharge. It is necessary to establish the water level in the receiving body for the catchment's critical time of concentration for the given design storm.

For design purposes, the water level at the point of discharge shall be taken to be the greater of:

- the modelled water level of the receiving body for the catchments critical time of concentration for the given design storm, or
- the pipe's soffit level.

Reference shall be made to Section 4.3.9.8 for design related aspects for inlets and outlets.

4.3.5.5 **Energy loss through structures** (replaces NZS 4404: 2010 Section)

Energy losses shall be calculated as follows:

$H_e = kV^2/2g$

Where k = energy loss coeffiecient (K_e), V = velocity in m/s, g = gravity (9.81 m/s^2)

4.3.6 **Stormwater pumping** (additional to NZS 4404: 2010)

Stormwater pumping will only be considered for approval where gravity disposal is not a feasible solution. Design philosophy and technical requirements are to be discussed and agreed with Council before commencement of detailed design. High level requirements are as follows:

- Pumping systems shall be specifically designed generally using a multi pump system to best balance the need for regular pump operation against the relative infrequency of major storm events. All pumps in a station shall be of the same size with an additional installed pump as standby and a smaller low flow pump. Pump makes and models shall be approved by Council.
- Pump pipework and valves shall make provision for easy maintenance and dismantling. Design shall be such that maintenance can be undertaken on a single pumped line at any time without interfering with the operation of the other pumps. Pipework shall be SS316L or other approved material.
- Depending on the economic consequences of flooding during a pump station power "outage" council may require that on site emergency power generation be provided. All stormwater pump stations shall have facilities to enable generator power connection, under emergency conditions.
- Stormwater pump stations shall incorporate control, monitoring, alarm and telemetry communication systems to Council standards at the time of the design and equipment shall comply with Council requirements.
- All electrical switch gear shall be located above ground and at least 500 mm above the predicted flood level resulting from a storm with a 2% probability of occurrence annually.

4.3.7 **Low impact design** (additional to NZS 4404: 2010)

The outcome of stormwater design is to safeguard people, property, infrastructure and the environment from the adverse effects of stormwater, contaminated or otherwise, and to meet the performance requirements outlined within this document.

Environmental quality must be taken into account in the location and design of stormwater systems. Sustainable stormwater techniques shall be employed to minimise the potential adverse effects of development. Options such as, but not limited to, bio-retention, retention of streams and natural landform, porous paving, rain gardens, rainwater tanks, green road reserves and detention storage shall be considered.

The following shall be taken into account:

- promoting improved environmental outcomes, including visual amenity
- avoiding adverse effects on cultural and heritage sites.
- preserving or protect areas of ecological significance, areas of significant habitat for indigenous flora and fauna and significant natural features.
- avoiding, remedying or mitigating adverse effects on open drains, streams and watercourses, esplanade strips, the estuary and coastal water.
- providing for on-site silt and sediment management, erosion control and dust control during construction; and
- consideration is to be given to pre-treatment of stormwater discharges to aquatic receiving environments.

All discharges must comply with the requirements of the NCC District Plan, stormwater bylaw, any applicable Catchment Management Plan or any specific direction provided from Council. The specific requirements for low impact design will vary from development to development. In all cases, early consultation with Council is critical to align expectations between the two parties. This will determine ownership of the low impact devices and the need for any easements. All low impact design devices shall be provided with a suitable operation and maintenance manual.

Some of the possible requirements from the District Plan that may apply to new development are as follows:

1. Stormwater runoff generated from new or infill development is to be discharged to the public stormwater pipe at no more than the existing (pre-development) peak runoff rate. Runoff beyond this rate must be detained on-site (within the up to the 50-year event for secondary system protection.
2. A minimum stormwater volume retention target of 20 mm.

Councils philosophy for stormwater management is well aligned with GD01 (http://www.aucklanddesignmanual.co.nz/regulations/technical-guidance), and this document shall form the basis of compliance for any low impact design measures.

4.3.7.1 **Low impact design stormwater system** (as per NZS 4404: 2010)

4.3.7.2 **Low impact design process** (as per NZS 4404: 2010)

4.3.7.3 **Low impact design devices** (replaces NZS 4404: 2010 Section)

The types of low impact design devices that are considered appropriate for use in Napier include:

- Detention ponds
- Wetlands
- Swales
- Rain gardens, tree pits and filter strips
- Rainwater detention tanks
- Permeable paving
- Proprietary stormwater treatment devices

A typical development could consist of the following low impact design measures:

1. Retention and detention of roof runoff via rainwater tanks
2. The utilisation of permeable paving where practical.
3. Impermeable paving treatment with rain gardens and tree pits
4. Swales for the conveyance of storm flows

5. A detention pond and/or wetland to provide for detention and/or water quality improvements
6. Specific "at-source" treatment for high risk properties / activities.

4.3.7.4 **Detention ponds** (additional to NZS 4404: 2010)

For large developments or where constraints exist in the downstream stormwater system a Developer may be required to ensure that the development creates no increase in downstream stormwater flow. To satisfy this requirement the design of stormwater attenuation will be required. This may necessitate the design and construction of detention ponds. This may be in the form of a dry pond (detention basin) or a wet pond.

The design of detention pond infrastructure shall be based on the technical guidance provided in Section C9 of GD01. This document will be used as a means of assessing design acceptability by Council.

It is noted that detention ponds provide little enhancement of water quality and may not be a preference of Council dependent on the development / catchment. Wetlands may provide a suitable alternative in this case.

Specific design considerations are as follows:

- Detention ponds shall be designed to attenuate all flows up to and including a design flow arising from a storm having a 1% probability of occurring annually (also called AEP).
- Dry ponds are not suitable in areas with high water tables. If suitable, dry ponds shall have suitable soils to ensure the bottom stays dry between storms (or have subsurface drains).
- They shall be designed for the entire contributing catchment, not just the development area.
- Pre-treatment to remove contaminants (litter and gross pollutants) shall be incorporated into the upstream network.
- Ponds shall have a length to width ratio of between 3:1 and 5:1 to promote the settlement of suspended solids and maintain suitable flow velocities.
- Short-circuiting designs shall be avoided along with designs creating "dead" areas.
- The pond (if a wet pond) shall have a forebay with suitable maintenance access for the removal of sediments. An area for drying of sediments shall be provided nearby to the forebay. The forebay shall be a minimum of 10% of the pond area, at least 1.5 m deep and shall be separated from the main pond with a bund.
- Inlets and outlets shall include flow velocity dissipation structures prior to the forebay to prevent scour and erosion.
- A constructed spillway shall provide for over-design floods, and this shall consider the effect of the Probable Maximum Flood. Spillways shall be designed to provide non-scouring velocities.
- Inclusion of bypass system for high flow (where permitted) and maintenance.
- Pond slopes shall be no steeper than 1V:4H for internal (wetted slopes_ and 1V:3H for external slopes. Any slopes requiring mowing shall be no steeper than 1V:6H. All slopes shall be approved by a geotechnical engineer.

4.3.7.5 **Wetlands** (additional to NZS 4404: 2010)

In a similar manner to detention ponds, a wetland can provide attenuation of stormwater flows. They also provide for the enhancement of water quality and can improve the public amenity and ecological values of urban environments if designed properly. Typically, because of their shallower nature they will not provide attenuation up to the 1% AEP event and may require an additional form of attenuation to be provided.

Where approved by Council, Wetlands shall be designed in accordance with Section C8 of GD01. This document will be used as a means of assessing design acceptability by Council.

Specific design considerations are as follows:

- The same design considerations apply as those from detention ponds in Section 4.3.7.4.
- The total system (wetland + other attenuation shall be designed to attenuate all flows up to and including a design flow arising from a storm having a 1% probability of occurring annually.
- The wetland shall contain four zones as follows:
  - Forebay – as per detention pond section
  - Shallow marsh – planted areas with an average depth of 0.2 m
  - Deep march – planted areas with an average depth of 0.5 m
  - Deep pools – unplanted areas covering no more than 20% of the wetland area and between 1.2 m and 1.5 m deep.
- Velocities shall be less than 0.1 m/s for a 30mm-24 hour rainfall event and less than 0.5 m/s for events up to 10% AEP. Bypassing may be required for higher velocities.
- At least 80% of the wetland area (excluding forebay) shall be densely planted (minimum of 4 plants / m^2) with approved plants.
- Fish passage shall be provided.

4.3.7.6 **Vegetated swales** (additional to NZS 4404: 2010)

The primary purpose of vegetated swales is the conveyance of storm flows, albeit they offer some water quality improvements and some attenuation of peak flow.

Vegetated swales shall be designed in accordance with Section C6 of GD01. This document will be used as a means of assessing design acceptability by Council.

Specific design considerations are as follows:

- Not used for slopes exceeding 8%. Check dams shall be used if the longitudinal slope exceeds 5%. The inclusion of a perforated underdrain where slope is less than 2% to enable drying between events.
- A channel bottom width of 0.6 to 2.0 m and side slopes of 1V:3H if vegetated and 1V:6H if grassed and mown.
- Of appropriate length (>30 m) and retention time (>9 minutes) to provide for water quality requirements.
- Velocities shall not exceed 0.8 m/s for a 30mm-24 hour event and less than 1.5 m/s for a 10% AEP event.

4.3.7.7 **Rain gardens** (additional to NZS 4404: 2010)

Rain gardens (and other bioretention devices such as tree pits or filter strips) provide for water quality improvements by removing both particulate and dissolve contaminants.

Rain gardens and tree pits shall be designed in accordance with Section C3 of GD01. This document will be used as a means of assessing design acceptability by Council.

Specific design considerations are as follows:

- Typically, the base of any device shall be 300 mm above the seasonal high groundwater table.
- They shall have minimum design depths as follows; ponding depth of 150mm, media depth of 500 mm, transition layer of 100mm and drainage layer of 200mm.
- The type of media, transition and drainage materials shall be as specified in GD01.
- Pre-treatment may be necessary for large areas (>50 m^2) or high contaminant load areas.
- Underdrains to drain the detention layer within 24 hours.

4.3.7.8 **Rainwater tanks** (additional to NZS 4404: 2010)

Rainwater tanks provide for attenuation of peak flows and additional storage capacity that can be used for garden watering during periods of water restrictions; but do not provide any water quality benefit.

Where approved by Council, rainwater tanks shall be designed in accordance with Section C5 of GD01. This document will be used as a means of assessing design acceptability by Council.

Specific design considerations are as follows:

- Allow for dead storage in the tank of minimum 150 mm depth.
- Utilise an agreed volume / depth for retention (i.e. reuse purposes) and detention. Typically this will require 2 to 5 m^3 for retention and 6 to 9 m^3 for detention.
- The detention outlet shall be at the top of the retention depth and shall have an orifice (minimum 10 mm diameter) to provide for controlled discharge of detention volumes over 24 hours.
- Utilise a detention volume as agreed with Council. This will depend on the area of the roof.
- A suitably sized overflow pipe.

4.3.7.9 **Soakage Devices** (additional to NZS 4404: 2010)

Suitably designed permeable paving can reduce runoff volumes for small upper catchment locations. They offer minimal water quality benefit.

Permeable paving shall be designed in accordance with Section C2 of GD01 and any specific manufacturer guidelines.

4.3.7.10 **Washdown facilities** (new section to NZS 4404: 2010)

Washdown facilities are to be designed to prevent any contaminated washdown water from entering the stormwater system and at the same time prevent the infiltration of storm water into the wastewater system.   The solution that is used will depend on the size of the installation and the types of contamination that may impact on both the stormwater and wastewater networks.

Options that are considered suitable for washdown facilities are detailed as follows:

4.3.7.10.1. **Roofing** (new section to NZS 4404: 2010)

Roofing the installation has the advantage that the stormwater and wastewater systems are separated and there isn't a need for complicated control systems to ensure that cross connections don't occur between the stormwater and wastewater networks.

With roofing, stormwater is collected on the roof and piped directly to the stormwater network. Stormwater cannot enter the wastewater system provided the washdown pad is higher than any surrounding ground. Surrounding ground that collects stormwater should be graded away from the washdown pad and the stormwater collected and drained to the stormwater network.

Washdown water is directed to a dedicated wastewater connection to the wash via any grit and grease traps that may be required to protect the wastewater network from oil, grease and solid material that could damage the wastewater network.

The design of grit and grease traps are to be approved by the Council. The design will depend on the function and size of the washdown facility. In the bigger installations the traps will take the form of an approved interceptor such as a 3 chamber API tank or 3 stage access chamber system.

The design of interceptors and traps shall be such that they can be easily maintained at regular intervals and in the event that they become overloaded they should "fail safe".

4.3.7.10.2. **Automated Valving** (new section to NZS 4404: 2010)

This option provides and automated system of valves that control how and when washdown water is directed to the wastewater network and stormwater to the stormwater network.

Only approved proprietary systems shall be used.

All installations are to be fitted with oil, grit and grease traps as appropriate to the installation. Traps are to be approved by Council.

4.3.7.10.3. Acceptable Solution (new section to NZS 4404: 2010)

The Standard Drawings D24 and D25 shows a schematic layout for a small to medium sized washdown facility using a pumped output to the wastewater network.

Installations using this solution must be submitted for approval and approval is to the Works Asset Manager's discretion.

Key points to note in this design are as follows:

- The pumped outlet to the wastewater networks must exit at a higher level than the outlet to the stormwater network.
- The inlet to the stormwater discharge pipe must be a minimum of 100 mm below the connection pipe between the chambers.
- The pump and the water supply to the washdown facility are controlled by a push button timer. The timer has to be active before the pump and the water supply to the washdown facility are available for use. Note: If the system is in stormwater mode when the timer is activated, the water supply will remain locked out until the pump lowers the water level below stormwater mode.
- The pump is controlled by float switches and an additional float is required to lock out the pump and the washdown facility when the system is working in stormwater mode.
- The water supply to the washdown facility is to be isolated by the float that determines when the facility is in stormwater mode. This will occur whenever the water level rises above the set point of the stormwater mode float switch. Note, if the pump fails for any reason water levels will rise to the point where the system will change to stormwater mode and a locked out water supply could be an indication of a pump failure.

4.3.8 Natural and connected waterways (additional to NZS 4404: 2010)

New open drains or upgraded drains or watercourses shall have the capacity to carry the full design flow. This may be the primary flow for small drains or the total (primary and secondary) flow for main watercourses. In some cases, with the agreement of the Council and where controlled flooding can be accepted under large storm flows (eg. parks, designated ponding areas) the design can take the attenuation effects of such areas into consideration.

Design of open channels and secondary flow paths shall ensure that gradients will not induce erosion or scour, or where such potential is unavoidable the design shall incorporate preventive measures, e.g. silt and debris traps, designed bank and bed protection.

Primary channel and flood berm widths shall be set by the Design Co-ordinator to suit the design flow and storage requirements. Two stage channels with a low flow channel and second stage flood channel are preferred. A typical waterway cross section is provided in the Standard Drawing D21. For watercourses and open drains Council will generally require a reserve to be created with 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.

Easements (see Section 1.7.4) will be required for the following:

- For designed overland flow paths.
- For significant channels, as for watercourses and open drains above.
- In urban areas where paths/accessways or grassed or other flood flow-paths are used, the easement width shall be the larger of the designed width required, or 3 metres.

4.3.9 Pipelines and culverts

4.3.9.1 **Location and alignment of public mains** (additional to NZS 4404: 2010)

Stormwater mains shall generally be laid in the road berm. The Council standard position for stormwater mains in residential areas is shown on the typical road cross-section in the Standard Drawing D18.

The placing of public drains in private properties will only be considered where particular conditions make the use of the public road not a feasible option.

For any public drainage on private property:

(a) Access chambers shall be sited completely on one lot such that the opening is 1.3 metres clear of the boundary and not on the boundary of two lots.
(b) Reticulation lines to rear lots shall be sited with regard to having a minimum effect on the building area available on the lot.
(c) Easements (see Section 1.7.4) shall be provided.

4.3.9.2 **Materials** (replaces NZS 4404: 2010 section)

Refer to Appendix 1.0.

4.3.9.3 **Minimum pipe sizes** (replaces NZS 4404: 2010 section)

The minimum size stormwater main to be taken over by NCC is DN225.

Catchpit leads shall be a minimum of DN225 for a single catchpit, and DN 300 for a double catchpit.

The minimum connection to each lot is either a double DN100 RHS kerb connection or a direct DN150 piped connection to a council-approved main or waterway.

Subject to satisfying the minimum falls in manholes of Section 4.3.10.5 and any other hydraulic losses pipes joined to smaller upstream pipes shall be jointed soffit to soffit. No pipe drain or connection shall connect into or onto a downstream pipe of a smaller diameter without the written consent of the Council. Where such consent is given the connection shall be made invert to invert.

4.3.9.4 **Minimum cover** (additional to NZS 4404: 2010)

Maximum and minimum covers shall be as specified in Table 15. Any design involving a cover outside this range will only be approved if a complying option is shown to be impractical and then the alternative must be supported with full calculations.

Cover Description	Depth
Maximum depth to invert	3.0 metres
Minimum cover in roads	750 mm
Minimum cover in berms and paths	600 mm
Note: cover is from the finished ground surface to the top of the pipe collar.	

Table 15 Stormwater Pipe Cover

4.3.9.5 **Minimum gradients and flow velocities** (replaces NZS 4404: 2010 section)

Minimum gradients and flow velocities are listed in Section 4.3.5.4.3.

4.3.9.6 **Culverts** (additional to NZS 4404: 2010)

Culverts shall be individually designed. The minimum size for culverts shall be DN 375.

Fish passage through culverts shall always be maintained.

4.3.9.7 **Inlets and outlets** (additional to NZS 4404: 2010)

All culvert inlets and outlets shall be provided with adequate wingwalls, headwalls, aprons, detritus traps and/or pits to prevent scouring or blocking. Entry losses shall be taken into account. At culvert entries the socket end of the pipe shall generally be laid upstream.

The design of inlets and outlets shall consider the riparian landscape and the effect on in-stream values. This requires consideration of planting close to the structure and/or locating outlets back from the waters edge.

4.3.9.8 **Outfall water levels** (additional to NZS 4404: 2010)

Where the velocity of discharge at the outlet of a stormwater pipe is high and likely to cause erosion, an energy dissipating structure shall be constructed. Such structures shall be designed to minimise the collection of debris. Where debris will collect, provision must be made for easy removal.

Backflow effects shall be designed for, where applicable. Discharges to existing drains, streams and rivers shall take full recognition of expected flood levels and shall incorporate backflow prevention as necessary.

4.3.9.9 **Subsoil drains** (additional to NZS 4404: 2010)

Subsoil drains shall be installed as required to lower ground water levels and pressures and avoid any potential for future build-up of ground water levels and pressures. They shall be specifically designed to cope with estimated flows and superimposed loads.

4.3.9.10 **Bulkheads for pipes on steep grades** (additional to NZS 4404: 2010)

Where the slope of a trench is 1:15 or greater, anti-scour blocks (also known as water-stops) shall be provided, to prevent surface water running along the pipeline and scouring the surround.

They shall be constructed as per the <u>Standard Drawing D04</u>.

4.3.9.11 **Trenchless technology** (additional to NZS 4404: 2010)

Alternative drainage construction methods shall comply with the appropriate technical standards and codes.

4.3.9.12 **Clearance from underground services and from structures** (additional section to NZS 4404: 2010)

The layout of the reticulation system shall provide adequate clearance from other services.

A minimum horizontal clearance of 500 mm shall be provided to all other services. This clearance may be relaxed for other water reticulation.

A minimum vertical clearance of 100 mm shall be provided to all other services. This space shall be filled with compressible material (i.e. pea gravel, neoprene rubber).

Pipelines shall not be laid within 2 metres of any structure unless no other option is available and the Design Co-ordinator can provide calculations and a construction system that will ensure that neither the structure nor pipeline will suffer any short or long term distress and that the pipe can be reasonably accessed for future maintenance.

4.3.10 Manholes (Access Chambers)

4.3.10.1 **Standard manholes** (additional to NZS 4404: 2010)

Access chambers of over 3 metres depth will not normally be acceptable. When no alternatives are available they shall be specifically designed.

Access chambers deeper than 1.5 m shall have manhole cover safety grills and shall have shall be plastic coated stainless steel 316 step irons installed by the manufacturer and designed to minimise slipping.

Access chambers shall be provided at all changes of direction, gradient and pipe size, at branching lines, terminations and at a distance apart not exceeding 120 metres. They shall be located such that the access chamber structure is clear of any boundary by a minimum of 600 mm and the opening is 1.3 metres clear of the boundary.

4.3.10.2 **Manhole materials** (additional to NZS 4404: 2010)

Precast concrete access chambers shall comply with the requirements of AS/NZS 4058 and have an internal diameter of 1050mm. The reinforced concrete top shall have a minimum thickness of 200mm and be capable of withstanding HN-HO-72 traffic loadings. If larger chambers are required, they shall be specifically designed for the purpose, or utilise approved proprietary components, suitable for the traffic loading characteristics.

All maintenance structures shall be formed from pre-cast components. For pipes smaller than DN600, manholes shall come complete with a pre-cast flanged base as shown on the Standard Drawing D05. Manholes up to 2.4 m deep shall be a single unit with no joints. Where manhole joints are required, they shall be sealed using proprietary supplier sealing methods (Hynds BM100 strip or Humes SM9020/MSR (or approved alternative) depending on the water table level).

All holes for pipe entry shall be saw cut. Impact holing is not permitted.

Mortar and its components shall comply with NZS 3103.

Access Chamber Covers and Frames shall be of the hinged, circular variety, nominally 600mm diameter, and manufactured from first quality heavy duty cast iron and shall be coated with bituminous protective coating. The covers shall be set a maximum of 400mm above the underside of the precast chamber slab, and bedded on concrete spacers. See Standard Drawing D05.

Proprietary bolt-down chamber covers, from an approved supplier, may be used where appropriate. They shall be set to level or allowing for the road cross-fall, and secured to the concrete slab, using suitable fixings, or cast-in anchors. When used in roads, the hinge shall be located on the side nearest to oncoming traffic.

On steep slopes, consideration shall be given to the use of proprietary adjustable levelling rings, to align the chamber covers with the gradient of the finished surface.

Where manholes are in grassed / mowed areas, a concrete mowing strip shall be provided around manhole covers.

4.3.10.3 **Size of manholes** (replaces NZS 4404: 2010 section)

Precast concrete access chambers shall have a minimum internal diameter of 1050mm. If larger chambers are required, they shall be individually designed to maintain structural integrity, or utilise approved proprietary components, suitable for the traffic loading characteristics.

4.3.10.4 **Shallow manholes** (replaces NZS 4404: 2010 section)

Shallow access chambers may be used on pipes up to DN225 provided full sized access chambers are placed at not more than 120 metre centres. Full sized chambers are required at terminations.

Shallow access chambers shall utilise DN600 catchpit barrels with a standard Council cast iron frame and cover. Maximum invert to lid depth is limited to 900mm.

4.3.10.5 **Hydraulic flow in manholes** (replaces NZS 4404: 2010 section)

The grade across the invert of a maintenance structure shall be a minimum of 20 mm plus 5 mm for every 10° of change in direction of flow.

The exceptions to these requirements are for prefabricated Polyethylene manholes or larger diameter pipe "cut-outs" where these minimum requirements may be relaxed by Council.

On steep pipelines, the maximum fall through a manhole shall be limited to 150 mm.

The maximum change in direction of a manhole is 90° unless otherwise approved.

4.3.10.6 **Manhole connections** (as per NZS 4404: 2010)

4.3.10.7 **Flotation** (consistent with NZS 4404: 2010)

Chambers shall be designed to prevent flotation when empty (with a safety factor of 1.25), and with groundwater up to ground level. This is of particular concern for non-concrete structures.

4.3.11 **Connection to public system** (additional to NZS 4404: 2010)

Urban lots shall be provided with stormwater connections at such depth at the boundary that a drain is able to be extended from the connection at grades and cover complying with the Building Act, to the furthest point on the lot. Connections shall extend 500 mm into the lot and shall be located near the centre of the lot unless the road is on a significant slope in which case the connection shall be placed 1.0 metre from the low side boundary. All connections where practicable shall have at least 300 mm horizontal clearance to adjacent services.

In areas where lots slope up from the road a connection into the kerb face is the preferred form of discharge. It shall utilise a 100 x 75 x 3 galvanised steel RHS taken through the kerb. The connection from the kerb to the boundary shall be RHS with a DN100 uPVC adaptor fitted. See Standard Drawings D15 and D16.

No more than four kerb connections, with no more than two at any one location, shall be allowed for any multi-unit development where common private drains are to be used. Individual connections for each unit may be used where a multi-unit development is parallel to a road frontage.

In areas where mountable kerbs are used or in cul-de-sac heads where connection to kerb may not be practicable through vehicle access provisions, connections shall be provided direct to the stormwater main or an adjacent access chamber, with the object of avoiding the need for a bubble up catchpit within the lot. An inspection or rodding eye will be required within the boundary. Connections directly into catchpits are not permitted.

For all residential lots DN150 connections (other than kerb connections) will be required as a minimum, unless agreed otherwise. For residential sites in excess of 600 square metres, pipes shall be sized DN150 or above, to suit expected discharges.

For industrial/commercial lots connections shall be based on the lot size and the minimum requirements for stormwater provisions as defined by the Building Act. A wet chamber shall be installed inside the boundary for all industrial/commercial lots. The chamber shall be a minimum of DN600 and be fitted with a suitable solid lid and shall not be used as a catchpit Where the depth exceeds 900 mm the diameter shall be DN1050.

Where connections to stormwater mains are required they shall be made as follows:

(a) Where practical, property and lateral connections shall be made directly to an access chamber, to provide better access, and reduce risk of damage to connections between chambers.

(b) When the connection is DN300 or larger it must be connected at an access chamber.

(c) Where the connection diameter exceeds one third of the main drain diameter the connection shall be via an access chamber unless the connection is made using a factory-made "Y" fitting, or a saddle reinforced with glass fibre.

4.3.12 **Connection of lateral pipelines to public mains** (additional to NZS 4404: 2010)

Connections shall typically be made at 90 degrees to the main.

All piped connections to stormwater mains shall be no less than 150 mm diameter.

Connections to mains of up to DN300 shall utilise factory made Y fittings. Connections to larger mains shall utilise properly manufactured saddles.

Connections to mains of DN1200 or larger may be made by breaking a hole in the main and placing the connection, trimming it neatly to the shape of the inside of the main and neatly epoxy mortaring the two together.

Where a connection of DN150 needs to go deeper than 1.8 metres below ground level to connect to a stormwater main a ramped riser shall be constructed to bring the connection to within 1.2 metres of ground level provided the site can be adequately serviced.

Connections shall not be made directly to stormwater mains which are more than 3.0 metres deep to the invert of the pipe. Such situations shall be overcome by the construction of a shallower branch drain laid from an access chamber on the deep drain and connections made to the shallower drain.

4.4 **Approval of proposed infrastructure** (additional to NZS 4404: 2010)

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.

Refer to Section 1.8.1.

4.5 Construction

4.5.1 **Pipeline construction** (additional to NZS 4404: 2010)

4.5.1.1 **General** (additional section to NZS 4404: 2010)

All drainage systems shall be constructed to lines and grades specified in the design drawings and to standards suitable for ensuring pipelines are able to serve their purpose over the required design life. Drainage construction methods shall comply with the appropriate technical standards, suppliers or manufacturers requirements and codes.

4.5.1.2 **Setting out** (additional section to NZS 4404: 2010)

All drainage works shall be set out to the position and levels detailed on the approved drawings.

Where the alignment is related to the road boundary, drains shall be laid with reference to permanent land transfer boundary pegs or temporary boundary marks placed by the registered surveyor responsible for the final land transfer pegging. Pipes shall be laid by reference to the kerb line only where the surveyor has confirmed that the kerb is located in the correct position.

All pipes must be laid to the gradients specified on the drawings. Final acceptance will be by CCTV inspection in accordance with the guidance provided in the NZ Gravity Pipe Inspection Manual 4th Edition (Water NZ, 2019). It is noted that any dips in plastic pipe alignment must be less than 10% of the pipe diameter.

4.5.2 **Trenching** (additional to NZS 4404: 2010)

Trenches shall be opened only after all required Consents and Trench Opening Notices have been uplifted. All trenching shall comply with the safety requirements of the Health & Safety in Employment Act.

All trenches shall be opened up to widths and depths suitable for enabling the requisite bedding metal thickness below the pipe to be placed (not less than 100mm). The trench width shall be kept to those dimensions detailed in the design drawings which ensure that it is narrow enough to allow the pipe to be laid in trench conditions but wide enough to enable pipe surround material to be adequately placed and compacted.

All trenching in Napier roads or on services to be taken over by Council shall be carried out in accordance with Council approved methods (see Section 4.5.3).

4.5.2.1 **Trenches in open land** (additional section to NZS 4404: 2010)

Trenches may be opened up for up to 200 metres ahead of pipelaying provided trench depth and material are of adequate stability to minimise any risk of trench failure and to ensure safety of workers and the public.

4.5.2.2 **Trenches in road** (additional section to NZS 4404: 2010)

Trenches in stable ground may be opened to a maximum of 50 metres in advance of pipe laying, but this distance shall be reduced where the public or network utility services are endangered or where traffic routes are restricted.

4.5.2.3 **Control of water** (additional section to NZS 4404: 2010)

The Contractor shall keep the excavations free from water and wastewater at all times and shall provide all such pumping plant, pipes, and materials as may be required for this purpose.

Under no circumstances shall any water be allowed to drain directly into the existing wastewater drains.

4.5.2.4 **Pipe condition** (additional section to NZS 4404: 2010)

All pipes supplied for use in the works shall be new and in good condition. They shall be examined before being laid and any pipe showing defects of any description shall be removed from the site and not used in Council works. Any pipes damaged during laying shall likewise be removed except where damage is minor or to repairable coatings. In such cases the coatings and other damage shall be repaired to the manufacturer’s specification so as to achieve a condition at least as good as a new undamaged pipe.

Handling of pipes and fittings shall be in accordance with the manufacturer's recommendations. All reasonable care shall be taken in handling pipe materials to preserve intact the pipe coatings, linings, structural strength and the various features necessary for long service. Pipes with external coatings shall be lifted using wide slings; ropes and chains shall not be used.

4.5.2.5 **Pipe laying and jointing** (additional section to NZS 4404: 2010)

A registered drainlayer shall be employed to supervise and certify all pipe laying works.

The laying and jointing of pipes shall be strictly in accordance with the manufacturer's recommendations, and Council's requirements. Bedding shall be as detailed in the design documents.

Where a pipeline is to be constructed through soft ground, unsuitable foundation material shall be removed and replaced with suitable compacted material. Unsuitable foundation material types include buried organic topsoil, soft peat, loose uncompacted sand, fill material, soft to very soft and/or expansive clay. Standard Drawings D02 and D03 provide details on adequate foundations for the pipeline.

Drainage structures including access chambers shall be clear of boundaries and other obstructions.

Pipelines shall be laid clear of existing buildings. Pipelines shall not be laid in front, side and rear yards unless clearance needs have been previously determined by the Design Co-ordinator having regard to possible disturbance of structures.

4.5.2.6 **Jointing pipes** (additional section to NZS 4404: 2010)

Jointing shall be strictly in accordance with the manufacturer's instructions or in accord with specific design details.

Spigots, sockets, rubber rings and sleeves etc shall be thoroughly cleaned and lubricated where appropriate before jointing.

4.5.2.7 **Pipe contamination** (additional section to NZS 4404: 2010)

Adequate precautions shall be taken while laying pipes to prevent the entry of debris. Where required, the pipeline shall be temporarily sealed with fixed covers or bungs to prevent entry of foreign matter or groundwater.

4.5.2.8 **Connections** (additional section to NZS 4404: 2010)

Connections shall be in accordance with Section 4.3.12.

Each connection shall be laid soffit to soffit except when a drop is constructed.

Each connection end shall be marked by a stake (plastic flexipost or similar) extending to 600mm above ground level.

Connections whether to reticulation lines or to access chambers shall be sealed by a factory made sealing cap.

4.5.2.9 **Access chamber construction** (additional section to NZS 4404: 2010)

Access chambers shall be constructed as detailed in Standard Drawings D05 to D08. Where more than a single riser is used in an access chamber, riser joints shall be sealed with epoxy mortar.

Shallow access chambers of 900mm or less to invert, may be formed using DN600 reinforced concrete pipe, with construction otherwise being to the requirements of this Code.

Where an access chamber excavation is found to be in soft ground the area under the access chamber shall be undercut down to solid and backfilled with hard fill to provide an adequate foundation for the access chamber base. Alternatively, work can be stopped and a specific solution designed.

Before any concrete is placed the base of the trench shall be free of all debris and water.

Stormwater access chambers inverts shall be smoothly formed with cement render.

The grade across the invert of an access chamber shall not be less than the greater of the general grade of the stormwater main, or 20mm. Where a main changes direction, additional falls shall be provided to account for losses due to bends.

When uPVC pipes are used factory made "access chamber shorts" shall be used at access chamber entry points.

Care shall be taken to ensure that chamber access holes are orientated correctly.

The walls, benching and invert of access chambers shall have smooth internal finish. Any leaks shall be neatly plugged. All pipes through access chambers shall have their inverts neatly lined with cement render to NZS 3114 concrete surface finish (U3). All inverts shall be carried vertically to the soffit of the pipe before haunching back to the access chamber walls.

Precast concrete access chamber covers shall be placed, jointed and sealed with mortar onto the top riser. Cast iron access chamber frames shall be bedded on epoxy mortar.

Access chamber frames shall be set proud of the surrounding ground levels by 10mm and set at the same crossfall and gradient as the surrounding surface. The immediate surrounding surface shall be shaped up to the edge of the chamber frame over a distance of not less than 500mm all round.

4.5.2.10 **Inlet and outlet structures** (additional section to NZS 4404: 2010)

Wing-wall inlet and outlet structures shall typically be of the precast type complying with NZS 3109 “Specification for concrete construction”, with surface finishes in accordance with NZS 3114 “Specification for concrete surface finishes”.

Non-precast types will require specific design approval.

All structures shall be constructed on adequate foundation material.

For outlet structures, specific design of scour prevention and energy dissipation will be required, including the consideration of baffles and rock rip-rap. Fencing around the structure may be required where human access to the inlet/outlet structure is likely and/or the height of the structure is greater than 1.2m.

All steel used on inlet gratings shall be hot dip galvanised.

4.5.3 **Reinstatement** (additional to NZS 4404: 2010)

Backfilling, around and for a depth of 100 mm over the pipes shall be with bedding material. This material shall be carefully placed and well tamped with hand rammers around and above the pipes with particular attention to compacting under the pipe haunches.

Completion of backfilling and surface reinstatement shall be in accordance with methodologies recommended in any of the following specifications authorised by Council, for the Works:

- "Specification for Service Maintenance Operations and New Service Installations within Road Reserve (including Trench Excavation and Reinstatement)",
- National Code of Practice for Utility Operators Access to Transport Corridors
- NZS 4404: 2010 “Land Development and Subdivision Infrastructure”

Backfilling shall be carried out immediately after the pipes have been inspected and the “as built” information recorded. The Contractor may wish to carry out a test at this stage. In some circumstances backfilling may be required immediately after laying.

4.5.4 **Inspection and acceptance** (additional to NZS 4404: 2010)

Council Officers shall be given not less than one working days’ notice to allow them to carry out all inspections required by Appendix B4.

4.5.4.1 **Testing of access chambers** (additional section to NZS 4404: 2010)

New access chambers shall be tested for water tightness by filling with water. After all absorption has taken place the water level shall be maintained for 30 minutes and a visual inspection carried out. Any leakage detected shall be made good and the access chamber retested until no leakage occurs.

4.5.4.2 **Testing of stormwater mains** (additional section to NZS 4404: 2010)

All stormwater mains of DN450 or smaller shall be tested in accordance with the water test described on Standard Drawing D23. Leaks shall be remedied as required for wastewater mains.

CCTV inspections will only be required where faults have been identified or where the inspections, as required in terms of Appendix B4, have not been notified to Council.

4.5.4.3 **Catchpits**

All catch-pits shall be cleared of construction debris including chip sweepings from road surfaces.

4.5.4.4 **As-builts and completion documentation** (additional section to NZS 4404: 2010)

On completion of construction, information and documents as required by Section 1.8.10 shall be provided by the Construction Co-ordinator.

5 WASTEWATER

5.1 Scope (additional to NZS 4404: 2010)

This section shall be read in conjunction with the Wastewater Section of the District Plan, which addresses objectives, policies and methods relating to earthworks associated with land development.

5.1.1 Mandatory Requirements and Performance Criteria (additional section to NZS 4404: 2010)

Reticulated wastewater systems shall be designed and constructed to appropriate engineering and technical standards and codes to achieve the following minimum performance criteria:

(a) Each Lot or separately titled unit / area shall have a separate connection to the wastewater network.
(b) Comply with any applicable Resource Consent and minimise any adverse effect on the environment.
(c) Be of capacity suitable for carrying peak flows anticipated during its lifetime with minimal risk allowance for uncontrolled ground and surface water infiltration and inflow (I and I).
(d) Minimise ground water infiltration and surface water inflow.
(e) Adequately service its catchment and all current and foreseeable future lots.
(f) Adequately convey wastewater to an approved discharge point.
(g) Maintain adequate self-cleansing velocities.
(h) Be compatible with the existing network.
(i) Not unduly restrict the location of any future buildings and/or land development.
(j) Minimise adverse effects on existing wastewater systems.
(k) Be laid out in such a way as to minimise the potential for blockage and facilitate ongoing maintenance or development.
(l) Be designed with adequate flexibility and provision to minimise the risk of seismic events.
(m) Be constructed of materials compatible with the type of wastewater being conveyed.
(n) Be constructed from materials suitable for the intended use and design life and with a proven record of performance.
(o) Minimise the likelihood of leakage and infiltration and the penetration of roots.
(p) Minimise the likelihood of blockage.
(q) Withstand all anticipated superimposed loads.
(r) Where utilising pumping facilities ensure that equipment is suitable for its purpose and electrical plant and the wet well cover is located 500 mm above the design flood level from a storm having a 2% probability of occurring annually.
(s) Where utilising mechanical equipment have adequate emergency storage and alarm systems to minimise the possibility of discharge to natural water or land.
(t) Provide alarm and telemetry systems that are compatible with those being used by the Council at the time of the project.
(u) Ensure that above-ground plant and equipment is designed and constructed in such a manner as to be aesthetically acceptable and to minimise visual impact.

Non-reticulated wastewater systems shall:

(v) Be classified as “private” systems and require building consent from Council, compliant with the relevant parts of the Building Act.
(w) May require resource consent as they will create discharges to land. Applications will have to be made to the Hawke’s Bay Regional Council.
(x) Obtain written confirmation from the Hawke’s Bay Regional Council that a resource consent is not required, or otherwise a copy of the granted discharge consent must be provided to Council.

5.2 General requirements

5.2.1 Objectives (additional to NZS 4404: 2010)

In addition to NZS 4404: 2010, reference shall be made to the Objectives and Policies in the District Plan and the regional plan.

5.2.2 **Referenced documents and relevant guidelines** (change to NZS 4404: 2010)

The design of wastewater reticulation, treatment and disposal systems shall be carried out in accordance with appropriate bylaws, technical standards and Codes.

The following is a selection of relevant standards and guidelines. The list is not exclusive and other standards and guidelines accepted by the engineering profession may be approved.

(a) Napier City Council's Safety in Design Guide (Version 1.0 or more recent version).
(b) Resource Management Act 1991, National Policy Statements, Regional Policy Statements, and plans prepared under that Act - set the planning frameworks, limits and targets for assessing environmental effects of discharges to air, water and land.
(c) Building Act & Code.
(d) Standards NZ - Standards and Codes covering various pipe types and systems.
(e) WSA 02: 2014 V3.1 Gravity Sewerage Code of Australia.
(f) WSA 04: 2005 V2.1 Sewage Pumping Station Code of Australia.

5.3 Design

5.3.1 **Design life** (consistent with NZS 4404: 2010)

In accordance with NZS 4404: 2010 and WSA 02, the design life for infrastructure shall be as follows:

(a) 100 years for pipework, appurtenances, all concrete work, tankage and detention structures.
(b) 20 years for mechanical and electrical plant, with provision made for easy maintenance and replacement.

Note: Concrete corrosion protection systems shall be used where concrete is in contact with sewage, or open to a sewage atmosphere, or otherwise inert materials shall be used to provide protection.

5.3.2 **Structure plan** (as per NZS 4404: 2010)

5.3.3 **Future development** (additional to NZS 4404: 2010)

All wastewater networks shall be capable of serving the entire catchment upstream of the actual system assuming development as identified on the relevant District Plan (including deferred zonings). This catchment may need to include land outside the City boundary.

Pumping station design shall be able to accommodate any likely future growth resulting from any development of the upstream catchment anticipated within the District Plan (including any deferred zoning).

Population density for any upstream catchments shall be in accordance with the District Plan densities and where zoning indicates future urbanisation then the designer shall allow for 15 lots per hectare gross (or other density as agreed with NCC) and 2.5 people per dwelling unit or lot. These are gross areas including roads but excluding major reserves.

5.3.4 **System Design** (additional to NZS 4404: 2010)

Where required, Resource Consents and Building Consents shall be obtained and Consent requirements incorporated in the design and construction.

Development must consider safety in design, access, hazards, maintenance and operation, potential environmental outcomes and mitigation, and the cultural values of mana whenua.

Pump stations and rising mains shall be the subject of specific design, with general requirements provided in Section 5.3.11. All design needs to consider system resilience (to natural events, or otherwise). Infrastructure shall be designed to resist the effects of liquefaction, lateral spreading, slope failure, flood events and tsunami. This requires pump stations and critical gravity and pressure pipelines to be designed to Importance Level 4. As a minimum this requires the designer to consider mechanisms to allow pipelines and structures to accommodate (or engineer against) significant movement.

5.3.4.1 **Catchment design** (as per NZS 4404: 2010)

Designers shall consider the impact on the existing network. Any existing and predicted overflows are to be minimised, and shall not be made worse (in terms of volume or frequency).

Where roads may be extended in future, the uppermost manhole shall be placed within 1 metre of the end of the legal road.

5.3.4.2 **Extent of infrastructure (as per NZS 4404: 2010)**

5.3.4.3 **Topographical considerations** (as per NZS 4404: 2010)

5.3.4.4 **Geotechnical investigations** (additional to NZS 4404: 2010)

Pipe and manhole material selection shall recognise the soil material and ground water around them. Where necessary, appropriate protective coatings shall be used.

5.3.4.5 **Infiltration Control** (additional section to NZS 4404: 2010)

All wastewater drainage including mains, laterals, access chambers and pumping stations must be constructed so as to prevent the inflow of stormwater and groundwater infiltration and any root penetration.

All joints in access chambers must be sealed using appropriate sealing systems. No visible infiltration through walls or floors will be permitted.

Existing laterals, mains and other structures that are abandoned during construction must be properly sealed off to prevent infiltration into the wastewater drainage system. Laterals shall be sealed as close to the main as possible or as required by the Asset Manager.

While construction of a new wastewater drainage system is underway, the pipeline at the lower end shall be effectively plugged to prevent ingress of stormwater into the main network from uncompleted pipework and structures. Any sediment shall be removed from the network before commissioning.

Residential gully traps receiving foul discharges must be constructed to prevent the ingress of surface water, as detailed in Acceptable Solution G13/AS2 of the Building Code (i.e. overflow set no less than 25mm above paved surfaces, or 100mm above unpaved surfaces.

5.3.5 Design criteria

5.3.5.1 **Design flow** (replaces NZS 4404: 2010 section)

Gravity systems shall be designed to carry Peak Wet Weather Flow (PWWF) including allowances for ground and stormwater inflow and infiltration. Design flows for other than domestic areas shall be discussed with the Council before detailed design is carried out

Pipes shall be sized to cope with PWWF without surcharge except where special situations make a differing flow appropriate. An example of such a situation could be when an upstream catchment is serviced by a pump station. In such a situation the downstream pipe shall be sized to cope with the known or expected pumping rate in addition to the PWWF from any contributing gravity catchment.

When areas used for calculating flows, the area shall be the net zoned land; ie. excluding roads, parks etc.

(a) Residential Flow

ADWF = 220 L/person/day x 2.5 persons/household x No. of households
PDWF = ADWF x Peaking Factor (2.5, unless agreed otherwise)
PWWF = ADWF x Peaking Factor (5.0, unless agreed otherwise)
Where, ADWF = Average Dry Weather Flow, PDWF = Peak Dry Weather Flow.

(b) Commercial and Light Industrial Flow (Ahuriri, Pandora, Onekawa)

PWWF = 0.70 L/s/ha

Where possible, flows from industrial areas shall be assessed by measurement or knowledge of the process being served. Where information is unavailable the heavy industrial flow shall be used.

(c) Heavy Industrial

PWWF = 1.30 L/s/ha

(d) Retail and Suburban Commercial Areas

PWWF = 0.40 L/s/ha

5.3.5.2 **Hydraulic design of pipelines** (replaces NZS 4404: 2010 section)

Gravity wastewater mains may be designed using Mannings or Colebrook White formulae. Roughness coefficients, allowing for aging and joints are shown in Table 16.

Pipe Type	**Colebrook White (k, mm)** for full pipes	**Manning (n)** for part-full pipes
Concrete[1]	1.5	0.013
uPVC or Polyethylene	0.6	0.012
Notes: *The use of concrete pipes is not preferred. uPVC is the preferred material for gravity pipelines and Polyethylene for rising mains.*		

Table 16 Pipe Roughness Coefficients

5.3.5.3 **Minimum pipe sizes** (consistent with NZS 4404: 2010)

The minimum diameter of connections shall be DN100. Connections shall not service more than one lot.

The minimum size gravity wastewater main to be taken over by the Council or considered for connections shall be DN150.

The minimum size for a wastewater rising mains are specified in Section 5.3.11.4.

5.3.5.4 **Limitation on pipe size reduction** (as per NZS 4404: 2010)

In no circumstances shall the pipe size be reduced in size on any downstream section.

5.3.5.5 **Minimum grades for self-cleansing** (replaces NZS 4404: 2010 section)

Normal acceptable minimum pipe grades shall be:

Pipe Internal Diameter (DN)	Minimum Grade[1]	
	%	Ratio
100 mm – property connections	1.65	1:61
150 mm – property connections	1.20	1:83
150 mm[1]	0.55	1:180
200 mm	0.33	1:300
225 mm	0.31	1:325
250 mm	0.29	1:350
300 mm	0.25	1:400
375mm	0.18	1:550
450mm (and greater)	0.12	1:850
Notes: *1. In all instances, the uppermost manhole to manhole length of DN150 pipe (or larger) must be laid at a grade of not less than 1% (1:100)*		

Table 17 Minimum Grades for Wastewater Pipes

Minimum velocity shall be 0.7 m/sec at the peak dry weather flow, where the grades in Table 17 do not facilitate this requirement, the pipe grade shall be increased.

Pipes shall generally be laid soffit to soffit but with reference also to minimum falls through manholes (Section 5.3.8.4.4)

5.3.5.6 **Maximum velocity** (replaces NZS 4404: 2010 section)

Maximum velocity shall be 3.0 m/sec unless otherwise agreed with the Council. High velocities can cause hydraulic jumps, increased turbulence, reduced airflow, increased corrosion, increased frequency of overflows and vacuums on boundary traps.

Where steep grades will cause a velocity above 3.0 m/s reference shall be made to WSA 02 for precautions and design procedures. Solutions may include reducing pipe grade, including drop structures, the use of energy dissipation structures or consideration of improved ventilation.

5.3.5.7 **Gravity wastewater applications** (as per NZS 4404: 2010)

5.3.5.8 **Pressure and vacuum wastewater applications** (consistent with NZS 4404: 2010)

The introduction of pressure systems into a network, requires approval from Council. In particular locations and / or situations these systems may be a preference of Council.

Vacuum sewerage systems are not accepted.

5.3.6 Structural design

5.3.6.1 **General** (additional to NZS 4404: 2010)

All pipes and bedding and surround standards shall be designed to resist future loads (weight of fill and traffic loads) as "pipes under an embankment" as AS/NZS 2566.1 or AS/NZS 3725 Supplement 1 as appropriate.

The minimum pipe strength shall be equivalent to Class 2 concrete OR SN16 PVC.

Generally, all pipes and associated structures within road reserves and all other areas likely to receive traffic shall be designed to HN-HO-72 loading as defined by NZTA.

5.3.6.2 **Seismic design** (as per NZS 4404: 2010)

5.3.6.3 **Structural consideration** (as per NZS 4404: 2010)

5.3.6.4 **Internal forces** (as per NZS 4404: 2010)

5.3.6.5 **External forces** (as per NZS 4404: 2010)

5.3.6.6 **Geotechnical investigations** (as per NZS 4404: 2010)

5.3.6.7 **Pipe selection for special conditions** (additional to NZS 4404: 2010)

Pipes shall be selected to resist attack from the fluid being carried.

Pipe materials shall be selected to protect against potentially aggressive conditions resulting from H_2S and sulphuric acid generation, particularly in the case of trade waste sewers and from septic rising main discharges at the time of development or in future.

5.3.6.8 **Trenchless technology** (as per NZS 4404: 2010)

5.3.6.9 **Marking tape or pipe detection tape** (replaces NZS 4404: 2010 section)

Detection tape is not required in most cases. It may be required on trunk mains at Council's discretion.

5.3.7 System layout

5.3.7.1 **Pipe location** (additional to NZS 4404: 2010)

Wastewater mains shall generally be laid in the carriageway. The Council standard position for wastewater mains in residential areas is in the centre of the carriageway. Manholes shall be kept clear of wheel tracks.

Locating wastewater infrastructure in a site of cultural significance or a significant natural areas is to be avoided.

5.3.7.2 **Materials** (replaces NZS 4404: 2010 section)

Refer to Appendix 1.0.

Polyethylene pipe is not approved for gravity pipework.

5.3.7.3 **Pipes in reserves and public open space** (as per NZS 4404: 2010)

5.3.7.4 **Pipes in private property** (additional to NZS 4404: 2010)

The placing of public drains in private properties will only be considered where particular conditions make the use of the public road unfeasible.

For any public drainage on private property:

(a) Access chambers shall be sited completely on one lot such that the opening is 1.3 metres clear of the boundary and not on the boundary of two lots. Access covers shall have a concrete surround.
(b) Reticulation lines to rear lots shall be sited with regard to having a minimum effect on the building area available on the lot.

Easements (see Section 1.7.4) shall be provided.

5.3.7.5 **Minimum cover**

Minimum covers shall be as specified in Table 18. Any design involving pipe cover outside this range shall be subject to approval of Council which will only be given if a complying option is shown to be impractical. The alternative must be supported with full calculations.

Location	Gravity Pipes	Rising Mains
Private property	500 mm	-
Driveways and similar trafficked areas	600 mm	750 mm
Open ground	600 mm	750 mm
Road reserves	750 mm	900 mm
Note: cover is from the finished ground surface to the top of the pipe collar.		

Table 18 Minimum Cover (above pipe crown)

The maximum depth to the invert for all pipe types is 3.0 metres

5.3.7.6 **Horizontal curves** (replaces NZS 4404: 2010 section)

All wastewater mains shall be laid true to grade and in straight lines between access chambers. Horizontal curves are not permitted.

5.3.7.7 **Vertical curves** (as per NZS 4404: 2010)

5.3.7.8 **Underground services** (as per NZS 4404: 2010)

5.3.7.9 **Clearance from underground services** (replaces NZS 4404: 2010 section)

The layout of the reticulation system shall provide adequate clearance from other services.

A minimum horizontal clearance of 500 mm shall be provided to all other services. This clearance may be relaxed for other water reticulation.

A minimum vertical clearance of 100 mm shall be provided to all other services. This space shall be filled with compressible material (i.e. pea gravel, neoprene rubber).

Designs which require wastewater mains to be laid in the same trench as water mains shall be avoided.

5.3.7.10 **Clearance from structures** (as per NZS 4404: 2010)

5.3.7.11 **Bulkheads for pipes on steep grades** (replaces NZS 4404: 2010 section)

Where the slope of a trench is 1:15 or greater, anti-scour blocks (also known as water-stops) shall be provided to prevent surface water running along the pipeline and scouring the surround.

They shall be constructed as per Standard Drawing D04.

5.3.8 Maintenance Structures (Access Chambers)

5.3.8.1 **General** (as per NZS 4404: 2010)

Access chambers of more than 3 metres depth will not normally be accepted. When no alternatives are available they shall be specifically designed.

Access chambers deeper than 1.5 m shall have manhole cover safety grills and shall have shall be plastic coated stainless steel 316 step irons installed by the manufacturer and designed to minimise slipping.

5.3.8.2 **Location of maintenance structures** (additional to NZS 4404: 2010)

The Council standard for the location of wastewater mains in residential areas is in the centre of the carriageway. Manholes shall be kept clear of wheel tracks.

Access chambers shall be provided at all changes of direction, gradient and pipe size, at branching lines, terminations and at a distance apart, not exceeding 120 metres. They shall be located such that the access chamber structure is clear of any boundary by a minimum of 600mm and the opening is 1.3 metres clear of the boundary

All lines of DN150 or larger shall terminate with a DN1050 access chamber at the upstream end. Where different sizes of new pipes are built into an access chamber the downstream pipe shall always be of a larger diameter than the upstream pipe and their soffits shall be at the same level.

Full size access chambers shall have a maximum of 6 connections. Any chamber with internal drop connections shall be minimum DN1200 in size.

Shallow type access chambers of DN600 may be used on lines of up to DN150 and to a maximum depth of 900 mm from lid level to invert provided full sized access chambers are placed at not more than 120 metre centres.

Ventilation shall be provided at manholes receiving rising main discharges. The nature and extent of the ventilation and any odour control is to be agreed with Council.

5.3.8.3 **Maintenance structure spacing** (replaces NZS 4404: 2010 section)

Access chambers shall be placed at not more than 120 metre centres.

