Chapter 6

Wastewater

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INTRODUCTION

6 PURPOSE

The purpose of this section is to outline Council's requirements for the provision of wastewater reticulation. The Standards aim to provide for the collection and disposal of wastewater to a Council-owned treatment and disposal facility. The reticulation must address health and safety, water quality and whole-of-life efficiency and effectiveness, regardless of the size and scale of development.

6.1 Performance Outcomes

Performance outcomes for wastewater network assets sought by these standards are set out below. They are subject to the objectives, policies and rules of the Nelson and Tasman RMPs:

a) Wastewater reticulation that ensures human health and safety;

b) Connectivity to or compatibility with existing networks;

c) Reticulation that allows for future development within the catchment or adjoining catchments;

d) Reticulation that provides individual connection for all newly created allotments;

e) Reticulation that is affordable, including maintenance and operations, replacement and renewal costs of the whole-of-life of the system;

f) Accessibility for maintenance and repair works, with a minimum of disruption;

g) A system that avoids ingress and egress from stormwater drainage.

All performance outcomes are also subject to the applicable RMP objectives and policies and appropriate wastewater supply bylaws, which take precedence over the requirements of the Nelson Tasman Land development Manual (NTLDM).

6.2 Referenced Documents

6.2.1 Regional Plan Requirements

The standards set out in this chapter address matters that are specific to Council asset creation or activities that may have an impact on an asset. They are subject to the respective Nelson and Tasman RMPs. Key sections of the Plans that may be relevant to wastewater management asset design and construction are subdivision and discharge provisions.

6.2.2 Building Consent

As well as the requirements of the NTLDM, the Building Act and NZ Building Code (NZBC) requirements also apply to individual connections to Council's wastewater reticulation. A building consent application is required and is to be supported with the appropriate plans and specifications (Section 45 of the Building Act 2004). These must demonstrate compliance with the performance requirements of NZBC clause G13 ("foul water").

The information required includes, but is not limited to, the size, fall (gradient) and setting out of the proposed drainage, details of access points for maintenance, provision for ventilation and proximity to any buildings.

6.2.3 External Standards

Unless otherwise specified within the standards of this document, wastewater networks will be designed and constructed in a manner consistent with the standards set out in Table 6-1. Where an Act or National Standard document is referenced, this will be the current version including any associated amendments.

Table 6-1 Wastewater Standards

Standard	Comment
AS/NZS 1260	PVC-U Pipes and fittings for drain, waste and vent applications
AS/NZS 2032	Installation of PVC pipe systems
AS/NZS 2566	Buried flexible pipelines – Structural design and Installation
AS/NZS 4158	Thermal-bonded polymeric coatings on valves and fittings for water industry purposes
AS/NZS 4998	Bolted unrestrained mechanical couplings for waterworks purposes
AS/NZS 2280	Ductile iron pipes and fittings
AS/NZS 4441	Oriented PVC (PVC-O) pipes for pressure applications
NZS 4442	Welded steel pipes and fittings for water, sewage and medium pressure
AS/NZS 1477	PVC Pipes and fittings for pressure applications
AS 1646	Elastomeric seals for water works purposes
AS/NZS 4058	Pre-cast concrete pipes (pressure and non-pressure)
AS/NZS 3725	Design for installation of buried concrete pipes
AS/NZS 4130	Polyethylene (PE) pipes for pressure applications
AS/NZS 5065	Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications
BS 3412	PE materials for moulding and extrusion
AS/NZS 2033	Installation of polyethylene pipe systems
AS 3572	Glass filament reinforced plastics
AS 3996	Access covers and grates
NZS 7643	Code of Practice for the installation of unplasticized PVC pipe systems
NZS 3109	Concrete construction
NZS 3121	Water and aggregate for concrete
NZS 4404	Land development and subdivision infrastructure
AS/NZS 1547 AS/NZS 1546	On-site domestic-wastewater management
www.astt.com. au	Australian Society of Trenchless Technology

Standard	Comment
Ministry of Business, Innovation & Employment	NZ Building Code - G13, G14 and B2
Water New Zealand	NZ Infiltration and Inflow Control Manual New Zealand Pipe Inspection Manual 3rd edition
Bylaw	Nelson City Council and Tasman District Council Wastewater Bylaw (current at the time of development)

STANDARDS

6.3 Reticulation Design

This section sets out Council's expectations for general design standards for wastewater reticulation, including private connections, trade waste and reticulation layout.

Mandatory Matters

Council requires the following standards to be met in the design of the wastewater supply reticulation.

6.3.1 General

6.3.1.1 Wastewater disposal will be provided to every lot by means of a connection to a reticulated wastewater system.

6.3.1.2 All systems will be designed to accommodate the flow from upstream of the subdivision or development and will be of sufficient capacity to provide for maximum flow from possible future development.

6.3.1.3 The Designer will eliminate retention of wastewater in piped systems and potential for wastewater to become anaerobic and produce gases by:

a) making use of adequate grades for self-cleansing and slime control;

b) avoiding use of wastewater pumping stations where possible;

c) ensuring adequate ventilation of stale wastewater; and

d) avoiding any unnecessary turbulence at junctions and changes in grades, particularly where rising mains enter the gravity system at drop junctions.

6.3.1.4 In specific circumstances, individual lot low-flow pressure pumping systems that comply with Council's requirements will be permitted.

6.3.1.5 Under no circumstances will wastewater reticulation be connected to stormwater reticulation or drains.

6.3.1.6 Wastewater reticulation will be provided for the full length of each new road/street, unless approved otherwise by Council.

6.3.1.7 Under no circumstances will glue joints be permitted to be used in jointing straight lengths of pipe.

6.3.2 Connections

6.3.2.1 Council responsibility does not extend to private connections within the lot, private pumping systems and rising mains, which remain the responsibility of the users they serve.

6.3.2.2 No new reticulation is to be connected to Council existing operational reticulation unless the new reticulation has been checked and is free of all debris materials.

6.3.2.3 In all subdivisions, a 100mm minimum diameter wastewater connection will be provided to at least 1.0m inside the boundary of every lot with an inspection tee installed on the road side of the boundary - before it connects to the private sewer lateral.

6.3.2.4 Wastewater laterals, pipes and end caps will be painted red (stormwater will be painted green), see SD611 for the inspection tee at the boundary.

6.3.2.5 The end of each lateral will be marked by a 75mm x 25mm ground-treated marker stake suitably identified and partly painted red.

6.3.2.6 Pipes will be laid to achieve a minimum cover of 600mm at the boundary and be deep enough to provide gravity service from the building site.

6.3.2.7 Each connection will be adequate to serve the lot and to have a self-cleansing velocity flowing full.

6.3.2.8 The minimum lid level of any gully trap for all new dwellings will not be less than 150mm above the lid level of the manhole on the public wastewater sewer immediately upstream of the lateral connection.

6.3.2.9 To be classified as public wastewater, reticulation must be inspected, approved and designated as such by Council.

6.3.3 Trade Waste

6.3.3.1 Any proposal to discharge contaminated stormwater to the wastewater network will require a Trade Waste application.

6.3.3.2 To ensure uncontaminated stormwater does not enter the wastewater system, any area being served by the silt and oil trap must be roofed and have a low bund around the perimeter with a minimum height of at least 50mm.

6.3.3.3 For premises where food is prepared, a grease trap will be provided. The grease trap will meet the requirements of the New Zealand Building Code G13 acceptable solution 2 type in ground grease trap.

6.3.3.4 An application to Council for a Trade Waste approval will be required. Building consents are required for all works together with a monitoring programme.

6.3.3.5 In respect of Trade Waste, Council will be notified if the premises changes discharge practices.

Good Practice

The following matters provide additional direction and guidance in the design of the wastewater supply reticulation.

6.3.4 General

6.3.4.1 Increased use of an existing wastewater reticulation may require upgrading of a downstream-reticulation to prevent surcharging of the network.

6.3.4.2 Ventilation of reticulation manholes and pumping stations may be required.

6.3.4.3 In certain circumstances glue joints may be permitted on fittings with the written approval of the Engineer.

6.3.4.4 In some locations, a gravity connection may not be possible and the discharge may have to be pumped to the wastewater reticulation. This will require specific design showing the pumping system discharging into a chamber before entering the gravity connection point and approval via a building consent.

6.3.5 Stormwater

6.3.5.1 To prevent stormwater from entering the wastewater system, an appropriate mechanically or electronically operated wastewater diversion system may be required.

6.4 Layout and Alignment of Reticulation

This section sets out Council's expectations for the location of wastewater services and includes standards that relate to wastewater in road reserve, private property, easements and the crossing of other services.

Mandatory Matters

Council requires the following standards to be met in the layout and location of wastewater reticulation:

6.4.1 General

6.4.1.1 Wastewater reticulation will be aligned within public areas such as roads wherever possible.

6.4.2 Reticulation in Roads

6.4.2.1 Wastewater reticulation in roads will be aligned parallel to kerb lines within the carriageway to ensure that they do not clash with other services or occupy the full carriageway width.

6.4.2.2 Wastewater manholes will not be located adjacent to kerb and channel or at low points in the finished ground surface to minimise the possibility of surface water infiltration into the wastewater system.

6.4.2.3 Adequate clearance from other services and kerb lines will be maintained to allow for:

a) Excavation on existing services;

b) The future relaying of the drains; and

c) The provision of additional future services.

6.4.2.4 In curved roads, reticulation will generally follow the road alignment in straight lines on such alignment that the reticulation does not occupy the full carriageway width.

6.4.3 Reticulation through Private Property

6.4.3.1 The catchment area to be served by public wastewater reticulation aligned through private property will be kept to an absolute minimum.

6.4.3.2 In planning the layout of wastewater reticulation through private property consideration will be given to preserving access to the pipelines for:

a) Maintenance purposes;

b) Preserving the route for relaying the reticulation in the future; and

c) Avoiding likely positions for buildings, garages, carports and retaining walls.

6.4.3.3 Where, as part of a subdivision or development, existing and/or proposed public wastewater reticulation will be located in private property, an easement will be required in favour of the Council.

6.4.4 Easements for Wastewater Reticulation

6.4.4.1 The width of easement will be central on the centre line of the reticulation and calculated as the general easement width of 3m, plus the diameter of the pipe and the pipe depth of the excavation. (Or at the discretion of the Engineering Manager)

6.4.4.2 The standard wording required on the Easement Document will be:

"Memorandum Easement in Gross will be provided in favour of the respective Council to convey sewage in a pipe and to provide unrestricted access along the line of the pipe for maintenance and renewal work."

6.4.5 Crossing other services

6.4.5.1 Diagonal crossing of other services, including kerb lines and boundaries or fence lines, at acute angles less than 45 degrees will be avoided wherever possible.

Good Practice

The following matters provide additional direction and guidance in the layout and location of wastewater reticulation:

6.4.6 Alignment of Reticulation

6.4.6.1 The preferred alignments of Wastewater reticulation on private property is:

a) Within rights-of-way (RoWs) or driveways;

b) Outside probable building envelopes (northern side of dwelling);

c) Clear of fence lines and kerb lines;

d) Adjacent to boundaries; and/or

e) Parallel to boundaries.

6.5 Pipe Design

This section sets out Council's requirements for design of wastewater supply reticulation pipes.

Mandatory Matters

Council requires the following standards to be met in the design of all pipe work that makes up the wastewater reticulation:

6.5.1 Pressure Reticulation Pipe Material

6.5.1.1 All public pressure wastewater reticulation will be PE 100 pipes complying with AS/NZS4130. All pressure reticulation should be subject to specific design for cyclic dynamic stresses (fatigue), in selection of pipe pressure class and complying with PIPA Technical Guidelines: POP010A Polyethylene Pipes – Design for dynamic stresses; and POP010B Fusion Fittings for use with Polyethylene Pressure Pipes – Design for Dynamic Stresses.

6.5.1.2 For pressure sewer rising mains, the design will consider GRB to AS 3571.1, or PVC-O to AS/NZS4441. These products are not subject to or highly resistant to fatigue and are commonly used internationally for this purpose.

6.5.2 Calculation of Flow

6.5.2.1 The parameters for calculating the design flow from residential catchments are:

a) Average dry weather flow (ADWF) = 225 litres per day per person;

b) Number of people per dwelling = 2.5;

c) Dry weather diurnal peaking factor (PF) = 2;

d) Dilution/infiltration factor for wet weather = 3;

e) Therefore, the peak wet weather flow (PWWF) is equivalent to 6 times the ADWF;

f) Flows should be based upon an 18-hour day.

6.5.3 Area/Zoning Coefficients

6.5.3.1 For catchments of mixed zones or where the number of potential dwellings is not known, wastewater flows will be calculated using the area/zoning coefficients given below in Table 6-2. The 'area' is that area within a zone comprising lots, roadways, esplanade reserves and neighbourhood parks. Major reserves will be excluded.

