TARARUA®
DISTRICT COUNCIL

Tararua District Engineering Standards 2024

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Revision History			
Ver.	**Date**	**Name**	**Summary of Changes**
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Abbreviations and Definitions

Abbreviation	Description
AADT	Annual average daily traffic
AC	Asphaltic Concrete
ADT	Average Daily Traffic
ADWF	Average Dry Weather Flow (l/s)
AEP	Annual Exceedance Probability (refer to definitions below)
CAR	Corridor Access Request
CMEngNZ	Chartered Member of Engineering NZ
CN	Curve Number
CPEng	Chartered Professional Engineer
EDA	Engineering Design Approval
ES	Engineering Standards (this document)
HIRDS	High Intensity Rainfall Design System in the form of software produced by NIWA
HRC	Horizons Regional Council
ISO	International Standards Organisation
LDEngS	Survey and Spatial Plus NZ Certified Land Development Engineer
MOTSAM	Manual of traffic signs and markings, as published by the Waka Kotahi
MPD	Maximum Probable Development
NZBC	New Zealand Building Code
NZGD	New Zealand Geotechnical Database
NZS	New Zealand Standard, as published by Standards New Zealand
NZTA	Waka Kotahi - New Zealand Transport Agency (Previously LTSA and LTNZ)
OD	Outside diameter
OLFP	Overland Flow Path
OMM	Operation Maintenance Manual
ONF	One Network Framework
ONRC	One Network Road Classification
PDWF	Peak Dry Weather Flow (l/s)
PE 100	Polyethylene type 100
PE 80B	Polyethylene type 80B
PF	Peak Flows
PPM	Parts per Million
RMA	Resource Management Act
RoW	Right of Way (refer to definitions below)
SCADA	Supervisory, Control and Data Acquisition
SQEP	Suitably Qualified and Experienced Person(s)
SSA	Site Specific Assessment
TDC	Tararua District Council
TMP	Traffic Management Plan
TSS	Total Suspended Solids
VPD	Vehicles per day

In the ES, unless inconsistent with the context, the following definitions shall apply.

Term	Definition
Accessway	Refer Local Government Act 1974 definition of accessway
Alternative Design	Alternative design is considered a design proposal deviating from the ES.
Annual Exceedance Probability (AEP)	The probability of exceedance of an event (generally a rainfall or flood) within a period of one year (e.g. 1% AEP is equivalent to 1 in 100-year storm).
Approved	Council approval in writing
Attenuation	Temporary storing stormwater for a period with a controlled release to lessen the intensity/severity/effects of runoff to a defined value, generally to peak flows at pre-development level or lower.
Average Recurrence Interval (ARI)	The average, or expected value of the periods between exceedances of a given rainfall total accumulated over a given duration. Refer to Annual Exceedance Probability above.
Brownfield Development	Occurs on land that has already been developed and therefore has existing infrastructure.
Catchment/ Catchment Area	The area over which surface water run-off will tend to flow under gravity towards a common point.
Carriageway Width	The road width normally traversed or occupied by vehicles.
Certificate of Completion	Any completion of works requires the developer to apply for a Certificate of Completion from Council.
Commercial and Industrial Area	As defined in the District Plan (Council should be consulted beforehand to determine the standard that will be applied to a particular area if there is any doubt).
Community Sewerage System	A wastewater reticulation, treatment and disposal system, that serves two or more properties. This applies irrespective of whether or not it is maintained by Council.
Consent Holder	See Developer
Contractor	The company engaged to undertake the physical works
Council	Tararua District Council – a territorial authority as per the Local Government Act 2002.
Curve Number	An empirical parameter used in hydrology for predicting direct runoff or infiltration from rainfall excess. The run-off curve number is based on the area's hydrologic soil group, land use, surface treatment, gradient and hydrologic condition.
Cycleway	Part of the road carriageway (between kerb lines) which is legally only for cyclists. Either a painted cycle lane or a protected cycle lane with associated paint and signs.
Defects Liability Period	The period required by Council, after the completion of the works, for which the Developer is responsible for repairing defects that may arise during this period, due to faulty materials and/or workmanship. Council will normally require a bond to cover any necessary works. See Section 1.C.4 Defects Liability Period.
Design/Technical Review	A review of a specific part of an overall design or report by a suitably qualified and experienced professional. Refer to document ENZ Practice Note 02: Peer Review. The review can be done internally with Council or externally. External reviews must be accompanied by a PS2- Design Review and associated documentation. Also see Peer Review.
Detention (hydraulic)	Temporarily detained water which enters a dry pond or tank, before being released slowly.

Developer	In relation to resource consents, is the applicant, owner, Trust, Company, person(s), or organisation or legal entity who have been granted consent to undertake the activities applied for.
Developer's Representative	See Section 1.C.4 Defects Liability Period
District Plan	The operative and proposed plans for the District and any combination of them applicable to resource consent applications.
Drain	A pipe or channel that conveys sewage or stormwater flow. Drainage has a corresponding meaning.
Earthworks	Any modification to the shape of the land surface, removal of soil, excavation, infilling or re-contouring, including construction of any road, track, landing, overland flow paths, open drains and streams.
Engineering Design Approval	Any works that impact on council owned assets and/or proposed assets to be vested to Council will require an EDA.
Footpath	The part of a road that is laid out or constructed primarily for pedestrians. It shall not include the associated edging and kerb.
Geo-Professional	A chartered professional engineer (CPEng) with a practice field in geotechnical engineering or an engineering geologist (PEngGeol), with recognised qualifications and experience in geotechnical engineering, and land development.
Gradient	The slope of a surface or object off horizontal generally described either as a percentage or as a ratio i.e. 1:4 is equivalent to 25% or 250 mm/m
Greenfield Development	Developments done on land that has not previously been developed.
Ground	The surface of the earth and below, whether soil or rock
Heavy Vehicle	Any vehicle exceeding 3500kg gross laden weight
Household Unit (hu)	A single self-contained household unit used principally for residential activities, whether by one or more persons, including accessory buildings. Where more than one kitchen facility is provided on the site, there shall be deemed to be more than one household unit
Household Unit Equivalent (HUE)	A measured 'unit of demand' relating to a development and used in calculating its development contributions.
Hydraulic	The static and dynamic behaviour of fluids.
Hydrology	The study of the movement, distribution, and quality of water.
Invert	The bottom of a pipe, channel or cesspit.
Legal Width for Roads (road reserve)	For public roads, the width of the strip of land that has been declared road in accordance with Section 114 of the Public Works Act 1981.
	For private roads, private ways or easements (rights-of-way), the width of the strip of land over which the public, shared owners or landowners with dominant tenement are legally entitled to pass without the specific approval of any one landowner.
Manhole	A chamber which provides access from the surface to an underground service.
Maximum Probable Development	MPD represent a maximum impervious area for an allowable land use by District and Regional Plans. It is used for hydrological/ hydraulics modelling scenarios.
Means of Compliance	A method by which the requirements of the standard may be complied with.

Modified Rational Method	A method to calculate the hydrograph from an empirical rational formula. Q = CIA, where Q = flow /discharge, C = dimensionless run-off coefficient representing land cover, I = rainfall intensity, A = catchment area, where uniform rainfall intensity applied over a catchment area. There is no 'loss method' associated with the Modified Rational Method. The underlying assumption is that the peak intensity is maintained for a long enough duration to reach peak flow at the outlet of the catchment.
Network Utility Operator	Has the same meaning as given to it by Section 166 of the Resource Management Act 1991.
Outlet	The discharge point of a catchment associated with a fluid conveyance system for both a gravity or pumped fluid system.
Overland Flow Path	A path taken by stormwater run-off as a surface flow concentrates. An OLFP may act as either primary or secondary stormwater conveyance system.
Owner	Includes an owner of land, whether beneficially or as trustee, and their agent or attorney, and a mortgagee acting in exercise of power of sale. It also includes the Crown, the Public Trustee, and any person, local authority, board or other body or authority however designated, constituted or appointed, having power to dispose of the land or interest therein by way of sale.
Pavement	The layer(s) of a road or access structure above the subgrade, incorporating sub-base and/or basecourse crushed granular material whether chemically stabilised or not, or rigid material (such as concrete), but excluding any seal coat.
Peak Flow (Q)	The maximum rate of surface flow at a point in catchment for given period of runoff and rainfall. It could be determined using various hydrological modelling software or by Modified Rational Method using basic formula Q = CIA, where Q = discharge, C = run-off coefficient, I = rainfall intensity, A = drainage area
Peer Review	An overall review of a design or report by a suitably qualified and experienced professional. Refer to ENZ Practice Note 02: Peer Review. Also see Design/Technical Review.
Primary Stormwater System	The stormwater system comprising of pipes, watercourses, and other elements of built and natural drainage, that convey the flow of stormwater within the catchment for more frequent storm events and provide a primary protection from flooding to surrounding properties. Which may be owned by Council or controlled by easements and Local Government Act.
Principal Mains	All water reticulation 100 mm inside diameter or greater, including associated valves.
Private Road	Any roadway, place or arcade laid out within Council on private land intended for the use of the public
Private Accesses	A road or passage over private land that is not open or intended to be open to general public use. Also refer definition of Privateway within Local Government Act.
Private Stormwater	Any part of the stormwater system that is privately owned and includes drainage from a private land to a receiving environment or up to the point of service connection with the public stormwater network, and includes pipes, gutters, downpipes, catchpits, swales, subsoil drains, stormwater treatment devices, rainwater tanks and any stormwater management device or redundant stormwater system.

Public Stormwater	Public stormwater network includes: Any stormwater pipe, channel, watercourse, land drainage or treatment facility, vested in or under the control of Council. Any stormwater drain, drain, land drainage work or treatment facility declared by Council to be a public drain under Section 462 of the Local Government Act 1974. The stormwater assets of other public entities such as Transport, Kiwi Rail, and the NZ Transport Agency are not considered "public" in the context of this document. They may be owned by a public entity but are not "public" assets in a context of stormwater services being accessible to anyone.
Receiving Environment	A water body, river, stream, lake or sea where a catchment runoff discharges.
Regional Council	Horizons Regional Council – regional council as per the Local Government Act 2002.
Regulatory Review	As defined in ENZ Practice Note 02: Peer Review -Version 2, April 2018.
Retention (hydrology)	A volume of stormwater reaming in a wetland, pond or tank after detained water was released, the retained water may infiltrate ground, evaporates and be used by living organisms.
Rider Main	Water reticulation less than 100 mm inside diameter, including associated valves, that serves more than one property
Right of Way (ROW)	A ROW is a private access
Rising Main	Pressure reticulation between a pumping station and a non pressurized junction or termination, including another pumping station, manhole, reservoir or treatment system
Road or Street	Road means, subject to Sections 43(1), 51(1), 54(1) & 55(1b) of the Government Roading Powers Act 1989, any road as defined in Section 315(1) of the Local Government Act 1974, and roading has a corresponding meaning
Rural Area	As defined in the District Plan.
Safety in Design	Refers to the Health and Safety by Design concept of managing health and safety risks throughout the lifecycle of structures, plant, substance or other products as presented by WorkSafe NZ guidelines and framework (WorkSafe NZ Health and Safety by Design: An Introduction, August 2018).
Secondary Stormwater System	The path taken by stormwater runoff in excess of the primary design flow, (e.g. in excess of 1% AEP). The secondary stormwater system is comprised mostly of Overland Flow Paths, and watercourses. The secondary system is vital for flood protection of surrounding properties.
Section 224(c) Certificate	Refer Resource Management Act 1991 – Section 224.
Service Lane	Has the meaning given in Section 315 of the Local Government Act 1974

Specific Design	A design that requires analysis, and/or calculation, as required by a method referenced in the ES, or outside of the scope of methods used in the ES. Specific Designs shall be prepared by a SQEP in accordance with sound and accepted engineering practice and principles and shall meet the objectives set out in the ES and/or the District Plan. The design shall comply with New Zealand Standard specifications and/or other nationally recognised procedures and systems. All specific designs must be accompanied by a PS1 Design and a PS4 Construction Review. Council may require a PS2 Design Review to be provided.
Stable Ground	Land that in the opinion of a suitably qualified and experienced Geo-Professional is in a state which is unlikely to settle, slip, erode or otherwise move, allowing for a suitable factor of safety to the detriment of superimposed buildings, services, roads or property.
Stormwater	Rainwater that turns into runoff and flows via primary and secondary stormwater systems into a receiving environment.
Stormwater Treatment Pond	A permanent pond, wetland or dry detention basin, designed to control peak stormwater flows and provide water quality treatment (see also Attenuation)
Sub-base	The material between the subgrade and basecourse aggregate
Subgrade	The top 1 m layer of the road formation below the pavement. It includes any stabilisation, granular or non-granular material of a lower standard than quarry run aggregate
Suitably Qualified and Experienced Person	Council requires that the engineering, including other technical aspects of infrastructure, environmental land development projects that need an engineering design approval and a consent from Council shall be undertaken, supervised and certified by a SQEP.
Surcharge	A pipe running in excess of its gravity flow condition, above full and under a degree of pressure.
Survey Plan	As described in Section 2 of the Resource Management Act 1991.
Swale	A planted or just grassed channel for conveying stormwater generally at low, non- eroding velocities and provide water quality treatment and amenity.
Transport Corridor	For the purpose of the ES, includes all Roads or Streets as defined above and includes all land from boundary to boundary (including the Berm and Carriageway).
Tree Dripline	The area defined by the outermost circumference of a tree canopy where water drips from and onto the ground
Urban Area	As defined in the District Plan
Vehicle Crossing	A trafficable pavement created over a public road corridor in order to connect Council's formed road to the boundary of private property.
Watercourse	A watercourse is part of the stormwater system and is a natural or man-made open channel where water collects and flows. It can be a river, stream, drainage channel, culvert or pipe that replaces a natural open channel etc.

1.A Minimum requirements

1.A.1 Land being developed shall be suitable for its intended use, and adequate provision shall be made for roads, vehicular access, stormwater drainage, wastewater disposal, water supply, landscaping, street lighting, and electricity and telecommunications servicing.

1.A.2 Sufficient provision shall be made for avoiding, remedying, or mitigating likely effects of damage by erosion, falling debris, subsidence, slippage, or inundation or ponding from any source.

1.A.3 Subdivision design and lot layout (including building platforms) shall be designed to ensure that any impact on both the upstream and downstream overland flow paths are managed effectively.

1.A.4 The developer shall appoint Suitably Qualified and Experienced Professionals, who have experience in similar scale development projects, acceptable to Council in Land development and or/ construction work, who shall be responsible for all compliance with the Resource Management Act requirements, all correspondence, investigations, calculations, preparation of engineering drawings and specifications in accordance with the Engineering Standards, monitoring and supervision of construction works, certification of the completed works and preparation of as-built plans, final inspection prior to practical completion being issued, and completing the requirements. Ensure that the Suitably Qualified and Experienced Professional(s) are separately covered by suitable current professional indemnity insurance, which shall cover all aspects of the works for which the professional is responsible. Where subdivision or development generates a need for off-site infrastructure upgrades, information required for resource consent, such as infrastructure modelling and cost sharing, shall be discussed with and agreed in principle with Council before application is made for resource consent.

1.A.5 Resource consent shall be obtained, engineering plans that adequately specify the works and materials shall be prepared and approved, and any other required consents and approvals shall be obtained before construction commences.

1.A.6 Works shall be constructed in compliance with resource consent and the approved plans and documents or approved amendments thereto. A geotechnical completion report shall be submitted where appropriate, and as-built plans and completion documentation shall be prepared and certified by the developer's representative.

1.A.7 Engineering signoff will be issued by Council on fulfilment of the consent requirements, to enable the relevant consent completion certificate to be issued prior to the relevant land uses being commenced.

1.B Means of compliance

1.B.1 Introduction to this document

1.B.1.1 This document provides developers with a means of compliance when designing and constructing development works required to meet engineering-related resource consent conditions.

1.B.1.2 Parts of this document may also be applied to non-resource consent related works involving the modification, upgrading or installation of existing or new Council infrastructure.

1.B.1.3 This document should be read in conjunction with NZ4404. Developers are welcome to propose design and construction alternatives to this document for Council's consideration and possible approval. When seeking alternatives or design details not already in this document, developers are advised to first refer to Engineering Codes of Practices and NZS 4404:2010 Land Development and Subdivision Infrastructure.

1.B.1.4 At the time of drafting this document, national standards are being drafted for the New Zealand water sector to provide regulatory engineers, design engineers, developers and contractors with one set of engineering standards common across the country. These standards are expected to be finalised in April 2025 and will potentially supersede the Stormwater, Water and Wastewater section of this document, however there may still be some requirement to retain local specifications so guidance will be issued on this once the national standards are available.

1.B.2 Related Documents

Related documents which should be read in conjunction with this document are as follows:

1. Council's District Plan (current and relevant future versions);
2. NZS 4404: 2010 Land Development & Subdivision Standards;
3. Austroads Design Standards and Specifications
4. NZTA Design and/or Performance standards and guidelines
5. Horizons Regional Council One Plan and supporting documents
6. Wastewater Pumped National Engineering Design Standard (to be determined);
7. NZTA Pedestrian Planning and design guide;
8. NZTA Cycling network guidance, https://www.nzta.govt.nz/walking-cycling-and-public- transport/cycling/cycling-standards-and-guidance/cycling-network-guidance
9. District/Regional Speed Management Plans;
10. Council's Public Places Bylaw;
11. Council's Traffic and Road Use Bylaw;
12. Council's Wastewater Drainage Bylaw;
13. Council's Water Supply Bylaw;
14. Councils Fees and Charges Schedule;
15. NZTA M30 Specification and Guidelines for Road Lighting Design;
16. ASNZS2566 Flexible Pipeline Design and Construction
17. SNZ PAS 4509:2008 New Zealand Fire Service Firefighting Water Supplies
18. Drinking Water Standards for New Zealand 2022

*Note: in absence of a specific Plan, Design Standard or Policy, council may choose to adopt a suitable alternative to manage the needs of the planned activity.

1.B.3 Developer's personnel

1.B.3.1 The developer shall appoint a single developer's representative who shall be responsible for liaising with Council, submitting information required for consent, preparing engineering plans, monitoring and supervising construction works, and certifying the works and the as-built information. The developer's representative shall be suitably qualified and experienced and hold the relevant insurances.

1.B.3.2 When requested by Council, the developer's representative shall be available for site meetings within five working days outside of the construction period, and within two working days following commencement of construction activities and throughout the duration of construction. In the case of emergencies, an immediate response may be required.

1.B.3.3 The developer's contractors and sub-contractors shall be suitably qualified and experienced, hold the relevant insurances, and comply with all relevant health and safety legislation and requirements.

1.B.3.4 Geotechnical investigation and completion reports shall be prepared by a suitably qualified Geotechnical Professional (as defined in NZS4404:2010).

1.B.3.5 Drainage lines less than 40m in length within lot boundaries may be certified by a registered drainlayer.

1.B.3.6 Drainage lines greater than 40m in length shall be certified by a suitably qualified Engineer in accordance with Section 1.C of this standard.

1.B.3.7 Connections to Public Drainage lines shall only be undertaken by Council's Approved Drainage Suppliers. Minimal requirements for approval include:

- Suitable resources
- Competent qualified staff
- Proven track record with examples demonstrating similar types of works
- Current insurances

1.B.3.8 All approved drainage suppliers are subject to satisfactory performance checks by Council engineers. A current list of suppliers can be requested from council.

1.B.4 Resource consent application

1.B.4.1 It is essential that enough engineering information is provided during lodgement to demonstrate that the ultimate development is feasible. The applicant is advised to liaise with Council in the pre-application period to confirm minimum engineering information requirements.

1.B.5 Engineering documentation

1.B.5.1 The following engineering information is to be considered and if necessary actioned and/or agreed with Council before any application is made for resource consent, and confirmation of the subsequent actions or agreements provided to support the application:

1. For urban on-demand water supply areas where new public water reticulation is proposed, confirmation that network supply water modelling has been carried out and approved by Council (under separate application to Council's Three Waters team) and that water is available and firefighting requirements can be met;
2. Where specialised new infrastructure (such as wastewater pump stations, wastewater pressure mains or water reservoirs) is proposed to be vested in Council, confirmation that pre-application liaison with Council has been carried out and approval provided;

3. Where any other resource consents have been or are proposed to be obtained by the developer and handed over to Council, confirmation that pre-application liaison with Council's engineers has been carried out;
4. Where some sharing of costs with Council is requested by the developer or required as part of development or financial contributions, confirmation that pre- application liaison with Council has been carried out, a schedule of costs for the relevant works, and an assessment of Council's share has been undertake and provided; and
5. Where development or financial contributions are required but the developer proposes an alternative arrangement, confirmation that pre-application liaison with Council has been carried out and that Council has confirmed the feasibility of the handover proposal.

Note 1.B.4.1 Council can collect Development Contributions from developers under the Local Government Act 2002. These can be contributions of land or money towards the cost of upgrading existing or providing new infrastructure to cater for future growth in the area.

Council can collect Financial Contributions from developers under the Resource Management Act 1991 through District Plan rules. These are designed to mitigate adverse effects of a particular development as identified in the Tararua District Plan.

1.B.5.2 The following engineering information is to be considered and if necessary actioned to support any application for resource consent, the level of detail required at the time of resource consent should be consistent with the application and we encourage a minimum level of detail to be discussed at preapplication stages. Engineering Documentation and Drawings submitted with resource consent application shall be stamped "FOR CONSENT".

1. For urban on-demand water supply areas where new public water reticulation is proposed, confirmation that internal water modelling has been carried out or confirmation from council that firefighting requirements can be met;
2. Copies of any other resource consents granted in respect of the subdivision or development including any associated approved plans and documents;
3. Preliminary design and construction documents including drawings and calculations for earthworks, roading and access, stormwater, wastewater, water supply, network utility services and street lighting, and landscaping;
4. A review by a suitability qualified professional confirming that the proposed road layout is safe, efficient and has a less than minor impact on the surrounding road network.
5. A geotechnical investigation report if required or requested by Council;
6. Where new vested roads are proposed, three suggested names for each proposed road, accompanied by an explanation about the name, in compliance with Council's Road Naming and Numbering Policy.
7. Road pavement design information detailing investigation methods (to be included as part of the geotechnical investigation report where one is being prepared), design assumptions and calculations;
8. Where on-site stormwater disposal is proposed, a soakage report detailing ground soakage rates and ground water levels (to be included as part of the geotechnical investigation report where one is being prepared);
9. Where a stormwater discharge is required to an existing reticulated network, open drainage systems within private property or a stream; a stormwater management plan or design shall be provided which demonstrates the activity meets the Regional Council's requirements (permitted activity, controlled activity, restricted discretionary activity).

10. Where on-site wastewater disposal is proposed, a wastewater report confirming that on-site wastewater disposal is feasible and is permitted activity (to be included as part of the geotechnical investigation report where one is being prepared);
11. Where existing private drains are proposed to become common private drains or public drains, a condition assessment report including CCTV footage and pipe condition assessment report;
12. Where Street lights are to be vested to Council a street light design demonstrating compliance with M30 specification for road lighting design. This includes situations where streetlights are required for local purpose (pedestrian access) reserves.

1.B.6 Drawings

1.B.6.1 Drawings shall adequately show the works and materials and shall include:

1. A locality plan including reference to legal property boundaries;
2. Staging plans showing each stage separately;
3. Topographical plans showing existing spot heights and features;
4. An erosion and sediment control plan meeting the requirements of Regional Council specifications;
5. Earthworks plans including existing and proposed contours, cut/fill isopach lines, site cross-sections, sub-soil drains and overland flow paths (where site is located within known flood zone further information may be requested);
6. Roading plans including long-sections, typical and detailed cross-sections, contours at intersections and cul-de-sacs, marking, signage, parking bays, right of ways and vehicle crossings;
7. Drainage and water plans including long-sections, structures and fittings, invert/ lid/ground levels, and areas to be compacted/hard-filled;
8. Proposed easements in favour of Council (these are usually required over all existing and proposed public pipes and features, and shall generally be a minimum of 3m wide except within right of ways where they shall be the entire width of the right of way);
9. Utilities services plans including layout and ducting, and streetlights;
10. Standard detail drawings;
11. Specific detail drawings and structural drawings if required;
12. Landscape planting plans of vested reserves if required; and
13. Any other specific requirement identified by Council during the Pre-Application process.

1.B.6.2 Coordinates shall be in terms of NZTM and levels shall be in terms of the NZ Vertical Datum 2016. Drawings shall be clear and legible and on A3 sheets at a suitable scale.

1.B.6.3 Each sheet shall have a unique identifying title and number.

1.B.6.4 Drawing sets shall include a cover sheet and drawing register list detailing sheet titles and numbers, and any revisions made.

1.B.6.5 Drawings submitted electronically shall be in A3 printable .pdf format.

1.B.7 Network utility agreements

1.B.7.1 The developer of all new subdivisions or developments incorporating roads for vesting in Council shall enter into financial agreements with the relevant network utility operators to ensure provision is made for the underground reticulation of all power lines, telephone services and road lighting, unless agreed otherwise by Council.

Note 1.B.7 Arrangements with the relevant network utility operators should be made as early as possible to avoid delays with design, construction and certification.

1.B.8 Engineering Design Acceptance

1.B.8.1 Approval of detailed engineering design information and drawings shall be sought prior to the commencement of any construction works. Final Engineering documentation shall be submitted electronically and stamped "FOR APPROVAL" by all relevant Council departments, and shall include the following information along with any specific engineering conditions detailed in the approved consent;

1. Final detailed design and construction documentation and drawings including a specification and incorporating any relevant consent conditions and additions, amendments or clarifications to the information in 1.B.4;
2. A quality management plan setting out construction and materials testing methodologies and inspection frequencies;
3. A road safety audit as set out in section 3.2.7 of NZS 4404:2010 Land Development and Subdivision Infrastructure;
4. For urban areas where new public water reticulation including rider mains is proposed and where modelling has not already been carried out as per 1.B.4, confirmation that water modelling has been carried out by Council (under separate application to Council's Three Waters team) and water is available;
5. For rural areas where private water schemes are proposed, a schematic drawing showing existing and proposed pipework and tank layouts, and a report from a Suitably Qualified and Experienced Person confirming that adequate volumes of potable water are available and that each lot can be supplied;
6. A design certificate in the form of Schedule 1A (Form Schedule 1A of NZS 4404:2010); and
7. Any other information required by the consent conditions.

1.B.8.2 Acceptance of engineering plans and documentation will be given in writing via email with plans/drawings stamped accepted. A copy of the approved plans and the resource consent shall be kept on site during the course of the works.

1.B.9 Building Act

1.B.9.1 The Building Act provides a national focus for building control to ensure that buildings are safe and sanitary and have suitable means of escape from fire, and the Building Regulations made under the Act provide the mandatory requirements for building control in the form of the New Zealand Building Code. The Building Code contains the objective, functional requirements and performance criteria that building works must achieve.

1.B.9.2 Where infrastructural development associated with capital works and the subdivision or development of land involves the creation of structures with associated site works, observe the requirements of the Building Act. Nothing in this development Standard shall detract from the requirements of the Building Act or the Building Code.

1.B.10 Approval of Privately Owned Assets

1.B.10.1 Building consent approval is required, acceptance and necessary to satisfy the Building Code, where a subdivision development includes the design and construction of commonly owned private assets within common access and/or ROW areas; that will be connected to or intended to service, buildings and/or structures on the subdivided lots. Alternatively in some situations, a Discretionary Exemption (schedule 1, 2 of the Building Act 200) can be applied through the Council's Building Department.

1.B.10.2 Where privately-owned common infrastructure is proposed as part of a subdivision application, the Council must ensure that appropriate consent conditions are in place to ensure the continued operation and maintenance of the privately-owned common infrastructure over its lifetime.

1.B.10.3 Conditions for the legal mechanism will usually require a consent notice to be registered on the record(s) of title as there will be a continuous requirement for owners to remain part of the entity and the ownership entity will have ongoing responsibilities associated with this, e.g., maintenance requirements.

1.B.10.4 Note that if common infrastructure is not located within a shared lot, then easements are required to allow access into the private lot for the other parties. These must be shown on the scheme plan.

1.B.11 Construction

1.B.11.1 Any deviation from the requirements of the approved engineering plans which may be necessary to meet particular circumstances shall be referred to Council for specific approval. A field amendment may be agreed to, or alternatively an amended design may be requested in which case the drawing register shall be updated and a new stamped plan showing the amended design will be issued. It is the developers' representatives' responsibility to manage design changes, amendments and subsequent approvals through construction.

Note 1.B.11.1 Significant changes to approved plans may require the developer to obtain a variation to the resource consent.

1.B.11.2 Prior to any construction works being undertaken, a Pre-start Meeting shall be held and attended by the developer, contractor, developer's representative, designer and appropriate council representative.

1.B.11.3 It is the developer's responsibility both directly and through the developer's representative to ensure that all physical construction work carried out directly or by contractors or subcontractors is in compliance with the resource consent and approved documentation and plans.

1.B.11.4 The developer's representative shall provide Council with such information as may be reasonably requested such as test results, site inspection records and forward works programs.

1.B.11.5 For larger or more complex developments, regular meeting times may be specifically agreed between the developer's representative and Council. Meeting minutes shall be taken by the developer's representative and circulated to attending parties afterward.

1.B.11.6 If, during construction works or the subsequent maintenance period, any situation arises whereby the security of the public, public or private property, or the operation of any public facility is endangered, Council may instruct the developer's representative to arrange and carry out such remedial works required to remove the danger. Any work so ordered shall be at the developer's expense. In the event that Council is unable to contact the developer's representative, Council may arrange for remedial works to be carried out at the developer's expense.

1.B.11.7 Temporary fencing or barriers shall be erected by the developer to protect the general public, particularly children, from all hazardous areas in the development including

stockpiles, excavations and ponds. Signs shall be erected warning of the hazards and danger in the area.

1.B.11.8 Corridor Access Requests (CAR) for Work Access Permits (WAP) must be submitted online via Submitica service online. A site location and traffic management plan is required as part of this process.

1.B.11.9 A Works Access Permit (WAP) is required for any works in an existing road reserve and/or any works that impact normal operating conditions of the adjoining road and shall be obtained by the developer before commencing work.

1.B.11.10 Further utility service plans can be obtained by applying via the beforeUdig service, online at beforeUdig.co.nz or by phone at 0800 248 344.

1.B.11.11 All traffic management measures shall comply with the relevant requirements.

1.B.11.12 The developer's representative shall ensure that the minimum levels of testing and inspections as set out in this document, as well as any other testing and inspections required by the consent conditions and the quality management plan, are carried out. This includes ensuring all materials are fit for purpose.

1.B.11.13 At the time of engineering design approval, a schedule of required inspection, testing and hold points shall be submitted to Council for approval. The schedule should outline the following:

- All required inspections,
- All required tests;
- Who is responsible for inspections and tests;
- Inspection and test frequency; and
- Compliance criteria.

1.B.11.14 Final inspections and maintenance inspections requiring the presence of Council shall be pre-inspected by the developer's representative, and a list of non- compliances drawn up, before a request is made to Council for official inspection.

1.B.11.15 A minimum of two working days' notice shall be given to Council for tests and inspections.

1.B.11.16 All Council inspections will be charged for in accordance with Council's Fees and Charges Schedule.

1.B.11.17 The developer and the developer's representatives and contractors shall be responsible for meeting all relevant health and safety requirements. However, Council may at any time comment on health and safety matters and if necessary request that development works be temporarily halted if it considers that the works are being carried out in an unsafe manner, particularly where the works are being carried out within a road reserve or on other Council land.