5.3.8.4 **Manholes**

5.3.8.4.1. **Manhole materials** (additional to NZS 4404: 2010)

Where elevated H_2S is expected (i.e. at rising main discharges, areas of turbulence), concrete shall not be used. Prefabricated Polyethylene manholes are permitted with approval of Council. These must be capable of withstanding HN-HO-72 traffic loadings.

Precast concrete access chambers shall comply with the requirements of AS/NZS 4058 and have an internal diameter of 1050mm. The reinforced concrete top shall have a minimum thickness of 200mm and be capable of withstanding HN-HO-72 traffic loadings. If larger chambers are required, they shall be specifically designed for the purpose, or utilise approved proprietary components, suitable for the traffic loading characteristics. Shallow access chambers shall utilise DN 600 catchpit barrels with a standard Council cast iron frame and cover.

All maintenance structures shall be formed from pre-cast components. For pipes smaller than DN600, manholes shall come complete with a pre-cast flanged base as shown on Standard Drawing D05. Manholes up to 2.4 m deep shall be a single unit with no joints. Where manhole joints are required, they shall be sealed using proprietary supplier sealing methods (Hynds BM100 strip of Humes SM9020/MSR (or approved equivalent) depending on the water table level).

All holes for pipe entry shall be saw cut. Impact holing is not permitted.

Concrete for all uses shall be high grade concrete with a minimum crushing strength at 28 days of not less than 20 MPa.

Mortar and its components shall comply with NZS 3103.

5.3.8.4.2. **Base layout** (as per NZS 4404: 2010)

5.3.8.4.3. **Allowable deflection through MHs** (as per NZS 4404: 2010)

5.3.8.4.4. **Internal falls through MHs** (replaces NZS 4404: 2010 section)

The grade across the invert of a maintenance structure shall be a minimum of 20 mm plus 5 mm for every 10° of change in direction of flow.

The exceptions to these requirements are for prefabricated Polyethylene manholes or larger diameter pipe “cut-outs” where these minimum requirements may be relaxed by Council.

On steep pipelines, the maximum fall through a manhole shall be limited to 150 mm.

Where the internal falls are not achievable due to a large difference between the levels of the incoming and outgoing pipes and internal drop may be provided in accordance with Standard Drawing D08. If internal drops are used, the minimum manhole size shall be DN1200.

The maximum change in direction of a manhole is 90° unless otherwise approved.

5.3.8.4.5. **Effect of steep grades on MHs** (as per NZS 4404: 2010)

5.3.8.4.6. **Flotation** (replaces NZS 4404: 2010 section)

Chambers shall be designed to prevent flotation when empty (with a safety factor of 1.25), and with groundwater up to ground level. This is of particular concern for non-concrete structures.

5.3.8.4.7. **Covers** (additional to NZS 4404: 2010)

Access Chamber Covers and Frames shall be of the hinged, circular variety, nominally 600mm diameter, and manufactured from first quality heavy duty cast iron and shall be coated with bituminous protective coating. Covers shall be sealed in a proprietary manner against water ingress. When used in roads, the hinge shall be located on the side nearest to oncoming traffic.

The covers shall be set a maximum of 400mm above the underside of the precast chamber slab, and bedded on concrete spacers. See Standard Drawing D05.

On steep slopes, consideration shall be given to the use of proprietary adjustable levelling rings, to align the chamber covers with the gradient of the finished surface.

Where manholes are in grassed / mowed areas, a concrete mowing strip shall be provided around manhole covers.

5.3.8.5 **Maintenance shafts** (NZS 4404: 2010 - section not to be used)

5.3.8.6 **Terminal maintenance shafts** (NZS 4404: 2010 - section not to be used)

5.3.9 **Venting** (as per NZS 4404: 2010)

5.3.10 Connections

5.3.10.1 **General considerations** (additional to NZS 4404: 2010)

Industrial, commercial and other non-residential allotments shall be provided with a wastewater main across the full frontage such that connections can be made at any location. The connection shall be made at the time of subdivision/development.

All urban lots (residential/commercial/industrial) shall be provided with wastewater connections at such a depth at the boundary that a drain is able to be extended from the connection at grades and cover complying with the Building Act, to the furthest likely wastewater connection point on the lot.

5.3.10.2 **Number of connections** (additional to NZS 4404: 2010)

Each Lot or separately titled unit / area shall have a separate single connection to the Council main, except for:

- Units in multi-storey buildings
- Subdivision of existing multi-unit developments

In which cases common private drains may be approved (reference shall be made to Section 1.11). Common private wastewater drains will not be approved, other than described above. Council mains will not be installed within multi-storey buildings.

5.3.10.3 **Location of connection** (additional to NZS 4404: 2010)

Residential connections shall be DN100 and shall be located centrally on the lot except where lots have a significant fall from one side to the other in which case the connection shall be approximately 2.4 metres from the low side of the lot. All connections where practicable shall have at least 300 mm horizontal clearance to adjacent services.

All connections to access chambers shall be between 45 degrees and 90 degrees to the property boundary to avoid long oblique connections in roads (see Standard Drawing D14). The connection to the main must generally be within the frontage of the property as defined by the side boundaries extended.

Commercial and industrial lots shall be provided with individual appropriately sized lateral connections of not less than DN150 located centrally on the lot. An inspection chamber shall be installed inside the property adjacent to the street boundary, where the connection is directly into the pipeline. An inspection chamber is not required where the connection is made to the main via an access chamber. Inspection chambers may be DN600 or 600 mm x 450 mm rectangular where the depth of the chamber does not exceed 900 mm. In all other cases a standard DN1050 access chamber shall be constructed with standard cover and frame. Direct connections of DN150 can only be made when the main is DN450 or greater.

5.3.10.4 **Requirements of design** (additional to NZS 4404: 2010)

Connections shall typically be made at 90 degrees to the main.

All connections shall be made to the main by use of factory made Y junctions or direct to access chambers. Where practical, property and lateral connections shall be made directly to an access chamber, to provide better access, and reduce risk of damage to connections between chambers.

Connections shall not be made directly to trunk mains, or drains more than 3.0 metres deep to the invert of the pipe. Such situations shall be overcome by the construction of a shallower branch drain laid from an access chamber on the deep drain and connections made from the shallower drain.

Subject to satisfying the above criterion the end of the connection which shall be located 500 mm into the lot shall be at a depth to invert of between 700mm and 1600mm. Where a connection needs to go deeper than 1.8 metres below ground level for a soffit to soffit joint a ramped riser shall be constructed to bring the connection to within 1.2 metres of ground level provided the site can be adequately serviced.

All lateral connections, are to be fitted with an inspection eye, to facilitate CCTV inspections and maintenance. End caps are to be brought to FGL, and appropriately marked. An approved plug or cap of appropriate material shall be installed on the last pipe of each lateral connection or on the inspection chamber as appropriate. Plugs or caps shall be colour-coded, or the pipe-ends painted (red for wastewater)

5.3.10.5 **Connection depth** (as per NZS 4404: 2010)

5.3.11 **Pumping stations and pressure mains** (replaces NZS 4404: 2010 section)

Pump stations and pressure mains (rising mains) shall be designed in accordance with WSA 04: 2005 V2.1 – Sewage Pumping Station Code of Australia. The wording throughout this section generally represents the requirements of WSA 04 with specific NCC requirements included.

5.3.11.1 **Detailed Design Drawings and Approvals**

A Resource Consent, Engineering Approval, and Building Consent shall be obtained before the commencement of any pumping station construction work.

Detailed design drawings shall be prepared in accordance with Council practices to a suitable scale and shall include the following as a minimum:

- A design report outlining the design philosophy, discussing risks and their controls, and also considering health and safety in design aspects in accordance with Napier City Council's Safety in Design Guide (Version 1.0 or any more recent version).
- A locality plan showing overall layout and location of works; including:
  - The location of any natural waterways or wetlands within the site, or in close proximity to a boundary. The location in plan, and the level of the water's edge and shoulder of the banks shall be indicated.
  - Typical pre-existing and post development cross sections through any natural waterways or wetlands.
  - The proposed proximity of infrastructure and buildings to the water's edge and/or shoulder of the banks.
- A detailed site plan of the pumping station
- Detailed plans of the civil structures and works
- Mechanical design plans
- Electrical design plans
- Plan and longitudinal sections of pressure mains and gravity sewers
- A landscape plan of the site
- Lighting, security and fire control plans
- Plans showing any appropriate special details

The close out phase of any pump station construction shall provide a comprehensive operation and maintenance manual, as-built drawings including rising main long sections, a statement of conformity to Council design / construction requirements and a confirmed ownership and maintenance agreement.

5.3.11.2 Privately Owned Pump Stations

Any communal pump stations and rising mains to be privately owned shall be designed and constructed to Code standards. As-built plans and an operation and maintenance manual shall be provided to Council.

5.3.11.3 General Planning and Design Principles

The following general requirements and design principles shall be met by the developer:

(a) Gravity sewer systems, where practicable, shall be preferred to pumping mains. Pumping stations and pressure mains serving less than the equivalent of 20 urban lots will not as a rule be taken over by the Council.
(b) The Designer shall be responsible for all aspects of the pumping station design but pumping stations which may eventually be taken over by the Council must comply with the minimum requirements set out in this Section.
(c) Pump stations and rising mains shall be planned to minimise the total life cycle costs. This shall consider the initial capital cost of the pump station and rising main, the operational costs (both energy and maintenance) and the life expectancy and replacement cost of pumps, switchgear and ancillary equipment.
(d) The pump station design shall adopt materials selection, fabrication design and corrosion protection measures to minimise corrosion and material degradation, the need for on-going maintenance and to prolong the life of the station and any fittings and equipment used.
(e) Measures to improve resilience of the infrastructure to natural hazards shall be incorporated.
(f) The design shall provide safe working conditions for operation and maintenance personnel. Where applicable, the design shall incorporate solutions that would minimise operation and maintenance risks associated with confined spaces.
(g) Meet odour and noise pollution prevention requirements. All designs shall consider means of reducing the production of hydrogen sulphide and / or treating the production of such gases.
(h) Minimise the visual impact on the neighbourhood. Above ground installations and equipment must be designed and constructed in a way as to be aesthetically acceptable and to minimise visual impact.
(i) The amenity values of watercourses and their natural character shall be retained wherever possible.

5.3.11.4 Resilience Requirements

Resilience of pump station infrastructure to damage from natural events shall be carefully considered. This requires consideration of the following factors, as a minimum:

- A Geotechnical report shall be provided for the pump station site, which shall include CPT investigation. This report shall identify the potential and possible extent of lateral spread and settlement at the site. The pump station design shall take this information into account and allow for any local ground improvement, specific foundation or piling.
- The depth of the pump station structure shall be minimised.
- The number of inlet pipes shall be minimised and these pipes over-steepened to reduce the consequence of differential settlement at the site.
- Careful detailing of inlet and outlet connections is required to allow for anticipated structure movement. This shall include detailing to prevent punching shear wall failure.
- Pump station ballast shall be carefully designed to provide appropriate protection against flotation. Symmetry shall be used in the design to reduce the likelihood of differential settlement.
- Valve chambers shall generally be located separate to the main structure. Connections between structure shall be flexible in nature and depending on the predicted settlement design to either move, or otherwise have a defined weak point for easy repair.
- Over-pumping connections shall be provided as a mitigation measure against damage.

5.3.11.5 Civil / Mechanical Design Requirements

Pump stations shall be designed for the following overarching design requirements:

(a) Pumping stations shall be designed to pump the full Peak Wet Weather Flows (PWWF) from their catchment area of Section 5.3.3 and shall make allowances for any pumped inflows.
(b) Rising mains (and mechanical pipework) shall be DN100 minimum and operate at a minimum velocity of 0.75 m/s (preferably 1.0 m/s) and a maximum velocity of 2.5 m/s. This dictates a minimum design flow of 6 L/s for all wastewater pump stations.
(c) Pumps chambers shall be sized to ensure that pump starts do not exceed 8 starts per hour at critical inflow (i.e. inflow is equal to half the maximum pump rate). Sizing of chambers shall provide adequate capacity to accommodate any likely future growth resulting from the development of the upstream catchment in terms of the District Plan (including any deferred zoning).
(d) Pumping stations shall be located on a separate lot in the subdivision. The lot shall be of adequate size to facilitate the parking and manoeuvring of trucks, tankers, cranes and other vehicles used for maintenance. A sealed accessway of not less than 3 metres width shall be provided to the nearest public road.
(e) Pump stations shall utilise a collection manhole immediately upstream of the wet well to collect all incoming wastewater flows from the catchment. A single gravity inlet pipe shall convey wastewater to the wet well and a SS316 knife gate valve (with an extension spindle) shall provide for isolation.
(f) A superstructure (building) shall be required for larger pump stations (typically those greater than 50 L/s pumped capacity) as directed by NCC. This needs to be determined in consultation with Council staff at the outset of the design process. If pumping stations incorporate a superstructure, provision must be made to enable the lifting and removal of pumps.
(g) The size of pump station (or site) shall be adequate to provide sufficient emergency storage to reduce the risk of overflows caused by power failure or blockage/damage of the pumps or rising main. For this reason, emergency storage of 12 hours ADWF shall be provided, above the normal pump starting level, in the main chamber, a special emergency chamber, in upstream access chambers and pipes or in a combination of these. The overflow point shall be the lowest lid level in the catchment with a 300 mm freeboard applied. Pump station storage shall not be used for flow buffering purposes.
(h) All electrical switch gear and the wet well cover shall be located above ground and at least 500 mm above the predicted flood level resulting from a storm with a 2% probability of occurrence annually. The area around the pump station shall be graded down to prevent surface water accumulation.

5.3.11.5.1. Materials

The design shall incorporate materials complying with the relevant NZS, AS/NZS and other international standards where possible. Designers shall familiarise themselves with the provisions of the Australian WSA 04 “Sewage Pumping Station Code” and apply its requirements where appropriate.

Pump stations structures shall be constructed from protective coated Concrete, FRP/GRP or Polyethylene following approval from NCC. Where elevated H_2S is expected concrete shall not be used.

Pump station mechanical pipework shall be SCH40 SS316L or other approved material.

Rising mains shall be PE100 or other approved material. Polyethylene rising mains shall be de-beaded.

5.3.11.5.2. Site

If a dedicated site is required for the pump station by Council, the whole section on which the pumping station is located shall be fenced and provided with removable bollards (or a locked gate to Councils discretion), and be of sufficient size to accommodate a replacement pump-station to be constructed in the future.

The selection of the site shall take into consideration the provision of sufficient buffer from houses (where typically > 15 m will be required), built-up areas, location of water courses, natural habitats and cultural sites, and future development. The site shall be suitably landscaped in consultation with the Council.

A 25-mm water supply connection must be provided at the immediate vicinity of the pumping stations. The supply shall be fitted with an approved reduced pressure zone (RPZ) backflow preventer.

5.3.11.5.3. Wet Well

Pump chambers shall be of adequate dimension to accommodate all pumps and other equipment without congestion and provide adequate space for repairs and maintenance. The minimum pump station chamber diameter is 1.8 m.

Pumping station chambers may be precast or built in situ. Concrete slabs shall have access openings located centrally over each pump and slabs shall be designed to withstand HN-HO-72 wheel loadings. Openings shall be large enough to allow the removal of pumps out of the pumping station chambers.

Cast in situ exposed concrete surfaces in the wet-well collection chamber and, if applicable, the storage tank, shall be constructed in sulphide resistant concrete or they shall be coated or lined to resist corrosion attack.

Chambers shall be designed to prevent flotation when empty, and with groundwater up to ground level.

Ventilation shall be provided to pump station chambers. The nature and extent of the ventilation and any odour control is to be agreed with Council.

All chambers shall utilise proprietary pump station covers of aluminium or SS316L construction. These shall be of the fold up style, incorporating safety grills, be fully sealed and lockable. No access ladder shall be provided.

The depth of the pump wet well invert shall consider the following factors:

- The invert of the incoming pipe
- Pump start level being at least 100 mm below the incoming invert level.
- A working depth / volume suitable to achieve no more than 8 pump starts per hour. This shall be no less than 300 mm.

- Pump stop level being at least 100 mm above the pump manufacturers minimum submergence height.
- Any additional depth allowed for emergency storage purposes.

5.3.11.5.4. Pump Selection

The only pumps acceptable for installation in a pumping station shall be sewage pumps with non-clogging impellers, capable of handling a minimum solid size of 75 mm discharging into DN100 (or larger) mechanical pipework and rising mains. If for sound technical reasons DN 100 rising mains are not suitable, grinder/macerator pumps with riser mains no smaller than DN 75 may be approved.

The design of the pumping station must allow for the PWWF flow to be dealt with by either one or more duty pumps. In addition to the duty pump/s, a standby pump shall also be installed in each pumping station. This pump shall have a capacity at least equal to the largest installed duty pump. The operating arrangement of the pumps shall allow the duty sequence to be automatically interchangeable and shall include a manual override.

Pumps shall operate within +/-25% of their best efficiency point and hydraulic efficiency shall be no less than 40%, unless specifically approved by the Council. Final selection shall be approved by Council in order to facilitate some standardisation of pump model and impeller sizes.

Pump wet wells shall be haunched as per pump supplier recommendations to remove dead spots and improve pump performance.

5.3.11.5.5. Valve Chamber

A dedicated valve chamber shall be provided separate to the wet well structure. This shall house a non-return valve, a metal seated gate valve, a pressure gauge and a tapping with ball valve for each pump discharge. All pipework shall be DN100 minimum. The valve chamber shall include an over pumping connection (DN100 gate valve and Bauer coupling). All pipework shall be dismantlable using a flange adapter or Gibault.

The valve chamber shall be drained back to the pump station wet well and provide protection against sewage and gas inflow through a check valve and water trap.

5.3.11.5.6. Flow Meter Chamber

A dedicated flow meter chamber shall be provided following the valve chamber. It shall allow for the manufacturer required minimum straight lengths in and out of the flowmeter with SS316L flanged pipework and enable dismantling using a flange adapter or Gibault. The pipework alignment shall ensure the flowmeter is fully submerged at all times.

The flowmeter chamber shall be drained back to the pump station wet well.

Flowmeters shall be grounded in accordance with supplier recommendations.

5.3.11.5.7. Rising Mains

Rising mains shall be laid in roadway berms unless otherwise approved.

Sewage rising mains shall be laid rising in the direction of flow, minimising any high points along the length of the pipeline. They shall be laid at a minimum cover of 750 mm and have a maximum depth of 1.5 metres, except where approved over short lengths up to 2.5 metres deep. Only in exceptional circumstances, where all other alignments have been exhausted, shall departure from these requirements be considered.

Unless otherwise approved, rising mains shall have scour valves to allow for maintenance and approved SS316 air valves at high points.

Flow velocities shall typically be in the range of 1.0 to 2.0 m/s, with a minimum permitted flow of 0.75 m/s. Council may require mains to be staged to allow for future development and may permit velocities of < 0.75 m/s in particular situations.

The Colebrook-White equation shall be used to calculate head losses in rising mains. A roughness value of k = 1.5 mm shall be used for mains operating between 1.0 to 1.5 m/s and k = 0.6 mm for mains operating above 1.5 m/s. All rising mains shall also be checked with k = 0.015 mm to ensure that pumps do not overload when pipes are in new condition.

The pressure rating of the rising mains shall be no less than PN10. The selection of a suitable pressure rating shall consider:

- The peak operating pressure under normal operating conditions.
- The development of transients (water hammer) as a result of valve closure or instantaneous pump failure. A detailed analysis shall be provided for all rising mains with a flow of greater than 20 L/s. For lower capacity mains (<20 L/s) the designer shall allow a safety factor of 1.25 when selecting the pipe pressure rating to cater for water hammer effects.
- The installation methodology and location of the pipeline in accordance with *AS / NZS 4130: Polyethylene (PE) Pipes for Pressure Applications.* Note: This requires derating due to installation under roadways and for any pipes installed by methods other than open-cut trenching.
- Fatigue loading in accordance with *POP010A: Polyethylene Pressure Pipes Design for Dynamic Stresses*. Note: this requires derating of any rising main / pump station that operates more than 8 times / day on average.
- Any other derating factors such as elevated temperature in accordance with *AS / NZS 4130: Polyethylene (PE) Pipes for Pressure Applications.*

The incorporation of transient control measures requires specific approval from Council.

Provision shall be made to allow for pigging of the rising main.

Rising main discharges shall be submerged in an approved manner to reduce the release of gas. Any manhole receiving a discharge shall be vented. Any rising mains with retention times exceeding 3 hours at average daily flow will require specific approval from Council.

For any rising mains discharging into existing rising mains the designer shall provide a full analysis of all possible pumping scenarios.

5.3.11.6 Electrical Design Requirements

5.3.11.6.1. General Requirements

Electrical fittings and equipment shall be safety rated for their particular location and use. All electrical equipment shall comply with standard NCC requirements. The electrical design shall allow for a 25% factor, above that which is calculated.

If the pumping station does not have a superstructure, all control equipment shall be installed in a weatherproof stainless steel 316 cabinet mounted on a plinth. Control panels shall conform to the Council's standard layout and their instrumentation shall include, but not be limited to, the following:

- Individual pump input and output flow and total station flow (by means of PSMs or equivalent)
- Rising main pressure
- Amperes
- Pump running times (cumulative)
- Excessive bearing temperatures

Individual pump operation and starting and stopping levels must be able to be set on site and all pumps must have a manual start/stop override. In order to reduce surge and high power demand on starting, pumps are required to operate with soft start, or Variable Speed Drives (VSD's).

Stations shall be fitted with an approved power point for connecting emergency power generators. A 3 pin, 3-phase plug shall also be provided.

5.3.11.6.2. Telemetry, Alarms and Control

Pumping stations shall be connected to a telemetry system. The size and complexity of this system shall depend on the size and complexity of the pumping station. Telemetry systems shall be designed to provide the following three functions:

The system shall create an alarm when an unacceptable status occurs at the station. The alarms shall be transmitted via telemetry and displayed at appropriate remote workstations.

The system shall provide information on the status of equipment, wet-well levels etc. while operating within normal parameters. The status shall be transmitted via telemetry and displayed at appropriate remote workstations.

Level sensing shall use pressure transducers or radar, with a high and low level float as backup.

The system shall provide limited remote manual control of the operation of the station. Specifically, provision shall be made to employ telemetry to turn station control from remote to local and vice versa and switch individual pumps ON and OFF.

Pumping station telemetry shall conform to the Council standards at the time of installation. Telemetry among other things shall include the following:

- Power outage
- Pressure in the rising main
- Electrical faults
- Wet well levels
- Pumps operating
- High level alarm

5.3.12 (Low) Pressure sewers and vacuum sewers (additional to NZS 4404: 2010)

Low pressure sewer systems (LPSS) require pre-approval from Council.

Pressure sewer design shall be undertaken in accordance with the *Water New Zealand Pressure Sewer National Guidelines*.

The point of demarcation between the public and private infrastructure is at the boundary kit (isolation valve and check valve).

Vacuum sewer systems are not permitted.

5.3.13 On-site wastewater treatment and disposal

5.3.13.1 Introduction (additional section to NZS 4404: 2010)

On-site treatment and disposal may be approved in areas where there is no immediate likelihood of connection to the City wastewater system and the provision of a community system for takeover by the Council is not considered appropriate.

5.3.13.2 Regulatory requirements (additional section to NZS 4404: 2010)

Reference shall be made to Section 5.1.1.

The developer shall provide evidence that a satisfactory non-reticulated wastewater system is available for each allotment.

Drawings shall be provided to show how the facility will be laid out on site, distances from adjacent waterways, water bores and property boundaries, and a feasible location for a reserve area of 100% of the disposal area size.

The developer shall provide evidence that the proposed non-reticulated wastewater system complies with the requirements of the Hawke's Bay Regional Resource Management Plan rules for on-site domestic wastewater.

The developer may need to also meet the requirements of the Hawke's Bay Regional Council's Water borehead requirements.

Where it is not feasible or appropriate to provide the above at the 'Subdivision/Development' stage then at the 'Building Consent' stage of site development an applicant will be required to provide one of the following:

(a) A certificate from the Hawke's Bay Regional Council to the effect that the proposed non-reticulated wastewater system is permitted; or
(b) Where required by the Hawke's Bay Regional Council, a resource consent with any conditions approving the proposed non-reticulated wastewater system for the site.

Note: where it is proposed to provide a non-reticulated wastewater system at the Building Consent stage then a consent notice shall be placed on the title to that effect.

On lot systems remain in the ownership of, and the responsibility of, the property owner.

5.3.13.3 **Relevant Standards and Guidelines** (additional section to NZS 4404: 2010)

The selection of an appropriate on-site wastewater system shall consider effluent results from the on-site effluent testing (OSET) national testing programme (NTP) available on-line.

The design of On-lot Wastewater Treatment and Disposal shall be in accordance with the appropriate technical standards and Codes. A selection of currently available relevant standards and guidelines are:

- GD06 On-site Wastewater Management in the Auckland Region – Auckland Council 2018. Which supersedes TP58.
- AS/NZS 1546.1 – On-site Domestic Wastewater Treatment Units, Part 1: Septic Tanks
- AS/NZS 1546.3 – On-site Domestic Wastewater Treatment Units, Part 3: Aerated Wastewater Treatment Systems
- AS1547 – On-site Domestic Wastewater Management
- Hawke's Bay Regional Council Resource Management Plan.

These documents need not limit designer's references and other recognised standards and guides may be approved.

5.3.13.4 **Design Standards** (additional section to NZS 4404: 2010)

On-lot treatment and disposal shall normally be water based providing treatment in two stages.

(a) A primary treatment system which may be a septic tank or home treatment plant,
(b) A disposal system which disposes of the primary treated waste to ground, in which further treatment occurs.

In some situations, where potential for environmental contamination is high (e.g. poor soil, high water table) tertiary treatment by disinfection or extra filtration may be required.

Ultimately, all systems must comply with the requirements of Hawke's bay Regional Council's Regional Resource Management Plan, including any consents, and it is recommended that any proposals for on-site treatment must be discussed with them at the feasibility stage.

The design of all systems shall be based on adequate fieldwork, to properly assess soil conditions and water table depth, and survey where necessary to accurately locate waterways and ditches.

All systems involving a direct discharge to water or land will likely require a Resource Consent to be obtained from the Regional Council.

5.4 **Approval of proposed infrastructure** (additional to NZS 4404: 2010)

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.

Refer to Section 1.8.1.

5.5 Construction

5.5.1 **Pipeline construction** (additional to NZS 4404: 2010)

All drainage systems shall be constructed to lines and grades specified in the design drawings and to standards suitable for ensuring pipelines are able to serve their purpose over the required design life. Drainage construction methods shall comply with the appropriate technical standards, suppliers or manufacturers requirements and codes.

5.5.1.1 **Setting Out** (additional section to NZS 4404: 2010)

All drainage works shall be set out to the position and levels detailed on the approved drawings.

Where the alignment is related to the road boundary, drains shall be laid with reference to permanent land transfer boundary pegs or temporary boundary marks placed by the registered surveyor responsible for the final land transfer pegging. Pipes shall be laid by reference to the kerb line only where the surveyor has confirmed that the kerb is located in the correct position.

All pipes must be laid to the gradients specified on the drawings. Final acceptance will be by CCTV inspection in accordance with the guidance provided in the NZ Gravity Pipe Inspection Manual 4th Edition (Water NZ, 2019). It is noted that any dips in plastic pipe alignment must be less than 10% of the pipe diameter.

5.5.1.2 **Control of Water** (additional section to NZS 4404: 2010)

The Contractor shall keep the excavations free from water and wastewater at all times and shall provide all such pumping plant, pipes, and materials as may be required for this purpose.

Under no circumstances shall any water be allowed to drain directly into the existing wastewater drains.

5.5.1.3 **Control of Wastewater Flows** (additional section to NZS 4404: 2010)

The Contractor shall be responsible for the maintenance of wastewater flows at all times during construction and shall ensure that workers or other people's health is not in any way affected by wastewater flows. Prior to commencing work and if required by Council, the Construction Co-ordinator/Contractor shall show how wastewater flows will be maintained.

To achieve maintenance of flows, measures such as temporary damming of access chambers and pumping or other methods may be required for the duration of the project or for parts of the project.

Disposal of wastewater from all properties shall not be affected by works.

5.5.1.4 **Pipe Condition** (additional section to NZS 4404: 2010)

All pipes supplied for use in the works shall be new and in good condition. They shall be examined before being laid and any pipe showing defects of any description shall be removed from the site and not used in Council works. Any pipes damaged during laying shall likewise be removed except where damage is minor or to repairable coatings. In such cases the coatings and other damage shall be repaired to the manufacturer's specification so as to achieve a condition at least as good as a new undamaged pipe.

Handling of pipes and fittings shall be in accordance with the manufacturer's recommendations. All reasonable care shall be taken in handling pipe materials to preserve intact the pipe coatings, linings, structural strength and the various features necessary for long service. Pipes with external coatings shall be lifted using wide slings; ropes and chains shall not be used.

5.5.1.5 **Pipe Laying and Jointing** (additional section to NZS 4404: 2010)

A registered drainlayer shall be employed to supervise and certify all pipelaying works.

The laying and jointing of pipes shall be strictly in accordance with the manufacturer's recommendations, and Council's requirements. Bedding shall be as detailed in the design documents.

Where a pipeline is to be constructed through soft ground, unsuitable foundation material shall be removed and replaced with suitable compacted material. Unsuitable foundation material types include buried organic topsoil, soft peat, loose uncompacted sand, fill material, soft to very soft and/or expansive clay. Standard Drawings D02 and D03 provide details on adequate foundations for the pipeline.

Drainage structures including access chambers shall be clear of boundaries and other obstructions.

Pipelines shall be laid clear of existing buildings. Pipelines shall not be laid in front, side and rear yards unless clearance needs have been previously determined by the Design Co-ordinator having regard to possible disturbance of structures.

5.5.1.6 **Jointing Pipes** (additional section to NZS 4404: 2010)

Jointing shall be strictly in accordance with the manufacturer's instructions or in accord with specific design details.

Spigots, sockets, rubber rings and sleeves etc shall be thoroughly cleaned and lubricated where appropriate before jointing.

5.5.1.7 **Pipe Contamination** (additional section to NZS 4404: 2010)

Adequate precautions shall be taken while laying pipes to prevent the entry of debris. Where required, the pipeline shall be temporarily sealed with fixed covers or bungs to prevent entry of foreign matter or groundwater.

5.5.1.8 **Connections** (additional section to NZS 4404: 2010)

Connections, unless approved otherwise, shall be constructed using factory made Y junctions. In-situ saddle connections are generally not allowed on wastewater mains.

Each connection shall be laid soffit to soffit except when a drop is constructed.

Each connection end shall be marked by a stake (plastic flexipost or similar) extending to 600 mm above ground level.

Connections whether to reticulation lines or to access chambers shall be sealed by a factory made sealing cap.

5.5.1.9 **Access Chamber Construction** (additional section to NZS 4404: 2010)

Access chambers shall be constructed as detailed in Standard Drawing D05. Where more than a single riser is used in an access chamber, riser joints shall be sealed with epoxy mortar (in addition to any proprietary seal).

Mini access chambers of depth 900 mm or less to invert shall utilise DN600 reinforced concrete pipe with construction otherwise being to the requirements of this Code.

Where an access chamber excavation is found to be in soft ground the area under the access chamber shall be undercut down to solid and backfilled with hardfill to provide an adequate foundation for the access chamber base. Alternatively, work can be stopped and a specific solution designed. Before any concrete is placed the base of the trench shall be free of all debris and water.

Pipes shall be laid 'soffit to soffit' taking into account grade of the pipelines and any designed drop through the access chamber.

When uPVC pipes are used factory made "access chamber shorts" shall be used at access chamber entry points.

Care shall be taken to ensure that chamber access holes and step-irons are orientated correctly.

The walls, benching and invert of access chambers shall have smooth internal finish. Any leaks shall be neatly plugged. All pipes through access chambers shall have their inverts neatly lined with cement render to NZS 3114 concrete surface finish (U3). All inverts shall be carried vertically to the soffit of the pipe before haunching back to the access chamber walls.

Precast concrete access chamber covers shall be placed, jointed and sealed with mortar onto the top riser. Cast iron access chamber frames shall be bedded on epoxy mortar.

Access chamber frames shall be set proud of the surrounding ground / road levels by 10 mm and set at the same crossfall and gradient as the surrounding surface. The immediate surrounding surface shall be shaped up to the edge of the chamber frame over a distance of not less than 500 mm all round.

5.5.2 **Trenching** (additional to NZS 4404: 2010)

Trenches shall be opened only after all required Consents and Trench Opening Notices have been uplifted. All trenching shall comply with the safety requirements of the Health & Safety in Employment Act.

All trenches shall be opened up to widths and depths suitable for enabling the requisite bedding metal thickness below the pipe to be placed (not less than 100 mm). The trench width shall be kept to those dimensions detailed in the design drawings which ensure that it is narrow enough to allow the pipe to be laid in trench conditions but wide enough to enable pipe surround material to be adequately placed and compacted.

All trenching in Napier roads or on services to be taken over by Council shall be carried out in accordance with Council approved methods.

5.5.2.1 **Trenches in Open Land** (additional section to NZS 4404: 2010)

Trenches may be opened for up to 200 metres ahead of pipelaying provided trench depth and material are of adequate stability to minimise any risk of trench failure and to ensure safety of workers and the public.

5.5.2.2 **Trenches in Road** (additional section to NZS 4404: 2010)

Trenches in stable ground may be opened to a maximum of 50 metres in advance of pipe laying, but this distance shall be reduced where the public or network utility services are endangered or where traffic routes are restricted.

5.5.3 **Reinstatement** (additional to NZS 4404: 2010)

Backfilling, around and for a depth of 100mm over the pipes shall be with approved bedding material. This material shall be carefully placed and well tamped with hand rammers around and above the pipes with particular attention to compacting under the pipe haunches.

Completion of backfilling and surface reinstatement shall be in accordance with methodologies recommended in either of the following specifications authorised by Council, for the Works:

- "Specification for Service Maintenance Operations and New Service Installations within Road Reserve (including Trench Excavation and Reinstatement)",
- National Code of Practice for Utility Operators Access to Transport Corridors
- NZS 4404: 2010 "Land Development and Subdivision Infrastructure"

Backfilling shall be carried out immediately after the pipes have been inspected and the "as built" information recorded. The Contractor may wish to carry out a test at this stage. In some circumstances backfilling may be required immediately after laying.

5.5.4 **Inspection and acceptance** (additional to NZS 4404: 2010)

5.5.4.1 **Inspection and Testing of Wastewater Mains** (additional section to NZS 4404: 2010)

A video record (CCTV inspection) of the interior of the completed wastewater main shall be provided to the Council's Liaison Officer, for the full length of the main to be taken over by the Council. The video record shall only be undertaken at the time of final inspection. If requested, the Council will undertake and provide the video record. This will be at the Developers cost. Final acceptance of the CCTV inspection shall be in accordance with the guidance provided in the NZ Gravity Pipe Inspection Manual 4th Edition (Water NZ, 2019). It is noted that any dips in plastic pipe alignment must be less than 10% of the pipe diameter.

The Council shall be given two working days' notice of the intention to undertake a video inspection regardless of whether or not the Council's equipment is used.

A written record of any defects shall accompany the video when passed to the Council not later than at the time of giving advice to Council of the final water test. Subject to the video test showing pipes to be clean and neatly laid Council will authorise the carrying out of the water test.

It is recommended that wastewater mains including access chambers and lateral connections be tested by water test upon completion of each section and prior to backfilling, while the joints are still visible.

5.5.4.2 **Testing of Access Chambers** (additional section to NZS 4404: 2010)

New access chambers shall be tested for water tightness by filling with water. After all absorption has taken place the water level shall be maintained for 30 minutes and a visual inspection carried out. Any leakage detected shall be made good and the access chamber retested, until no leakage occurs.

Groundwater infiltration must also be prevented.

5.5.5 **Leakage testing of gravity pipelines** (additional to NZS 4404: 2010)

Pipelines shall be made watertight prior to any test. Junctions shall be plugged and tested as an integral part of the main.

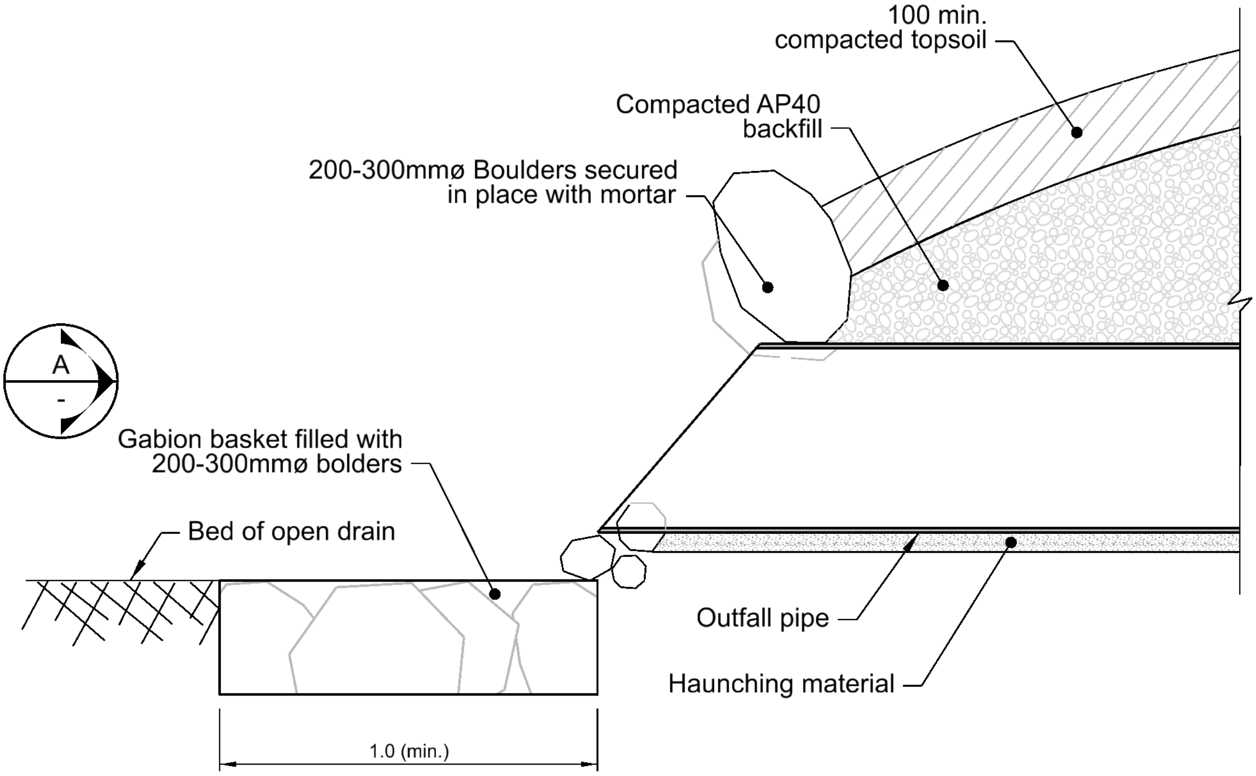
All pipelines shall be tested in accordance with the requirements that are set out Standard Drawing D23, which is based on methodology described in withdrawn standard NZS 4452.

Any faults indicated by either loss of pressure or visible leakage shall be remedied until conforming test results are achieved.

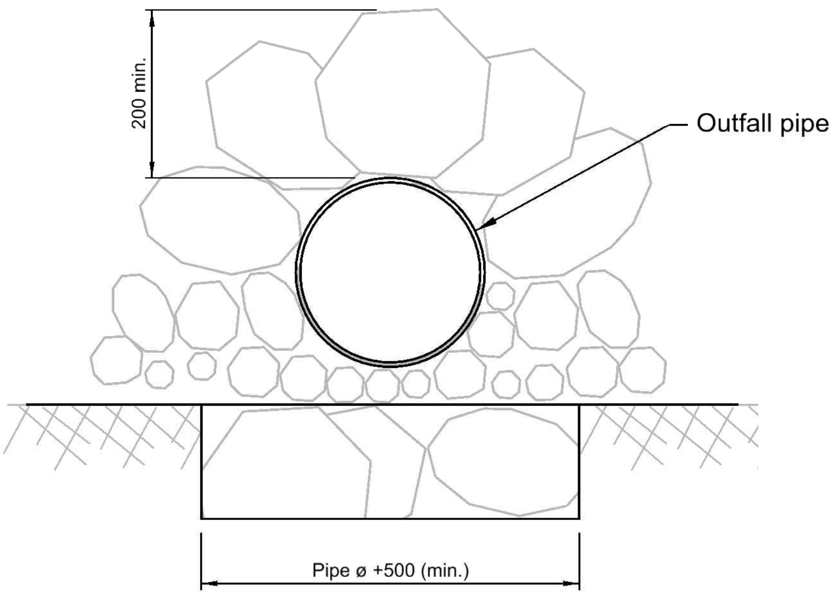
5.5.6 **Leakage testing of pressurised sewers** (as per NZS 4404: 2010)

5.5.7 **As-builts and completion documentation** (additional section to NZS 4404: 2010)

On completion of construction, information and documents as required by Section 1.8.10 shall be provided by the Construction Co-ordinator.



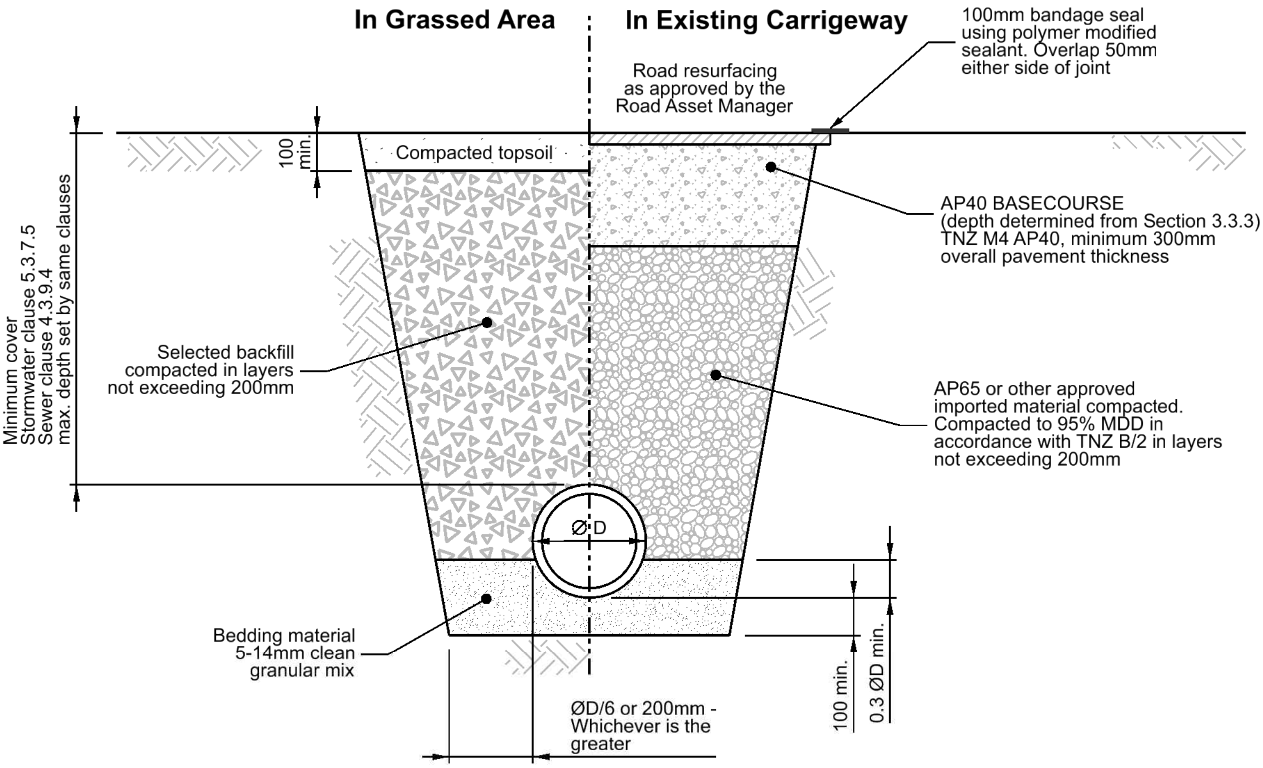
CROSS SECTION



VIEW A

NOTE: Whole numbers = mm, decimalised numbers = m.

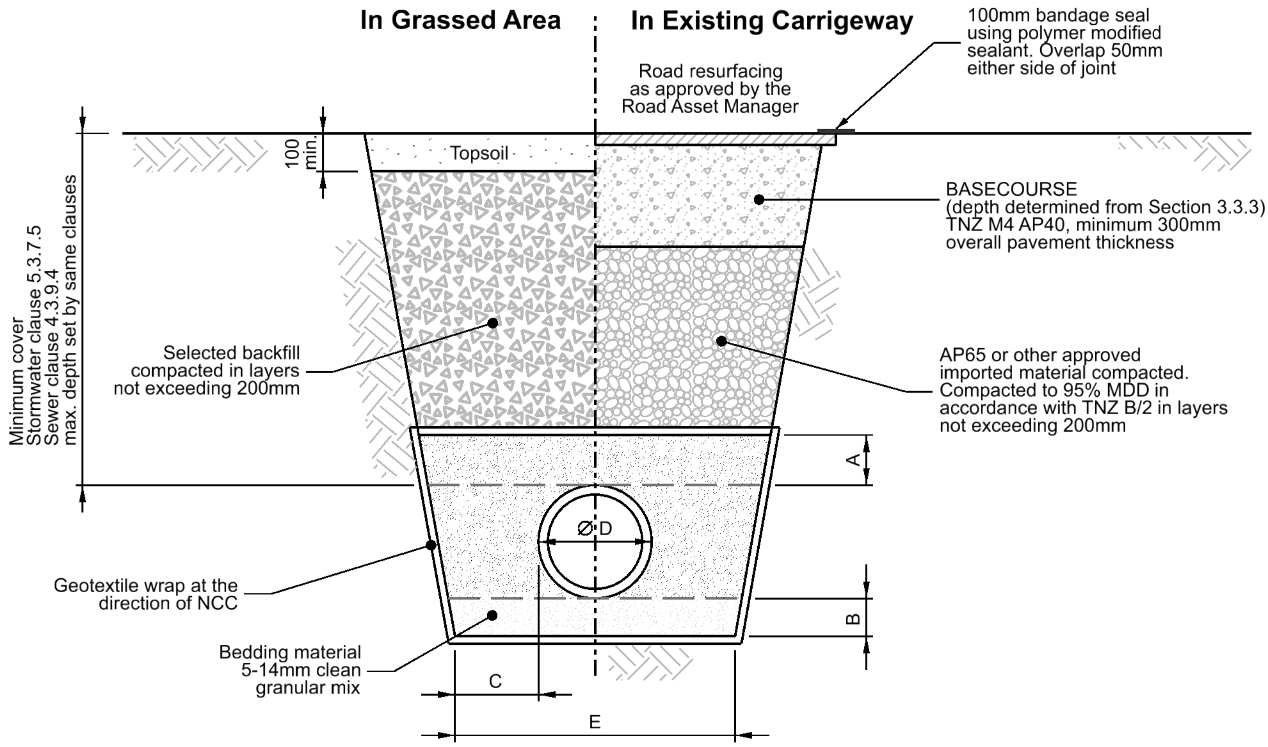
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**BEDDING AND OUTFALL DETAILS**	NOT TO SCALE	**D01**



NOTES:

1. Basecourse and surface design for new roads to be determined by separate design
2. Any specific trench fill requirements shall be determined by the Design Engineer
3. Refer to Drawing No. R50 for typical trench details
4. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	TYPICAL SEWER AND STORMWATER TRENCH DETAILS - CONCRETE PIPE	NOT TO SCALE	D02

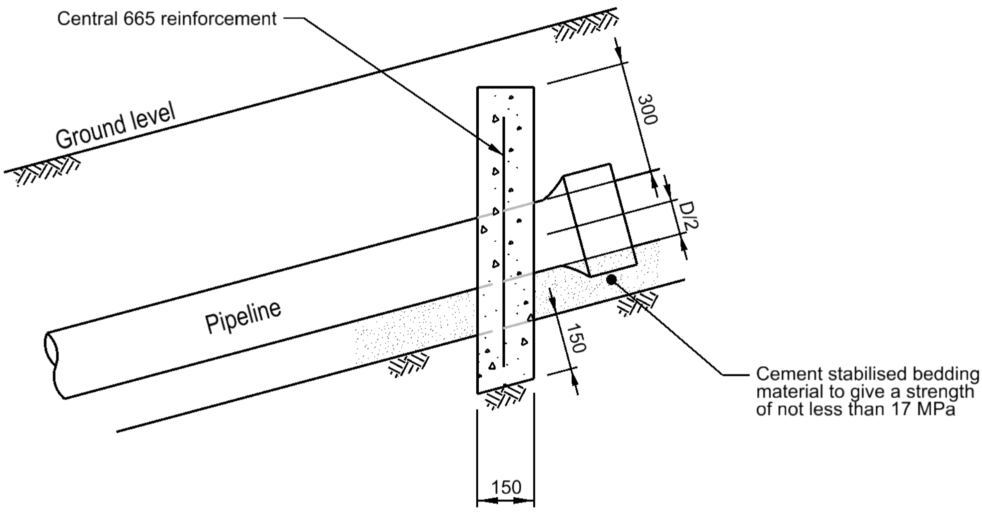


Diameter - D	Minimum Dimensions			
	A	B	C	E = D + 2C
> = 75, < = 150	100	75	100	275 - 350
>150, < = 300	150	100	150	450 - 600
>300, < = 450	150	100	200	700 - 850
>450, < = 900	150	150	300	1050 - 1500

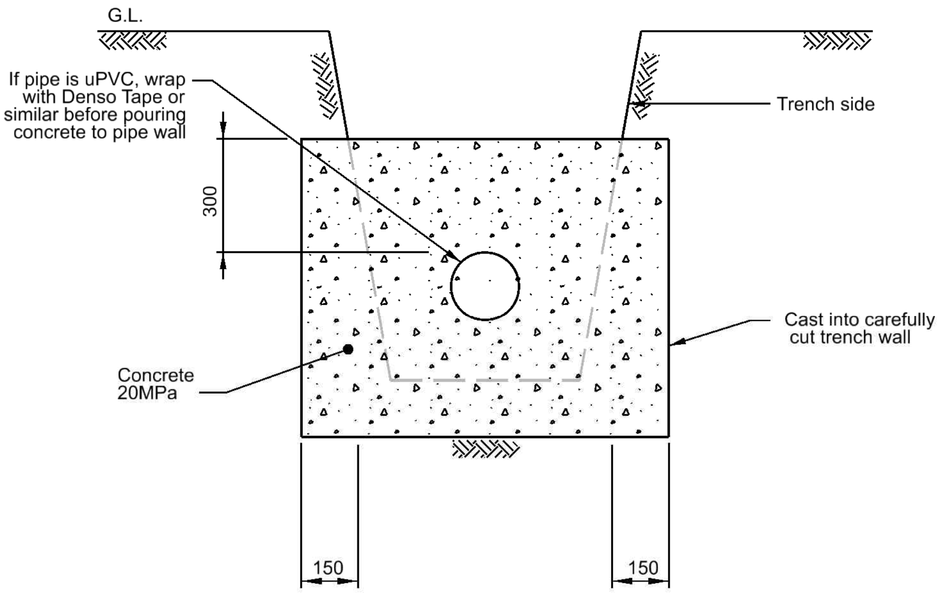
NOTES:

1. Any specific trench fill requirements shall be determined by the Design Engineer
2. Refer to Drawing No. R50 for typical trench details
3. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	TYPICAL SEWER AND STORMWATER TRENCH DETAILS - FLEXIBLE PIPE	NOT TO SCALE	D03



LONGITUDINAL SECTION
1:20



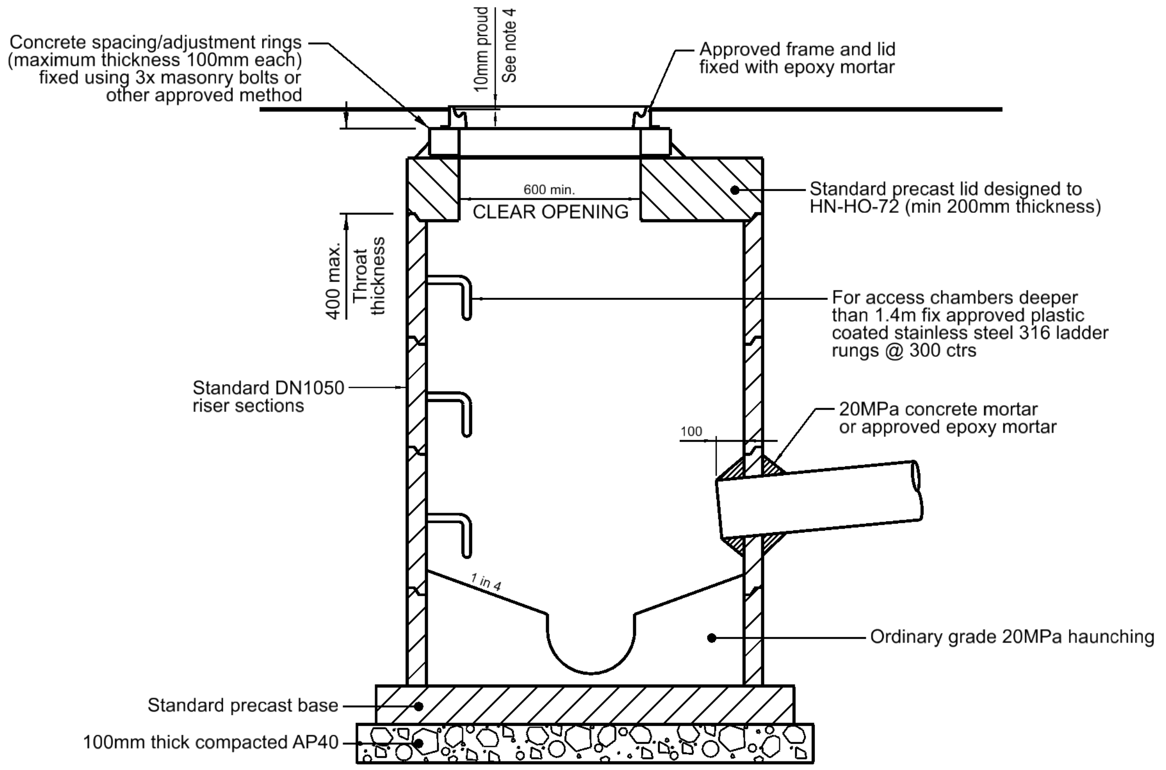
CROSS SECTION
ANTI-SCOUR BLOCKS
1:20

NOTES:

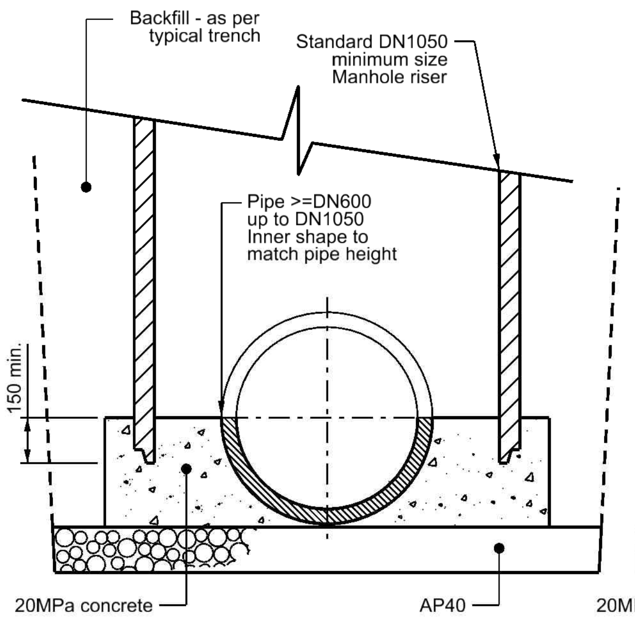
1. Anti-scour blocks to be placed behind every second pipe joint or at a spacing of 100 / Grade (%), whichever is less unless directed otherwise by the NCC Asset Engineer

2. All dimensions are in mm.

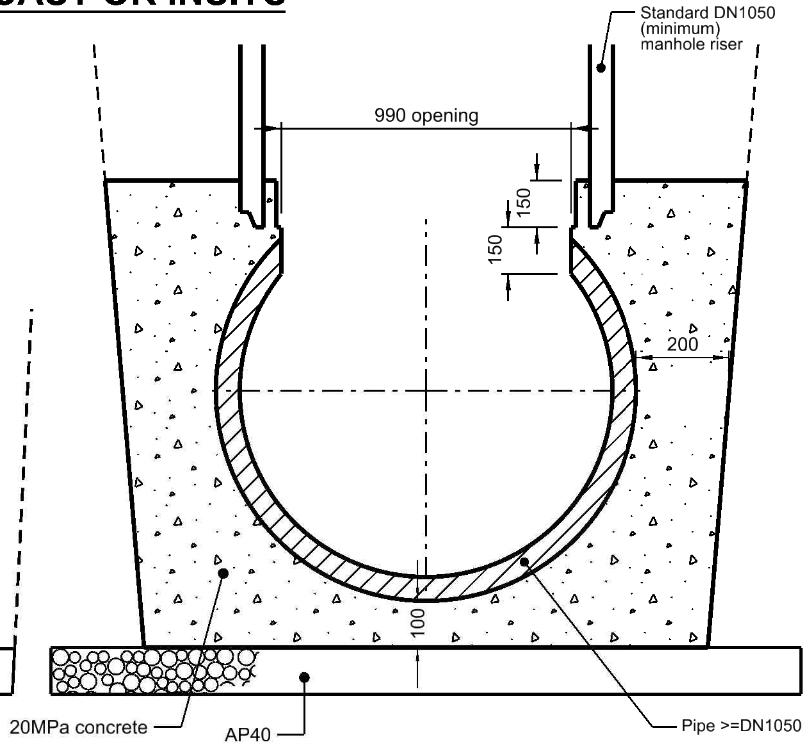
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	ANTI-SCOUR BLOCKS FOR STEEP PIPELINES	1:20	D04



STANDARD ACCESS CHAMBER
PRECAST OR INSITU



FROM DN600 TO DN1050 PIPES

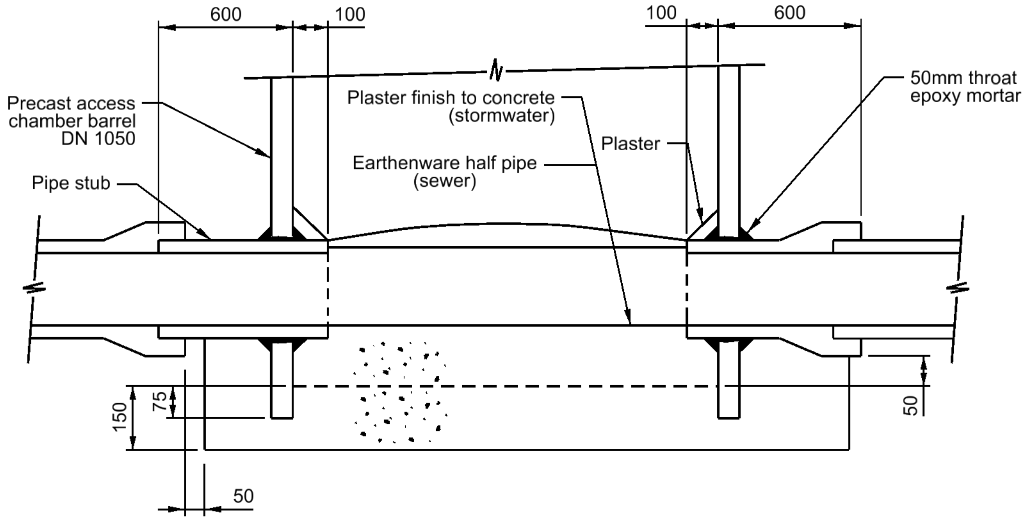


MANHOLES FOR >=DN1050
REINFORCED CONCRETE PIPES

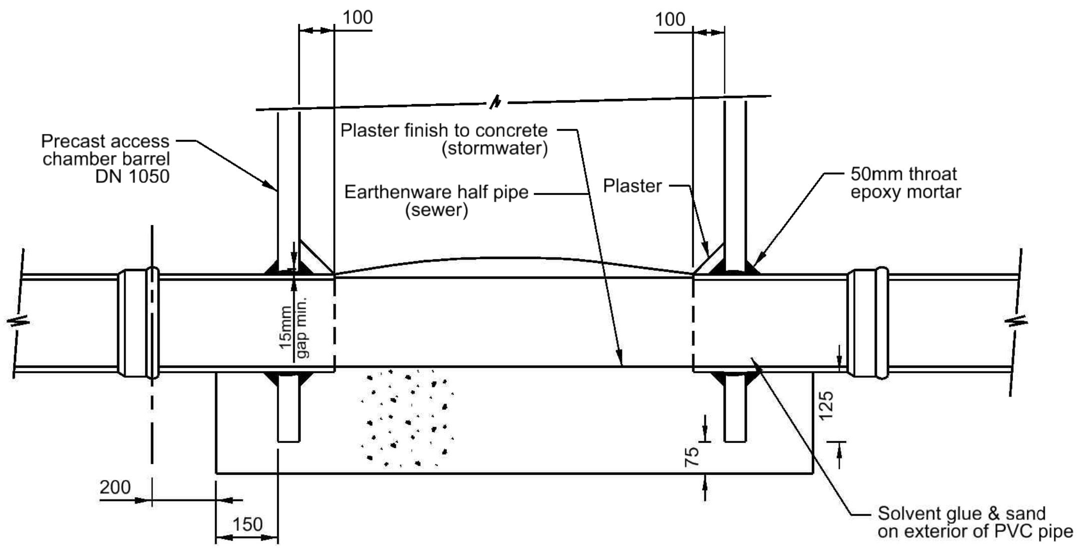
NOTES:

1. Covers and frames shall comply with AS3996 Class D, and have a clear opening of not less than 600mm
2. Covers shall be hinged for all manholes
3. When used in roads, hinges should be located on the side nearest to oncoming traffic
4. Leave 10mm proud of surface to accomodate second coat seal
5. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	STANDARD ACCESS CHAMBER WITH PRE-CAST COMPONENTS	NOT TO SCALE	D05



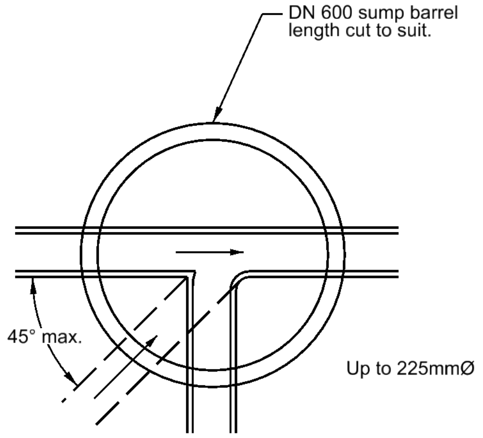
CONCRETE PIPE DETAIL



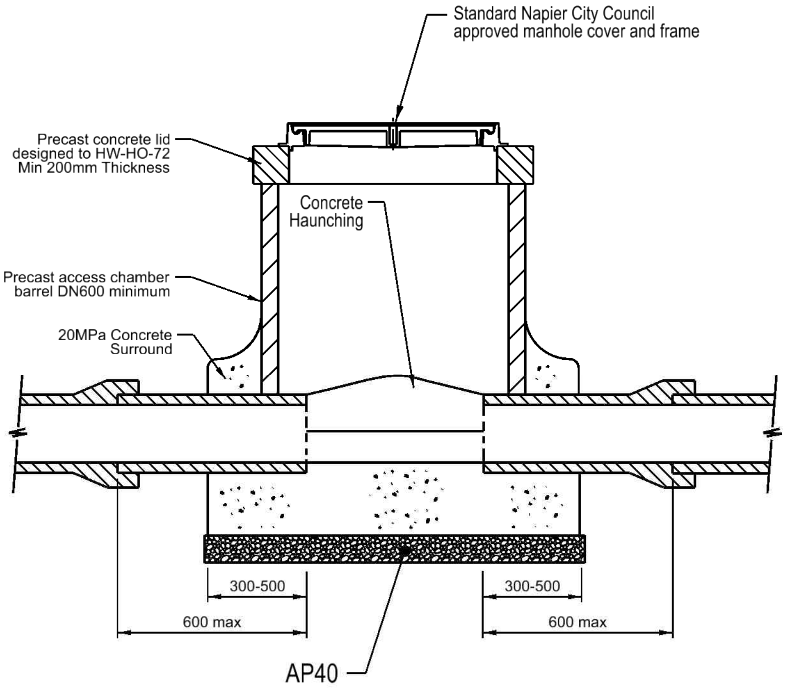
PVC. PIPE DETAIL

NOTE: Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	STANDARD ACCESS CHAMBER JOINT DETAILS	NOT TO SCALE	D06



ORIENTATION OF BRANCH ENTRIES (TYPICAL)



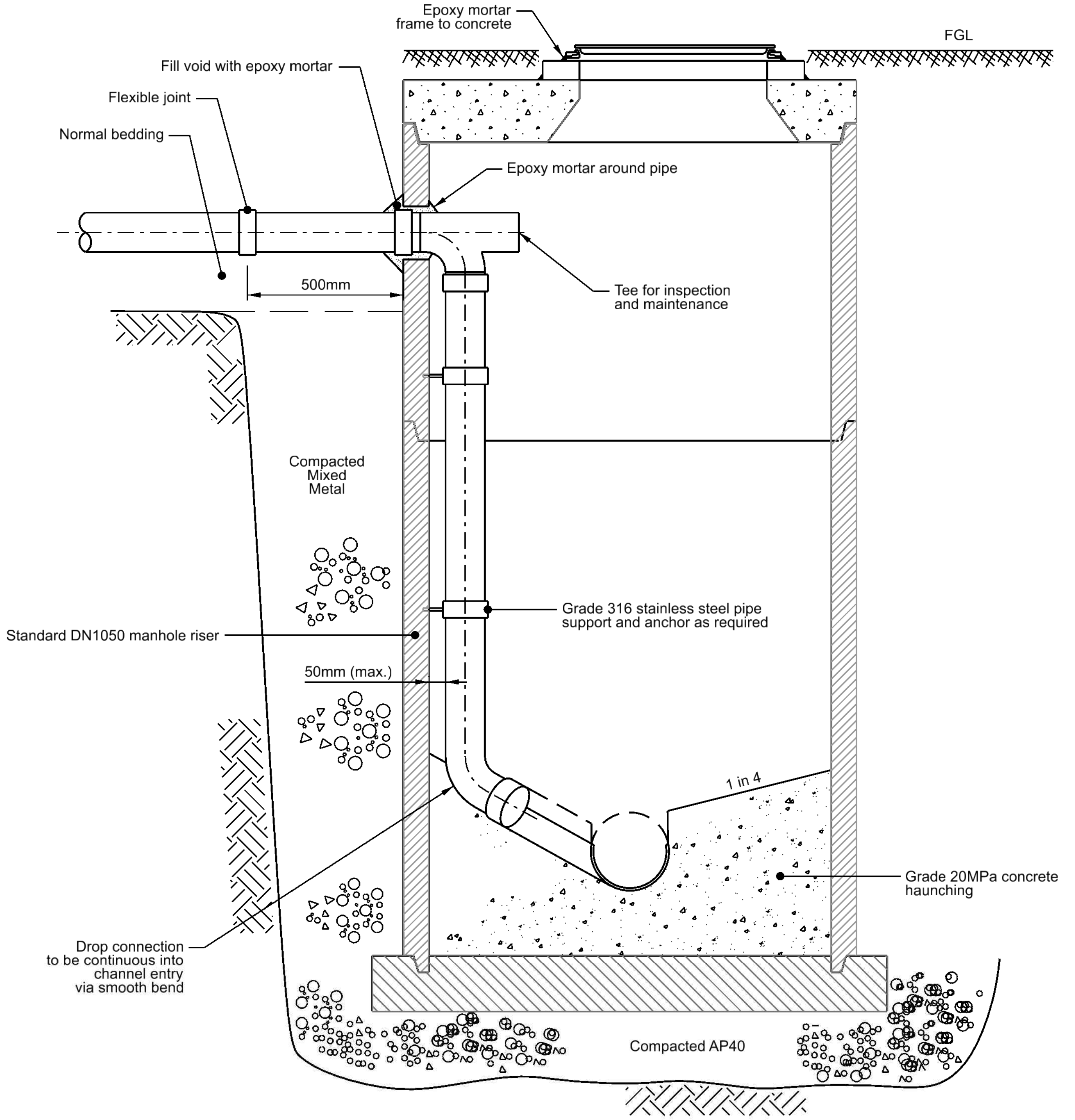
TYPICAL SECTION

INSPECTION CHAMBER AND SHALLOW ACCESS CHAMBER

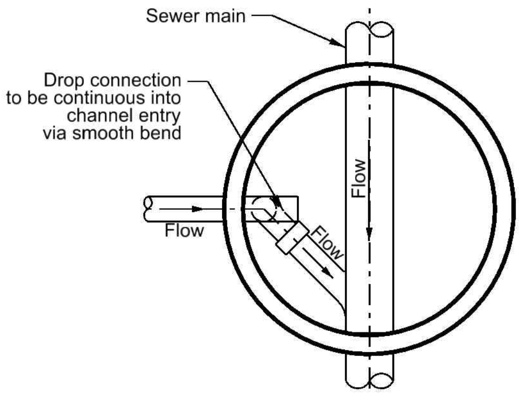
NOTES:

1. Depth not to exceed 900mm
2. Maximum pipe size connected DN225
3. All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	INSPECTION CHAMBER AND SHALLOW ACCESS CHAMBER	NOT TO SCALE	D07

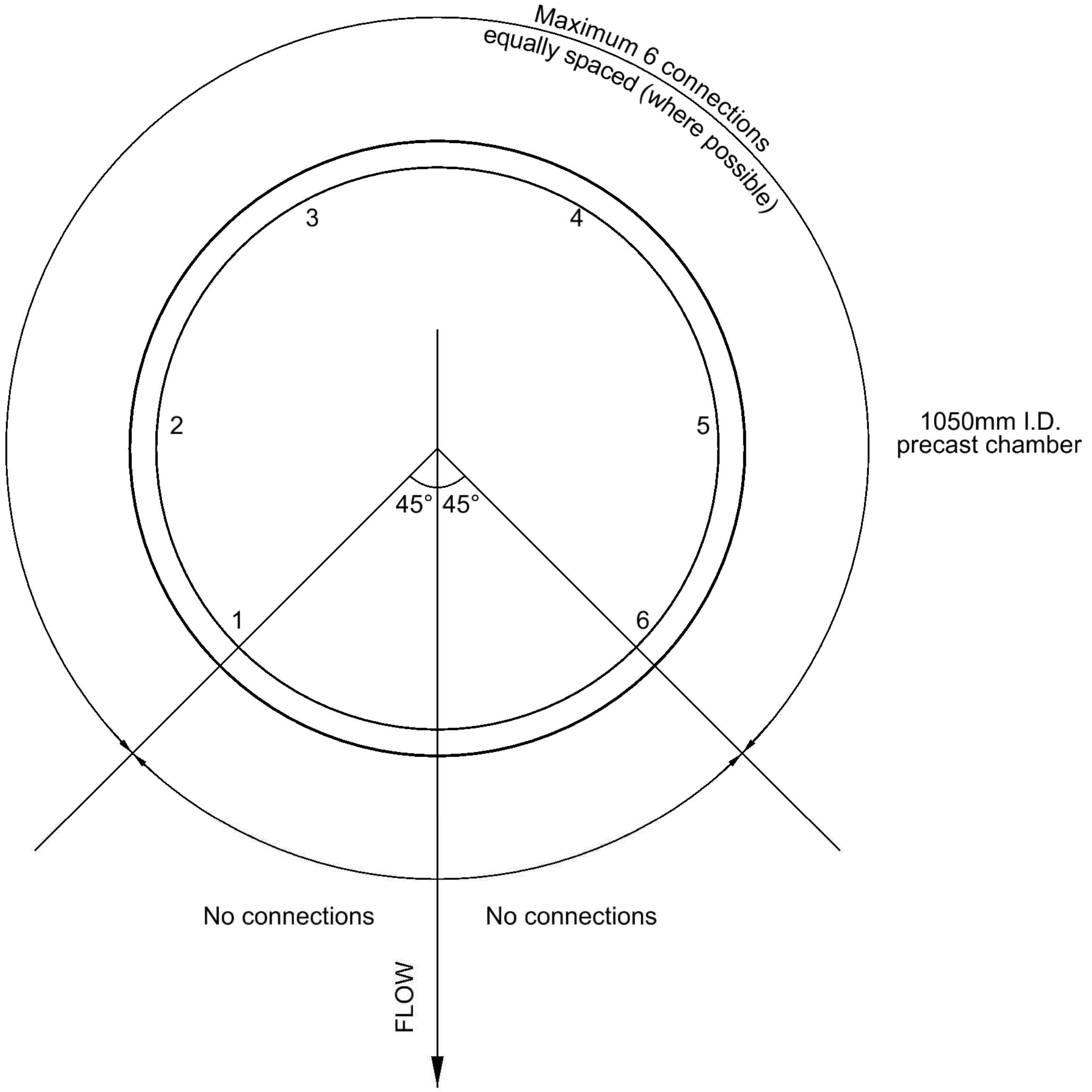


SECTION THRU CHAMBER

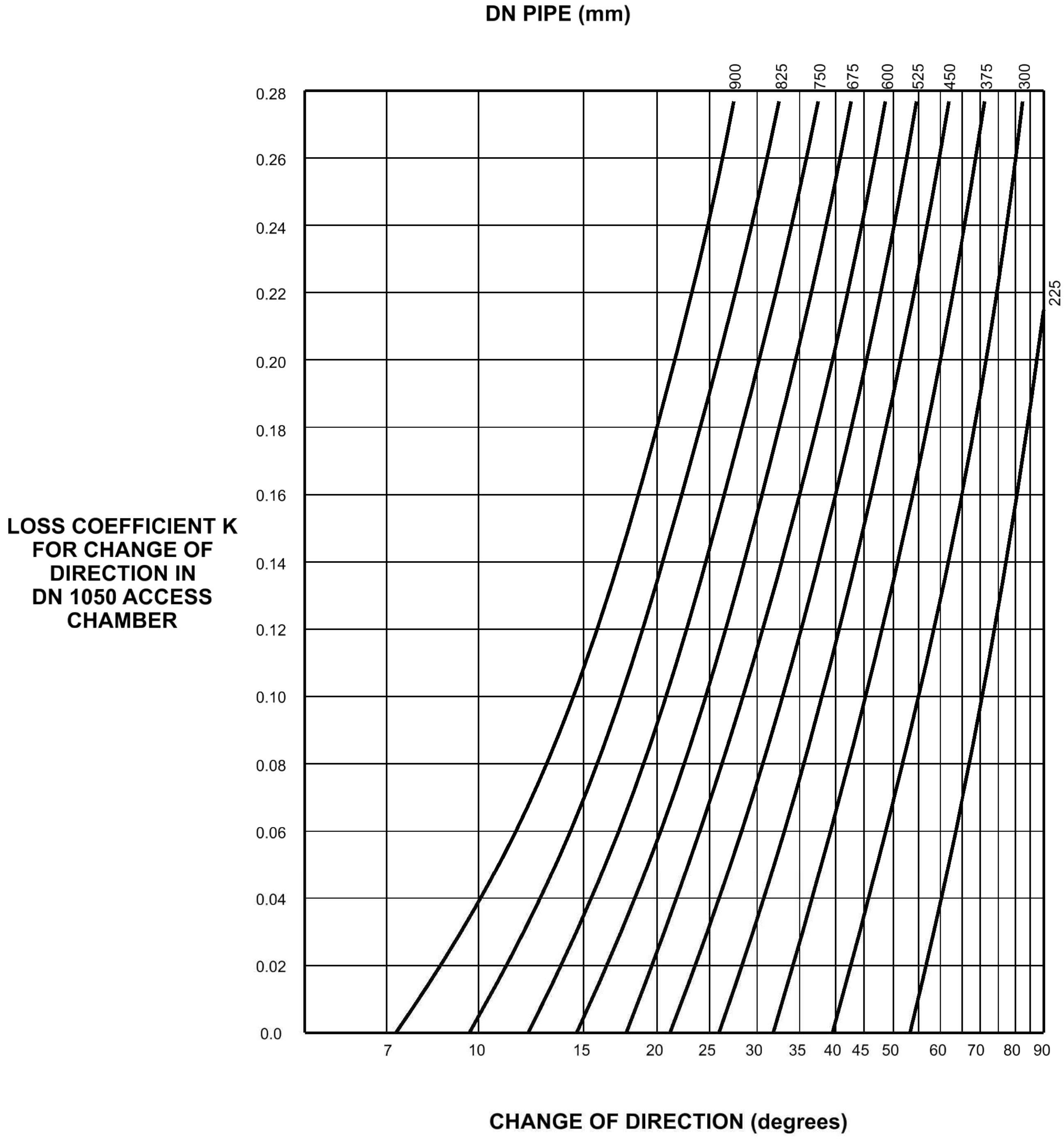


PLAN OF MANHOLE (HALF SIZE)

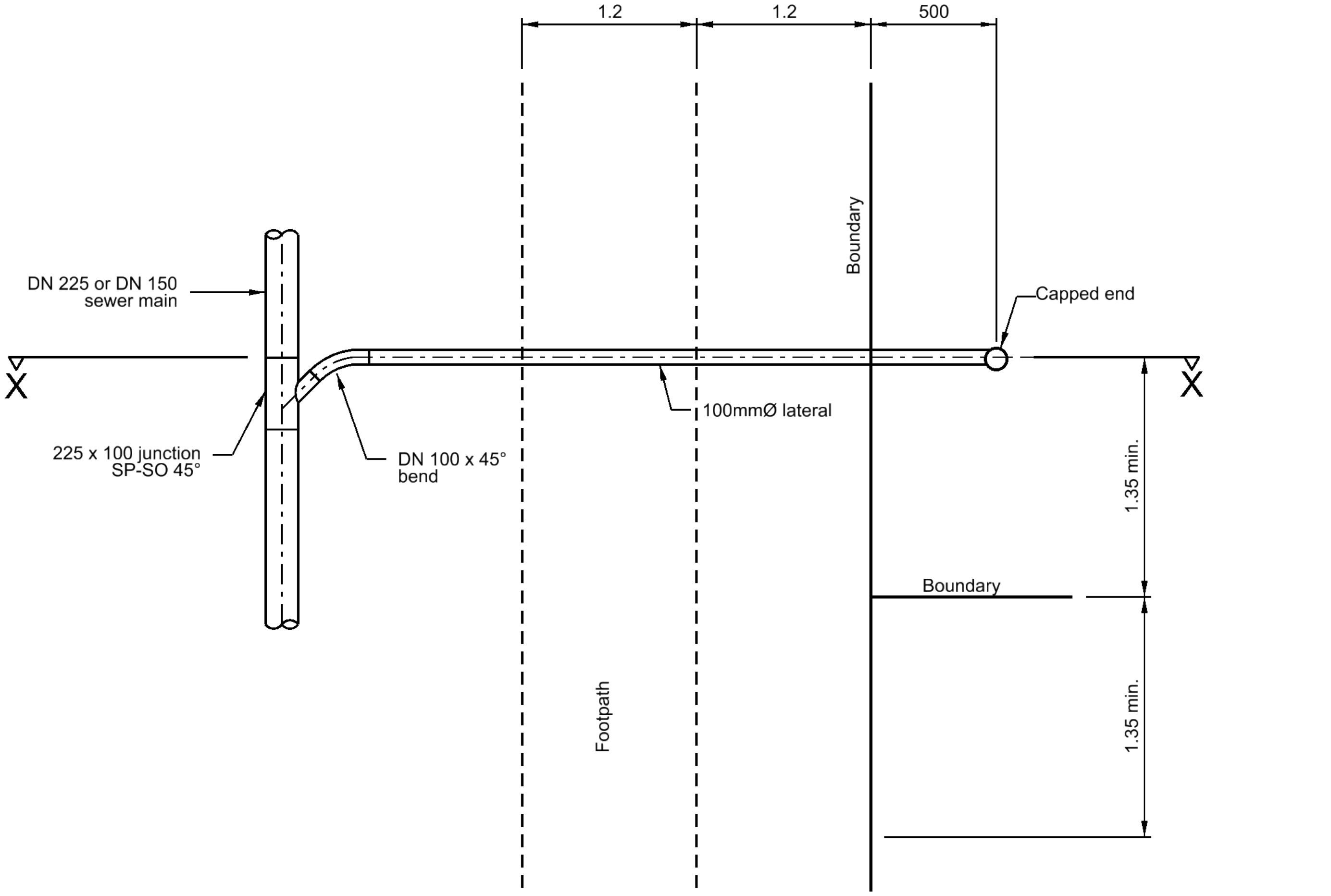
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	DROP CONNECTION TO ACCESS CHAMBER - WASTEWATER ONLY	NOT TO SCALE	D08



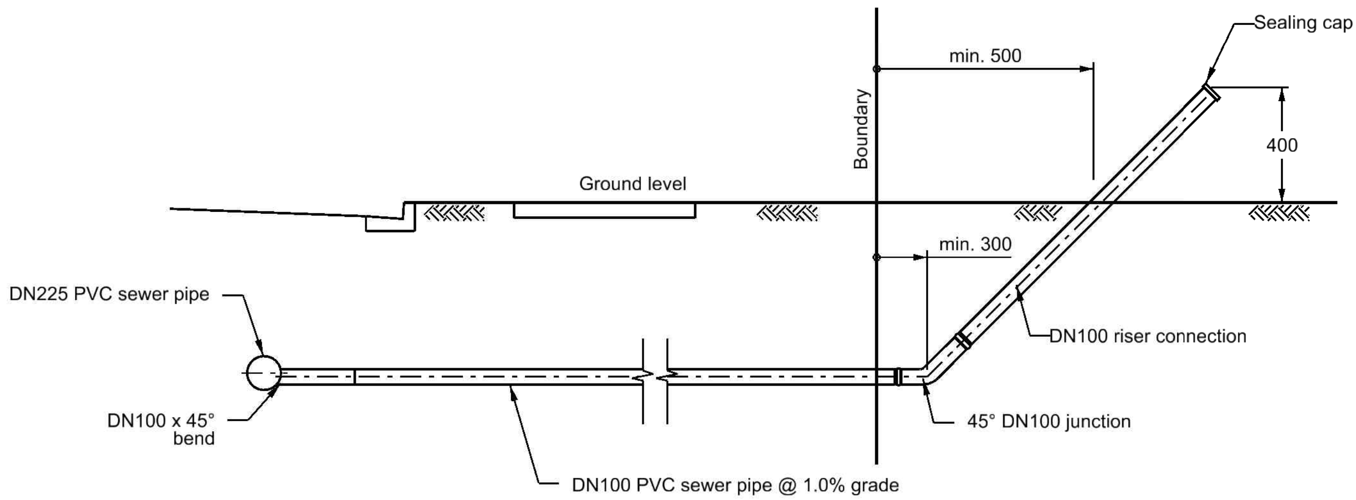
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**CONNECTIONS INTO ACCESS CHAMBERS**	NOT TO SCALE	**D09**



NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	ENERGY LOSS CO-EFFICIENTS THROUGH STANDARD ACCESS CHAMBER	NOT TO SCALE	D10



PLAN

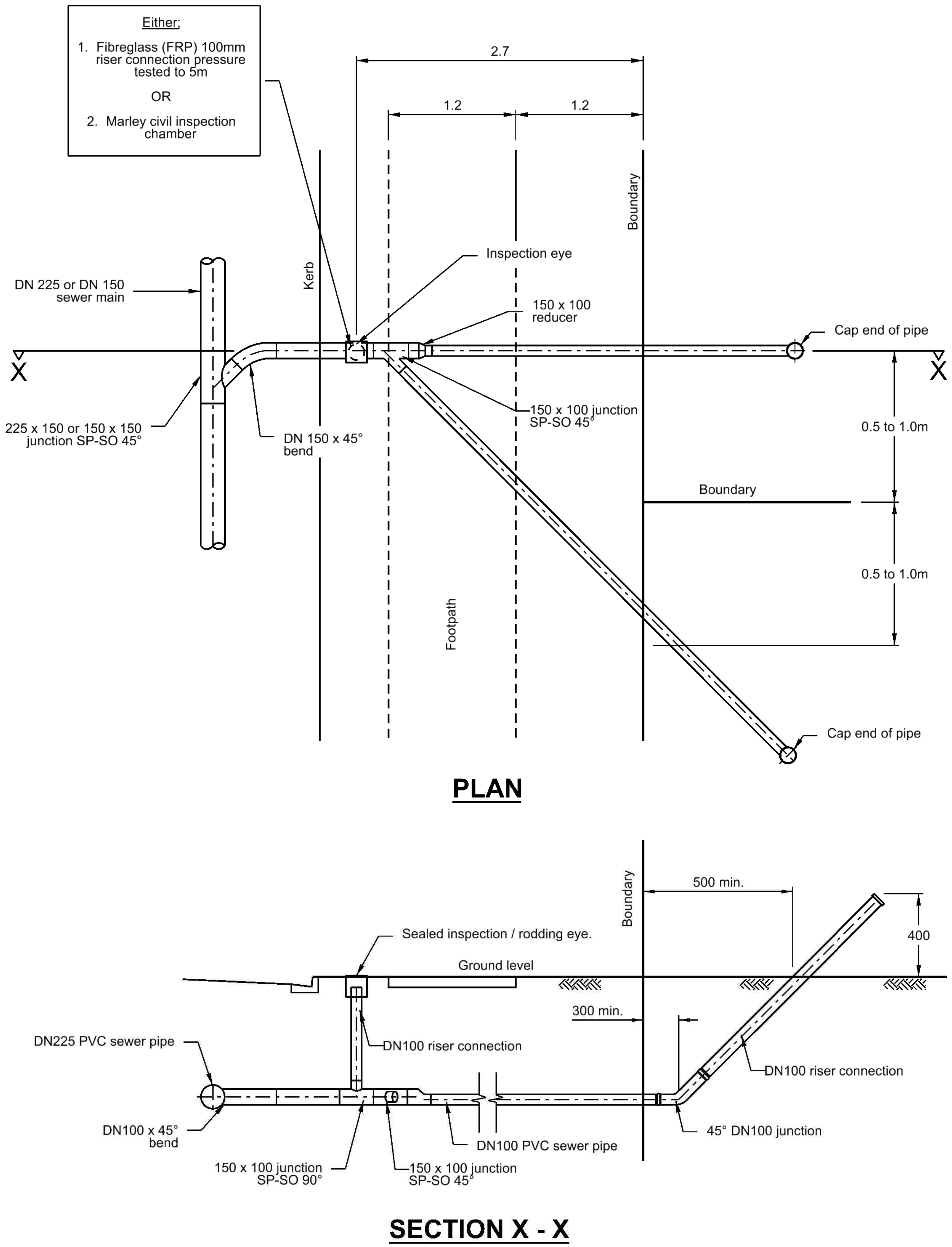


SECTION X - X

NOTES:

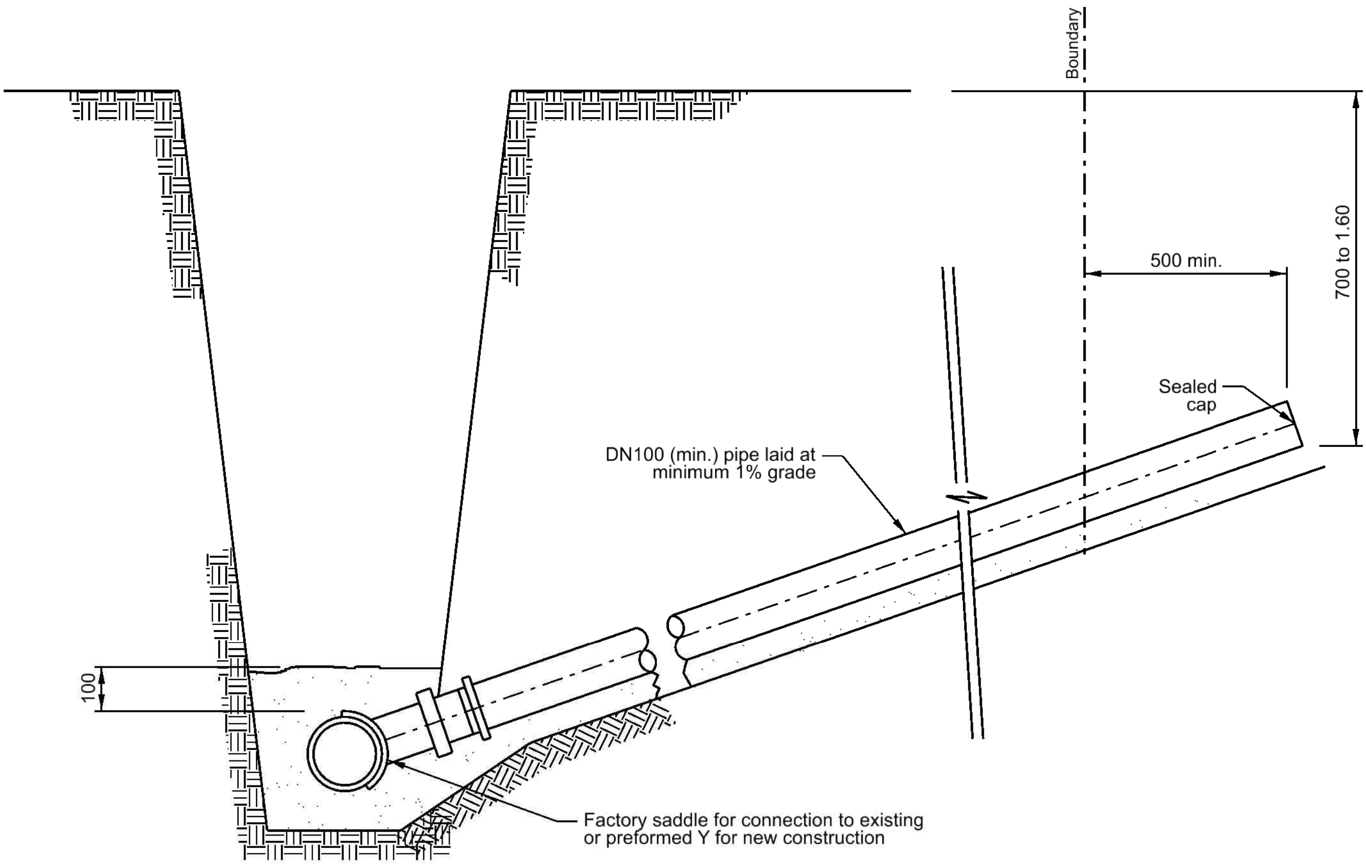
1. Whole numbers = mm, decimalaised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	SINGLE SEWER CONNECTION	NOT TO SCALE	D11



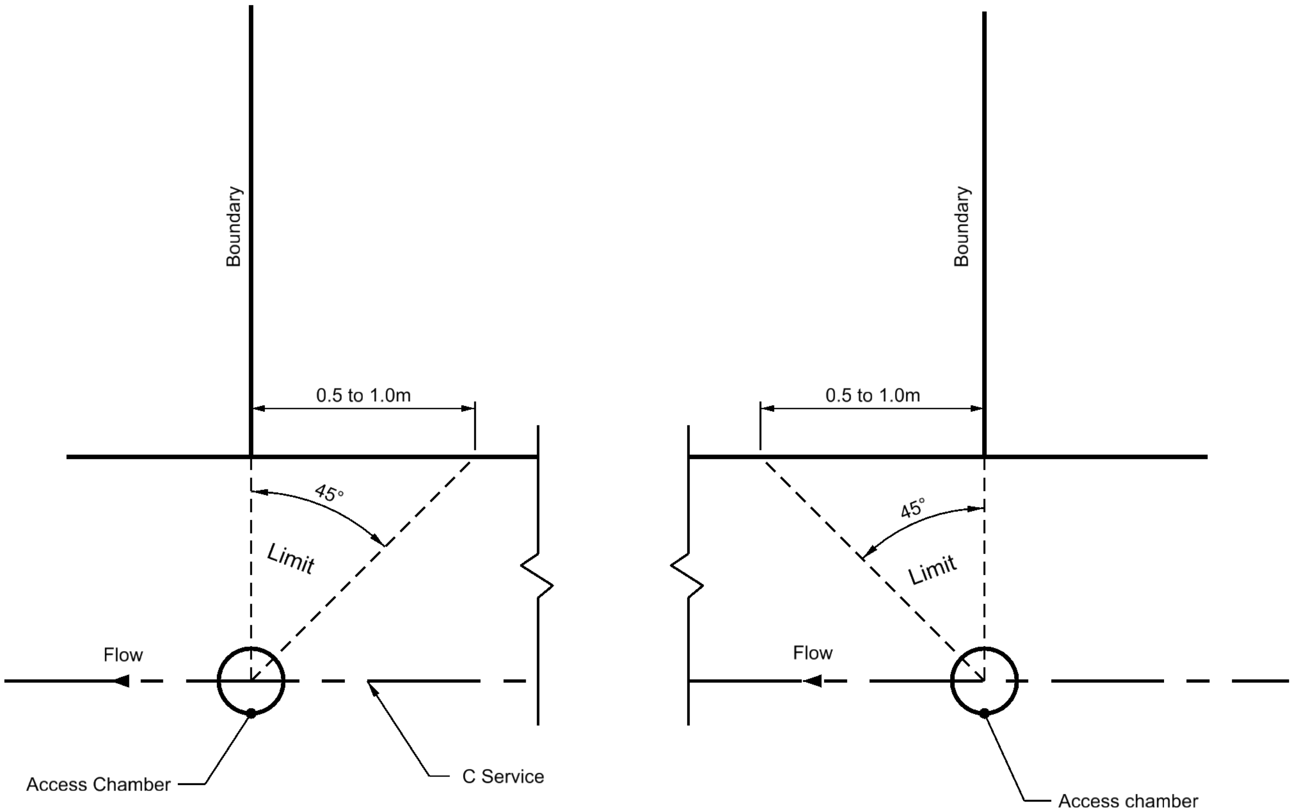
NOTE: Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**TWIN SEWER CONNECTION**	NOT TO SCALE	**D12**



NOTE: Whole numbers = mm, decimalised numbers = m.

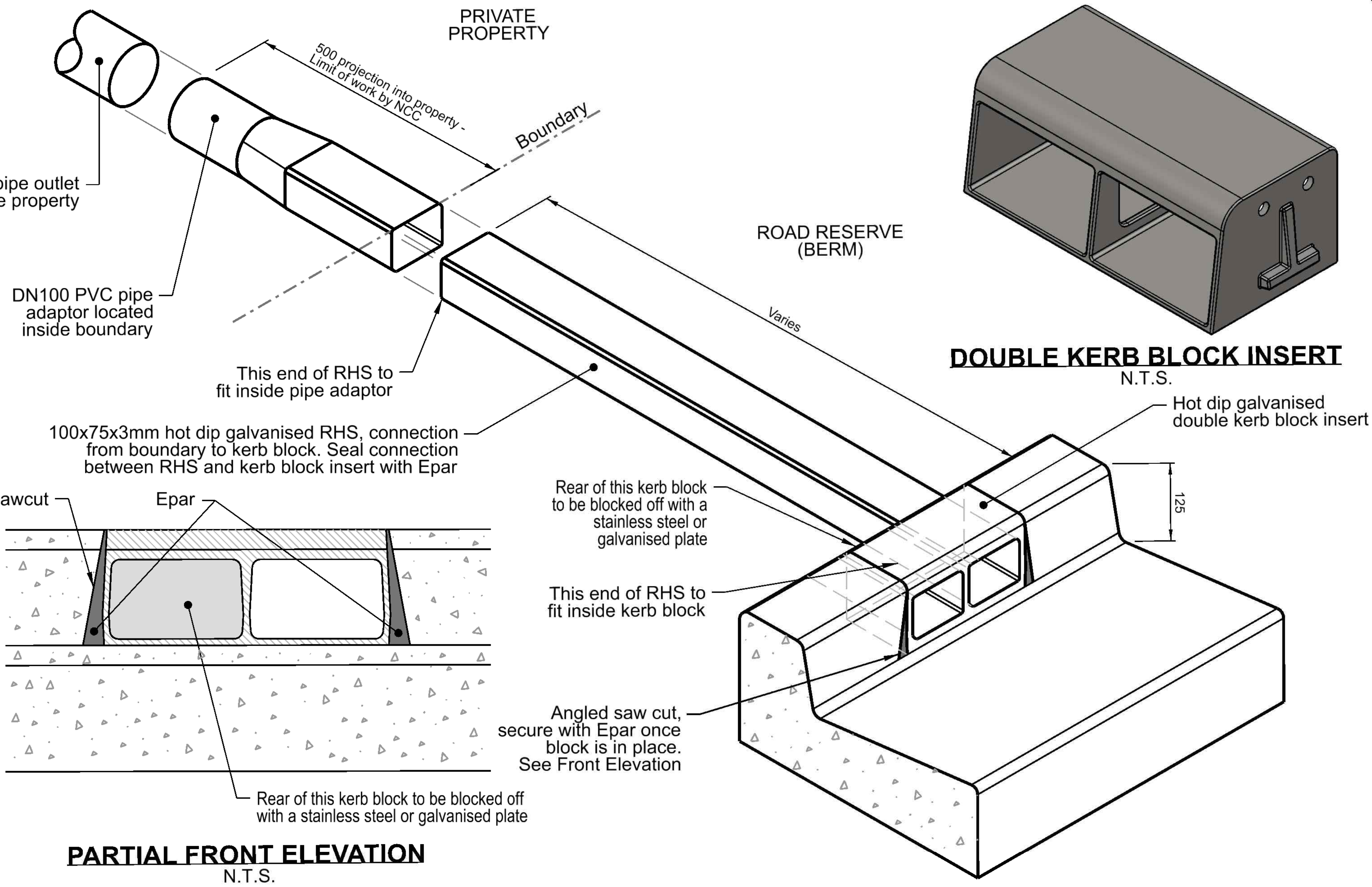
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**HOUSE CONNECTION WITH RAMPED RISER**	NOT TO SCALE	**D13**



NOTES:

1. Connections preferably located in front of a property and within the limits above
2. All dimensions are in metres.

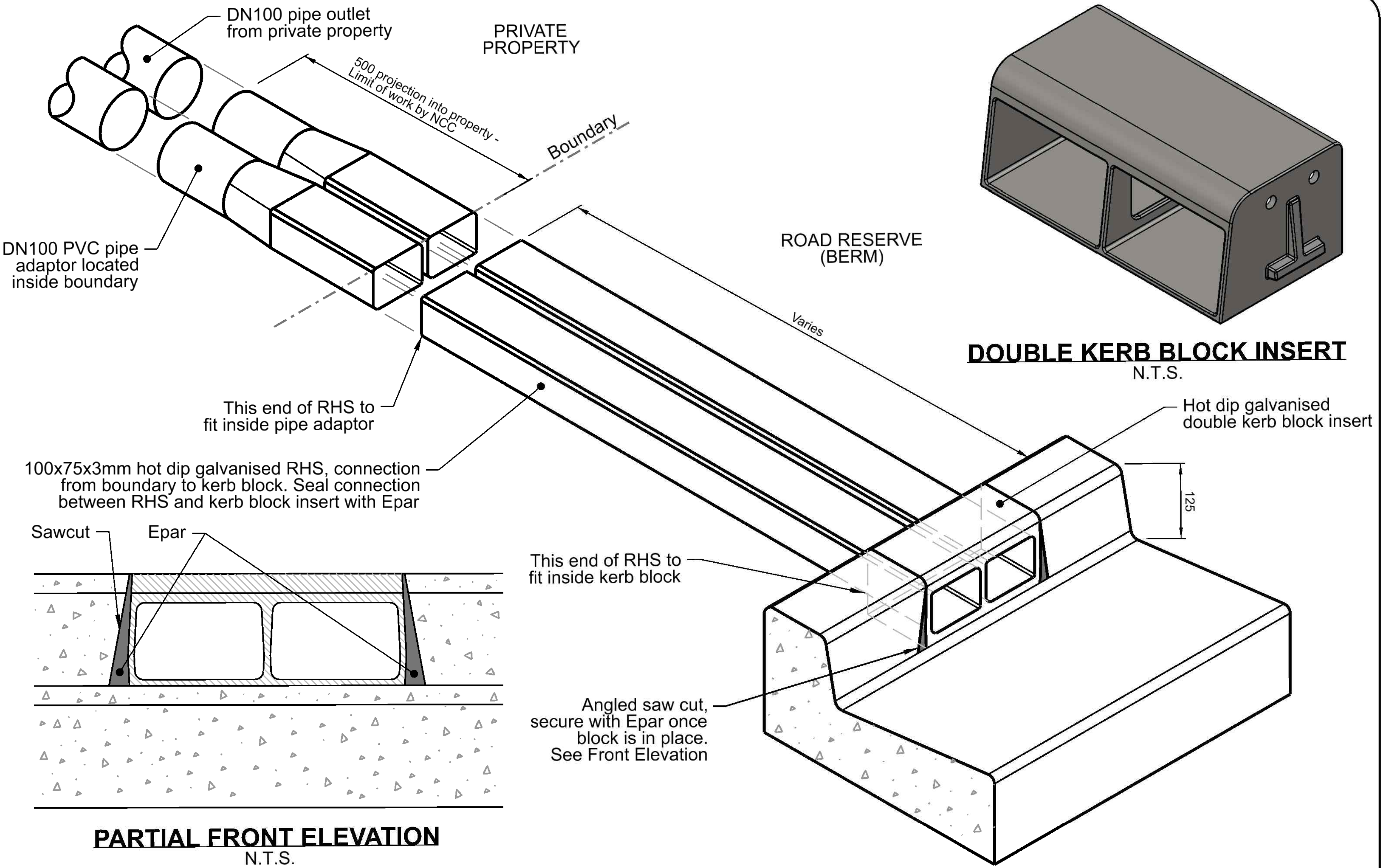
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**CONNECTION LOCATIONS**	NOT TO SCALE	**D14**



DOUBLE KERB BLOCK INSERT
N.T.S.

PARTIAL FRONT ELEVATION
N.T.S.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**SINGLE STORMWATER CONNECTION TO KERB AND CHANNEL**	NOT TO SCALE	**D15**



DOUBLE KERB BLOCK INSERT

N.T.S.

PARTIAL FRONT ELEVATION

N.T.S.