6.5.3.2 Where more than one zone contributes to the wastewater reticulation to be designed, the wastewater discharge from each zone will be calculated using the individual zone area multiplied by the appropriate discharge per hectare as for the total catchment area (not the individual zone area).

6.5.3.3 The total catchment discharge is the sum of the individual zone discharges as calculated above.

Table 6-2 Wastewater Area/Zoning Coefficients

Sewage Discharge Coefficients (Litres Per Second Per Hectare)					
Residential Zone	**Total Catchment Area (hectares)**				
	0 to 2	Over 2 to 8	Over 8 to 80	Over 80 to 200	Over 200
Low Density	0. 81	0. 69	0. 58	0. 45	0. 32
Normal/Standard Density	0. 94	0. 81	0. 68	0. 53	0. 38
High Density	1. 08	0. 96	0. 84	0. 65	0. 47

Note: The catchment area is defined as the total gravity catchment upstream of the point being considered.

6.5.4 Pipe Size for Gravity Sewer

6.5.4.1 The minimum permissible diameter for new wastewater reticulation aligned in the road reserve will be 150mm.

6.5.4.2 The minimum permissible diameter for all other new wastewater reticulation is 150mm except as detailed below.

6.5.4.3 When an Infill Subdivision, Development, or Cross Lease Subdivision (hereinafter referred to as Infill Development) occurs in an area served by an existing 100mm diameter wastewater drain, it will be upgraded to 150mm diameter to the lesser requirement as follows:

a) From the point in the wastewater reticulation where there are a maximum of five residential units being served by the 100mm diameter wastewater drain downstream until the reticulation is at least 150mm diameter;

b) From the point of connection of the property being developed downstream until the reticulation is at least 150mm diameter;

c) Where 100mm diameter - wastewater reticulation is required to be upgraded to 150mm diameter or where it is proposed to lay 100mm diameter wastewater reticulation, an Engineering Drawing including the longitudinal section will be provided.

6.5.4.4 Where infill development results in the existing private drain becoming public wastewater reticulation, the existing pipe will be:

a) Pressure and CCTV tested to prove that it is sound to the satisfaction of the Engineering Manager where it is 150mm or larger, or re-laid;

b) Surface opening access points will be required at every change in direction or change in grade. In general, the minimum access point will be a rodding point but inspection bends, mini-manholes or standard 1050mm diameter manholes may be required in appropriate circumstances.

6.5.5 Reuse of Existing Service Connections

6.5.5.1 A proposal to reuse an existing service will only be approved if the service is of adequate size and condition and one of the following conditions applies:

a) It can be established that the service is less than 40 years old and Pressure and CCTV tested to prove that it is sound to the satisfaction of the Engineering Manager and has adequate surface opening access points along its length

b) The service is to continue supplying the same building that it was originally intended for, and no others;

6.5.5.2 This policy applies only to the Council portion of the wastewater lateral ie. from the reticulation up to the Boundary inspection.

6.5.6 Disconnections

6.5.6.1 Redundant services will be disconnected from the Wastewater reticulation by Council's approved contractor at the main reticulation.

6.5.6.2 The service fitting lateral will be removed or plugged at the connection to the Wastewater reticulation. All cost associated with the disconnection will be recovered by Council from the landowner requiring the disconnection.

6.5.7 Grades and Velocities

6.5.7.1 All wastewater reticulation will be designed to utilise velocity and flow characteristics to improve hydraulic performance and minimise settlement of solids and future maintenance costs.

6.5.7.2 The same roughness factor will be adopted for all pipe materials to account for sewer slimes, grit deposits and other in situ variables such as construction performance and pipeline deterioration with age.

Table 6-3 Minimum Velocity and Grade Requirements

Internal Diameter	Residential Units Served	Minimum Grade	Minimum Velocity Flowing Full
150mm	1–5	1. 25% - 1-in-80	1. 0m/s
150mm	6–10	1. 00% - 1-in-100	0. 9m/s
150mm	11–19	0. 80% - 1-in-125	0. 8m/s
150mm	20–150	0. 67% - 1-in-150	0. 75m/s
>150mm	Specific design	Specific design	0. 75m/s

Note:

Data presented in Table 6-3 approximates a pipe roughness equivalent to ks = 1.5mm for the "Colebrook White" formula or "rough concrete" for the Mears Water Flow Calculator.

6.5.7.3 Submission of catchment flow plans and calculations will be required on submission of the design plans for all reticulation serving more than 150 residential (or equivalent) units, or where the minimum grades and flows do not comply with Table 6-3.

6.5.8 Pipe Cover

6.5.8.1 Generally shallow wastewater reticulation, less than 1.2m in depth, will be avoided. Shallow wastewater reticulation limits the area which may be adequately serviced and limits the surcharge capacity in the case of blockage before overflow occurs.

6.5.8.2 Pipe systems will be designed to ensure the minimum cover over the barrel as set out in Table 6-4.

Table 6-4 Minimum Cover

Location of Drain	Minimum Cover for All Pipes
Areas subject to highway traffic loading eg. within road carriageway	750mm
Areas subject to light traffic loading outside road, eg ROWs, driveways, carparks and berms	600mm

6.5.8.3 Minimum cover may be reduced providing the reticulation is concrete encased for concrete pipes and concrete capped for PE/PVC and subject to the Councils' approval.

6.5.8.4 Where reticulation with inadequate cover requires concrete protection, this will be constructed in compliance with a specific design to the Engineering Manager's approval.

6.5.8.5 To avoid reflective cracking of pavements and differential settlement, concrete protection will not be permitted to penetrate the basecourse or pavement construction.

6.5.8.6 No concrete protection will be placed around the reticulation until the line has been inspected and approved by the Council. Reticulation testing will be undertaken after the concrete protection has been completed.

6.5.8.7 Reduced cover on reticulation may be approved without additional concrete protection providing the appropriate class of pipe is specified and cover is according to the pipe manufacturer's specification.

6.5.8.8 Wastewater reticulation will be no deeper than 2.5m below finished ground levels.

Good Practice

The following matters provide additional direction and guidance in the design of all pipe work that makes up the wastewater reticulation:

6.5.9 Gravity Pipe Material

6.5.9.1 Wastewater gravity sewers should be rubber ring jointed uPVC pipes and fittings complying with AS/NZS 1260 and laid in 6.0m lengths. Pipe stiffness should be in accordance with Table 6-5. ('Sandwich Construction PVC pipes are not approved for use).

6.5.9.2 PE (polyethylene) pipe complying with AS/NZS 5065 may be used in specific circumstances (eg. for sleeving or relining existing wastewater gravity sewers) with the approval of the Engineering Manager. PE wastewater pipes will be black with white liner.

6.5.10 Calculation of Flow

6.5.10.1 In the majority of cases 150mm diameter reticulation wastewater reticulation may be provided without calculation provided that the Council can be satisfied that not more than 150 sections (or residential equivalent) will be served by this reticulation and that the reticulation is laid to the approved gradient as per Table 6-3.

6.5.10.2 The design flow comprises domestic wastewater, industrial wastewater and infiltration of stormwater.

Table 6-5 Pipe Stiffness Required for uPVC Pipe for Gravity Applications

uPVC Pipe	Public Wastewater Reticulation	Private Wastewater Drains
DN 100mm	SN 10	SN 6
DN 150mm	SN 8	SN 4
DN 175mm and larger	SN 8	SN 4
depths greater than 2.5m	Specific design to AS/NZS2566 design method	
wheel loads > 96 kN	Specific design to AS/NZS2566 design method	

6.5.11 Wastewater Area/Zoning Coefficients

6.5.11.1 In reference to Table 6-2 (Wastewater Area/Zoning Coefficients), the following matters apply:

a) Several trunk gravity mains discharging into one pump station should be considered as separate catchments;

b) Discharge rates from pump stations may be accumulated but their catchment areas should not be accumulated; and

c) Industrial and commercial areas should be treated as Residential Normal Density unless a greater rate of discharge is known.

6.5.12 Grades and Velocities

6.5.12.1 Where velocity limits (Table 6-3) cannot be complied with, additional works may be required in order to obtain satisfactory operation of the system.

6.5.12.2 The recommended minimum grade for a 100mm wastewater sewer is 1-in-60, which allows for improved hydraulics and minimises future maintenance cost on the line. Flatter grades, not less than 1-in-120, may be permitted where steeper grades are not practical, and only with the written approval of the Engineering Manager.

6.5.13 Pipe Cover

6.5.13.1 Reticulation required at a depth greater than 2.5m (Table 6-5), will require the written approval of the Engineering Manager, and to the specific design criteria, approved by the pipe manufacturer.

6.6 Seismic Design and Liquefaction

This section outlines additional design consideration to address earthquake damage risk and liquefaction.

Mandatory Matters

Council requires the following standards to be met in reticulation design that addresses seismic and liquefaction risks:

6.6.1 General

6.6.1.1 All pipes and structures will be designed with adequate flexibility and provisions to minimise risk of damage during earthquakes.

6.6.1.2 Specially designed flexible joints will be provided at all junctions between pipes and rigid structures (such as reservoirs, pump stations, bridges, and buildings) in natural or made ground.

6.6.1.3 In liquefiable or lateral spread prone areas, a geotechnical investigation will be required. The geotechnical investigation will need to assess the potential of the ground to liquefy under seismic loading and assess the likely effects of liquefaction or lateral spread on buried infrastructure. The potential effect of large scale changes in grade and reduced levels of gravity

pipes, and structures, from seismic induced ground movement will be required. The assessment will be conducted in accordance with New Zealand Geotechnical Society guidance: Guideline for the identification, assessment and mitigation of liquefaction hazards.

Good Practice

The following matters provide additional direction and guidance in reticulation design that addresses seismic and liquefaction risks:

6.6.2 General

6.6.2.1 Historical experience in New Zealand earthquake events suggests that suitable pipe options, in seismically active areas, may include rubber ring joint PVC pipes, or PE pipes.

6.6.2.2 Piped infrastructure is not generally designed for a particular seismic event but rather for optimum resilience under seismic loading.

6.7 Access points

This section outlines standards for the design of manholes, rodding points and inspection points.

Mandatory Matters

Council requires the following standards to be met in the design and location of access points within the wastewater reticulation:

6.7.1 Concrete Manholes

6.7.1.1 Manholes will conform to SD601 to SD607 unless other detailed drawings are approved by Council.

6.7.1.2 Manholes must be designed to resist uplift especially in areas where high ground water is experienced.

6.7.1.3 Where there is a likelihood of groundwater accumulating around the manhole and where drainage of the wastewater trench, as per SD61e is unable to be provided, an approved prefabricated plastic manhole such as the Smart PitTM will all be installed, see section 6.7.2.

6.7.1.4 Manholes are to be located in the road carriageway, preferably at the centreline of the road but no closer than 2.0m to kerb and channel, to minimise inflow from stormwater flowing down the road/street. Manholes maybe permitted on the grass berm or footpath provided that the fall is towards the road kerb and channel.

6.7.1.5 Manholes will be required in the following locations:

a) At least every 100m of pipe run (ie to ensure there is no greater than 100m of pipe length between manholes);

b) At change of pipe diameter grade and direction;

c) At junctions of main reticulation;

d) At least 2.0m away from adjacent kerb and channel; and

e) Manholes are to be located clear of traffic lanes.

Note: For hillside situations, see also 6.7.3.

6.7.1.6 A uniform and continuous fall will be provided along the invert of the channels through the manhole of not less than 50mm between the invert of the inlet pipe and the invert of the outlet pipe.

6.7.1.7 The opening of a manhole (other than a mini-manhole) will have a minimum clear opening diameter of 600mm.

6.7.1.8 Access covers and frames for standard 1050 diameter manholes or larger will be heavy duty ductile iron manhole covers and frames with Class E strength classification to AS 3996 and complying with SD605 and SD606. Hinged lids will be aligned to close (if open) when driven over by a passing vehicle.

6.7.1.9 Manhole rungs or ladders will not be installed in manholes.

6.7.1.10 Shallow mini-manholes will be in accordance with the requirements set out on SD603 and SD604 or a proprietary PVC or polypropylene moulded product approved by Council.

6.7.2 Thermoplastic Manholes

6.7.2.1 The Council permits the use of thermoplastic manholes in place of concrete manholes subject to the following:

a) The manholes must be designed, tested and approved to BS EN 13598-2 ‘Plastics piping systems for non-pressure underground drainage and sewerage. Plasticised poly (vinyl chloride) (PVC-U), polypropylene (PP) and polyethylene (PE). Specifications for manholes and inspection chambers in traffic areas and deep underground installations; and,

b) The manholes must be installed to the manufacturer’s recommendations.

6.7.3 Rodding Points (Lamphole Cleaning Eyes)

6.7.3.1 Rodding points will be used in the following circumstances:

a) Installed on straight pipe on straight grades;

b) At a maximum spacing of 50m;

c) At the head of a wastewater reticulation; and

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

Note: buried preformed inspection bends maybe used in lieu of rodding points where a change in direction or grade is closer than 20m from a rodding point or manhole.