1.C Acceptance

1.C.1 Documentation

1.C.1.1 Where required by the consent conditions the following documentation shall be provided with application for engineering clearance:

1. A status list of conditions outlining how each condition has been met;
2. Completion certificates in the form of Schedules 1B and 1C (Form Schedule 1B and 1C of NZS 4404:2010);
3. As-built drawings (and associated attribute data in accordance with any relevant national standards) including the information set out in NZS4404, Schedule 1D (Form Schedule 1D of NZS 4404:2010), in A3 hard copy or A3 printable .pdf format, and in

electronic format (eg .dwg, .dxf or .shp files, preferably as email attachments) (coordinates shall be in terms of NZTM and levels shall be in terms of NZ Vertical Datum 2016);

4. Where a geotechnical completion report is required a Schedule 2A certification (Form Schedule 2A of NZS 4404:2010);
5. Evidence that all testing and inspections required by this document, the quality management plan and the consent conditions has been carried out, and that the results comply. All test results shall be accompanied by comment on the results and conclusions;
6. CCTV inspection data and reports on all new public wastewater and stormwater mains;
7. Operation and maintenance manuals, and/or maintenance plans (if required);
8. Post Construction Road safety audit results (if required);
9. Road surfacing quality assurance records;
10. Approved streetlighting design and with details of what has been installed i.e types of poles, luminaires and outreach brackets etc.
11. Evidence that power and telecom services to be taken over by network utility operators have been installed to their standards and that each lot has been serviced if required by a consent condition (for subdivisions, this shall be in the form of certification from the network utility operator concerned, referring to the subdivision and to each lot by number);
12. A report from a Suitably Qualified and Experienced Person demonstrating that any private water supplies serving more than one lot meet the requirements set out in the Drinking Water Standards for New Zealand 2022 and providing a full description of the proposed water supply. Where treatment of the supply is required the report must identify a preferred treatment option;
13. A statement from a Suitably Qualified and Experienced Person confirming that where a private supply meets the criteria for a Community Drinking Water Supply as determined in the Drinking Water Standards for New Zealand 2022, the supply has been registered with the national drinking water regulator.
14. A detailed schedule of prices showing the value of constructed infrastructure assets to be vested in Council, and the value of any associated maintenance bonds;
15. Any other documentation required by the consent conditions; and
16. A schedule of any variations to the approved design
17. Completed and Signed Copies of the Inspection and Test Plans
18. Evidence of retentions to be held for the duration of the defects liability period (see section 1.C.4).

Note 1.C.1 Council will process completion documentation as quickly as possible, however delays will occur where incomplete or inaccurate information has been supplied by the developer. To expedite this process it is advised that all documentation is submitted in a clear consistent manner in its entirety.

1.C.2 Section 224C

1.C.2.1 The developer shall maintain the works until they are formally taken over by the Council. The formal takeover date will be agreed with the relevant Council department for any vested assets.

1.C.2.2 All documentation detailed in Section 1.C.1 of this standard shall be provided prior to the Council accepting the works and the issue of Section 224(c) certificates.

1.C.3 Uncompleted Works Bonds

1.C.3.1 Bonds for uncompleted works will not usually be approved by Council and shall be subject to specific application and approval.

1.C.3.2 For uncompleted works covered by a bond the developer shall maintain the works until a date specified in the bond or, if earlier than such date, the works are completed to the satisfaction of the Council.

1.C.3.3 The amount of any bond shall be 125% of the estimated value of the uncompleted work.

1.C.4 Defects Liability Period

1.C.4.1 Unless stated otherwise in the engineering approval, a defects liability period of twelve (12) months from formal takeover by the Council shall apply. In specific circumstances e.g. stormwater planting, this is likely to be increased to 24 months. However, the developer shall not be responsible for damage caused by other activities, such as building construction on completed sections, or for fair wear and tear caused by public use of roads.

1.C.4.2 Where required, the developer shall provide evidence to Council that retentions will be held for the duration of the defects liability period. The value of retentions shall meet the minimum requirements as specified within NZS3910-2013.

1.C.5 Accuracy and defects

1.C.5.1 Council's receipt and acceptance of as-built plans and certification does not absolve the person who provided the information of responsibility for its accuracy. In the event of a connection not being found where shown on the as-built plans, Council will contact the certifier and give the certifier 48 hours to resolve the situation. If the information is found to be incorrect Council may arrange to have another connection installed and charge the certifier accordingly.

1.C.5.2 When public drainage and watermain systems are completed and live, the operation becomes physically the responsibility of the Council although the developer remains financially responsible for any hidden workmanship or materials defects on works covered by the Schedule 1C completion certificate (Form Schedule 1C of NZS 4404:2010) provided as per 1.C.1.

2.A Minimum requirements

2.A.1 Each lot shall contain a building site suitable for the types of building appropriate to the zoning of the land.

2.A.2 A geotechnical investigation report shall be provided with any resource consent application, where fill over 300mm is proposed, where there is uncontrolled fill, steep slopes or obvious geotechnical hazards, close proximity to adjacent watercourses, drains or rivers or in the coastal environment, where large trees are being removed or backfilling of redundant septic tanks within the buildable lot area and including in the road reserve, where ground stability and strength needs to be assessed to enable construction of infrastructure and building platforms, or where otherwise requested by Council. There may be instances for small scale developments where this is not required, and this will be agreed upon by Council.

2.A.3 The geotechnical investigation report shall consider all aspects of the proposed design and identify any lots or building sites with specific geotechnical requirements.

2.A.4 A Subdivision level Geotechnical Report (requirement as per 2.A.2) prepared by a suitably qualified professional needs to certify that a stable building platform exists within each proposed lot and which:

i. Certifies to the satisfaction of the Consent Authority that the foundations can be designed for any proposed building that are suitable with respect to the bearing strength of the supporting ground (In accordance with New Zealand Standard);

ii. Includes site specific geological, geomorphological and stability analysis that confirms that the proposed development will not be subject to natural hazards; and;

iii. Includes a site-specific analysis which confirms that the proposed development will not be subject to instability or erosion or lateral movement under fully saturated ground conditions and earthquake seismic loading;

iv. Specifies as appropriate, any remedial works to be undertaken to protect the development from natural hazards.

The new Peak Ground Acceleration (PGA) and earthquake magnitude recommendations from the New Zealand Geotechnical Society should be used if liquefaction analyses are carried out.

2.A.5 Lots or building sites with specific geotechnical requirements may be approved subject to restrictions and recommendations which shall be registered on the lot titles by way of a consent notice.

2.A.6 For subdivisions where earthworks have been undertaken as part of it, a geotechnical completion report prepared by a suitably qualified geo-professional (as defined in NZS4404:2010) who has monitored the work shall be submitted attesting to the suitability of the land for its intended purpose. The form in Schedule 2A of NZS 4404:2010 shall be completed and submitted along with the geotechnical completion report. In cases where no earthworks have been carried out the geotechnical investigation report may also comprise the geotechnical completion report.

2.A.7 Where the geotechnical completion report identifies that any area of the (site or platform etc) possesses development limitations, the consent holder shall rework that area to remove the limitations.

2.A.8 The geotechnical completion report shall include all test results as required by the geotechnical investigation report, the quality management plan or the consent conditions, and as-built drawings showing the extent of earthworks and subsoil drains and the location of any no-build areas or areas requiring specific foundation design.

2.A.9 All geotechnical investigation and completion reports shall be prepared by a suitably qualified Geotechnical Professional (as defined in NZS4404:2010).

2.A.10 In some instances, Council may require geotechnical reports to be peer reviewed by a Chartered Professional Engineer who specialises in geotechnical engineering (CPEng) or a Professional Engineering Geologist (PEngGeol), who is familiar with local geology. Such peer reviews will be at the developer's expense.

2.A.11 Geotechnical investigation reports shall take into account specific geological hazards in the Region. Hazard overlay maps can be found on the District or Regional Council's GIS website. Additional maps are also available on GNS website.

2.B Means of compliance

2.B.1 Sections 2.1-2.3 and 2.5 of NZS 4404:2010 Land Development and Subdivision Infrastructure set out the investigation, design and construction recommendations for earthworks and geotechnical requirements.

2.C Acceptance

2.C.1 The minimum level of construction testing for earthworks shall be fill compaction testing, which shall be carried out as per the requirements set out in the geotechnical investigation report, the quality management plan or the consent conditions, and certified by the developer's geotechnical engineer or other nominated party as agreed to by Council.

2.C.2 Prior to signoff, the developer's representative shall have supplied to Council the documentation and as-builts as per 1.C.1.

3.A Minimum requirements

3.A.1 The road network shall provide vehicle access to each lot and building site, link to the existing road network, and be able to accommodate the predicted volume and type of vehicle movements associated with the development.

3.A.2 The design life of all road pavements shall be 50 years.

3.A.3 Road design shall consider road hierarchy, zoning, use by vehicles, pedestrians and cyclists, and drainage and infrastructure functions.

3.A.4 Where the upgrading of an existing road (including assets within the roading corridor) is required as part of a resource consent, the developer shall cover the cost of this upgrade, until the point in time that a Development Contributions Policy is adopted by Council. Where such upgrading involves sharing construction costs with Council, liaison shall be carried out with Council before application is made for consent, and a schedule of costs and assessment of Council's share shall be provided with the consent application.

3.A.5 The developer shall arrange and carry out a road safety audit if required by Council.

3.A.6 The developer shall ensure that all relevant traffic management requirements are met and that Works Access Permits are obtained for all works in existing road reserves.

3.B Road Hierarchy

3.B.1 Road classifications to be used in defining design requirements are in accordance with the Waka Kotahi One Network Framework. Further information can be found on the ONF at https://www.nzta.govt.nz/planning-and-investment/planning/one-network- framework/.

3.B.2 For District specific Road Hierarchy designation, contact the Council Roading Department.

3.C Means of compliance

3.C.1 Design Philosophy

3.C.1.1 The Council encourages innovative design, for access and roading, which satisfies the following objectives:

1. Safe – the layout must be safe for pedestrians, cyclists, public transport and motorists,
2. Secure – the design of the roads and other linkages must not compromise the personal security of the users;
3. Energy efficient – the layout should minimise the number and length of vehicle trips and promote alternatives to motor vehicle use;
4. Linked – the layout of a development should be extended on a hierarchical network basis for all modes. It should promote walking and cycling, particularly for short trips to local facilities, and should provide direct access to public transport routes. Linkages to existing areas of development must also be provided;
5. Suitable vehicle speeds – the road design must encourage vehicle speeds that are appropriate for the road classification and context;
6. Comprehensible – the road layout must be easy to read and follow, for both residents and visitors;
7. Accessible - the road design should incorporate footpaths and kerb cutdowns that provide easy access for all;
8. Enhances environment – the road design should incorporate carriageway and residential stormwater quality improvements or design features as part of the grass berm design e.g. encouraging sheet flow over grass berms, swales protected from traffic use;
9. Attractive – the design of the street landscaping, trees and other features can add significantly to the amenity, environment, and character of the area.

3.C.2 Road widths

3.C.2.1 Legal widths shall be wide enough to cater for all design features such as footpaths, parking, services, landscaping and stormwater drainage. Road widths shall be planned to cope with the estimated long term community needs and potential future vehicle, cycle, pedestrian traffic and the location of existing and future services (including drainage, underground and overhead utility services).

3.C.2.2 Road corridor widths shall be specified in accordance with Table 1 and 2 below. Any departures from Table 1 and 2 shall be specifically designed and agreed with the Council Roading Department.

Table 1 - Design standards for new Urban Roads

Design element				
Road type	**Low Volume Local Streets**	**Local Streets**	**Local Streets – Enhanced** [1]	**Urban Connectors**
Typical design AADT	<50	<1500		
Maximum length (m)	150m			
Maximum number of residential units served	20	200	200	
Road reserve width (m) [2]	16.0	20.0	20.0	22.0
Footpath (m) [3]	1 x 1.5	2 x 1.5	2 x 1.5	1 x 1.8 (one side)
Shared use path (m) [4]			-	1 x 2.5 (one side)
Parking (m) [5]	2.5 (within carriageway, one side only)	2.0 (within carriageway, each side)	2.0 (within carriageway, each side)	Indented parking bays (outside carriageway, each side)
Cycle lane (m) [6]			2 x 1.8	2 x 1.8
Traffic lane (m)	4.0 Minimum [7]	2 x 3.0m	2 x 3.0m	2 x 3.3m
Minimum carriageway width (m)	6.5	10.0	11.6	10.2

1. Local roads may be elevated to 'Enhanced' where they form part of a desired cycle network.
2. The balance of the road reserve not occupied by the carriageway, indented parking bays, footpaths, and shared use path, may be used for landscaping and installation of services. Services should not be installed under footpaths or shared use paths.
3. Where a footpath is positioned against a property boundary, they shall be formed 150mm wider than stated.
4. Consultation should be undertaken with the District Council to confirm the location of a shared use path.
5. Parking design standards are shown in the District Plan - TRAN-APP1.
6. Where cycle lanes are required, these shall be permanently marked.
7. Restrictions will be required to ensure that a minimum of a 4.0m traffic lane is maintained at all times.

Table 2 - Design standards for new Rural Roads

	Design element			
Road type	**Low Volume Rural Road**	**Rural Road**	**Peri -Urban Road**	**Rural Connectors**
Typical design AADT	<50	<1,500	<1,500	
Maximum length (m)	150			
Maximum number of residential units served	20	150	150	
Road reserve width (m)	20.0	20.0	20.0	23.0
Shared use path (m) (one side) [1]			2.0	2.5
Traffic lane (m)	1 x 3.5	2 x 3.0	2 x 3.3	2 x 3.5
Minimum sealed shoulder width (m)	2 x 1	2 x 0.5	2 x 1.0	2 x 1.0
Total shoulder width (m) [2]	2 x 2	2 x 2	2 x 2	2 x 2
Minimum sealed width	5.5	7.0	8.6	9.0
Minimum formed carriageway width (m)	9.5	9.6	9.6	10.0

1. Consultation should be undertaken with the District Council to confirm the location of a shared use path.
2. Where the minimum shoulder width cannot be obtained due to topography, side water channels will be supplemented with Mountable Kerb and Channel or Dish Channel on approval from Council's Roading Engineer

3.C.3 Gradients

3.C.3.1 Gradients are measured on the inside of any curves at the edge of the traffic lane

3.C.3.2 Kerb grades will not be less than 1-in-250 (0.4%).

3.C.3.3 Gradient lengths should be as long as possible with vertical curves provided where necessary. Where the gradient change exceeds 1% the minimum curve length shall be 30m, except in the case of cul-de-sacs where the minimum curve length shall be 20m.

3.C.3.4 Gradients at intersections shall be specifically designed in accordance with Austroads design guides for all rural roads and for urban roads where the speed limit is higher than 50 km/h.

3.C.3.5 The maximum longitudinal grade of roads shall be as follows unless otherwise approved by District Council:

1. Low Volume Local Streets = 1 in 8 (12.5%)
2. Local Streets = 1 in 8 (12.5%)
3. Urban Connectors = 1 in 10 (10%)
4. Activity/Main Streets = 1 in 15 (6.7%)
5. Transit Corridor = 1 in 15 (6.7%)
6. Low Volume Rural Road = 1 in 8 (12.5%)
7. Rural Roads = 1 in 8 (12.5%)
8. Peri-Urban Road = 1 in 10 (10%)
9. Rural Connectors = 1 in 15 (6.7%)
10. Interregional Connectors = 1 in 15 (6.7%)

3.C.4 Cross Falls

3.C.4.1 Standard crossfalls shall normally be 3% for sealed roads. However, when widening an existing carriageway, crossfalls may vary dependent on stormwater facilities, and existing features with a nominal target gradient of more than 3%. Where this cannot be achieved, consultation with the Council Roading Engineer is required, and mitigations and treatments agreed upon.

3.C.4.2 Unsealed roads, unsealed private accesses or right of ways crossfalls shall be 5%-6%.

3.C.4.3 Transitions from sealed roads to unsealed private accesses, shall be designed in accordance with the usage of the property (refer to Drawings for specific details).

3.C.4.4 Turning circles and cul-de-sacs shall be designed to avoid excessive differential levels between the crown and the edge of seal. Minimum turning circle and cul-de-sac crossfalls shall be 2% for asphaltic concrete. Where an off-centre cul-de-sac head is used, the crown shall be offset to create symmetrical crossfalls.

3.C.5 Super-elevation

3.C.5.1 Super-elevation is not required in areas with a speed limit of 60 km/h or below.

3.C.5.2 Superelevation shall be specifically designed in accordance with Austroads design guides for all rural roads and for urban roads where the speed limit is more than 60 km/h.

3.C.6 Horizontal Curves

3.C.6.1 The design of horizontal curves for road alignment shall be in accordance with Austroads Guide to Road Design Part 3. If not able to be achieved due to topography, consultation with Council is required.

3.C.6.2 Minimum curve radii for roads shall be designed to reflect intended road use and anticipated vehicle speeds. Widening may be required on curves with a tight radius or where heavy vehicles are likely.

3.C.7 Vertical Curves

3.C.7.1 The design of vertical curves must be in accordance with Austroads Guide to Road Design Part 3.

3.C.7.2 The maximum grade change in the longitudinal alignment without a vertical curve is summarised in table 3 below:

Table 3 - Maximum Grade Change without a Vertical Curve

Design Speed (km/h)	Grade Change (%)
40	1.0
50	0.9
60	0.8
70	0.7
80	0.6
90	0.5
100	0.4
110	0.3
120	0.2

3.C.7.3 The design of the vertical curves must be in accordance with Austroads Guide to Road Design Part 3: Geometric Design

3.C.8 Intersection Design

3.C.8.1 Intersections will be designed to improve the legibility of the transport network and reinforce the function of the intersecting roads as defined by the road hierarchy.

3.C.8.2 The design of intersections must be in accordance with Austroads Guide to Road Design Part 3.

3.C.8.3 Intersections on local roads in commercial and industrial zones shall have an inside kerb radius of 12m-15m. Intersections on other local roads shall have an inside kerb radius of 9m-12m.

3.C.8.4 The design of unsignalised and signalised intersections will be in accordance with Austroads Guide to Road Design Part 4A – Unsignalised and Signalised Intersections.

3.C.8.5 The design of roundabouts will be in accordance with Austroads Guide to Road Design Part 4B – Roundabouts.

3.C.8.6 The design of cycle facility intersections will be in accordance with NZTA's Cycling Network Guidance and Austroads Guide to Road Design Part 6A Paths for Walking and Cycling.

3.C.8.7 The road marking and sign layout at all intersection types will be in accordance with the NZTA Manual of Traffic Signs and Markings (MOTSAM) and NZTA Traffic Control Devices Manual.

3.C.9 Cul-de-Sac Heads

3.C.9.1 Cul-de-Sac heads must have minimum 10.5m radius turning area in residential areas. In commercial and industrial zones, the radius must be 15m.

3.C.9.2 A berm and/or footpath is required around the complete head of the cul de sac.

3.C.9.3 No parking is permitted anywhere within the total turning area of the Cul-de-Sac unless it has been specifically designed to allow parking.

3.C.9.4 Off centre Cul-de-Sac heads must be designed by offsetting the road carriageway crown to create symmetrical conditions with the kerb return.

3.C.9.5 Any alternative arrangement proposed must fully demonstrate the ability to accommodate turning manoeuvres of an 8m rigid truck for refuse and recycling collection services.

3.C.9.6 The minimum longitudinal grade of kerb and channel in Cul-de-Sac heads must be 1 in 250.

3.C.9.7 Where grades are less than 1 in 200, sumps are to be placed either at the neck of the Cul-de-Sac on both sides of the carriageway or a double sump at the end of the Cul- de-Sac.

3.C.10 Parking (On Street)

3.C.10.1 Parking is required in accordance with the requirements in Table 1 and Table 4. If indented bays are used, they will be at least 2.4m wide and no wider than 2.11m.

3.C.10.2 On street parking is required to be provided within 50m of the property boundary of every residential unit where no off-street parking is available.

3.C.10.3 Parking bays to be evenly distributed along the road at no greater spacing than 50m.

3.C.10.4 Parking spaces will commence a minimum distance of 6.0m from any side road and no closer than 1.0m to any access.

3.C.10.5 Where parking is metered, restricted or angled, individual parking spaces will be marked.

3.C.11 Footpaths

3.C.11.1 The design of footpaths will be in accordance with the requirements of the NZTA Pedestrian Network guidance.

3.C.11.2 The number and width of footpaths are to be provided in all planning zones are specified in Table 1. The widths specified in Table 1 are 'Through Route' widths must be free of all obstructions such as vegetation, light columns, signs, utility furniture, bollards etc.

3.C.11.3 Where any footpath is located directly against the property boundary, they shall be formed 150mm wider than stated in Table 1. Where a footpath is located against a kerb, the width of the footpath excludes the top of the kerb.

3.C.11.4 Footpath crossfall should be 2%, with a range of 1%-3% permitted where approved by Council.

3.C.12 Berms, Batters and Retaining Structures

3.C.12.1 Where berms are not required to cater for pedestrians, mowable grassed batters with a maximum crossfall of 17% (1 in 6) may be used.

3.C.12.2 In all cases the top edge of any fill or the toe of any cut adjacent to the road shall have a crossfall of 2%-6% extending a minimum of 300mm beyond the outside edge of the footpath or, where there is no footpath, the back of the kerb or carriageway shoulder.

3.C.12.3 New cut or fill faces shall be stabilised with suitable approved vegetation or retained if required by the geotechnical investigation report or the consent conditions.

3.C.12.4 Retaining walls which support road reserve shall be located entirely within the road reserve. Retaining walls which support adjoining land shall be located entirely within the adjoining land unless approved otherwise by Council.

3.C.13 Road Name Signage

3.C.13.1 Road marking and signage shall meet the requirements of the Land Transport Rule (Traffic Control Devices) 2004 and associated sign specification.

3.C.13.2 Road name signs shall be consistent with the road priority. Where named right of ways have been approved, right of way name signs shall have the words “private access” in place of the words “no exit”.

3.C.14 Private Access and Right of Ways

3.C.14.1 All new private access and right of ways shall be designed in accordance with NZS4404:2010 specifications, unless otherwise agreed to by Council.

3.C.14.2 Legal right of way widths shall be wide enough to allow for access and provision of all necessary services and stormwater controls and shall meet the minimum requires specified in table 4 below:

Table 4 - Private Access Widths

Zone	Number of residential units	Number of parking spaces provided	Minimum legal width (m)	Minimum formed width (m)	Maximum formed width (m)	Passing bays
Residential	1 - 3		4.6	3.5	6.0	Yes
	4 – 8		5.0	3.5[1]	6.0	Yes
	9 – 15		6.5	5.5	6.0	
Commercial and Industrial		<15	8.0	5.5	9.0	
		≥15	8.0	6.0	10.0	
Rural	1-15		10.0	4.0	8.0	Yes

3.C.14.3 A place where access may be made to a connection for inspection, cleaning or maintenance as defined in the NZ Building Code.

3.C.14.4 For residential accessways or right of ways more than 75m long in urban areas, and more than 150m long in rural areas the provision of passing bays shall be made. Passing bays shall have a minimum width of 5.5m carriageway over a minimum length of 15m, located with adequate visibility between them and at maximum spacings of 50m in urban areas and 100m in rural areas where visibility is available from bay to bay.

3.C.14.5 For commercial / industrial accessways or right of ways more than 75m long in urban areas, and more than 150m long in rural areas the provision of passing bays shall be made. Passing bays shall have a minimum width of 6.5m carriageway over a minimum length of 25m, located with adequate visibility between them and at maximum spacings of 50m in urban areas and 100m in rural areas where visibility is available from bay to bay.

3.C.14.6 Private accessways serving more than 3 units shall include a turning head designed in accordance with NZS4404:2010 Figure 3.4.

3.C.14.7 Where a right of way is greater than 250m in length traffic calming measures will be required to manage vehicle speeds to 30km/hr.

3.C.14.8 All right of ways in urban areas shall be surfaced with concrete, chip seal or asphaltic concrete. In rural areas right of ways adjoining sealed roads shall be surfaced for a minimum of 30m from the edge of the seal.

3.C.14.9 Not more than one crossing is to be provided per site. Except to facilitate on-site turning and a one-way traffic flow in Commercial and Industrial zones through a site, provided there is at least 7.5 metres between accesses on the same road frontage, and one access is marked “in” and the other “out”.

3.C.14.10 For all vehicle access points, a minimum visibility splay with the dimensions shown in Figure 4-10 must be provided. Items located within the visibility splay must not obstruct visibility to pedestrians. This means avoiding objects and vegetation with a height of more than 0.9m.

3.C.14.11 Any rural private access or right of way with a grade greater than 8% shall be sealed.

3.C.15 Pavements

3.C.15.1 All flexible pavements shall be designed with a 50-year life and in accordance with Austroads guidelines. Flexible pavements shall be used unless approved otherwise by Council.

3.C.15.2 Minimum pavement depths for vested roads shall be 150mm AP40 on 200mm AP65.

3.C.15.3 The total number of Equivalent Design Axles (EDA) that will use the pavement during its design life must be determined from table 5 of this Standard and Austroads Guide to Pavement Technology – Part 2: Pavement Structural Design. The minimum growth rate to be applied to the traffic loading is 1.5% per annum.

3.C.15.4 Pavement design and construction may be completed using the charts as per drawing R01, with pavement layer depths increased accordingly following testing if required, unless specific design is required as specified in Table 5.

Table 5 - Assumed SDA Traffic Loadings

Street Classification	EDA/Lane
Transit Corridors and Interregional Connectors	Specific Design Required
Activity/Main Streets	Specific Design Required
Urban Connectors and Rural Connectors	4.0×10^5
Local Streets and Peri-Urban Road	1.0×10^5
Rural Roads	5.0×10^4
Low Volume Local Streets and Rural Roads	4.0×10^4
All roads in Industrial zone	Specific Design Required

3.C.16 Kerbs and sumps

3.C.16.1 Unless directed otherwise by Council, kerbs and channels shall be provided on all roads in urban areas as per drawing R02.

3.C.16.2 Where required as part of a designed stormwater system, sumps shall be located in roads as follows:

1. With a maximum channel run of 90m;
2. On the high side of intersections, located at the kerbline tangent point;
3. At changes of gradients or direction in the channel (e.g. at an intersection where both channels fall towards the intersection and where superelevation is required);
4. Clear of vehicle crossings and pram crossings;
5. Where practical, new sumps shall be located in the middle third of an adjacent lot's frontage to allow for vehicle crossing construction. New vehicle crossings shall be located clear of existing sumps or the existing sump relocated at the developer's expense;
6. A double sump to minimise the risk of ponding shall be provided at cul de sac ends where there is a low point, and at the lowest point in sag vertical curves for all roads.

3.C.16.3 Catchpits shall be constructed as per drawing D01. Where a standard catchpit does not meet intake capacity requirements, an alternative specific design shall be required.

3.C.16.4 Catchpit outlets shall have a minimum diameter of 300mm. Catchpits connecting to soak pits or swales shall be fitted with a submerged outlet as per drawing D01.

3.C.16.5 Secondary stormwater flowpaths shall be provided from all low points along the road.

3.C.17 Pram crossings

3.C.17.1 Pram crossings shall be provided at all road intersections, and at other locations where required to enable logical and safe movement of pedestrians unless directed otherwise by Council. Tactile pavers shall be provided in accordance with RTS14 – Guidelines for facilities for blind and vision impaired pedestrians.

3.C.17.2 Pram crossings shall be constructed generally as per drawing R03 with no "bull nose" in the channel, ie with no abrupt change in level through the kerb and channel portion of the crossing. For pram crossings where the footpath abuts the kerb, localised footpath widening maybe required to ensure that the correct grades can be achieved.

3.C.18 Vehicle crossings

3.C.18.1 Vehicle crossings shall be provided if their positions are known at the time of subdivision, otherwise they may be deferred to building stage subject to Council approval. Crossings deferred to building stage and subject to specific design or location requirements may need to be registered on the title by way of a consent notice.

3.C.18.2 Unless otherwise approved by Council, vehicle crossings shall intersect the carriageway at an angle of 90 degrees (plus or minus 15 degrees) and shall be located clear of existing and proposed roadside features such as sumps, valves, street trees, streetlights and pram crossings. At Council's discretion such roadside features may be relocated or strengthened at the developer's expense to allow construction of a new vehicle crossing.

3.C.18.3 Vehicle crossings shall be designed to enable a 90th percentile car to use them without grounding any part of the vehicle. They shall have a grade no steeper than 12.5% (1 in 8) within the first 6m from the road carriageway.

3.C.18.4 Visibility requirements (safe sight line distances) and locations of vehicle crossings shall be as per drawings R04.

3.C.18.5 Vehicle crossings serving lots in areas where no firefighting hydrants are available shall be a minimum of 4m wide at the boundary to allow for access by fire appliances.

3.C.18.6 Unless otherwise approved by Council, gates across rural vehicle crossings to be recessed back from the road for sufficient distance to allow any vehicle using the driveway to stop clear of the traffic lanes while the gate is being opened or closed.

3.C.18.7 Urban crossings adjoining roads with kerb and channel shall be constructed as per drawing R05. Where the crossing serves a right of way, additional kerb and channel strengthening shall be provided as per drawing R06. Where the crossing serves a commercial or industrial site, additional kerb and channel strengthening shall be provided as per drawing R05, and the depth of the crossing's AP65 layer shall be increased to a minimum of 200mm.

3.C.18.8 All crossings adjoining roads with no kerb and channel shall be specifically designed and approved.

3.C.18.9 Where new crossings pass through an existing footpath, the footpath shall be saw cut 300mm wider than the crossing on each side and removed. The footpath shall be rebuilt as part of the crossing while maintaining the same longitudinal grade and crossfall as the adjacent sections of footpath.

3.C.18.10 All rural crossings shall be constructed in accordance with NZ Transport Agency (Waka Kotahi) Appendix 5B – Accessway Standards and Guidelines. If the road is sealed the crossing shall be surfaced with chip seal or asphaltic concrete a minimum distance of 30m from the edge of the road carriageway.

3.C.18.11 Where a vehicle crossing abuts a sealed carriageway, the carriageway shall be saw cut at the joint to protect the existing pavement structure. Where asphaltic concrete or concrete is used, edge banding must be completed.

3.C.18.12 Where roadside drainage is provided by a swale or table drain with maximum side slope grades of 6.5%, vehicle crossings may be constructed to pass through the swale or table drain. For swales with subsoil drains, the portion of the crossing traversing the swale shall be constructed as per drawing R07.

3.C.18.13 Vehicle crossing culverts shall have a minimum diameter of 300mm with traversable ends unless otherwise approved by Council.

3.C.18.14 Where a new vehicle crossing has been installed to a lot, any redundant crossings shall be removed at Council's discretion and the berm and road edge reinstated.

Note 3.C.18 *A Works Access Permit shall be obtained before commencing any vehicle crossing works within existing road reserves. The permit can be obtained by applying for corridor access approval from Council. You will need to complete a Corridor Access request and submit it to Submitica service, online. Provision of a site location plan and traffic management plan is required as part of this process.*

For non-resource consent related vehicle crossing works:

- *A Works Access Permit is required prior to commencement of works as per the above;*
- *A preconstruction meeting is required prior to commencement of works – contact the development Engineer on at the Council*
- *Vehicle crossings associated with new building works should be dug out and metalled before the site scrape is carried out and before any building works commence; and*
- *Council inspections are required when the crossing has been dug out, and prior to final surfacing – contact the development Engineer.*

3.C.19 Surfacing

3.C.19.1 The minimum surfacing requirement is a two-coat grade 4 and 6 wet lock chip seal for urban roads and a two-coat grade 3 and 5 wet lock chip seal for rural roads.

3.C.19.2 For asphalt roads a membrane seal using asphaltic binder or emulsion and grade 5 chip shall be laid prior to surfacing with asphaltic concrete as per the approved design.

3.C.19.3 In cul de sac heads the minimum surfacing requirement is a 30mm layer of paver- laid AC10 asphaltic concrete laid over a grade 5 chip seal.