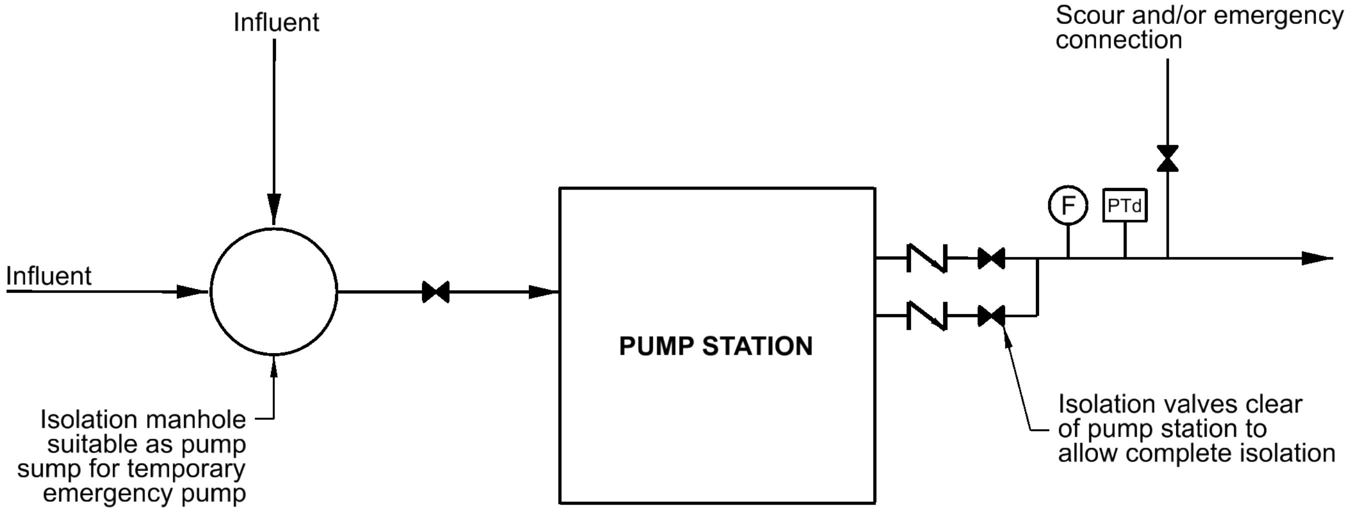
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri

Version: SEPT 2020

DOUBLE STORMWATER CONNECTION TO KERB AND CHANNEL

NOT TO SCALE

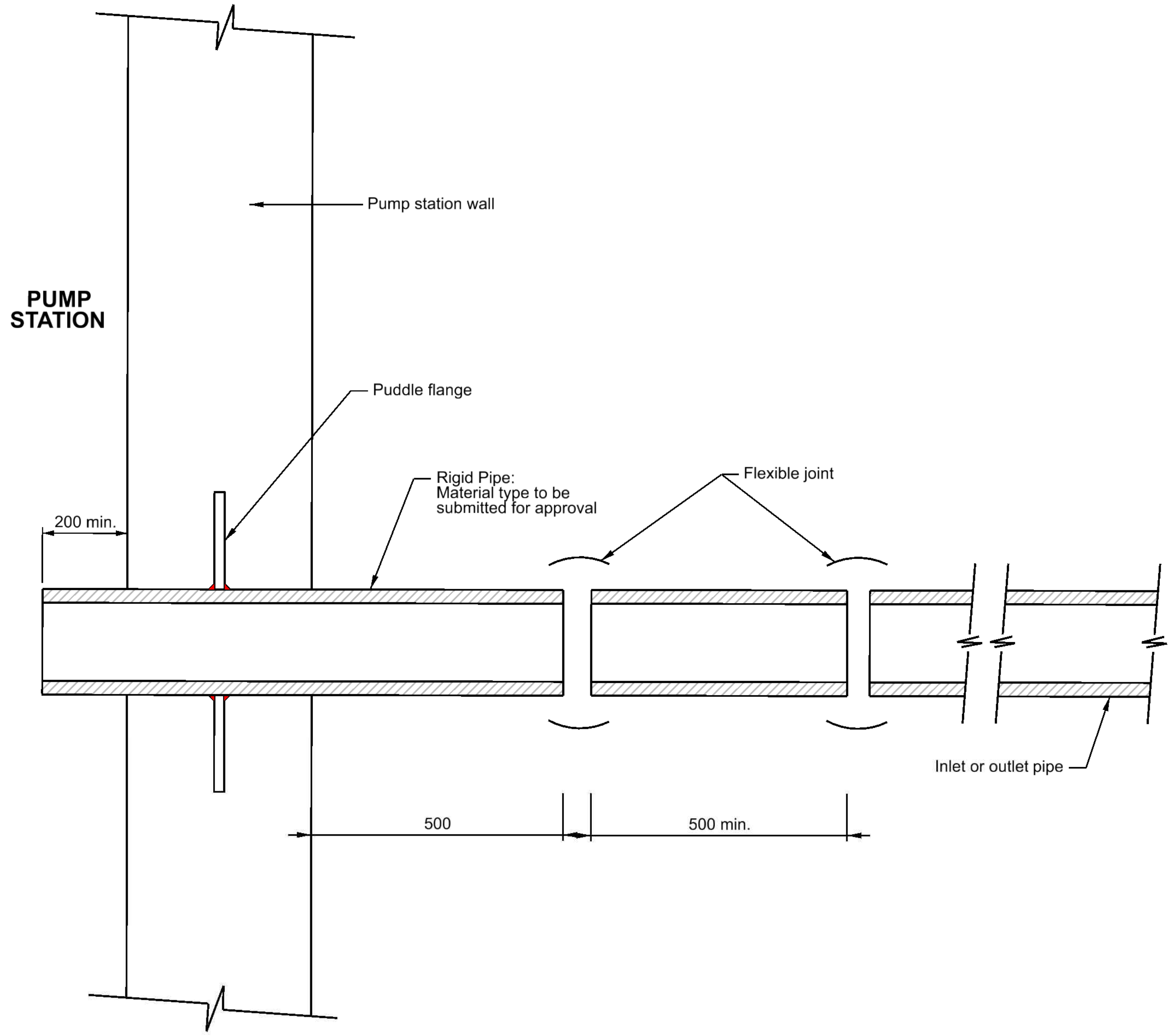
D16



KEY

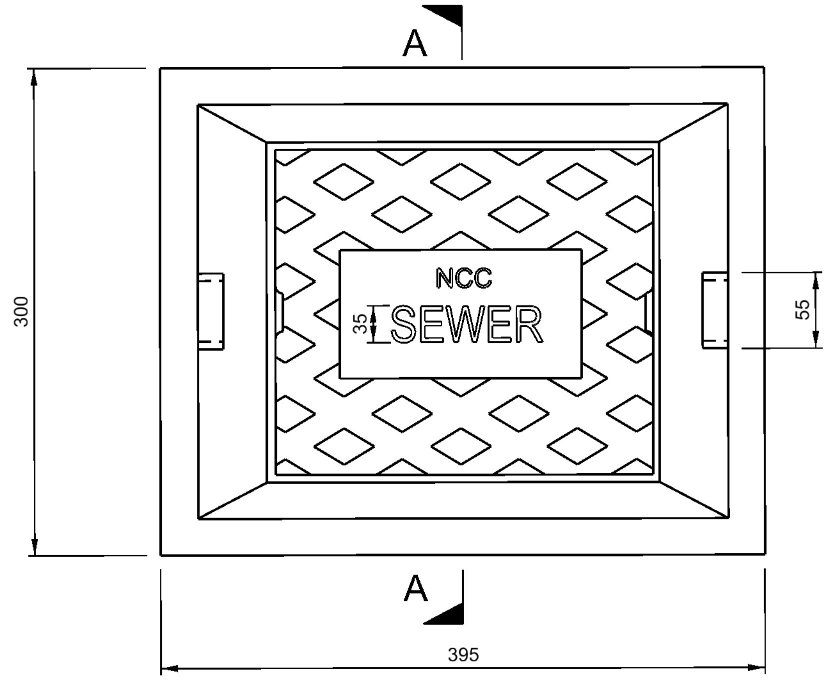
- Isolating valve
- Check valve
- Flow meter
- Pressure transducer

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**WASTEWATER PUMP STATION - SCHEMATIC ARRANGEMENT**	NOT TO SCALE	**D17**

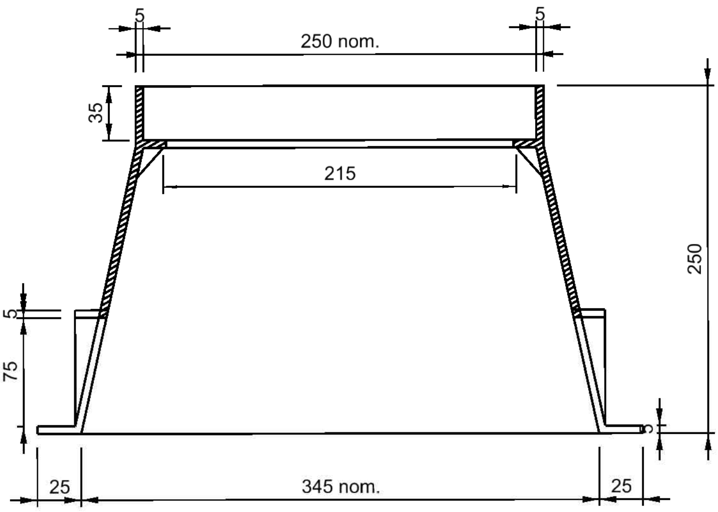


NOTE: Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**PIPE JOINTS AT PUMP STATIONS**	NOT TO SCALE	**D18**



PLAN

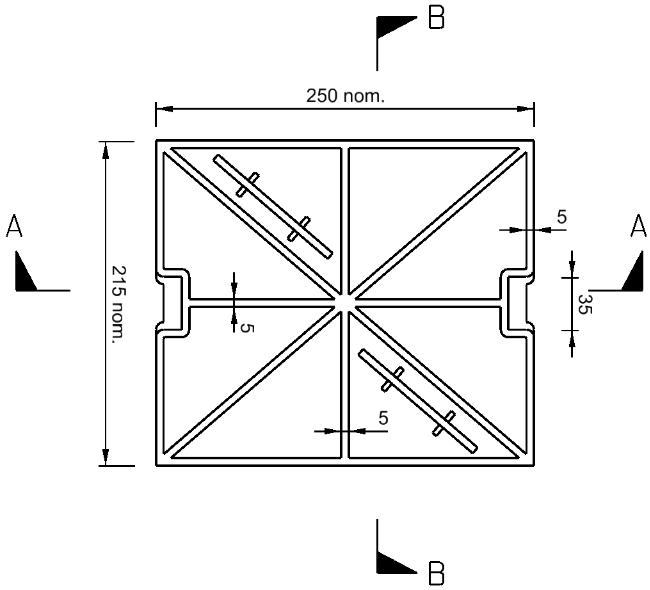


SECTION A - A

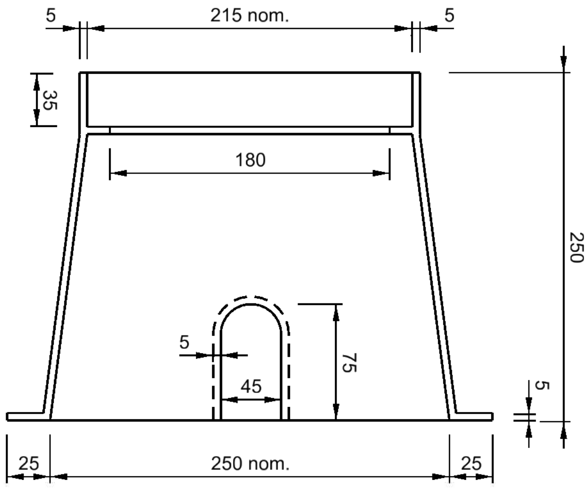
NOTES:

1. Inspection and valve box material shall be high density polyethylene (black) in berms but shall be metal in carriageways
2. Letters and pattern to be raised 3mm
3. All plan dimensions nominal
4. All dimensions are in mm.

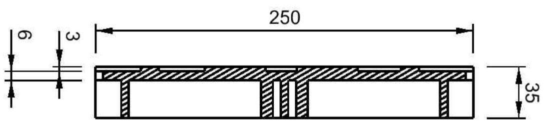
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**INSPECTION BOX - SEWER**	NOT TO SCALE	**D19**



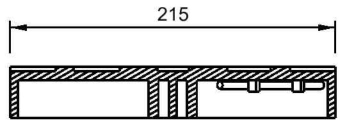
PLAN UNDERSIDE OF LID



SECTION B - B



SECTION A - A LID

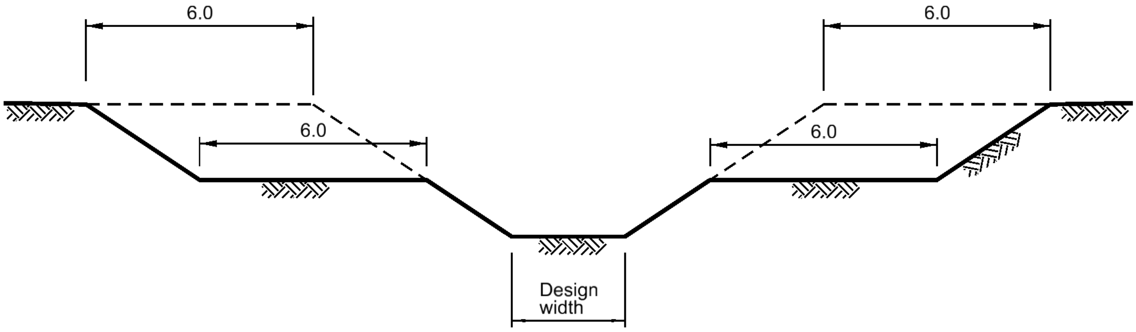


SECTION B - B LID

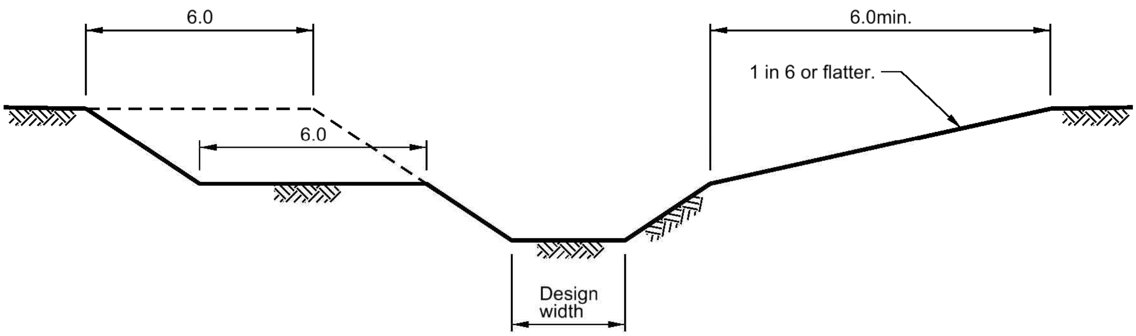
NOTES:

1. Inspection box material shall be high density polyethylene
2. 100mm long x 5mm diameter galvanised bar to be attached to under side of lid (black)
3. Plan dimensions nominal
4. All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	INSPECTION BOX DETAILS - SEWER	NOT TO SCALE	D20



MINIMUM BERM REQUIREMENTS



Alternative with one or both sides with gradients 1 in 6 or flatter. The minimum width shall be 6.0m

NOTES:

1. In certain situations profiles may be amended in line with geotechnic recommendations, to mitigte the effects of lateral spread during seismic events.
2. All dimensions are in metres.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**OPEN CHANNEL CROSS-SECTION**	NOT TO SCALE	**D21**

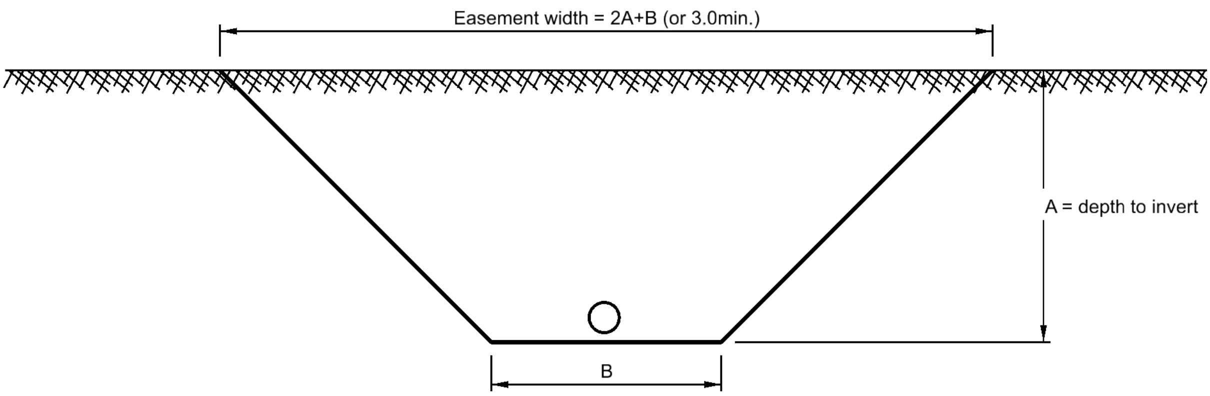
EASEMENT FOR SERVICES

Easement or reserve widths for pipes shall be:

(a) A width equal to twice the depth to invert plus the diameter of the pipe plus 0.4m with the service laid in the center. The minimum width shall be 3.0m.

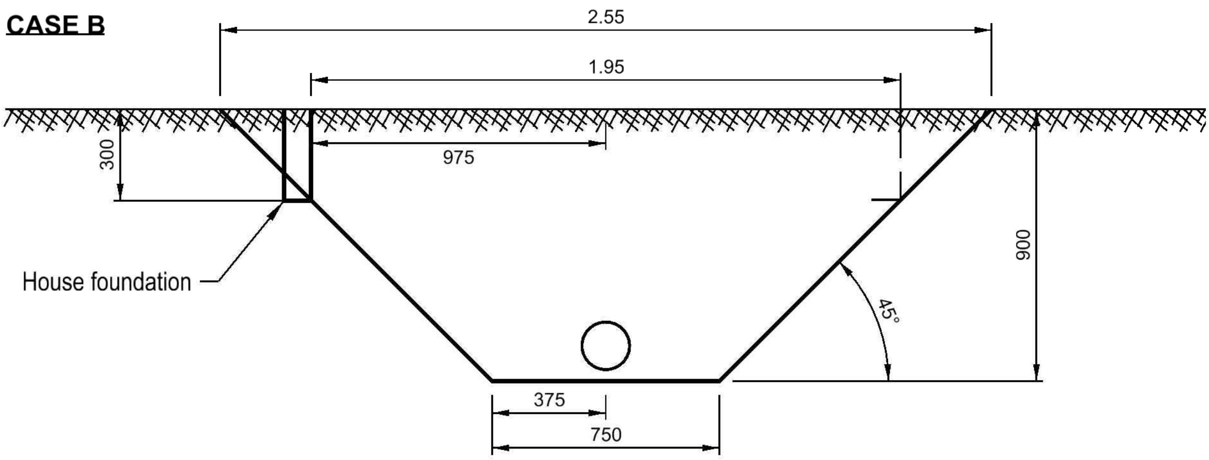
(b) Easements for privately owned service connections that pass from one allotment to another may be reduced to 2.0m where the service (Water, Wastewater or Stormwater) is less than 1.0m to invert.

CASE A



B = pipe Ø + 400mm

CASE B



In essence the normal house foundation is 300mm deep and a Sewer connection will be in order of 900mm deep. Given those dimensions and the need for the foundation to meet the 45° line from the side of a trench required to maintain the pipe, a distance from the centre of the pipe to the side of the foundation is a minimum of 975mm.

This gives an easement width of 1.95m which is almost the same as the Code requirement of 2.0m.

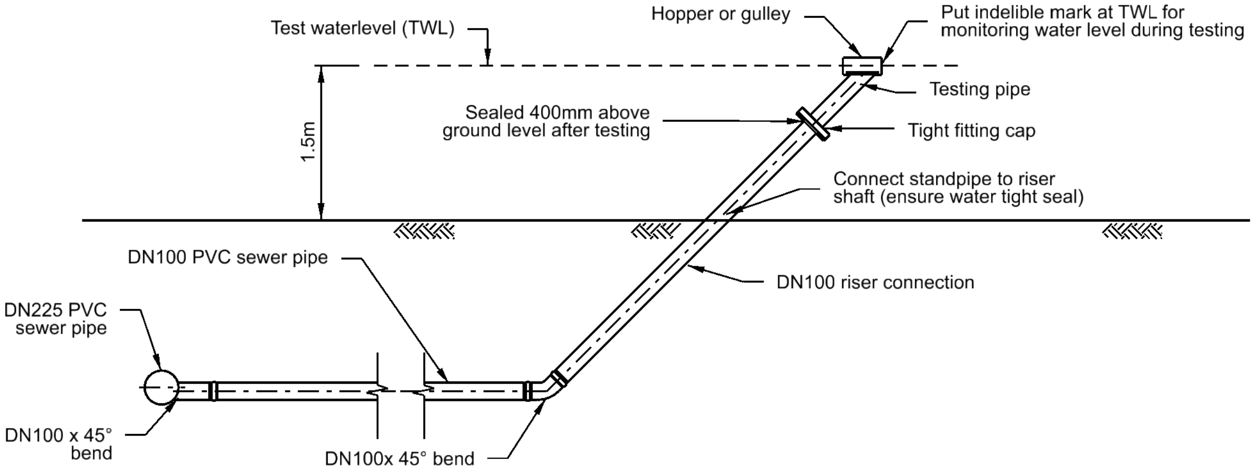
NOTE: Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	EASEMENT DIMENSIONS	NOT TO SCALE	D22

HYDROSTATIC TESTING

Hydrostatic testing of flexible pipelines shall conform to Clause 6.4.4 of AS/NZS 2566.2 : 2002. For general purposes water in a standpipe shall be 1.5 metres above ground level, but not exceeding 6.0m above the low end.

For all other purposes the ground water level shall be located.



TESTING DRAINS

All pipes, branches and connections shall be tested by the Contractor, in the presence of the Engineer, and be tested in suitable lengths using a pressure equal to 2.0m head of water. (20kPa)

The section to be tested shall be sealed off by means of watertight plugs or bulkheads and filled with water so that there is a minimum head of 1.5m of water above ground level at every point. Fresh water shall be used for filling the sewers. An approved method of checking the pressure in the sewer shall be used.

The water in the sewer shall be allowed to stand under pressure for a sufficient length of time to allow any absorption, and to allow the dissipation of air from any air pockets. During this absorption period the plugs or bulkheads and the joints shall be carefully examined, and any points of leakage made good before the actual testing period commences. The minimum head of 1.5m above ground level shall be checked, and if any drop in level has occurred it shall be made good.

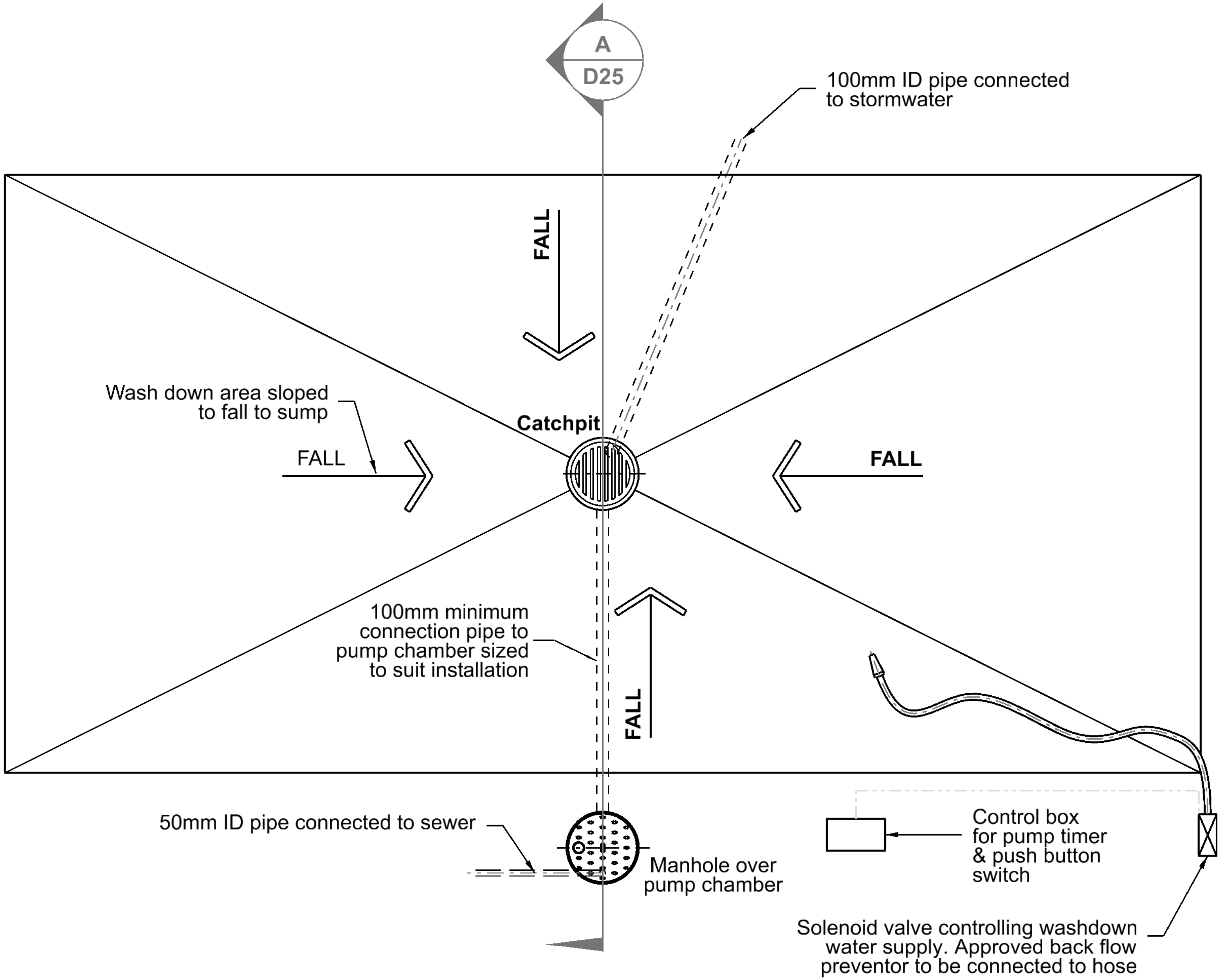
The test shall then be applied and the leakage shall be measured for at least 2 hours.

In order to pass the test the amount of leakage shall not exceed:-

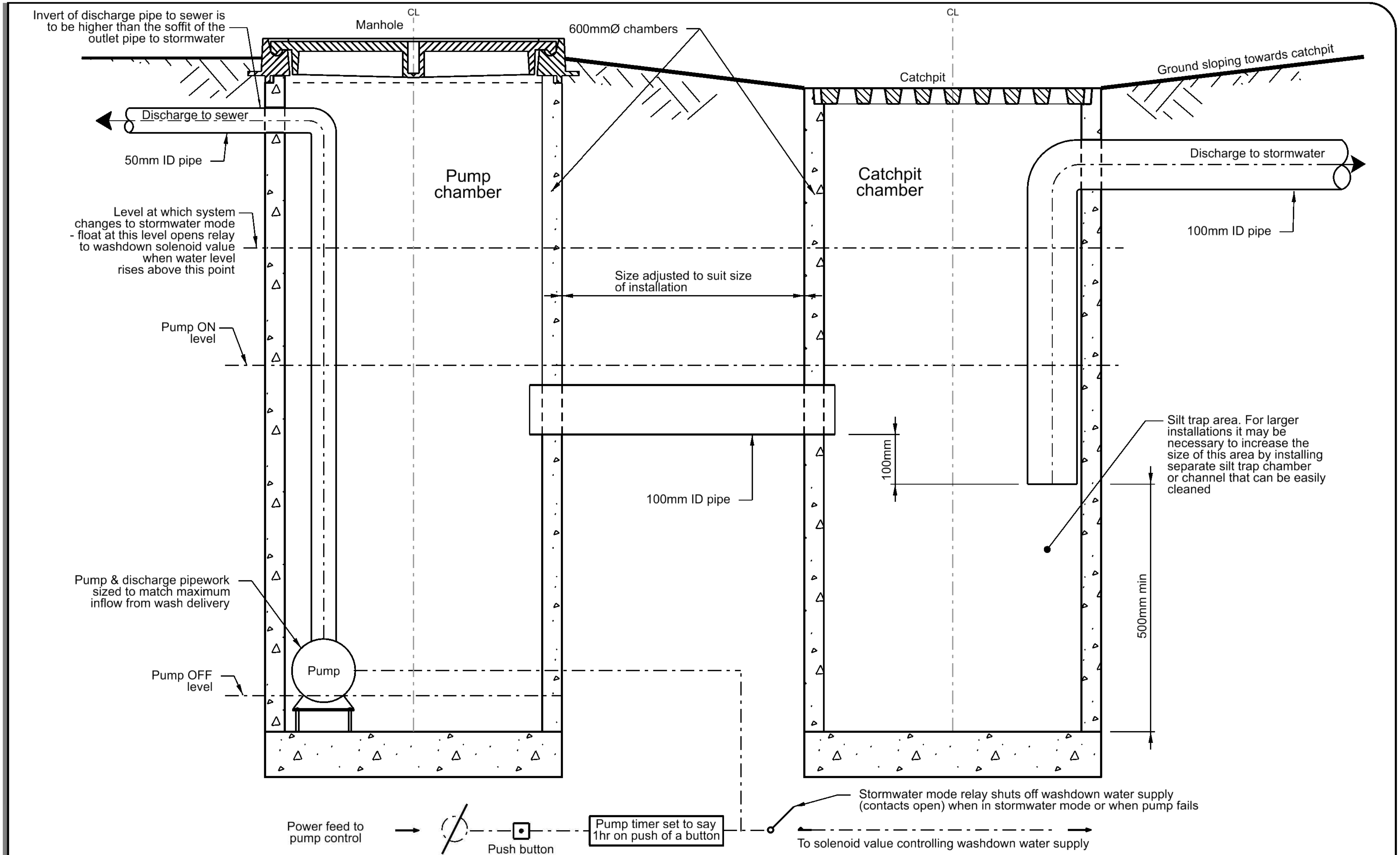
0.5 litres / hour / metre length / metre diameter

The head on the pipe during the test shall not drop by more than 75mm.

In carrying out this test, no portion of the sewer is to be subjected to an excessive pressure which might damage the pipe.



NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**WASHDOWN FACILITY (SMALL TO MEDIUM)**	NOT TO SCALE	**D24**



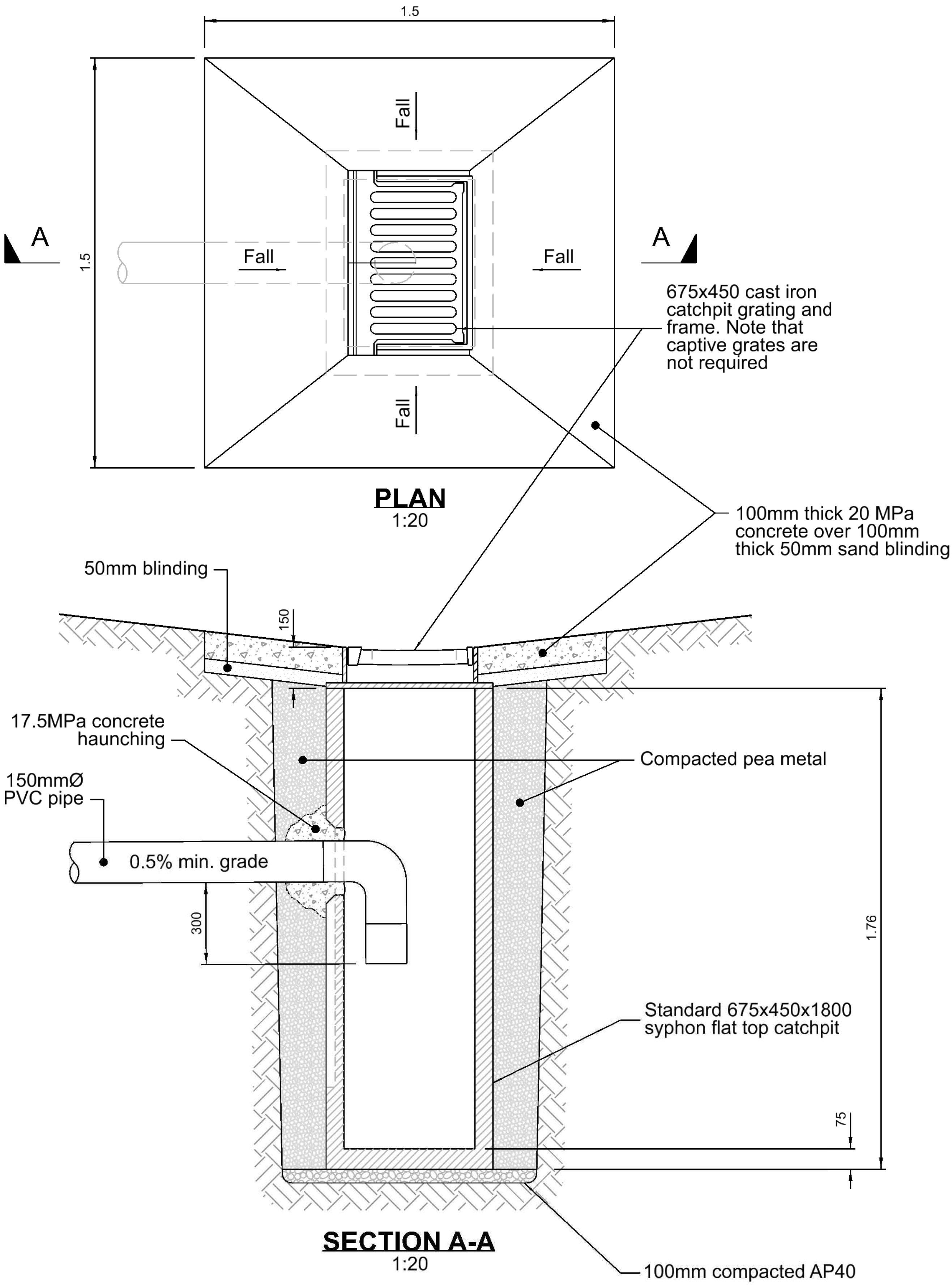
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri

Version: SEPT 2020

WASHDOWN FACILITY CHAMBER DETAILS (SMALL TO MEDIUM)

NOT TO SCALE

D25



NOTES:

1. All concrete to be ordinary grade 17.5 MPa at 28 days
2. Whole numbers = mm, decimalised numbers = m.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	FIELD CATCHPIT	1:20	D26

6 WATER SUPPLY

6.1 Scope (additional to NZS 4404: 2010)

This section shall be read in conjunction with the District Plan, including provisions that contain objectives, policies and methods relating to stormwater quality and earthworks associated with land development.

Water supply facilities include water uptake, storage, treatment, protection and distribution via limited access trunk mains and multiple access local networks, along with all appurtenances necessary for a secure supply and fire supply.

A water supply system shall be provided in areas where an operative water supply system is available or where in the opinion of Council a system is required for an area being developed.

This Code sets out requirements and standards for water supply systems in two categories.

(a) Where an urban standard of water supply is to be installed.
(b) For land zoned Rural when an urban standard is not required or requested (Rural Water Supply) refer to Section 6.3.18.

6.1.1 Mandatory Requirements and Performance Criteria (additional section to NZS 4404: 2010)

Water supply facilities shall be designed and constructed to appropriate engineering and technical standards and codes to achieve the following minimum performance criteria:

(a) Each Lot or separately titled unit / area shall have a separate connection to the wastewater network.
(b) Produce water complying with the Ministry of Health Drinking-water Standards for New Zealand, the Health Act 1956, the Council's Water Safety Plan (WSP) and the Water Services Act 2021 (TBC), that are current at the time and other standards adopted by the Council.
(c) Minimise the risk of water contamination and any reduction in water quality.
(d) Have capacity to service at adequate flow and pressure the anticipated demand over the lifetime of the facility.
(e) Satisfy appropriate fire protection standards and permit access for firefighting.
(f) Be located in such a way as to adequately service each lot, development or road area.
(g) Be compatible with the existing water reticulation network.
(h) Provide reasonable access for maintenance.
(i) Minimise the extent of network without supply, during maintenance works.
(j) Keep trunk main supplies separate from local reticulation systems.
(k) Where utilising mechanical and electrical equipment provide alarm and telemetry systems that are compatible with those being used by the Council at the time of the project.
(l) Comply with any applicable Resource Consent and minimise any adverse effect on the environment.
(m) Obtain supply from an approved point.
(n) Minimise adverse effects on the existing water supply system.
(o) Where utilising pumping facilities, ensure that equipment is suitable for its purpose, and electrical plant / monitoring equipment / air valves are located 500 mm above the design flood level for a storm having a 2% probability of occurring annually.
(p) Ensure that above ground plant and equipment is designed and constructed in such a manner as to be aesthetically acceptable and to minimise visual impact.
(q) Be constructed from materials suitable for the intended use and design life and with a proven record of performance.
(r) Minimise the likelihood of leakage, the ingress of contaminants, or the penetration of roots.
(s) Withstand all anticipated superimposed loads.
(t) Provide mechanical or electrical plant with a design life comparable with that expected from the best current technology.
(u) Where the life of any plant is less than that of the system of which it is a part make provision for ease of access and removal for repair and replacement.
(v) Withstand all anticipated pressures including those transient loads reasonably expected from uncontrolled pump stops, pump start up and emergency valve closures and the opening and closing of hydrants.

6.2 General requirements

6.2.1 **Objectives** (additional to NZS 4404: 2010)

In addition to NZS 4404: 2010, reference shall be made to the Objectives and Policies in the District Plan.

6.2.2 **Referenced documents and relevant guidelines** (change to NZS 4404: 2010)

The design of water supply facilities shall be carried out to appropriate technical standards and Codes and supported by full calculations and information on features incorporated.

The following is a list of currently available relevant standards and guidelines. The list is not exhaustive and other standards and guidelines may be approved.

- Napier City Council's Safety in Design Guide (Version 1.0 or any more recent version).
- Ministry of Health Drinking Water Standards for New Zealand
- The Health Act 1956
- Council's Water Safety Plan (WSP)
- The Water Services Act 2021 (TBC)
- Worksafe NZ Asbestos Guidelines
- NZS PAS 4509 (NZ Fire Service CoP for Fire Fighting Water Supplies).
- Relevant National Standards
- NCC Water Supply Bylaws
- WSA 03: 2011 V3.1 - Water Supply Code of Australia

6.2.3 **Drinking water quality requirements** (additional section to NZS 4404: 2010)

Water supply facilities shall:

(a) Produce water complying with the Ministry of Health Drinking-water Standards for New Zealand that are current at the time and other standards adopted by the Council.
(b) Minimise the risk of water contamination and any reduction in water quality.
(c) The water supply system shall be designed to avoid contamination and minimise water age and pressure variations in the reticulation. The reticulation shall be designed to avoid airlocks, taste, odour and discolouration problems.
(d) Provide the required treatment, protection, monitoring and system controls.
(e) Water extraction facilities, (e.g. well-heads, booster pumps, flowmeters, PRV's, backflow preventers, air valves and water sampling taps) must be located 'above-ground', unless to do so would be impractical.

Approval for siting facilities 'below-ground' must be sought from Napier City Council. In normal circumstances no below-ground water extraction facilities will be permitted.

6.2.4 **General requirements** (additional section to NZS 4404: 2010)

The design of the water supply shall comply with the following:

(a) Each Lot or separately titled unit / area shall have a separate connection to the Council main. Council mains will not be installed within multi-storey buildings.
The supply to multi-unit buildings will be metered and arrangements made for payment of the 'water by meter' account by way of consent notice.
The following methods are acceptable:
   i) Register, against the property titles, the portion of the total consumption that each property will be responsible for.
   ii) Include the responsibility to pay the total 'water by meter' account in the articles of association of a body corporate responsible for the maintenance and operation of the building.
(b) Industrial, commercial and other non-residential allotments shall be provided with a water supply main across the full frontage, but the connection shall not be made until the demand of the site has been determined.
(c) Any subdivision or development in the Napier or Bay View urban water supply areas shall be provided with a reticulated water supply.
(d) All reticulation to be taken over by the Council shall, wherever practicable, be installed in the locations shown in Standard Drawing R04.

6.3 Design

6.3.1 **Design life** (replaces NZS 4404: 2010 section)

The design life shall be as follows:

(a) 100 years for pipework, storage etc.
(b) 50 years for valves, hydrants etc with provision made for easy maintenance and replacement.
(c) 20 years for mechanical and electrical plant, with provision made for easy maintenance and replacement.

6.3.2 **Structure plan** (as per NZS 4404: 2010)

6.3.3 **Future development** (additional to NZS 4404: 2010)

The provision of water mains shall apply to all existing or proposed roads where a water supply is available or where the installation of a system is identified in the 10-year capital programme.

Water supply facilities shall be designed based on the maximum demand expected during the lifetime of the facility. This shall be based on the levels of development indicated in the District Plan, including any deferred zonings.

Demand for non-residential areas shall be based on demand assessments or records agreed with Council as being appropriate to the land use but in no case shall be less than flows derived based on the population density basis as described above.

6.3.4 **System design** (additional to NZS 4404: 2010)

Where required, Resource Consents and Building Consents shall be obtained and Consent requirements incorporated in the design and construction.

Water supplies through, or adjacent to, contaminated sites, shall be subject to specific design. Water supplies in the vicinity of petrol stations shall not be constructed from PE or PVC materials. Ductile iron or Stainless Steel 316 SCH10 are considered a suitable alternative in these areas.

Development must consider safety in design, access, hazards, maintenance, and operation.

All design needs to consider system resilience (to natural events, or otherwise). Infrastructure shall be designed to resist the effects of liquefaction, lateral spreading, slope failure, flood events, sea level rise and tsunami. This requires water sources, treatment plants, reservoirs, pump stations and critical pipelines to be designed to Importance Level 4. As a minimum this requires the designer to consider mechanisms to allow pipelines and structures to accommodate (or otherwise engineer against) significant movement.

Pump stations and reservoirs shall be the subject of specific design, with general requirements provided in Section 6.3.13.

6.3.5 **Design criteria**

6.3.5.1 **Hydraulic Design** (additional to NZS 4404: 2010)

The rate of fall of the Hydraulic Grade Line (HGL) used to determine heads at peak demand conditions in Section 6.3.5.3, shall be based on Section 6.3.5.4.

6.3.5.2 **Network Analysis** (as per NZS 4404: 2010)

6.3.5.3 **Peak Flows** (replaces NZS 4404: 2010)

(a) Residential Demand

Demand shall be based on not less than 2.5 people per dwelling unit or lot. Where lot layouts are unknown but zoning indicates future urbanisation then the designer shall allow for

15 lots per hectare gross (or other density as agreed with NCC). These are gross areas including roads but excluding major reserves.

Average demand on maximum day shall be based on 900 litres/head/day.

Peak demand on maximum day shall be based on (where D = number of dwelling units.):

Less than 800 dwellings	$Q_{peak} = 0.061D + 0.45D^{0.45}$
More than 800 dwellings	$Q_{peak} = 38 + 0.025D$

(b) Non-Residential Demand

Demand from developments such as schools, hotels, commercial and industrial developments etc, shall be taken into account based on best available demand records or assessments. In some cases of existing industry etc, specific metering to accurately assess daily and peak demands may be required.

(c) Fire Flows

Fire flow will often dictate the sizing and layout of principal mains for small to medium sized development. Design shall allow for the fire flow plus 60% of the peak demand on maximum day.

The water reticulation shall be designed to comply with the requirements of the NZ Fire Service SNZ/PAS4509 "Fire Fighting Water Supplies Code of Practice" for FW2 classification. The Code provides risk classification which shall form the basis of protection standards. Reference shall be made to Section 6.3.11 of NZS4404: 2010.

Note that both commercial (typically FW3 and above) and residential fire suppression sprinkler systems may have a flow and pressure requirement greater than NCC's minimum standard. It is the developer's responsibility to demonstrate that the network can supply and fire suppression systems adequately or provide their own systems separately. In urban areas NCC generally provides FW2 Fire Fighting capacity. If Fire Fighting greater than FW2 is required, this shall be assessed using the Council Water hydraulic model. Any sprinkler systems shall be design based on a water reticulation pressure of 300 kPA.

6.3.5.4 **Head Losses** (replaces NZS 4404: 2010 section)

Pipelines shall be sized to service the design flow, with pipeline losses as follows:

(a) New Principal Mains and Trunk Mains

A hydraulic grade line (HGL) falling at no more than 0.2% from the floor level of the reservoir. Where minimum pressures cannot be met with this gradient, a lesser gradient may be used subject to approval by the Council. Pipes shall be sized such that the rate of fall of the HGL does not exceed the approved gradient.

(b) New Rider Mains

HGL falling at no more than 2.0% from the point of connection to a principal main. Rider mains shall be designed with adequate connections to principal mains such that the rate of fall of the HGL is within this requirement.

(c) Existing Mains

The actual calculated HGL if determined to be greater than 0.2% for principal mains and 2.0% for rider mains. Alternatively, the Council may specify the head available at the point or points of connection to existing reticulation under various flow conditions.

6.3.5.4.1. **Hydraulic roughness values** (replaces NZS 4404: 2010 section)

Pipe head losses shall be calculated based on actual internal diameter.

Pipes shall be sized using the Colebrook-White formula or design charts based on this formula for water at a temperature of 15°C. The Colebrook roughness "k" shall be 0.3 mm for all new pipework and for assessment of existing pipework, the "k" value shall be based on best practice values.

6.3.5.5 **Minimum flows** (delete NZS 4404: 2010 section)

6.3.5.6 **Minimum water demand** (delete NZS 4404: 2010 section)

6.3.5.7 **Sizing of mains** (additional to NZS 4404: 2010)

Pipe sizes listed below are based on the nominal diameter or 'Diametre Nominale' (DN) of the pipe:

Principal Mains

A principal main is defined as a water main of not less than DN100 pipe fitted with fire hydrants. In most cases the minimum principal main size shall be DN150, unless evidence is provided that DN100 can cater for peak flows. In industrial and commercial and other non-residential areas principal mains shall be a minimum of DN150 pipe.

Acceptable sizes are DN100, 150, 200, 300 for PVC / other and DN125, DN180, DN225, DN280 for Polyethylene (convention for PE pipes is that DN represents the outside diameter). Larger sizes shall be as agreed with NCC.

Rider Mains

Rider mains are only permitted if accompanied by a principal main. In residential areas, rider mains shall be minimum DN50 PVC or DN63 PE. In industrial and commercial areas, rider mains shall be DN100 minimum.

Service Connections

Service connections to residential lots shall be DN20 PE80 PN12.5 SDR11 (16.1mm ID).

Acceptable sizes for service connections to non-residential lots are DN20, 25, 32, 40, 50, 65, 80 and 100.

6.3.5.8 **Pressure Zones** (replaces NZS 4404: 2010 section)

Water mains shall be designed such that the variation in reticulation pressure at other than fire flow conditions do not exceed ±30% of the static pressure calculated for a full reservoir. The maximum reduction in pressure (-30%) shall be based on peak demand with the HGL starting at reservoir floor level and falling 0.2%.

The average head over the entire area serviced by a reservoir, shall not exceed 50 metres under static conditions and based on a full reservoir.

The variations shall be such that they remain within the maximum and minimum range established in 6.3.5.9 and 6.3.5.10 below.

6.3.5.9 **Maximum pressure requirements** (additional to NZS 4404: 2010)

The maximum operating head in water mains shall not exceed 80 metres without prior approval of NCC

6.3.5.10 **Design pressure** (replaces NZS 4404: 2010 section)

Head in watermains shall be calculated based on peak demand conditions and the reservoir water level equal to the floor level of the reservoir.

The minimum pressure for peak demand on maximum day shall not be less than 20 metres at the point of supply. Where this cannot be achieved, supply to properties shall be subject to specific design and NCC approval sought.

The minimum pressure for firefighting flow (the fire flow plus 60% of the peak demand on the maximum day) shall be 10 metres at any point along the mains

Where urban development requires the construction of a reservoir to service an area, the following requirements shall apply:

(a) The head available at the point of supply shall not be less than 20 metres.
(b) The average residual head shall not be less than 30 metres.

The requirements (a) and (b) above shall not apply where additional storage is to be provided to an existing supply system.

6.3.6 Water quality

6.3.6.1 Materials (additional to NZS 4404: 2010)

Materials to be used in all new water-related installations shall comply with AS/NZS 4020 (testing of products for use in contact with drinking water.

6.3.6.2 Prevention of backflow (additional to NZS 4404: 2010)

For residential properties that present a low risk to public health and are serviced using a Meter Manifold, the non-testable double check valve fitted in the manifold will normally provide sufficient protection against a backflow event. In some circumstances, activities on a residential property or the property's elevation may present a medium or high risk to public health in a backflow event. Testable backflow prevention devices shall be fitted to those residential connections identified as being a medium to high risk with device selection in accordance with hazard ratings defined in Table 19.

Description of Premises	Hazard Rating	Backflow Prevention Device
Premises with an Alternative Water Supply	High	Registered Break-Tank (RBT) or Reduced Pressure Zone Device (RPZD)
Premises where Inspection is Restricted	High	RBT or RPZD
Hospitals, Mortuaries, Clinics, Dental, Veterinary and the like	High	RBT or RPZD
Piers, Docks, Marinas and Other Waterfront Facilities	High	RBT or RPZD
Sewage Treatment Plants and Sewage Lift Stations	High	RBT or RPZD
Chemical Plants and Laboratories	High	RBT or RPZD
Metal Finishing Plants	High	RBT or RPZD
Petroleum Processing or Storage Plants	High	RBT or RPZD
Car and Plant Washing Facilities	High	RBT or RPZD
Abattoirs	High	RBT or RPZD
Factories Using, Processing or Manufacturing Toxic Chemicals	High	RBT or RPZD
Pathology Laboratories	High	RBT or RPZD
Sanitary Depots	High	RBT or RPZD
Universities	High	RBT or RPZD
Dry Cleaning Facilities	High	RBT or RPZD
Photographic Processing Laboratories	High	RBT or RPZD
Timber Treatment Facilities	High	RBT or RPZD
Nurseries	High	RBT or RPZD
Premises with Reticulated and Disinfected Reclaimed Water Systems	Medium	Testable device
Irrigation Systems	Medium	Testable Device
Commercial Laundry Facilities	Medium	Testable Device

Description of Premises	Hazard Rating	Backflow Prevention Device
Hair Salon Wash Basin Facilities	Medium	Testable Device
Automatic Fire Sprinkler System	Medium	Testable Device
Food and Beverage Processing Plants	Medium	Testable device
Caravan Parks	Medium	Testable device
Premises with Grey Water Re-Use Systems	Medium	Testable Device
Public Swimming Pools and Spa Pools	Medium	Testable Device
All other premises	Medium	Testable Device

Table 19 Backflow Prevention Hazard Ratings

All service connections to properties involving industrial activities or where District Plan zoning classifies industrial activities as a permitted activity shall be fitted with a testable backflow prevention device hazard as defined in Table 19. In no case can this be less than a medium hazard rating.

All service connections to properties involving commercial activities shall be fitted with a testable backflow prevention device selected in accordance with the hazard rating as defined in Table 19.

All properties with more than one service connection shall be treated as if they have an alternative water supply.

Where a testable backflow prevention device is required or inferred to be installed on a service connection to a property, the device shall be installed on the property side of the water meter or property side of the toby if a meter is not fitted.

The backflow prevention device shall be mounted 600 mm above ground in a galvanised cage fixed to a concrete foundation beneath. The cage shall have a hinged (and lockable) top and arranged to allow annual testing of the backflow device without removal of the cage. Interconnecting pipework shall be stainless steel 316 or ductile iron.

All testable backflow prevention devices shall comply with AS/NZS 2845.

6.3.6.3 **Water Age** (replace NZS 4404: 2010 section)

Drinking water supply systems shall be designed to minimise water age and ensure no unacceptable deterioration of water quality. The reticulation shall be designed to avoid airlocks, taste, odour and discolouration problems.

Layout of reticulation mains shall, where possible, provide a looped system to avoid dead ends and provide alternative feed when any section is isolated for maintenance. Locations of mains and rider mains shall as far as possible comply with the positions defined in Standard Drawings WS01 to WS04.

All dead ends shall provide a means of flushing via a hydrant or dedicated flushing point.

All mains larger than DN150 need to make provision for pigging with dedicated entry and exit points and valves as required. Provision is required for unidirectional flushing of rider mains through the operation of hydrants and isolation valves.

6.3.7 **Flow velocities** (as per NZS 4404: 2010)

6.3.7.1 **Surge analysis** (consistent with NZS 4404: 2010)

A surge analysis shall be undertaken for any pipeline within a pumped system or system containing automated valves.

6.3.8 System layout

6.3.8.1 **General** (additional to NZS 4404: 2010)

In arterial roads, dual carriageway roads and in commercial and industrial areas principal mains shall be provided on both sides of roads.

Where possible, water mains shall be laid parallel with property boundaries and in the location shown in Standard Drawings WS01 to WS04.

6.3.8.2 **Reticulation layout** (additional to NZS 4404: 2010)

General

Layout of reticulation mains shall, where possible, provide a looped system so as to avoid dead ends and provide alternative feed when any section is isolated for maintenance.

In the case where two pressure zones / or supply zones are separated by a closed valve, the maximum length of dead end pipework shall be 10 m.

Water mains crossing roads, railway lines, drains and underground services shall, as far as practicable, be at right angles. Mains shall be ducted for the full extent of any rail corridor crossings.

Refer to Standard Drawings WS01 to WS04 for typical layout arrangements.

Trunk Mains

Where demand requires a DN 300 or larger principal main, it shall be considered as a trunk main and shall not be used for direct tapping of service connections. In such situation's rider mains shall be used to provide service connections with the rider main connecting into at least one other main independent of the trunk main. A rider main shall be laid parallel with the road frontage of lots on the side of the road remote from the principal main so that service connections do not cross the carriageway.

No connections shall be made to trunk mains between bore and reservoir sites.

Principal Mains

For developments of 50 lots or more, supply shall be provided by at least 2 independent principal mains. Where only 2 principal mains supply 50 lots or more, each main shall be capable of supplying peak demand.

In residential areas a principal main shall be laid on at least one side of all roads, within 65 metres of the end of cul-de-sacs, subject to requirements regarding hydrant spacing. Mains shall extend across the full frontage of all lots.

Principal mains shall be capped within 500 mm of a terminal fire hydrant. In roads which may be extended in future, mains shall be laid to within 1 metre of the end of the legal road and capped off. An additional gate valve shall be provided immediately following the last connection to avoid stagnant pipework.

Rider mains and service connections shall be taken off upstream of terminal fire hydrants.

Rider Mains

A rider main shall be laid parallel with the road frontage of lots on the opposite side of the road remote from the principal main so that service connections do not cross the carriageway. Rider mains are only permitted if accompanied by a principal main.

Rider mains shall be connected to the principal main with either a ductile iron tee or an elongated gibault joint (i.e. "Readytap"), each with a female threaded branch. On principal mains DN 150 and larger, 50 mm tapping bands may be approved.

Rider mains shall be supplied at both ends from a principal main except in private ways where supply from one end may be acceptable. Rider mains fed from one end only are generally not permitted, but if so shall be provided with an approved flushing point.

The maximum length of rider main between connections to a principal main shall be:

DN50 fed one end only	100 metres
DN50 fed both ends	600 metres

Hydraulic considerations may make these lengths unsuitable and head conditions in rider mains shall be checked in all cases.

Intermediate connections to a principal main shall be required on rider mains where the length of pipe between connections to a principal main exceeds 600 metres. Rider mains shall be continuous between intersections. In cul-de-sacs, rider mains shall be connected to the main in the intersecting road.

Residential Connections

Service connections shall be provided to all lots along with meters and backflow preventers, where required by Council. Service connections to residential lots shall be DN20 PE80 PN12.5 SDR11 (16.1mm ID) and fitted with meter manifolds.

Water meters approved by the Council shall be provided to all new service connections with the exception of supplies to single dwelling domestic properties within the Napier urban water supply area.

Sections having road frontage shall be provided with a service connection at the mid-point of the frontage laid to a point 300 mm outside the property boundary terminating with a toby. All connections, where practicable, shall have at least 300 mm horizontal clearance to adjacent services. Connections shall typically be made at 90 degrees to the main.

Where up to 3 lots/dwellings will share a common right of way, they shall be provided with individual service connections terminating with a toby 300 mm outside the right of way from the road frontage. A suitably sized pipe shall be laid from each toby up the right of way to the dwelling site of each lot. Manifold(s) shall be located outside of trafficked areas.

Where 4 or more lots/dwellings will share a common right of way, a rider main shall be provided to service the development. Service connections shall be laid from the rider main to a point 300 mm outside the property in the right of way terminating with a manifold. An easement (see Section 1.7.4) in favour of the Council shall be provided for the rider main, service connections, and fittings.

Testable backflow prevention shall be provided if required in accordance with the requirements of Section 6.3.6.2

Industrial and Commercial Connections

Service connections do not need to be provided to non-residential lots at the time of subdivision unless demand is known at that time. They shall be sized according to expected demand and shall be configured as follows:

- Point of supply: 300mm outside the property boundary.
- Toby: As per the requirements of Section 6.3.16.
- Water meters: All non-residential connections shall be fitted with water meters, including connections to fire sprinkler systems complying with the requirements of NZS 4517 or NZS 4541.
- Backflow Prevention devices: Shall be fitted to connections as required in Section 6.3.6.2.

6.3.8.3 **Mains layout** (additional to NZS 4404: 2010)

The vertical alignment of pipelines shall minimise air pockets and sediment accumulation. In flat areas this means designing high points and low points at alternate fire hydrant locations to allow for removal of air at high points and sediment at low points.

6.3.8.4 **Water mains in private property** (consistent with NZS 4404: 2010)

Water mains located in private property will require an appropriately sizes and registered easement (see Section 1.7.4) in accordance with Council's requirements.

6.3.8.5 **Types of system configuration** (as per NZS 4404: 2010)

6.3.8.6 **Mains near trees** (additional to NZS 4404: 2010)

Council policy is to site all water mains beneath the footpath. If mains must be located near trees, then proximity to the root zone of any tree shall be avoided.

6.3.8.7 **Shared trenching** (additional to NZS 4404: 2010)

Where possible, designs which require water mains to be laid in the same trench as wastewater mains shall be avoided. Where shared trenching is unavoidable, a detailed design shall be submitted for approval by Council.