6.7.3.2 Vertical inspection pipework is to be 100mm diameter on a 100mm diameter rodding eye, on 150mm diameter and larger the vertical inspection pipework is to be 150mm diameter.

6.7.3.3 For details of rodding points see SD608, SD609 and SD610.

6.7.3.4 At the Engineering Manager’s discretion one rodding point can be used before another manhole on hillside developments. This can be increased to two rodding points dependent on the grade of the pipelines.

6.7.4 Inspection 'T'

6.7.4.1 An Inspection 'T' as per SD611 will be installed on all private laterals within road reserve or as close as practical to the connection 'y' within private property. The inspection 'T' will be positioned 150mm from the road boundary.

Good Practice

The following matters provide additional direction and guidance in the design and location of access points within the wastewater reticulation:

6.7.5 Concrete Manholes

6.7.5.1 If manhole cover slabs other than "Humes" or "Hynds" pre-cast concrete cover slabs are to be used then the appropriate certification must be submitted to Council showing that the cover slabs will withstand loadings of 0.85HN (51kN).

6.8 Pumping Stations

This section outlines standards for the design of pumping stations but excludes Low Pressure pumping systems, see section 6.14.6).

Mandatory Matters

Council requires the following standards to be met in the use and design of wastewater pumping stations:

6.8.1 Pump Station Design

6.8.1.1 Pump stations will comply with Council's requirements and these specific designs are updated on a regular basis. Design will be dependent on a number of factors and should be discussed with the Council at an early stage.

6.8.1.2 Design of the pumping station will enable operation of the station in compliance with industry health and safety requirements having particular regard to safety from falling aspects on site.

6.8.1.3 Pumping stations will be of the wet-well type, fitted with approved types of submersible pumps that meet whole-of-life economies taking in capital cost, power consumption, likely parts and maintenance cost during design life.

6.8.1.4 Pumping stations will be located where occasional adverse effects of smell and/or noise will have minimum impact and not within 20m of an existing or potential residential dwelling.

6.8.1.5 Pump stations will not be located in low-lying areas with potential for surface flooding or Q100 flood inundation.

6.8.1.6 Sufficient duty pumping capacity will be available to handle the design flow rate from the catchment area that has been calculated for projected growth extending out to 25-years.

6.8.1.7 A minimum of two pumps on stainless steel guide rails with stainless steel lifting chains will be installed, with one acting as duty pump and the other on automatic standby. The duty sequence is to be alternate start on variable speed drives in accordance with Council's control system standards. The standby pump will be equal in capacity to the duty pump.

6.8.1.8 The wet well will be of sufficient volume and shape so as to limit the frequency of pump starts, allow cooling of pumps, minimise build-up of sludge and to minimise potential odours.

6.8.1.9 The dimensions of the wet-well will be such that under maximum flow conditions the number of starts for the pumps will not exceed the pump manufacturer's recommendations.

6.8.1.10 In Nelson City, a minimum of four hours on-site emergency storage, based on the design average dry weather flow volume measured above the overflow to storage, or high-level alarm level (measured by Multitrode or ultra-sonic level detector).

6.8.1.11 In the Tasman District, a minimum of ten hours on-site emergency storage is required, or six hours where approved by the Engineering Manager. This exception will consider environmental and cultural sensitivity. The storage design will be based on the design average dry weather flow volume measured above the overflow to storage, or high-level alarm level (measured by Multitrode or ultra-sonic level detector).

6.8.1.12 The storage facility will be self-draining and normally located in an underground approved structure within the site and covered with grassed topsoil or approved alternative top blending in with surroundings.

6.8.1.13 The storage structure will have a sealed access lid for inspections.

6.8.1.14 The wet well structures will be first priority for consideration of emergency storage volume by oversizing to minimise expensive underground structures and control features on site.

6.8.1.15 Wet wells will be provided with ventilation. An approved active fan assisted odour control system such as activated carbon odour control units will be constructed adjacent to the pump station to mitigate odours.

6.8.1.16 Ground floor levels will be at least 200mm above finished ground levels in order to exclude surface water entry.

6.8.1.17 All pump station site structures and the capacity of them will be designed for a minimum 50-year life complying with the building code. Note – these structures will need to comply with the Inundation Practice Note.

6.8.1.18 All pumping stations will be fitted with lids and internal safety frames. Outer safety frame supports need to be provided to allow for the removal of pumps.

6.8.1.19 All electrical systems need to be radio frequency neutral, isolated or complying with Central Government radio frequencies standards.

6.8.1.20 All storage chambers will be fitted with cleaning systems and pressure transducer level sensors connected to the telemetry network

6.8.1.21 All valve and emergency storage chambers will drain back to the wet well. The drains will be constructed with a water stop to prevent odour and hydrogen sulphate migration from the wet well and incoming reticulation.

6.8.2 Access and Services

6.8.2.1 A 25mm diameter water supply with a standard 20mm brass hose tap must be provided in the immediate vicinity of the pump station. This water source may be from the Council reticulation or a bore within the area where no Council reticulation exists.

6.8.2.2 This water supply will be fitted with an approved reduced pressure zone (RPZ) backflow preventer and - approved water meter/isolating valve assembly. A water meter is required.

6.8.2.3 Pumping stations and control buildings will be sited on a separate lot or a drainage or utility reserve. The lot is to be vested in Council and will have a sealed access road for maintenance vehicles. The site and buildings will comply with health and safety requirements and have appropriate lighting.

6.8.2.4 The site as a minimum must have screen planting on all common boundaries that will not exceed 2m in height on the South boundary.

6.8.2.5 The planting will not be within 1.5m of any chambers, cabinet, aerial or other structures associated with the facility.

6.8.2.6 The site must be fenced, encompassing the whole site, and there must be a lockable gate on the access.

6.8.2.7 The site must accommodate a means of lifting pumps and other heavy equipment, or alternatively access to enable mobile plant to perform. This task is to be provided on site without disruption to the public.

6.8.2.8 An approved flow meter will be installed on the outlet line from the pump station and connected to the telemetry system.

6.8.3 Electrical Equipment

6.8.3.1 An electrical pump control, alarm, and telemetry system is required on site. It will be assembled and installed in accordance with Council's standard specification.

6.8.3.2 An approved soundproof stainless-steel control cabinet is required to house electrical equipment. Cabinets are to be fitted with a lock keyed to Council's security system.

6.8.3.3 All electrical switch gear is to be located a minimum of 300mm above ground level. All electrical equipment is to be assembled and installed in accordance with these standards or the manufacturer's specifications.

6.8.3.4 All equipment including metering must comply with the requirements of the Network Utility operator and supplier (power).

6.8.3.5 Suitable alarm and system control interrogation and transmitting facilities will be provided to enable the pumping stations to be connected to Council's telemetry system.

6.8.3.6 Cable ducting from the pump station to the control cabinet must be sealed to protect against corrosive gasses travelling to the electrical switchboard.

6.8.3.7 Phase failure protection relays will be provided for all pump motors unless that protection is incorporated into the electronic control for Soft Start or Variable Speed Drive units.

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

6.8.3.9 A standard three-phase industrial power connection will be supplied such that a portable generator can be connected when power failure occurs.

6.8.3.10 Suitable LED lighting will be provided for the pump station, cabinets and valve chambers with protective materials suited to the corrosive environment.

6.8.3.11 Details on pump/motor components and electrical control equipment will be incorporated into an Operation and Maintenance Instruction Manual.

6.8.3.12 The Manual will include as-built plans of the pump station including electrical wiring and operational schematic diagrams.

6.8.3.13 Electronic copies of the Manual will be supplied to Council on handover of the completed pump station and associated works.

6.8.4 Private Pumping Stations

6.8.4.1 Individual, private pump systems are permitted provided:

a) They meet the requirements of Appendix 1 (1.7 Services on Public Land) and the approved design;

b) Their construction meets the requirements of the NZ Building Code (a Building Consent will be required); and

c) The connection to the Council system is via an inspection chamber (This may require odour control) and a gravity pipe connection (pressurised pipelines must be located entirely on private property).

6.8.4.2 Private pumping stations must discharge to a chamber adjacent to the lot boundary. From this chamber, the effluent must gravitate in a 100mm (min) sewer lateral to the reticulation.

6.8.5 Wastewater Pressure Rising Mains

6.8.5.1 Wastewater rising mains will meet the requirements for the construction of water mains.

6.8.5.2 All pressure reticulation will be subject to specific design for cyclic dynamic stresses (fatigue), in selection of pipe pressure class. (Refer to Plastic Industry Pipe Association POP 101 and POP 010A and POP 010B). Refer also to materials selection in section 6.7.2.

6.8.5.3 The location of all pumping or pressure mains will be marked with an approved foil or wire banded tape, buried in the trench (see section 6.12).

6.8.5.4 All HDPE pumping mains must be coloured black with cream strip.

6.8.6 Commissioning

6.8.6.1 On completion of any pump station, and prior to handover to Council (residential only), a full commissioning test will be carried out on all components of the pump station. This commissioning will be in the presence of a representative of Council and of Council's operations and maintenance contractor.

6.8.6.2 It should be noted that Council requires, prior to the 224 certificate being issued, that Council has a full set of as-builts and a complete Operations and Maintenance manual for the operation of the development. This is to ensure that the Council maintenance contractor can operate the appropriate plant correctly. Operations and Maintenance manuals will be provided to Council in electronic format.

Good Practice

The following matters provide additional direction and guidance in the use and design of wastewater pumping stations that will be vested in Council ownership:

6.8.7 General

6.8.7.1 New pumping stations will only be accepted by Council when all other practical options have been ruled out (filling of sites is a normal practical option to gain the required gravity fall so that pump station sites can be avoided).

6.8.7.2 Other odour control devices may be approved on a case-by-case basis to be approved by Council.

6.9 Reticulation Construction and Installation

6.9.1 Trenching

This section sets out Council requirements for the construction and installation of wastewater reticulation.

Mandatory Matters

Council requires the following standards to be met in the construction and installation of wastewater reticulation using excavated trenches:

6.9.2 Trench Width

6.9.2.1 The minimum trench width will be 200mm wider than the external diameter of the collar of the pipe being laid.

6.9.2.2 The trench will be of sufficient width to permit with freedom the installation of all trench support and to allow the laying and jointing of pipes and placing of bedding and pipe surround materials.

6.9.3 Base of Excavation

6.9.3.1 No construction or work upon the excavation bottom will commence until the natural bottom of the excavation has been inspected and accepted by the DPA.

6.9.3.2 The foundation of the trench is to be checked for stability of the soil by the DPA.

6.9.3.3 In respect of trench floor bedding, the DPA will order the use of additional granular bedding material as specified in AS/NZS 3725 for concrete pipes, or AS/NZS 2566 for PVC and other flexible pipe systems.

6.9.4 Trench Support

6.9.4.1 The contractor will provide trench support to comply with the requirements of relevant New Zealand legislation.

6.9.4.2 The contractor will ensure that the sides of the trench are sufficiently supported so that cracking of the surrounding ground does not occur.

6.9.4.3 The contractor will comply with health and safety legislation.

6.9.5 Dewatering

6.9.5.1 Excavations will be kept free of water during construction.

6.9.5.2 In no circumstances will stormwater or ground water be allowed to drain into any existing wastewater reticulation and pipe ends will be plugged to prevent such ingress.

6.9.5.3 Discharge of stormwater or groundwater to existing stormwater drains or the pipes already laid will be permitted providing adequate silt traps prevent debris and suspended matter from entering drains.

6.9.5.4 Should deposits in existing stormwater drains or the pipes already laid occur as a result of the operations of the Developer or the contractor, such deposits will be cleared forthwith at the Developer's or the contractor's cost as the case may be.

6.9.5.5 The contractor or Developer will cause as little damage or interference to property or persons as possible in disposing of water from the works, and will be responsible for any damage or interference, which may be caused. This will include any damage to the structure of any road.

6.9.6 Metal Bedding

6.9.6.1 Metal bedding will be in accordance with SD614 and SD615. This includes bedding, haunch support and side support material as defined by NZS 2566 and AS/NZS 3725.

6.9.6.2 For concrete pipes, "Type H2" bedding in accordance with AS/NZS 3725 will be used.

6.9.6.3 The bedding material will be:

a) In a sand environment – Saturated sand;

b) For PVC and flexible pipes - NZTA M4 AP20, or as per AS/NZS 2566, Appendix G; and,

c) For concrete pipes - NZTA M4 AP20, or as per AS/NZS 3725, Table 6.

6.9.6.4 Bedding compaction will be undertaken in accordance with AS/NZS 3725 for type H2 support.

6.9.6.5 The pipes will be laid and brought to true alignment and level before installing the metal haunching, side support and covering the pipes.

6.9.7 Pipe Embedment

6.9.7.1 The metal haunching and side support will be placed uniformly along and around the whole length of the pipe barrel, couplings and other appurtenances in a manner to ensure uniform density of side support (including haunch support) and overlay with no distortion, dislodgement or damage to the pipeline.