3.C.19.4 Private right of ways which are to remain unsealed shall be prepared to sealing standard and covered with 100mm of AP20 as a running course.

3.C.19.5 Chip sealing operations shall not be carried out when the shade air temperature above the pavement is less than 10^{o}C.

Note 3.C.19.5 *First coat sealing shall generally be carried out in accordance with TNZ P/3: 1995 Specification for first coat sealing, with an appropriately reduced rate of chip application to allow for application of the second coat.*

3.C.19.6 Prior to surfacing the pavement shall be swept clean and shall present a tight, uniform, stone mosaic surface.

3.C.19.7 In all cases sealing contractors shall follow best practice guidelines to ensure kerbs and channels are sufficiently clear of swept debris at the time of sealing and protected from overspray. Untidy work and unsightly excessive overspray shall render the work unacceptable.

3.C.19.8 For new roads the developer's representative shall retain a copy of all surfacing quality assurance records, to be submitted to Council with the application for engineering clearance.

3.C.20 Access tracks

3.C.20.1 Council may require access to be provided to or around Council assets such as stormwater ponds and water tanks, as follows:

3.C.20.2 Grassed access tracks: Shall have a crossfall of 3%-5% and consist of a minimum of 200mm AP65 on a firm subgrade, 3m wide and covered with a 75mm layer of topsoil; and

3.C.20.3 All-weather access tracks: Shall have a crossfall of 3%-5% and consist of a minimum of 250mm AP65 on a firm subgrade, 3m wide, capped with a suitable running course to ensure the surface stays bound.

3.C.20.4 Alternative access track solutions such as gobi blocks or similar will be considered and are subject to specific Council approval. In all cases stormwater control shall be considered and allowed for.

3.D Acceptance

3.D.1 Testing

3.D.1.1 Testing shall be conducted in accordance with the relevant standards noted in NZTA Z8:2002 – Standard for Inspection, Sampling and Testing (i.e. F1 Specification for Earthworks, B2 for Unbound Basecourse or other relevant standard) and results submitted to Council in an appropriate digital format.

3.D.1.2 The minimum level of testing shall be as per the following sections.

3.D.1.3 Clegg impact testing: Shall be carried out prior to surfacing on subbase metal under kerbs and channels, on basecourse metal under footpaths, right of ways and vehicle crossings, and on basecourse metal under roads alongside channels and other key areas where requested by Council. Readings shall be taken at maximum 10m spacings, and shall comply with the following criteria:

1. Subbase metal under kerbs and channels, and basecourse under vehicle crossings, right of ways and under roads shall have a minimum impact value of 32; and
2. Basecourse metal under footpaths shall have a minimum impact value of 25.

3.D.1.4 Nuclear densometer testing: Shall be carried out on subbase and basecourse metal on all vested roads. Readings shall be taken in both lanes at maximum 20m spacings, and shall comply with the following criteria:

1. Subbase: Mean Value ≥ 95%. Minimum Value ≥ 92%
2. Basecourse: Mean Value ≥ 98%. Minimum Value ≥ 95%

3.D.1.5 Benkelman Beam testing: Shall be carried out on all roads, and on right of ways if required by consent condition, prior to surfacing. Readings shall be taken in the wheel path in both lanes at maximum 10m spacings or as otherwise requested by Council, and shall comply with the following criteria:

1. Maximum designed deflection for asphalt surfacing = 1mm.
2. Maximum designed deflection for right of ways servicing residential properties = 1.6mm.
3. Maximum designed deflection for chipseal = 2mm.
4. Not more than 5% of the tests exceed given maximums.
5. No single result exceeds 2.0mm.
6. Not more than one test per $5m^2$ exceeds 1.5mm.

3.D.2 Inspections

3.D.2.1 The minimum number of inspections shall be as per the relevant standards listed within NZTA Z8:2002 – Standard for Inspection, Sampling and Testing and be undertaken by a Suitably Qualified and Experienced Person. Records of all inspections must be submitted to Council in accordance with these standards prior to application for Section 224C.

3.D.3 Signoff

3.D.3.1 Prior to acceptance of the completed infrastructure, the developer's representative shall have supplied to Council the completion documentation, including the following:

1. As- built drawings signed by a Registered Surveyor
2. All Quality Assurance Test Result records as required under section 1.B.1
3. Inspection Records referred to in in 1.B.2
4. A Schedule 1C Certificate (Form Schedule 1C of NZS 4404:2010) signed by a Suitably Qualified and Experienced Person

4.A Minimum requirements

4.A.1 All stormwater systems must be designed in accordance with relevant national and regional standards and specifications.

4.A.2 The stormwater system shall serve the entire upstream catchment for the land use likely to prevail during the economic life of the system.

4.A.3 The design life shall be 80 years although some components such as soak pits may require earlier maintenance or replacement.

4.A.4 Subdivisions shall be designed and constructed with a stormwater system that allows for the discharge of stormwater from roads and lots in an approved manner. Construction of individual on-site storage or soakage systems may be deferred to the time of building by way of a consent notice registered on the lot titles if it can be demonstrated that installation of the systems is feasible.

4.A.5 For urban areas where Council does not hold a global stormwater discharge consent, the developer shall confirm with Horizons Regional Council whether a discharge consent is required and obtain a discharge consent if necessary.

4.A.6 The developer shall ensure that all relevant consents are obtained, that traffic management requirements are met, and that Works Access Permits are obtained for all works in existing road reserves.

4.B Ownership and Access

4.B.1 This section is to be used to define the demarcation between public and private common assets.

4.B.2 Private assets are those constructed within commonly owned or private properties (such as Right of Ways), which service only commonly owned areas. Commonly owned assets should be contained within right of way boundaries and ownership should be defined on property titles.

4.B.3 Public assets are those constructed within council owned land and assets constructed in private property that form part of a wider stormwater network/system such as swales, pipes, and overland flow paths. Public assets located within private property shall be contained within easements.

Easement widths for buried pipe should be the larger of:

- A width equal to 1.5 times the depth to invert with the service laid in the centre, or
- A minimum of 4 metres with the service laid in the centre.

Easement widths for watercourses and open drains:

- 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 for maintenance vehicles.

4.C Primary Stormwater System

4.C.1 The primary stormwater systems include both open and closed conduits and shall be designed to cater for the flows generated by the event specified in the design standards in Section 4.E.1 below.

4.C.2 The location of primary systems shall be aligned with natural flow paths as far as possible.

4.C.3 Any primary piped systems shall be designed to cater for the peak flow without surcharge, using a Colebrook-White roughness coefficient k=1.5 for pipes up to and including 300mm diameter and k=0.6 for pipes larger than 300mm diameter.

4.C.4 Primary drainage pipelines to vest in Council shall be capable of serving the upstream catchment and have a minimum internal diameter of 300mm.

4.C.5 Pipelines shall be laid to a constant grade and line between access manholes located at each change of direction, grade and pipe size or class. Manhole spacings shall not exceed 90m for pipe sizes up to 1500mm diameter, above which spacings may extend to 150m. Each branch line shall join the main line at a manhole.

4.C.6 Pipelines in roads and rights of way should be located in the carriageway adjacent to the kerb or shoulder.

4.C.7 Pipelines in berms shall have a minimum cover from finished ground level of 600mm and pipelines in roads, rights of way and other trafficable areas shall have a minimum cover of 900mm, unless subject to specific design. Where this cover cannot be achieved in roads, right of ways and other trafficable areas, additional protection shall be provided.

4.D Secondary Stormwater System

4.D.1 The secondary system is the route taken by stormwater when the primary system is unable to cope either because of blockages or because the hydraulic capacity of the primary system is exceeded by a larger-than design storm.

4.D.2 The secondary stormwater system shall consist of ponding areas and overland flow paths with sufficient capacity to transfer flows generated by the event specified in the design standards in section 4.E below.

4.D.3 Secondary flow paths from upstream properties shall be maintained during and after the development process.

4.D.4 Whenever possible overland flow paths should be along the road network. Where required to cross private land they should be aligned alongside boundaries where possible and protected by easements in favour of Council.

4.D.5 Secondary flow paths are to be:

a) Aligned with natural flow paths wherever possible;

b) Via roads, public walkways or right of ways wherever possible;

c) Kept clear of proposed building sites;

d) Protected by legal easements in favour of Council;

e) Subject to an encumbrance placed on the title of the land which prohibits ground reshaping and the erection of any barriers to the secondary flows;

f) Appropriately formed and/or hardened to make their presence obvious and durable;

g) Designed for public safety.

4.E Means of compliance

4.E.1 Design storms and surface runoff

4.E.1.1 Design rainfall intensities shall be as per NIWA's High Intensity Rainfall System V4, available online at hirds.niwa.co.nz. To allow for climate change, apply Representative Concentration Pathways (RCP) 6.0.

4.E.1.2 Stormwater systems shall be design for a minimum annual exceedance probability (AEP) rainfall event as outlined in Table 6.

Table 6 - Stormwater Rainfall Design Events

Stormwater Management System	Design AEP
Primary Systems	10% AEP
Rural Road Culverts	5% AEP
Urban Culverts	1% AEP
Secondary Systems	1% AEP
Flood Management – streams, rivers	1% AEP
Stormwater Detention Devices	2% AEP
Primary Systems and Detention Devices where no Secondary Systems are provided for	1% AEP

4.E.1.3 It is the discretion of the Engineering Manager to require a higher or lower design standard than the standards set out in Table 6 in certain occasions or for specific locations. The Engineering Manager will inform designers of any specific requirement outside the above standards (e.g. where the downstream network has a greater or lower design capacity).

4.E.2 Detention

4.E.2.1 Detention design shall include assessment of the pre-development stormwater flows from a catchment and designing future development such that the pre-development flows are not exceed following development.

4.E.2.2 The effects of development on stormwater flows and flooding associated with increased levels of impervious surface shall be managed through an effective engineering design.

4.E.2.3 Detention requirements for stormwater management devices shall be relative to the type, scale and location of the proposed development as outlined in table 7. Development situation and detention requirements will be confirmed at pre-application stage by engineering manager.

Table 7 – Detention Requirements Summary.

Situation	Detention Requirements
Development, greenfield, infill or brownfield that generates no additional impervious area.	None Required
Development, greenfield, infill, or brownfield, where the downstream network has sufficient capacity for the increased flows (based on maximum probable development of the catchment) and/or where there are no existing flood risks that would be increased as a result of the development.	None Required (Network Capacity to be confirmed by council)
Brownfield and infill developments that result in additional impervious surface greater than 50m^2 where the downstream receiving network has insufficient capacity for the increased flow (based on maximum possible development of the catchment) and a stormwater discharge consent is not required.	Provide detention so that post development peak flow shall not exceed pre-development peak flow for the 10%AEP and 1% AEP.
Greenfield developments where there is an increase in impervious surface, and the receiving downstream network has insufficient capacity for the increased flow (based on the maximum possible development of the catchment).	Provide detention so that post development peak flow shall not exceed pre-development peak flow for the 10% AEP and 1% AEP.

4.E.3 Freeboard

4.E.3.1 The minimum freeboard height above the 1% AEP top water level shall be determined as per table 8. The minimum freeboard shall be measured from the top water level to the building platform level or the underside of the floor joists or underside of the floor slab, whichever is applicable

Table 8 - Design Freeboards

Type of structure	Freeboard height above 1% AEP top water level
Non-habitable residential buildings and detached garages	0.3m
Commercial and industrial buildings	0.3m
Habitable dwelling (including attached garages)	0.5m
Major community facilities related to supply of electricity, telecommunications, water supply or wastewater disposal	0.6m
Bridges and buildings over watercourses (freeboard to underside of structure)	0.6m

Note 4.E.3.1

i) Structures need to comply with the freeboard requirements of the NZ Building code and those may be separate from and in addition to freeboard requirements in table 8.

ii) Specific freeboard requirements apply to areas that are at risk of coastal inundation and shall be agreed to in consultation with the Engineering Manager.

iii) Any proposed deviation from the freeboard requirements in table xx shall be approved by the Engineering Manager.

iv) Minimum floor levels may be set by consent notice where necessary. The requirements of section E1 of the Building Code and any District Plan Flood Assessment Zone rules will also apply.

4.E.4 Runoff Coefficients

4.E.4.1 Runoff volumes shall be calculated taking likely impervious areas based on the proposed land use activity into account, using runoff coefficient values as shown in table 9.

Table 9 - Run off Co-efficient Values

Surface type	C value
Roofs	0.90
Chip seal, concrete, and asphaltic concrete pavements	0.85
Bare impermeable clay/silts with no runoff control	0.70
Bare uncultivated soil with medium soakage	0.60
Unsealed metalled pavements	0.50
Bush, pasture and berms on poor draining soils	0.30
Bush, pasture and berms on good draining soils	0.20
Ground slope	***C amendment***
0%-5%	-0.05
5%-10%	0
10%-20%	+0.05
>20%	+0.10

4.E.5 Low Impact Design - Detention Ponds and Wetlands

4.E.5.1 Detention ponds and wetlands shall be specifically designed and comply with the requirements of any relevant discharge consents. Where created as part of a subdivision they shall be located on land owned by or to be vested in Council. Any investigations shall be incorporated into the geotechnical investigation report where one exists.

4.E.5.2 Permanent means of access to ponds and wetlands on Council land by maintenance vehicles and excavators shall be provided. Access shall be provided as per section 3.C.20.

4.E.6 Low Impact Design - Soak pits

4.E.6.1 Where soakage devices are proposed, it shall be the developer's responsibility to carry out an investigation to ensure sufficient soakage is available and to confirm groundwater levels. This investigation may be incorporated into the geotechnical investigation report where one exists.

4.E.6.2 Field testing of soakage may be carried out as follows:

1. Bore test holes of 100mm to 150mm diameter to the depth of the proposed soak pit. Record the ground profile as excavation proceeds. Locate the ground water level if possible and assess the likely change in this during winter conditions and/or wet weather.
2. Fill the hole with water and maintain full for at least 4 hours (unless the soakage is so great that soakage exceeds the available delivery rate).
3. Fill the hole with water to the maximum depth achievable during the 4-hour pre-soak period and record the drop in water level against time until the hole is almost empty or over 4 hours, whichever is the shortest.
4. Plot the drop in water level against time on a graph and determine the soakage rate in mm/hr from the minimum slope of the curve. If there is a marked decrease in soakage rate as the hole becomes nearly empty, the lower rates may be discarded and a value closer to the average may be adopted.

4.E.6.3 All soak pits shall be located to allow for overflow from up to a 1% AEP event and be designed in such a way that they are maintainable.

4.E.6.4 Soak pits draining trafficable surfaces or swales shall be fed via an approved pre- entry submerged outlet sump.

4.E.6.5 In rural areas roadside soak pits without pre-entry sumps may be approved subject to Council approval. All rural roadside soak pits shall be marked adjacent to the boundary with an orange plastic marker post.

4.E.7 Low Impact Design - Raingardens

4.E.7.1 Raingardens shall be specifically designed in accordance with Wellington Water, Water Sensitive Design Guidelines.

4.E.8 Low Impact Design - Rainwater tanks

4.E.8.1 Above-ground and in-ground rainwater storage tanks shall only be sited on private land. Dual purpose rainwater tanks which allow for watering gardens and the like are encouraged, however these shall be sized and configured so that the required detention storage capacity and outflow is not compromised.

4.E.9 Low Impact Design - Swales

4.E.9.1 Where swales are proposed for roads or right of ways, additional width shall be provided in the legal road or right of way if necessary to accommodate the swales.

4.E.9.2 Each swale shall be sized to cater for a minimum of a 10% AEP rainfall event with a maximum flow velocity of 1.5 m/s unless provided with erosion protection.

4.E.9.3 Longitudinal grades should be 1.5%-5%. For grades of less than 1.5% a swale subsoil drain shall be provided as per drawing R07. Grades steeper than 5% will not be approved in road reserves, and where approved in right of ways the swale shall have timber or rock check dams or similar provided at 10m maximum spacings to impede water flows.

4.E.9.4 Side gradients shall be 2% - 25%. Where un-culverted vehicle crossings across the swale are proposed, side gradients shall be no steeper than 6.5%.

4.E.10 Low Impact Design – Proprietary Systems

4.E.10.1 Proprietary treatment systems such as cartridge filters and gross pollutant traps shall be specifically designed and subject to Council Approval.

4.E.11 Stormwater Quality

4.E.11.1 Where a stormwater discharge consent is required, design of stormwater treatment devices shall be in accordance with the Regional Council's requirements.

4.E.11.2 Examples where a regional stormwater discharge consent may be required are; where earthworked areas exceed permitted activity rules or where stormwater discharge to a stream/watercourse is proposed or as required under any relevant global stormwater consents. It is recommended that advice from the Horizons Regional Council is sought on consenting requirements for all developments.

4.E.11.3 Stormwater treatment is required for all stormwater runoff that originates from a high contaminant generating surface, including:

a) All State Highways, Arterial and Principal roads;

b) Collector roads with an actual or forecast average annual daily traffic (AADT) of greater than 5,000 at full development;

c) Parking areas, exposed to rainfall, greater than 1,000m2 total surface area or more than 50 (AADT), including access ways;

d) All roads and paved areas (including metalled surfaces) within new industrial and commercial developments;

e) Service stations;

f) Unpainted or treated building materials such as copper or zinc roofing.

4.E.12 Drainage Layout – Pipe Systems

4.E.12.1 Drainage systems constructed of the following pipe materials will be accepted, alternative systems will be subject to specific design and approval:

a) uPVC minimum SN16

b) RCRRJ class 2, or 4;

4.E.12.2 For uPVC or RCRRJ, SN8 and class 2 respectively are acceptable in berms. The minimum pipe class under roads, right of ways, vehicle crossings or other trafficable areas, including berms (where the possibility of being driven on) shall be SN16 or class 4 respectively.

4.E.12.3 All joints on pipes and fittings less than 1050mm in diameter shall be factory made spigot and socket flexible type joints.

4.E.12.4 All rubber ring jointed pipes shall be laid with their sockets at the uphill end.

4.E.13 Drainage Layout - Manholes

4.E.13.1 Manholes shall be laid out on all drainage lines in accordance with 4.C.5 and at the end of all terminal lines greater than 40m in length.

4.E.13.2 A 300mm diameter branch line less than 40m long and with no more than three service connections may be terminated with a top entry sump as per drawing D01.

4.E.13.3 Manholes shall be 1050mm diameter or larger precast concrete with factory fitted bases as per drawing D02. Square manholes are subject to specific Council approval.

4.E.13.4 All manholes in roads, right of ways and other trafficable areas shall be fitted with heavy duty lids.

4.E.13.5 Minimum internal invert falls through manholes for pipes of the same size shall be as follows:

1. For an inlet to outlet deflection angle of 0-30 degrees, 30mm;
2. For 30-60 degrees, 50mm; and
3. For 60-90 degrees, 80mm.

4.E.13.6 For pipes of different diameters, the soffit level of the smaller inlet pipe shall be level with or higher than the soffit level of the larger outlet pipe.

4.E.13.7 Manholes shall be benched as per drawings D02. Benching for lines entering a manhole from the side shall join the main line at an angle of no more than 45 degrees, with a minimum inside radius of 1.5x the incoming pipe diameter.

4.E.13.8 A maximum of three invert connections (in addition to the through line) shall be allowed into a standard 1050mm diameter manhole.

4.E.13.9 Laterals and branch pipelines may enter a manhole at an inlet to outlet deflection angle of more than 90 degrees provided that the connection is not at invert level and the manhole is deep enough to allow the incoming pipe to cascade into the manhole without benching.

4.E.13.10 All manholes with a depth exceeding 2.5m shall be fitted with step irons, orientated within the manhole so that they are not above the inlet and outlet pipes.

4.E.13.11 Manhole corbels and pipe jointing shall be constructed as per drawings D02.

4.E.13.12 Pipelines up to 675mm diameter and joining manholes at invert level shall not extend inside the internal manhole wall for a distance of more than 70mm (measured at the pipe's vertical centreline). Pipes joining manholes above invert level as cascading droppers shall not extend inside the internal manhole wall for a distance of more than 20mm (measured at the pipe's vertical centreline).

4.E.13.13 Manhole diameters shall be increased beyond 1050mm to allow for reduced access space where:

a) more than three invert connections or two internal drop connections (in addition to the through line) are to be installed;

b) achieving a benching inside radius of 1.5x the incoming pipe diameter requires it; or;

c) manholes greater than 2.0m deep shall be a minimum of 1200mm diameter.

d) the manhole is more than 4.5m deep. Such manholes shall be subject to specific design and approval.

4.E.14 Drainage Layout - Bedding and protection

4.E.14.1 All drainage lines shall be designed and constructed to withstand the loads they will likely be subject to during the lifetime of the system. Specific bedding and protection shall be considered for pipes subject to special loadings such as traffic, tree roots and buildings.

4.E.14.2 All open cut drainage lines shall be thoroughly bedded, haunched and backfilled as per drawings D03.

4.E.14.3 For drainage lines and laterals laid in soft ground, trenches shall be undercut as directed by the geotechnical engineer or Council.

4.E.14.4 Pipes shall be laid to line and grade and uniformly bedded along their entire length. For concrete and PVC pipes care shall be taken to ensure the pipe barrel does not rest on ridges or span from joint to joint.

4.E.14.5 For drainage lines and laterals laid at grades between 10%-20%, the bedding and surround material shall be of low grade 5 MPa concrete with interruptions at each pipe joint, or alternatively water stops shall be provided at 12m spacings as per drawing D07. For lines exceeding 20% grade, water stops shall be provided at 6m spacings.

4.E.14.6 Backfilling to subgrade level in roads, right of ways, vehicle crossings, carparks and private driveways shall be with hardfill, placed and compacted in 200mm maximum layers. AP65 will be acceptable as hardfill backfill. Use of river or pit run for subgrade improvements is subject to specific Council approval and will only be approved if its larger particles are not excessively sized and it contains sufficient broken faces and fines. Other granular material may also be approved by Council provided that a satisfactory compaction standard can be set and achieved by the contractor, as set out in the quality management plan.

4.E.14.7 Backfilling of open cut drainage in berms and other non-pavement areas may be with in-situ trench excavation material relaid and compacted in 200mm maximum layers, provided that the material is of a suitable type and moisture content for such use.

4.E.14.8 Backfilling shall be carried out as soon as possible after pipe laying.

4.E.14.9 Where trenching is carried out in existing pavements or berms, reinstatement at the surface shall be as per drawing D03. Reinstatement of trenches in footpaths shall require the full width of footpath to be reconstructed.

4.E.14.10 The minimum clearance between any two crossing pipelines shall be 300mm. Clearance less than this shall be subject to specific design and approval.

4.E.15 Drainage Layout - Service connections

4.E.15.1 All stormwater unless approved otherwise by Council will be attenuated or where discharge is directly into a Council main. Service connection overflow laterals shall be a minimum of 100mm for individual lots and 150mm for industrial lots or connections serving two or three dwellings or premises.

4.E.15.2 Laterals shall be capable of serving the proposed building area and shall be brought a minimum of 1m inside the main area of lot and to within 1.2m of the final ground surface. The end shall be capped and its position marked with a blue marker stake.

4.E.15.3 Laterals shall be laid true to line and, where connecting to a reticulated line, graded at right angles to the main line. They shall be located so as not to compromise available building areas or access opportunities. To achieve this the lateral should generally be located centrally on the road frontage or adjacent to one of the side boundaries.

4.E.15.4 Lateral connections to plastic pipes shall be made with a factory-made junction where possible as per drawing D05. Lateral connections to concrete pipes of 225mm diameter or larger may be made directly to the pipe as per drawing D05. Under no circumstances shall connections intrude inside the main pipe barrel and impede flows.

4.E.15.5 Where manholes are conveniently located, connections shall be directed to the manhole

where possible.

4.E.15.6 Where a bubble up sump is required, lateral connections to kerbs shall be via an inspection box and kerb entry adaptor as per drawings D05. Where laterals are larger than 100mm, two kerb entry adaptors from the inspection box shall be provided.

4.E.15.7 Lateral connections directly to swales or drainage basins which are normally dry are permitted where approved on the engineering drawings and shall be via a formed outlet protected with a concrete surround. Where high stormwater exit velocities are anticipated the connection to the swale or pond shall be via a bubble-up sump or similar to prevent erosion. All stormwater outfalls shall be specifically designed and approved.

4.F Acceptance

4.F.1 Testing

4.F.1.1 The minimum level of testing shall be as per the following sections

4.F.1.2 Backfill compaction testing: On pipelines in road, right of way, vehicle crossing, carpark and private driveway pavements, as follows:

1. Nuclear densometer testing shall be carried out on hardfill under Activity/Main Streets and Transit Corridors, all business and industrial roads and any other pavement Council considers likely to be subjected to heavier than usual traffic loads due to the proposed development. Readings shall be taken at maximum 10m spacings on each 200mm layer and shall have a
2. minimum dry density of 2050 kg/m^3. Where approved by Council the initial complying nuclear densometer readings may be calibrated against clegg hammer readings, and the clegg hammer may then be used in place of the densometer for the remainder of the testing provided that the same backfill material with approximately the same moisture content continues to be used.
3. For hardfill backfill in areas other than the above, a clegg hammer alone may be used. The test spacings shall be as per above, and the backfill layers shall have a minimum impact value of 25.
4. Where material other than AP65, pit run or river run has been approved for use as hardfill backfill, compaction testing shall be carried out as per the requirements set out for that material in the quality management plan, or as otherwise approved by Council.
5. Testing of materials for use in wetlands, raingardens and proprietary systems shall be determined as part of the detailed design and approval process.

4.F.2 Inspections

4.F.2.1 The minimum requirement for inspections undertaken by a suitability qualified person shall be as specified below. Records of all inspections must be submitted to Council prior to application for 224C.

1. Set-out: following set-out of stormwater manholes and pipework and prior to any excavation works
2. Pipework: inspection of pipe laying operation (i.e. trenching, bedding, haunching and backfill), for each section of pipeline (i.e. between manholes and sump leads).
3. Manholes: following pouring of corbels, prior to backfilling.
4. Manholes: following completion of all benching and plastering
5. Soakage Pits: following excavation and prior to backfilling
6. CCTV Survey: CCTV inspections shall be undertaken and supplied to Council for all stormwater pipework greater than 10m in length.
7. Inspections during the construction of wetlands, raingardens or proprietary systems

shall be determined as part of the detailed design and approval process.

4.F.3 Signoff

4.F.3.1 Prior to acceptance of the completed stormwater systems, the developer's representative shall have supplied to Council the completion documentation and as- builts referred to in in 1.C.1.

5.A Minimum requirements

5.A.1 The wastewater system shall serve the entire upstream catchment for the land use likely to prevail during the economic life of the system. Where required the system shall be designed and built to include pumped flow to and from adjacent areas.

5.A.2 The design life shall be 80 years.

5.A.3 Unless otherwise approved subdivisions shall be provided with a piped wastewater system that provides an adequate connection to each building site, residential or business unit, tenancy or allotment, and provides a suitable outlet to an approved means of wastewater disposal.

5.A.4 All onsite disposal systems must be specifically designed to suit the location. All designs must be in accordance with Horizons Regional Council's document 'Onsite Wastewater Systems, Guidelines for the Manawatu-Whanganui Region'.

5.A.5 The Developer must advise of the requirement including initial design criteria and site suitability to use onsite disposal systems at the time of submitting the Development Concept Plan. Detailed design plans must be submitted for engineering approval. All systems will require the approval of Council.

5.A.6 Where the proposed development cannot be adequately serviced by a gravity system a pressure sewer system with individual private pump units, or alternatively a public pump station system, will be considered provided that it is designed and located to service the entire upstream catchment.

5.A.7 The wastewater system shall be designed to prevent stormwater entry into the system.

5.A.8 The developer shall ensure that all relevant consents are obtained, that traffic management requirements are met, and that Works Access Permits are obtained for all works in existing road reserves.

5.B Means of compliance

5.B.1 Design flows

5.B.1.1 Residential wastewater systems shall cope with a peak wet weather domestic flow without surcharge of 4 times the average dry weather flow of 250 litres/person/day, for an anticipated population density of 2.7 persons/dwelling over the 80-year design life.

5.B.1.2 For business and industrial systems, actual anticipated peak wet weather flows shall be used where known, otherwise the following shall be used:

- For light water usage, 0.4 litres/second/hectare;
- For medium water usage, 0.7 litres/second/hectare; and
- For heavy water usage, 1.3 litres/second/hectare.

5.B.1.3 The design flow shall be based on a Colebrook-White roughness coefficient k=1.5 for pipes up to and including 300mm diameter and k=0.6 for pipes larger than 300mm diameter, with peak wet weather velocities between 0.65m/s and 3m/s.

5.B.1.4 Minimum grades for public lines shall be as follows:

- For 150mm diameter, 0.55%, except on the last section of line at the head of the catchment where the minimum grade shall be 1% unless approved otherwise by Council and the line is to be extended in future;
- For 225mm diameter, 0.33%; and
- For 300mm diameter, 0.25%.

5.B.1.5 All lines shall be assumed to flow a minimum of half full.

5.B.2 Pumped systems (Private)

5.B.2.1 Pumped systems shall be subject to specific design and approval, and liaison with Council shall be carried out before application is made for resource consent.

5.B.2.2 Council's preferred pumped systems are pressure systems with boundary connection kits as per drawing D06 installed at the time of subdivision, and privately-owned and maintained reticulation and pump units installed on the lots at the time of building, with the requirement for such private systems registered on the lot titles by way of a consent notice.

5.B.2.3 Flushing points shall be provided in accessible chambers at the end of all 50mm diameter pressure mains as per drawing D06. Unless approved otherwise by Council odour control shall be provided where pressure systems connect to gravity mains.

5.B.3 Trade waste

5.B.3.1 The specific provision for trade waste disposal within business and industrial developments does not need to be addressed at subdivision development stage, however the impact of any anticipated trade waste shall be considered in the design. Any subsequent request for trade waste approval for a specific site or activity will be subject to specific Council approval.

5.B.4 Drainage layout

5.B.4.1 The wastewater reticulation system shall consist of pipelines with a minimum internal diameter of 150mm laid to a true grade and line between access manholes located at each change of direction, grade and pipe size or class. Manhole spacings shall not exceed 90m for pipe sizes up to 225mm, above which spacings may extend to 120m. Each branch line shall join the main line at a manhole.

5.B.4.2 Public wastewater mains may be permitted or required by Council in urban right of ways. Where a right of way is serviced by a public wastewater main, the entire right of way shall be covered by an easement in favour of Council to allow continued accessibility of the main and manholes for operation and maintenance.

5.B.4.3 Gravity pipelines in roads and right of ways should be located centrally in the carriageway. Around road curves manhole spacings shall be reduced as required to maintain a minimum offset from pipe to kerb face or seal edge of 2m unless otherwise approved by Council.

5.B.4.4 Pressure pipelines in roads and right of ways shall be located in the shoulder (where no kerb exists), or the front berm beside the footpath.

5.B.4.5 Pipelines in berms shall have a minimum cover from finished ground level of 900mm and pipelines in roads, rights of way and other trafficable areas shall have a minimum cover of 1.2m. Where this cover cannot be achieved in roads, right of ways and other trafficable areas, additional protection.

5.B.5 Pipe systems

5.B.5.1 Drainage systems constructed of the following pipe materials will be accepted:

a) uPVC SN16;

b) PE 100;

c) Ceramic (subject to specific approval);

d) Ductile iron (subject to specific approval); and

e) Concrete or plastic lined steel (subject to specific approval).

5.B.5.2 For uPVC the minimum pipe class under roads, right of ways or other trafficable areas shall be SN16.

5.B.5.3 HDPE Pumped mains shall have a minimum pressure rating of PN16.

5.B.5.4 All fittings and service connections shall be factory fabricated of similar material to the proposed system chosen.