6.3.8.8 **Rider mains and duplication** (as per NZS 4404: 2010)

6.3.8.9 **Crossings** (as per NZS 4404: 2010)

6.3.8.10 **Crossing waterways or reserves** (as per NZS 4404: 2010)

6.3.8.11 **Location marking of valves & hydrants** (as per NZS 4404: 2010)

6.3.9 Clearances

6.3.9.1 **To underground services** (replaces NZS 4404: 2010 section)

The layout of the reticulation system shall provide adequate clearance from other services.

A minimum horizontal clearance of 500 mm shall be provided to all other services. This clearance may be relaxed for other water reticulation.

A minimum vertical clearance of 100 mm shall be provided to all other services. This space shall be filled with compressible material (i.e. pea gravel, neoprene rubber).

6.3.9.2 **Clearance from structures** (as per NZS 4404: 2010)

6.3.9.3 **Clearance from high voltage transmission facilities** (consistent with NZS 4404: 2010)

Pipelines constructed from metallic materials shall generally not be located close to high voltage transmission lines and other electrical facilities.

6.3.9.4 **Deviation of mains around structures** (additional to NZS 4404: 2010)

Reference shall be made to Section 6.5.3.1.

6.3.10 Pipe Selection

6.3.10.1 **Standard pipe sizes** (replaces NZS 4404: 2010 section)

Refer to Section 6.3.5.7.

6.3.10.2 **Minimum pipe sizes** (consistent with NZS 4404: 2010)

Refer to Section 6.3.5.7.

6.3.10.3 **PN pipe class** (additional to NZS 4404: 2010)

The pressure rating of pipes and fittings shall be the larger of 90 metres or 1.5 times the maximum head anticipated in service. The selection of the pressure rating shall consider the effects of pipeline transients and shall allow for derating of pipework due to fatigue / cyclic loading (if applicable).

6.3.10.3.1. **Design Pressure** (additional to NZS 4404: 2010)

Refer to Sections 6.3.5.9 and 6.3.5.10.

6.3.10.3.2. **Minimum pipe PN** (consistent with NZS 4404: 2010)

The minimum pipe and fittings PN to be used for water reticulation mains shall be PN9, noting the requirements of Section 6.3.10.3.

6.3.10.3.3. **Nominated pipe PN** (replaces NZS 4404: 2010 section)

PN9 is the nominated pressure class for pressure pipes and fittings, noting the requirements of Section 6.3.10.3.

6.3.10.3.4. **Pumped mains** (consistent with NZS 4404: 2010)

Pumped mains with a flow of greater than 20 L/s require a detailed transient analysis to ensure an appropriate design head is utilised for pipe selection and to identify any surge control devices to be included in the design. The incorporation of transient control measures requires specific approval from Council.

6.3.10.4 **Pipe materials**

Refer to Appendix 1.0.

6.3.11 **Fire flow** (as per NZS 4404: 2010)

6.3.12 **Structural design**

6.3.12.1 **General** (as per NZS 4404: 2010)

6.3.12.2 **Seismic design** (as per NZS 4404: 2010)

6.3.12.3 **Structural considerations** (as per NZS 4404: 2010)

6.3.12.4 **Internal forces** (as per NZS 4404: 2010)

6.3.12.5 **External forces** (as per NZS 4404: 2010)

6.3.12.6 **Geotechnical investigations** (as per NZS 4404: 2010)

6.3.12.7 **Pipe selection for special conditions** (as per NZS 4404: 2010)

6.3.12.8 **Above-ground water mains** (as per NZS 4404: 2010)

6.3.12.9 **Trenchless technology** (as per NZS 4404: 2010)

6.3.12.10 **Embedment**

6.3.12.10.1. **Minimum pipe cover**

Cover over pipes after completion shall be in the range as follows:

Pipe Type	Minimum Cover (mm)	Maximum Cover (mm)
Mains DN 100 or greater:		
- Under carriage ways	900	1200
- Under grass berms and footpaths	750	1200
Rider mains:	750	1000

Pipe Type	Minimum Cover (mm)	Maximum Cover (mm)
Service Pipes larger than DN 20	600 reducing to 400 ± 50 at the gate valve (toby)	
Service pipes DN DN 20	600 reducing to 250 ±50 at the manifold box.	
Note: cover is from the ground surface to the top of the pipe collar.		

Table 20 Pipe Cover Requirements

Reduction in covers may be approved over short lengths subject to full engineering design of the system, but only where full compliance with the above standards cannot reasonably be achieved.

For pipes installed by the open cut trenching method and where the pipe cannot be installed in straight lines between surface fittings then a metallic detector tape shall be installed within 150 mm to 300 mm of the finished surface for all mains DN 50 and greater.

6.3.12.10.2. **Minimum trench width** (replaces NZS 4404: 2010 section)

Refer to Standard Drawing WS27.

6.3.12.11 **Pipeline restraint** (consistent with NZS 4404: 2010)

Anchorage / thrust blocks shall be provided on all unrestrained thrust including bends, tees, reducers, valves, and dead ends, to restrain against water pressure forces. PE pipelines may not require restraint depending on the jointing method used.

6.3.12.11.1. **Thrust blocks** (additional to NZS 4404: 2010)

Thrust blocks shall be designed for all locations where out of balance forces occur such as bends, tees, valves, tapers etc. Design shall be based on the bearing strength of the soil at the particular location as derived by soil testing, and the maximum bearing value used shall not exceed 75 kPa.

Thrust blocks are shown in Standard Drawing WS09.

Thrust blocks shall be sized based on the actual internal diameter of the pipe and either the test pressure or estimated surge pressure, whichever is greater.

Thrust blocks shall be poured against undisturbed natural ground. They shall be kept clear of all pipe joints, and pipes should not be encased beyond the half the pipe diameter.

6.3.12.11.2. **Anchor blocks** (as per NZS 4404: 2010)

6.3.12.11.3. **Restrained joint water mains** (as per NZS 4404: 2010)

6.3.12.11.4. **Trench Slope** (additional section to NZS 4404: 2010)

Where water mains are laid on slopes steeper than 1:4, they shall be of steel pipe, suitably tied and anchored.

Where the slope of a trench is 1:15 or steeper, anti-scour blocks (also known as water-stops) shall be provided, to prevent surface water running along the pipeline and scouring the surround.

They shall be constructed as per Standard Drawing D04.

6.3.13 **Reservoirs and pumping stations** (additional to NZS 4404: 2010)

6.3.13.1 **Reservoirs and Water Storage Tanks**

Whenever a new storage reservoir is necessitated by development, it shall be provided to the approval of the Council at the expense of the Subdivider/Developer according to the following principles. The Council reserves the right to provide the storage and charge the Subdivider/Developer accordingly.

General Requirements

(a) Storage requirements shall be based on the larger of:
- 500 litres per head + SNZ PAS 4509 firefighting volume (45 m^3 for FW2).
- 900 litres per head.
- Any specific design for non-residential development.

(b) Fire-fighting storage shall be considered in terms of the NZ Fire Service Code of Practice for Fire Fighting Water Supplies and be included within the capacity requirements.
(c) Reservoirs shall not normally be more than 6 metres deep. For reservoirs of 400 m^3 volume or greater, provision shall be made for the storage to be held in a minimum of two compartments. Compartmentalised tanks shall be symmetrical in design.
(d) A detailed geotechnical assessment is required for all reservoir sites.
(e) System design shall be such that alternative means of supplying the area are available in the event of the reservoir or outlet main being out of service.
(f) Multiple storage tanks shall be linked in parallel, and individually isolated.
(g) All reservoirs shall be concrete, custom-built, and structurally designed for wind and seismic events in accordance with the relevant NZ standards. Design shall be to Importance Level 4, making allowance for suitable freeboard above the top water level.
(h) Reservoirs made of other materials may be used, subject to the approval of the Council.
(i) A legal well-formed, drained and metalled off-road all-weather vehicular access shall be provided, with sufficient parking and manoeuvring for service vehicles.
(j) Reservoir site to be securely fenced, with a minimum of 1.8m high chain-link fencing, and access gates as necessary.
(k) A minimum of 5m of clearance between the tank walls and the security fence.
(l) Safety in design, access, hazards, maintenance and operation must be addressed.

Pipework Design Aspects

(a) Reservoirs shall have separate isolatable inlet, outlet, scour and overflow connections. Inlets and outlets shall be at opposite sides and levels to promote turnover of water.
(b) Inlets shall be located above the high-water level to promote mixing and prevent backflow.
(c) Outlets shall be located 150 mm above the adjacent tank floor level and have both a manual isolation valve and an actuated seismic valve.
(d) All valves shall be in drained chambers at ground level. Valves shall be gate valves unless larger than DN300 where butterfly valves shall be used. Valve shafts and actuators shall be located outside of chambers but protected from vandalism. Provision shall be made for simple replacement of all valves.
(e) Scour outlets shall be a catchpit and outlet pipe located at the lowest point of the reservoir floor. Floors shall be sloped to the catchpit.
(f) Overflow pipework shall be located above the tank freeboard level and be piped to within 300mm of ground level, incorporating spring loaded gates and vermin screens.
(g) Overflows and scours shall be directed to an approved location, typically the wastewater network (to be approved by NCC) or other design overflow location.
(h) Tank vents shall be separate to overflow pipework and designed to be downturned with a minimum 600 mm clearance above a horizontal surface and have tamper proof removable stainless steel 316 1mm mesh on the outlet. Vents shall be a readily maintainable location. NCC reserves the right to require air filtration on tank vents.
(i) Lockable sampling points shall be provided on both inlet and outlet pipes and located 0.5m above any localised 1:50-year flood levels and inside the fenced compound.
(j) Provision shall also be made to allow future turbidity and free available chlorine water quality monitoring at tank inlet and outlets through DN20 plugged connections.
(k) An external fire-service connection points are to be provided (to NZ Fire Service Code Firefighting Water Supplies Code of Practice).

Structural Design Aspects

(a) Reservoirs shall be constructed such that the walls are entirely above ground.
(b) The internal walls shall be vertical.
(c) Reservoir roofs shall be designed to shed rainfall and prevent ingress of rainfall either directly or indirectly. A roof membrane may be required by NCC.
(d) A lockable personnel access hatch with integral safety hatch shall be provided. Access hatch frames shall be raised above the level of the roof (shoebox type opening) to

prevent rainfall ingress and shall be rated to at least IP66. Provision shall be provided for locking using the standard locks in use by Council. Tank hatches shall be fully sealed to provide preferential air flow through the tank vent.

(e) A separate hatch following the same design principal shall be provided for any depth monitoring or dosing requirements.

(f) External walls are to be left unpainted concrete or coloured as directed by the District Plan.

(g) Roof access ladders and fall protection shall be provided as necessary. These shall be lockable full caged ladders (or tiered staircases dependent on height) of aluminium or stainless steel 316 construction with agreed Safe Working Load (SWL)

(h) Internal access ladders of stainless steel 316 construction shall be provided (or tiered staircases dependent on depth) with agreed SWL.

(i) Tanks shall have full perimeter safety rails or aluminium or stainless steel 316 construction.

(j) Stainless steel 316 "hard-points" shall be provided for connection of harness ropes.

Electrical and Control Design Aspects

(a) Depth monitoring and telemetry equipment shall comply with NCC requirements.

(b) Ducts for monitoring equipment shall be provided through the wall of the reservoir and sealed with an approved system.

(c) Suitable levels of redundancy as agreed with NCC.

(d) The reservoir shall be connected to the NCC telemetry system, and include alarms for:
- Water level (high and low) with continuous monitoring (pressure transducers)
- Valve actuation (position monitoring and fault alarms required)
- Hatch access

6.3.13.2 Pump Stations

Pumps shall only be used to fill service reservoirs, and not as a "booster" to provide or maintain pressure in reticulation. Pump systems for abstracting water from ground water or river sources shall be specifically designed after discussion with the Council.

Pump stations shall be designed according to the following principles:

(a) Ensure that equipment is suitable for its purpose, and electrical plant / monitoring equipment is located 500 mm above the design flood level for a storm having a 1% probability of occurring annually (100-year event) or with approval from NCC 1000 mm above the 50 year flood level.

(b) Deliver the total maximum day water requirement without using a standby unit in 15 hours for stations under 25 litres per second and 18 hours for larger stations. The minimum capacity of any one pump shall be 4 litres per second.

(c) Pumps within a pump station shall be of equal size and of the same make and model. Standby capacity of 100% shall be provided for stations under 25 litres per second.

(d) For larger stations standby capacity of at least 50% shall be provided,
eg. Total number of pumps = 2; capacity each 100%
Total number of pumps = 3; capacity each 50%

(e) Stations under 25 litres per second shall be designed so that both pumps can be operated simultaneously if so required.

(f) A permanent pump station building will typically be required for all pump station sites. This shall have suitable security, access, ventilation, acoustic dampening, lifting provisions, vermin prevention, access, flushing, isolation, drainage and parking.

(g) Electromagnetic flow meters shall be fitted to each pump line. Each meter shall produce signals to indicate flow rate, volume pumped, and reverse flow.

(h) Valving of pumps shall be such that maintenance can be undertaken on the standby pump, check valve and flow meter without interfering with the operation of the duty pump. Pipes of DN 100 or larger shall be Stainless Steel 316 (or other approved material) with all bends and valves adequately protected against movement. Flanged or welded fittings shall be provided throughout with a pair of gibault or similar joints in the system to facilitate dismantling.

(i) Pressure gauges shall measure the inlet pressure at the site and the outlet pressure from each pump.

(j) Sampling ports shall be provided on the discharge pipework.

(k) Provision for emergency chlorine dosing through a spare tapping and ball valve.

(l) Seismic resilience shall be considered in terms of settlement / lateral spread and provision of pipework restraint / allowance for movement.

(m) Electrical and telemetry equipment shall be provided to all pump stations and shall comply with NCC requirements. This requires a PLC at each station. Supply and loading of the PLC programme for the station shall be by the Council's electrical contractor at the Developers expense.

(n) NCC will require either a permanent emergency generator at the site or provision for connection of a portable generator via an external plug (typically panel mounted, 415 VAC, 63 A (or larger to suit), 3P+N+E).

(o) Safety in design, access, hazards, maintenance and operation must be addressed.

6.3.14 Valves

6.3.14.1 **General** (additional to NZS 4404: 2010)

Gate valves shall be placed on a minimum of two of the three branches of a tee. Valves shall be placed on all branches if necessary, to limit the number of properties isolated to 30 during maintenance work.

6.3.14.2 **Siting of valves** (additional to NZS 4404: 2010)

The maximum distance between isolating valves on mains with service connections shall be 600 metres.

The maximum distance between isolating valves on mains without service connections shall be 2000 metres.

The maximum distance between valves may need to be reduced where required, for operational and maintenance purposes.

Valves shall be located out of the roadway (where possible).

6.3.14.3 **Gate valves** (additional to NZS 4404: 2010)

Gate valves (DN 100 mm and larger) shall be anti-clockwise closing and flanged both ends and shall comply with AS 2638.2 "Sluice Valves for Waterworks Purposes" Part 2 Resilient Seated. They shall be key operated and anti-clockwise closing. Valves shall be flanged when laid in conjunction with other cast or ductile iron fittings. Line valves up to DN 200 may be spigoted or socketed to make flexible joints.

Gate valves of DN 50 or less shall be female threaded to BS 21, clockwise closing single gate, non-rising spindle. Gate valves shall comply with AS 1628. Handwheels shall be constructed from either nylon or cast/ductile iron.

Valves DN375 and larger shall be fitted with a bypass valve.

6.3.14.4 **Butterfly valves** (consistent with NZS 4404: 2010)

Butterfly valves shall only be used with Council's approval.

6.3.14.5 **Pressure reducing valves (PRVs)** (replaces NZS 4404: 2010 section)

PRVs shall be avoided if at all practicable and shall only be used with the approval of NCC.

Where the use of a PRV is approved, it must be installed above ground in a cage with bypass pipework and shutoff valves for maintenance and located 0.5m above any localised 2% AEP flood levels.

6.3.14.6 **Air valves** (additional to NZS 4404: 2010)

Air release valves may be required at high points on principal and rider mains. They shall be fitted on trunk mains at high points or at intervals not exceeding 1000 metres. Air release valves shall be sized as part of the specific design. They shall be fitted with isolating valves and be installed in an above ground structure / cage and located 0.5m above any localised 2% AEP flood levels.

6.3.14.7 **Scours and pump-out branches** (replaces NZS 4404: 2010 section)

On mains DN200 and larger, scour outlet valves may be required at low points having suitable drainage. They shall be installed so that ground water cannot enter the main at negative pressure and shall be in a permanent valve box. Gate valves shall be used of minimum DN100 size.

6.3.14.8 **Flushing points** (as per NZS 4404: 2010)

6.3.15 Hydrants

6.3.15.1 **General** (additional to NZS 4404: 2010)

In FW3, FW4, FW5, FW6 and FW7 fire risk areas all fire hydrants shall be tall pattern to NZS 4522. In FW1 and FW2 fire risk areas medium pattern hydrants may be used, except terminal hydrants which shall be tall pattern.

6.3.15.2 **Hydrants for firefighting** (additional to NZS 4404: 2010)

Hydrants for fire protection purposes shall be located in accordance with the current NZ Fire Service Fire Fighting Water Supplies Code of Practice, currently SNZ PAS 4509. Typically, this requires hydrants at intervals not exceeding 135 m for residential areas (90 m for commercial / industrial on each side of the road) along with other requirements reference in the Code.

Additional fire hydrants may be required for maintenance and operational purposes. In particular, all separately isolatable sections of principal main shall be fitted with at least one fire hydrant.

Hydrants may be required on trunk mains for special fire risks and for scouring.

Hydrants shall conform to NZS 4522 or other approved type with the following modifications:

(a) Hydrants shall be clockwise closing.
(b) All steel nuts and bolts used in the construction of the hydrant shall be hot dip galvanised, stainless-steel, or cadmium plated, with bolts of the square headed type to facilitate nut removal in place.
(c) The inlet from the flange to the valve seat shall be protected against internal corrosion with an approved coating.
(d) The washer shall be of polyurethane or nitrile rubber.
(e) Frost plug drains shall not be fitted or alternatively the plug shall not be free draining. If the hydrant is supplied with a frost plug drain it shall be plugged with non-ferrous tapered metal plugs.

6.3.15.3 **Hydrant installation** (additional to NZS 4404: 2010)

Hydrants shall be fitted to water mains comprising not less than DN100 pipes.

Hydrant boxes shall be NCC pattern, cast iron and comply with the standard design shown in Standard Drawing WS13. Boxes shall be supported by precast concrete surrounds. Tall hydrants shall have a minimum of three surrounds supporting the surface box. Medium hydrants shall have a minimum of two surrounds.

Hydrants shall have a thrust block constructed underneath.

6.3.15.4 **Hydrants for reticulation system operational requirements** (additional to NZS 4404: 2010)

Additional fire hydrants may be required for maintenance and operational purposes. All separately isolatable sections of principal main shall be fitted with at least one fire hydrant.

6.3.15.5 **Hydrants at ends of mains** (as per NZS 4404: 2010)

6.3.16 Connections

6.3.16.1 **New mains to existing** (as per NZS 4404: 2010)

6.3.16.2 **Property service connections** (additional to NZS 4404: 2010)

For service connections up to and including DN50, the service connection shall be connected to the water main such that the connection is taken from the top of the main. For connections larger than DN50, the connection to the main will usually be taken from the side of the main. No connections shall be taken from a main below the horizontal plane.

PE80 pipe complying with AS/NZS 4130 shall only be used for connections up to DN 40. PVC pipe complying with AS/NZS 1477 shall be used for connections up to, and greater than DN 40. Service connection fittings shall be threaded to BS 21, BS 2779 or AS 1722.1 (series RP) or AS 1722.2 (series G).

Connections to PE pipe shall be made by electro-fusion welded fittings. Pipe and fittings shall be mechanically held while welding is in progress.

6.3.16.2.1. **Tobies** (additional section to NZS 4404: 2010)

Meter Manifolds and Manifold Boxes complying with the requirements of Section 6.3.16.2.3. shall be used as the toby valve for all DN20 service connections to provide access to the manifold for operation and maintenance. These shall be installed outside of trafficked areas.

Gate valves shall be used as the toby valve for all other service connections up to and including DN50. The valve shall be located 300 mm outside the property boundary. A valve box complying with the requirements of Section 6.3.16.2.4 shall be installed with the valve to provide access for operation.

Gate valves complying shall be used as the toby valve for all other service connections larger than DN50. The valve will usually be fitted to the branch of the Tee connection into the main and may be remote from the property boundary. A valve box complying with the requirements of Section 6.3.16.2.4 shall be installed with the valve to provide access for operation.

6.3.16.2.2. **Water Meters** (additional section to NZS 4404: 2010)

Meters shall be suitable for cold potable water and shall conform to the requirements of ISO 4064-4 or OIML R-49.

Concentric water meters fitted to a Meter Manifold complying with 6.3.16.2.3 shall be used on DN20 service connections. The nominal size of the threaded connection shall be G1½.

In line meters shall be used on connections larger than DN20 (G1½)

Where a meter is required on a service connection, the meter shall comply with the above specification, and be fitted beyond the toby.

An additional valve, which shall belong to the property being served, shall be fitted on the property side of the meter. The valve shall be fitted in such a way that it can be closed and the meter readily removed for servicing without the valve being removed or displaced. Gate valves shall be used.

6.3.16.2.3. **Meter manifolds** (additional section to NZS 4404: 2010)

A meter manifold is the pipe fitting specific to the connection of a concentric flowmeter. The manifold dimensions shall be suitable for the connection of G1½ concentric meters, in accordance with ISO 4064-4 or OIML R-49.

Meter manifolds shall incorporate a WRC (or similar) approved double check valve irrespective of whether a concentric meter is fitted to the manifold.

The end connections of the manifold shall be threaded in accordance with the requirements for in line water meters as described in ISO 4064-4 or OIML R-49.

The manifold body shall be dezincification resistant metal. Copper alloys shall comply with AS 2345.

The manifold shall incorporate a diaphragm-type stop valve upstream of the meter fitting. The stop valve shall have a non-rising spindle and be replaceable without removing the manifold from the service line. Ball valves are not acceptable.

6.3.16.2.4. **Valve and Meter Boxes** (additional section to NZS 4404: 2010)

Valve and service connection (toby) boxes shall be aligned long ways in the direction of the main. Boxes shall be supported by a minimum of two precast concrete surrounds

Valve and meter boxes located in vehicle crossings and driveways, shall be avoided, but if it is not practical then shall be of cast-iron or ductile iron (AS 3996:2019) construction, to resist deformation and damage.

Water meter boxes shall be suited to the particular application, shall be vandal resistant and able to take anticipated imposed loads. For smaller size meters polyethylene cast iron or ductile iron (AS 3996:2019) box shall be used.

A range of purpose made covers may be required for larger size meters depending on where and how they are mounted and whether they are in conjunction with other fittings such as a back-flow preventer.

A standard meter manifold box shall be used for all meter manifolds located in non-carriageway / paved areas.

6.3.17 **Termination points** (as per NZS 4404: 2010)

6.3.18 **Water supply – non reticulated areas** (additional section to NZS 4404: 2010)

Where a Council reticulated supply is available, or the installation of a supply is identified in the 10-year capital programme, then rural and rural residential subdivisions shall connect to (or in the case of a planned system, provide reticulation to enable future connection to) the public water supply in which case it shall be designed in accordance with the preceding section of the Code.

Where an existing lot has its own potable water supply, which is subsequently included within the Council reticulated supply area, the lot shall connect to the reticulated supply and decommission the private water supply. Evidence shall be provided to Council that any bores or private supplies have been decommissioned. Any bores shall be decommissioned in accordance with HBRC standards.

Where no Council system is in place or expected, the following requirements modify or extend the preceding sections, in the case of rural and rural residential lots.

6.3.18.1 Resource Consents

The taking and use of water for an individual's reasonable domestic needs or for stock watering are allowed in terms of Section 14(3) (b) of the RMA without a resource consent, provided they do not, and are not likely to, have an adverse effect on the environment.

The taking of water for communal supplies may require a Resource Consent from the Regional Council.

6.3.18.2 Individual Households

At the time of subdivision, the Developer shall show that adequate potable water supply (not less than 1,000 litres/day/dwelling unit) is available for every lot from either source, within the lot or at the lot boundary. On-lot sources may include roof water, individual wells, a site stream or a combination of these.

Any water supply bores shall comply with the HBRC standards for borehead works.

Any private water supply from one property to another property or properties, or non-standard supply may place additional liabilities on the water supplier under the Water Services Act.

Sources provided at lot boundaries will generally be reticulated shared systems from such sources as off-site streams, dams or wells.

Summer water supply is subject to drought and therefore, where roof supplies are proposed the developer shall provide calculations as to roof size and storage required to provide an average daily household supply of 1000 litres per day. To provide a consistent water supply this will often require a connected roof area exceeding 300 m^2. The minimum on site storage to be provided for roof-based systems shall be 40 m^3 provided in two tanks with the smallest being at least 33% of the total volume.

6.3.18.3 Fire Supply

Where Council reticulated water supply is unavailable, any rural or rural residential subdivision or development shall be provided with an adequate alternative potable and fire-fighting (in compliance with the NZ Fire Service Code of Practice for Firefighting Water Supplies NZS PAS 4509:2008 to the satisfaction of Council) water supply either from sources within the lot or at the lot boundary.

For large rural lots and rural residential lots, the level of fire protection water supply shall be discussed with Council and the Fire Service.

6.3.18.4 Communal Supplies

Communal supplies installed by the Developer/Subdivider to be operated and maintained by private arrangements made between the users are acceptable solutions for rural/rural residential water supplies where no Council reticulated system is available or is identified in the 10-year capital programme. Such systems may be provided on a voluntary basis by Developers/Subdividers to enhance the desirability of a subdivision.

Usual sources are (and may require resource consent):

(a) Stream or river supplies utilising dams or run of the stream,
(b) Well supplies,
(c) Public water supply to private system.

All such systems shall be used in conjunction with balancing storage. Supply to dwelling units may be by pumping from the balancing storage or gravity if available ground levels allow the placing of the storage at adequate elevation. The minimum balancing storage provided shall be 20 m^3 or 1 m^3/lot or dwelling unit whichever is the greater.

Water for human consumption must be treated to potable quality prior to reticulation.

6.3.18.5 Materials

All components used in rural water supply systems shall be new and satisfy the Code for acceptable materials.

6.3.18.6 Reservoir Storage

Where communal storage is to be provided, it shall be built of concrete complying with NZS 3106 for concrete structures for the storage of liquids. Tanks shall be watertight, bird and vermin proof, clean and roofed to exclude daylight.

Precast tanks may be used up to a capacity of 23 cubic metres. Where storage greater than 60 cubic metres (nominally 3 tanks @ 20 m^3) is required it shall be provided by a purpose-built reservoir.

Plastic tanks will not normally be accepted.

6.4 Approval of proposed infrastructure

6.4.1 **Approval process** (additional to NZS 4404: 2010)

Council approval shall be obtained for any proposed connection to a piped water supply service under Council control. Approval shall be obtained in writing before work commences. The approval to connect will be based on the capacity available as well as the engineering aspects for the proposed works. Connections to piped systems controlled by the Council will be carried out by the Council at the applicant's expense. A price for making the connection based on current fees and changes will be provided by Council to the Applicant who will be invoiced for the sum on completion of the connection.

No person, other than the Council staff, or a Contractor authorised by the Council shall make any connection to a water main or pipeline already supplying water to consumers.

No connection will be made until the whole of the new works being connected is completed to the standard required by the Council.

6.4.2 **Information to be provided** (additional to NZS 4404: 2010)

Refer to Section 1.8.1.

6.5 Construction

6.5.1 **Excavation** (additional to NZS 4404: 2010)

Trenches shall be opened only after all required Consents and trench opening notices have been uplifted. All trenching shall recognise the safety requirements of the Health & Safety in Employment Act.

All trenches shall be opened up to widths and depths suitable for enabling the requisite bedding metal thickness below the pipe to be placed (not less than 100 mm). The trench width shall be kept to those dimensions detailed in the design drawings which ensure that it is narrow enough to allow the pipe to be laid in trench conditions but wide enough to enable pipe surround metal to be adequately placed and compacted.

All trenching in Napier roads or on services to be taken over by the Council shall be carried out in accordance with Council approved methods.

Where a pipeline is to be constructed through soft ground, unsuitable foundation material shall be removed and replaced with suitable compacted material. Unsuitable foundation material types include buried organic topsoil, soft peat, loose uncompacted sand, fill material, soft to very soft and/or expansive clay. Standard Drawing WS27 provides details on adequate foundations for the pipeline.

6.5.1.1 **Trenches in Open Land** (additional section to NZS 4404: 2010)

Trenches may be opened for up to 200 metres ahead of pipe laying, provided trench depth and material are of adequate stability to minimise any risk of trench failure and to ensure safety of workers and the public.

6.5.1.2 **Trenches in Road** (additional section to NZS 4404: 2010)

Trenches in stable ground may be opened to a maximum of 50 metres in advance of pipe laying, but this distance shall be reduced where the public or existing services are endangered or where traffic routes are restricted.

6.5.1.3 **Control of Water** (additional section to NZS 4404: 2010)

Excavations shall be kept free from water at all times.

Under no circumstances shall any water be allowed to drain directly into new or existing water mains.

6.5.2 **Embedment** (additional to NZS 4404: 2010)

Granular bedding shall be used with all pipes except in high load situations when structural design shows it to be inadequate.

In normal load conditions bedding shall extend from 100 mm below the pipe, around it and to a height of 100 mm above the pipe. Bedding material shall be clean pea metal (6 to 10 mm) or silt approved by the Council for pipes DN 100 and larger or silt for pipes DN 50 or less. In high load or soft flexible soil conditions, bedding and protection shall be specifically designed to suit conditions.

In high load or soft flexible soil conditions, bedding and protection shall be specifically designed to suit conditions.

Sufficient filling shall be placed and compacted around the barrel of the pipe to prevent it floating should the trench become flooded.

6.5.3 Backfilling and reinstatement

6.5.3.1 **Carriageways** (additional to NZS 4404: 2010)

Water supply pipes laid in carriageways shall be backfilled as per Standard Drawing WS27.

Completion of backfilling and surface reinstatement shall be in accordance with methodologies recommended in any of the following specifications authorised by Council, for the Works:

- "Specification for Service Maintenance Operations and New Service Installations within Road Reserve (including Trench Excavation and Reinstatement)",
- National Code of Practice for Utility Operators Access to Transport Corridors
- NZS 4404: 2010 "Land Development and Subdivision Infrastructure

Pipework shall be inspected and approved, after laying, bedding and placing of all thrust blocks etc. but before commencement of trench backfill.

The maximum angle between the line of adjacent pipes being jointed shall not be more than 50% of the manufacturer's maximum allowable deflection for the particular joint type but in no case shall exceed 5°. Curvature of the pipe barrel will not be accepted except for polyethylene pipework where a minimum bend radius of 50 x DN is permitted.

All flanged connections, electrofusion connections and any other valves and fittings shall be visible for pressure testing.

Pipes, valves, fittings, service connections and other items that will be part of the permanent works shall be laid during construction of the reticulation to ensure they are included in all inspections, testing and disinfection.

Cast in-situ concrete thrust blocks shall be provided at all points where an unbalanced thrust occurs including on valves and tapers.

Concreting shall comply with NZS 3109 or NZS 3124. It shall be placed so as to not cover or obstruct bolts or bolted joints nor interfere with any flexible joint. Bearing surfaces shall always be placed against trench sides as dug.

Hydrant and valve spindles shall be brought to adequate proximity to the ground surface to be readily accessible with the normal equipment, keys etc held by Council and Fire Service staff. This will generally be a position of between 175 mm and 250 mm below ground surface. Fire hydrants shall be fixed vertically with the centre of the valve spindle and standpipe outlet aligned along the longitudinal axis of the main.

Service connections shall be located accurately in the positions shown on the approved engineering drawings / as-builts. The location of such connections shall be made evident during all stages of construction by a marker post (wooden peg, 0.5m long, sprayed blue) placed within 200 mm of the toby position.

Kerbs shall be cut to a depth of 5 to 10 mm by diamond saw with two lines approximately 50 mm apart immediately adjacent to the toby for each service connection. The lines shall be on top of the kerbs for standard kerbs and on the sloping face for mountable kerbs.

6.5.3.2 **Berms** (additional to NZS 4404: 2010)

Water supply pipes laid in berms shall be backfilled as per Standard Drawing WS27.

Council's standard surface boxes and surrounds shall be fitted over fire hydrants, valves, meter manifolds on service connections, water meters, gate valves and other fittings requiring access for operation or maintenance. They shall be centrally located over all fittings. Valve boxes shall have their long side in the direction of the main.

The tops of surface boxes shall be set proud of the surrounding ground levels by 10 mm and set at the same crossfall and gradient as the surrounding surface. The immediate surrounding surface shall be shaped up to the edge of the surface box frame over a distance of not less than 300 mm all round.

Boxes shall be fitted so they do not move under expected loads. Boxes and surrounds shall be placed so that no load on the box can be transferred directly to any pipe or fitting.

Where accurate placing is required mortar may be placed between the concrete surrounds. Wood shall not be used as packing between surrounds or surrounds and boxes.

6.5.3.3 **Detector tape /Tracer Wire** (additional to NZS 4404: 2010)

It is currently Council policy not to provide detector tape or tracer wire, in order to prevent confusion over which pipes may be marked, and which may not.

Careful location of existing services (i.e. potholing) is preferred, prior to excavation.

6.5.4 **Pressure testing of water mains** (additional to NZS 4404: 2010)

Testing shall be carried out in the presence of the Construction Co-ordinator and a Council representative. At least one working day prior notice shall be given, prior to testing.

The final acceptance test for Council shall be carried out after all backfilling and compaction has been completed. The Contractor may wish to carry out preliminary tests with or without the pipeline trench being backfilled.

It is necessary to remove all air from the line as the main is filled and in the case of concrete or concrete lined pipes, prefilling and soakage for at least 24 hours is necessary, to remove air and overcome water loss into the concrete.

Pressure testing shall not be undertaken against closed valves. Blank flanges shall be used and valves left open for testing.

When the Construction Co-ordinator is confident the test requirements can be met the Council Liaison Officer shall be called to arrange a representative to observe the final test. The Council Liaison Officer shall be given not less than one working days' notice of the intention to test.

Mains, fittings and service connections shall be subjected to a pressure head of:

- The greater of 135 metres or 1.5 times the working head of the pipe
- But no more that 25% above the rated pressure of any pipeline component.

Testing shall be in accordance with the following procedures.

6.5.4.1 **Rigid or uPVC Pipes** (additional section to NZS 4404: 2010)

Pipework shall be tested using the constant pressure method (M4 of AS/NZS 2566.2). Test pressure shall be held for a minimum of 2 hours and a maximum of 12 hours.

The quantity of make-up water in litres / hour necessary to maintain the test pressure shall comply with:

$Q < 0.14LDH$

Where, Q = allowable make up water (litres/hour), L = length of the test (km), D = nominal diameter of the test length (metres), H = average test head over the length of pipeline (meters head). E.g for a 500 m long, 100 mm pipeline tested at 10 bar, Q < 0.70 L/hour.

6.5.4.2 **PE Pipes** (additional section to NZS 4404: 2010)

The rebound test (M7 of AS/NZS 2566.2) shall be used for pipework up to DN315 (OD) and up to lengths of 1000m. This test is described in brevity below. Larger or longer pipework shall use the reference test (M5 of AS/NZS 2566.2) and reference shall be made to AS/NZS 2566.2 for procedures.

Once the pipeline is filled with test water and all air removed, the pipeline pressure shall be reduced to just below atmospheric, ensuring no air enters the line and the pipeline allowed to relax for at least 60 minutes.

The pipeline pressure shall then be raised smoothly to the test pressure in less than 10 minutes. This will require a suitable size pump. The pressure shall be held at test pressure for a further 30 minutes by pumping as necessary. During this period the pipeline shall be inspected for leaks / seeps. Any areas of non-compliance shall be remedied, and the system retested until satisfactory results are achieved.

The test pump shall then be shut off and the pressure allowed to decay for 60 minutes (Decay Phase). The pressure shall be measured at the end of this phase and if less than 70% of the test pressure, the test has failed.

Following a pass of the Decay Phase test, an Air Volume Assessment shall be undertaken. The pressure should be reduced by 10% to 15% within 5 minutes. This shall be completed in a smooth manner with slow opening and closing of valves to remove the effect of pressure losses.

The volumes of water bled out shall be accurately measured accurately (ΔV). If $\Delta V > \Delta V_{max}$ allowable (see Section M7.5 of AS/NZS 2566.2), the test has failed.

$\Delta V_{max\ allowable} = 1.2 \times V \times \Delta P \times (1/EW + D/ER)$ where

V = pipe volume in litres
ΔP = measured pressure drop (10 to 15% drop) in kiloPascals
D = pipe internal diameter in metres
EW = bulk modulus of water in kPa (2,140,000 at 15°C)
ER = pipe material modulus in kPa (use 870,000 for PE100)

If the Air Volume Assessment passes, the Main Test Phase shall commence. The pressure rise shall be observed and recorded over 30 minutes; if the pressure rise is marginal this phase shall be extended to 90 minutes.

If the passing or failure of any phase is marginal, or if the leakage rate needs to be determined, the test shall be repeated using the Reference Test (M5 of AS/NZS 2566.2).

6.5.5 **Disinfection of water mains** (additional to NZS 4404: 2010)

Disinfection shall be carried out by the Council at the Developer's cost. Alternatively, NCC 3Waters approved contractor can undertake this works, adhering to agreed procedures as outlined in this section.

6.5.5.1 **Planning** (additional section to NZS 4404: 2010)

All pipes, valves, services and other fittings shall be flushed and disinfected (where practicable) by means of chlorination before being put into service. The Contractor shall allow for all special tapings, connections etc. for the flushing, introduction and draining of the chlorine solution to the pipelines.

An approved Sampling Plan by NCC Compliance Officer should be in place and adhered to. Sampling Plan shall define representative sampling points for superchlorinated water testing and micro sampling in order to cover all parts of the new network (e.g. including main's ends in cul-de-sacs).

6.5.5.2 **Flushing** (additional section to NZS 4404: 2010)

The main shall first be thoroughly flushed through hydrants or scour valves to develop a velocity of >2.0 m/s for a minimum of 15 minutes in the main to completely remove all foreign matter and air. Visual checks of the water discharged are good practice. Only compliant potable water should be used to undertake this exercise. For mains exceeding DN250 diameter, the Contractor should provide a methodology for approval by 3 Waters Team, which delivers the same outcomes.

Note – if flushing is undertaken by external contractor, the details of this activity (e.g. planned date and hours, duration) must be agreed beforehand with NCC Compliance Officer to assess and mitigate or publicly communicate potential discoloured water incidents this might cause.

6.5.5.3 **Superchlorination** (additional section to NZS 4404: 2010)

Solution to be used for super-chlorination shall be in 25 – 50 ppm FAC range, however refer to 'NCC Water Supply System Disinfection Worksheet' (available from NCC upon request, quote EDRMS #1316790) for different scenarios. Sodium hypochlorite solution (not older than 3 months) to be used. For evidential purposes next parameters must be recorded:

- calculations re preparation of an appropriate sodium hypochlorite solution
- chemical used (chemical name, manufacturer, batch, production date)
- date and time od superchlorination commencing
- person overseeing the works details
- FAC strength at entry point and at sampling locations as per Sampling Plan
- details of FAC colorimeter used (brand, model, S/N, verification expiry date)

The main shall be left filled with chlorinated water for 24 hours (exemption for less than that shall only be approved by 3Waters Team). During filling all valves, hydrants and other fittings on the section shall be operated and superchlorinated water tested at sampling locations as per the Sampling Plan.

The point of application of chlorine shall be at one end of the section to be chlorinated (usually lowest point) and the line shall be filled until water issues from a tapping point at the opposite end(s). Every care is to be taken to see that no air is trapped in the line, that would prevent solution's contact with pipe walls.

At the end of 24 hours, the FAC recorded must not be less than 10 ppm at any of the sample points as per Sampling Plan. If it is less, the chlorination shall be repeated. The main shall then be flushed out using compliant potable water until the FAC residual at the sampling points as per Sampling Plan corresponds to that of the mains supply. Before ceasing flushing an infield organoleptic test(s) shall be undertaken.

6.5.5.4 **Discharge of superchlorinated water** (additional section to NZS 4404: 2010)

Any chlorinated water shall not be discharged onto the ground or into the storm water system. It must be dechlorinated or otherwise discharged to the sewer system subject to NCC approval.

FAC testing of superchlorinated and flush-water and organoleptic testing shall be performed at representative locations as per Sampling Plan.

Then water shall be sampled at representative locations as per Sampling Plan for Total Coliforms (MPN), *E. coli* (MPN) and infield tests undertaken (temperature, turbidity, pH, conductivity, TDS, FAC, combined chlorine). Sampling and testing shall be undertaken by IANZ certified sampler / lab. Total Coliforms, *E. coli*, turbidity, pH and FAC results must meet DWSNZ MAV / GV. FAC residual must be above 0.20 mg/l, turbidity below 1.00 NTU and pH below 8.50.

6.5.5.5 **Record keeping** (additional section to NZS 4404: 2010)

All above steps and results need to be well documented, provided to Council and stored for evidence in InfoSource. Use 'NCC Water Supply System Disinfection Worksheet' (available from NCC upon request, quote EDRMS #1316790) to record the process and water testing results.

6.5.5.6 **Connecting to the water supply** (additional section to NZS 4404: 2010)

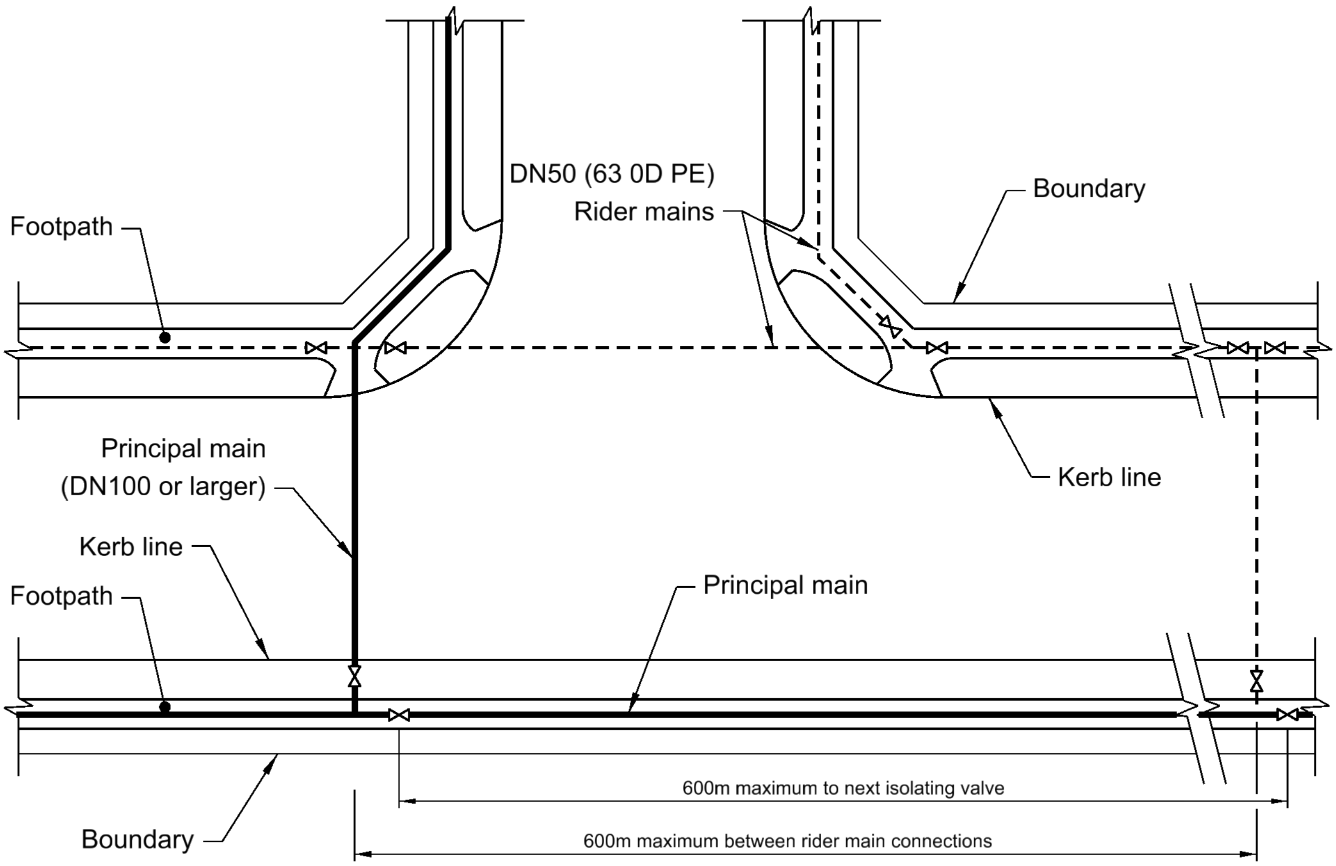
The Contractor shall not undertake any work on the reticulation after disinfection complete.

After any water main has been tested and disinfected it shall be kept charged with water under pressure if possible. If the permanent connection to the existing reticulation is not made within five working days a temporary connection of at least DN20 shall be made from the existing reticulation.

Connection to the existing reticulation will only be made by the Council after all provided evidence for steps above have been reviewed and signed off by NCC Compliance Officer.

6.5.6 **Discharge of treated water** (as per NZS 4404: 2010)

6.5.7 **Water sampling** (as per NZS 4404: 2010)



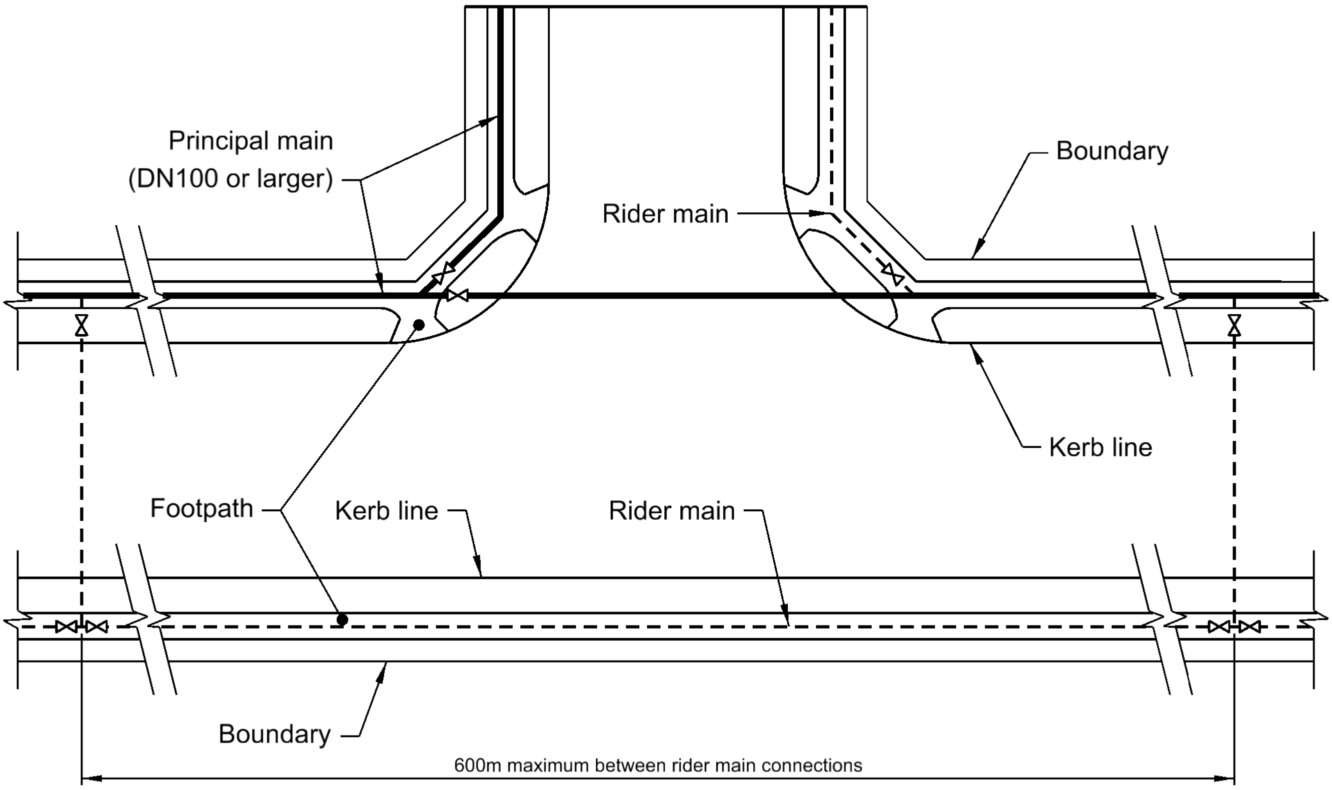
LEGEND

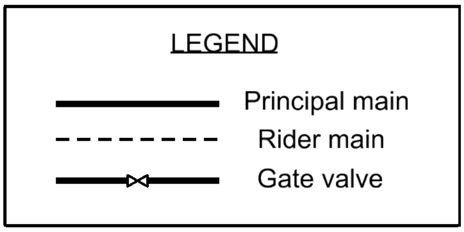
solid line	Principal Main
dashed line	Rider Main
valve symbol	Gate Valve

NOTE:

1. Inside diameter presented.
DN50 = 63 OD PE, DN100 = 125 OD PE

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	WATER RETICULATION LAYOUT TEE INTERSECTION NO.1	NOT TO SCALE	WS01

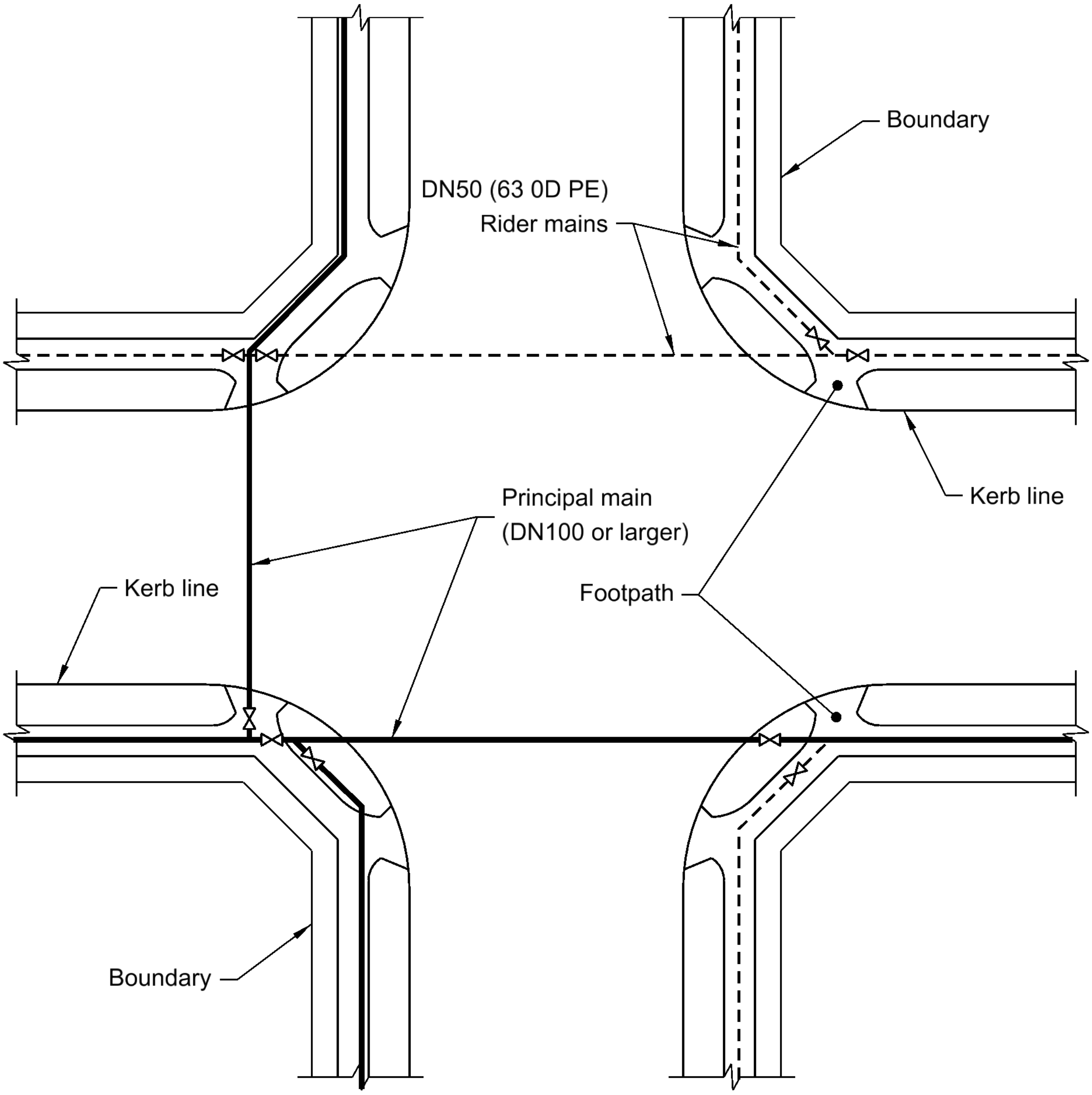




NOTE:

1. Inside diameter presented.
DN50 = 63 0D PE, DN100 = 125 OD PE

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**WATER RETICULATION LAYOUT TEE INTERSECTION NO. 2**	NOT TO SCALE	**WS02**