6.9.7.2 Following placement, the embedment material will be compacted in layers to uniformly support the pipe.

6.9.7.3 When choosing compaction equipment, the number of passes and the thickness of layer to be compacted, the material to be compacted and the pipe to be installed will be taken into account.

6.9.7.4 Compaction equipment or methods that produce horizontal or vertical earth pressures that may cause damage to, or excessive distortion of, the pipe will not be employed.

6.9.7.5 Metal haunching and side support will be compacted to the manufacturer's requirements and as a guide, a minimum Clegg Impact Value of 25 shall will be achieved at any point on any haunching constructed of AP20 NZTA M4.

6.9.8 Installation of Geotextiles

6.9.8.1 Where there is a possibility of migration of fines between the native soil and the pipe surround soil, the DPA will require the metals to be protected by an approved geotextile filter fabric that overlaps by at least 300mm. The extent of this "geotextile wrapping" must be shown on the As-built plans.

6.9.9 Water-stops and Trench Groundwater

6.9.9.1 A specific design is needed where permeable bedding is used. Water-stops and trench drainage will be constructed to prevent unwanted movement of groundwater along the trench and pipe bedding, see SD613. All captured stormwater must be reticulated to the stormwater network, or at least an approved stormwater outlet.

6.9.9.2 Manholes will be considered to be water-stops provided they are constructed appropriately.

6.9.9.3 Where water stops are required, they must be provided at the intervals set out Table 6-6.

Table 6-6 Water Stop Spacings

Grade	Spacing
1 in 15 or steeper	12m
1in 15	15m
1 in 25	30m
1 in 100	60m

6.9.9.4 Where necessary and practicable, trench drainage as per SD613 will be required to prevent groundwater infiltration at manhole connections.

Note: This will not be necessary where prefabricated plastic manholes such as the Smart Pit™ are used (see sections 6.7.2 and 6.11.2).

6.9.10 Pipe Installation

6.9.10.1 To help with future identification the end caps and inside of the end of all new wastewater laterals must be painted with red acrylic paint and marked with a 75mm x 25mm ground treated marker stake suitably identified and partly painted red. (Note: stormwater laterals are to be marked green).

6.9.10.2 A laser will be used by the contractor for fixing line and grade, for setting the pipes to line and level, and for jointing on all major pipe-laying work where possible.

6.9.10.3 The maximum deviation in level of pipe invert when laid will be 5mm from design level. The line must have a continual falling grade such that water cannot pond in any part of the pipeline.

6.9.10.4 The maximum horizontal deviation from a straight line will be 10mm.

6.9.10.5 Pipes will not be laid on bricks, blocks and wedges or other temporary or permanent supports except when concrete surround is to be placed.

6.9.10.6 Joints will be flexible and watertight.

6.9.10.7 Pipes will be kept clear of dirt or debris, and any pipes that contain such matter will be required to be cleaned out. Internal pipe walls will be kept clean and free of all dirt, rubbish and water. Spigots, sockets, rubber rings, etc, will be thoroughly cleaned before jointing.

6.9.10.8 No glue joints will be permitted.

6.9.10.9 No new reticulation is to be connected to Council's existing operational reticulation unless the new reticulation has been checked and is free of all debris materials.

Good Practice

The following matters provide additional direction and guidance in the construction and installation of wastewater reticulation using excavated trenches:

6.9.11 General

6.9.11.1 Generally, a plate compactor is to be run over the trench base to bind the surface and identify any obvious weak spots.

6.9.11.2 Where the bottom of an excavation is unable to provide a firm foundation with minimum bearing capacity of 50kPa (eg. clay soils that can easily be penetrated 40mm with a thumb or in sand or gravel that makes a footprint more than 10mm deep) at the required level without abrupt irregularities, engineering advice should be sought on how to provide a satisfactory foundation (see AS/NZS 2032:2006, clause 5.3.6).

6.9.11.3 Where trench support extends below the invert of the pipeline or structure, special precautions may be required including leaving part of the support in place, to ensure the foundation of the pipe or structure is not weakened.

6.9.11.4 Groundwater lowering may be permitted except where this practice may present a risk of subsidence. Resource consent may be required.

6.9.11.5 Concrete surround for concrete pipes.

6.9.11.6 For concrete pipes, the DPA may provide concrete surround following the written approval of the Engineering Manager, and to the following specifications:

a) In areas subject to vehicle traffic where the cover of the pipe barrel is, or will be, less than that required for the class of pipe as specified by the pipe manufacturer; and

b) In areas other than those covered above, where the cover over the barrel of the pipe is or will be less than 300mm, irrespective of the type or class of pipe.

c) Flotation of the pipe during placement of concrete surround will be prevented. PVC pipes will not be concrete surrounded.

6.9.12 Water-stops and trench groundwater

6.9.12.1 Manholes can be considered to be water-stops provided they are constructed appropriately.

6.9.12.2 Where water stops are required, they should be provided at the intervals set out in Table 6-6.

6.10 Trenchless Technology

This section relates to the use of trenchless technology for the installation of wastewater reticulation.

Mandatory Matters

Council requires the following standards to be met in the use of trenchless technology for the installation of wastewater reticulation:

6.10.1 General

6.10.1.1 Trenchless technology will only be used in specific circumstances where approved by the Engineering Manager.

6.10.1.2 Pipes used for trenchless installation will have suitable mechanically restrained joints, specifically designed for trenchless application, which may include integral restraint, seal systems, or heat fusion welded joints.

6.10.1.3 Any trenchless technology and installation methodology will be chosen to be compatible with achieving the required gravity pipe gradient – refer to the manufacturer's and installer's recommendations.

6.10.1.4 The following details including location of access pits and exit points will be submitted to the Engineering Manager for approval:

a) Clearances from services and obstructions; the depth at which the pipeline is to be laid to ensure minimum cover is maintained;

b) The pipe support and ground compaction;

c) How pipes will be protected from damage during construction;

d) Any assessed risk to abutting surface and underground structures; and

e) A clear methodology of how to deal with unknown obstructions and services.

6.10.1.5 Gouging or notching of the pipe will not exceed 10% of the pipe wall thickness for pressure pipe and 20% of the pipe wall thickness for gravity pipe. Pipe will not be bent to a radius less than 35 times the pipe OD for PE pipes or 600 times the pipe OD for PVC pipes.

6.10.1.6 The specified allowable load on the pipe will not be exceeded during pulling.

6.10.1.7 Where gouging or notching exceeds the above limits or if buckling of the pipe occurs, that length of pipe will be removed, and a new section welded in at the nearest join.

6.10.1.8 The contractor will over tow the pipe by one lineal metre for each length of pulled pipe that is the greater of one manhole length or 200m. The excess pipe length will be supplied to the DPA for a visual inspection.

Good Practice

The following matters provide additional direction and guidance in the use of trenchless technology for the installation of wastewater reticulation:

6.10.2 General

6.10.2.1 Trenchless technology may be preferable for alignments passing through or under:

a) Environmentally sensitive areas;

b) Built-up or congested areas to minimise disruption and reinstatement; Major road crossings;

c) Significant vegetation;

d) Vehicle crossings and areas with high quality paving surface;

e) Where there is a large number of existing services (thorough investigation is required to verify the position of existing services).

6.10.2.2 For new pipes, trenchless installation methods may include:

a) Horizontal directional drilling (HDD) (PVC with restraint joint/fusion welded PE);

b) Uncased auger boring/pilot bore micro tunnelling/guided boring (PVC with restraint joint/fusion welded PE);

c) Static pipe bursting (GRP/vitrified clay (VC)/reinforced concrete) (PVC with restraint joint/fusion welded PE).

6.10.2.3 For pipe rehabilitation/renovation, trenchless installation methods may include:

a) Slip lining/grouting (PVC with restraint joint/fusion welded PE);

b) Close fit slip lining (PVC with restraint joint/fusion welded PE);

c) Static pipe bursting (PVC with restraint joint/fusion welded PE);

d) Reaming/pipe eating/inline removal (PVC with restraint join/fusion welded PE);

e) Soil displacement/impact moleing (fusion welded PE);

f) Cured in place pipe (thermoset resin with fabric tube).

6.10.2.4 Further information on trenchless technologies may be found in ‘Trenchless technology for installation of cables and pipelines’ (Stein), ‘Trenchless technology – Pipeline and utility design, construction and renewal’ (Najafi), and ‘Guidelines for horizontal directional drilling, pipe bursting, micro-tunnelling and pipe jacking’ (Australasian Society for Trenchless Technology).

6.11 Manhole Construction

The following standards relate to the installation of manholes.

Mandatory Matters

Council requires the following standards to be met in the installation of manholes:

6.11.1 Concrete Manholes

6.11.1.1 Manholes will be constructed in accordance with SD601 to SD607.

6.11.1.2 All concrete manholes will be made water tight by effective sealing of manhole section joints with mastic sealant and around pipe entries, where applicable, using epoxy mortar inside and out.

6.11.1.3 The connection of PVC pipes to concrete structures, such as manholes and sumps, will be with a purpose made PVC starter and finisher with a 'gritted' external surface.

6.11.1.4 The connection of PE pipes to concrete structures will be in accordance with SD607.

6.11.1.5 All PVC pipes entering or leaving a manhole will have one flexible joint within 200mm of the manhole.

6.11.1.6 All concrete pipes entering or leaving a manhole will have one flexible joint within 500mm of the manhole.

6.11.1.7 The channel through the manhole will be formed from in-situ concrete properly formed to grade and radius sweeps. The channel will be finished with a smooth, regular half circle invert with falls as specified in SD601 and SD603. Benching will be steel float finished to give a regular smooth surface.

6.11.2 Installation of Thermoplastic Manholes

6.11.2.1 In regard to thermoplastic manholes, installation will be to the supplier's requirements subject to the following conditions:

a) The ground is firm and stable;

b) The pipe size is small (ie. pipes up to and including diameter NB 225mm).

6.11.2.2 A manhole from thermoplastics will consist of a factory manufactured benched base, a vertical riser(s), a suitable transition, as necessary, from the base to the riser (eg. an adaptor), a cover slab, a throat, as necessary, from the cover slab to the lid at ground level, a frame and a cover. The components must be easy to assemble on site to form a watertight construction.

6.11.2.3 Manholes from thermoplastics will have a safety factor of at least two against flotation after backfilling (eg. weight of backfill over horizontal ring fins and cover slab).

6.11.2.4 All components of the manhole will be designed by the manufacturer for the expected site loading including vehicle loads of 51kN (0. 85HN) where in trafficable areas. A manufacturer's certificate will be provided to this effect.

6.11.2.5 Depth to the invert of the outlet from the lid will not exceed 3.0m.

6.12 Tracer Tape

The following standards relate to the use and installation of tracer tape for pumping mains and gravity pressure mains.

Mandatory Matters

Council requires the following standards to be met in the installation of tracer tape:

6.12.1 Tape Location, Tape Type and Tape Installation

6.12.1.1 The location of all pumping mains and gravity pressure mains (swallows) will be marked with a foil tape buried in the trench.

6.12.1.2 The tape will be red, 50mm wide, and printed with “CAUTION PRESSURE SEWER MAIN BURIED BELOW” or similar message. All printing will be encased to avoid any rub-off.

6.12.1.3 The tape will be either a woven reinforced acid and alkali resistant polythene plastic with a solid aluminium foil core which will be visible from both sides.

6.12.1.4 The tape will be buried above the centre line of the pipe within 300mm to 400mm from the finished surface, refer SD702.

6.12.1.5 All joints in the tape (eg. roll ends, accidental breaks and at tees) will be made electrically conductive with purpose made splice clips installed to the specific manufacturer's instructions. Tying together of the tape ends is not acceptable as the polythene coating will prevent electrical conductivity.

6.12.1.6 The tape will be brought up inside the surface box risers at all manholes and air valves with a 300mm long tail so that pipe location equipment can be readily connected.

6.12.2 Tracer Wire

6.12.2.1 When a pumping main or swallow pipe is installed by a directional drilling technique or bored through the ground for a distance exceeding 20 metres a specific design for traceability is required.

6.12.3 Testing

6.12.3.1 The tracer tape or wire will be tested by the contractor for continuity using an electric pulse induction system. The test must be witnessed and approved by Council. The new pipeline will be tested between manholes, valves, etc where the tape is brought up inside the surface box risers. The test will only be undertaken when all work associated with laying the wastewater main is complete.

6.13 Valve painting

Valves will be painted as shown on SD616.

Good Practice

The following matters provide additional direction and guidance in the installation of tracer tape:

6.13.1 General

6.13.1.1 "Thor Tec™" tape is an acceptable product.

6.13.1.2 Alternatively, acceptable tape will be a durable sinusoidal stainless-steel wire encased in a polythene strip. "Waterwave" and "Wavelay" are acceptable products.

6.14 Testing

This section relates to the testing of wastewater reticulation.