5.B.5.5 All joints on pipes and fittings shall be factory made spigot and socket flexible type joints.

5.B.5.6 All rubber ring jointed pipes shall be laid with their sockets at the uphill end.

5.B.5.7 PE pipes shall have butt fusion joints joining pipes of similar material, diameter and wall thickness, carried out by suitably qualified operators to the manufacturer's recommendations.

5.B.5.8 Installation of pipes by trenchless technology shall be subject to specific design and approval.

5.B.6 Manholes

5.B.6.1 Manholes shall be laid out on all drainage lines in accordance with 5.B.4 and at the end of all terminating lines greater than 40m in length.

5.B.6.2 150mm diameter branch lines less than 40m long and with no more than three service connections may be terminated with a blank cap adjoining the last lateral.

5.B.6.3 150mm diameter branch lines more than 40m long and ending within private property may be terminated with a 600mm diameter inspection chamber as per drawing D07, provided that the chamber's depth is 900mm or less.

5.B.6.4 Manholes shall be 1050mm diameter or larger precast concrete with factory fitted bases as per drawing D08.

5.B.6.5 All manholes in roads, right of ways and other trafficable areas shall be fitted with heavy duty lids.

5.B.6.6 Minimum internal invert falls through manholes for pipes of the same size shall be as follows:

a) For an inlet to outlet deflection angle of 0-30 degrees, 30mm;

b) For 30-60 degrees, 50mm; and

c) For 60-90 degrees, 80mm.

5.B.6.7 For pipes of different diameters, the soffit level of the smaller inlet pipe shall be level with or higher than the soffit level of the larger outlet pipe.

5.B.6.8 Manholes shall be benched as per drawings D08. Benching for lines entering a manhole from the side shall join the main line at an angle of no more than 45 degrees and shall be benched with a minimum inside radius of 1.5x the incoming pipe diameter.

5.B.6.9 Approved manhole starters shall be used on all inlets and outlets ensuring a flexible joint in within 600mm of the manhole wall.

5.B.6.10 Internal manhole channels in wastewater manholes shall be formed using half pipes unless approved otherwise by Council.

Note 5.B.6.9: Where PVC pipe is proposed to be used to form manhole benching PVC that will be in contact with concrete shall be gritted using PVC glue and clean sand prior to forming manhole base.

5.B.6.11 A maximum of three invert connections or two internal drop connections (in addition to the through line) shall be allowed into a standard 1050mm diameter manhole.

5.B.6.12 Branch line drop connections shall be avoided where possible and are subject to specific Council approval. Where internal drop connections are approved, branch lines may enter a manhole at an inlet to outlet deflection angle of more than 90 degrees. Internal drop connections shall be as per drawing D09.

5.B.6.13 All manholes with a depth exceeding 2.5m shall be fitted with step irons.

5.B.6.14 Manhole corbels and pipe jointing shall be constructed as per drawings D08.

5.B.6.15 Pipelines joining manholes at invert level shall not extend inside the internal manhole wall for a distance of more than 50mm (measured at the pipe's vertical centreline).

5.B.6.16 Manhole diameters shall be increased beyond 1050mm to allow for reduced access space where:

a) more than three invert connections or two internal drop connections (in addition to the through line) are to be installed;

b) achieving a benching inside radius of 1.5x the incoming pipe diameter requires it; or

c) the manhole is more than 2.0m deep diameter should increase to 1200mm

5.B.7 Bedding and protection

5.B.7.1 All drainage lines shall be designed and constructed to withstand the loads they will likely be subject to during the lifetime of the system. Specific bedding and protection shall be considered for pipes subject to special loadings such as traffic, tree roots and buildings.

5.B.7.2 All open cut drainage lines shall be thoroughly bedded, haunched and backfilled as per drawings D03. Sand may be used for bedding and haunching pressure pipes.

5.B.7.3 The base of trenches shall achieve a minimum bearing capacity of 50KPa (allowable), for drainage lines and laterals laid in soft ground, trenches shall be undercut as directed by the geotechnical engineer or Council. Scala penetrometer or shear vane shall be used to measure the strength of the invert trench depends on the type of the material and required testing depth. If the foundation material is non-cohesive, a clegg hammer may be used to determine if it has insufficient strength.

5.B.7.4 Pipes shall be laid to line and grade and uniformly bedded along their entire length. For PVC pipes care shall be taken to ensure the pipe barrel does not rest on ridges or span from joint to joint.

5.B.7.5 For drainage lines and laterals laid at grades between 10%-20%, the bedding and surround material shall be of low grade 5 MPa concrete with interruptions at each pipe joint, or alternatively water stops shall be provided at pipe joints at 12m spacings as per drawing D04. For lines exceeding 20% grade, water stops shall be provided at pipe joints at 6m spacings.

5.B.7.6 Backfilling to subgrade level in roads, right of ways, vehicle crossings, carparks and private driveways shall be with hardfill, placed and compacted in 150mm maximum layers. AP65 will be acceptable as hardfill backfill. Use of river or pit run for subgrade improvements is subject to specific Council approval and will only be approved if its larger particles are not excessively sized and it contains sufficient broken faces and fines. Other granular material may also be approved by Council provided that a satisfactory compaction standard can be set and achieved by the contractor, as set out in the quality management plan. Excavated trench material maybe re-used as trench fill as per drawing D03 under the direction and supervision of the engineer.

5.B.7.7 Backfilling of open cut drainage in berms and other non-pavement areas may be with in-situ trench excavation material re-laid and compacted in 200mm maximum layers, provided that the material is of a suitable type and moisture content for such use.

5.B.7.8 Backfilling shall be carried out as soon as possible after pipe laying.

5.B.7.9 Where trenching is carried out in existing pavements or berms, reinstatement of the surface shall be as per drawing D03. Reinstatement of trenches in footpaths shall require the full width of footpath to be resurfaced.

5.B.7.10 The minimum clearance between any two crossing pipelines shall be 300mm. Clearance less than this shall be subject to specific design and approval.

5.B.8 Service connections

5.B.8.1 Unless approved otherwise by Council, gravity service connection laterals shall be a minimum of 100mm for individual residential or business lots, and 150mm for industrial lots or connections serving two or three dwellings or premises.

5.B.8.2 Gravity laterals shall be capable of serving the proposed building area and shall be brought a minimum of 1m inside the main area of the lot and to within 1.2m of the final ground surface. The end shall be capped, and its position marked with a red marker stake.

5.B.8.3 Minimum gradients shall be 1.65% for 100mm diameter property laterals and 1.2% for 150mm diameter property laterals.

5.B.8.4 Laterals shall be laid true to line and graded at right angles to the main line. They shall be located so as not to compromise available building areas or access opportunities. To achieve this the lateral should generally be located adjacent to one of the side boundaries.

5.B.8.5 Installation of an approved wastewater boundary kit at the property boundary, in the road reserve, will be required at the time of subdivision as per drawing D10.

5.B.8.6 Lateral connections to wastewater mains shall be made with factory-made junctions where possible as per drawings D10. Under no circumstances shall connections to mains intrude inside the main pipe barrel and impede flows.

5.B.8.7 Where manholes are conveniently located, connections shall be directed to the manhole where possible. Such connections shall be at the manhole invert level.

5.B.9 Existing Laterals

5.B.9.1 Where new lots are being created and an existing wastewater lateral exists, the existing lateral may be accepted providing that;

a) the lateral has a minimum grade of 1:100;

b) the lateral is in good condition, as ascertained by CCTV inspection

5.C Acceptance

5.C.1 Testing

5.C.1.1 Backfill compaction testing: On pipelines in road, right of way, vehicle crossing, carpark and private driveway pavements, as follows:

1. Nuclear Density Moisture (NDM) Testing shall be carried out on hardfill (AP65 and AP40) under strategic and arterial roads, all commercial and industrial roads, and any other pavement Council considers likely to be subjected to heavier than usual traffic loads. One test per lift or 50m^3 of placed material shall be undertaken. Where approved by Council the initial complying nuclear densometer readings may be calibrated against clegg hammer readings, and the clegg hammer may then be used in place of the densometer for the remainder of the testing provided that the same backfill material with approximately the same moisture content continues to be used.
2. NDM test results shall comply with clause 3.D.1.3
3. For hardfill backfill in areas other than the above, a clegg hammer alone may be used. The test spacings shall be as per above, and the backfill layers shall have a minimum impact value of 25.
4. Where material other than AP65 or AP40 is approved for use (such as pit run, river run or insitu trench material) compaction testing criteria shall be submitted to council for approval.

5.C.1.2 Low pressure air testing of uPVC pipes shall be carried out by a Suitably Qualified and Experienced Person as per APPENDIX N of ASNZS-2566. Results shall be recorded and submitted to council with final as-builts.

5.C.1.3 Pressure wastewater pipes: Testing shall be carried out by suitably experienced personnel as per APPENDIX M of ASNZS-2566.2. Results shall be recorded and submitted to council with final as-builts.

5.C.1.4 Manhole testing: The manhole inlets and outlets shall be plugged, and the manhole completely filled with water and left to soak for 4 hours, with the water level being topped up as required. The water loss shall then be measured every hour for 8 hours, and the average water loss over the 8 hours shall be no more than 0.3 litres per 1m diameter per 1m depth per hour. The manhole shall then be drained and left for an hour, after which time no water shall be observed entering the manhole thorough any joint.

5.C.2 Inspections

5.C.2.1 The minimum requirement for inspections undertaken by a suitability qualified person shall be as specified below. Records of all inspections must be submitted to Council prior to application for 224C.

1. Set-out: following set-out of wastewater manholes and pipework and prior to any excavation works
2. Pipework: inspection of pipe laying operation (i.e. trenching, bedding, haunching and backfill), for each section of pipeline (i.e. between manholes).
3. Manholes: following pouring of corbels, prior to backfilling.
4. Manholes: following completion of all benching and plastering
5. CCTV Survey: CCTV inspections shall be undertaken and supplied to Council for all vested pipework.
6. Inspections of public pump stations and rising mains during construction including

submission of commissioning information and Operation and Maintenance Manuals.

5.C.3 Connection to existing network

5.C.3.1 Connection of new wastewater reticulation to the existing public network shall be only carried out by, or under the supervision of, Council's Three Waters team. A minimum of three working days' notice shall be given, although more notice may be required to allow shutdown notices to be issued if necessary. Such shutdown notices shall be delivered by the contractor to addresses as advised by Council.

5.C.3.2 New reticulation will not be connected to the existing system until successful pressure testing has been carried out as per 5.C.1.

5.C.4 Signoff

5.C.4.1 Prior to acceptance of the completed wastewater systems, the developer's representative shall have supplied to Council the completion documentation and as- builts referred to in in 1.C.1. As-builts are to provide the following minimum level of information;

1. Manhole lid horizontal positions
2. Manhole lid vertical positions
3. Manhole inlet and outlet vertical positions and depths
4. Pipe types, sizes and grades
5. Pump Station lid horizontal, vertical positions and depths
6. Position of all lateral connections and boundary kits
7. If available manhole and pipe asset numbers are to be included on as-built drawings.

6.A Minimum requirements

6.A.1 The water supply system shall serve the entire supply area for the land use likely to prevail during the economic life of the system.

6.A.2 The design life shall be 80 years.

6.A.3 Subdivisions in urban on-demand water supply areas shall be provided with a piped water supply system adequate for firefighting purposes, together with adequate domestic, business or industrial capacity as required.

6.A.4 Subdivisions in all restricted water supply areas shall be provided with a piped water supply system capable of providing pressures in accordance with Council's requirements. Each lot shall be provided with a tank with capacity for at least three day's supply, and additional firefighting capacity if required.

6.A.5 Subdivisions in urban on-demand water supply areas involving the construction of new roads, or where otherwise directed by Council, shall be subject to network modelling before application is made for resource consent.

6.A.6 Subdivisions in all restricted water supply areas shall be subject to network modelling, including assessment of new or reallocated water unit requirements, before application is made for resource consent.

6.A.7 The developer shall ensure that all relevant consents are obtained, that traffic management

requirements are met and that Works Access Permits are obtained for all works in existing road reserves.

6.B Means of compliance

6.B.1 Modelling

6.B.1.1 Water network modelling is required for all developments involving the laying of new public water mains, and for all urban and rural developments in restricted supply areas where new lot connections or where new water units or reallocation of existing water units is proposed.

6.B.1.2 External network modelling will be carried out by Council's Three Waters team on receipt of the appropriate application form and preliminary reticulation layout plan, unless approved otherwise. All external modelling shall be carried out before application is made for resource consent as per 1.B.3, and the results supplied with the consent application.

6.B.1.3 Internal water modelling shall be carried out by the applicant before application is made for consent to confirm that any firefighting requirements can be met, and the results may be supplied with the consent application or with the engineering plans following granting of the consent.

6.B.2 Flows

6.B.2.1 The following shall be used for design purposes:

- Residential – a peak hourly flow of 0.1 litres/second/lot;
- Business/industrial – use actual figures if known, otherwise a peak hourly flow of 1.0 litres/second/hectare;
- Fire flow plus 50% of peak hourly flow, with a minimum residual pressure of 100 kPa at hydrants, a minimum combined flow from any two hydrants of 25 litres/second, and a minimum flow from any single hydrant of 30 litres/second; and
- Peak hourly domestic flow with a minimum residual pressure of 300 kPa and a minimum flow of 20 litres/second at lot lateral connections;
- Two hydrants of 25 litres/second, and a minimum flow from any single hydrant of 30 litres/second.

6.B.3 Reticulation layout

6.B.3.1 In restricted urban areas and rural areas the layout of mains and hydrants shall be in accordance with Council's requirements set out in the modelling results, consent conditions or engineering approvals.

6.B.3.2 In urban on-demand areas the layout of watermains shall provide for the efficient provision of fire protection and individual connections to all lots.

6.B.3.3 A principal firefighting main fitted with hydrants shall be laid on one side of all roads. To supply lots on the other side of the road, a rider main shall be laid on that side.

6.B.3.4 In business and industrial areas and on some main roads two principal mains shall be laid, one on each side of the road, as directed by Council. Duplicate principal or rider mains may be required where lot service connections are not permitted from a trunk main.

6.B.3.5 Watermains shall normally be laid continually from one street intersection to the next, being supplied with water at each end without being cross-connected to the main on the other side of the street between those points. Layout configurations as per drawing W01 shall be used at intersections. Rider mains on cul-de-sac streets shall extend on from the end of the principal main, around the head of the cul-de-sac and down the street to the next street intersection, as per drawing W01.

6.B.3.6 The reticulation design shall take into account continued accessibility of the watermains and hydrants for operation and maintenance.

6.B.3.7 Watermains in berms shall have a minimum cover from finished ground level of 600mm and watermains in roads, rights of way and other trafficable areas shall have a minimum cover of 700mm. Where this cover cannot be achieved in roads, right of ways and other trafficable areas, additional protection shall be specifically designed and approved by Council.

6.B.3.8 Maximum watermain cover shall be 1000mm unless approved otherwise by Council.

6.B.3.9 Watermains in urban areas shall generally be located in the rear berm area 1.1m from, and parallel to, the legal boundary, as per drawings W01.

6.B.3.10 Public watermains, including fire mains with hydrants, may be permitted or required by Council in urban right of ways more than 80m in length and serving more than three lots, and in rural right of ways more than 500m in length and serving more than three lots.

6.B.3.11 Where a right of way is serviced by a public watermain, the entire right of way shall be covered by an easement in favour of Council to allow continued accessibility to the mains and hydrants for operation and maintenance.

6.B.4 Principal mains

6.B.4.1 Principal mains in roads or right of ways fitted with fire hydrants shall be 100mm dia or larger and shall be PVC or PE with a minimum pressure rating of PN15 unless otherwise approved.

6.B.4.2 Pipe types and pressure ratings for pumped or trunk mains, or for principal mains in out-of-the ordinary situations (e.g., under wide roads, near petrol stations, in industrial areas), shall be specifically agreed with Council.

6.B.4.3 Principal main PVC fittings shall be rubber ring jointed.

6.B.4.4 The minimum radius on which PVC pipes can be installed on a curve is as follows:

- for 100mm dia, 30m;
- for 150mm dia, 45m;
- for 200mm dia, 60m.

6.B.4.5 When laid in a curve the maximum deflection at any joint shall be 1.5 degrees (equating to a 150mm offset over a 6m length), and the joint shall be braced against the outside trench walls with a kerb block or similar.

6.B.4.6 All rubber ring jointed pipes shall be laid with their sockets at the uphill end.

6.B.4.7 PE pipes shall have butt fusion joints joining pipes of similar material, diameter and wall thickness, carried out by qualified operators to the manufacturer's recommendations.

6.B.4.8 Adjacent fittings shall be flanged and bolted together to form a single unit. Stand- alone fittings shall be socket-jointed where possible to avoid the use of gibaults.

6.B.4.9 Gibaults may be used for cutting into an existing pipe. Where the pipe length between two gibaults is 1m or less, each gibault shall be braced against the trench walls with thrust blocks or similar to prevent sideways movement within the trench.

6.B.4.10 All hydrants and fittings shall have a pressure rating of at least PN16. Flanges, gibaults, large bore tees, reducers and tapping bands shall be protected with a thermally bonded epoxy or nylon coating.

6.B.4.11 Installation of pipes by trenchless technology shall be subject to specific design and approval.

6.B.5 Rider mains

6.B.5.1 Rider mains shall have an internal diameter of 50mm.

6.B.5.2 Rider mains shall be PE80 with minimum pressure rating of PN12.5.

6.B.5.3 Double end feed rider mains may serve up to 25 lots. Single end feed rider mains should be avoided where possible, but where unavoidable they may serve up to 10 lots from a public road and up to six lots from a right of way and shall terminate with a flushing point as per drawing W02.

6.B.5.4 The layout and valve positions of rider mains shall suit the flushing of the rider main through the nearest hydrant. Where this is not possible a flushing point shall be provided.

6.B.5.5 Rider main joints shall be reinforced plastic compression types. Connections of rider mains to principal mains shall be as per drawings W03.

6.B.6 Bedding and protection

6.B.6.1 All open cut watermains shall be thoroughly bedded, haunched and surrounded in their own trench where possible as per drawing D03.

6.B.6.2 For watermains laid in soft ground, trenches shall be undercut as directed by the geotechnical engineer or Council.

6.B.6.3 Pipes shall be generally laid to line and grade and uniformly bedded along their entire length. The maximum acceptable out of alignment tolerance is 50mm on straights and 100mm on bends. For PVC pipes care shall be taken to ensure the pipe barrel does not rest on ridges or span from joint to joint.

6.B.6.4 The entry of clay, bedding, runoff and other foreign material into the pipeline shall be avoided by the use of end caps and diligence during construction. All rubber ring jointed pipes and fittings shall be joined using a lubricant containing an anti-bacterial agent suitable for potable water use.

6.B.6.5 Thrust blocks as per drawing W04 shall be installed at all points where an unbalanced thrust occurs. Thrust blocks shall be poured or placed perpendicular to the angle of thrust and against undisturbed ground. For poured in-situ blocks, all concrete shall be a minimum of 17.5 MPa at 28 days and shall not encase the fitting. Precast thrust blocks shall only be used for pipes of 200mm dia or less with a maximum operating pressure of 700 kPa, and where the minimum surface area in contact with the undisturbed trench wall is 0.18m2.

6.B.6.6 Where watermains have been laid in proximity to other services, the other services shall be routed over or under the thrust block or ducted through it as necessary.

6.B.6.7 For watermains laid at grades between 10%-20%, water stops shall be provided at pipe joints at 12m spacings as per drawing D04. For any lines exceeding 20% grade, water stops shall be provided at pipe joints at 6m spacings.

6.B.6.8 An approved metallic detection tape shall be laid along the pipe alignment at all road crossings and wherever Council has approved the laying of watermains in a non- standard berm location.

6.B.6.9 Backfilling to subgrade level in roads, right of ways, vehicle crossings, carparks and private driveways shall be with hardfill, placed and compacted in 200mm maximum layers. AP65 will be acceptable as hardfill backfill. Use of river or pit run for subgrade improvements is subject to specific Council approval and will only be approved if its larger particles are not excessively sized and it contains sufficient broken faces and fines. Other granular material may also be approved by Council provided that a satisfactory compaction standard can be set and achieved by the contractor, as set out in the quality management plan.

6.B.6.10 Backfilling in berms and other non-pavement areas may be with in-situ trench excavation material relaid and compacted in 200mm maximum layers, provided that the material is of a suitable type and moisture content for such use.

6.B.6.11 Backfilling shall be carried out as soon as possible after pipe laying.

6.B.6.12 Other installation methods including trenchless technology such as thrusting, or mole ploughing will be subject to specific approval. In all cases the manufacturer's recommendations for pipe storage, handling, protection and laying techniques shall be followed.

6.B.6.13 Where trenching is carried out in existing pavements or berms, reinstatement of the surface shall be as per drawing D03. Reinstatement of trenches in footpaths shall require the full width of footpath to be resurfaced and must meet NZUAG requirements.

6.B.6.14 The minimum clearance between any two crossing pipelines shall be 300mm. Clearance less than this shall be subject to specific design and approval.

6.B.7 Hydrants

6.B.7.1 All principal mains in urban on-demand and restricted supply areas shall be provided with in-ground hydrants for firefighting, air release and maintenance purposes.

6.B.7.2 Hydrants shall be clear of parking areas and readily accessible to fire trucks.

6.B.7.3 Hydrants shall be spaced a maximum of 135m apart in residential areas, a maximum of 90m apart in business/industrial areas and a maximum of 35m from the end of a no- exit street or cul de sac.

6.B.7.4 Hydrants shall be located adjacent to the entrance of right of ways longer than 60m unless a hydrant has been provided within the right of way.

6.B.7.5 Hydrants must also be located at the end of all principal mains on a dead end unless approved otherwise.

6.B.7.6 Hydrants shall be mounted on an approved socketed hydrant tee with risers as required as per drawing W05. The base of the hydrant tee shall be supported on a kerb block or similar, and the top of the hydrant spindle shall be within 100mm- 300mm of the finished ground level.

6.B.7.7 Hydrants shall be provided with a surface box set at the same slope as, and no more than 10mm above, the finished ground level as per drawing W05. The box lid shall be painted yellow and the box shall be set on precast concrete sections in such a way as to prevent the transfer of loads to the watermain.

6.B.7.8 The location of hydrants shall be indicated adjacent to the hydrant by marking a solid yellow thermoplastic triangle on the road close to the centreline and pointing towards the hydrant, and a yellow "FH" marker abutting the road reserve boundary.

6.B.8 Valves

6.B.8.1 Valves shall be provided on all public watermains to enable isolation of sections of the reticulation for connections, repairs and maintenance purposes.

6.B.8.2 The maximum spacing between valves shall be 500m. Sluice valves on principal mains and gate valves on rider mains shall be located at intersections and around cul de sac heads as per drawings W01 and W06, and in such a way that any section of reticulation can be isolated by turning off no more than five valves and without cutting supply to more than 50 properties.

6.B.8.3 Valves shall be provided with a surface box set at the same slope as, and no more than 10mm above, the finished ground level, with a vertical section of 150mm dia PVC ducting extending from the valve bonnet to within 150mm below the finished ground level as per drawing W06. The box shall be set on a precast concrete section and the box and PVC duct shall be installed in such a way as to prevent the transfer of loads to the watermain.

6.B.8.4 Special purpose valves may be required by Council and will be subject to specific design and approval. Scour valves and air valves should be used on high and low points of

watermains where hydrants are not proposed and where releasing water or air from the pipes is considered necessary. Pressure reducing valves shall be installed within a drainable concrete manhole or chamber with a trafficable lid.

6.B.9 Service connections

6.B.9.1 Unless approved otherwise by Council, all lot service connection laterals shall be 20mm ID diameter blue PE80B pipe extending a minimum of 1m inside the lot boundary.

6.B.9.2 Connections to mains shall be made with a gun metal tapping band, aligned from the side of the main where possible rather than the top.

6.B.9.3 Lot connections along road frontages in urban areas shall generally be located in pairs

6.B.9.4 1.5m apart adjacent to alternating common lot boundaries, staggered to avoid clashing with power and telecommunication connection positions as per drawing W07.

6.B.9.5 Meter boxes for lots serviced from public watermains within roads or right of ways shall be positioned within the road reserve or right of way reserve with their valve offset 500mm from the lot boundary.

6.B.9.6 Meter boxes for lots serviced via right of ways from public watermains in roads shall be positioned in the road reserve adjacent to the right of way, with their valve offset 500mm outside the lot boundary. Multiple meter boxes may be used. The relevant lot or tank number, or alternatively a lot or tank layout diagram, shall be annotated on the underside of the meter box lids or on a tag around the lateral 20mm line within the boxes.

6.B.9.7 All meter boxes shall be located clear of trafficable areas, unless specifically approved by Council and installed or upgraded to heavy duty trafficable standard.

6.B.9.8 Meter boxes and connection set ups shall be as per drawing W07. All in-ground boxes shall be DRA40 type boxes with a blue lid, fitted with a heavy-duty lid and supported with kerb blocks or similar under their bases where they are likely to be driven over. All box lids shall be flush with finished ground level.

6.B.9.9 Developments requiring private firefighting connections or service laterals larger than 20mm dia shall be subject to specific approval.

6.B.10 Tanks

6.B.10.1 Water storage tanks to be vested in Council on Council-owned or private land shall be subject to specific design and approval. Permanent means of access shall be provided. Such tracks shall be all-weather as per 3.C.20 and may require provision of a vehicle crossing. Private water storage tanks required to meet consent conditions shall be sized at least in accordance with the consent conditions, and sited and installed in accordance with the tank manufacturer's recommendations.

Note 6.B.10 Where hydrants are not available, PAS 4509:2008 NZ Fire Service Firefighting Water Supplies *recommends that additional static water storage is provided for firefighting purposes, with an appropriate fitting at the base of the tank and 4m wide all-weather access to the tank (see also 3.B.7.3 and 3.B.10). If the future land use or building type is known at the time of development, the developer should consider this in the design and construction.*

6.B.11 Private water supplies

6.B.11.1 All private water supplies must meet requirements of relevant drinking water standards.

6.C Acceptance

6.C.1 Testing

6.C.1.1 Backfill compaction testing on pipelines in road, right of way, vehicle crossing, carpark and private driveway pavements, and where new principal or trunk mains have been laid in existing road berms, as follows:

1. Nuclear Density Moisture (NDM) Testing shall be carried out in accordance with the National Code of Practice for Utility Operators Access to Transport Corridors. Ton hardfill (AP65 and AP40) under strategic and arterial roads, all commercial and industrial roads, and any other pavement Council considers likely to be subjected to heavier than usual traffic loads. One test per lift or 50m^3 of placed material shall be undertaken. Where approved by Council the initial complying nuclear densometer readings may be calibrated against clegg hammer readings, and the clegg hammer may then be used in place of the densometer for the remainder of the testing provided that the same backfill material with approximately the same moisture content continues to be used.
2. NDM test results shall comply with clause 3.D.1.3
3. For hardfill backfill in areas other than the above, a clegg hammer alone may be used. The test spacings shall be as per above, and the backfill layers shall have a minimum impact value of 25.
4. Where material other than AP65 or AP40 is approved for use (such as pit run, river run or insitu trench material) compaction testing criteria shall be submitted to council for approval.

6.C.1.2 Hydrostatic pressure testing shall be carried out by A Suitably Qualified and Experienced Person and observed by a Council representative and in accordance with ASNZS2566.2 APPENDIX M. Council's Three Waters team will provide guidance on specified test pressure requirements.

Note 6.C.1 To enable early identification of any issues it is recommended that the contractor carries out preliminary pressure tests on sections of line before completing backfilling.

6.C.2 Sterilisation

6.C.2.1 Sterilisation by chlorination shall be carried out by a Suitably Qualified and Experienced Person on all new public watermains following backfilling and successful pressure testing, and prior to connection to the existing public water network.

6.C.2.2 Mains shall be chlorinated by filling with a free available chorine solution in clean water such that a chlorine level of 30 ppm is reached. The solution shall be left in the line for at least 24 hours, after which time the residual chlorine shall be no less than 10 ppm.

6.C.2.3 The watermain shall then be flushed to a Council-approved discharge point until no more than 0.5 ppm residual chlorine exists.

6.C.3 Inspections

6.C.3.1 The minimum requirement for inspections undertaken by a Suitably Qualified and Experienced Person shall be as specified below. Records of all inspections must be submitted to Council prior to application for 224C.

1. Set-out: following set-out of water service covers and pipework and prior to any excavation works
2. Pipework: inspection of pipe laying operation (i.e. trenching, bedding, haunching and backfill), for each section of pipeline.
3. Visual Inspection of all thrust blocks.
4. Visual Inspection of all valves, bends and fittings

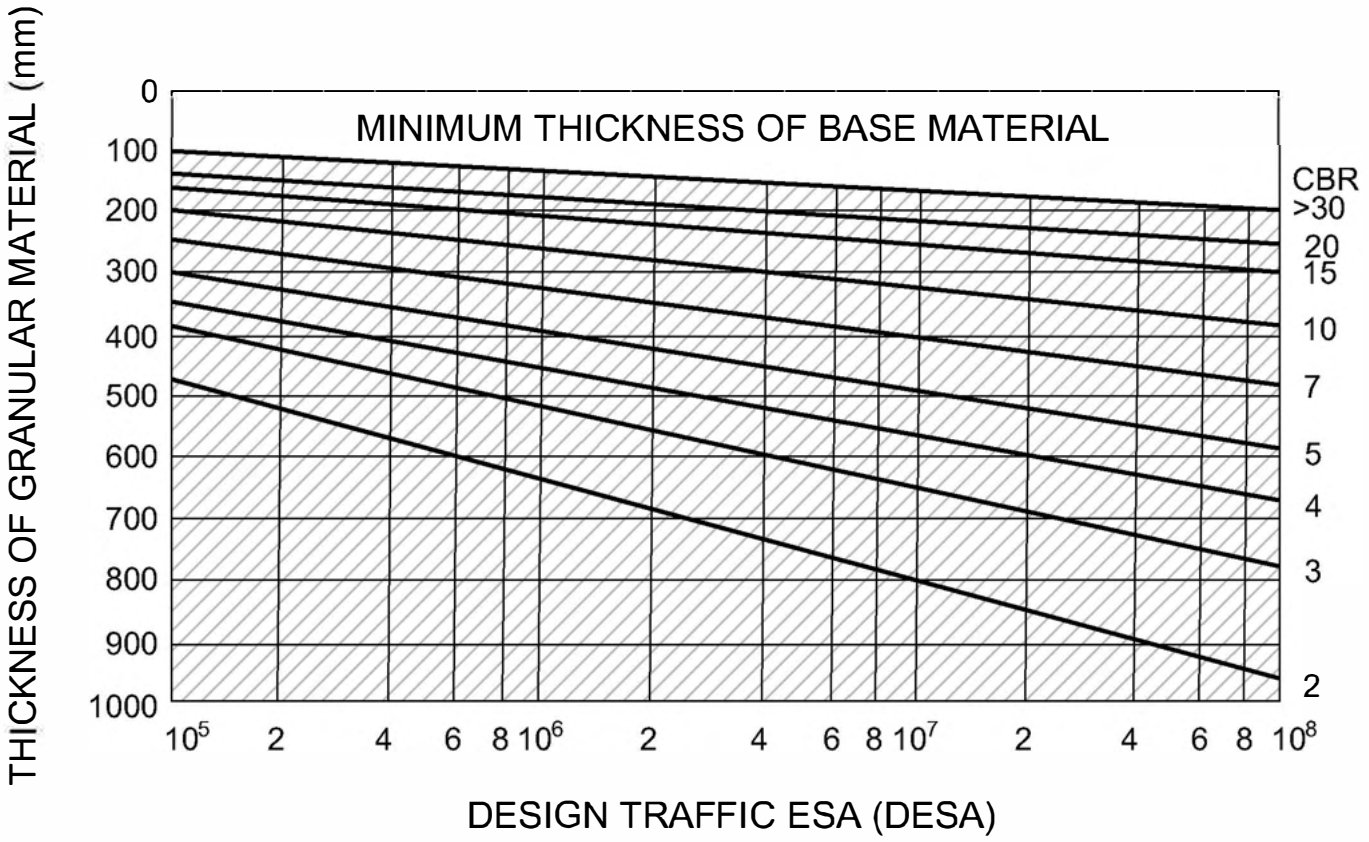
6.C.4 Connection to existing network

6.C.4.1 Connection of new water reticulation to the existing public network shall only be carried out by, or under the supervision of, Council approved contractors. A minimum of three working days' notice shall be given, although more notice may be required to allow shutdown notices to be issued if necessary. Such shutdown notices shall be delivered by the contractor to addresses as advised by Council.