LEGEND

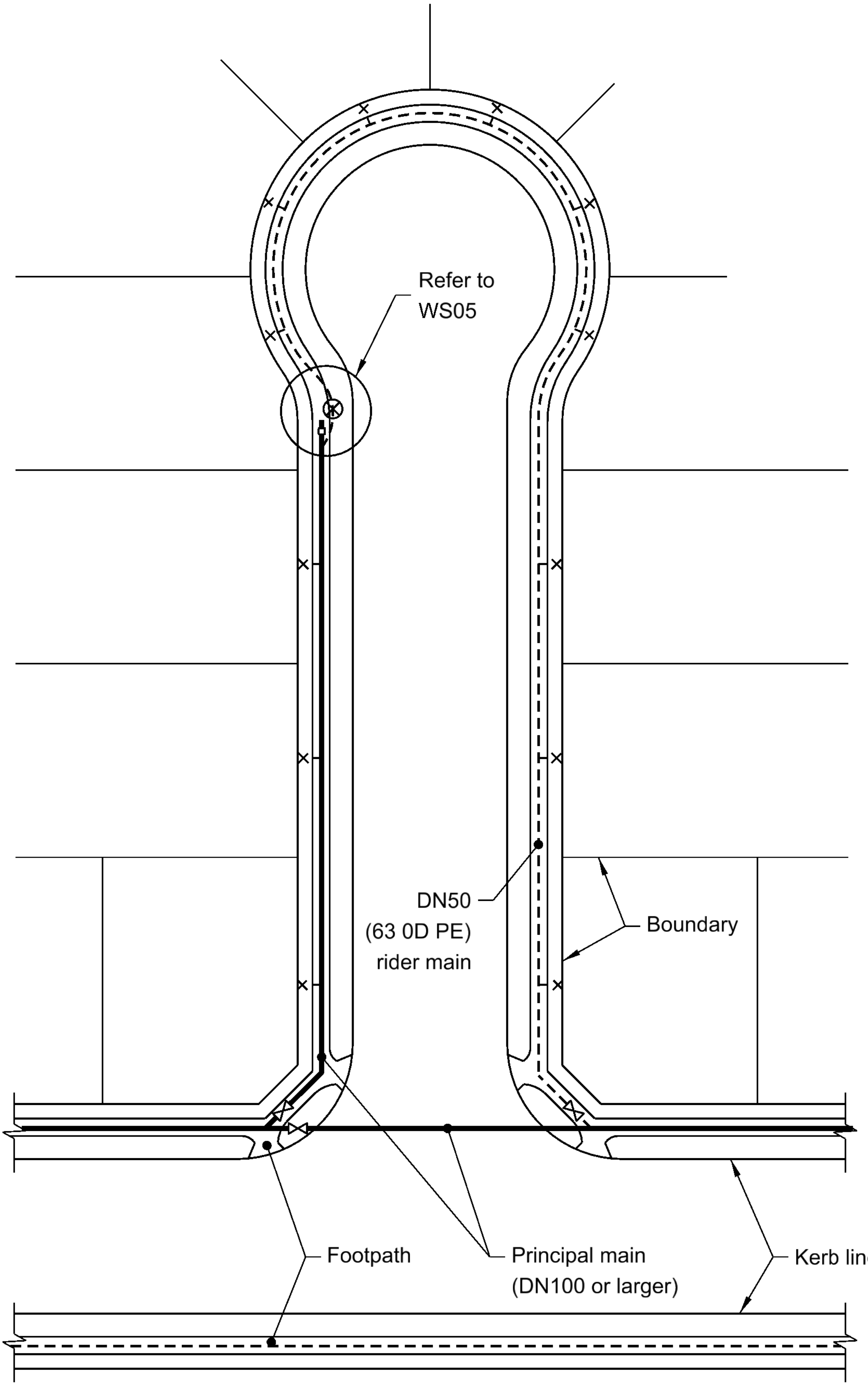
Principal Main

Rider Main

Gate Valve

NOTE:

1. Inside diameter presented.
DN50 = 63 0D PE, DN100 = 125 OD PE



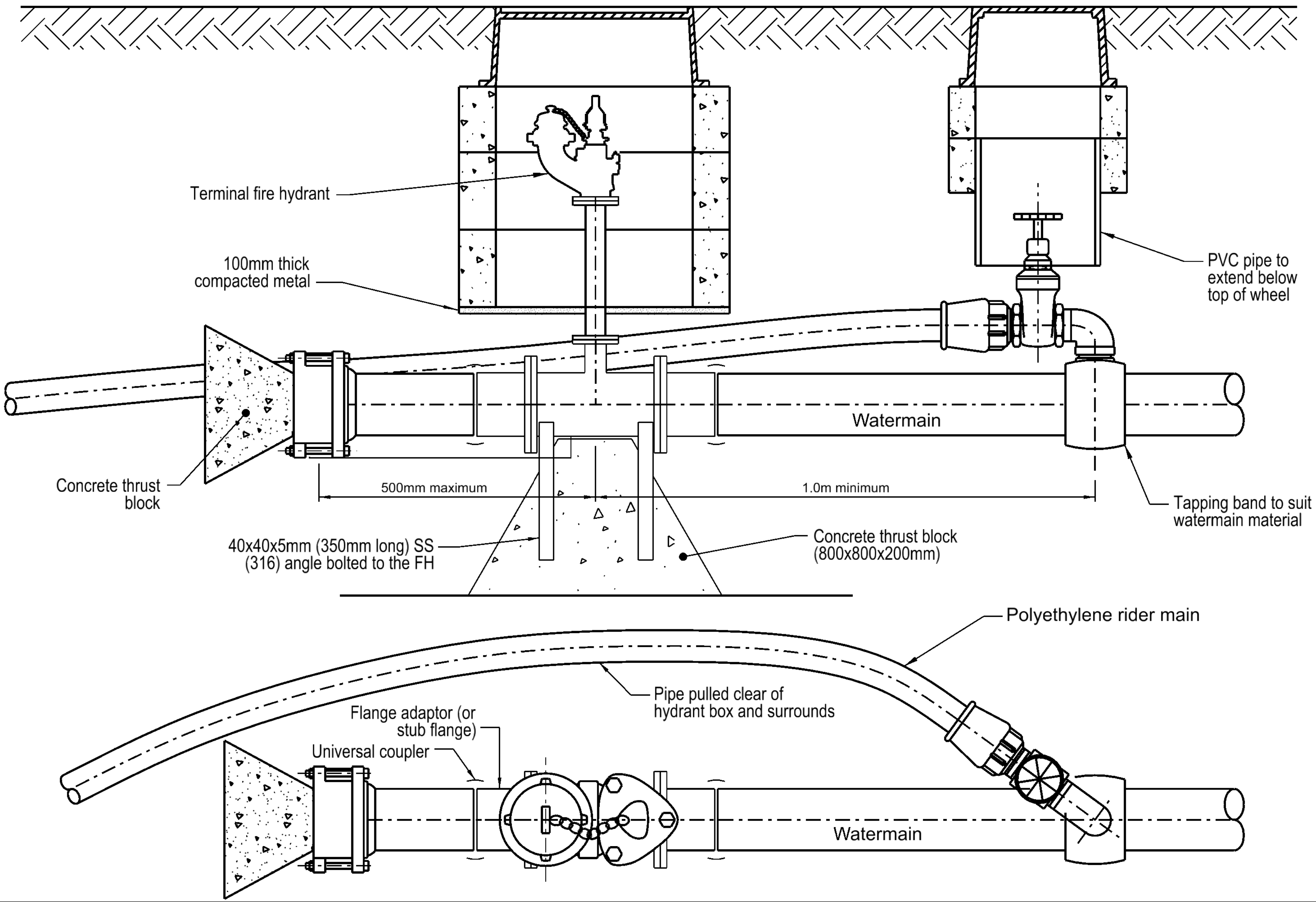
LEGEND

- Principal main
- Rider main
- Gate valve
- Fire hydrant
- Service connection

NOTE:

1. Inside diameter presented.
   DN50 = 63 OD PE,
   DN100 = 125 OD PE

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	WATER RETICULATION LAYOUT CUL-DE-SAC	NOT TO SCALE	WS04



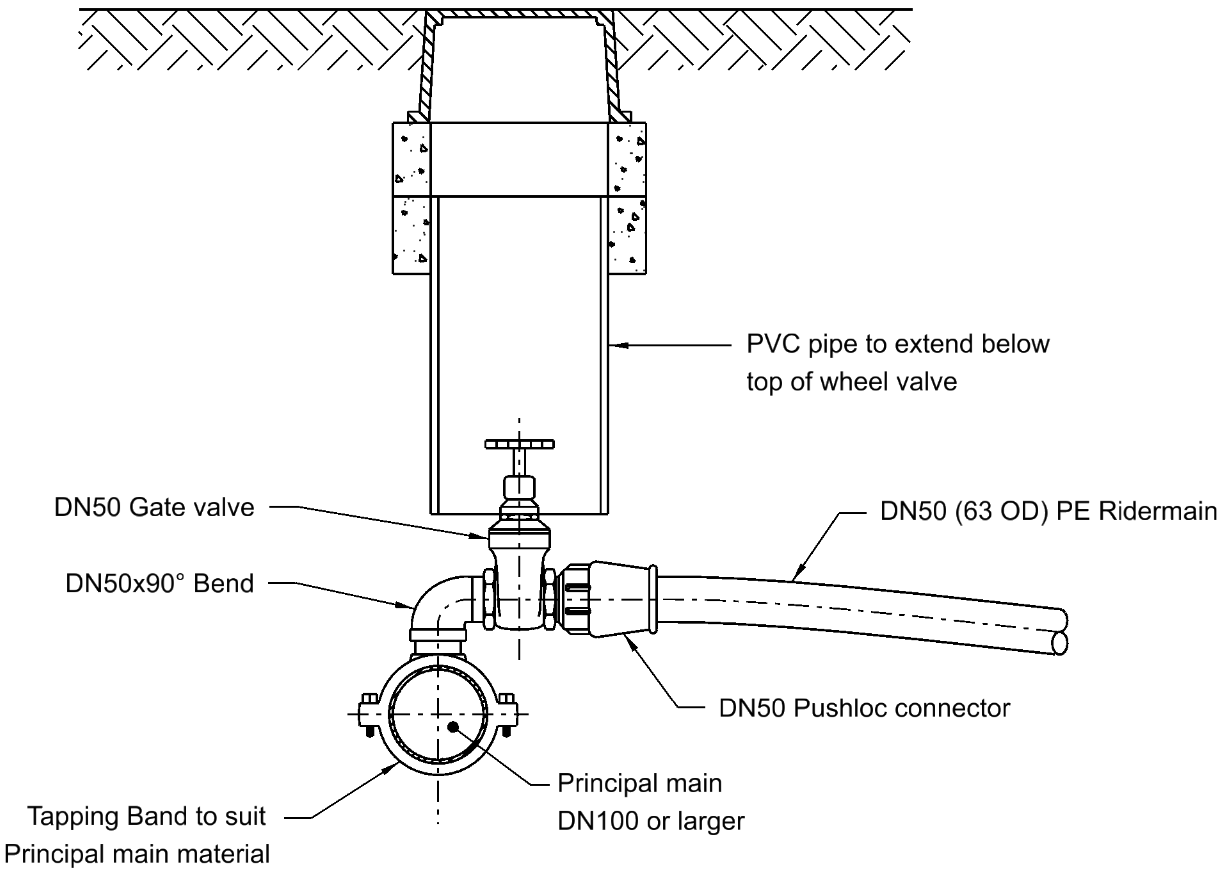
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri

Version:
SEPT 2020

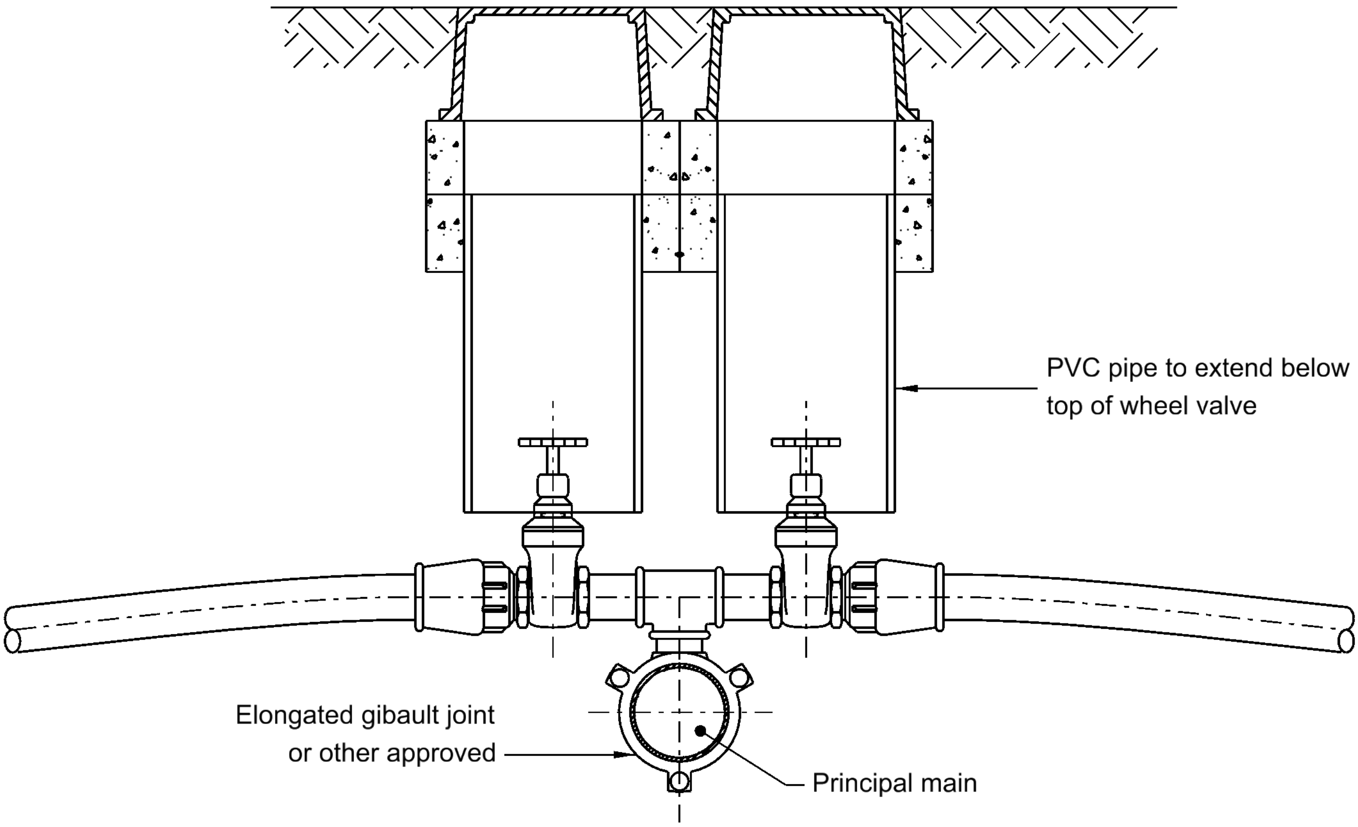
CONNECTION OF RIDER MAIN TO PRINCIPAL MAIN - CUL DE SAC

NOT TO SCALE

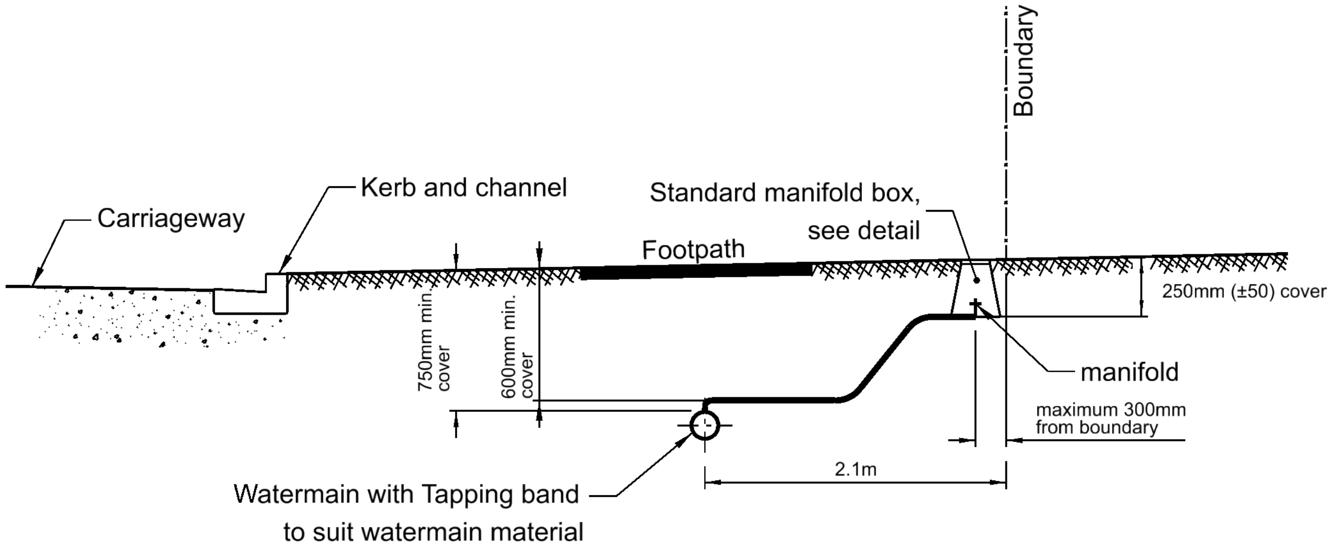
WS05

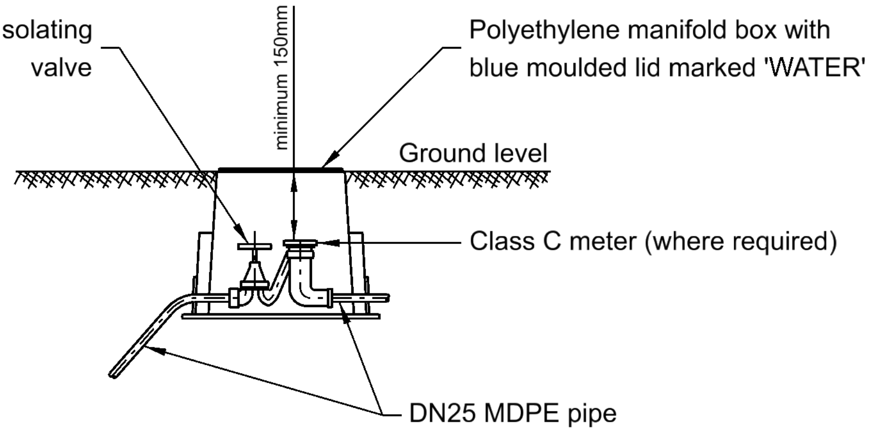


NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**CONNECTION OF RIDER MAIN TO PRINCIPAL MAIN - TEE INTERSECTION**	NOT TO SCALE	**WS06**

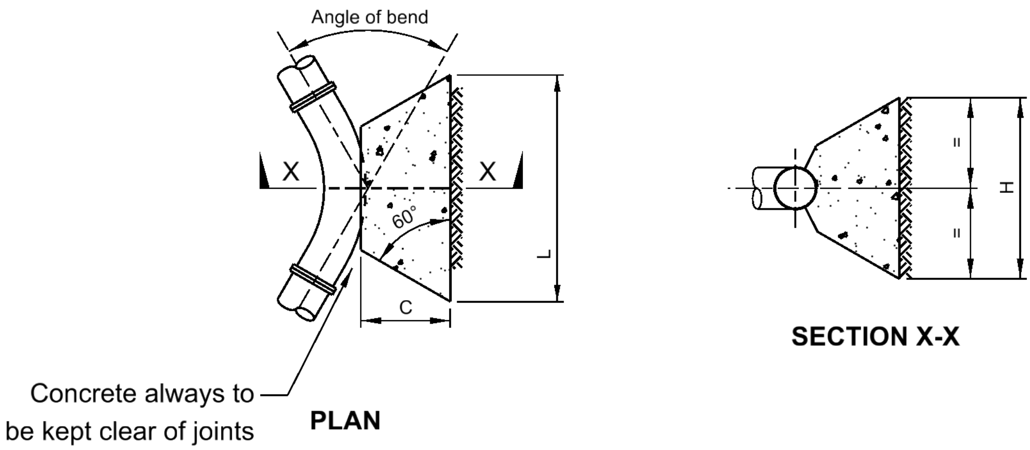


NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**CONNECTION OF RIDER MAIN TO PRINCIPAL MAIN - CROSS INTERSECTION**	NOT TO SCALE	**WS07**





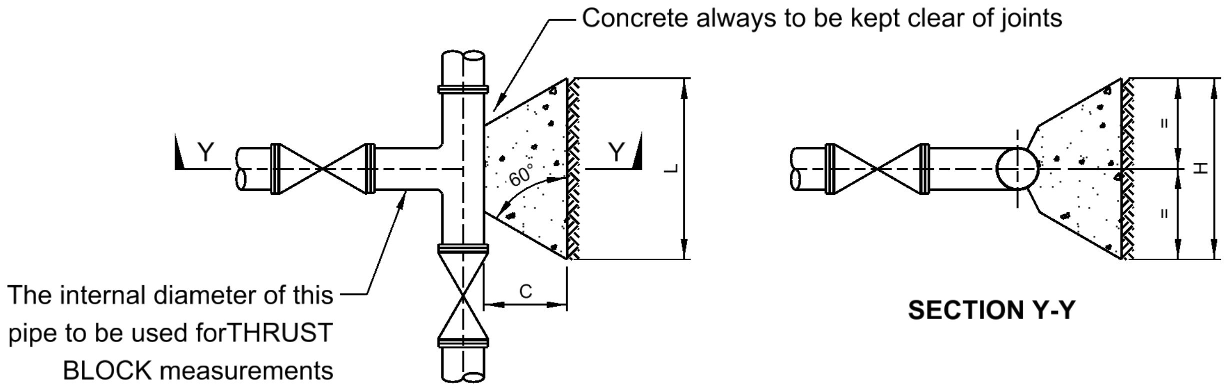
STANDARD MANIFOLD DETAIL



PLAN

SECTION X-X

HORIZONTAL BEND



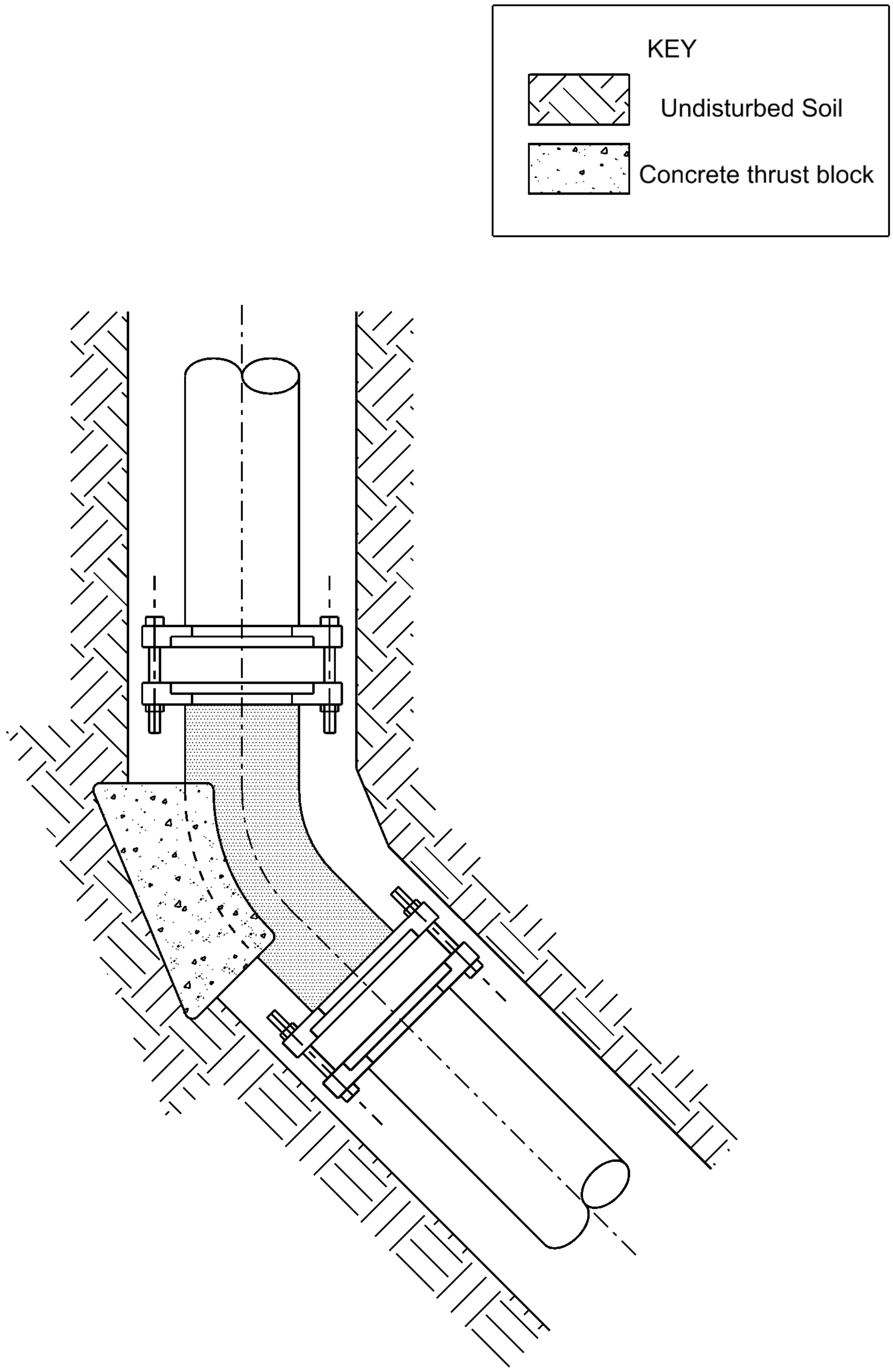
PLAN

SECTION Y-Y

TEE OR END CAP

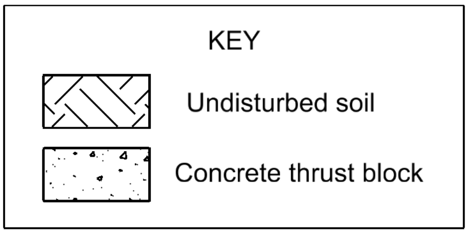
NOTES:

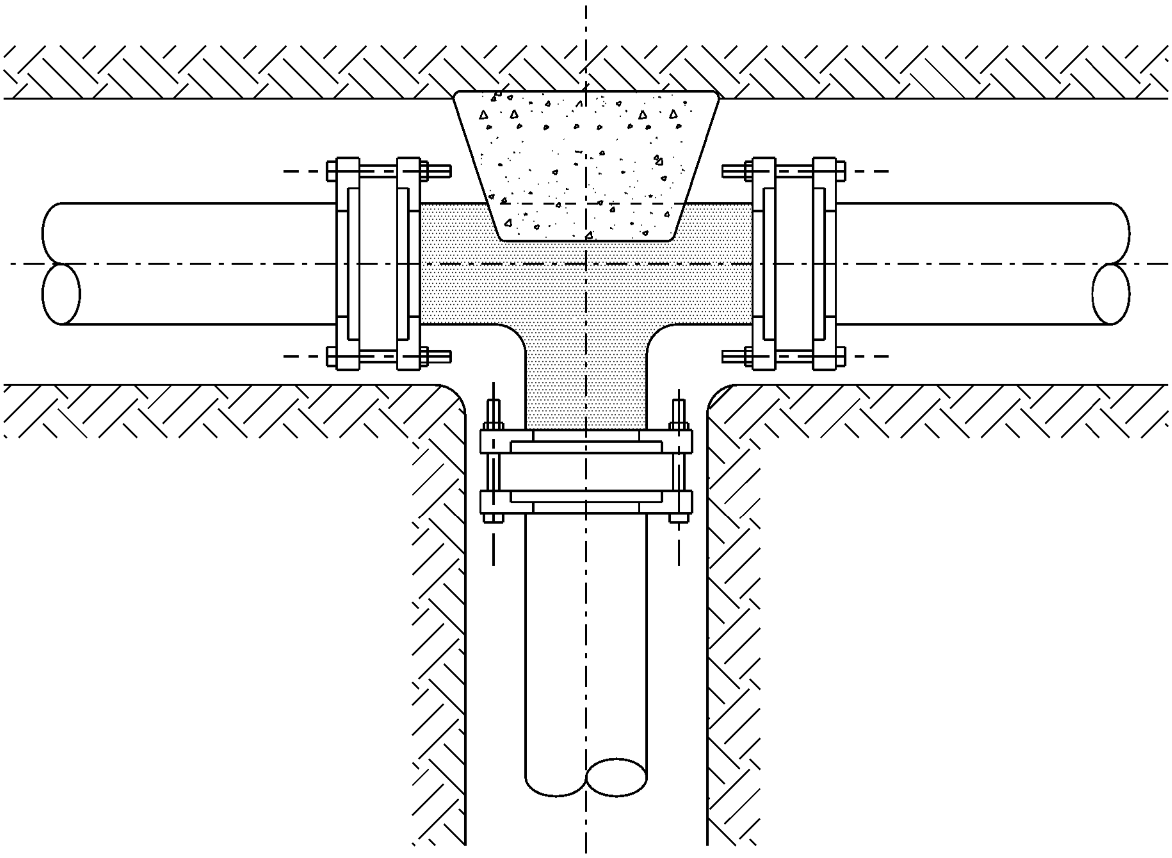
1. Dimensions L and H should be sized specifically. L may be up to 1.4 times H. C should be generally be ~50% of L
2. Thrust block concrete should be kept clear of all pipe joints and should not encase beyond the point of max pipe diameter
3. Uplift thrusts do not develop soil bearing pressure in this way and they must be designed specifically. For uplift thrusts the total thrust must be held by the mass of the thrust block and galvanised steel tension straps shall be used to hold the pipe to the thrust block
4. All bearing faces of the thrust blocks to be poured against natural ground
5. All bolts shall be positioned such that bolts can be replaced
6. All unbalanced forces to be restrained.



NOTE: Socketed rubber ring joint fittings may be used

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**WATERMAIN THRUST BLOCK BEND IN HORIZONTAL**	NOT TO SCALE	**WS10**

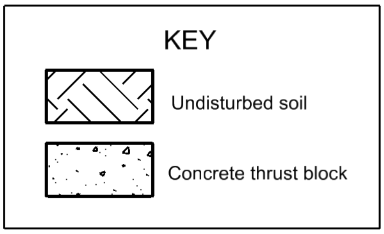


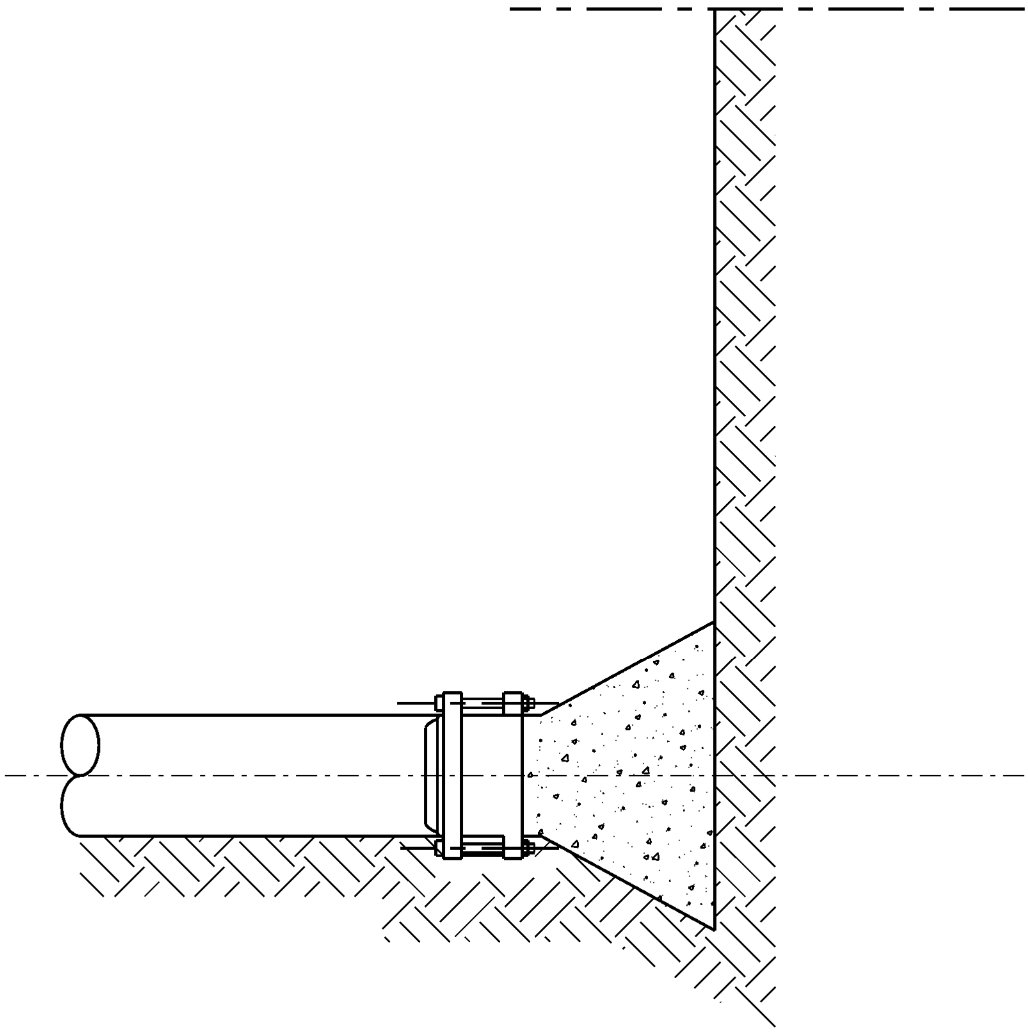


NOTES:

1. Isolating valves shall be placed on minimum of two branches of a tee. Refer to Code Clause G1.14.1

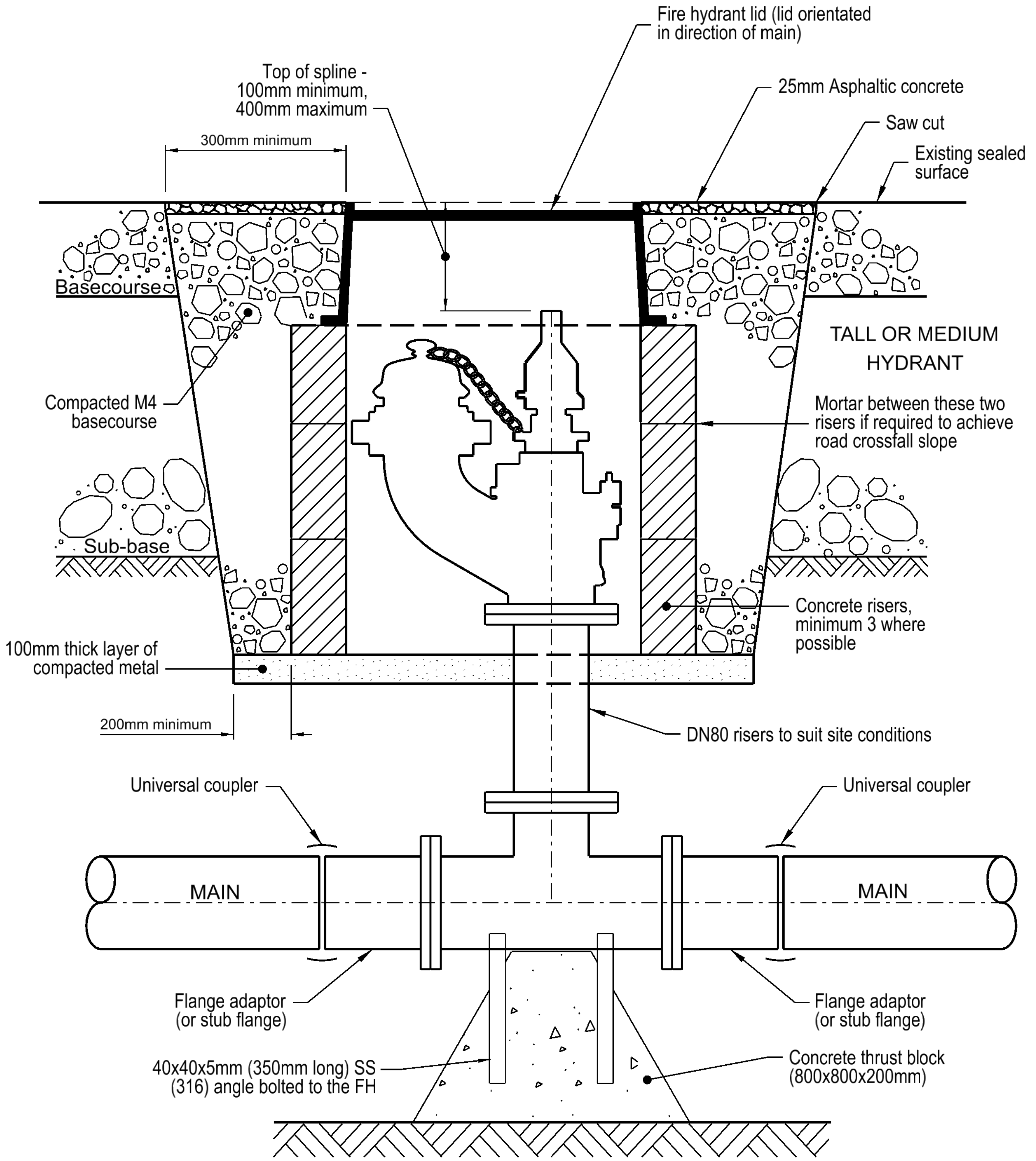
2. Socketed rubber ring joint fittings may be used.



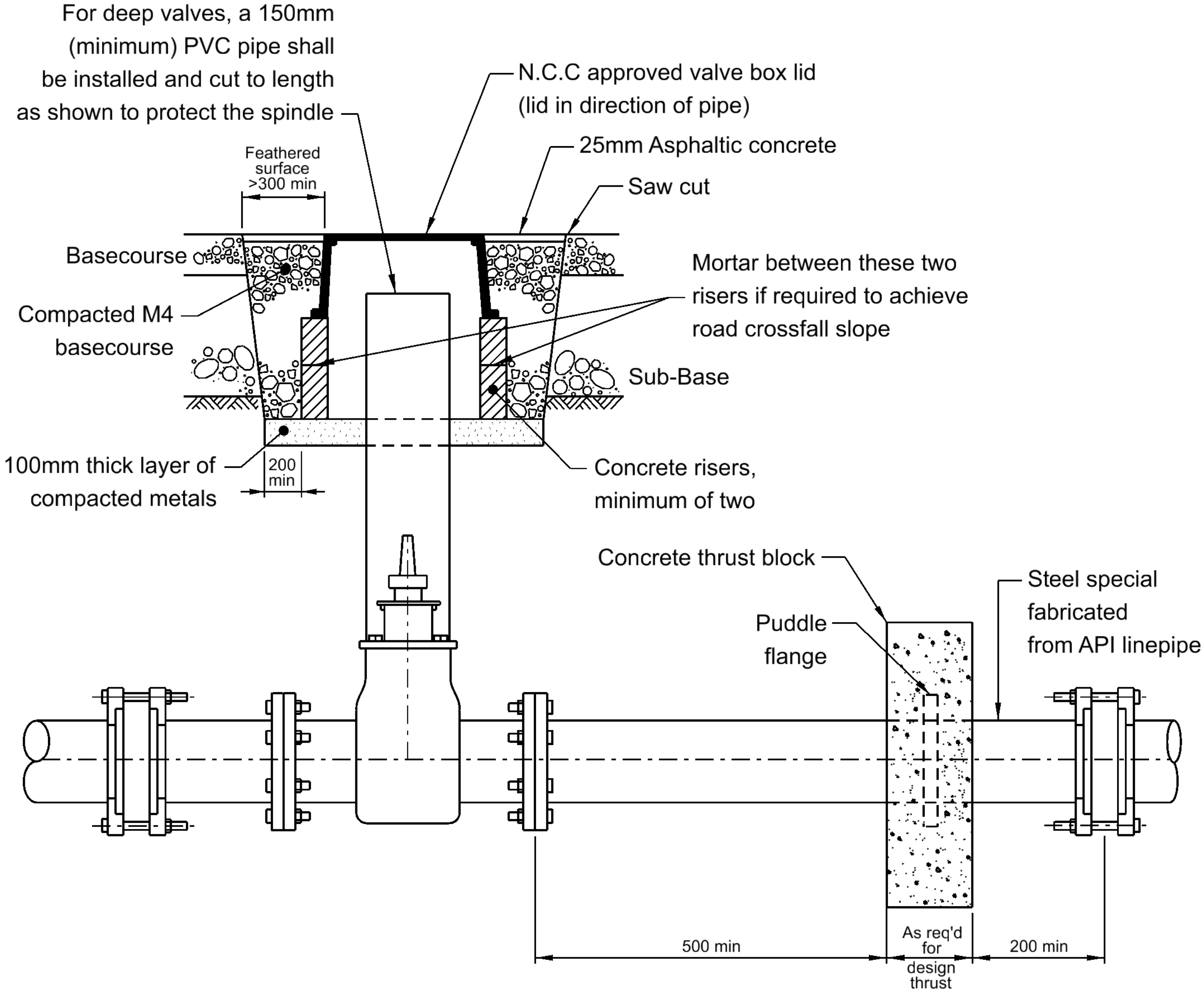


NOTE: Socketed rubber ring joint fittings may be used

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**WATERMAIN THRUST BLOCK CLOSED END**	NOT TO SCALE	**WS12**

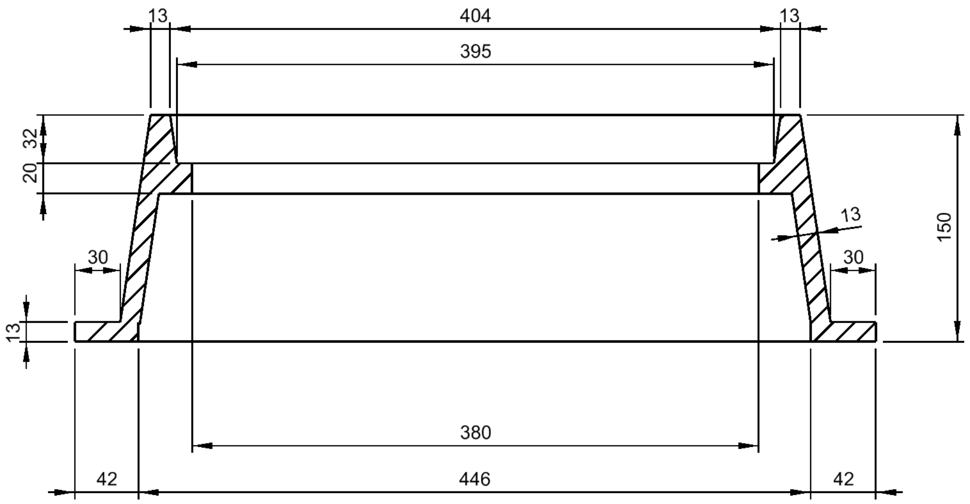


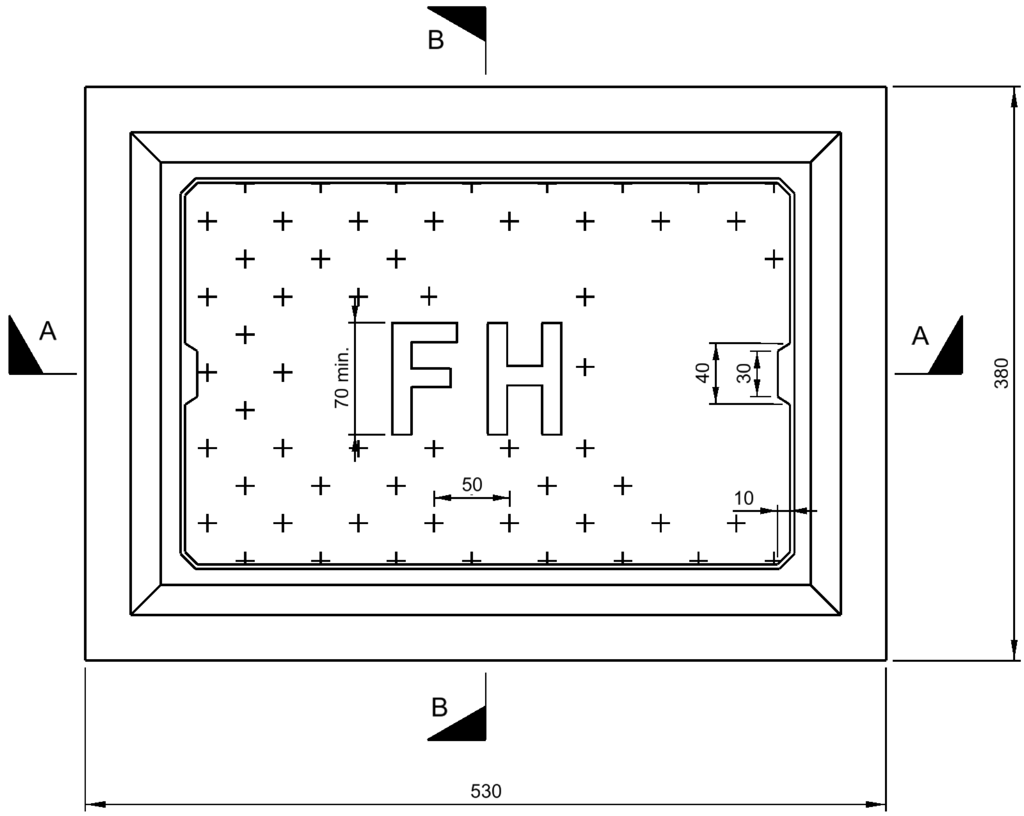
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**FIRE HYDRANT INSTALLATION**	NOT TO SCALE	**WS13**



NOTE: All dimensions in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**LINE VALVE INSTALLATION**	NOT TO SCALE	**WS14**

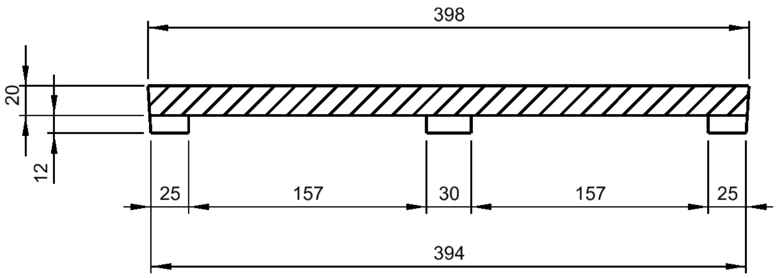


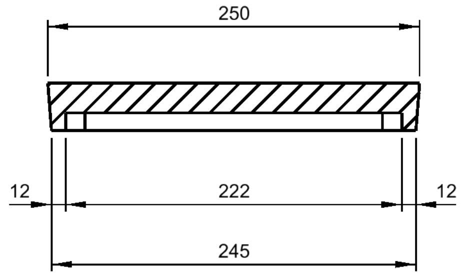


NOTES:

1. Maximum sizes taken from NZS 4522:2010
2. Surface cover and frame to comply with AS 3996 (Class D) and the Utilities Access Act
3. See Dwg WS16 for Section B-B
4. All dimensions are in mm.