Mandatory Matters

6.14.1 General

Council requires the following standards to be met in testing of wastewater reticulation prior to connection:

6.14.1.1 Connection to existing wastewater mains will not be made until all upstream work has been completed and inspected and approved by Council.

6.14.1.2 Specifically, this will include flushing and testing of all new pipework, manholes, and other wastewater facilities by the contractor and internal (CCTV) and external inspections by Council.

6.14.1.3 No contractor is permitted to access a live wastewater system without the written approval of the Engineering Manager.

6.14.1.4 Only Council's approved maintenance contractor is permitted to undertake connections to Councils reticulation.

6.14.2 Air or Pressure Testing (for Non-Pressure Pipelines)

6.14.2.1 All non-pressure pipelines to be vested in Council ownership will pass one of the following air or water pressure tests:

Air Test – To NZS 4404:2010 Appendix C, C2. 1 'Low pressure air test'. For safety reasons, plugs must be well braced into position as the failure of a plug could result in serious injury.

6.14.3 Hydrostatic Test – NZS 4404:2010, Appendix C, C2. 2 'Hydrostatic test'

6.14.3.1 All manholes will be watertight and may require testing at the Council's direction. The test involves plugging and filling the manhole with water (including time allowed for absorption for concrete manholes). During the test, the level of water in the manhole will not drop more than 5 mm in 10 minutes for concrete manholes. For thermoplastic manholes, the allowable make up water will be 0. 5 litres/hour per metre length per metre diameter.

6.14.4 Pressure Pipelines

6.14.4.1 All pressure pipelines to be vested in Council ownership will pass the hydrostatic pressure test in NZS 4404:2010 Appendix C, C3 'Pressure pipelines – Field hydrostatic pressure testing'.

6.14.5 Closed-circuit Television Inspection (CCTV)

6.14.5.1 All pipelines to be vested in Council ownership will pass a closed-circuit television (CCTV) inspection, carried out at an appropriate time agreed by Council or at the completion of the works.

6.14.5.2 A professional operator with proof of experience in operating such devices will carry out the CCTV inspection using a pan and tilt camera, in accordance with the technical specifications of the NZ Pipe Inspection Manual (published by the New Zealand Water & Wastes Association).

6.14.5.3 The operator will 'pan-around' every joint and check every lateral connection and defect.

6.14.5.4 The video footage in DVD format, and the accompanying CCTV log sheets in electronic format for each wastewater sewer length (as per the template in the NZ Pipe Inspection Manual), showing the features and condition of all inspected manhole lengths, will be provided to Council. Video footage supplied without log sheets will not be accepted.

6.14.5.5 All pipelines will be free of debris and flushed within 24-hours prior to inspection.

6.14.5.6 Inspections of non-cleaned pipelines are not acceptable.

6.14.5.7 A pipeline will fail its inspection if:

a) The pipe is horizontally misaligned or deformed by more than 5% of the pipe diameter;

b) The pipe has visible dips or ponding of water;

c) The pipe has visible defects, such as open or displaced joints, defective or protruding laterals, cracked barrels or similar defects;

d) There is evidence of infiltration at joints or laterals.

6.14.6 Low Pressure Sewerage Pumping Systems

6.14.6.1 Pressure sewerage systems will be designed by a competent designer. Pressure pumping systems will meet Council's requirements. Note – in Nelson City area, specific approval from Nelson City Council will be required for this type of system

6.14.6.2 Designer and Pump Supplier to provide a PS2 and PS4 design approval on completion of installation.

6.14.6.3 The design of low pressure sewerage pumping stations (in Tasman District Council) will be guided by the Tasman District Council's Owner and Occupier's Manual and Council's installation instructions.

6.14.7 Low Pressure Pump Station Non-Residential Zoning (Industrial and Commercial)

6.14.7.1 At time of subdivision, the Developer is required to install all wastewater reticulation and an approved boundary kit (point of connection) for all proposed lots. The boundary kit is the demarcation point of the public reticulation.

6.14.7.2 The property owner is required to install an approved low-pressure pump station at the time of building consent. The pump station is required to be sized according to proposed building use.

6.14.7.3 The pumping station and the electrical operations box is to be installed in a location appropriate in relation to the building. The pumping station to be installed at a level approximately 100mm below the floor level of the building.

6.14.7.4 The property owner is responsible for providing power to this pump station.

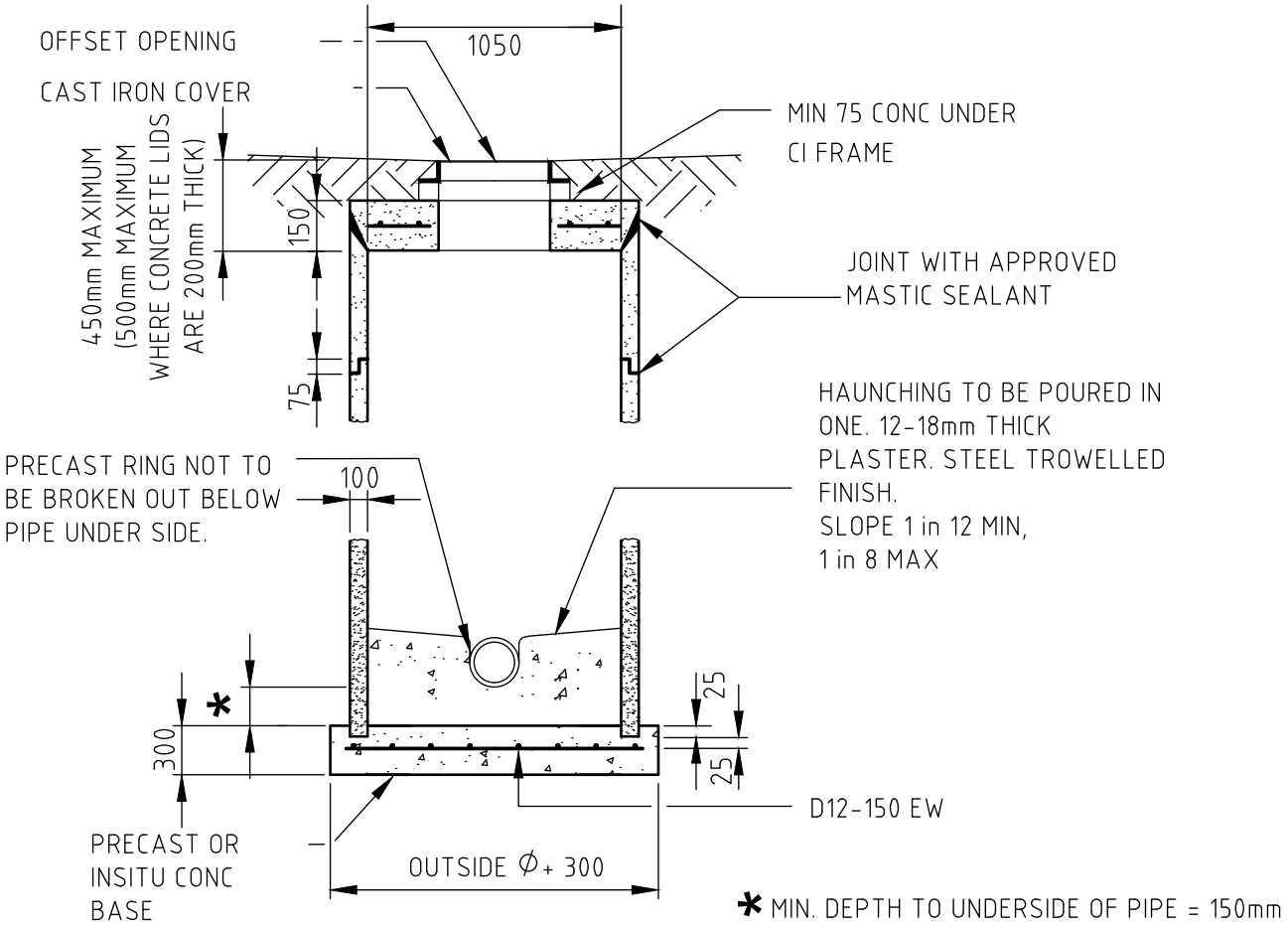
6.14.7.5 The property owner is responsible for providing and maintaining all plumbing to the boundary kit (point of connection) and the operation of the pumping station.

6.14.7.6 The use and the operations of the pumping station shall follow Council "Owner and Occupier's Manual".

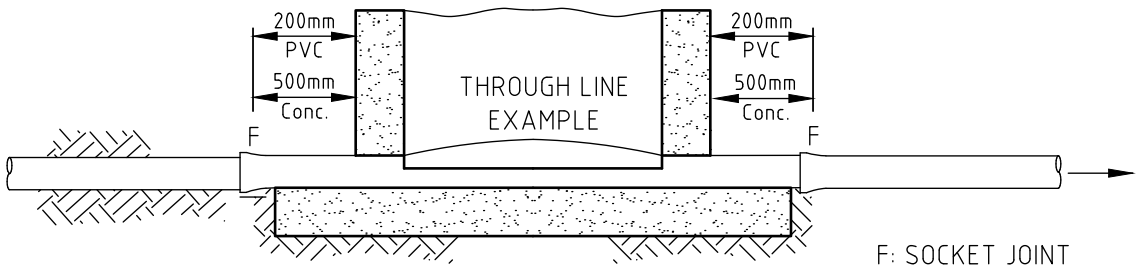
6.14.8 Testing – General

6.14.8.1 All gravity pipelines to be vested in Council ownership may be required to be tested for short term vertical deflection using an appropriate proving tool ("rigid prover") and complying with AS/NZS 2566, Table 5.6, Section 6 and Appendix O – "Diametric Deflection Measurement".

6.14.8.2 Other testing as considered appropriate may be required by Council to ensure Council's future infrastructure will meet its projected life cycle. This will be discussed at the preconstruction meeting if new testing technology has become available since the approval of this document.