6.C.4.2 New reticulation will not be connected to the existing system until successful pressure testing and chlorination has been carried out as per 6.C.1 and 6.C.2.

6.C.5 Signoff

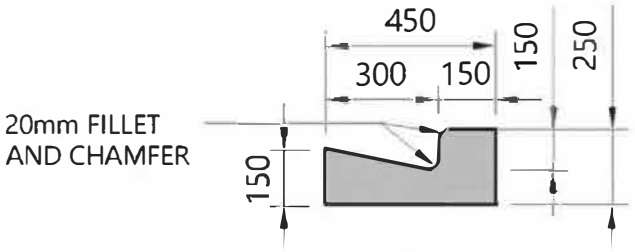
6.C.5.1 Prior to acceptance of the completed water systems, the developer's representative shall have supplied to Council the completion documentation and as-builts referred to in in 1.C.1.



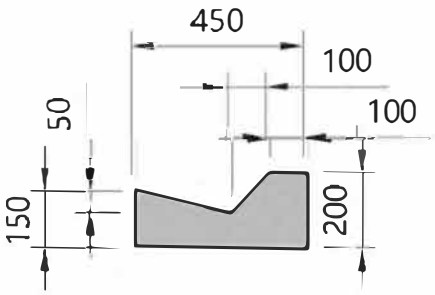
DESIGN CBR CHARTS

TARARUA
DISTRICT COUNCIL

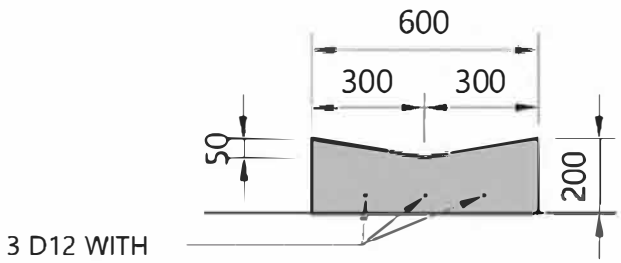
Scale	NTS
Drawing No:	R01
Sheet	1 of 28



STANDARD KERB
AND CHANNEL



MOUNTABLE
KERB AND
CHANNEL



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KERB AND
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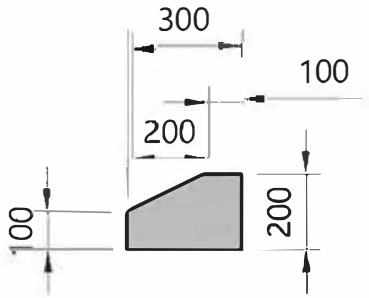
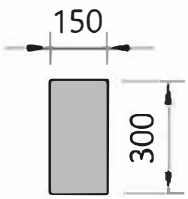


MOUNTABLE
NIB KERB

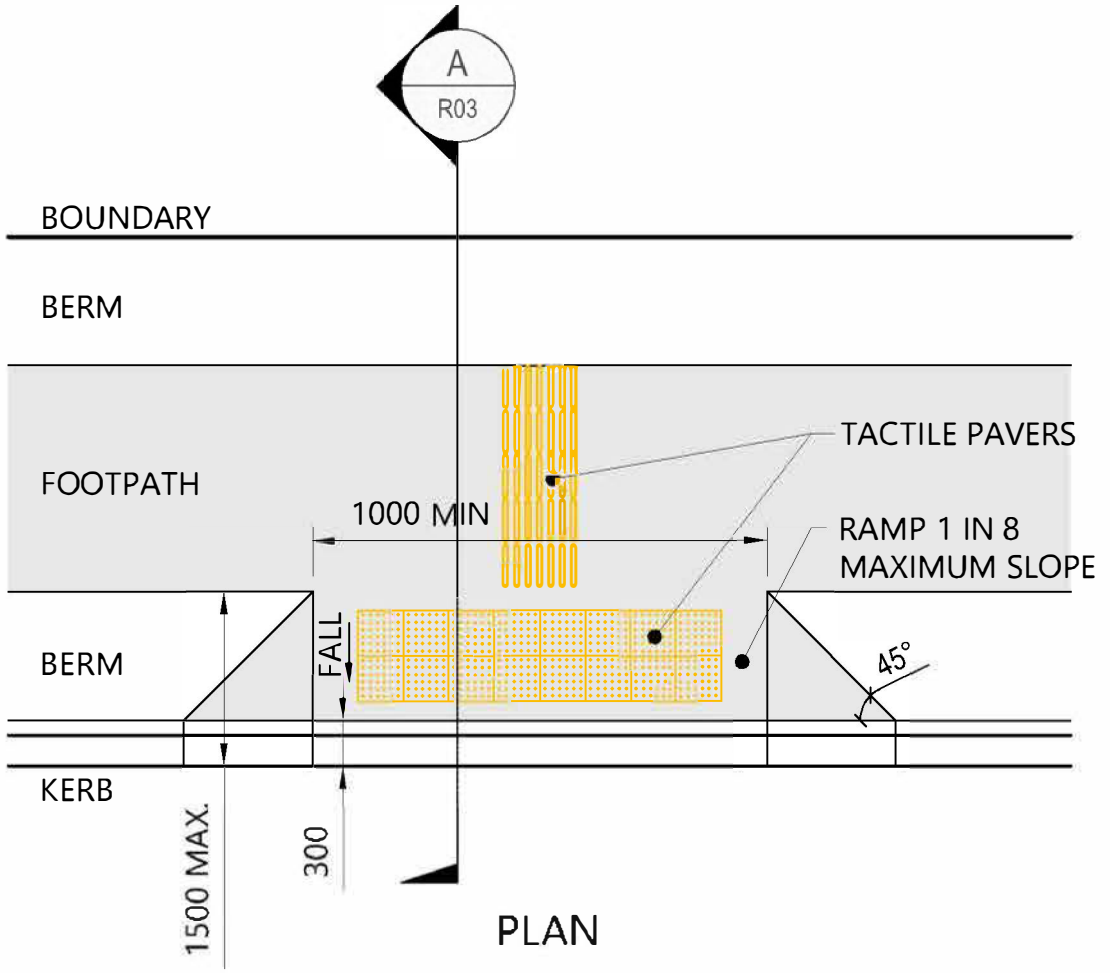


NIB
KERB

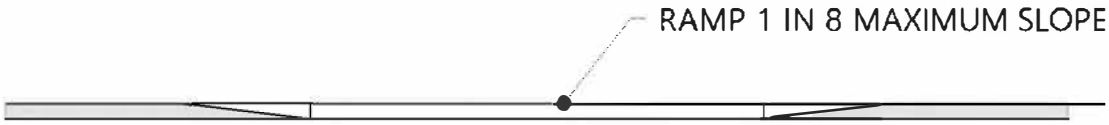
STANDARD KERB PROFILES

TARARUA
DISTRICT COUNCIL

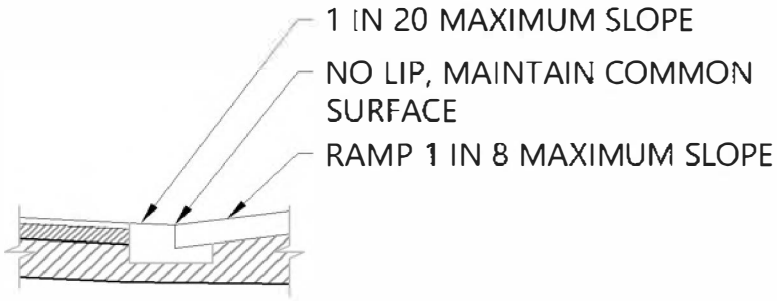
Scale	1:20
Drawing No:	R02
Sheet	2 of 28



PLAN



ELEVATION



SECTION A

PRAM CROSSING DETAIL

TARARUA
DISTRICT COUNCIL

Scale 1:50

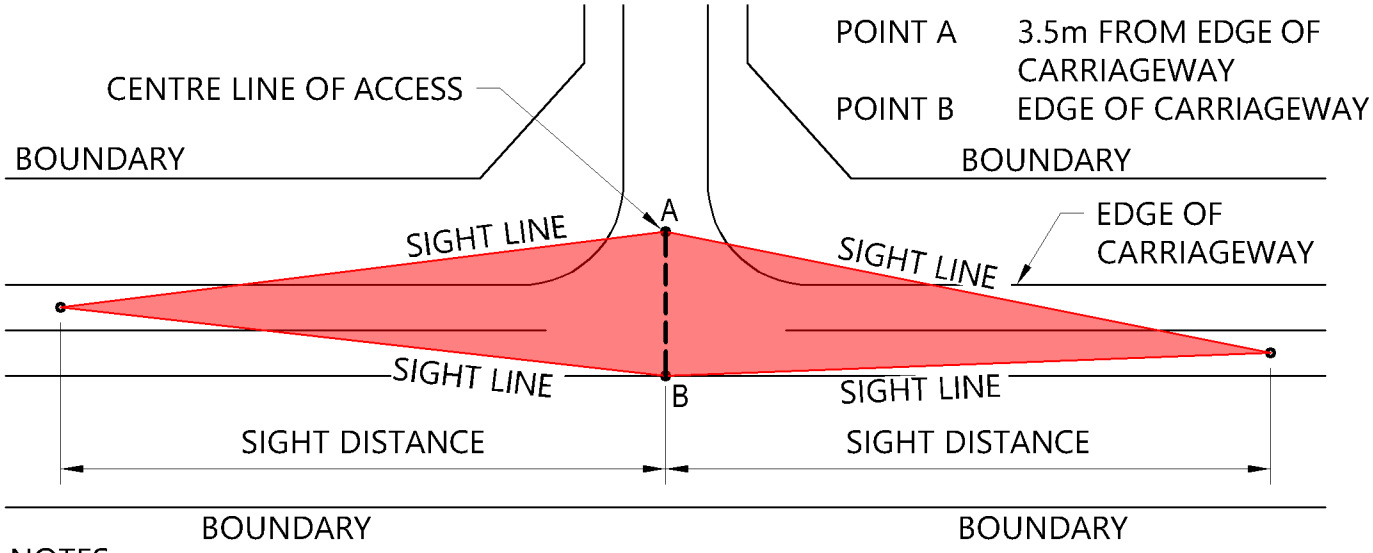
Drawing No:

R03

Sheet 3 of 28

Driveway classifications	Operating speed (km/h)*	Minimum sight distance (metres)** Frontage road classification Local	Collector	Arterial
Low volume	40	30	35	70
Up to 200 vehicle manoeuvres per day	50	40	45	90
	60	55	65	115
	70	85	85	140
	80	105	105	175
	90	130	130	210
	100	160	160	250
	110	190	190	290
	120	230	230	330
High volume	40	30	70	70
More than 200 vehicle manoeuvres per day	50	40	90	90
	60	55	115	115
	70	85	140	140
	80	105	175	175
	90	130	210	210
	100	160	250	250
	110	190	290	290
	120	230	330	330

* OPERATING SPEED = 85TH PERCENTILE SPEED ON FRONTAGE ROAD. THIS CAN BE TAKEN AS THE SPEED LIMITED PLUS 15% IF SURVEY DATA IS NOT AVILABLE.
** DISTANCES ARE BASED ON THE APPROACH SIGHT DISTANCE AND SAFE INTERSECTION SIGHT DISTANCE TABLES IN NAASRA, INTERSECTIONS AT GRADE (1) ASSUMING REACTION TIMES OF 1.5 SECONDS ON LOCAL ROADS WITH OPERATING SPEEDS UP TO 60KM/H AND 2.0 SECONDS FOR ALL OTHER SPEEDS AND ALL COLECTOR AND ARTERIAL ROADS.



NOTES:

SITE DISTANCES SHALL BE MEASURED FROM A POINT 1.15m (MOTORISTS EYE LEVEL) ABOVE FINISHED SURFACE OF THE ACCESS CROSSING PLACE AND 1.15m ABOVE THE ROAD SURFACE.

THERE SHALL BE NO OBSTRUCTIONS TO VISIBILITY INSIDE THE AREA BOUNDED BY SIGHT LINES

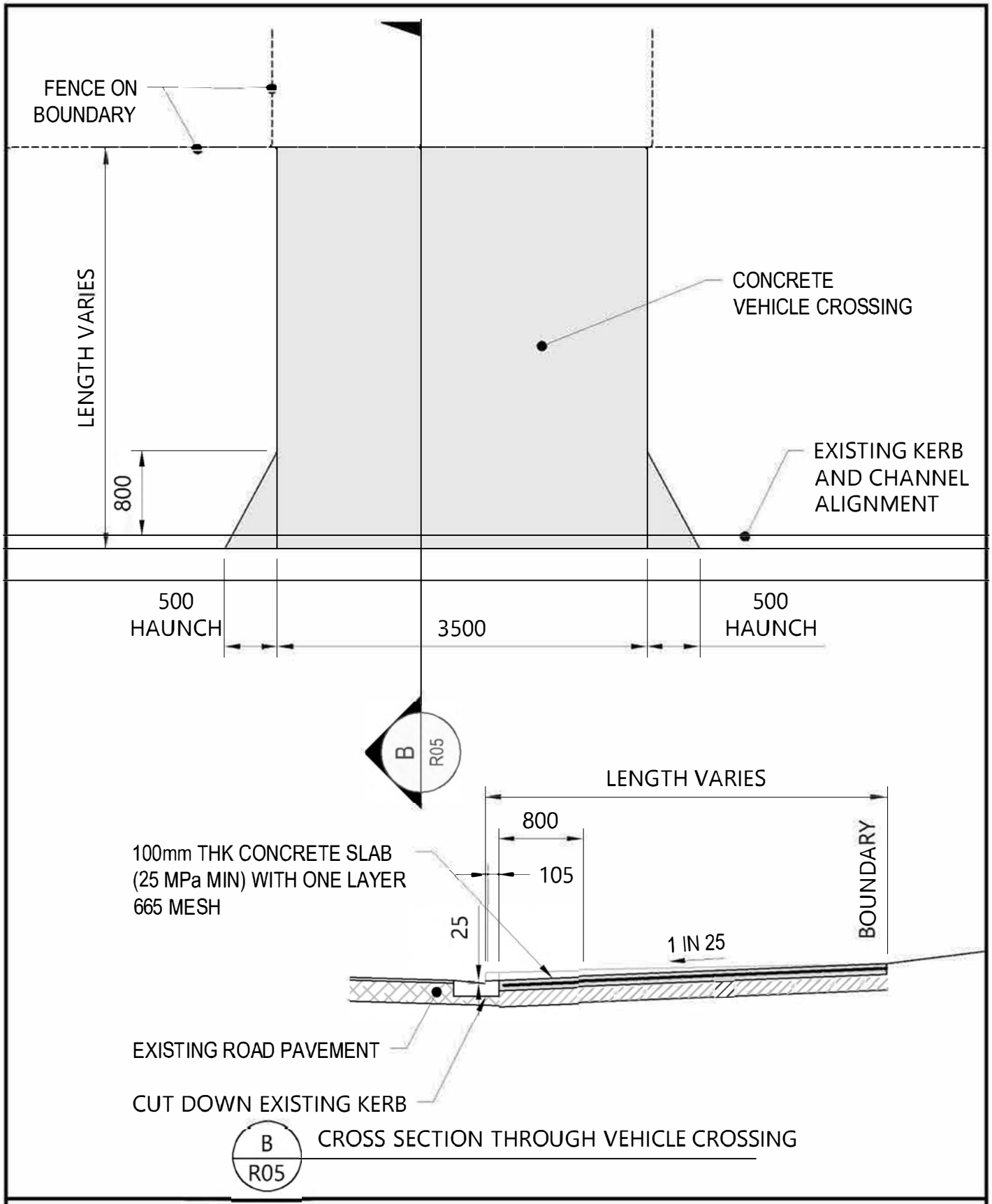
SIGHT DISTANCES

TARARUA DISTRICT COUNCIL

Scale 1:500

Drawing No: R04

Sheet 4 of 28



STANDARD URBAN VEHICLE CROSSING DETAILS

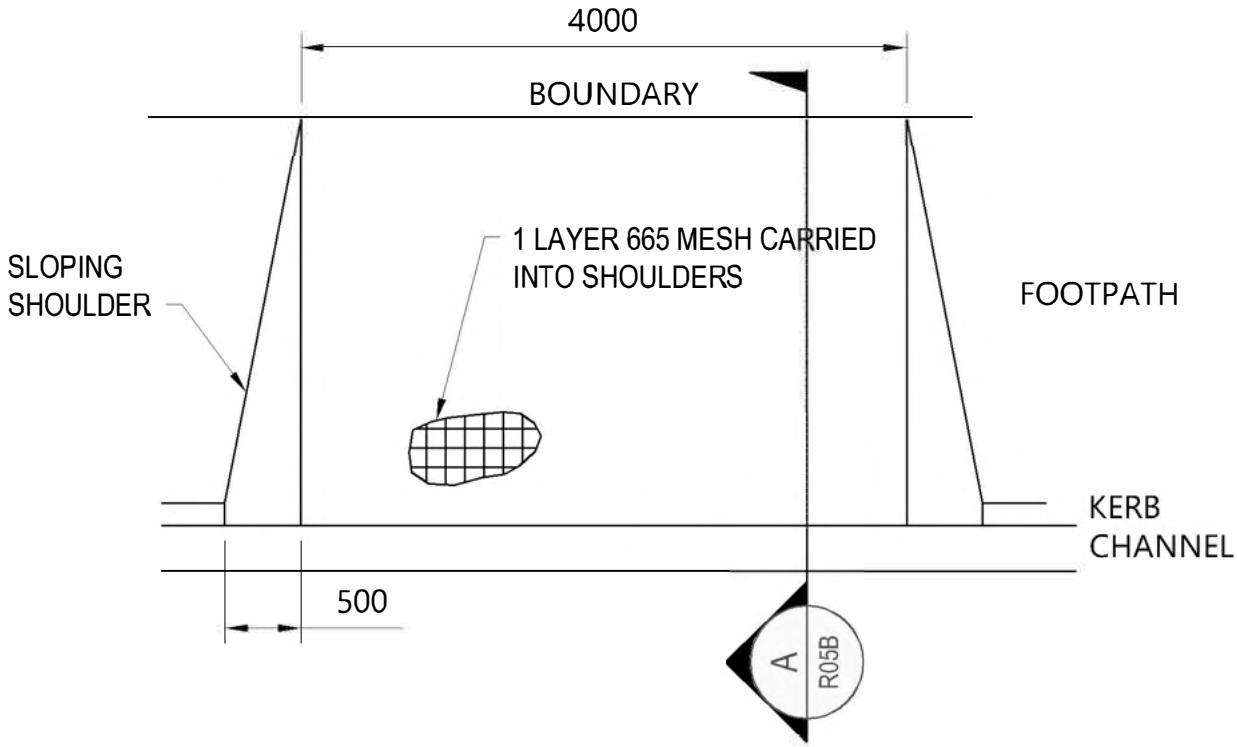
TARARUA DISTRICT COUNCIL

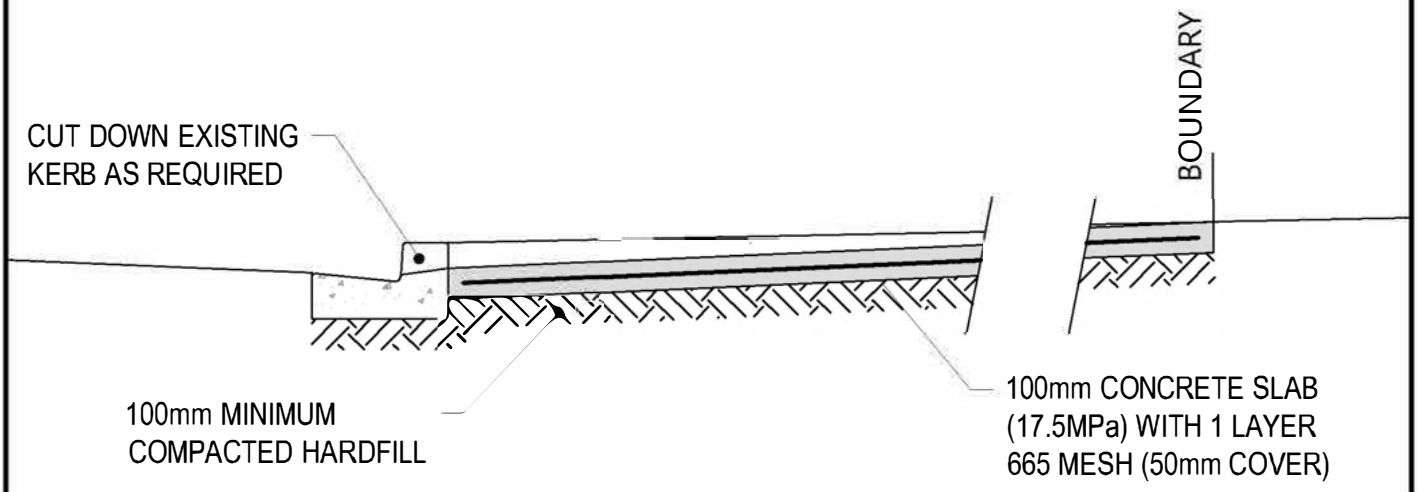
Scale 1:50

Drawing No:

R05A

Sheet 5 of 28





A / R05B TYPE 1 - PLAN STANDARD ROAD CAMBER & LOW PROFILE KERB

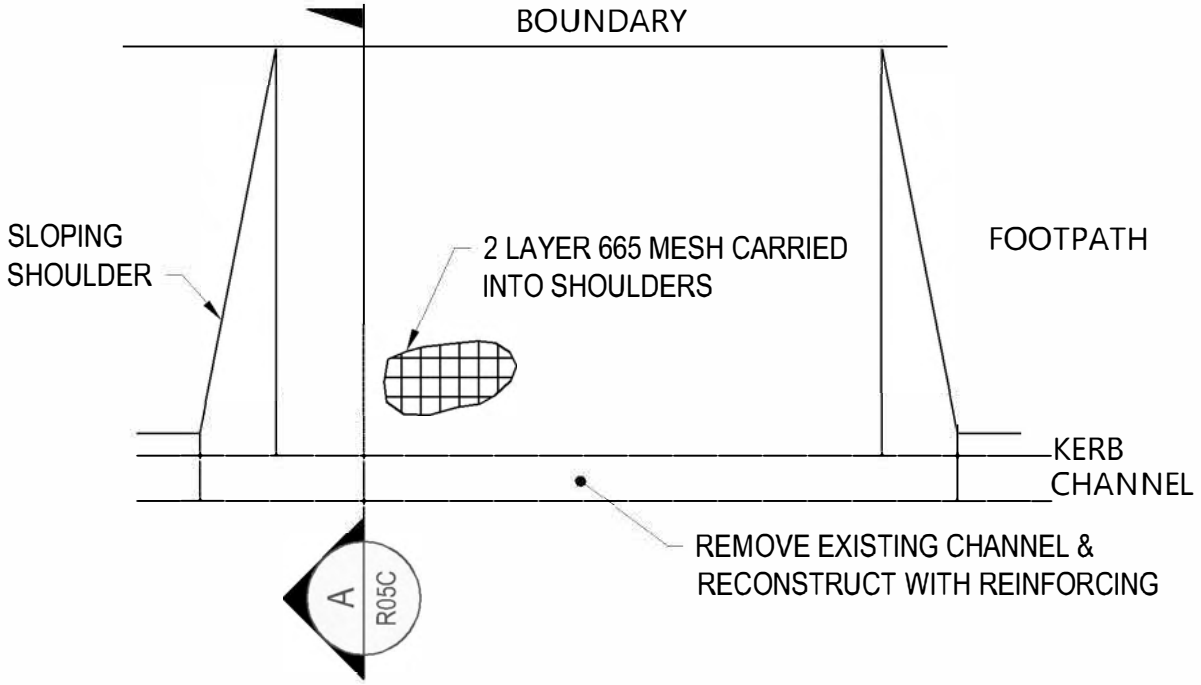
RESIDENTIAL OR LIGHT DUTY (COMMERCIAL) VEHICLE CROSSING DETAILS

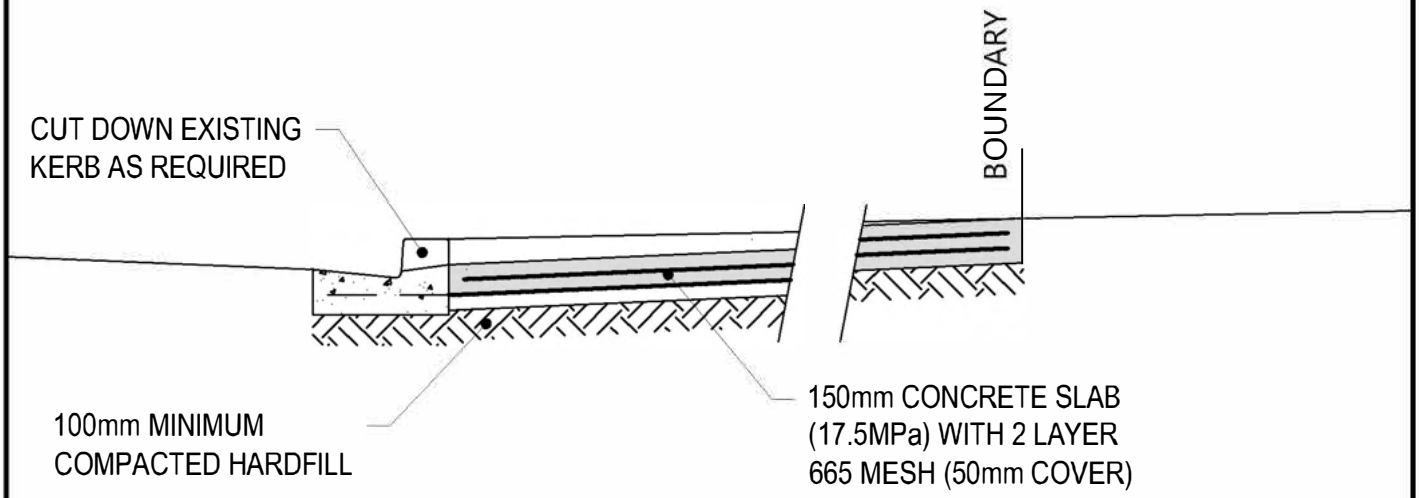
TARARUA DISTRICT COUNCIL

Scale 1:50 & 1:25

Drawing No:

R05B





A R05C TYPE 1 - PLAN STANDARD ROAD CAMBER & LOW PROFILE KERB

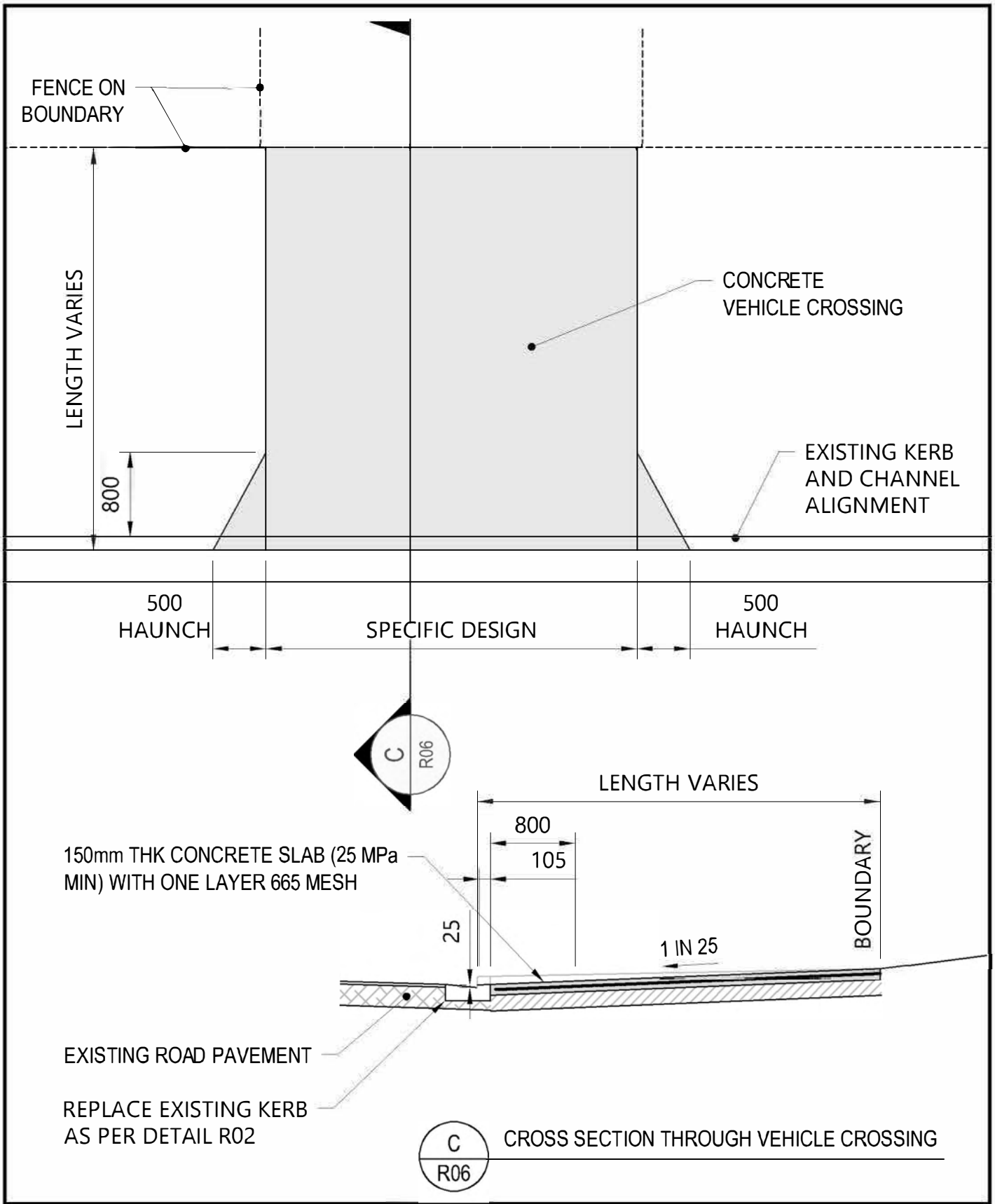
HEAVY DUTY (COMMERCIAL) VEHICLE CROSSING DETAILS

TARARUA DISTRICT COUNCIL

Scale 1:50 & 1:25

Drawing No:

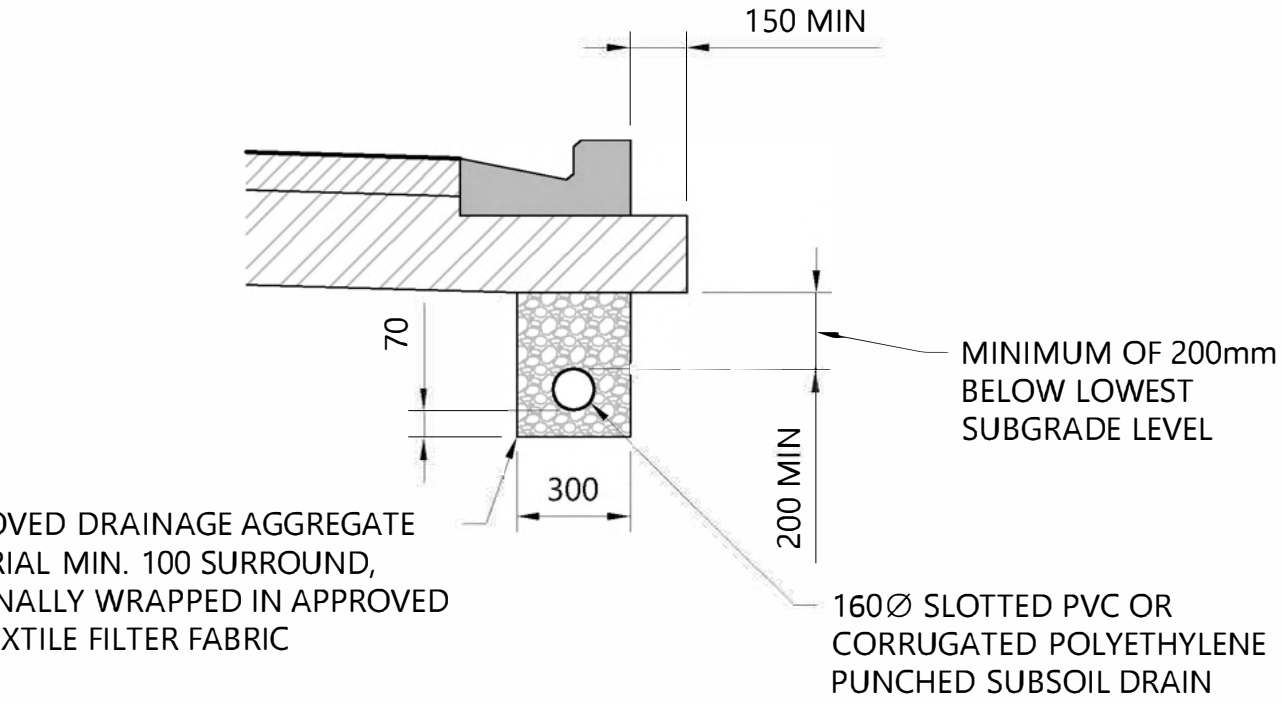
R05C



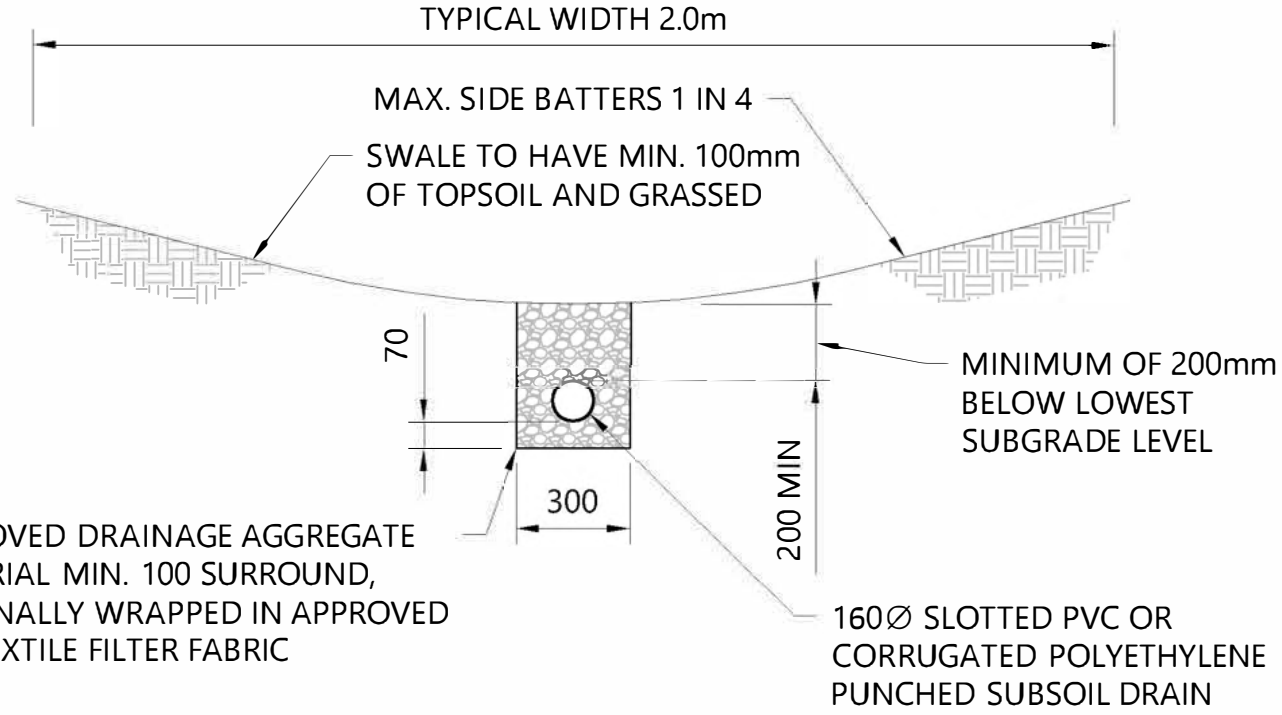
ROW VEHICLE CROSSING DETAILS

TARARUA DISTRICT COUNCIL

Scale	NTS
Drawing No:	R06
Sheet	8 of 28



UNDER KERB DRAINAGE

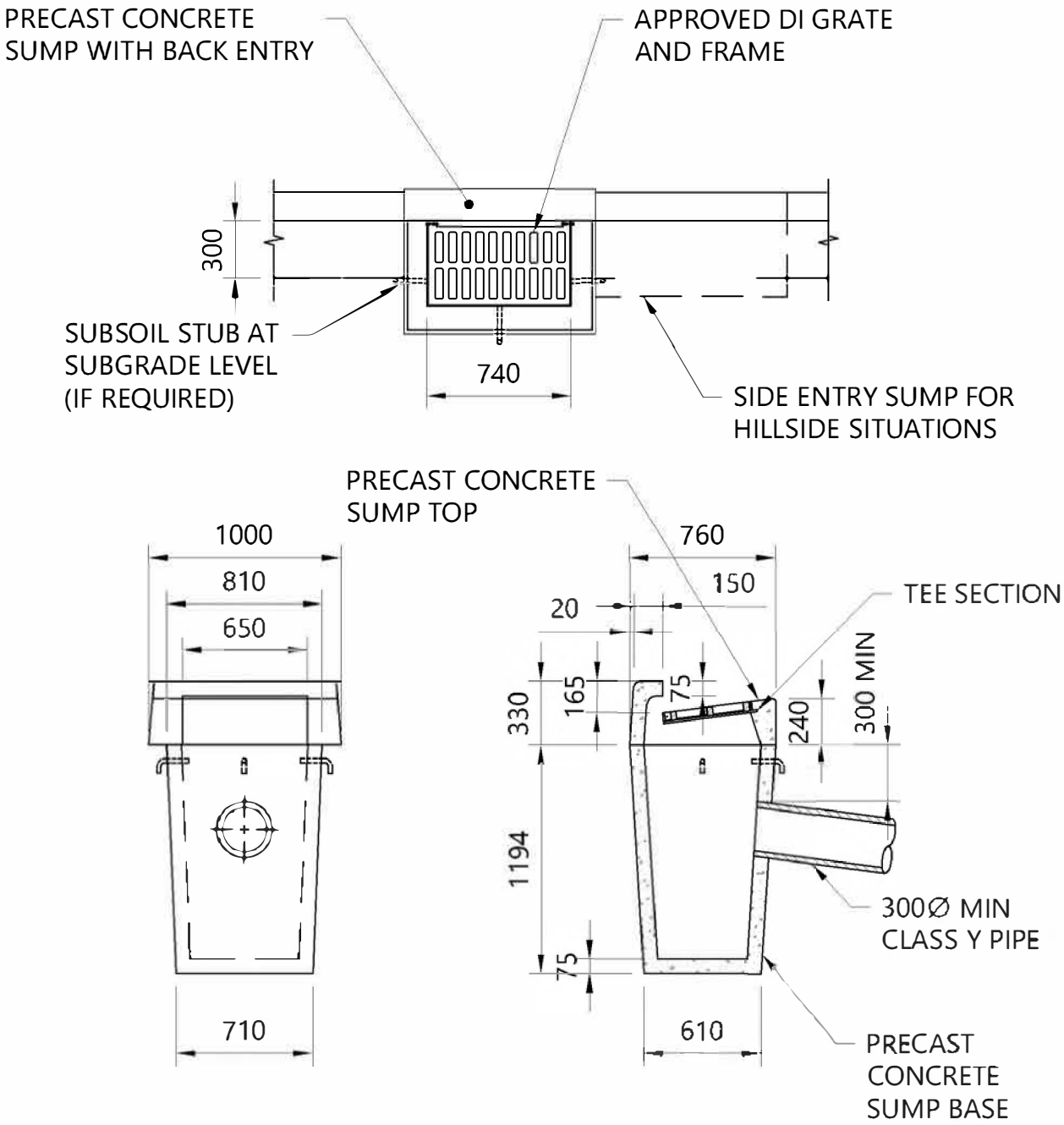


TYPICAL SWALE DETAIL WITH SUB SOIL DRAINAGE

ROADSIDE SWALE AND SUB SOIL DETAILS

TARARUA DISTRICT COUNCIL

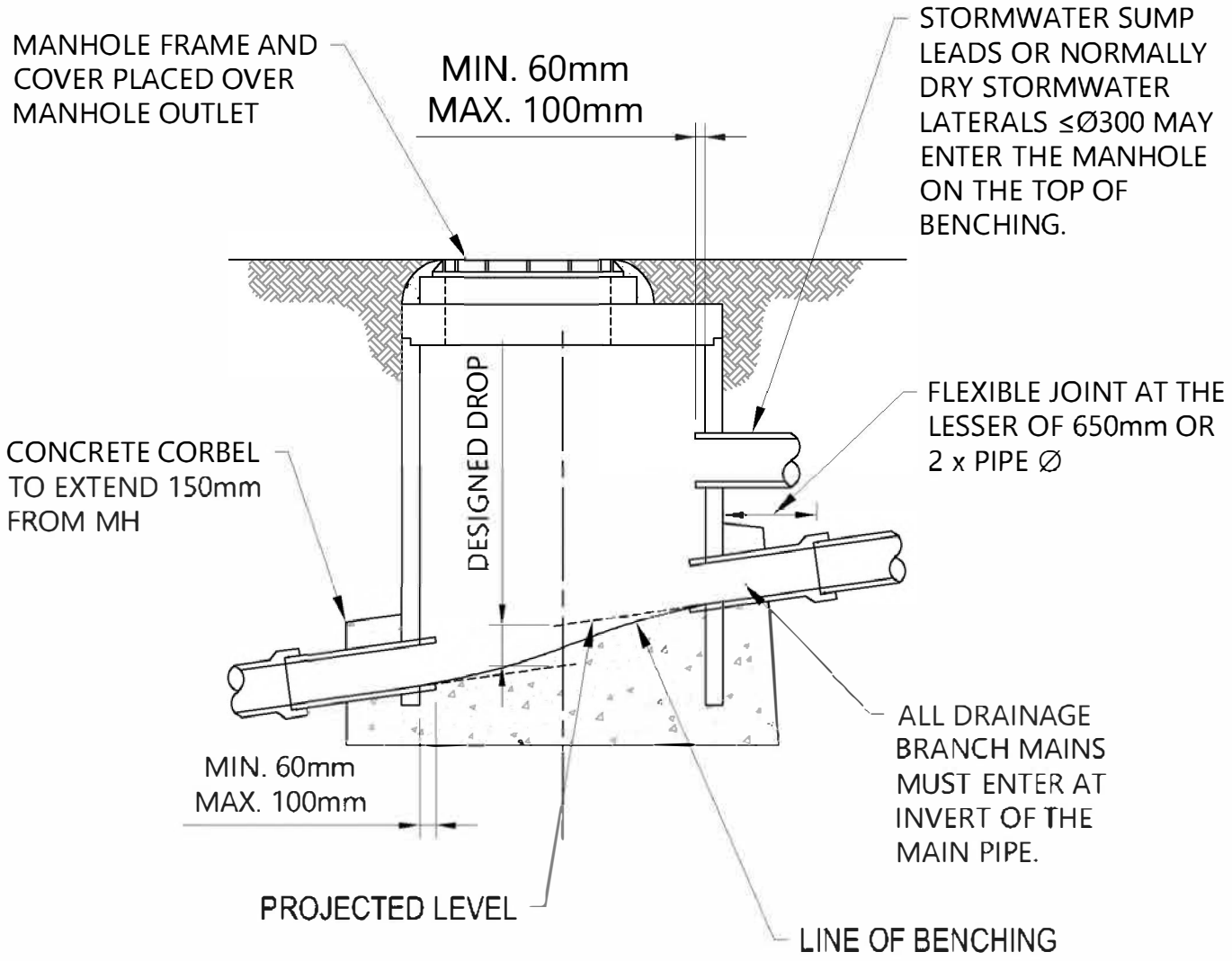
Scale	1:20
Drawing No:	R07
Sheet	9 of 28



STANDARD CATCHPIT DETAILS

TARARUA
DISTRICT COUNCIL

Scale	NTS
Drawing No:	D01
Sheet 10 of 28	

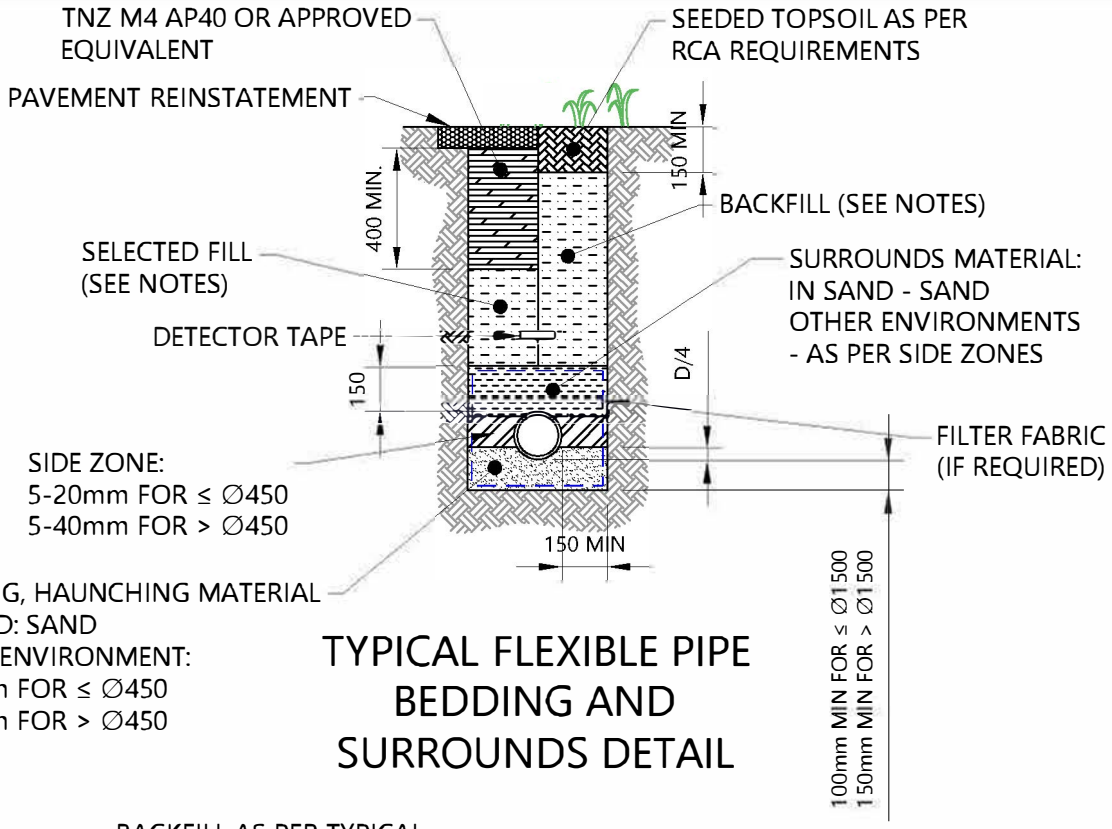


CROSS SECTION THROUGH
STORMWATER MANHOLE

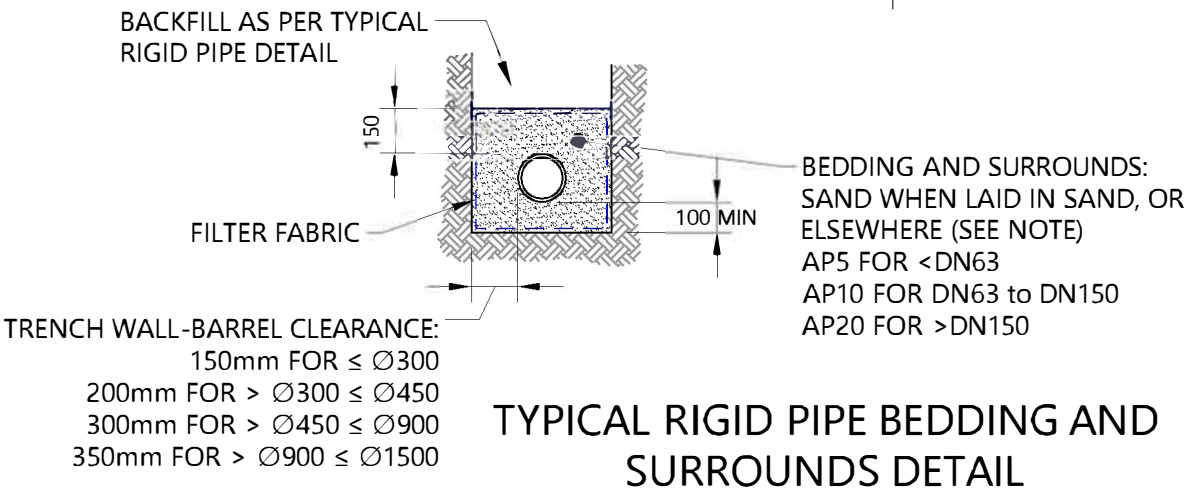
STORMWATER - TYPICAL MANHOLE DETAILS

TARARUA
DISTRICT COUNCIL

Scale	NTS
Drawing No:	D02
Sheet 11 of 28	



TYPICAL FLEXIBLE PIPE BEDDING AND SURROUNDS DETAIL



TYPICAL RIGID PIPE BEDDING AND SURROUNDS DETAIL

NOTES:

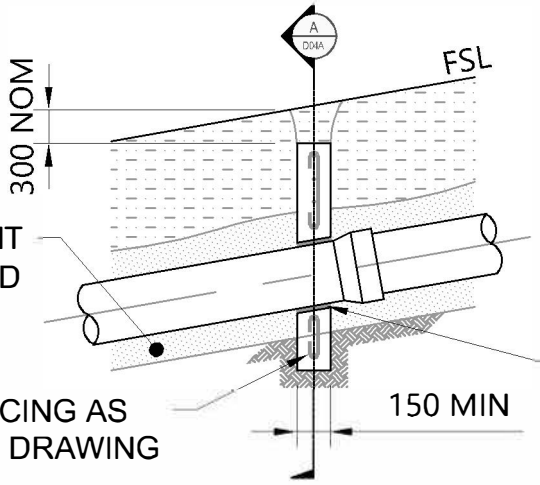
1. BACKFILL IS GENERALLY AP40 OR AP65 BUT THIS MAY DIFFER IN CERTAIN AREAS IN ACCORDANCE WITH DESIGN REQUIREMENTS.
2. RIGID PIPES INCLUDE: CONCRETE PIPES, EARTHENWARE PIPES.
3. FLEXIBLE PIPES INCLUDE ALL PVC PIPES, ALL POLYETHYLENE PIPES, COPPER, POLYBUTYLENE, CORRUGATED STEEL AND ALUMINIUM PIPES, STEEL AND DUCTILE IRON PIPES.
4. FOR FLEXIBLE PIPES, BEDDING AND SURROUNDS MAY BE SINGLE SIZE AGGREGATE WHERE NECESSARY, FOR EXAMPLE 5-14mm OR 8mm DOWN.

TRENCHING - TRENCH BACKFILL DETAIL

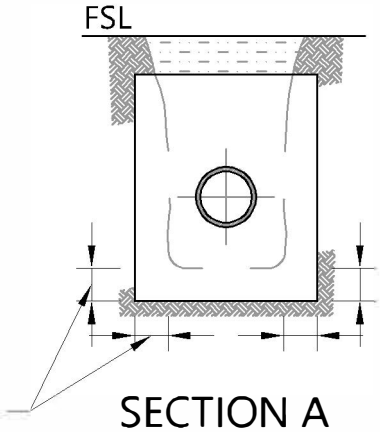
TARARUA DISTRICT COUNCIL

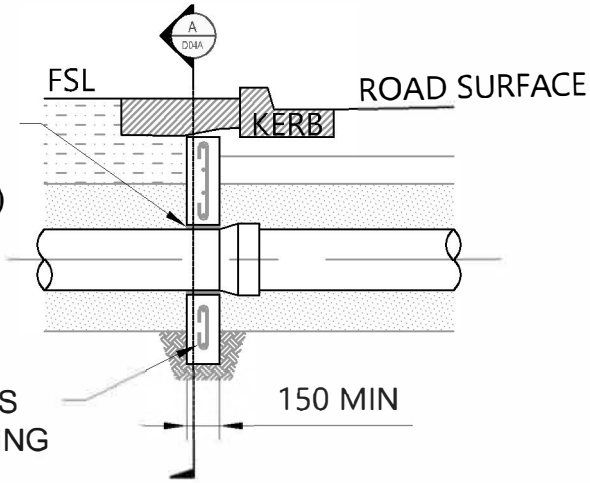
Scale NTS

Drawing No: D03



CONCRETE BULKHEAD DETAIL



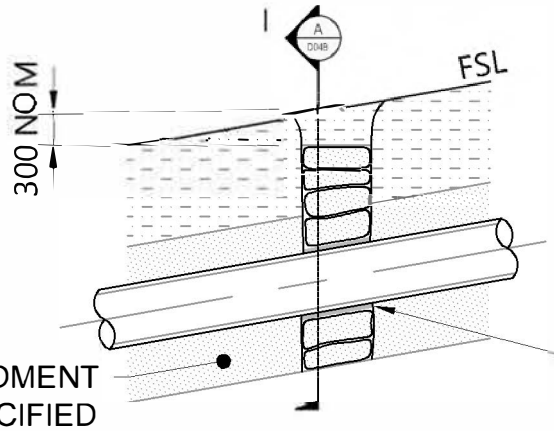


TYPICAL ROAD CROSSING BULKHEAD

TRENCHING - TRENCH STOP TYPICAL DETAIL

TARARUA DISTRICT COUNCIL

Scale	NTS
Drawing No:	D04A
Sheet 13 of 28	

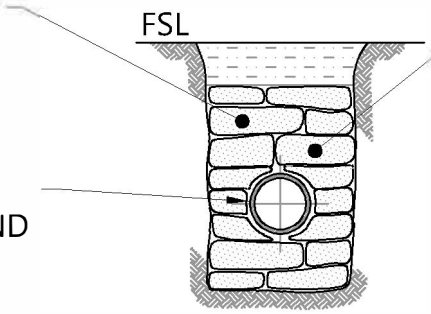


GRANULAR EMBEDMENT MATERIAL AS SPECIFIED

COMPRESSIBLE MEMBRANE AROUND PIPE (SEE NOTE 9)

TRENCH STOP DETAIL

PACK BAGS TIGHTLY TOGETHER



WOVEN POLYETHYLENE BAGS MIN 0.25 THICK FILLED WITH SAND OR HESSIAN BAGS FILLED WITH CEMENT STABILISED SAND.

COMPRESSIBLE MEMBRANE AROUND PIPE (SEE NOTE 9)

SECTION B

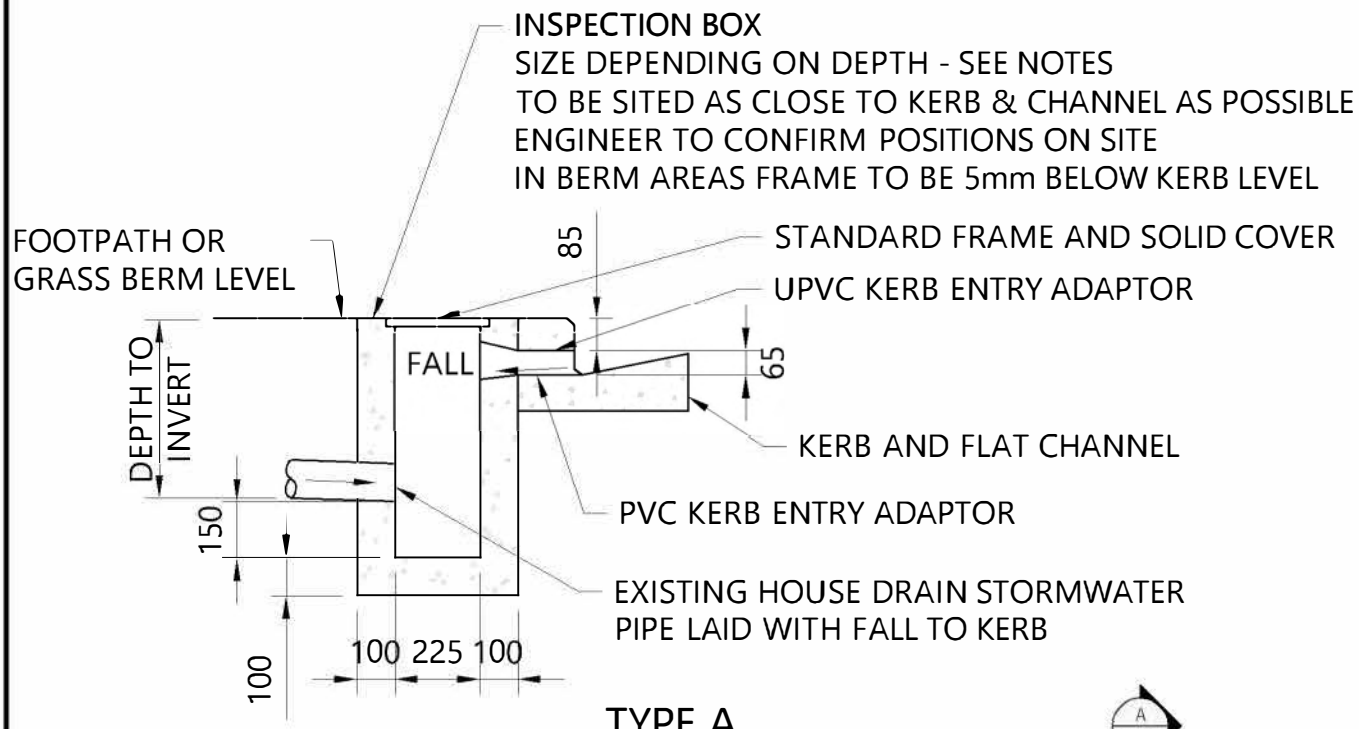
NOTE:

1. ALL DIMENSIONS IN MILLIMETRES.
2. CONSTRUCT CONCRETE BULKHEADS AND TRENCH STOPS AT LOCATIONS SPECIFIED IN DESIGN DRAWINGS.
3. CONSTRUCT BULKHEAD ADJACENT TO KERB AND GUTTER SHOULDER OF SEALED ROADS.
4. BULKHEAD AT A RETAINING WALL TO BE UNDER THE WALL.
5. KEY CONCRETE BULKHEADS INTO SIDES AND BOTTOM OF TRENCH AGAINST A BEARING SURFACE OF UNDISTURBED SOIL.
6. CONCRETE TO BE 17.5 MPa.
7. DO NOT DEFORM PIPES DURING PLACEMENT OF CONCRETE OR BAGS.
8. SEAL BAGS TO PREVENT LEAKAGE OF CONTAINED MATERIAL.
9. COMPRESSIBLE MEMBRANE AROUND PIPE TO BE 10 THICK POLYSTYRENE FOR BULKHEADS ADJACENT TO KERBS AND 3 THICK RUBBER FOR BULKHEADS AND TRENCHSTOPS ON SLOPES.
10. FOR SLOPES >35% SPECIFIC DESIGN REQUIRED.