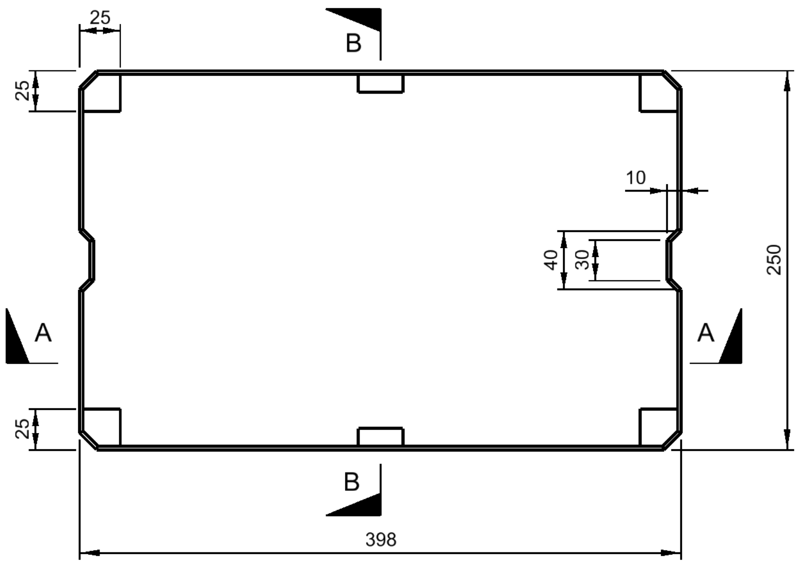
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**FIRE HYDRANT BOX**	NOT TO SCALE	**WS15**



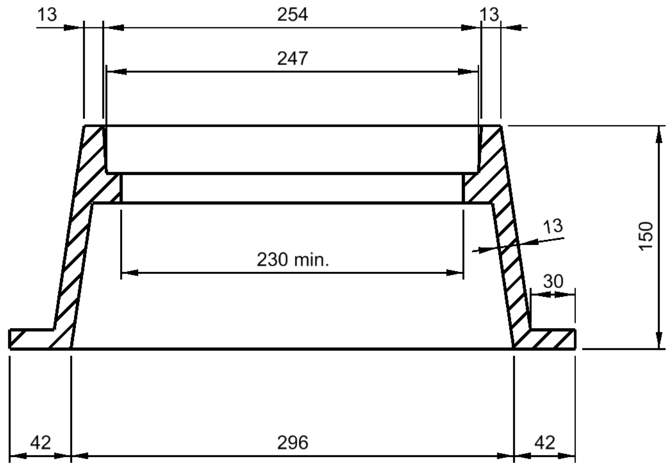


SECTION A - A LID

SECTION B - B LID



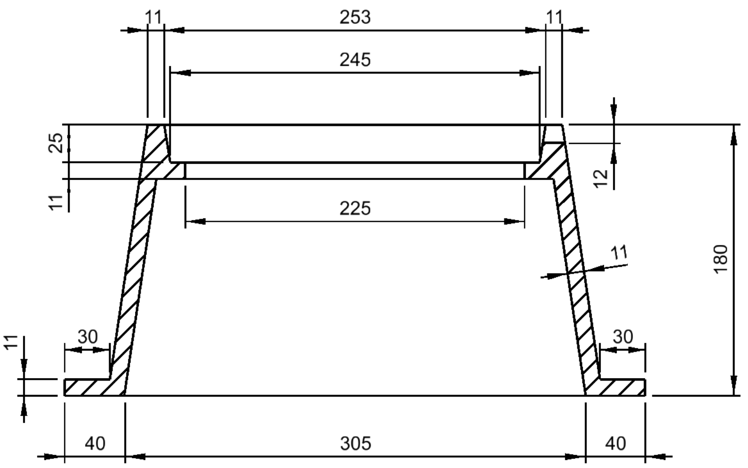
PLAN - UNDERSIDE OF LID



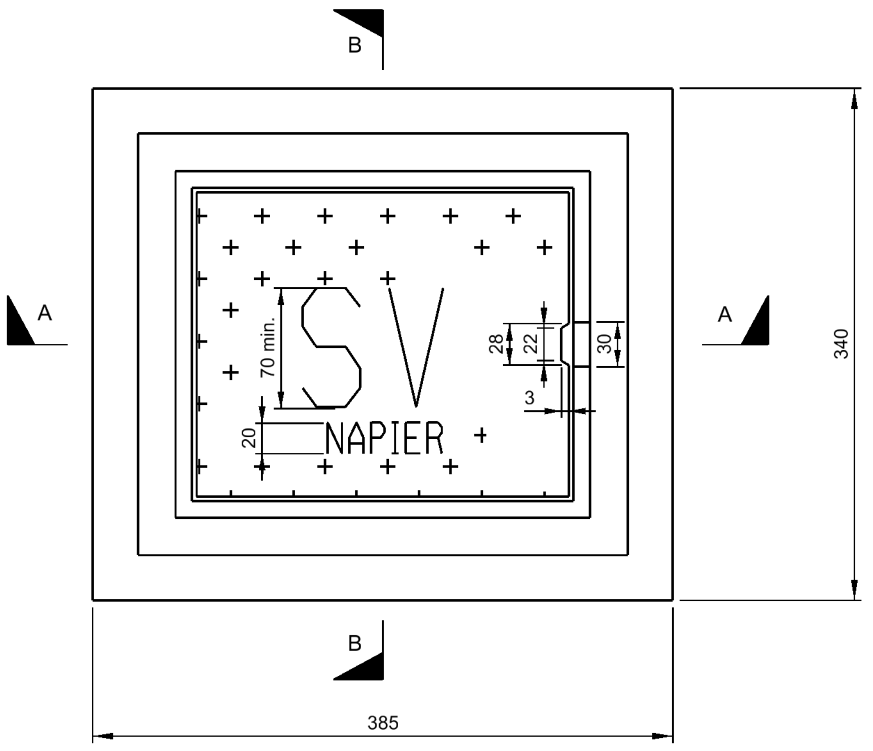
SECTION B - B

NOTE: All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**FIRE HYDRANT BOX DETAILS**	NOT TO SCALE	**WS16**



SECTION A - A

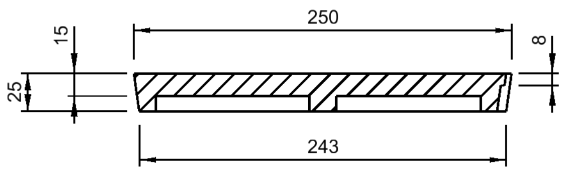


PLAN

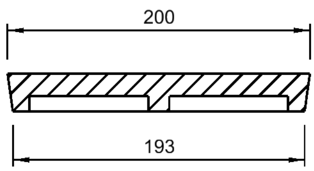
NOTES:

1. See WS18 for cross section B-B
2. All dimensions are in mm.

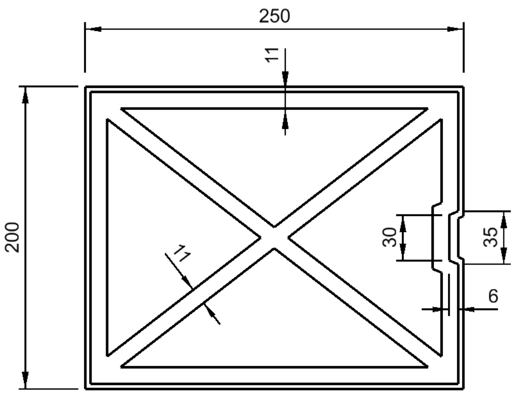
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	VALVE BOX	NOT TO SCALE	WS17



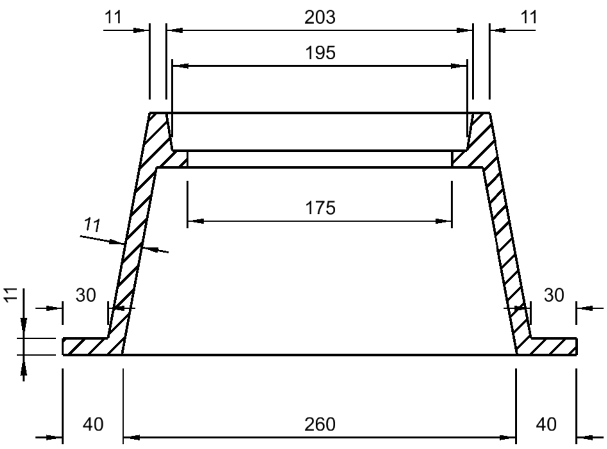
SECTION A - A LID



SECTION B - B LID



PLAN UNDERSIDE OF LID

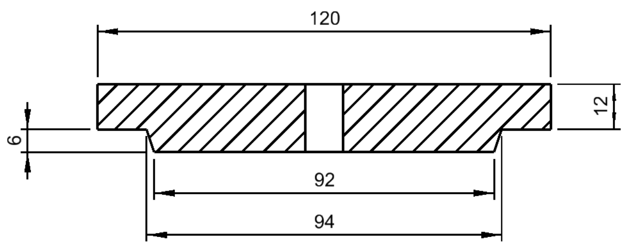


SECTION B - B

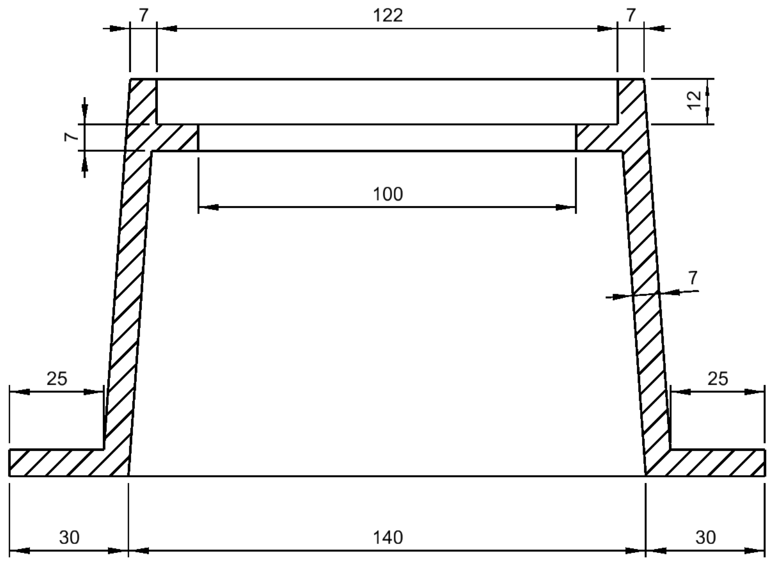
NOTES:

1. To be read in conjunction with WS17
2. All dimensions are in mm.

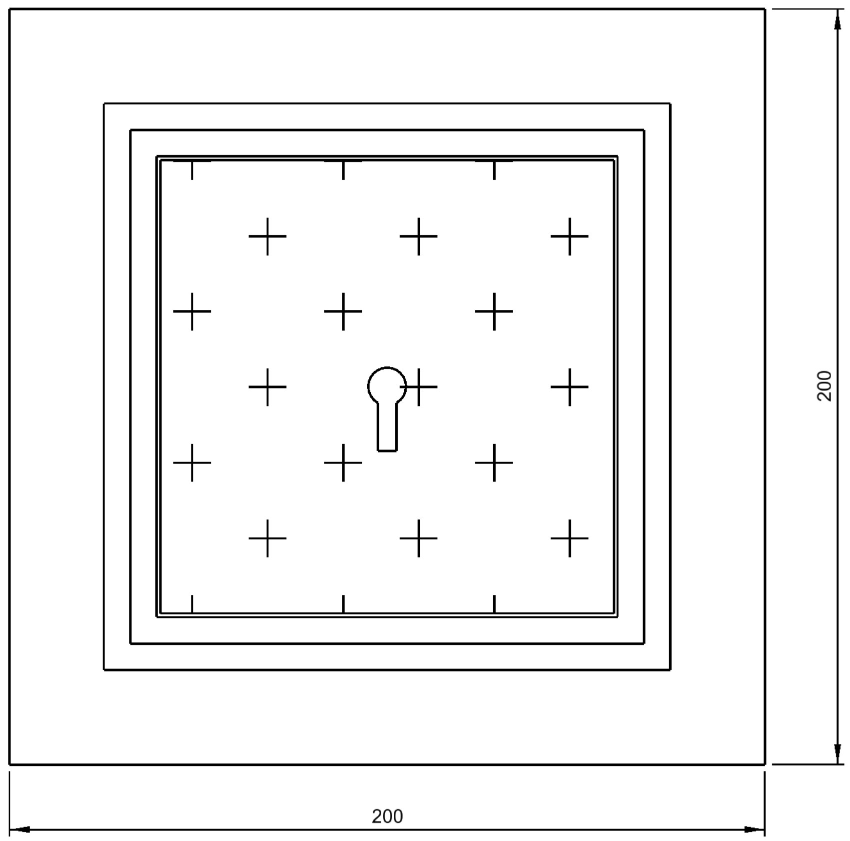
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**VALVE BOX DETAILS**	NOT TO SCALE	**WS18**



TOBY BOX LID SECTION



TOBY BOX SECTION

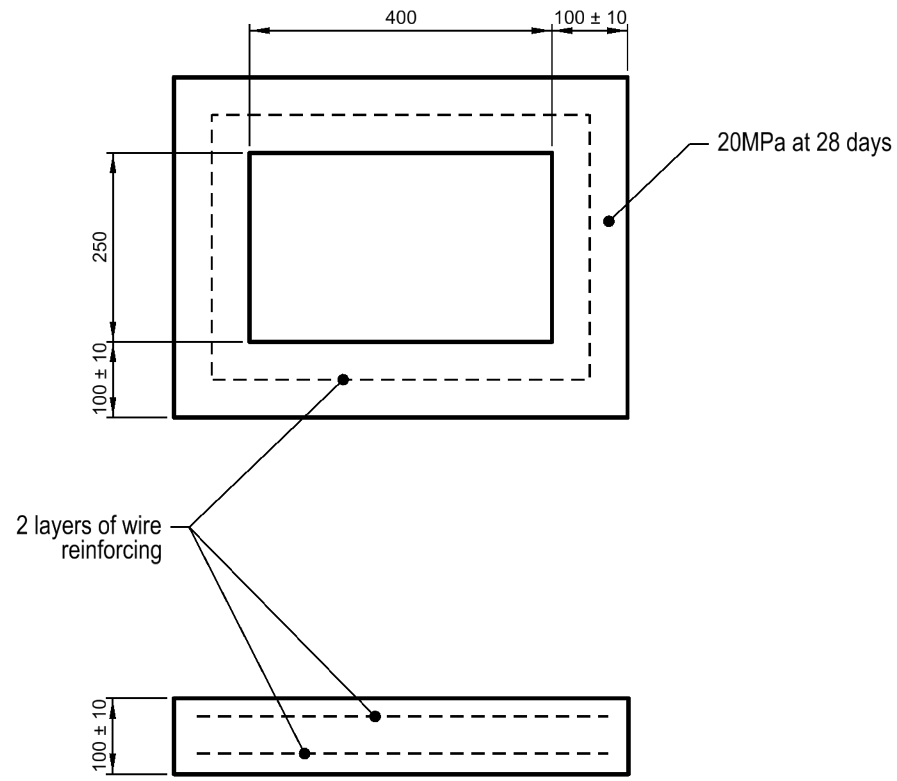


TOBY BOX PLAN

NOTES:

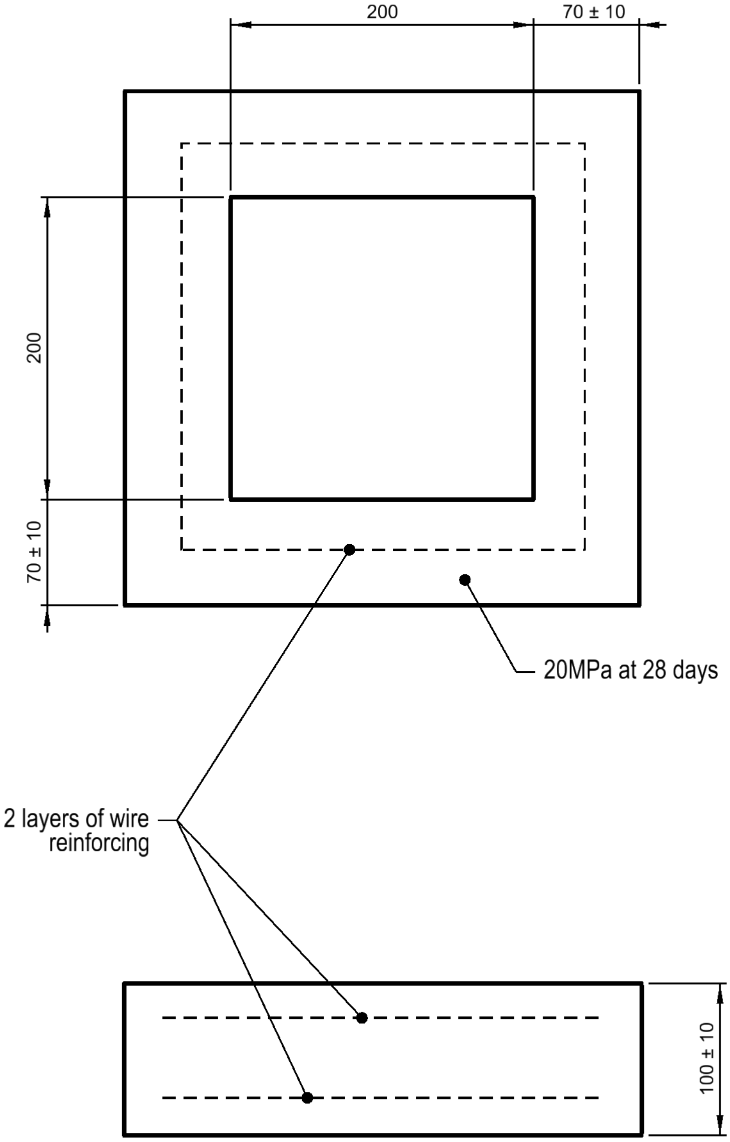
1. Use of these boxes is restricted and requires specific approval
2. All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	TOBY BOX DETAILS	NOT TO SCALE	WS19



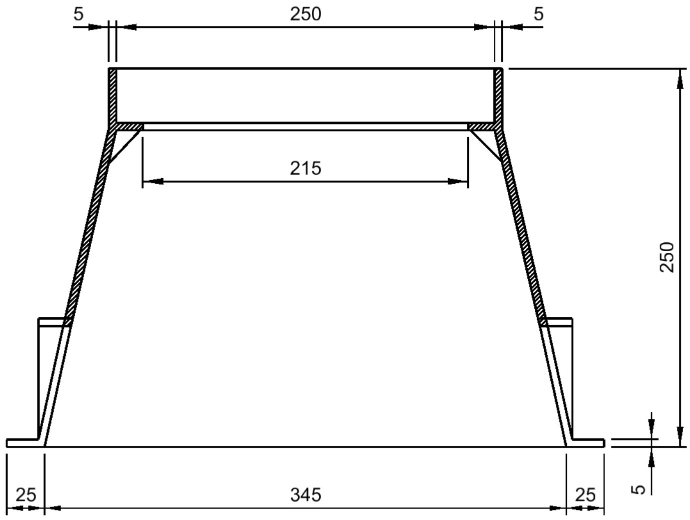
NOTE: All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**CONCRETE HYDRANT SURROUND**	NOT TO SCALE	**WS20**

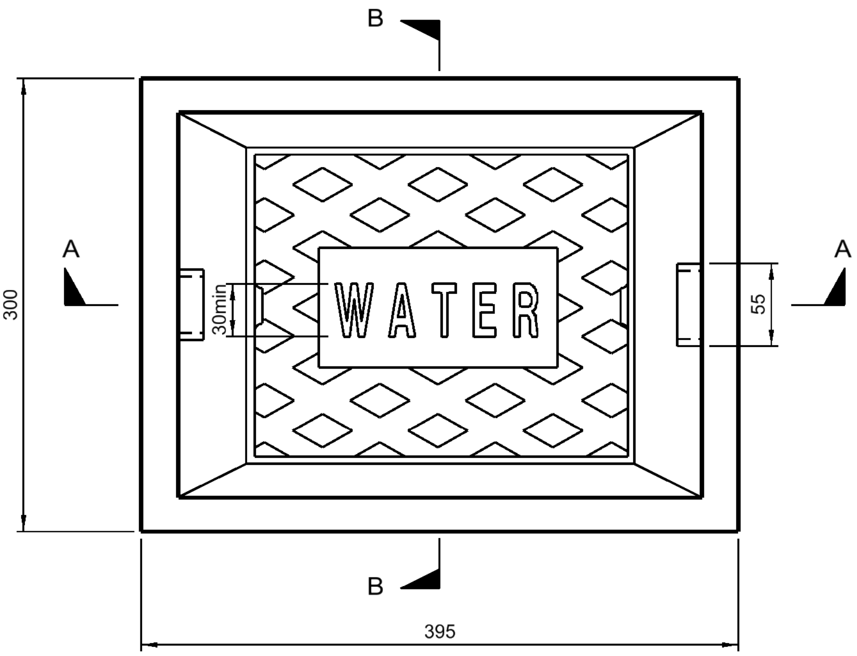


NOTE: All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**CONCRETE VALVE SURROUND**	NOT TO SCALE	**WS21**



SECTION A - A

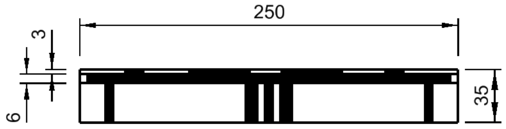


PLAN

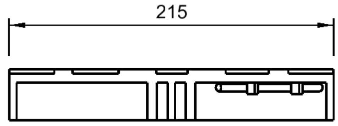
NOTES:

1. Manifold box material shall be high density polyethylene
2. Letters and patterns to be raised 3mm
3. Covers to be painted blue or left black
4. Polyethylene boxes not to be used in carriageways
5. See Dwg WS23 for Section B-B
6. All dimensions are in mm.

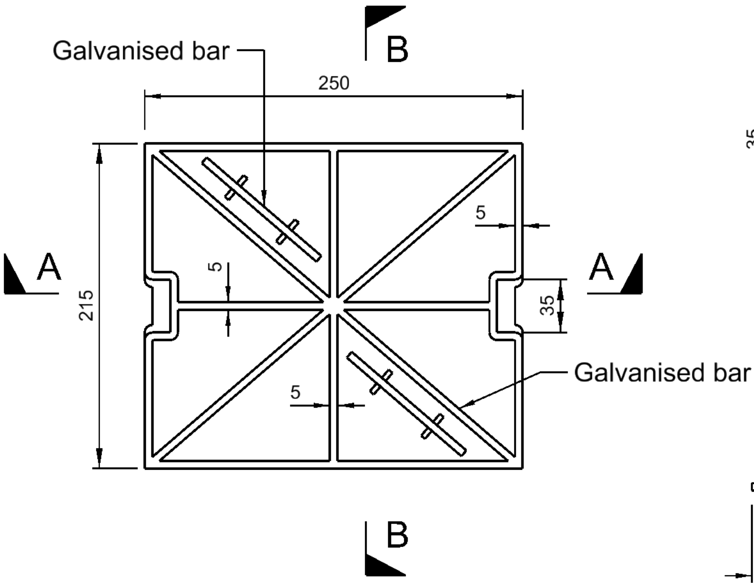
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	MANIFOLD BOX	NOT TO SCALE	WS22



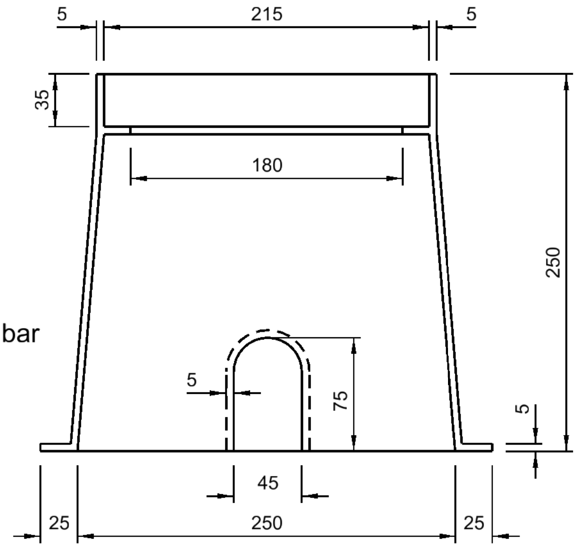
SECTION A-A - LID



SECTION B-B - LID



PLAN - UNDERSIDE OF LID

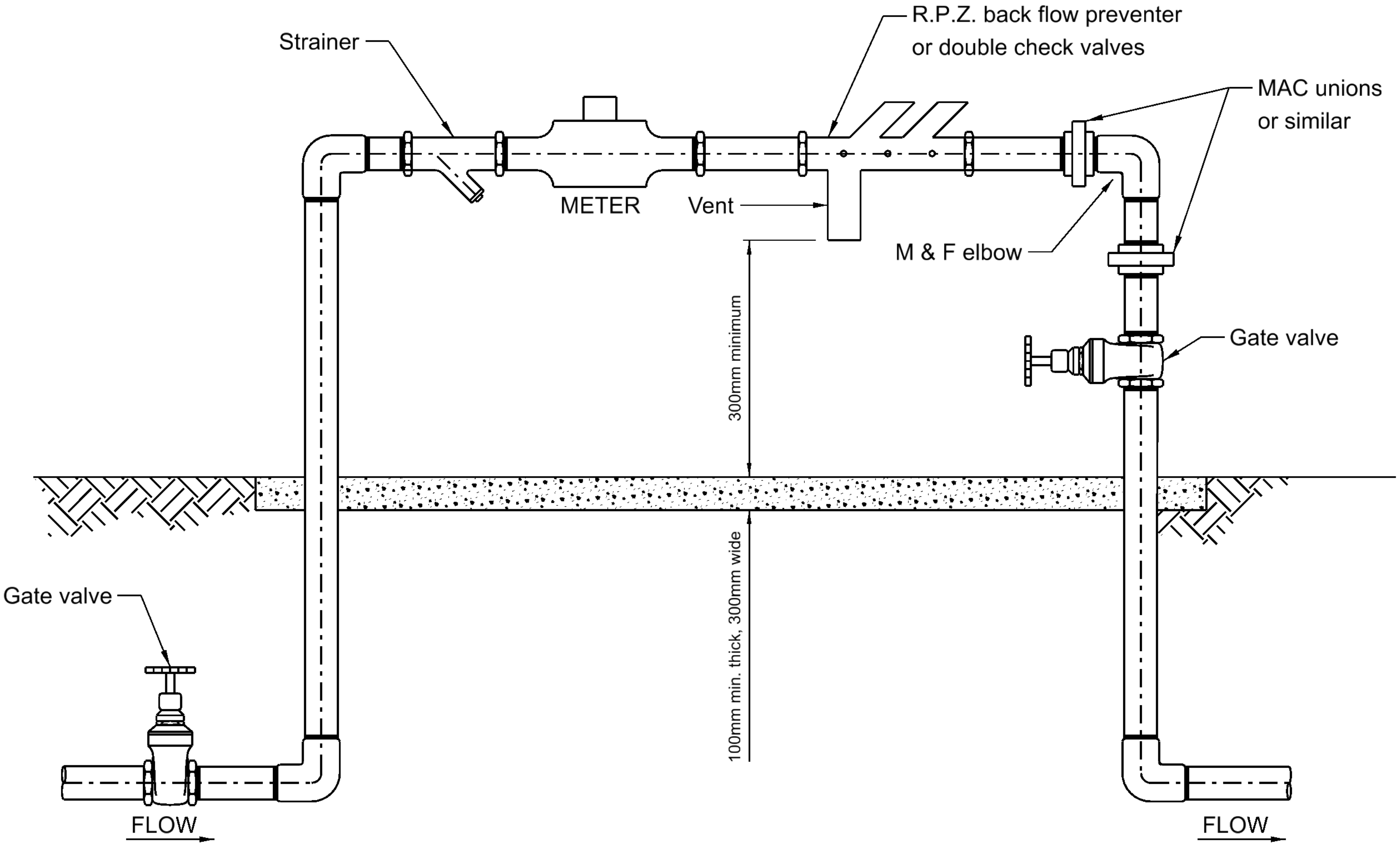


SECTION B-B

NOTES:

1. Manifold box material shall be high density polyethylene
2. 100mm long x 5mm diameter galvanised bar to be attached to under side of lid
3. Polyethylene not to be used in carriageway
4. All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**MANIFOLD BOX DETAILS**	NOT TO SCALE	**WS23**



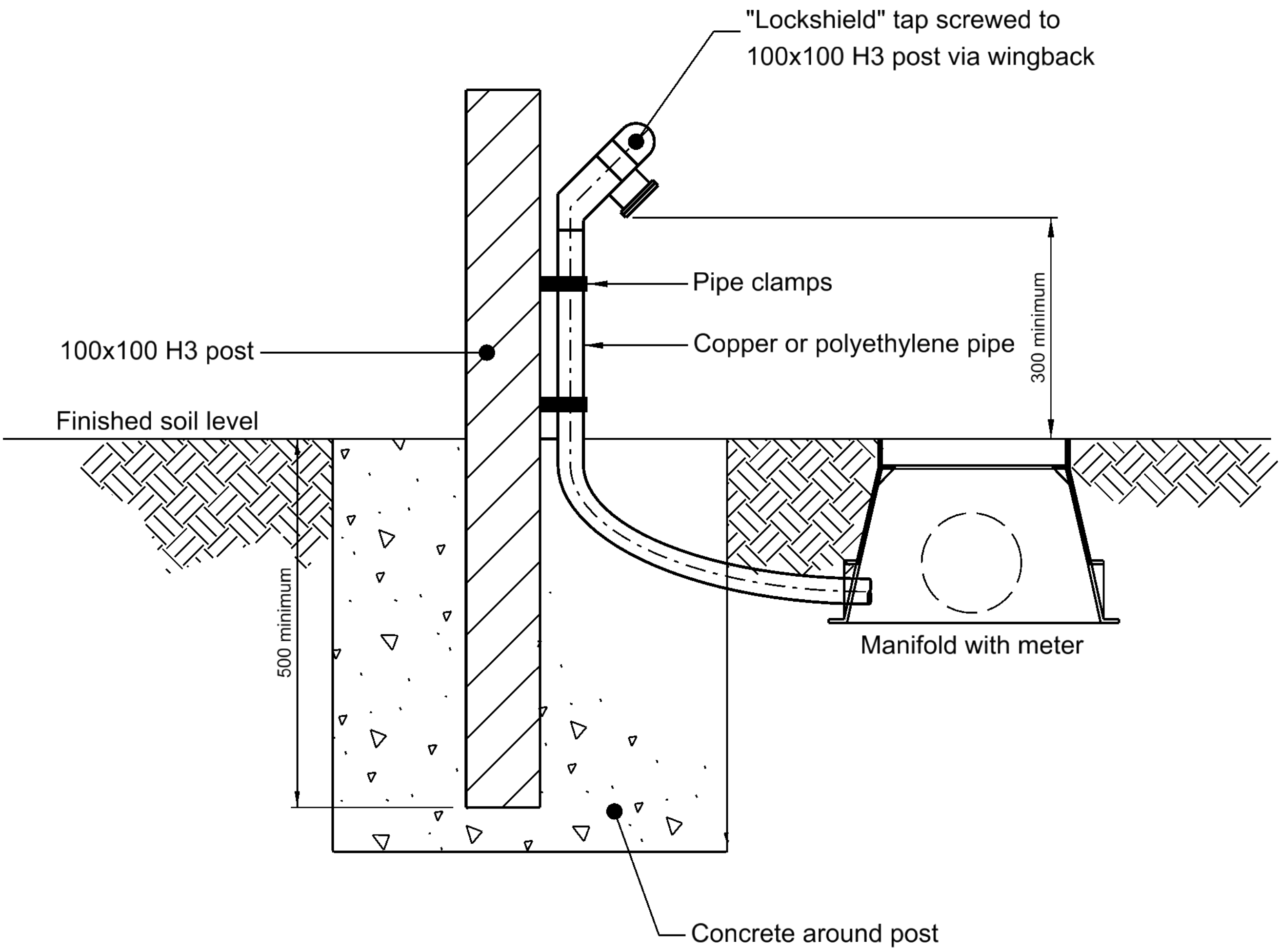
NAPIER CITY COUNCIL Te Kaunihera o Ahuriri

Version: SEPT 2020

BACKFLOW PREVENTER ASSEMBLY

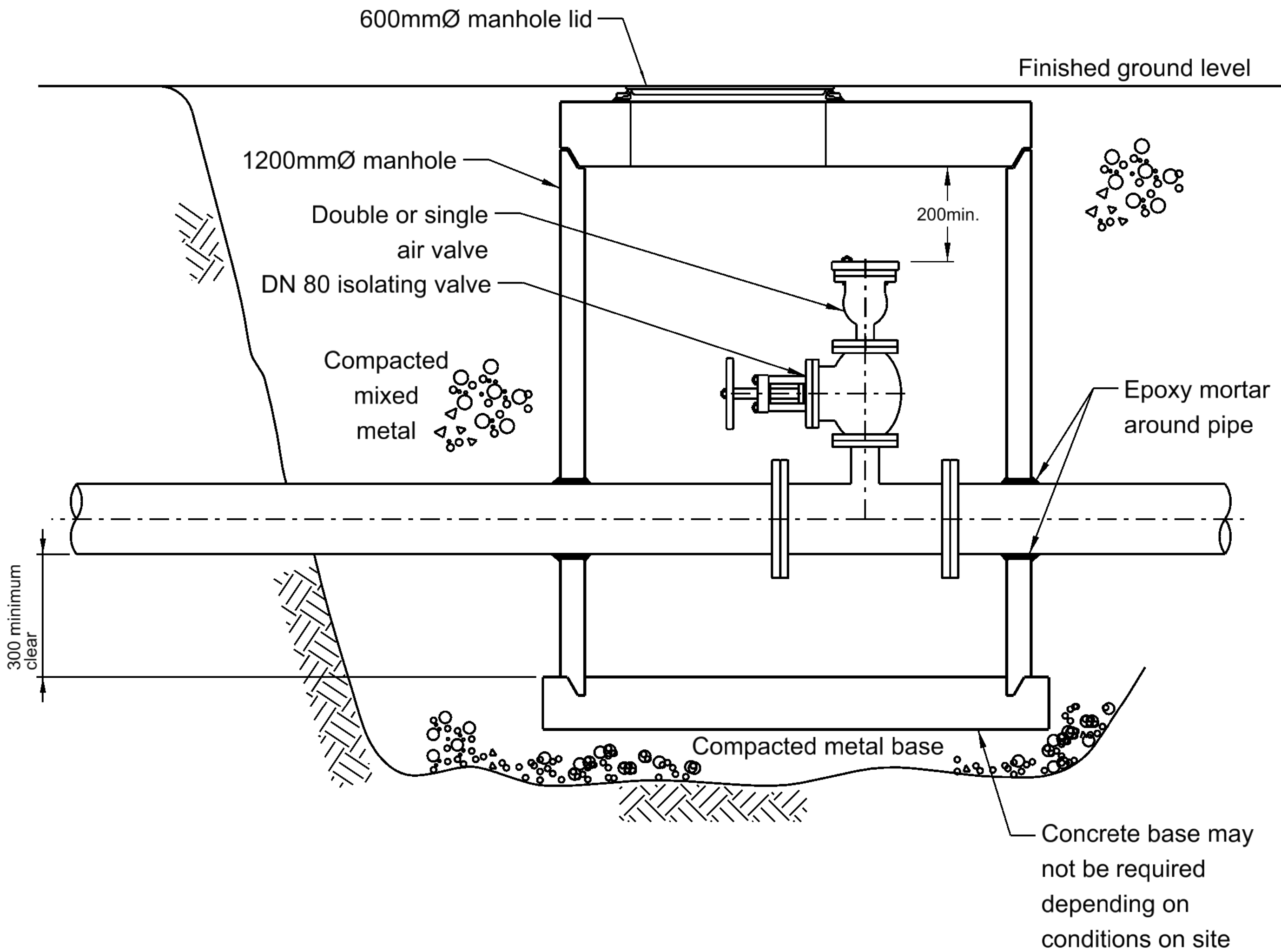
NOT TO SCALE

WS24



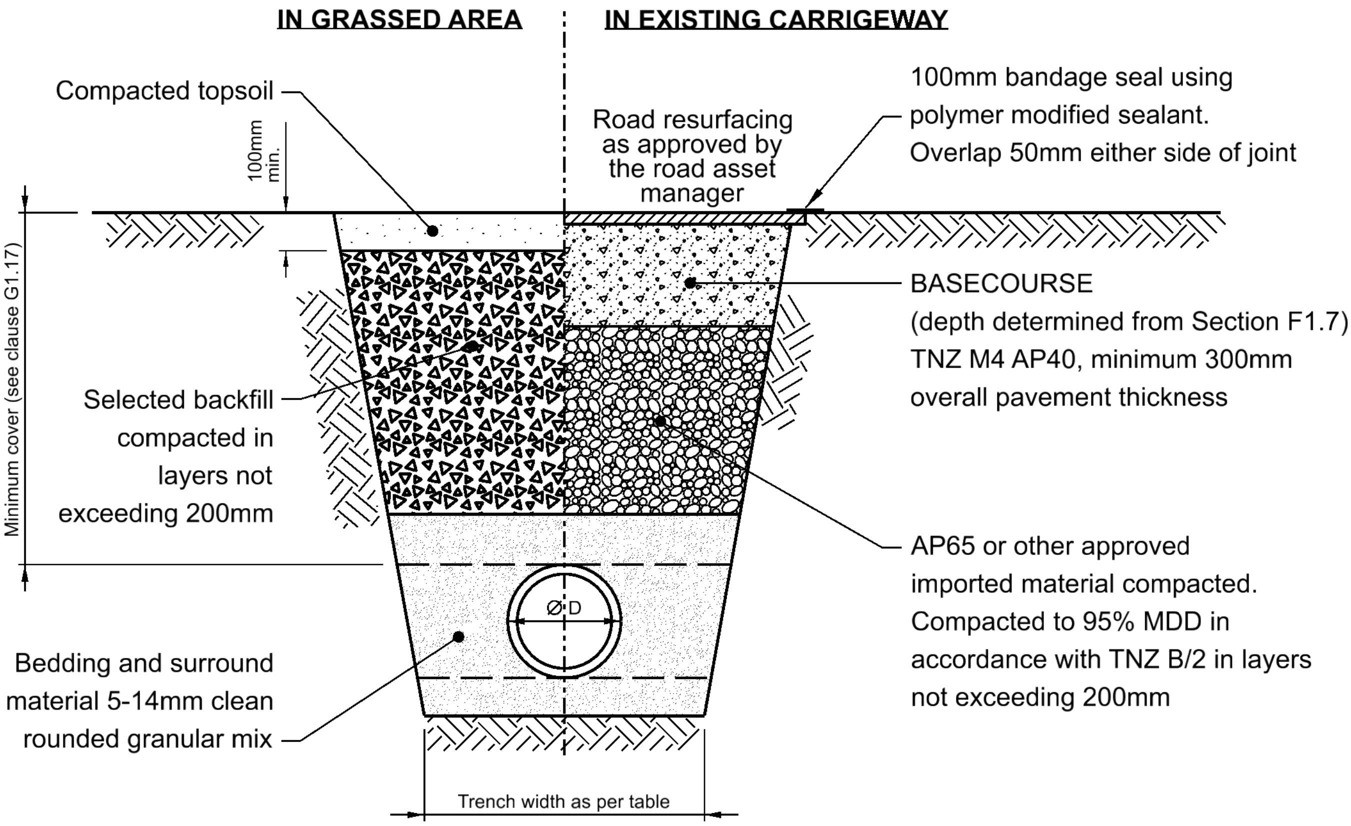
NOTE: All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**HOSE TAP SPECIFICATION**	NOT TO SCALE	**WS25**



NOTE: All dimensions are in mm.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**AIR VALVE DETAIL**	NOT TO SCALE	**WS26**



Water Supply - Clause G1.17/G2

Nominal Pipe Diameter	Trench Widths
20mm - 100mm	400mm - 750mm
150mm - 200mm	450mm - 800mm
250mm - 300mm	550mm - 900mm

NOTE: Any specific trench fill requirements shall be determined by the Design Engineer.

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	TYPICAL TRENCH DETAIL - WATER SUPPLY PIPES	NOT TO SCALE	WS27

7 LANDSCAPE

7.1 Scope (additional to NZS 4404: 2010)

This section shall be read in conjunction with the District Plan, including the provisions that contain the objectives, policies and methods relating to stormwater and earthworks associated with land development.

7.1.1 Mandatory Requirements and Performance Criteria (additional section to NZS 4404: 2010)

Reserves shall be developed in areas determined by the District Plan and in accordance with any conditions of a subdivision/development consent. All reserves, landscaping and equipment shall be designed by suitably qualified people. The minimum performance criteria are as follows:

(a) Satisfy the conditions of any resource consent and enhance the open space, recreation and environmental outcomes in the subdivision.
(b) Reserves shall be in a fit state for use or further development at the completion of the subdivision.
(c) All development on a reserve shall be such that user safety is maintained.
(d) All reserves shall have an open frontage with adequate vehicular access off a formed and sealed road. The minimum frontage shall be 20 metres.
(e) The manufacture and installation of all play equipment shall comply with the relevant codes and standards for that type of equipment.

Selection of tree type and planting location and patterns shall be undertaken by a suitably qualified person in consultation with the Council, so as to achieve the following minimum performance criteria:

(a) Satisfy the conditions of any Resource Consent and enhance the subdivision environment.
(b) Be located in such a way that access to utility services is available.
(c) Take into account the effect of a mature canopy on street lighting, daylight, access to buildings and footpaths, and property views.
(d) Be located in such a way that traffic and pedestrian safety is able to be maintained.
(e) Be selected and located so as to minimise future damage to roadscape, utility services and private property.
(f) Retains or improves existing vegetation cover

7.2 General

7.2.1 Approval (additional to NZS 4404: 2010)

All reserves shall be created in accordance with the approved subdivision plan.

Where landscaping is a condition of the subdivision/development then the approved works shall be carried out.

7.2.2 Environmentally-responsive design (as per NZS 4404: 2010)

7.2.3 Reserves and land protection covenants (as per NZS 4404: 2010)

7.2.4 Ecological, functional, and aesthetic opportunities (as per NZS 4404: 2010)

7.2.5 Landscape and planting opportunities (as per NZS 4404: 2010)

7.3 Design

7.3.1 Location (as per NZS 4404: 2010)

7.3.2 Reserves location and layout (additional to NZS 4404: 2010)

Reserves shall be developed in areas determined by the District Plan and in accordance with any conditions of a subdivision/development consent. All reserves, landscaping and equipment shall be designed by suitably qualified people.

All reserves shall have an open frontage with adequate vehicular access off a formed and sealed road. The minimum frontage shall be 20 metres.

Reserves shall be fully developed, and left in a fit state for use or further development at the completion of the subdivision.

Note: fully developed means; levelled, drained where necessary, water connections installed, cultivated and sown down in grass, planted with trees and play equipment installed as for an agreed Development Plan. Boundaries with neighbouring properties must be fully fenced, road frontages protected by pole barriers or other approved barriers, and concrete footpaths installed as required.

7.3.3 **Existing vegetation and trees** (as per NZS 4404: 2010)

7.3.4 **New trees and road geometry** (as per NZS 4404: 2010)

7.3.5 **Planted grass areas, berms, swales, or rain gardens** (as per NZS 4404: 2010)

7.3.6 **Species selection** (as per NZS 4404: 2010)

7.3.7 **Quality control** (as per NZS 4404: 2010)

7.3.8 **Landscaping structures** (additional to NZS 4404: 2010)

The adverse effects of urban subdivision/development are mitigated by the provision of suitably located recreation reserves and play areas.

The manufacture and installation of all play equipment shall comply with the requirements of NZS 5828 “Playground equipment and surfacing’ and the relevant codes and standards for the particular type of equipment.

7.3.9 **Fencing of reserves** (as per NZS 4404: 2010)

7.3.10 **Planting period and irrigation** (as per NZS 4404: 2010)

7.4 Construction and maintenance

7.4.1 **Introduction** (as per NZS 4404: 2010)

7.4.2 **Soil and fertility** (additional to NZS 4404: 2010)

Any topsoil or fill material to be imported into reserve areas shall be approved by the Parks and Reserves Asset Manager.

7.4.3 **Weeds and litter control** (as per NZS 4404: 2010)

7.4.4 **Planting grass areas** (additional to NZS 4404: 2010)

Berms shall be formed after all other works have been completed. The berm shall have a minimum topsoil depth of 100mm. The topsoil shall be of good quality, free from weeds, stones, and other foreign matter, and shall be graded to footpath edge and with a finished level 15 mm above the footpath level, to allow for settlement. The cross-fall shall generally be 1 in 25 (4%)

Berms shall be sown, maintained, mown, be substantially free of weeds, and achieve 90% grass strike prior to either:

(a) The issue of the Defects Liability Certificate
(b) The time at which Council takes over the development.

7.4.5 **Mulch** (as per NZS 4404: 2010)

7.4.6 **Specimen tree planting** (additional to NZS 4404: 2010)

Trees shall be planted in accordance with the approved landscape drawings and staked and tied to neatly cut timber stakes capable of providing support to the tree for at least three years. Root directors may be required to be installed with trees adjacent to underground services. For root director installation details, refer to Standard Drawings L01 and L02.

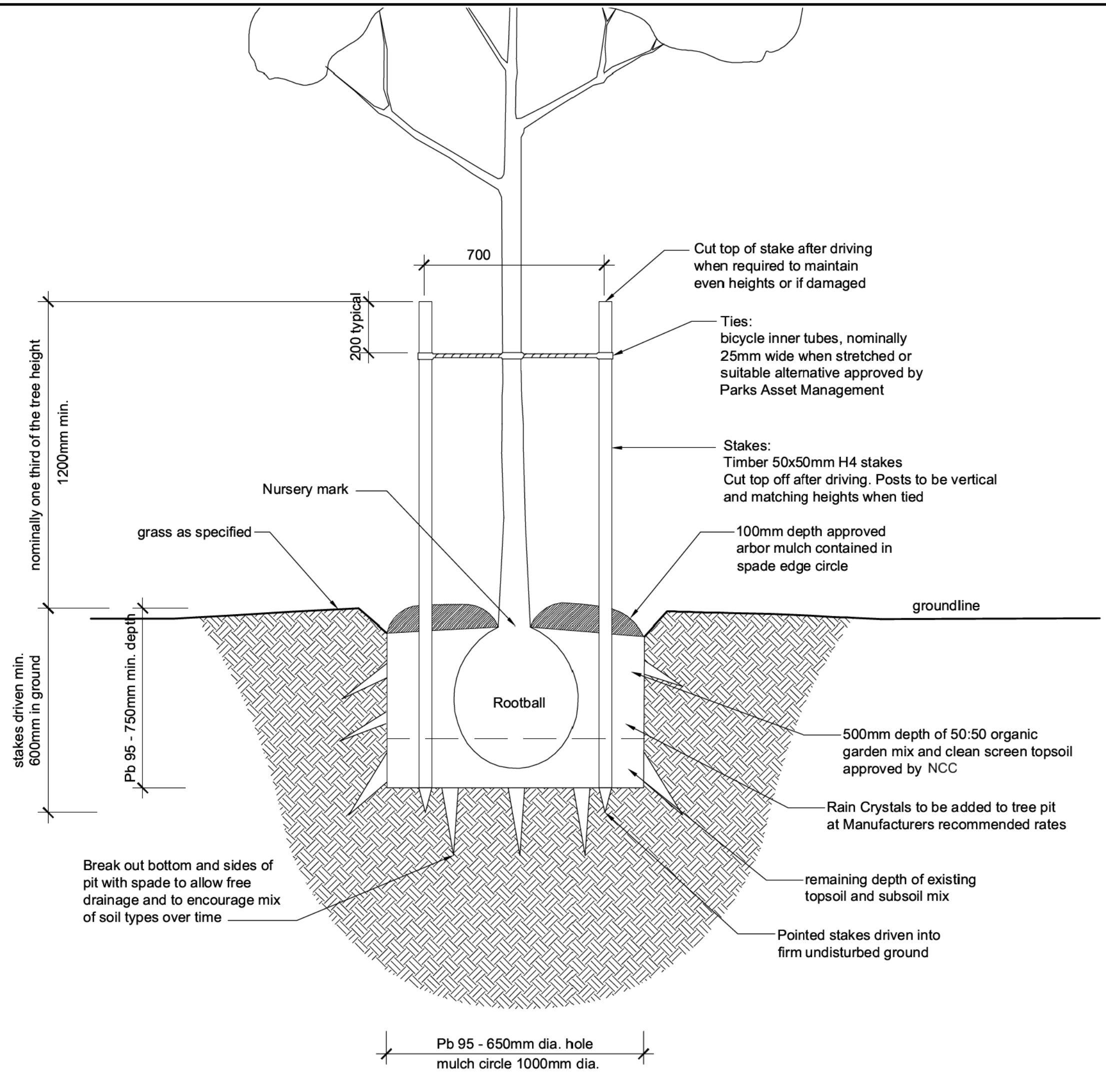
7.4.7 General amenity planting (as per NZS 4404: 2010)

7.4.8 Revegetation planting and existing vegetation (as per NZS 4404: 2010)

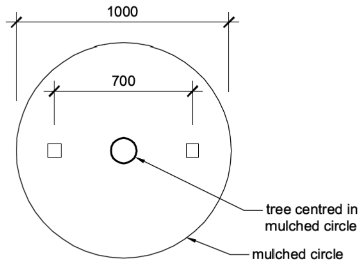
7.4.9 Swales, rain gardens, wetlands, and riparian margins planting (as per NZS 4404: 2010)

7.4.10 Pruning (as per NZS 4404: 2010)

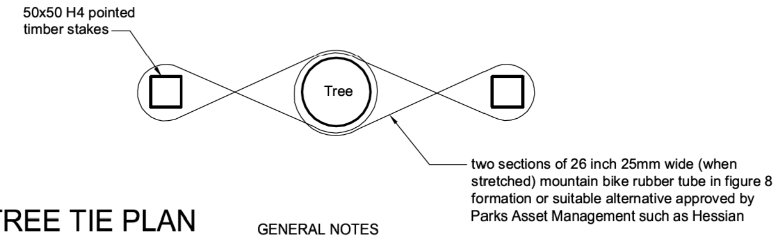
7.4.11 Maintenance (as per NZS 4404: 2010)



TREE PLANTING IN GRASS SECTION/ELEVATION



TREE PLANTING PLAN



TREE TIE PLAN

TREE SPECIFICATION

Trees shall be single leader and no branches lower than 1.5m from the top of the rootball.

Tree size to be PB 95 of best nursery stock, of good health, of good form and root structure and true to name and size specified.

Trees with poor root development will be rejected.

GENERAL NOTES

All trees shall be planted to the following performance standard

Target spacing for trees is one tree every 20m on both sides of carriageway but adjusted as necessary for driveways and street lights

All underground services to be accurately located prior to any excavation of tree pits

Two stakes per tree typically 1800mm long but 1500mm stakes may be used on shorter trees where approved by Parks Asset Management

All stakes to be driven until firm and then cut to consistent height. All stakes shall be vertical & perpendicular when tied

Steel central stake/pipe to support taller whippy trees where required

Tree tying heights and stake orientation to be confirmed with Parks Asset Management for each tree planting project

Stakes used in Town Centres tree planting to be stained black with minimum two coats

3 No. 10g Grow Tabs at base of root ball mixed in with approved organic garden mix are required at time of planting and these can be obtained from NCC on request

Rain Crystals are required at time of planting to manufacturers recommended rates and these can be obtained from NCC on request.

No tree shall be planted within 5m of any streetlight

Derived and used with permission from Hastings District Council

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	TYPICAL TREE PLANTING IN GRASS DETAILS	NOT TO SCALE	L01

GENERAL NOTES

All trees shall be planted to the following performance standard

Target spacing for trees is one tree every 20m on both sides of carriageway but adjusted as necessary for driveways and street lights

Trees less than 1250mm from edge of any hard infrastructure eg kerb, footpath require an NCC precast concrete tree pit

Precast concrete tree pits available from NCC or suitable alternative root control system approved by Parks Asset Management such as root barrier or alternative shaped pit

All underground services to be accurately located prior to any excavation of tree pits

Two stakes per tree typically 1800mm long but 1500mm stakes may be used on shorter trees where approved by Parks Asset Management

All stakes to be driven until firm and then cut to consistent height. All stakes shall be vertical & perpendicular when tied

Steel central stake/pipe to support taller whippy trees where directed by Parks Asset Management

Tree tying heights and stake orientation to be confirmed with Parks Asset Management for each tree planting project

Stakes used in Town Centre tree planting to be stained black with minimum two coats

3 No. 10g Grow Tabs at base of root ball mixed in with approved organic garden mix are required at time of planting and these can be obtained from NCC on request

Rain Crystals are required at time of planting to manufacturers recommended rates and these can be obtained from NCC on request.

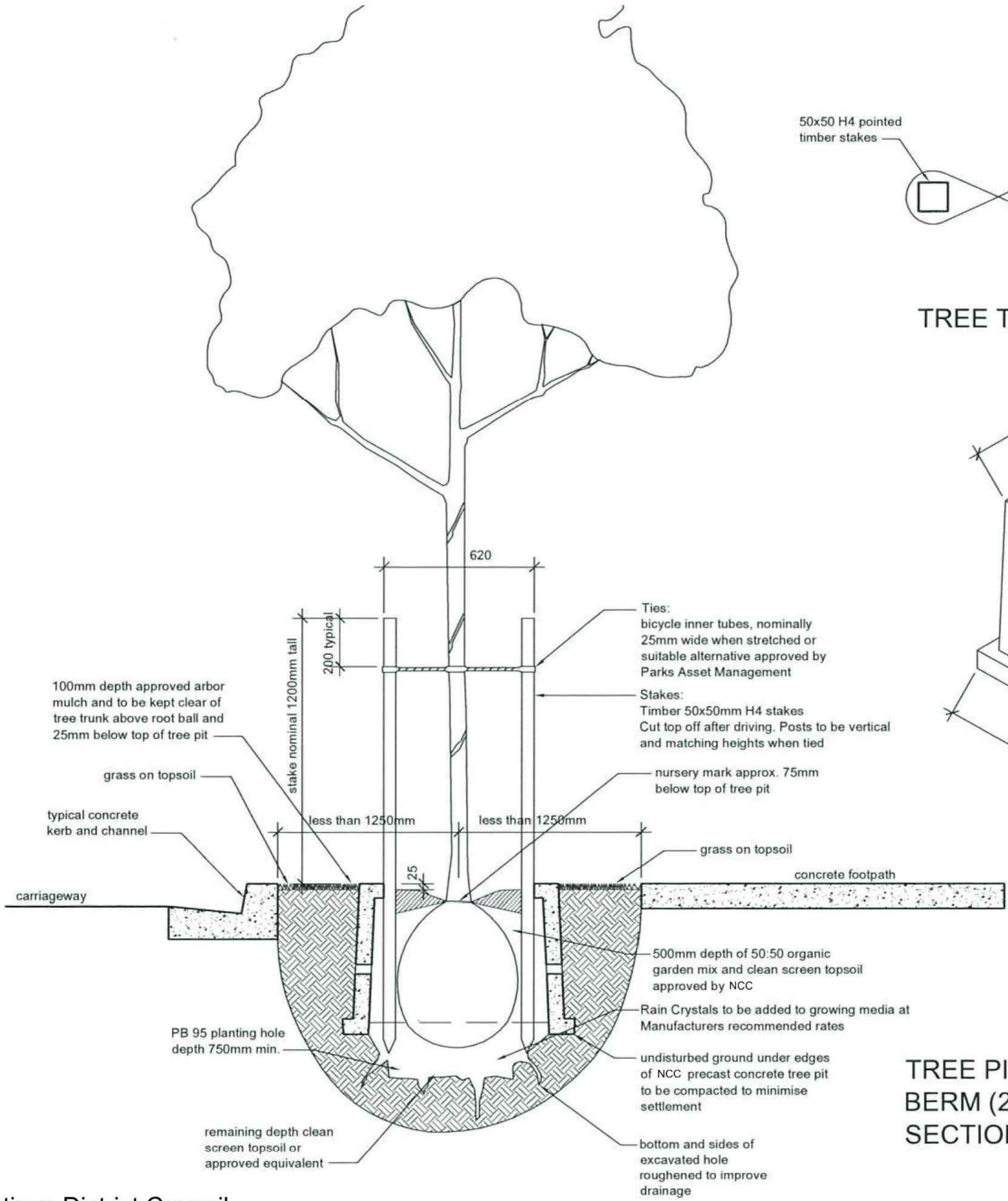
No tree shall be planted within 5m of any street light

TREE SPECIFICATION

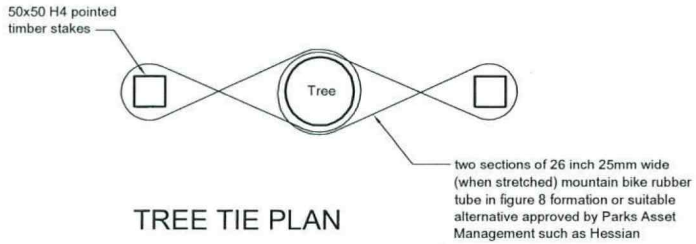
Trees shall be single leader and no branches lower than 1.5m from the top of the rootball.

Tree size to be PB 95 min. of best nursery stock, of good health, of good form and root structure and true to name and size specified.

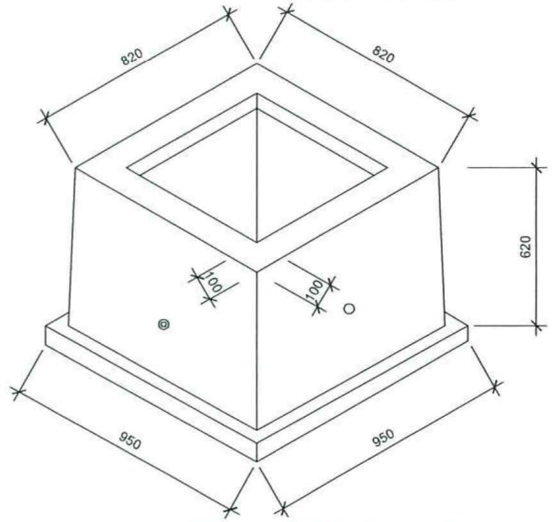
Trees with poor root development will be rejected.



TREE PIT IN NARROW GRASS BERM (2.5m max. width typical) SECTION/ELEVATION



TREE TIE PLAN



PRECAST CONCRETE TREE PIT AXO VIEW

Derived and used with permission from Hastings District Council

NAPIER CITY COUNCIL Te Kaunihera o Ahuriri	Version: SEPT 2020	**TYPICAL TREE PLANTING WITH TREE PIT DETAILS**	NOT TO SCALE	**L02**

8 NETWORK UTILITY SERVICES

8.1 Scope (consistent with NZS 4404: 2010)

This section sets out requirements for the provision of all network utility services including but not limited to stormwater, wastewater, and water supply systems, power, telecommunications and gas, and their locations in the road.

All network utility services shall be designed and installed in accordance with any resource consent and District Plan requirements.

8.2 General (as per NZS 4404: 2010)

8.3 Design

8.3.1 Plans

8.3.1.1 Specific Requirements for Electrical Power (new section to NZS 4404: 2010)

Electrical power facilities shall be designed and constructed to appropriate technical standards and codes so as to achieve the following minimum performance criteria:

(a) Utilise separate cables for power and road lighting.
(b) Provide underground cabling with the following exceptions:
    i. Industrial environments
    ii. Rural environments with lots in excess of 2 hectares
    Note: Any variations other than to have cables underground shall be considered as a restricted discretionary activity.
(c) Use the best practical option to ensure that electrical equipment is above ground and designed and constructed so as to minimise any visual impact.
(d) Ensure that equipment prone to water damage or becoming dangerous when wet is located so as to remain operational during a storm having a 2% probability of occurring annually.
(e) Be located so as to ensure public safety and minimise public and traffic obstruction or inconvenience.
(f) Have capacity suitable for carrying peak loads anticipated during their lifetime.
(g) Have a design life which is compatible with the facilities being served.
(h) Be compatible with the existing network.
(i) Be laid out in such a way as to facilitate ongoing maintenance and enable servicing of all expected lots and abutting sites and roads.
(j) Incorporate redundancy, safety and alarm provisions to minimise the potential for loss of service and danger to human life. Alarm provisions should be of no greater than or less than the standard of those prevailing generally for electrical reticulation work by network utility operators.
(k) Be located at a safe distance from other services.
(l) Be capable of carrying all anticipated superimposed loads without unacceptable movement of ground or components.
(m) Comply with any applicable Resource Consent and minimise adverse environmental effects

Design of power supply facilities may be carried out by the relevant Electrical Network Operator or other designer approved by the Council and the relevant Electrical Network Operator.