PRECAST MANHOLE DETAIL

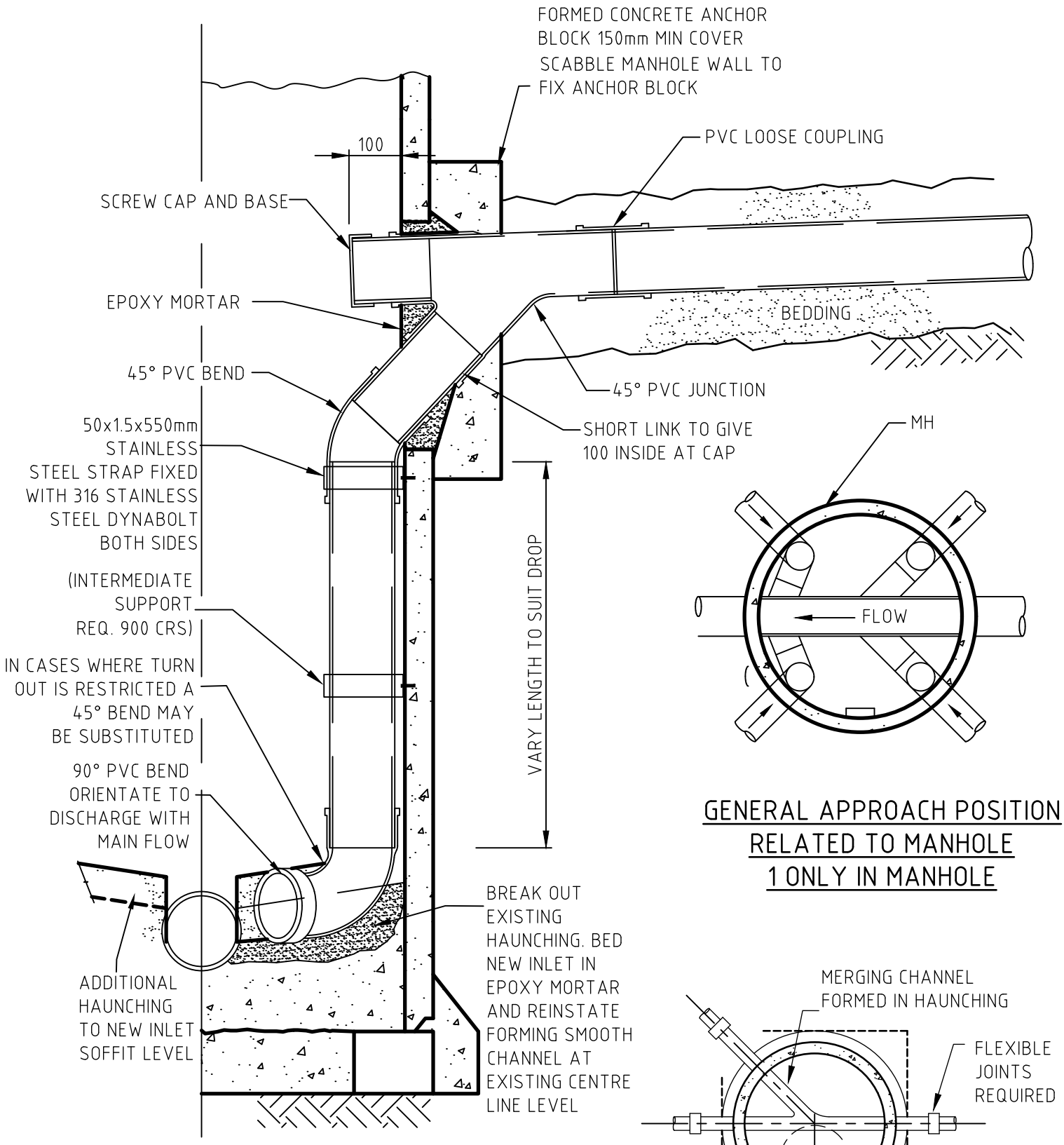


FLEXIBLE JOINTS AT MANHOLES

NOTES

1. ALL "INSITU" CONCRETE TO BE VIBRATED
2. CONCRETE CRUSHING STRENGTH TO BE 27.5 MPa AFTER 28 DAYS
3. MAX. SIZE OF PIPE TO BE 450 mm DIA FOR 1050mm MANHOLE
4. PRECAST CONCRETE MANHOLE RISERS SHALL COMPLY WITH THE REQUIREMENTS FOR CLASS 2 PRECAST CONCRETE PIPES TO AS/NZS 4058, 2007
   MAXIMUM GRADIENT FOR HAUNCHING THROUGH MANHOLES SHALL BE 1 in 3
5. HYDROPHILLIC SEALANT SHALL BE USED WHERE THERE IS A HIGH GROUNDWATER LEVEL OR WHERE DRAINAGE OF THE TRENCH IS NOT POSSIBLE. THIS SHALL BE USED FOR ALL WASTEWATER MANHOLES, AS PER DRAWING 607 (UNLESS APPROVED OTHERWISE BY COUNCIL).
6. SEALANT TO BE ADEKA ULTRASEAL P-201, (or similar) WATER SWELLING ELASTIC SEALANT 10mm MIN. THICKNESS AROUND THE PIPE AT PUDDLE FLANGE CURED BEFORE PLACING EPOXY MORTAR IN LINEAR JOINT. MIN. COVER TO SEALANT FROM FREE EDGE OF INSITU CONCRETE IS 75mm

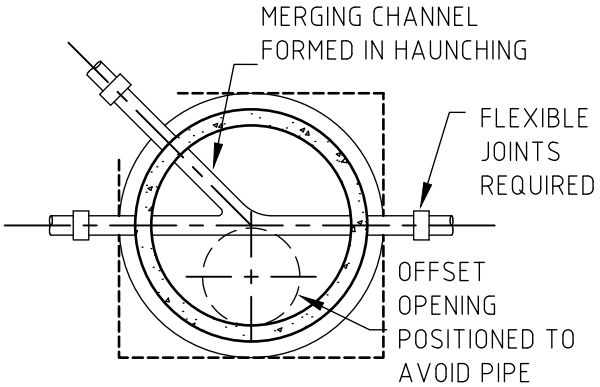
NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	1050ø PRECAST MANHOLE FOR PIPELINES UP TO AND INCLUDING 450ø (1 OF 2)		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	601



INTERNAL DROP MANHOLE DETAIL PVC 150 ø

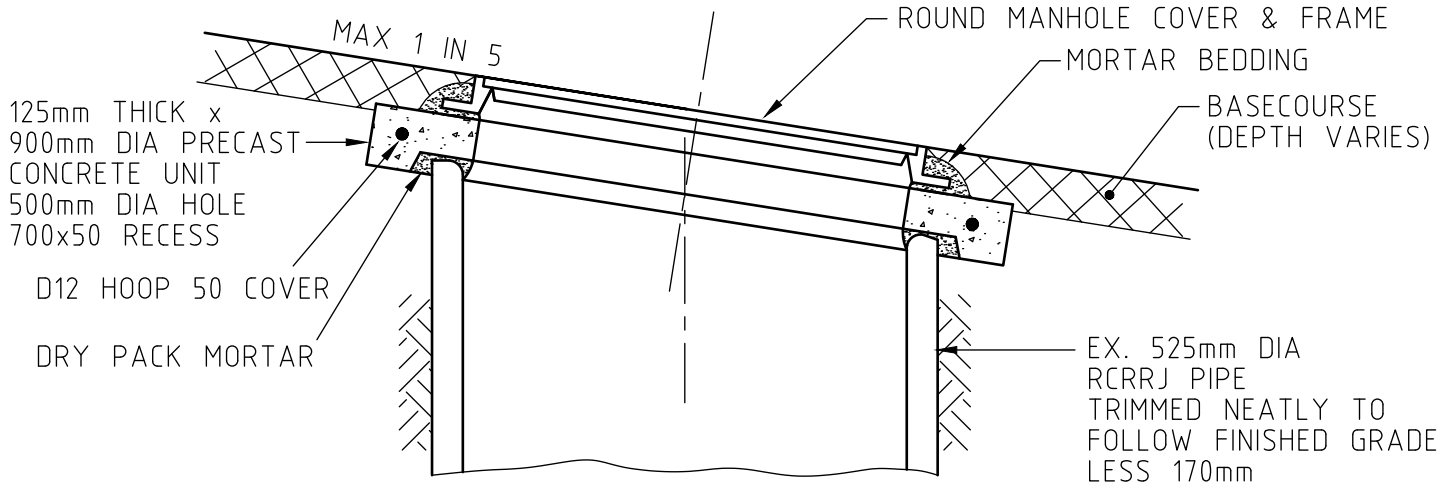
TO BE USED IN SPECIAL CASES AT ENGINEERS DIRECTION FOR EXISTING MANHOLES ONLY

GENERAL APPROACH POSITION RELATED TO MANHOLE 1 ONLY IN MANHOLE

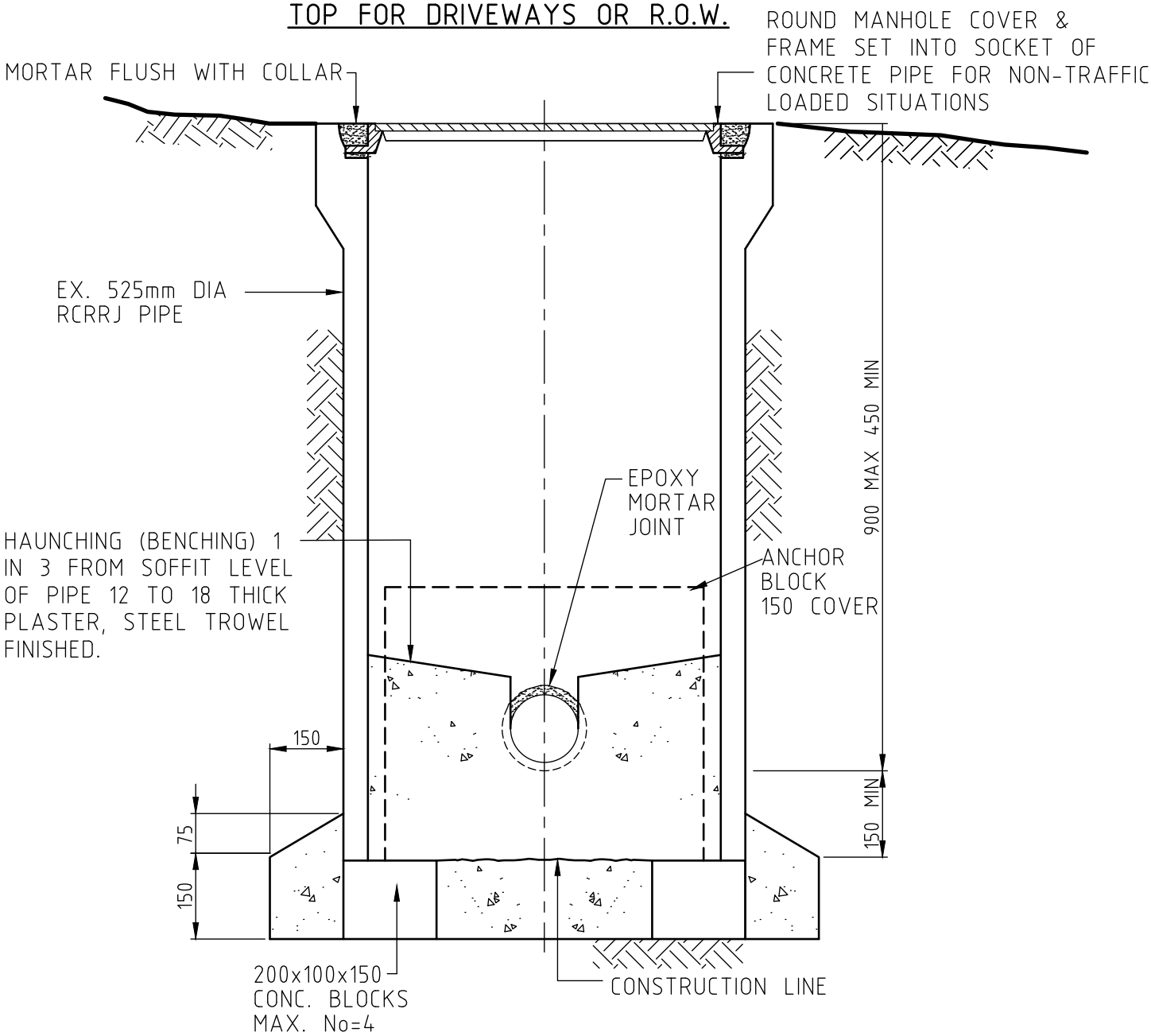


TYPICAL PLAN

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	1050ø PRECAST MANHOLE FOR PIPELINES UP TO AND INCLUDING 450ø (2 OF 2)		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	602

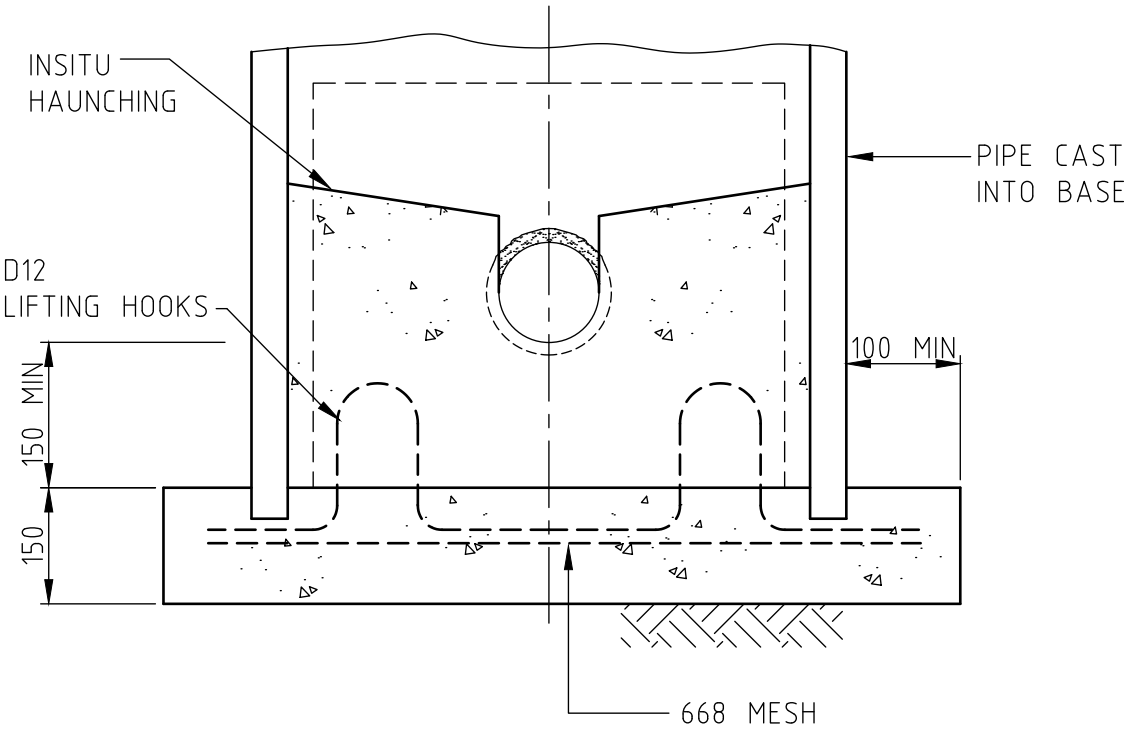


TOP FOR DRIVEWAYS OR R.O.W.