TRENCHING - TRENCH STOP TYPICAL DETAIL

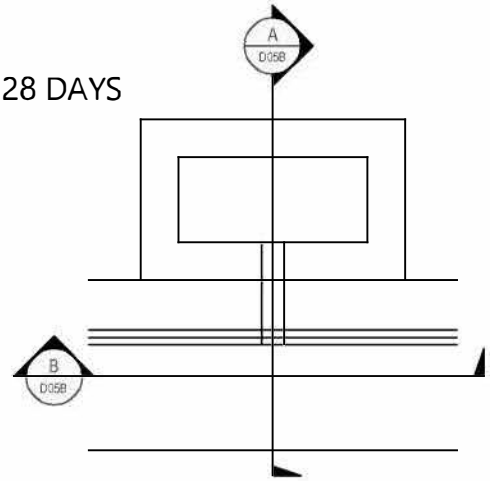
TARARUA DISTRICT COUNCIL

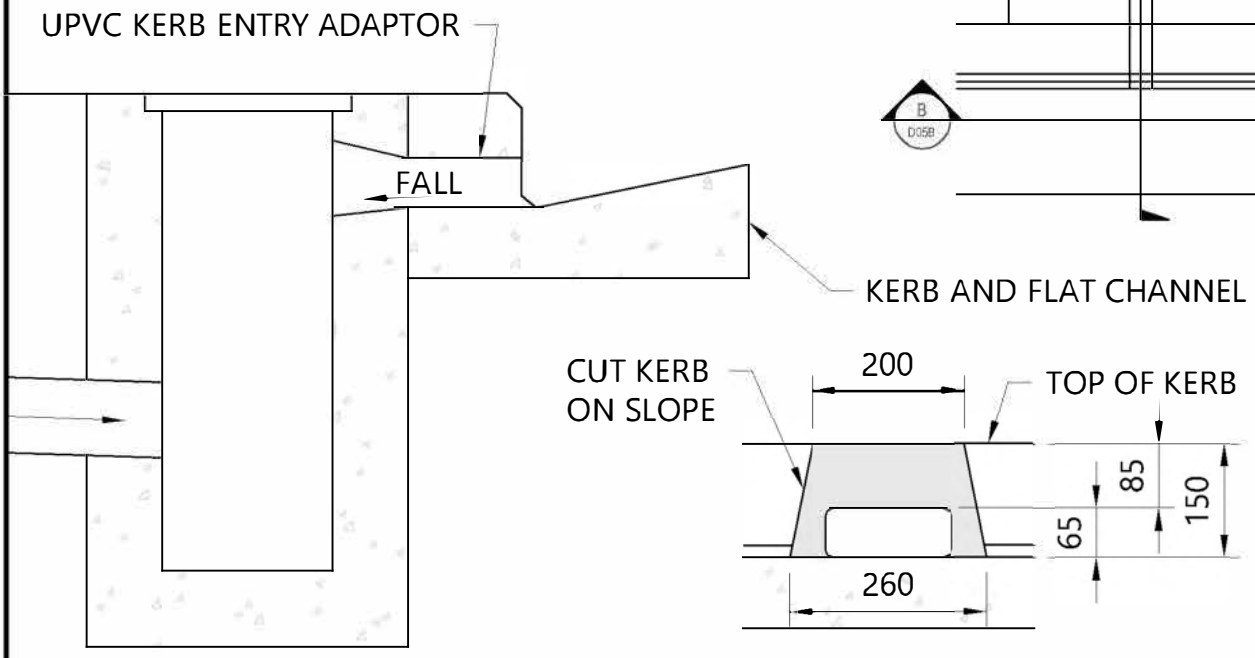
Scale	NTS
Drawing No:	D04B
Sheet 14 of 28	



TYPE A

ALL CONCRETE TO BE 20MPa AT 28 DAYS





SECTION A

SECTION B

STORMWATER LATERAL TYPICAL DETAIL

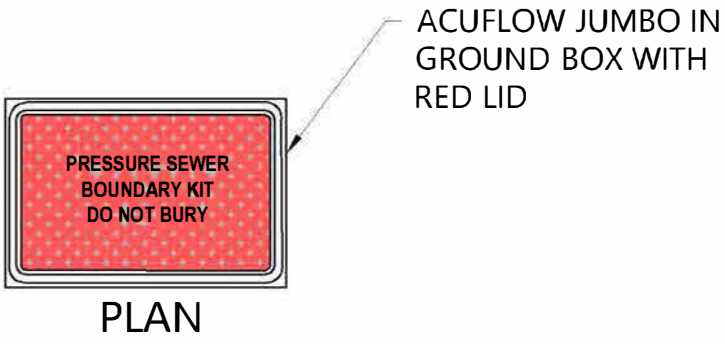
TARARUA
DISTRICT COUNCIL

Scale NTS

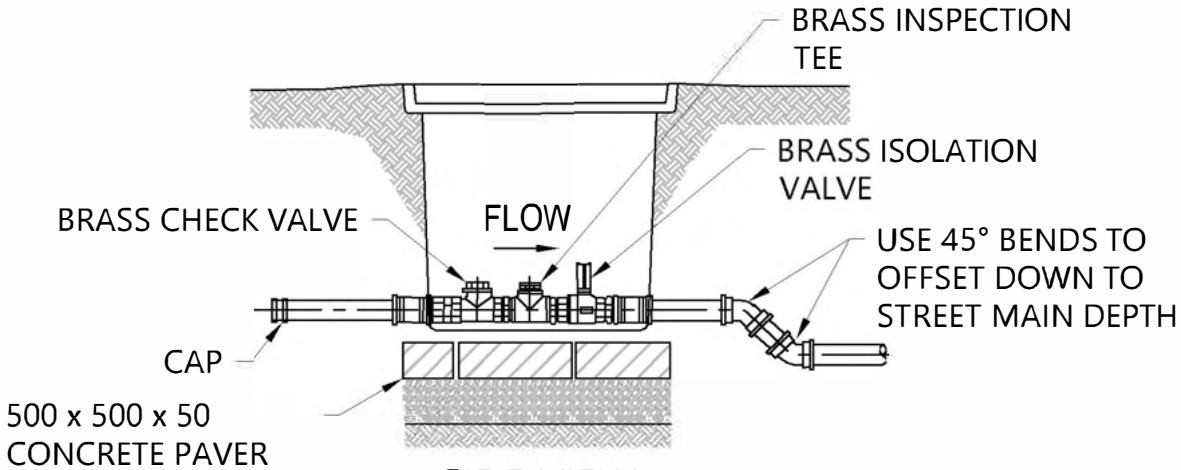
Drawing No:

D05

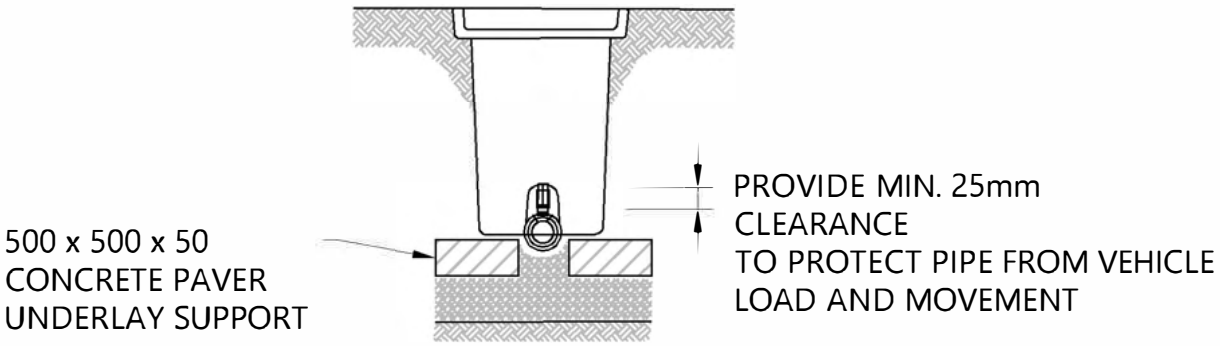
Sheet 15 of 28



PLAN



SIDE VIEW



END VIEW

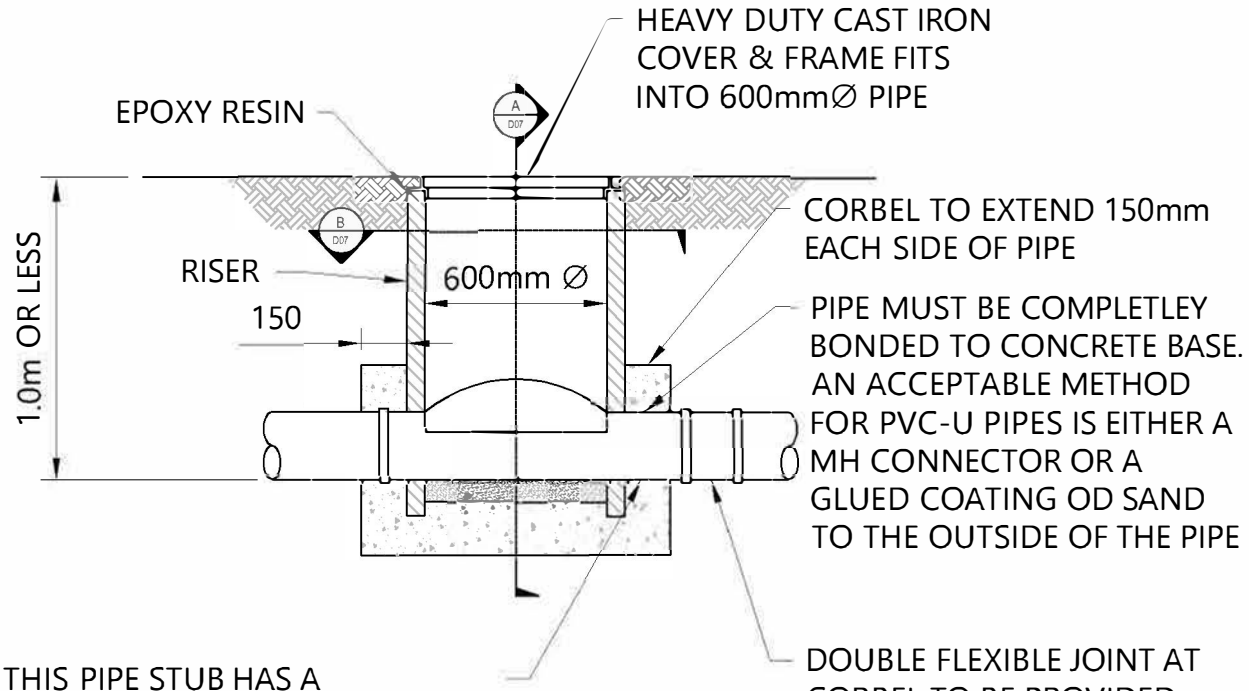
WASTEWATER - PRIVATE PUMPED CONNECTION DETAIL

TARARUA DISTRICT COUNCIL

Scale NTS

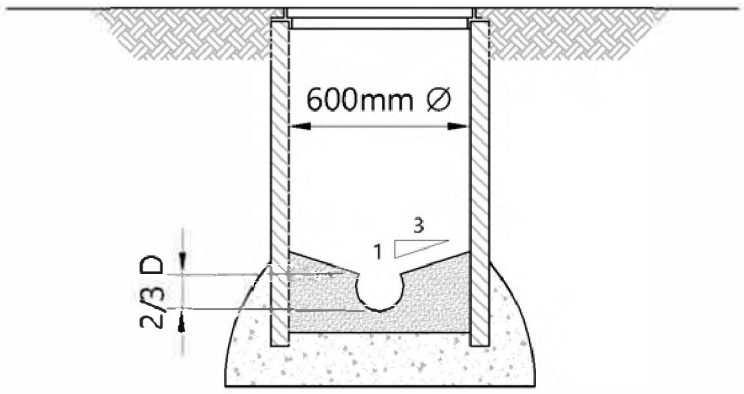
Drawing No:

D06

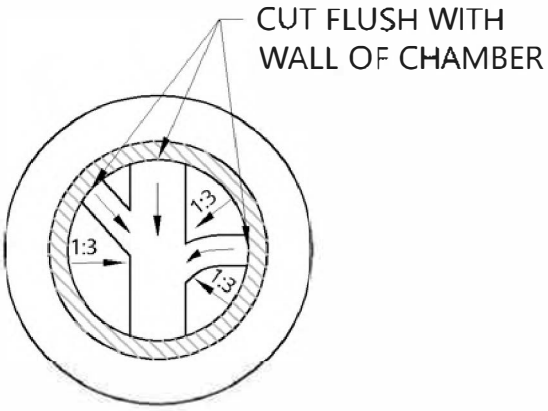


WHERE THIS PIPE STUB HAS A DOWNSTREAM FACING SOCKET, IT SHALL BE ENCASED AS SHOWN OPPOSITE

WASTEWATER



SECTION A



SECTION B

NOTE:
CHAMBERS TO BE INSTALLED CLEAR OF TRAFFICABLE AREAS

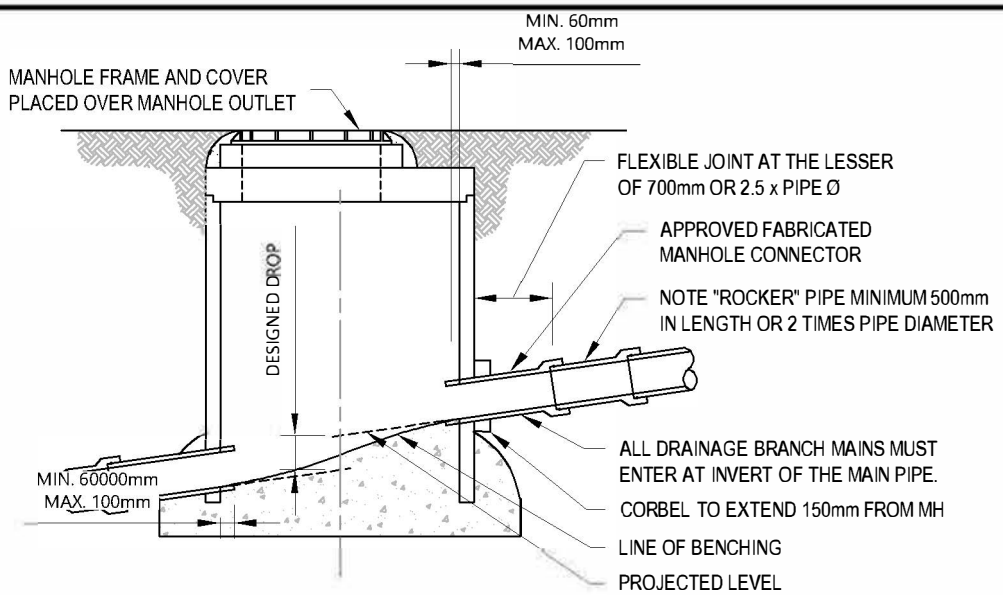
WASTEWATER - INSPECTION CHAMBER (600mm) TYPICAL DETAIL

TARARUA DISTRICT COUNCIL

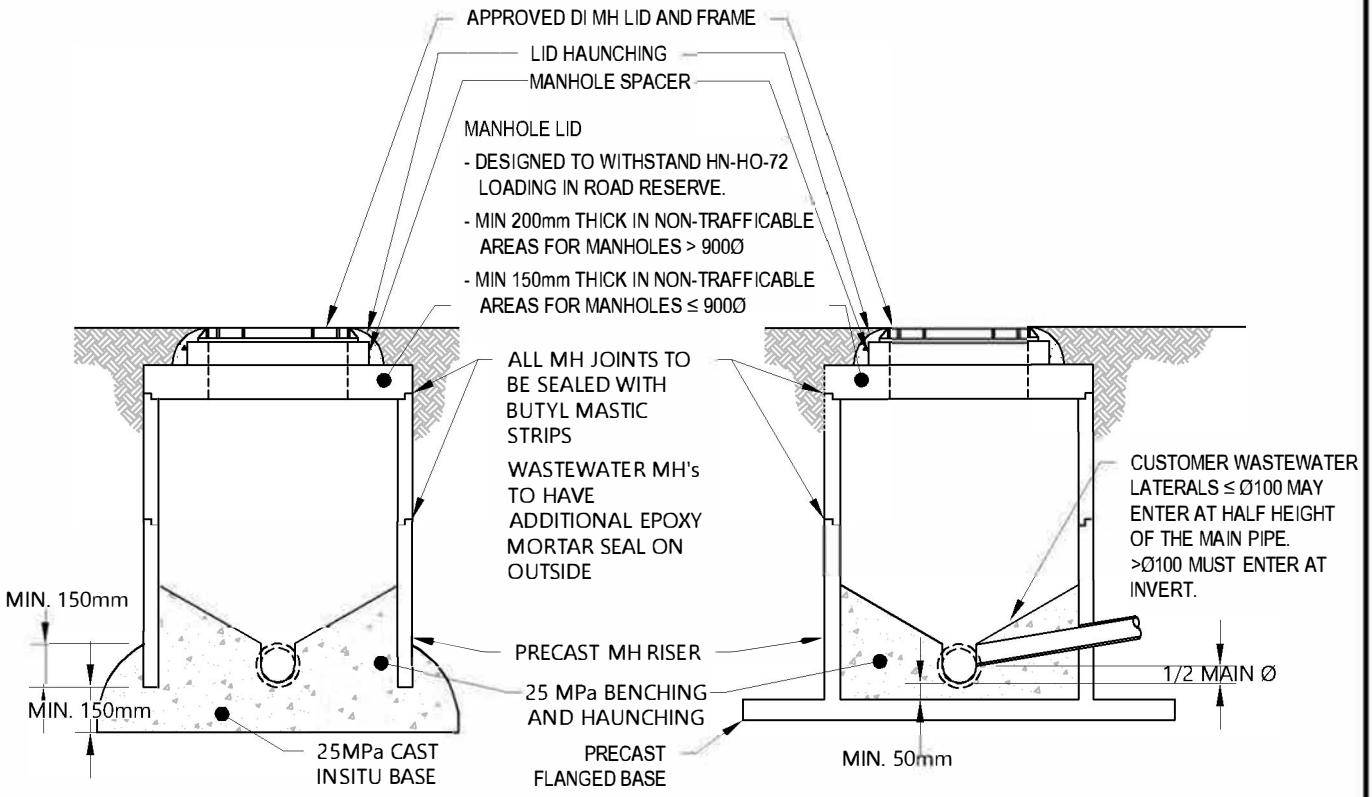
Scale NTS

Drawing No:

D07



CROSS SECTION THROUGH STANDARD MANHOLE



BENCHING AND HAUNCHING

NOTES:

1. MANHOLES AND BASES TO BE DESIGNED AGAINST FLOATATION WITH A SAFETY FACTOR OF 1.25 IN AREAS OF HIGH WATER TABLE OR LIQUEFACTION POTENTIAL.
2. MANHOLE BENCHING AND BASE TO BE POURED TO A MINIMUM 150mm BELOW LOWEST PIPE INVERT. THIS INCLUDES MINIMUM DEPTH BETWEEN LOWEST PIPE INVERT AND PRECAST FLANGED BASE.

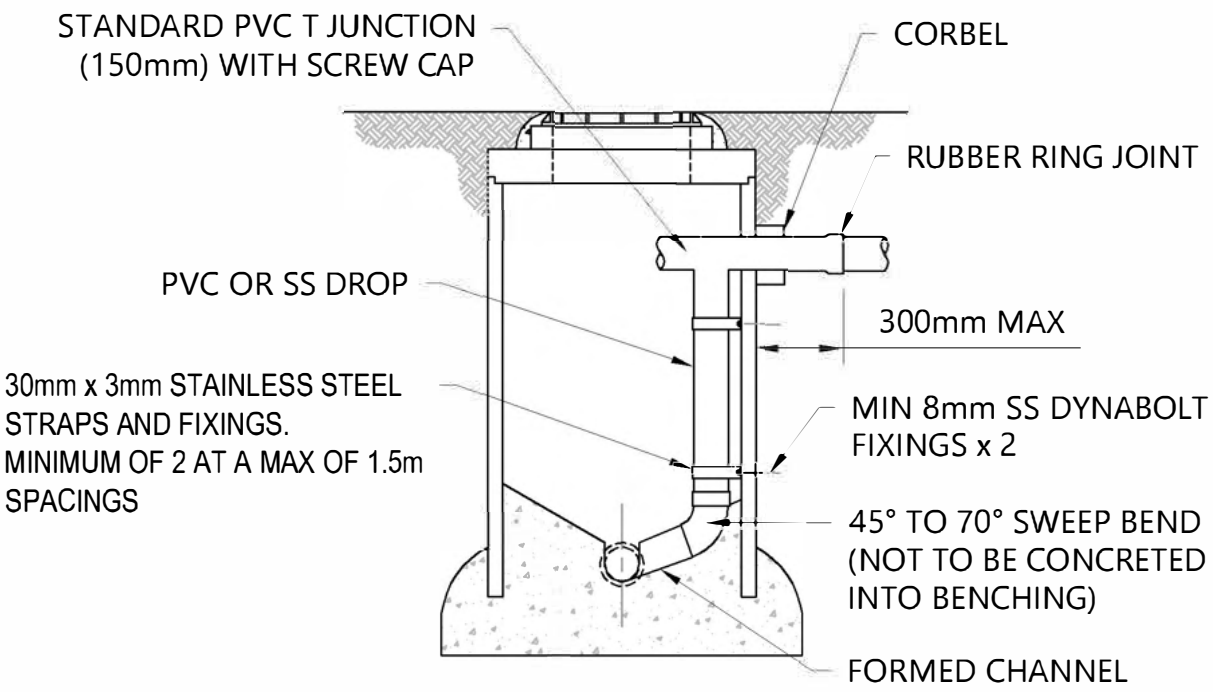
WASTEWATER - TYPICAL MANHOLE DETAIL

TARARUA
DISTRICT COUNCIL

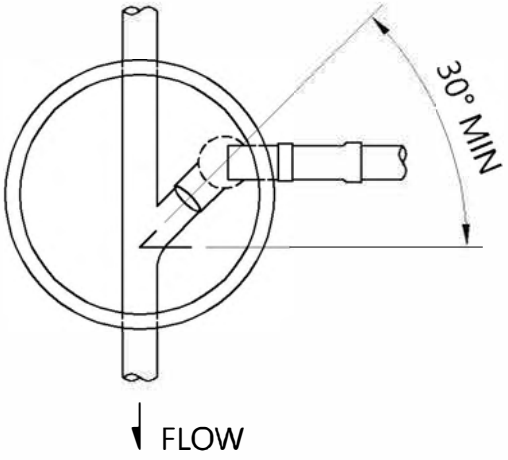
Scale NTS

Drawing No:

D08



TYPICAL INTERNAL DROP DETAILS

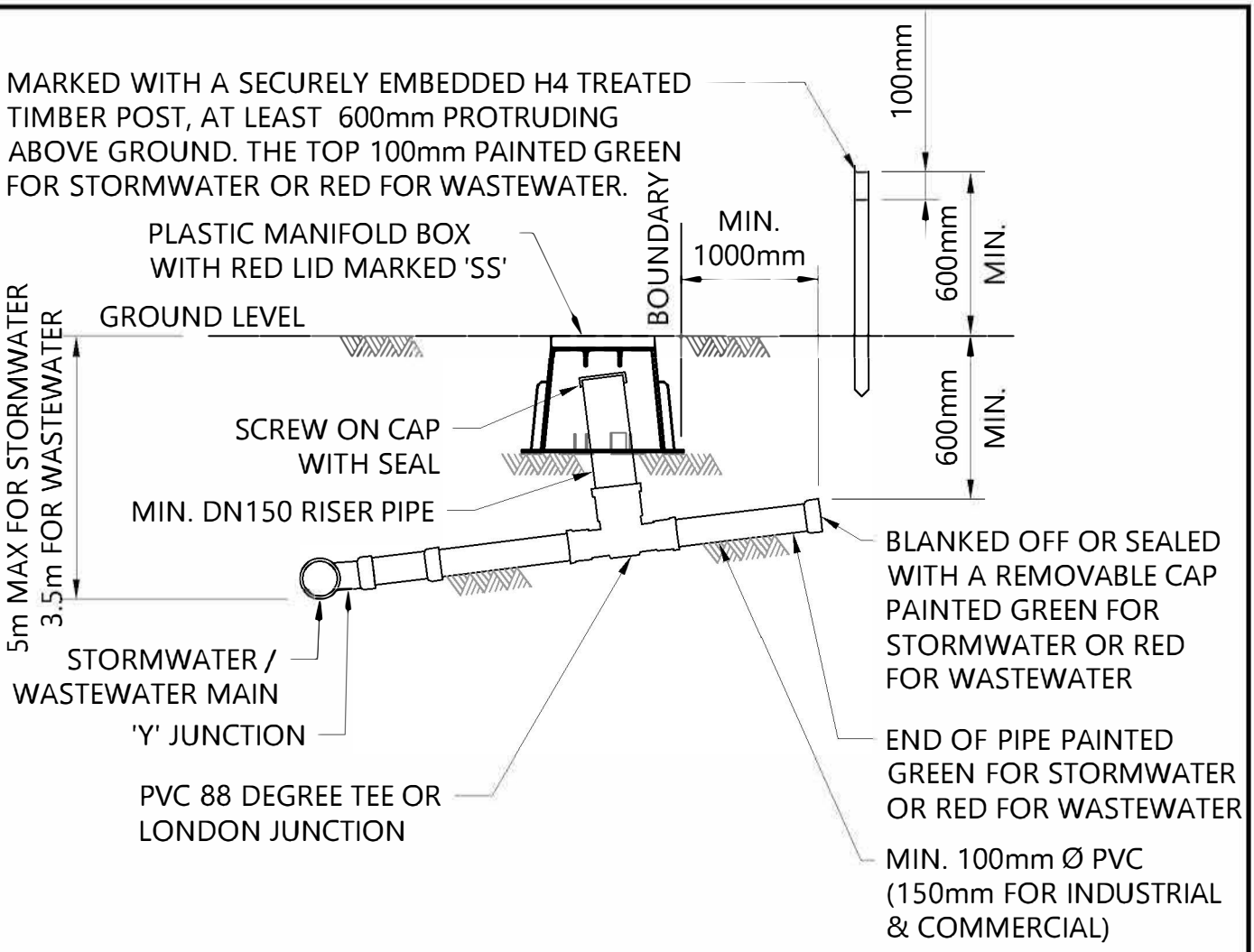


PLAN VIEW

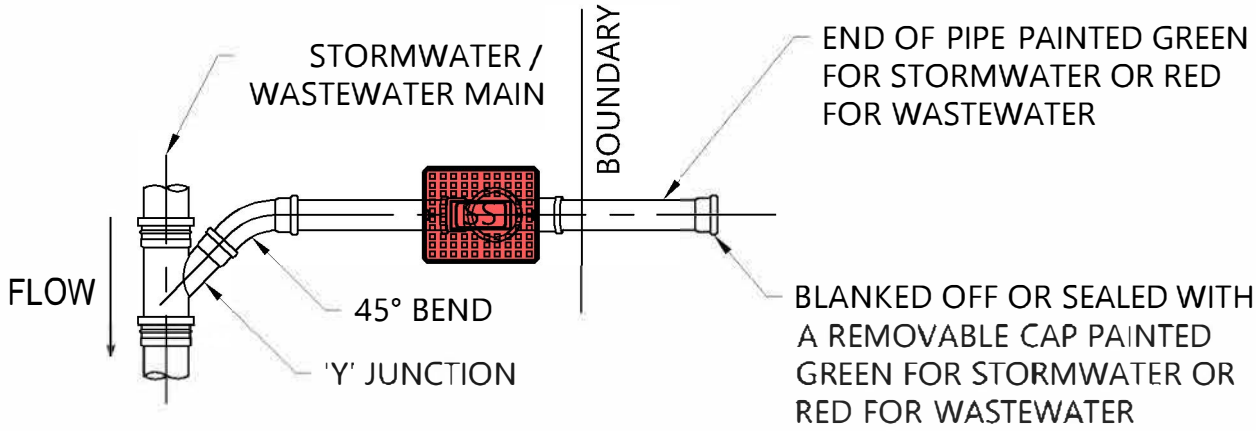
WASTEWATER - MANHOLE DROPPER DETAIL

TARARUA DISTRICT COUNCIL

Scale	NTS
Drawing No:	D09
Sheet 19 of 28	



CLEANING EYE DETAIL - SECTION VIEW



CLEANING EYE DETAIL - PLAN VIEW

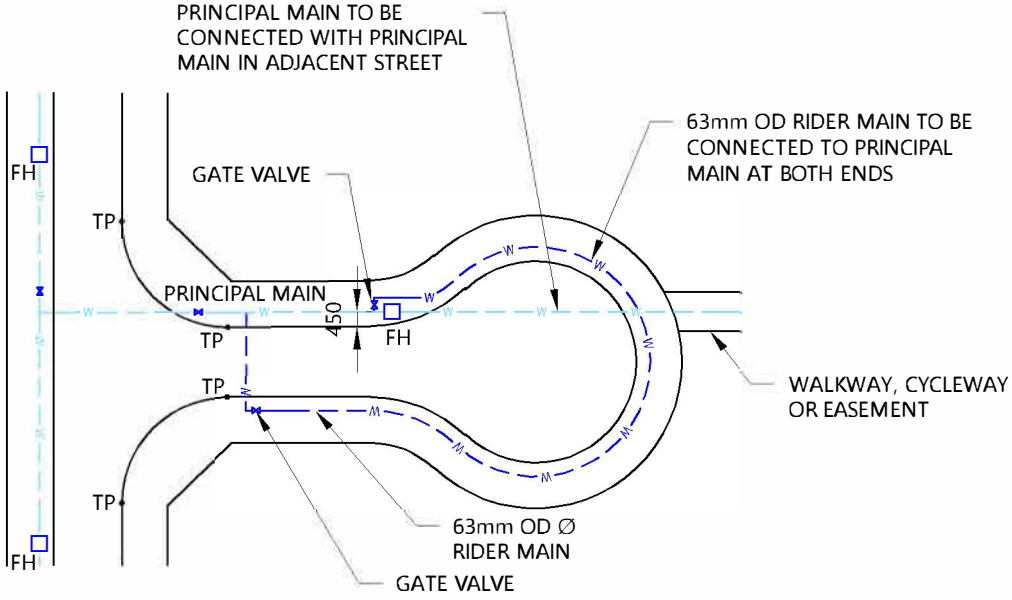
WASTEWATER - LATERAL CONNECTION & BOUNDARY KIT DETAIL

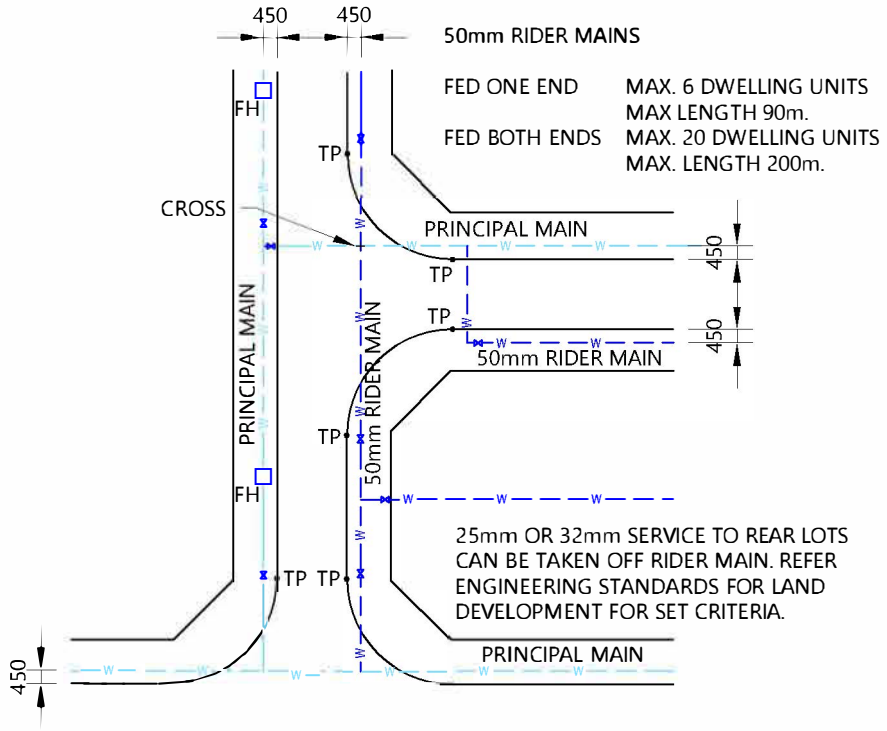
TARARUA DISTRICT COUNCIL

Scale NTS

Drawing No:

D10





NOTE:

1. VALVE SPACING - NOT TO EXCEED 350m.
2. FIRE HYDRANT SPACING TO COMPLY WITH SNZ PAS 4509:2008 NEW ZEALAND FIRE SERVICE FIREFIGHTING WATER SUPPLIES CODE OF PRACTICE.
3. FIRE HYDRANT SPACING
   - 3.1. NOT EXCEEDING 135m IN RESIDENTIAL STREETS
   - 3.2. NOT EXCEEDING 90m BUSINESS AND INDUSTRIAL STREET.
4. A FIRE HYDRANT IS REQUIRED AT THE END OF A RESIDENTIAL RIGHT OF WAY IF IT IS LONGER THAN 65m.