8.3.1.2 Specific Requirements for Road Lighting (additional section to NZS 4404: 2010)

As per Section 8.3.1.1 plus the following.

Road lighting facilities shall be designed and constructed to appropriate technical standards so as to achieve the following minimum performance criteria.

(a) Utilise lamps and lighting standards at locations which provide visibility and security to standards appropriate to the road hierarchy.
(b) Incorporate circuits and switching that enables Council to provide different communities with different periods over which lights are on and to enable adjustment of such time periods.

(c) Comply with the requirements of AS/NZS 1158 “Road Lighting”

Design of lighting, cabling, lamps, standards and associated facilities may be carried out by the relevant Electrical Network Operator or a designer approved by the Council and the relevant Electrical Network Operator.

8.3.1.3 Specific Requirements for Gas Installations (additional section to NZS 4404: 2010)

Gas supply systems for energy demands shall be provided in a safe manner and to the environmental standards required under these Criteria in areas where a gas reticulation system is required or considered desirable by the Council.

Reticulation shall be laid in berm areas between the footpath and road boundary, and be clear of road or accessway formation areas. Any above ground plant will require specific approval as to siting. Small above ground plant may be located in the road berm or in areas specifically set aside for this purpose. Large plant shall be placed in off road land areas specifically designated for this purpose.

Minimum cover of pipe work in berms and footpaths shall be 750mm. In roads, minimum cover shall be 900 mm unless the pipe is ducted, in which case 750mm cover is acceptable. Reticulation shall be provided with sufficient valves and loop systems to minimise the loss of service.

Every lot connected to the reticulation, shall be provided with a meter, which shall be located near the centre of the frontage of each lot, and within 300 mm of the boundary on the road side.

Gas reticulation and associated facilities shall be designed and constructed to appropriate technical standards and codes so as to achieve the following minimum performance criteria:

(a) Have capacity appropriate to the anticipated peak demand during its lifetime.
(b) Be laid out underground in such a way as to be able to service all relevant lots or demand points and to facilitate ongoing maintenance.
(c) Have a design life compatible with the facilities being served.
(d) Be designed to standards and incorporating materials, safety and alarm provisions to appropriate standards.
(e) Be located at a safe distance from other services.
(f) Be capable of carrying all anticipated superimposed loads without unacceptable movement of ground or components.
(g) Ensure that any equipment that requires to be constructed above ground is designed and built to aesthetically acceptable standards so as to minimise visual impact.
(h) Comply with any applicable Resource Consent and minimise adverse environmental effects.

Before Council will process any subdivision or land development for takeover, letters shall be provided by the gas network utility operator advising that the work has been completed to their standards and they have taken responsibility for its ongoing operation and maintenance.

8.3.1.4 Specific Requirements for Telecommunications and Information Cabling (additional section to NZS 4404: 2010)

Telecommunications and information reticulation and associated facilities shall be designed and constructed to appropriate engineering and technical standards and codes so as to achieve the following minimum performance criteria:

(a) Have capacity appropriate to the anticipated peak demand during its lifetime.
(b) Provide underground cabling with the following exceptions:
    i. Industrial environments
    ii. Rural environments with lots in excess of 2 hectares
    Note: Any variations other than to have cables underground shall be considered as a restricted discretionary activity.
(c) Be laid out in such a way as to service all lots and demand points and to facilitate ongoing maintenance.

(d) Have a design life compatible with the facilities being served.
(e) Be designed to standards and incorporating materials, safety and alarm provisions to appropriate technical standards and codes.
(f) Be located at a safe distance from other services.
(g) Be capable of carrying all anticipated superimposed loads without unacceptable movement of ground or components.
(h) Ensure that any equipment that requires to be constructed above ground is designed and built to aesthetically acceptable standards so as to minimise visual impact.
(i) Be located so as to minimise public and traffic obstruction or inconvenience.
(j) Comply with any applicable Resource Consent and minimise adverse environmental effects.

Design of telecommunication facilities may be carried out by the relevant Telecommunication Network Operator or other designer approved by the Council and the relevant Telecommunication Network Operator.

8.3.1.5 **Specific Requirements for Traffic Services and Road Signage** (additional section to NZS 4404: 2010)

Traffic services and road signage shall be designed and constructed to appropriate engineering and technical standards and codes so as to achieve the following minimum performance criteria:

(a) Be laid out and marked to the standards current in Napier City at the time or where Napier City has no local standards to those accepted nationally at the time.
(b) In the case of signals, be designed to satisfy existing and anticipated future traffic needs.
(c) Have a design life compatible with the infrastructure being served.
(d) Be laid out in such a way as to facilitate ongoing maintenance.
(e) Be located so as to minimise public and traffic obstruction or inconvenience.
(f) Incorporate fail safe and alarm provisions to minimise the potential for loss of service and public danger.
(g) Comply with any applicable Resource Consent or New Zealand Transport Agency (NZTA) requirements and minimise any adverse environmental effects.

8.3.2 **Utilities above ground** (as per NZS 4404: 2010)

8.4 Construction

8.4.1 Underground cabling

8.4.1.1 **Electricity and Road Lighting** (additional section to NZS 4404: 2010)

The service shall include reticulation cabling, lighting poles, connections to all lots and all associated above and below ground plant and controls necessary for the safe and efficient provision of community electricity and lighting needs.

8.4.1.2 **Telecommunications and Information Cabling** (additional section to NZS 4404: 2010)

The service shall include all cabling, jointing and distribution boxes and all associated facilities necessary to provide comprehensive and efficient Telecommunication and Information Systems.

8.4.1.3 **Relevant Standards** (additional section to NZS 4404: 2010)

Electrical, Telecommunication and Information cabling shall conform to the standards set by the relevant network utility operator and to the approval of Council.

8.4.1.4 **Electrical, Telecommunication & Information Cabling Design** (additional section to NZs 4404: 2010)

All cabling systems shall be designed to the appropriate technical standards and to service peak expected demands during the life of the facility based on the expected land zonings. They shall be provided with adequate loop systems and safety features to ensure public safety and to reduce inconvenience to the public.

8.4.1.5 **Reticulation** (additional section to NZS 4404: 2010)

Lighting and electrical cables shall be laid in a common trench under the road berm between the footpath and lot boundaries. The preferred location is shown on Standard Drawing R04.

Telecommunication and Information cabling shall be laid under berms. The preferred location is shown on Standard Drawing R04.

Where underground reticulation crosses roads or accesses it shall be placed in ducts. Underground reticulation shall be at a cover of not less than 600 mm and cables shall be protected, as required by the relevant network utility operator. In constrained conditions, the minimum cover may be reduced to 450mm with the approval of the Transportation Asset Manager. Overhead reticulation shall have adequate clearance above the maximum allowable vehicle height.

8.4.1.6 **Plant** (additional to NZS 4404: 2010)

No plant in urban developments shall be in private property. Small above ground plant may be located discretely in road berms or areas set aside for the plant. Large plant such as substations shall be placed on off-road land areas designated specifically for the purpose.

Below ground plant shall be placed in accessible chambers outside of road carriageways wherever possible. Service pillars for each lot shall be located in the road within 300mm of the front boundary of lots and on an extension of the boundary between lots.

8.4.1.7 **Acceptance of Cabling** (additional to NZS 4404: 2010)

Before Council will process any subdivision or land development for takeover, letters shall be provided by all network utility operators, advising that the work has been completed to their standards and they have taken responsibility for its ongoing operation and maintenance.

8.4.2 **Materials** (as per NZS 4404: 2010)

8.4.3 **Conversion to underground on existing roads** (as per NZS 4404: 2010)

8.4.4 **Commercial and industrial subdivisions** (as per NZS 4404: 2010)

8.4.5 **Location of services** (as per NZS 4404: 2010)

8.4.6 **Trenches** (as per NZS 4404: 2010)

APPENDIX A: ACCEPTABLE MATERIALS

1.0 Water Supply Materials

1.1 General

All pipes, fittings, hydrants, valves and other materials used in the construction of water mains and services shall be new, clean and in good condition.

The pressure rating of pipes and fittings shall be the larger of 90 metres or 1.5 times the maximum head anticipated in service.

1.2 Preferred Materials

In order to standardise materials and therefore reduce the stocking of spare components, Table 21 lists the materials which are preferred for use in water supply reticulation. Alternatives may only be used if approved by Council. Typically alternatives would have to offer superior asset life, operation and/or performance.

Application	Material Types Preferred
Principal mains	PVC pipe, elastomeric ring jointed pipe or Polyethylene pipework
Rider mains	uPVC Series1 PN9 pipe, solvent jointed or PE80 with Pushlok couplings
Service Connections	DN20 to DN50 to be PE 80 SDR17 Series 1 pipe with mechanical couplings that comply with the requirements of AS/NZS 4519 or electro-fusion joints > DN50 can use uPVC Series1 PN9 pipe Electro-fusion fittings are required for service connections off PE mains
Rider main fittings	For PVC pipes, fittings other than valves shall be LG2 gunmetal complying with BS EN 1982 or AS 2345. Metal fittings shall be threaded to BS 21
	For PE80, electro-fusion fittings or approved mechanical fittings
Bends	Proprietary Ductile Iron fittings compliant with AS/NZS 2280, shall be used at all changes of direction
Tapping Bands	LG2 gunmetal threaded to BS 21:1985 with integrated LG2 bolts complying with AS 2345.

Table 21 Preferred Materials

1.3 Pipe Materials

1.3.1 Polyethylene Pipe

Polyethylene pipe for use in cold potable water services shall comply with the requirements of AS/NZS 4130 series 1 pipe with a minimum pressure rating of PN10 shall be used.

Couplings shall comply with the requirements of AS/NZS 4129 and shall incorporate a rigid internal sleeve liner at compression fittings if approved for use.

1.3.2 Unplasticised PVC (uPVC) Pipes

Pipe and fittings for use with potable water shall comply with AS/NZS 1477 and shall have a minimum pressure rating of 90 metres. The metric pipe series (Series 1) shall be used.

uPVC pipes where used for principal mains and all pipes greater than DN 50 shall have elastomeric ring joints. uPVC pipes of DN 50 or less may be solvent cement jointed.

The use of Gibault joints shall be minimised. Cast iron hydrant tees and other fittings with formed elastomeric ring sockets are preferred.

1.3.3 Oriented PVC (PVC-O) Pipes

The use of PVC-O pipe and fittings is not permitted.

1.3.4 Spiral Welded Steel Pipe

Spiral welded steel pipes shall be manufactured by the spiral butt welding process and shall meet the requirements of NZS 4442. Buried pipes shall be lined internally with mortar, and coated externally with an approved tape wrapping system as required by NZS 4442. When used for above ground situations special protective coatings will be required to best suit the location. These may include tape wrapping, hot galvanising or paint/epoxy coating systems. Jointing systems shall be as approved by the manufacturer and the Council.

1.3.5 Ductile Iron Pipe

May be used for trunk mains in compatible soil conditions.

Ductile Iron pipes and fittings shall comply with the requirements of AS/NZS 2280. Unless otherwise specified ductile iron pipes shall be internally lined with cement mortar and externally coated with a bitumen coating. The pipe shall be protected by a loose fitting polyethylene jacket.

1.3.6 Cast Iron Pipe

Not to be used.

1.4 Joints

The following details acceptable joint systems, or specifies standards for systems mentioned above.

1.4.1 Gibault Type Joints

Gibault type joints shall be ductile iron or stainless steel 316.

Where gibault joints or similar couplings are used in conjunction with PVC pipe, the central sleeve shall have a minimum length as tabulated below:

Fitting Nominal Bore DN (mm)	Min Central Sleeve Length
100	105
150	125
200	150
300	185

Table 22 Gibault Central Sleeves Min Length

Tapped elongated gibault joints with approved coating may be used for connections up to DN 50. All gibault joints used in potable water application shall be factory coated to inhibit corrosion.

For pipes of DN 200 to 450, only elongated gibault joints may be used. For pipes of over DN 450 all joints shall be separately detailed to be capable of resisting seismic movement. Gibault joints without designed joint ties will generally not satisfy the seismic needs.

1.4.2 Flanges

Shall comply with the requirements of AS 4087 for standards and drilling patterns.

Flange size and thickness, bolt size and pattern shall be appropriate to the relevant standard and the test pressure applicable at the site but never less than 140 metres rated test head.

Flange gaskets shall be 3 mm or thicker nylon reinforced rubber.

1.4.3 Welded Joints

Welded jointing is acceptable for use in steel pipelines and welded specials are acceptable for use in pipelines. Welding shall be to NZS 4442.

1.4.4 Elastomeric Seals

Elastomeric seals shall comply with the requirements of AS1646 and are acceptable in ductile iron, steel, uPVC provided all components are rated to the test pressure required but not less than 140 metres.

1.4.5 Threaded Joints

These shall comply with BS 21.

1.4.6 Other Joint Systems

Other joint systems may be approved by the Council depending on the use and performance record of the system proposed, provided all components are rated to at least the required test pressure but not less than 140 metres.

1.5 Specials and Fittings

1.5.1 Polyethylene Fittings

Polyethylene pipe fittings shall only be used with polyethylene pipe. They shall comply with the requirements of AS/NZS 4129. Compression fittings shall incorporate a rigid sleeve liner supplied by the manufacturer. Pipe and fittings shall be mechanically held while welding is in progress.

1.5.2 Ductile Iron

Ductile iron pipe fittings and other castings shall comply with the requirements of AS/NZS 2280. All fittings shall have polymeric coatings and linings in terms of sections 7.3 and 7.4 of the standard.

1.5.3 Threaded Pipe Fittings (DN20 to 50)

Threaded pipe fittings shall be manufactured from LG2 gunmetal in compliance with BSEN 1982 or stainless steel 316 or dezincification resistant bronze as described in AS 2345 and shall be threaded to BS 21.

1.5.4 Steel

Spiral welded steel pipe fittings and specials shall comply with NZS 4442 and shall be mortar lined and coated externally to prevent corrosion of the steel surface. All welded joints shall be cleaned internally and externally after fabrication and repaired internally and externally to the same condition as the unaffected parts of the pipe.

Where used above ground they shall be specially coated externally to suit the environment. Where special external coatings are provided the pipe exterior shall be sand blasted after fabrication and prior to application of the coating. Where hot dip galvanising is used it shall comply with AS/NZS 4680. Epoxy or similar coatings shall be shop applied to the paint manufacturer's standards.

Approval of the system proposed shall be obtained from the Council for all external coatings proposed for use on exposed pipelines or pipes within reservoirs.

Where specials are fabricated from spiral welded steel and used below ground all slag shall be removed from weld lines, heated areas wire brushed clean and the exterior protective coating made good to the manufacturer's instructions. The whole fitting shall then be wrapped with an approved protective tape. Interior lining shall be made good with epoxy mortar.

Fittings and specials fabricated from Seamless galvanised steel pipe shall be sand blasted after fabrication and hot dip galvanised as specified above for galvanised spiral welded pipe. Welded fittings shall comply with ASME B16.9, factory made wrought steel butt-welding fittings.

1.5.5 Cast Iron

Cast iron pipe fittings shall not be used.

1.5.6 Tapping Bands

Shall be manufactured from LG2 gunmetal in compliance with BSEN or from Ductile Iron complying with AS/NZS 2280. Direct tapping of pipes is not permitted.

Polyethylene specific tapping bands shall be used for PE pipe.

1.5.7 Nuts and Bolts

Items such as nuts and bolts, washers and similar shall be galvanised steel with an average minimum zinc coating mass of 305 g/m^2.

2.0 Wastewater and Stormwater Materials

2.1 Preferred Materials

In order to standardise materials and therefore reduce the stocking of spare components, Table 23 lists the materials which are preferred for use in wastewater and stormwater reticulation. Alternatives may only be used if approved by Council. Typically alternatives would have to offer superior asset life, operation and/or performance.

<table>
<tr><th>Material</th><th>Preference</th><th>Material Standard</th><th>Laying Standard</th></tr>
<tr><td>Unplasticised PVC (uPVC)</td><td>Preferred</td><td>SN16 - AS/NZS 1260</td><td rowspan="2">Flexible pipelines
• Design AS/NZS 2566.1
• Laying AS/NZS 2566.2</td></tr>
<tr><td>Polyethylene</td><td>Approved for pressure applications</td><td>AS/NZS 4130
AS/NZS 4131</td></tr>
<tr><td>DICL – Ductile Iron Cement Mortar Lined</td><td>Preferred in shallow cover situations particularly in roads, not recommended in aggressive soils.</td><td>AS/NZS 2280 or BS EN 598</td><td>-</td></tr>
<tr><td>FRP-Fibreglass Reinforced Plastic</td><td>Approved for use for specific site conditions – refer Asset Manager</td><td>BS EN 14364 (2006) / BS 2782</td><td>-</td></tr>
<tr><td>Reinforced Concrete</td><td>Stormwater – preferred material
Wastewateer - Not to be used unless specifically approved</td><td>AS/NZS 4058 Wastewater to Class 4(Z), Stormwater to Class 2(X)</td><td>AS/NZS 3725</td></tr>
<tr><td>CLS –Cement Lined Steel</td><td>Approved for large diameter pumping mains</td><td>NZS 4442</td><td>-</td></tr>
<tr><td>Stainless Steel</td><td>Mechanical pipework and interconnecting pipework in valve chambers</td><td>-</td><td>-</td></tr>
<tr><td>Galvanised Steel</td><td>Wastewater - Not allowed
Stormwater – kerb connections only</td><td>-</td><td>-</td></tr>
</table>

Table 23 Wastewater and Stormwater Materials

2.2 Pipes

2.2.1 General

Whilst the following pipe materials can provide acceptable solutions for certain uses not all materials will be accepted for general use. The Design Co-ordinator shall discuss preferred pipe types with the Council prior to completion of design drawings and specification. Pipes shall comply with the industry accepted standard applicable at the time. Pipe selection shall recognise the soil type and groundwater around the pipe.

Pipes used shall be new and of good quality. All pipes shall utilise flexible joints of a type recommended by the manufacturer and as approved by the Council for the use being proposed.

2.2.2 Concrete Pipes

Concrete pipes shall be reinforced concrete, rubber ring jointed and shall comply with AS/NZS 4058 “Precast concrete pipes (pressure and non-pressure)". They must be marked with the date of manufacture, and cured for at least ten days before delivery. Pipes without a date mark will not be accepted.

Flush jointed pipes above DN900 are acceptable for stormwater provided they are used with approved external jointing sleeves.

If concrete is approved for wastewater, pipes shall be made from sulphate-resistant concrete.

The minimum strength class of pipe shall be Class 4 (wastewater), Class 2(X) (stormwater)

2.2.3 Cement Lined Steel Pipes

Steel pipes shall meet the requirements of NZS 4442: - "Welded steel pipes and fittings for water, sewage and medium pressure gas". Pipes shall be lined internally with mortar. When used in above or below ground situations, special external protective coatings approved by Council shall be used.

These may include tape wrapping, hot galvanising or paint/epoxy coating systems. Jointing systems shall be as recommended by the manufacturer and as approved by the Council.

2.2.4 Unplasticised PVC (uPVC) Pipes

Rubber ring joining systems shall be used.

Gibault joints shall be used at junctions with cast iron and concrete lined steel fittings except where cast iron fittings with formed rubber ring sockets are used.

2.2.5 Galvanised Steel Pipe

Galvanised steel pipes are required for shallow stormwater laterals under berms and footpaths to kerb. Pipes shall be medium wall hot dipped galvanised.

Connections from the boundary to the kerb shall preferably be RHS 100 x 75 x 3 galvanised.

Jointing systems shall be as recommended by the manufacturer and as approved by the Council.

2.2.6 Polyethylene

Polyethylene pipe shall comply with the requirements of AS/NZS 4130.

Joints shall be butt welded, electro-fusion, flanged or approved mechanical couplings. Only jointing systems that provide a clean unimpeded bore will be approved.

3.0 Concrete and Mortar Materials

The following NZ Standards shall be used as a means of compliance with this specification.

- NZS 3104 Specification for Concrete Production
- NZS 3109 Concrete Construction
- NZS 3124 Concrete for Small Works
- NZS 3114 Concrete Surface Finish

Concrete for all uses shall be high grade concrete with a minimum crushing strength at 28 days of not less than 20 MPa.

Mortar and its components shall comply with NZS 3103.

APPENDIX B: SUPPORTING INFORMATION

B1 Drawing and As-Built Requirements

1.0 General

On completion of the project the Construction Co-ordinator shall provide accurate As- Built plans at the same scale and standard as the design plans (see Section 1.8.2) showing services in their correct position. As-Built Plans are required for all assets to be vested in the Council, private assets within Council land, Council built assets and for all service connections to Council mains.

As-built records of any private works included in any Engineering Approval, shall also be provided. This shall also include any as-builts and operations manuals for any significant privately owned three waters infrastructure (i.e. pump stations, stormwater ponds, detention structures etc). This requirement provides suitable information to enable possible ownership transfer to Council in future.

Where a single lot is subdivided to form two lots, requiring only additional connections to serve the second lot, then an as-built plan may not be required.

2.0 Format

Plans shall be submitted electronically as A1 sized Adobe Acrobat PDF files or as hard copy plans. A2 may be used where new Council services are involved and only one sheet is required, or A3 may be used where only connections are involved and only one sheet is required.

Requirements for plans are as follows:

- PDF files must not be scaled and must be able to be reproduced at their original size without scaling. When printed at the original size, all measurements must scale correctly.
- All sheets must clearly state the following minimal information:
    - Original sheet size (as per Section 1.8) and scale
    - The horizontal and vertical datums and coordinate system
    - Relative Level terms and offset
    - The sheet number and total number of sheets
    - Sheet orientation (i.e. north arrow)
    - Date of survey and drawing
    - Include plans and long sections for gravity and pressure pipelines, with chainage points every 20m and at connections, branches, tees, manholes including finished ground level, existing ground level, cover level, invert level.
    - Plans shall be a true and accurate record of assets constructed and checked prior to submission
    - Show assets to be / have been abandoned (removed or in-situ)
- PDF files shall only contain one drawing sheet and contain only one page.
- PDF files shall be created so that there is a clear difference between existing and new features when the document is reproduced at its original scale and in black and white.
- PDF files must be generated directly from the CAD, GIS, Survey, or Civil Engineering Software and must not be edited or modified by an intermediary process. PDF files must not be scanned copies of the completed printed As-Built drawings; they must be the original and authoritative drawing.
- PDF files may contain layers, as long as the following criteria are meet:
    - Layer names must be clearly understood (i.e. Existing Water Main, not W1234)
    - Layers must logically group features.
- PDF files may be geo-referenced.
- PDF files must be clearly and uniquely named as per the following criteria:
    - Files must be sequentially named to show the sheet order; and
    - File names must not contain spaces; and
    - File names must only contain Alphanumeric Characters, Under score, and hyphen (i.e. A – Z, 0 – 9, a – z, _, and -); and
    - The prefix of the file name must clearly identify the project.
    - An example of an acceptable file name is "Project-1_Sheet_9.pdf". Alternately, the Council may issue file names for each sheet upon request. If the Council has issued file names, then these file names must be used and also shown on the drawing.

    - PDF files may be supplied on media formats such as USB Flash Drives. Any media supplied to the Council in these formats, will be retained by the Council, and not returned.
- PDF files must not have any security permissions set.
- As Built plans must not be submitted in more than one form. As Built plans can be submitted as Adobe Acrobat PDF documents or as printed documents. They must not be submitted in both formats.

3.0 Information Requirements

3.1 General Requirements

The following general requirements apply:

(a) Unless otherwise approved in writing by Council, separate drawings shall be provided for each of roading, water supply, wastewater and stormwater.
(b) Areas of filling - showing the total depth of fill, in the form of lines joining all points of equal fill depth (fill contours) and the location of compaction tests.
(c) The size, pressure class, joint type, and material shall be recorded for all pipelines, plus the reference number, material type, and manufacturer of all fittings.
(d) Drawings shall include long sections of all pipelines (including rising mains) laid to grade.
(e) The positions of easements and the depth of all associated services.
(f) The co-ordinates of at least 3 points on each plan in terms of Hawke's Bay 2000 Circuit and the origin of the level datum in terms of New Zealand Vertical Datum 2016 (NZVD2016), for geo-registering purposes.
(g) For drainage pipework, a csv text file shall be provided containing co-ordinates and surface levels of all surface openings along with clear identification of the opening to which the information applies.

3.2 Roads

The following information is required in plan form:

- Road names – as approved by Council
- Roading layout
- Longitudinal section or kerb levels
- Typical cross section for each road showing:
- Kerb Line, including kerb type (vertical/mountable, channel/nib)
- Pavement, berm & footpath widths
- Pavement construction (layer details)
- Design subgrade CBR
- Design EDA
- Cross falls
- Subsoil drains
- Size & material
- Catchpit location and type, grate / back entry, lid level, lead invert, and catchpit floor level
- Drainage details
- Road signs location of all street furniture, road signs, information signs giving co-ordinates, ground level, wording (including row signage).
- Streetlight location, co-ordinates, ground level, pole length, manufacturer & model, lighting head, manufacturer & model.

The following information is to be supplied on RAMMS data sheets supplied by NCC Road Asset Unit:

- Sealing details
- Pre-seal repairs
- Road marking details

3.3 Stormwater

As-built drawings shall show all features (such as subsoil drainage, manholes, catchpits, inspection eyes, new and existing surface features) accurately dimensioned and referenced to survey marks, so that they can be accurately relocated in the field. Coordinates and floor levels of catchpits shall also be provided. Invert levels of all pipes shall be provided.

Plans shall state the “design storm” and show hydraulic grade lines on long sections. They shall also show any overland flow paths and levels for the 2% AEP event.

Connections to stormwater mains shall be detailed as follows:

- Position of the termination point of the connection measured from the front or rear boundary and the nearest side boundary. It may be necessary to seek assistance with boundary identification in order that the correct location of connections can be achieved. The developer's surveyor should be enlisted for assistance wherever there is any doubt.
- Length of the connection from the main to the termination point (measured on the slope).
- Offset of the main from the front or rear boundary at the point of connection to the main.
- Cover on the main at the point of connection
- Cover on the connection at the termination point
- Distance from the point of connection to the main to the centre of the downstream manhole.
- The size, pressure class, joint type and pipe material used for the connection shall be recorded.

Kerb connections shall be detailed as follows:

- The distance from a side boundary to the connection.
- The size and pipe material used for the connection shall be recorded. It may be necessary to seek assistance with boundary identification in order that the correct location of connections can be achieved. The developer's surveyor should be enlisted for assistance wherever there is any doubt.

3.4 Wastewater

As-built drawings shall show all features (such as manholes, catchpits, inspection eyes, valves, access pits, new and existing surface features) accurately dimensioned and referenced to survey marks, so that they can be accurately relocated in the field. Invert levels of all pipes shall be provided.

Wastewater connections shall be detailed as follows:

- Position of the termination point of the connection measured from the front or rear boundary and the nearest side boundary.
- Length of the connection from the main to the termination point (measured on the slope).
- Offset of the main from the front or rear boundary at the point of connection to the main.
- Cover on the main at the point of connection.
- Cover on the connection at the termination point.
- Distance from the point of connection to the main to the centre of the downstream manhole.
- The size, pressure class, joint type and pipe material used for the connection shall be recorded.

3.5 Water Supply

As built drawings show shall all features (such as hydrants, valves, tees, reducers and bends. All features shall be accurately dimensioned and referenced to survey marks so that they can be accurately relocated in the field. The size, pressure class, joint type and material shall also be recorded along with the level / depth of mains.

The running distance to buried fittings (such as tapping bands, gibault joints etc) from adjacent surface fittings shall be shown. Alternatively, the co-ordinates of the various fittings shall be provided.

Water connections shall be detailed as follows:

- Position of the toby measured from the front boundary and the nearest side boundary.
- Length of the connection from the main to the toby.
- Offset of the main from the front boundary at the point of connection to the main.
- Cover on the main at the point of connection.
- Distance from the point of connection to the main to the nearest surface fitting (e.g. hydrant or valve).
- The size, pressure class, joint type and pipe material used for the connection shall be recorded.
- Identification of termination point, i.e. whether toby or manifold.
- If the route of the connection meanders (i.e. anything other than a straight connection), the route shall be clearly shown on the as-built plan.

3.6 Other Services and Benchmarks

Measurements to ducts installed for telephone, power and gas reticulation, must be shown on the roading as-built plans.

The roading plans shall also show the position and levels of all newly established benchmarks and be tabulated on the plan. Information shall be provided as follows:

- Levelling sheets
- Mark attribute files

Any benchmarks temporarily relocated as part of the works must be recorded and accompanied by a diagram showing the details of the offset.

3.7 Private Works

All private rights-of-way, and other private works in the development which are included in the Engineering Approval, shall be undertaken in accordance with the requirements of this Code of Practice, and final details confirmed to Council, on as-built drawings.

This shall also include any significant privately owned three waters infrastructure (i.e. pump stations, stormwater ponds, detention structures etc.), in which case a suitable operation and maintenance manual shall be provided.

B2 Application for a Dispensation to the Code Requirements

Details of Applicant:

Name: ……………………………………………………………………………………………………..

Tel. No: ……………………………………

Email address: …………………………………..

Details of Dispensation requested:

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Location description (please attach plan if applicable):

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Background:

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Code clauses applicable / affected:

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Form continued overleaf

Reasons for dispensation request: ……… ……… ……… ……… ……… ………
Any benefits accruing from dispensation: ……… ……… ……… ……… ………
Resultant Outcome / Recommendation: ……… ……… ……… ………
Signature of Applicant **Signed:** ……………………………… **Print Name**…………………………………… **Date::** ……./…………/………
Application APPROVED / REJECTED **Signed:** ……………………………………… **Services Engineer** **Date:** ………/………/………… **Authorised:** ………………………………… **Position:** **Date: :** ………/………/…………

PROFESSIONAL OPINION (SUITABILITY OF LAND FOR DEVELOPMENT)

To: Napier City Council
Private Bag 6010
NAPIER

STATEMENT OF PROFESSIONAL OPINION
AS TO SUITABILITY OF LAND FOR DEVELOPMENT

(Note: This form is to be used and submitted with resource consent applications for all subdivision, building and land development that includes earthworks)

Project: ______________________________

Owner: ______________________________

Location: ______________________________

I, ______________________________
(Full Name)

of ______________________________
(Name and Address of Firm)

Hereby confirm that:

1. I am a Geo-professional experienced in the field of soils engineering and have been retained by the Owner as the Soils Engineer on the above project.
2. Site investigations have been carried out under my direction and are as described in my report,

   ____
   (Insert references to all reports including dates of latest information)

3. I am aware of the details of the proposed project and of the nature of the proposed engineering works as shown on the following drawings,

   ____
   (Insert references to all drawings including dates of latest information)

4. In my professional opinion, not to be construed as a guarantee, I consider that the proposed works give due regard to land slope and stability considerations and that the land is suitable for the proposed project providing that:
   a) ______________________________
   b) ______________________________
   c) ______________________________

5. This professional opinion is furnished to the Council and the Owner for their purposes alone, on the express condition that it will not be relied on by any other person and does not remove the necessity for further inspection during the course of the works.

Signed: ______________________ *Dated:* ______________________

NAPIER CITY COUNCIL
Te Kaunihera o Ahuriri

PROFESSIONAL OPINION – EARTHWORKS COMPLIANCE

To: Napier City Council
Private Bag 6010
NAPIER

STATEMENT OF PROFESSIONAL OPINION
AS TO EARTHWORKS COMPLIANCE

(Note: This form is to be used and submitted when earthworks have been completed for subdivision, building or land development that includes earthworks. It shall be submitted with applications for certification pursuant to section 224(c) of the RMA, or as part of the As Built information required under the Code.)

Project: ______________________________

Owner: ______________________________

Location: ______________________________

I, ______________________________
(Full Name)

of ______________________________
(Name and Address of Firm)

Hereby confirm that:

1. I am a Geo-professional experienced in the field of soils engineering and have been retained by the Owner as the Soils Engineer on the above project.
2. The extent of my inspections during construction, and the results of all tests carried out are described in my report,

____
(Insert references to all reports including dates of latest information)

3. In my professional opinion, not to be construed as a guarantee, I consider that:
   a) The completed works give due regard to land slope and foundation stability considerations.
   b) The fills have been placed and the cuts executed in accordance with the approved drawings and the Napier City Council's Code of Practice for Subdivision and Land Development. The fills and cuts are as shown on the attached as built plan,

____
(Insert references to all drawings including dates of latest information)

c) The original ground, not effected by the earthworks, does/does not comprise 'good ground' as defined in the New Zealand Building Code and is suitable for the erection thereon of residential buildings in accordance with Acceptable Solution B1/AS4, providing that:

i) ______________________________

ii) ______________________________

iii) ______________________________

d) The filled ground does/does not comprise 'good ground' as defined in the New Zealand Building Code and is suitable for the erection thereon of residential buildings in accordance with Acceptable Solution B1/AS4, providing that:

i) ______________________________

ii) ______________________________

iii) ______________________________

e) The cut ground not effected by the filling, does/does not comprise 'good ground' as defined in the New Zealand Building Code and is suitable for the erection thereon of residential buildings in accordance with Acceptable Solution B1/AS4, providing that:

i) ______________________________

ii) ______________________________

iii) ______________________________

4. This professional opinion is furnished to the Council and the Owner for their purposes alone, on the express condition that it will not be relied on by any other person. It does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any dwelling.

Signed: ______________________ *Dated:* ______________________

PROFESSIONAL OPINION – LAND FOR RESIDENTIAL BUILDINGS

To: Napier City Council
Private Bag 6010
NAPIER

STATEMENT OF PROFESSIONAL OPINION
AS TO SUITABILITY OF LAND FOR RESIDENTIAL BUILDINGS

(Note: This form is to be used and submitted with resource consent applications for subdivision, building or land development that does not include earthworks, yet earthworks have previously been undertaken on the site, or the site is subject to potential land stability issues).

Project: ______________________________

Owner: ______________________________

Location: ______________________________

I, ______________________________
(Full Name)

of ______________________________
(Name and Address of Firm)

Hereby confirm that:
1. I am a Geo-professional experienced in the field of soils engineering and have been retained by the Owner as the Soils Engineer on the above project.
2. The extent of my inspections, and the results of all tests carried out are described in my report,

   ____
   (Insert references to all reports including dates of latest information)

3. In my professional opinion, not to be construed as a guarantee, I consider that:
   a) The project gives due regard to land slope and foundation stability considerations.
   b) The original ground does/does not comprise 'good ground' as defined in the New Zealand Building Code and is suitable for the erection thereon of residential buildings in accordance with Acceptable Solution B1/AS4, providing that:

      i) ______________________________

      ii) ______________________________

      iii) ______________________________

c) The previously filled and/or cut ground is shown on the attached plan,

____
(Insert references to all drawings including dates of latest information)

It does/does not comprise 'good ground' as defined in the New Zealand Building Code and is suitable for the erection thereon of residential buildings in accordance with Acceptable Solution B1/AS4, providing that:

i) ____

ii) ____

iii) ____

4. This professional opinion is furnished to the Council and the Owner for their purposes alone, on the express condition that it will not be relied on by any other person. It does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any dwelling.

Signed: ________________________________ *Dated:* ________________________________

PROFESSIONAL OPINION – LAND FOR RESIDENTIAL BUILDINGS

To: Napier City Council
Private Bag 6010
NAPIER

STATEMENT OF PROFESSIONAL OPINION
AS TO SUITABILITY OF RESIDENTIAL BUILDING PLATFORM SITES

(Note: This form is to be used and submitted with resource consent applications for subdivision, building, or land development in a rural environment to define suitable potential building sites)

Project: ______________________________

Owner: ______________________________

Location: ______________________________

I,

____
(Full Name)

of ______________________________
(Name and Address of Firm)

Hereby confirm that:

1. I am a Geo-professional experienced in the field of soils engineering and have been retained by the Owner as the Soils Engineer on the above project.
2. The extent of my inspections, and the results of all tests carried out to confirm possible house sites are described in my report and shown on the enclosed plans,

____
(Insert references to all reports & drawings including dates of latest information)

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

   a) The building platform site/s give due regard to land slope and foundation stability considerations.
   b) The ground shown as future house site/s does/does not comprise 'good ground' as defined in the New Zealand Building Code and is suitable for the erection thereon of residential buildings in accordance with Acceptable Solution B1/AS4, providing that:
      i) ______________________________
      ii) ______________________________
      iii) ______________________________

4. This professional opinion is furnished to the Council and the Owner for their purposes alone, on the express condition that it will not be relied on by any other person. It does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any dwelling.

Signed: ______________________________ *Dated:* ______________________________

B4 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 - NCC pattern
- 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 - NCC pattern
- 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 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.
(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 Co-ordinator 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) Inspection 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:
   a. Fill is not placed over soft or organic material
   b. All areas of existing ground showing seepage or potential seepage emission have relief drains provided iii) Unsuitable material is not incorporated into the fill
   c. 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.

B5 Project Completion Report

Project:

………………………………………………………………………………….**Engineering Approval**

Number:

..………..…..…………………….

Resource Consent reference (if applicable):

………..…………………………….

Full Name (Construction Co-ordinator):

……………………………………………………………………………………………………

This report is to confirm that the above project has been completed to the requirements and standards set out in the Code of Subdivision and Land Development, the specific conditions of Engineering Approval, the approved drawings and conditions of Resource Consent that apply to this work.

Attached to this report are:

(1) A complete set of approved 'As Built' plans.
(2) A set of Asset Valuation Forms for each type of service that is to be vested in Council.
(3) A set of check sheets for each type of service that is to be vested in Council. The check sheets have been signed off for final inspection. The Registered Drain layer has entered their name and registration number and signed the wastewater and stormwater check sheets as applicable.
(4) Benchmark data, including levelling sheets, mark attribute data, and offset details (where applicable).

In reference to 1.8.10.1 of the Code, I confirm that:

(1) All works have been constructed in the locations and to the levels and details shown on the 'As Built' plans.
(2) The works have been built to currently accepted design and construction standards and the design intent as detailed in the specification, design drawings and calculations has been achieved.
(3) Testing of all roads and services has been carried out by or under the direction of the Construction Co-ordinator and test results comply with the specified standards. The specific standards, dates of the tests and the test results are attached.
(4) All non-public access ways have been constructed in accordance with the approved construction drawings.

Signed: ……….…………………………………………………… Date …………………..
(Construction Co-ordinator)

NAPIER CITY COUNCIL
Te Kaunihera o Ahuriri

B6 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.

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 ....

B7 Levelling Run Attribute Sheet (Example)

LEVELLING RUN (ROUTE FROM - TO);	SS43 - BDA3 SALE ST/MARINE PDE INT - LATHAM ST/GEORGES DRIVE INT													
NAME OF LEVEL ORIGIN	NCC SUFI#	LINZ CODE	EQUIPMENT USED	VERTICAL ORDER OF LEVEL ORIGIN	HORIZONTAL ORDER	HBTM NORTHING	HBTM EASTING	PUBLISHED LEVEL	SOURCE/ PLAN REFERENCE	SURVEY DATE	NAME OF SURVEYOR	SURVEY COMPANY	LEVELLING LENGTH (1 WAY)	MISCLOSE (m)
SS 43 SO4877	366	CT3X	Leica NA704 Auto level SN34450	1	6	816374.07	421055.850	15.972	NCC INTRAMAPS	42005.000	J.SMITH	ABC SURVEYS LTD	3000m	0.006
LEVELLING RUN - MARK ATTRIBUTES														
NEW	EXISTING	NCC SUFI#	MARK NAME	LINZ ID	LINZ CODE	HBTM NORTHING	HBTM EASTING	PUBLISHED ORTHOMETRIC HEIGHT	LEVELLED/REDUCED ORTHOMETRIC HEIGHT (MSL +10m)	SOURCE /SUPPORTING PLAN REFERENCES	MARK TYPE (PHYSICAL TYPE)	MARK GNSS (GOOD OR BAD)	POSITIONAL DESCRIPTION	LOT & DP # ADJACENT TO
	✔	339	PIN 18 SO 478094	44174753	CT3Y	N/A	N/A	12.600	12.600	NCC INTRAMAPS	Bolt	N/A	over street sump	Pt Lot 1 DP112
	✔	340	PIN 19 SO 478094	44174754	CT3Z	N/A	N/A	12.860	12.861	NCC INTRAMAPS	SS Pin	N/A	Top of kerb	Lot 1 DP2173
	✔	N/A	01.01.15.001	3654011	N/A	816000.00	420000.00	N/A	12.869	DP450000	OMA	GOOD	In footpath	Lot 1 DP500000
✔		N/A	01.01.15.002	N/A	N/A	816100.00	420100.00	N/A	12.872	N/A	MA	BAD	Top of kerb	Lot 11 DP500000
✔		N/A	01.01.15.003	N/A	N/A	816602.76	420990.51	N/A	14.653	N/A	IT	GOOD	In footpath	Lot 1 DP10796

NOTE; SOME OF THE INFORMATION SHOWN ABOVE IS FICTITIOUS. NONE OF THE DATA ABOVE SHOULD BE USED AS A SURVEY REFERENCE.

B8 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.

1.0 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			

2.0 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			

3.0 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			

4.0 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			

5.0 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 (separate each)	Metres		
Footpaths	Metres		
Car Parks (Improvements)	m^2		
Lighting (Poles and Type of Lantern)	No		
Park Furniture (Specify Separately)	LS		
Play Equipment (Inc. Safety Surfaces)	LS		
Buildings or other Structures (List)	LS		
Water Features and Associated Controls (List)	No		
Total Reserves Asset			

B9 Check Sheets

NAPIER CITY COUNCIL

WORKS ASSET DEPARTMENT

ENGINEERING APPROVAL CHECKLIST

STORMWATER

SCHEME PLAN NO.: **N/A** ENGINEERING APPROVAL NO.: **2017/0**

SUBDIVISION/PROJECT NAME:

CONSTRUCTION CO-ORDINATOR:

CONTACT PHONE NO.:

CHARGE NO.:

Drawings:	Submitted	Approved	Fees/Deposits Paid
Date:	**4/11/2017**	**4/11/2017**	**4/11/2017**

					INITIALS	**DATE**
1	Notification of Start of Work					
2	Visual Inspection	S1	S2	S3		
3	Water Test	S1	S2	S3		
4	Video Inspection	S1	S2	S3		
5	Final Inspection - Depot a) Manhole Covers - NCC Type b) Manhole Benching c) Manhole Location d) Manhole Central e) Sumps - Standard Type f) Sumps - Sealing Off g) Stormwater Connections					
	Name____________________________Reg No__________________________________ Signature____					
6	As Built and Asset Valuation Forms					
7	Final Acceptance and Issue of Code of Compliance a) Payment of Contributions and Other Fees b) Engineers Representative c) Drainage Engineer					
8	Asset Maintenance Register					

DATE	COMMENTS	INITIALS

NAPIER CITY COUNCIL

WORKS ASSET DEPARTMENT

ENGINEERING APPROVAL CHECKLIST

SEWER

SCHEME PLAN NO.: **N/A** ENGINEERING APPROVAL NO.: **2017/0**

SUBDIVISION/PROJECT NAME:

CONSTRUCTION CO-ORDINATOR:

CONTACT PHONE NO.:

CHARGE NO.:

Drawings:	Submitted	Approved	Fees/Deposits Paid
Date:	4/11/2017	4/11/2017	4/11/2017

					INITIALS	DATE
1	Notification of Start of Work					
2	Visual Inspection	S1	S2	S3		
3	Water Test	S1	S2	S3		
4	Video Inspection	S1	S2	S3		
5	Final Inspection - Depot a) Manhole Covers - NCC Type b) Manhole Benching c) Manhole Location d) Manhole Central e) Sewer Connections					
DRAINLAYER: Name:___________________________ Reg No:____________________________ Signature:_____________________________						
6	As Built and Asset Valuation Forms					
7	Final Acceptance and Issue of Code of Compliance a) Payment of Contributions and Other Fees b) Engineers Representative c) Drainage Engineer					
8	Asset Maintenance Register					

DATE	COMMENTS	INITIALS

NAPIER CITY COUNCIL
WORKS ASSET DEPARTMENT
ENGINEERING APPROVAL CHECKLIST

WATER SUPPLY

SCHEME PLAN NO.: **N/A** ENGINEERING APPROVAL NO.: **2017/0**

SUBDIVISION/PROJECT NAME:

CONSTRUCTION CO-ORDINATOR:

CONTACT PHONE NO.:

CHARGE NO.:

Drawings: Date:	Submitted **4/11/2017**	Approved **4/11/2017**	Fees/Deposits Paid **4/11/2017**

					INITIALS	DATE
1	Application for connection to system received (including deposit)					
2	Notification of start of work received					
3	Initial inspection					
4	Trench Alignment and depth					
5	Bedding material					
6	Backfill material					
7	Pressure tested	S1	S2	S3		
8	Disinfected	S1	S2	S3		
9	Connection to existing mains completed					
10	All valves turned on					
11	Fire hydrant, valves, tobys marked					
12	Surface boxes installed and correctly aligned					
13	As Built and Asset Valuation Forms					
14	Final Acceptance and Issue of Code of Compliance a) Payment of Contributions and Other Fees b) Engineers Representative c) Water Engineer					
15	Asset Maintenance Register					

DATE	COMMENTS	INITIALS

NAPIER CITY COUNCIL

WORKS ASSET DEPARTMENT

ENGINEERING APPROVAL CHECKLIST

RESERVES

SCHEME PLAN NO.: **N/A**   ENGINEERING APPROVAL NO.: **2017/0**

SUBDIVISION/PROJECT NAME:

CONSTRUCTION CO-ORDINATOR:

CONTACT PHONE NO.:

CHARGE NO.:

Drawings:	Submitted	Approved	Fees/Deposits Paid
Date:	**4/11/2017**	**4/11/2017**	**4/11/2017**

		INITIALS	DATE
1	Notification of start of work		
2	Site Inspections (Construction)		
	(3a) Prior to earthworks commencing		
	(3b) Completion of preliminary grading		
	(3c) Field tile drains		
	(3d) Water supply/irrigation systems		
	(3e) Final grade & cultivation (prior to any grass sowing or planting)		
3	Site Inspections (establishment)		
	(4a) Completion of works		
	(4b) 90 Days – Final inspection		
4	Final Inspection		
	(a) Grass Cover		
	(b) Trees/Staking		
	(c) Shrubs		
	(d) Water Features		
	(e) Fences/Barriers		
	(f) Footpaths/Culverts/Bridges		
	(g) Car Parks/Road Access		
	(h) Lighting Poles/Lanterns		
	(i) Park Furniture		
	(j) Play Equipment/Safety Surfaces		
	(k) Buildings/Other Structures		
	(l) Water Features/Fountains		
5	As Built and Asset Valuation Forms		
6	Final Acceptance and issue of Code of Compliance		
	(a) Payment of contributions and other fees		
	(b) Reserves Asset Manager		
7	Asset Maintenance Register		

DATE	COMMENTS	INITIALS

NAPIER CITY COUNCIL
WORKS ASSET DEPARTMENT
ENGINEERING APPROVAL CHECKLIST
ROADING

SCHEME PLAN NO.: **N/A** ENGINEERING APPROVAL NO.: **2017/0**

SUBDIVISION/PROJECT NAME:

CONSTRUCTION CO-ORDINATOR:

CONTACT PHONE NO.:

CHARGE NO.:

Drawings:	Submitted	Approved	Fees/Deposits Paid
Date:	**4/11/2017**	**4/11/2017**	**4/11/2017**

		INITIALS	DATE
1	Notification of start of work		
2	Site Inspections (Construction)		
	(3a) Subgrade inspection		
	(3b) Kerb foundation inspection		
	(3c) Footpath foundation inspection		
	(3d) Basecourse inspection (incl beam testing)		
3	Final Inspections		
	(a) Surfacing		
	(b) Footpaths, pedestrian accessways & cycleways		
	(c) Kerb & channel, dish channel, side drains		
	(d) Sumps & leads		
	(e) Subsoil drainage		
	(f) Culverts, bridges & structures		
	(g) Vehicle crossings (where provided)		
	(h) Stormwater kerb outlets (where provided)		
	(i) Traffic signs, road markings, road furniture		
	(j) Network utilities (including service covers)		
	(k) Street lighting		
	(l) Benchmarks		
	(m) Road name plates		
	(n) Berms, trees, landscaping, amenities		
	(o) Boundary fencing (rural roads)		
4	As Built and Valuation Forms		
5	Final Acceptance and issue of Code of Compliance		
	(a) Payment of contributions and other fees		
	(b) Road Asset Manager		
6	Asset Maintenance Register		

DATE	COMMENTS	INITIALS

B10 Roading Standard Forms

PAVEMENT INFORMATION SHEET

DATE: / /

ROAD INFORMATION

1. Road No. ____

2. Road Name: ____

2a Estimate AADT ____

LOCATION

3. Start Displacement ____ m

4. Between ____ St/Rd

5. End Displacement ____ m

6. And ____ St/Rd

7. Offset from LHS kerb or LHS edge of seal, or centre of recorded pavement ____ m

8. Width of recorded section ____ mm

NEW PAVEMENT INFORMATION

	Hot Mix (mm)	Premix (mm)	Seal	Slurry	Unsealed	Other
9. Surfacing Details						

	AP40 (mm)	AP65 (mm)	Pitmetal (mm)	Other
10. Pavement Layers				

11. Fabric / Geotextile (tick) | YES | NO | If yes, details ____

12. Subgrade (tick)

Material	Clay	Topsoil	Other
Compaction	Good	Average	Poor
Moisture Content	Wet	Average	Dry

13. Subgrade CBR/Scala Penetrometer

14. Final Compaction/Prior to Sealing Clegg Hammer/Nuclear Densometer

EXISTING PAVEMENT INFORMATION

	Hot Mix (mm)	Premix (mm)	Seal	Slurry	Unsealed	Other
15. Surfacing Details						

	AP40 (mm)	AP65 (mm)	Pitmetal (mm)	Other
16. Pavement Layers				

17. Grading (tick) | Well Graded | Excess Course | Excess Fines |

18. Contamination (tick) | Clay | Water | Other |

19. Fabric / Geotextile (tick) | YES | NO |

20. Subgrade (tick)

Material	Clay	Topsoil	Other
Compaction	Good	Average	Poor
Moisture Content	Wet	Average	Dry

21. Subgrade CBR/Scala Penetrometer

MISCELLANEOUS

22. Reason for Recording: Reconstruction / Maintenance / S.O.N / Test hole / Other ____

23. Comments, if any ____

Recorded by (name) ____ Company ____

RAMM ENTRY

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: Amended 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 ____________________

NZS 4404:2004 LANDDEVELOPMENT AND SUBDIVISION ENGINEERING
SCHEDULE 1C

CITY OF NAPIER

SCHEDULE 1C

CERTIFICATE UPON COMPLETION OF LAND DEVELOPMENT/SUBDIVISION WORK

ISSUED BY:..
(*Suitably qualified professionalr*)

TO:..
(*Developer*)

TO BE SUPPLIED TO:..
(*Territorial authority)*

IN RESPECT OF:..
(*Description of land development/subdivision work*)

AT:..

....
(*Address*)

....has been engaged by..
(*Consultant*) (*Developer*)
to provide construction observation, review and certification services in respect of the above work which is

described in the specification and shown on the drawings numbered..

approved by...on...
(*Territorial authority*) (*Date*)

I have sighted tbe...
(*Territorial authority*)

consent and conditions of consent to the works and the approved specifications and drawings.

As an independent professional, I or personnel under my control, have carried out periodic reviews of the land development work appropriate to the nature of the work and in my professional opinion, based upon reasonable enquiry, these reviews, information supplied by the contractor during the course of the works and the contractor's certification upon completion of the works (copy attached), the works, other than those outstanding works listed below, have been completed in accordance with the above consent and sound engineering practice.

.... Date: ....
(*Signature suitably qualified professional*)

....Member CSNZ NZIS ACENZ IPENZ
(*Professional qualifications*)

....
(*Address)*
Outstanding works

....

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 design & MOTSAM.		

NAPIER CITY COUNCIL
Te Kaunihera o Ahuriri

Contractors form for
STREET LIGHT RAMM DATA CAPTURE

This form shall be used for all developments requring additional street lights to be maintained by Napier City Council.
Subdvisions require one form for each pole and lamp type installed for each different road.
Please complete all sections as fully as possible and return with the Engineering Approval documentation OR email to: infrastructureservices@napier.govt.nz

LOCATION DETAILS

Street Light Installing Company:		**Date Of Installation:**	
Installer Contact Name:		**Phone No.:**	
Road Name:		**Suburb:**	
Light Route Position: *(GPS co-ordinates preferred* **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)*	

NAPIER CITY COUNCIL
Te Kaunihera o Ahuriri

POLE DETAILS

Network Company ID No.: *(N.C.C Office use only)*		**Council ID No.:** *(N.C.C office use only)*	
Base Dimensions:	mm x mm	**Level:** *(Height of base of pole from road surface)*	(metres)
Pole Height:	(metres)	**Height Of Bracket:** *(Where bracket is fixed to pole)*	(metres)
Pole Off Set: *(Steel, Concrete, etc)*	(metres)	**Light Height:** *(From centre of light to road surface)*	(metres)
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:**	

ELECTRICITY DETAILS

ICP No.: *(N.C.C office use only)*	

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		
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		