POTABLE WATER - TYPICAL HORIZONTAL LAYOUTS

TARARUA DISTRICT COUNCIL

Scale NTS

Drawing No: W01

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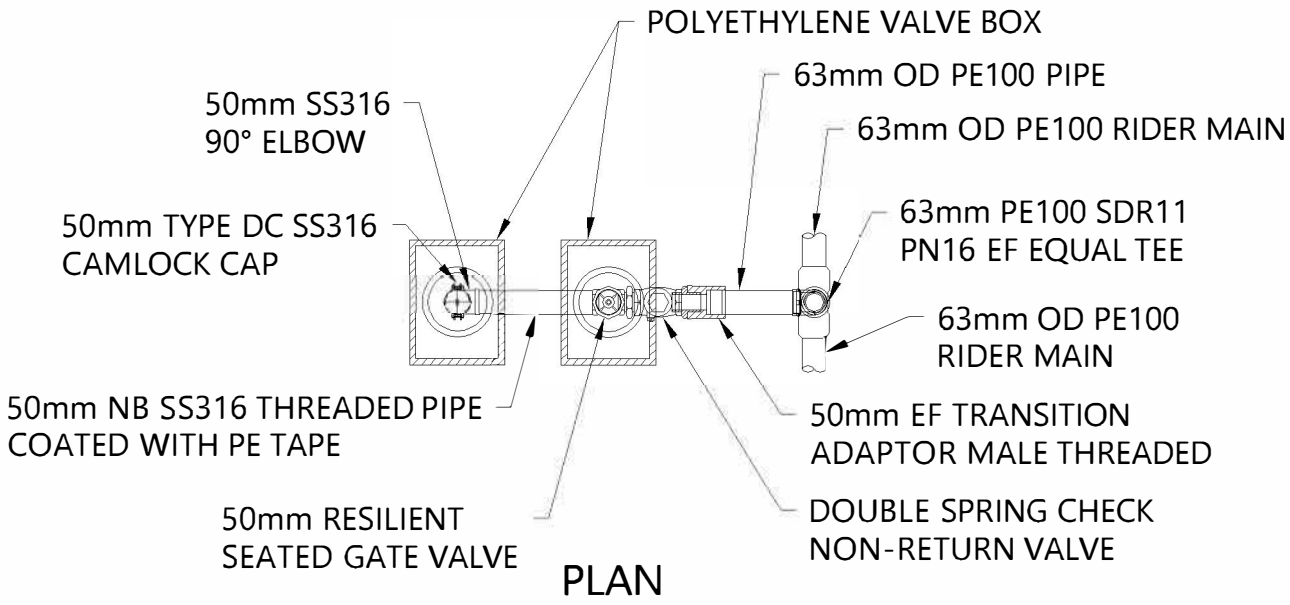
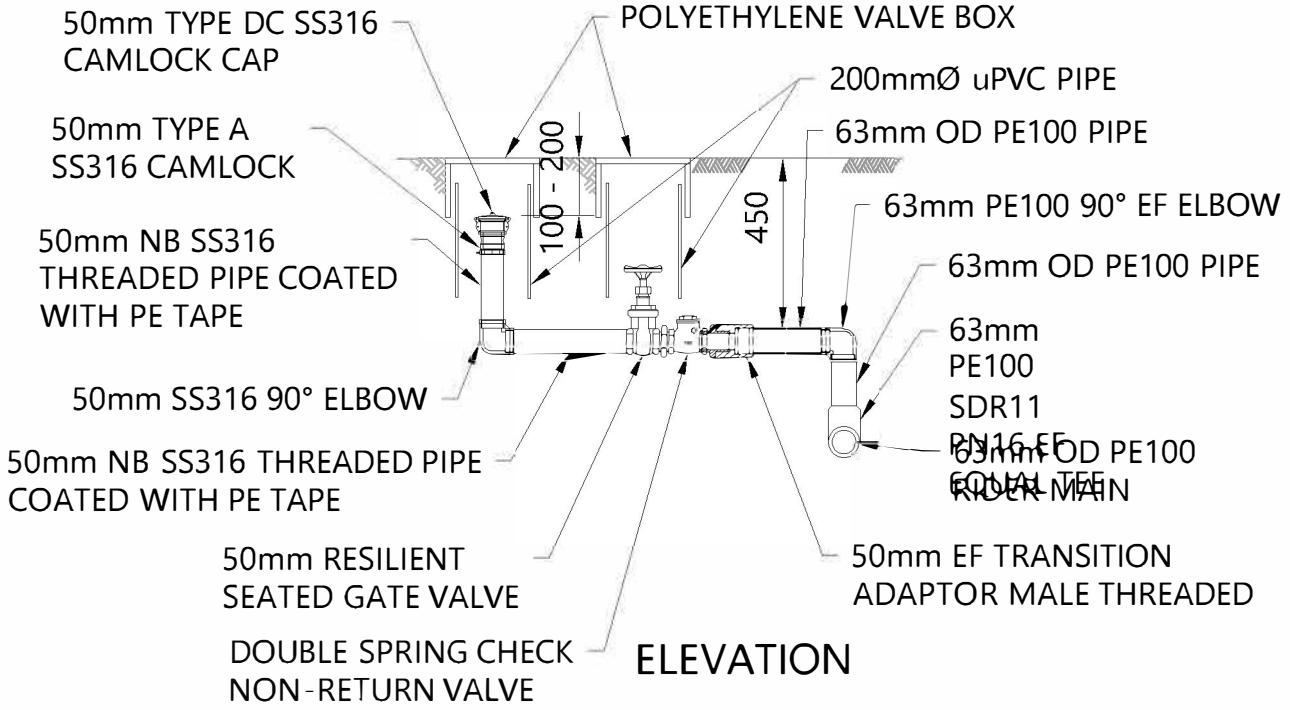
BERM / FOOTPATH



PLAN



ELEVATION

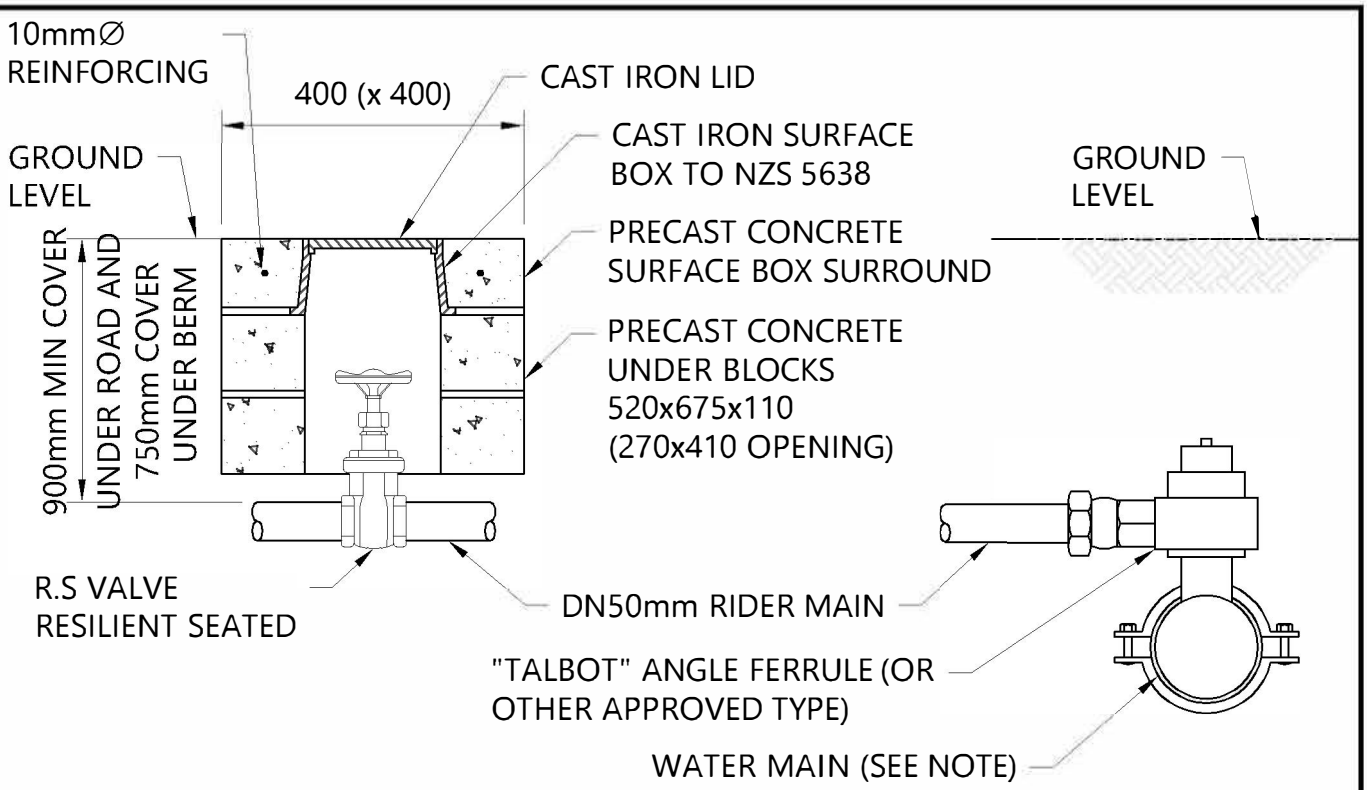
NOTE:

1. ALL FASTENINGS OR FLANGES THAT WILL BE (OR HAVE THE POTENTIAL TO BE), BURIED SHALL BE COATED AND WRAPPED IN THE FULL DENSO SYSTEM (PRIMER, MASTIC, WRAP AND OVER WRAP).

POTABLE WATER - FLUSHING POINT TYPICAL DETAIL

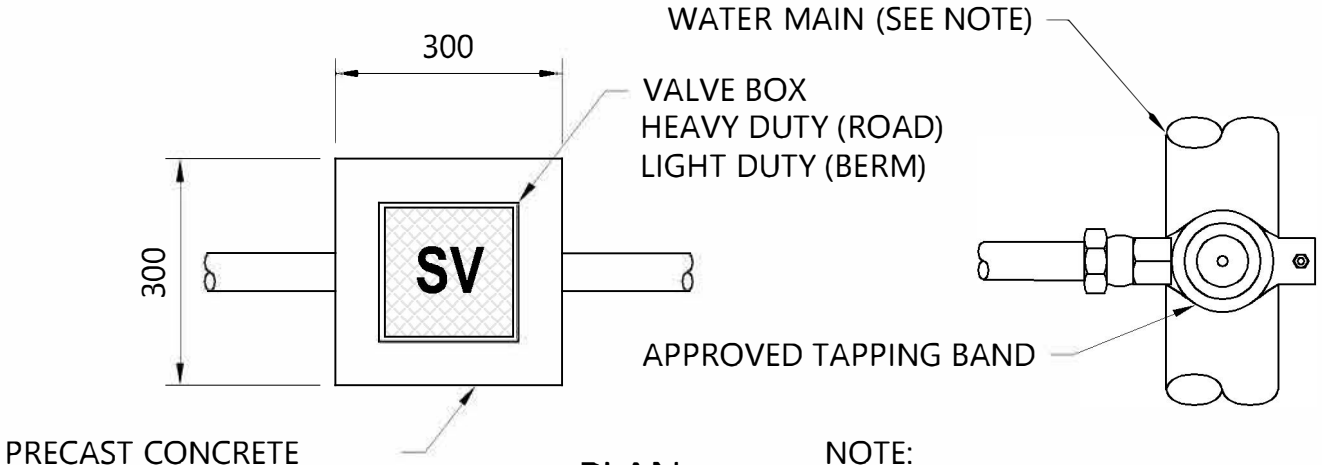
TARARUA DISTRICT COUNCIL

Scale	NTS
Drawing No:	W02
Sheet 22 of 28	



SECTIONAL ELEVATION

NOTE:
NOMINAL SERVICE COVER DEPTH SHOWN ONLY. DEPTH OF COVER TO PIPES TO CONFORM WITH MANUFACTURE'S REQUIREMENTS



PLAN

NOTE:
PRINCIPLE MAIN CONNECTIONS:
150mm AS SHOWN

200mm
225mm
250mm
{ USE GIBAULT JOINT WITH 50mm TAKE OFF PLACED VERTICAL. 90° BEND REQUIRED

POTABLE WATER - RIDER MAIN TYPICAL DETAIL

TARARUA DISTRICT COUNCIL

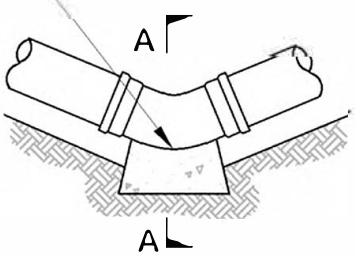
Scale NTS

Drawing No:

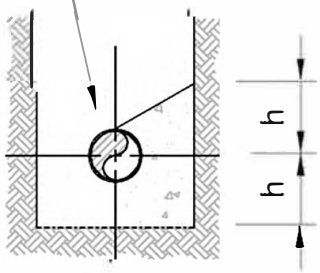
W03

FITTING TO BE PROTECTED FROM CONCRETE WITH POLYETHYLENE SHEET OR APPROVED SIMILAR

NO MORE THAN 180° CONCRETE ENCAPSULATION



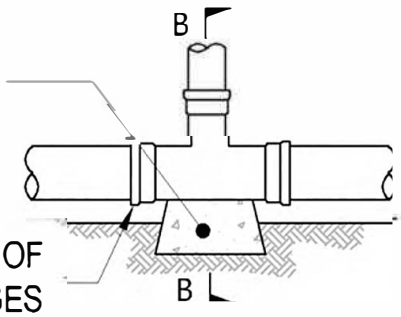
TYPICAL THRUST BLOCK DETAIL ON BENDS - PLAN VIEW



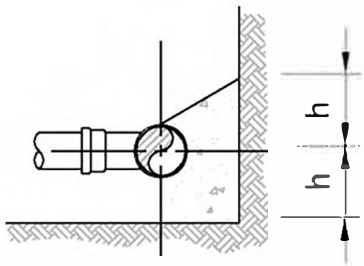
SECTION A-A

MIN. 20 MPa @ 28 DAYS CAST INSITU CONCRETE

CONCRETE TO BE CLEAR OF ALL SOCKETS AND FLANGES



TYPICAL THRUST BLOCK DETAIL ON TEE - PLAN VIEW



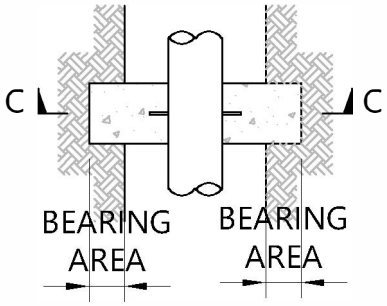
SECTION B-B

POTABLE WATER - THRUST BLOCK DETAIL

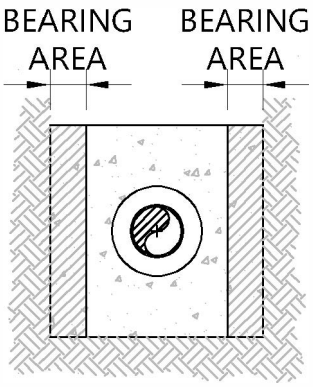
TARARUA DISTRICT COUNCIL

Scale 1:25

Drawing No: W04A



TYPICAL IN-LINE THRUST BLOCK DETAIL - PLAN VIEW



SECTION C-C

FACTOR OF SAFETY = 1.5

THE FOLLOWING FORMULAE CAN BE USED TO CALCULATE MIN. BEARING AREAS:

FOR BENDS = $\frac{AP2\sin(\theta/2)}{SBP}$ m²

FOR END CAPS / TEES = $\frac{AP}{SBP}$ m²

WHERE:

A = AREA OF PIPE (m² : USING OUTSIDE DIA. OF PIPE)

P = TEST PRESSURE OF PIPE (kPa)

θ = ANGLE OF BEND

SBP = SAFE BEARING PRESSURE OF IN SITU SOIL (kPa)

NOTES:

1. THRUST BLOCKS TO BE POURED AGAINST FIRM, CLEAR AND UNDISTURBED NATIVE GROUND.
2. THRUST BLOCKS FOR PIPES >DN300 TO BE SPECIFICALLY DESIGNED.
3. MINIMUM BEARING AREAS MAY BE INCREASED PRO-RATA FOR INCREASED TEST PRESSURES.
4. THRUST BLOCK VOLUMES ARE FOR A 1600kPa TEST PRESSURE. ADJUST VOLUMES FOR HIGHER TEST PRESSURES.
5. MINIMUM COVER TO PIPE SHALL BE 600mm, OR SPECIFIC DESIGN IS REQUIRED.
6. SHALL NOT BE PLACED UNDER WORKING OR TEST LOAD FOR AT LEAST 3 DAYS AFTER POURING, WHERE THIS IS UNAVAILABLE, TOMMING WITH TIMBER STRUTS TO PROVIDE IMMEDIATE THRUST RESTRAINT IS ALLOWABLE IF APPROVED BY COUNCIL.

POTABLE WATER - THRUST BLOCK DETAIL

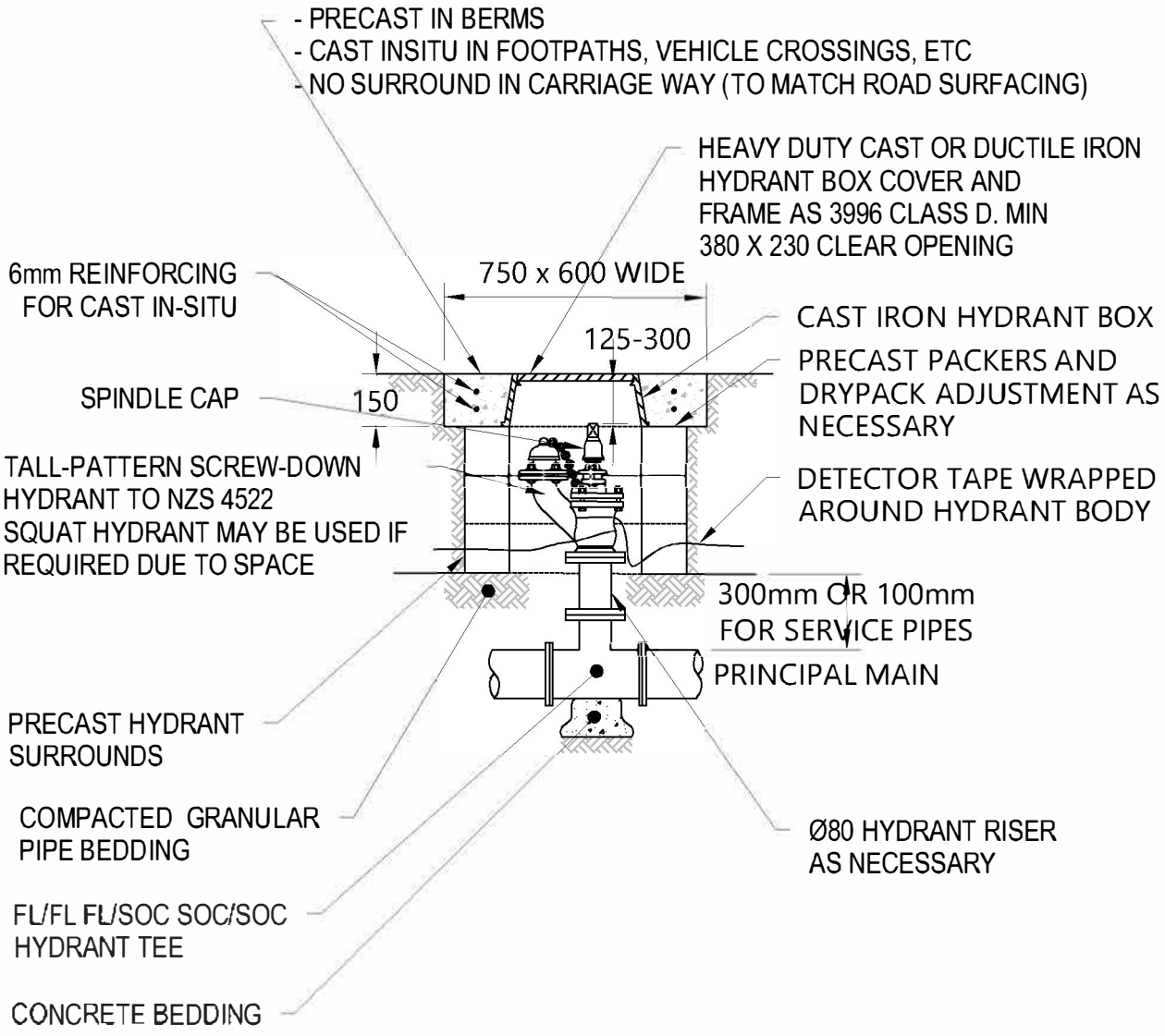
TARARUA DISTRICT COUNCIL

Scale 1:25

Drawing No: W04B

NOTES:

1. MARKING OF HYDRANTS SHALL INCLUDE THE HYDRANT BOX LID, ANY CONCRETE SURROUND AND REQUIRED ROAD MARKINGS.
2. METALLIC DETECTOR / WARNING TAPE TO BE LAID 200 TO 300mm ABOVE ALL BULK, TRUNK, PRINCIPAL AND RIDER MAIN PIPES AND 100mm ABOVE SERVICE PIPES, AND CONTINUE THROUGH HYDRANT ENCLOSURE WHILST MAINTAINING TAP CONDUCTIVITY.
3. ALL FASTENINGS OR FLANGES THAT WILL BE (OR HAVE THE POTENTIAL TO BE), BURIED SHALL BE COATED AND WRAPPED IN THE FULL DENSO SYSTEM (PRIMER, MASTIC, WRAP AND OVER WRAP).

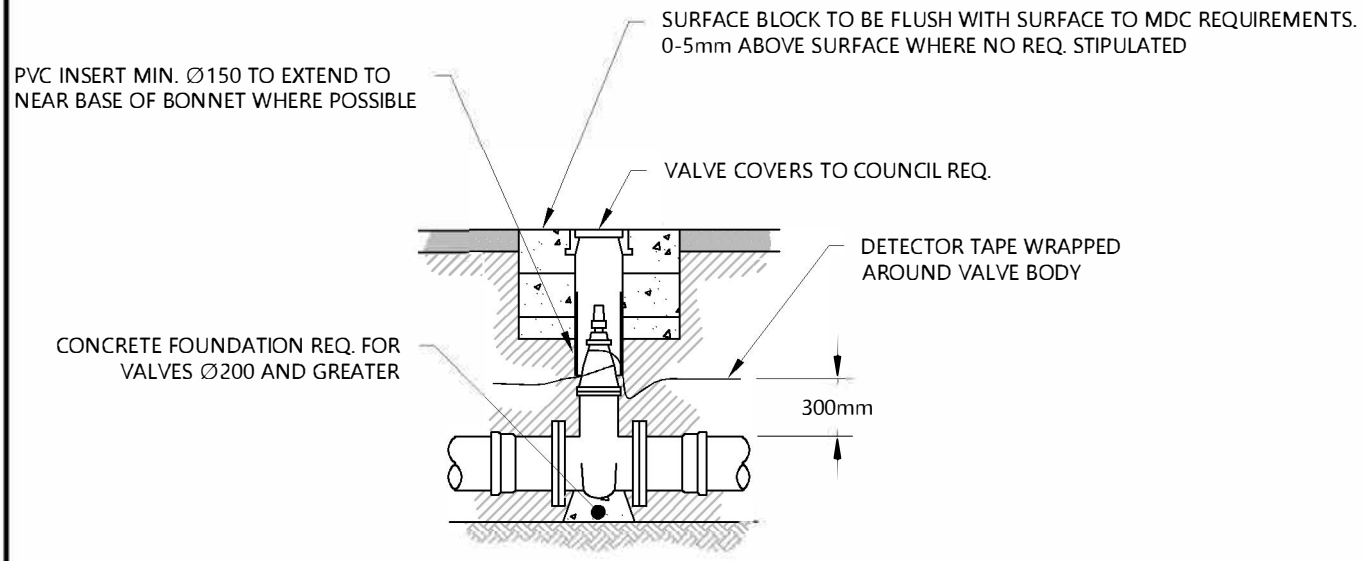


POTABLE WATER - TYPICAL HYDRANT DETAIL

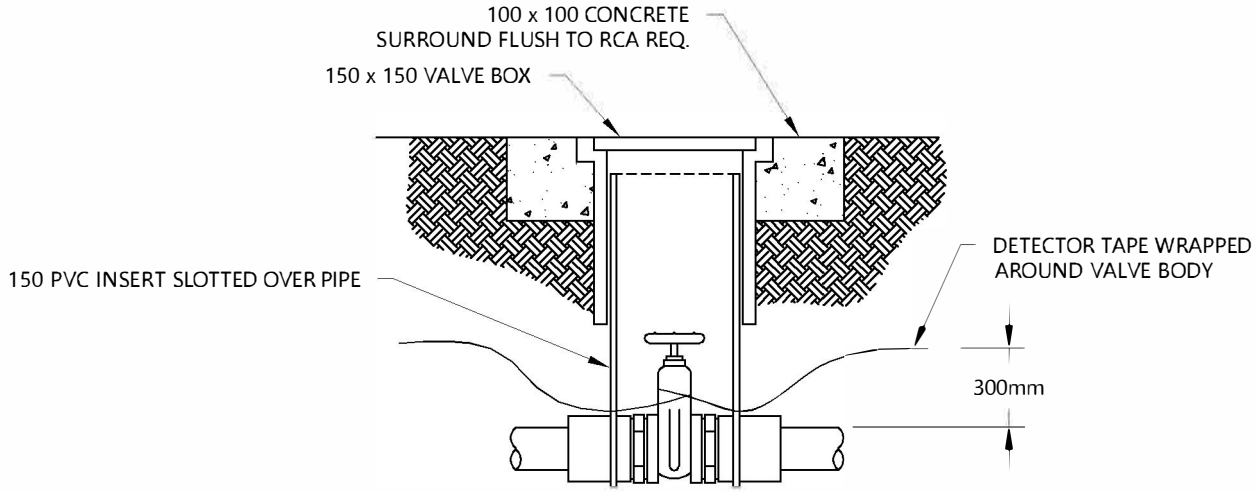
TARARUA DISTRICT COUNCIL

Scale 1:20

Drawing No: W05



GATE VALVES Ø80 AND ABOVE



GATE VALVES Ø50 OR LESS

NOTES:

1. NOMINAL DEPTH OF BETWEEN 100 AND 350mm FROM GROUND LEVEL TO TOP OF GATE VALVE SPINDLE CAP.
2. METALLIC DETECTOR / WARNING TAPE TO BE LAID 300mm ABOVE ALL BULK, TRUNK, PRINCIPAL AND RIDER MAIN PIPES AND 100mm ABOVE SERVICE PIPES AND CONTINUE THROUGH VALVE ENCLOSURE WHILST MAINTAINING TAPE CONDUCTIVITY.
3. THRUST BLOCKS MAY BE REQUIRED FOR VALVES TO SECURE AGAINST LATERAL THRUST WHEN VALVE CLOSED AND MAIN IS DRAINED ON ONE SIDE OF THE VALVE. REFER TO WS14 AND WS03.
4. ALL VALVES SHALL INCLUDE A TAG OR OTHER MEANS TO CLEARLY INDICATE CLOSING DIRECTION.
5. ALL FASTENINGS OR FLANGES THAT WILL BE (OR HAVE THE POTENTIAL TO BE), BURIED SHALL BE COATED AND WRAPPED IN THE FULL DENSO SYSTEM (PRIMER, MASTIC, WRAP AND OVER WRAP).

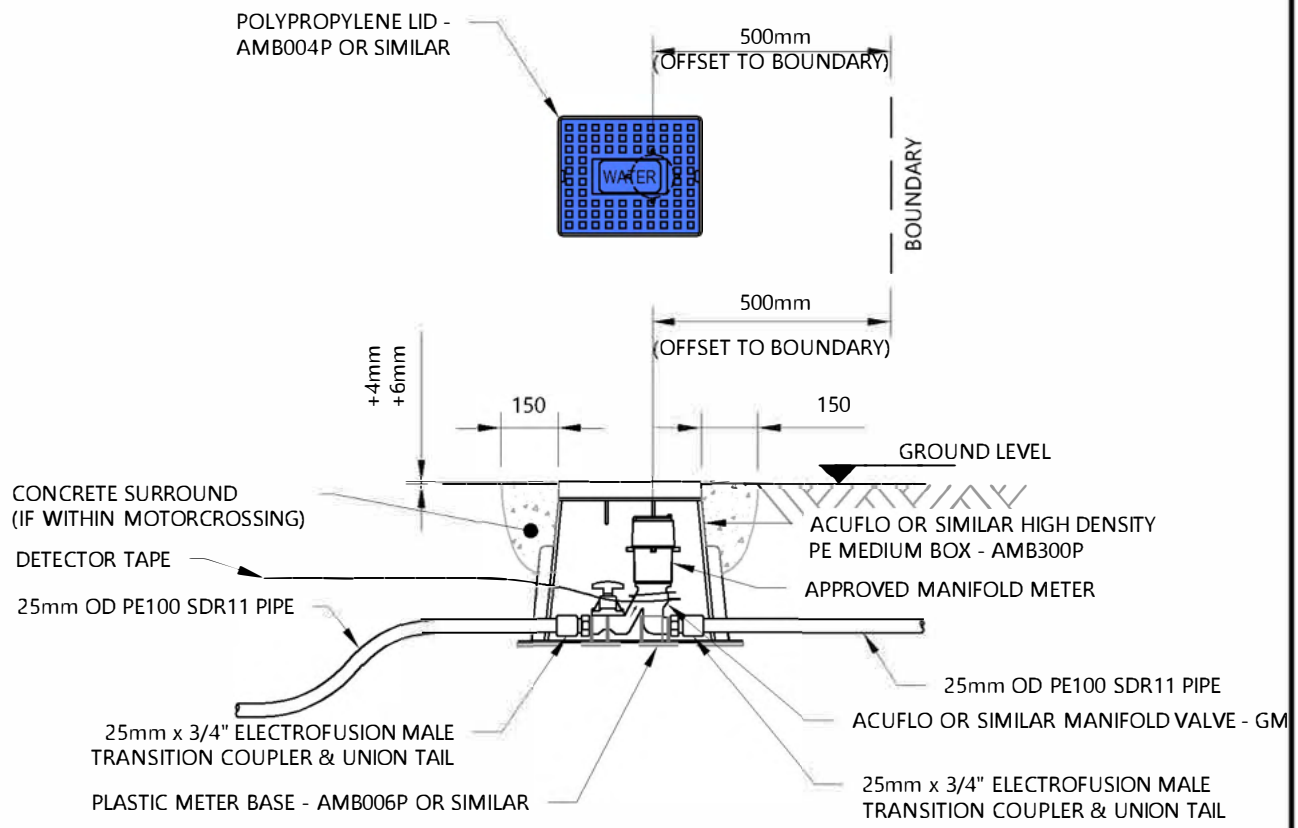
POTABLE WATER - TYPICAL VALVE DETAIL

TARARUA DISTRICT COUNCIL

Scale 1:25

Drawing No:

W06



NOTES:

1. VALVE AND METER SHALL BE INSTALLED IN THE ROAD RESERVE OUTSIDE THE PROPERTY SERVICED.
2. VALVE BOX SHALL BE SET UP AT RIGHT ANGLES TO THE PROPERTY BOUNDARY.
3. VALVE BOX SHALL HAVE PLASTIC BASE CORRECTLY INSTALLED AND FITTED.
4. SERVICE VALVE SHALL BE INSTALLED OUTSIDE OF THE VEHICLE CROSSING.
5. WHERE THE SERVICE VALVE CANNOT BE INSTALLED OUTSIDE OF THE VEHICLE CROSSING THE VALVE AND METER SHALL BE INSTALLED IN AN APPROVED CAST IRON BOX COMPLETE WITH CONCRETE PACKER BLOCKS, SIZE OF BOX MUST BE SUFFICIENT TO ENABLE METER TO BE SERVICED WITHIN BOX.
6. FOR NEW CONNECTIONS, A MINIMUM OF 1m SERVICE PIPE TO BE PROVIDED ON THE CUSTOMER SIDE OF THE MANIFOLD. THIS SERVICE SHALL BE SECURE PLUGGED.
7. SERVICE SHALL BE CLEARLY MARKED AS PER THE REQUIREMENTS OF THE REGIONAL SPECIFICATION FOR WATER SERVICES.
8. WHERE THE EXISTING SERVICE PIPE IS NOT AT THE CORRECT DEPTH THE SERVICE PIPE SHALL BE RELAID EITHER SIDE OF THE REPLACEMENT BOX AND VALVE.
9. WHERE THE VALVE BOX IS INSTALLED IN THE FOOTPATH SHALL BE SURROUNDED BY NOT LESS THAN 150mm OF LOW STRENGTH CONCRETE SO THAT COMPACTION OF BACKFILL MATERIAL DOES NOT RESULT IN DEFORMATION OF THE BOX WALL.
10. WITH REGARDS TO POLYETHYLENE PIPES DN MEANS OUTSIDE DIAMETER.
11. DETECTOR TAPE TO BE INSTALLED ABOVE SERVICE PIPE ARRANGEMENT, UP TO THE METER BOX.

POTABLE WATER - BOUNDARY KIT DETAIL

TARARUA
DISTRICT COUNCIL

Scale NTS

Drawing No:

W07

Sheet 28 of 28