CAST INSITU BASE

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	SHALLOW MINI - MANHOLE (1 OF 2)		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	603

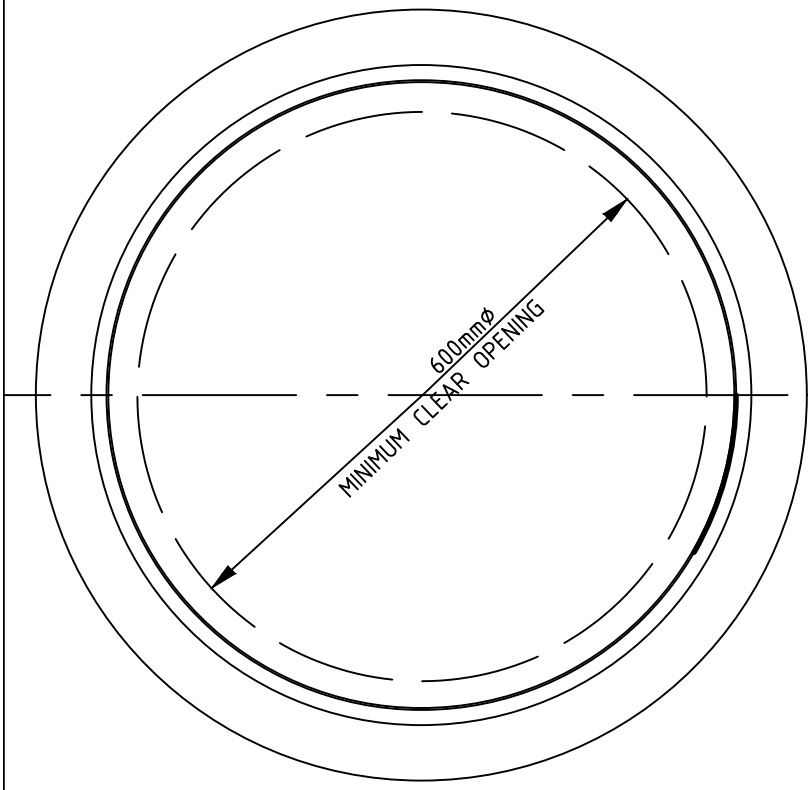


ALTERNATIVE PRECAST UNIT

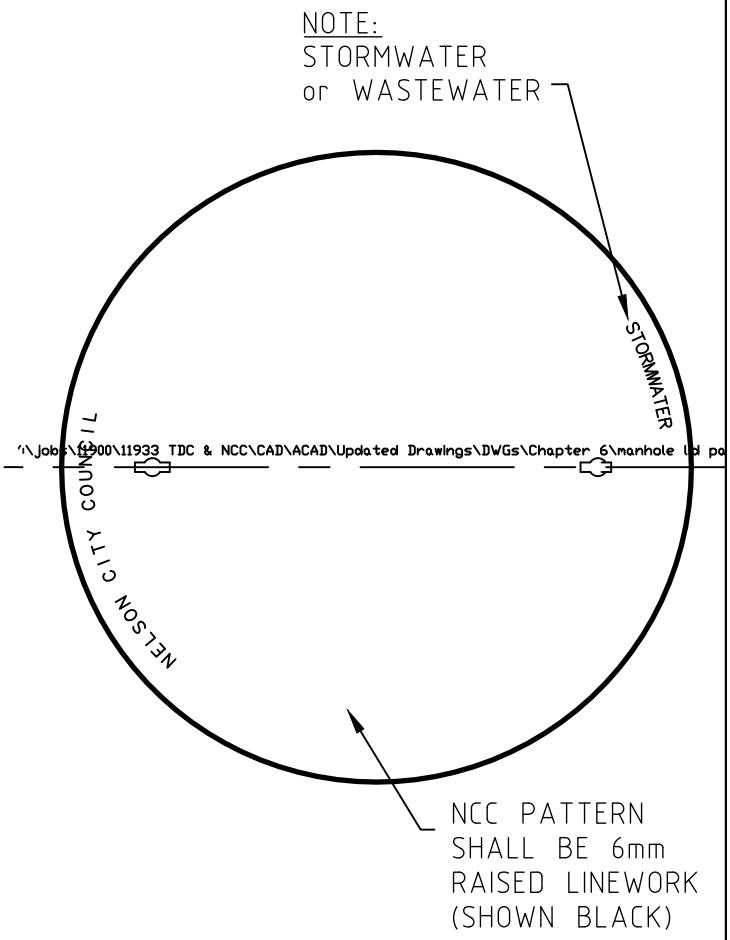
NOTES

1. APPROVED PRE-FORMED PLASTIC INSPECTION CHAMBERS MAY BE USED AS MINI-MANHOLES FOR PIPE SIZES 100mmØ & 150mmØ SUITABLE FOR SEWER & STORMWATER SEWERS
2. MINI-MANHOLES ARE NOT TO BE ASSUMED TO REPLACE THE STANDARD MANHOLE
3. MINI-MANHOLES SHALL NOT BE USED IN AREAS SUBJECT TO VEHICULAR TRAFFIC, EXCEPT IN FORMED RESIDENTIAL DRIVEWAYS OR RIGHTS OF WAYS FOR LIGHT DOMESTIC VEHICLES
4. THE USE OF MINI-MANHOLES IS TO BE LIMITED, AND AT THE DISCRETION OF COUNCIL:
   A) MANHOLES LESS THAN 1M DEEP
   B) THE MAXIMUM PIPE SIZES OF 150mmØ FOR SEWERS & 225mmØ FOR STORMWATER DRAINS
   C) MANHOLES AT THE HEAD OF A LINE
   D) STRAIGHT THROUGH MANHOLES
   E) CHANGES OF GRADE
5. CONCRETE MINI-MANHOLES AS DETAILED ARE NOT TO BE USED IN SEWERS AT:
   A) JUNCTIONS
   B) DEFLECTIONS GREATER THAN 45 DEGREES.
6. COVER & FAME SHALL BE CAST IRON or DUCTILE IRON TO CLASS C STRENGTH TO AS3996 (CLASS & STANDARD TO BE STAMPED OF FRAME & LID
7. COVER MUST HAVE 2 SEPARATE RECESSED SLOTS TO FACILITATE LIFTING & REMOVAL OF COVER, AND MUST BE WATER TIGHT TO PREVENT SW INGRESS
8. COVERS MUST HAVE ANTI-SKID PATTERN EMBOSSED ON TOP WITH THE WORDS WASTEWATER or STORMWATER. ALL FONT TO BE GOTHIC, 15mm HEIGHT RAISED 2.5mm
9. ANY OTHER WORDING, SUCH AS THE SUPPLIERS & MANUFACTURERS NAME, SHALL BE PLACED ON THE UNDERSIDE OF THE COVER (NOT ON THE TOP)

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	SHALLOW MINI - MANHOLE (2 OF 2)		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	604



PLAN - COVER + FRAME
(PATTERN OMITTED)



PLAN - COVER
(WITH PATTERN SHOWN)

NOTES

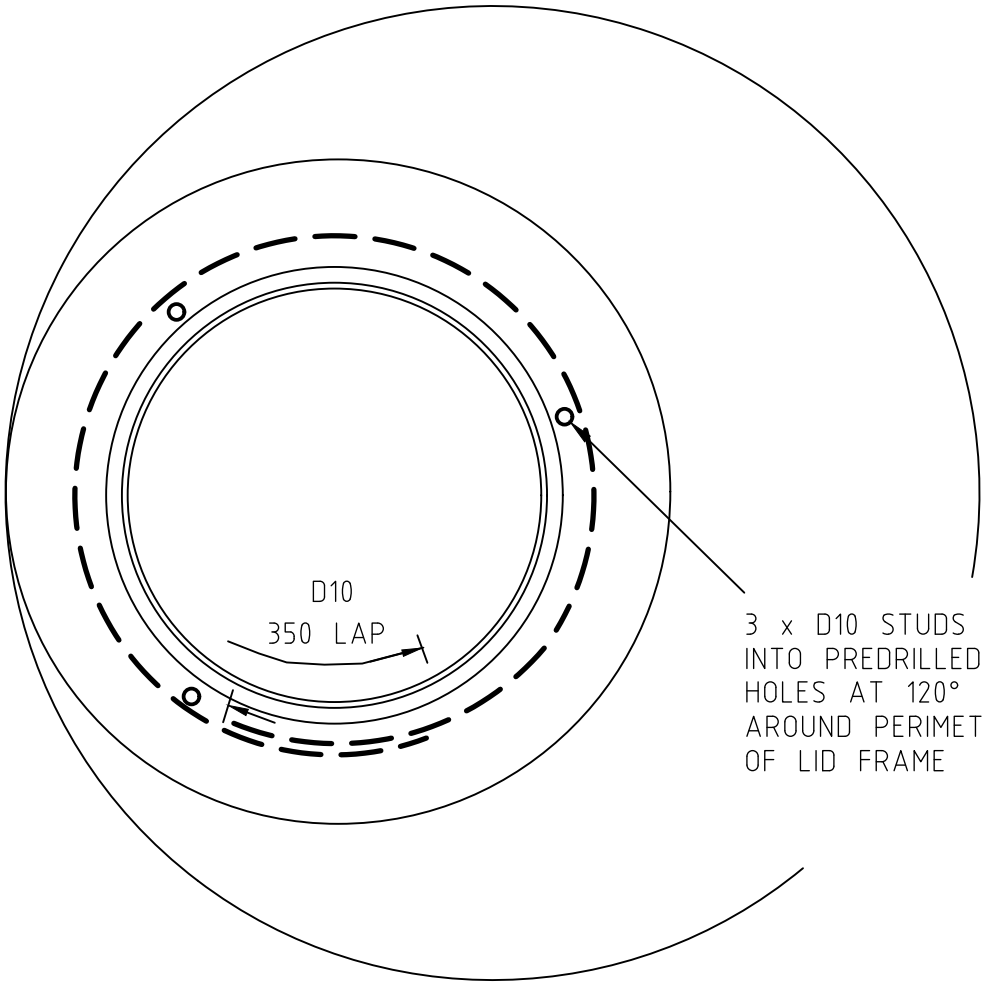
1. FRAMES AND COVERS MUST HAVE THE FOLLOWING FEATURES AND BE APPROVED BY NCC:

- DUCTILE IRON TO AS1831:2007
- CERTIFIED TO MEET CLASS E (400kN) TO AS3996. THE CLASS STRENGTH IN KiloNewtons SHALL BE SHOWN ON THE TOPSIDE OF THE COVER
- BE 'ANTI-ROCKING' (ie. MUST HAVE SPECIFIC FEATURES THAT PREVENT THE COVERS RATTLING OR MAKING NOISE WHEN DRIVEN OVER BY VEHICLES)
- SEALED TO PREVENT INFILTRATION
- FRAME AND COVER TO HAVE NON-CAPTIVE HINGE ALLOWING EASIER LIFTING OF THE COVER TO UPRIGHT POSITION, WITH THE ABILITY TO REMOVE THE COVER FROM THE FRAME
- PARTIAL LOCKING MECHANISMS THAT PREVENT THE COVER OPENING UNDER SMALL SURGES OF BACK PRESSURE
- COVERS MUST HAVE THE NCC PATTERN INCORPORATED ONTO THE COVER AS DETAILED IN THE PLAN ABOVE

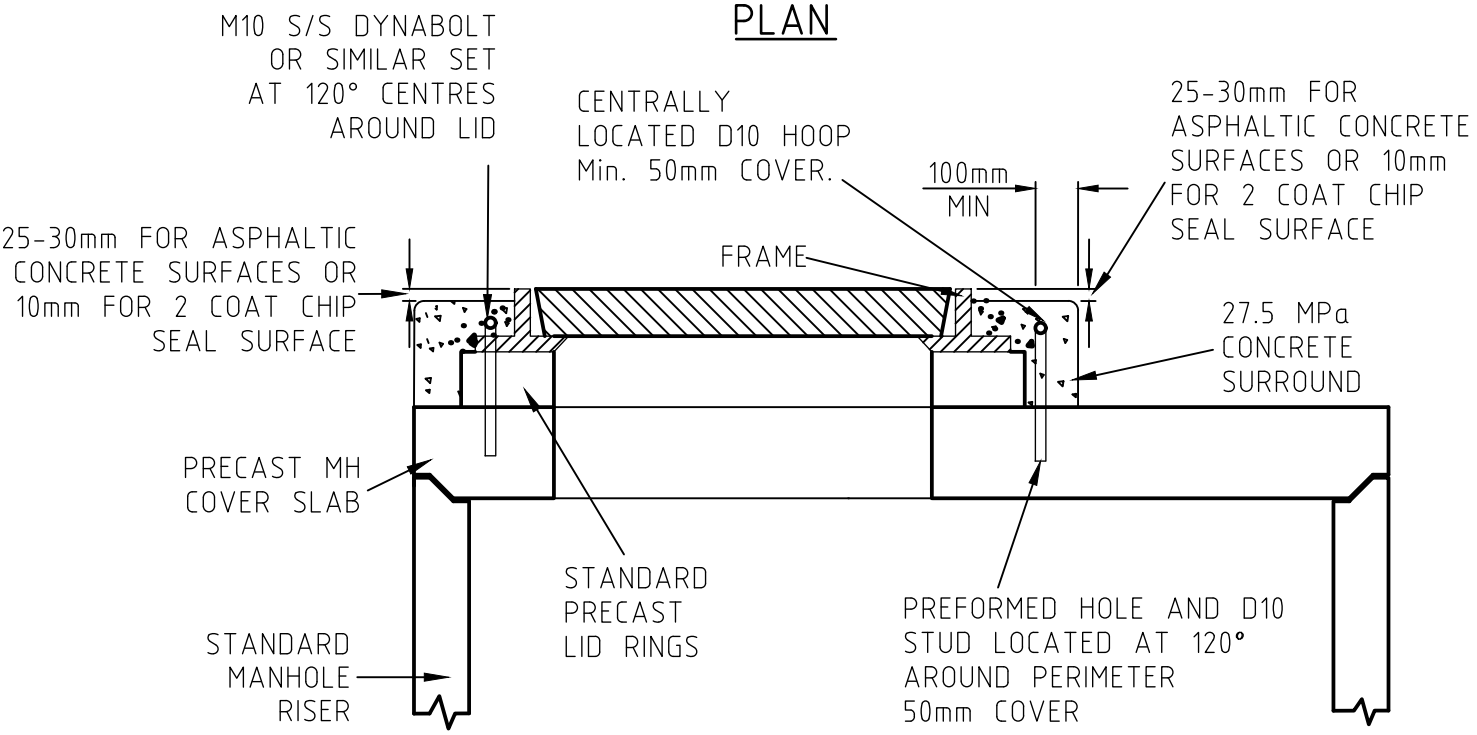
2. FRAME AND COVERS THAT MEET THE ABOVE CRITERIA AND WHICH HAVE ALREADY BEEN APPROVED BY NCC FOR USE IN NELSON CITY AREA ARE:

- THE MAESTRO ROADWAY CLASS E 400kN FRAME AND COVER PRODUCED BY EJ

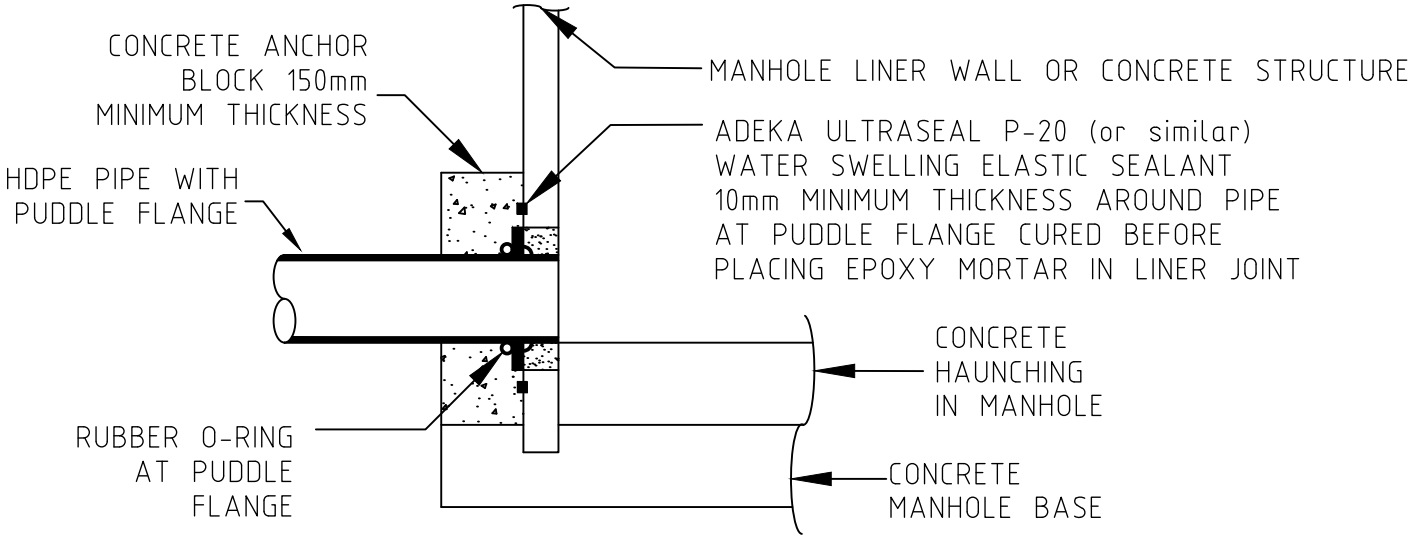
NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	NCC STANDARD PATTERN FOR 600mmØ (NOMINAL) D.I. FRAME AND COVER		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	605



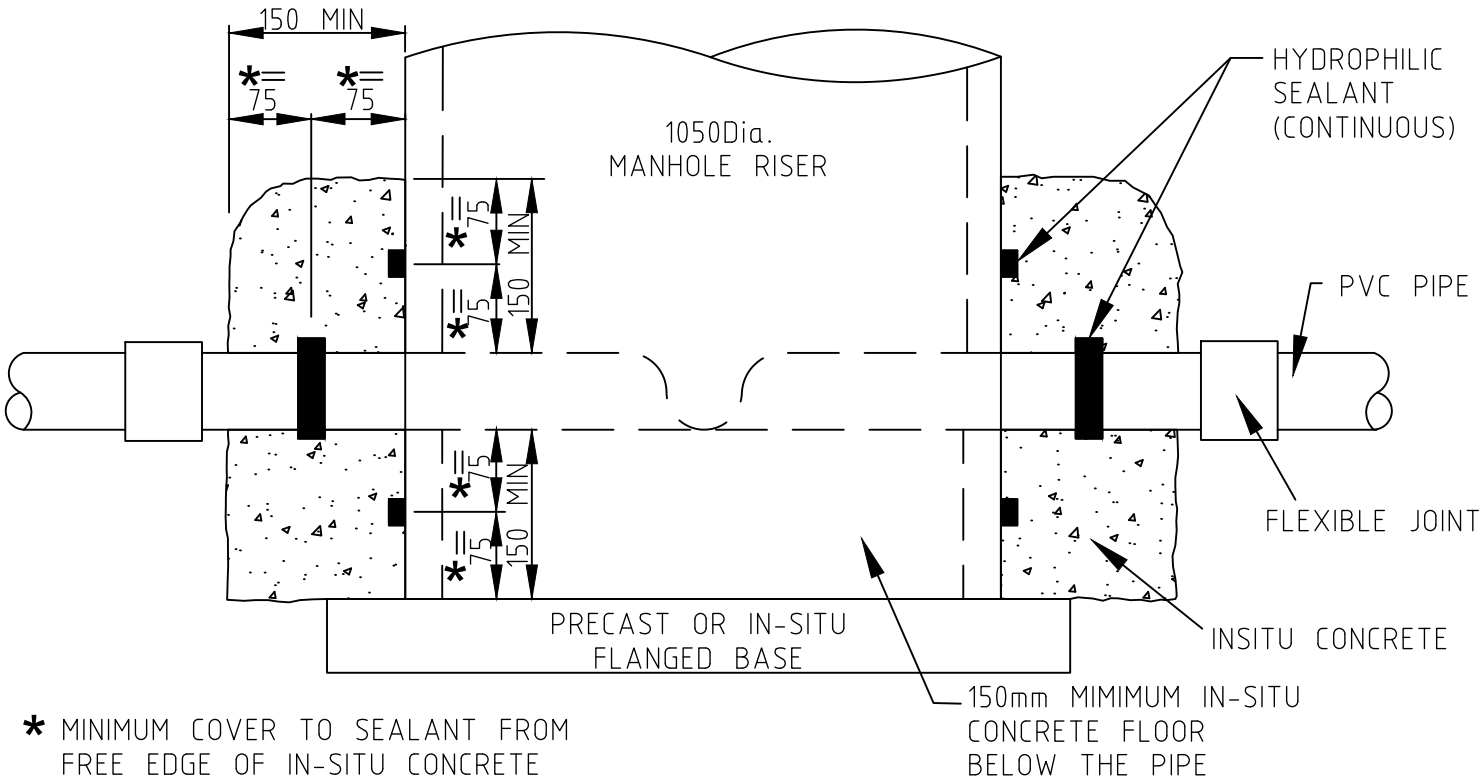
PLAN



NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	MANHOLE FRAME & COVER FIXING, DYNABOLT OR SIMILAR OR REINFORCING FRAME & CONCRETE		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	606



HDPE PIPES



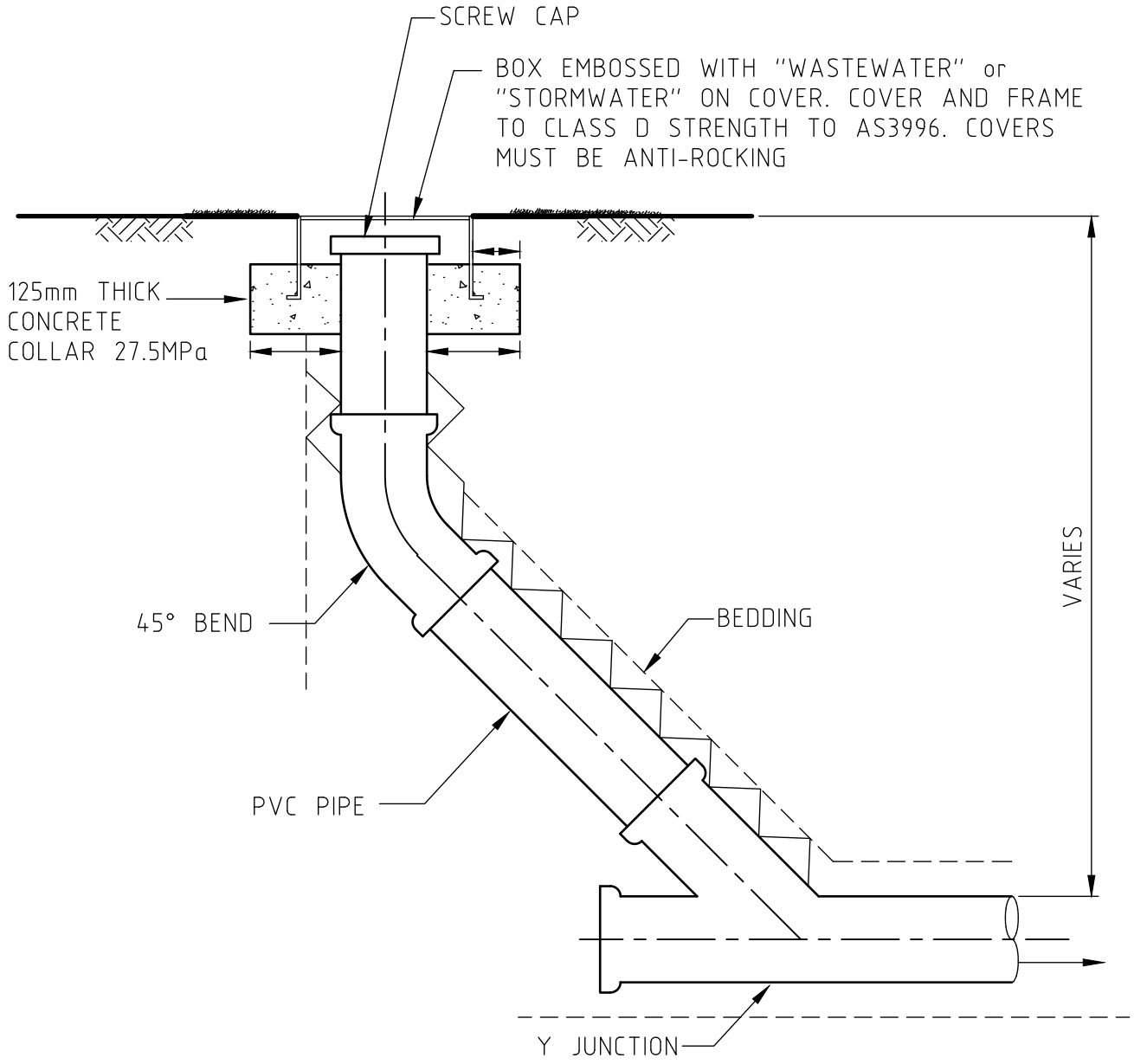
* MINIMUM COVER TO SEALANT FROM FREE EDGE OF IN-SITU CONCRETE

PVC PIPES

NOTES

1. HYDROPHILLIC SEALANT TO BE ADEKA ULTRASEAL P-201 (OR SIMILAR) WATER SWELLING ELASTIC SEALANT 10mm MIN. THICKNESS AROUND THE PIPE CURED BEFORE PLACING IN-SITU CONCRETE.
2. DETAIL APPLIES TO ALL WASTEWATER MANHOLES WHERE THE WASTEWATER PIPELINE MAY BE DEEPER THAN THE WATER TABLE &/OR WHERE TRENCH DRAINAGE (SEE DRAWING 613) IS NOT POSSIBLE WRAP EACH INCOMING & OUTGOING PIPE WITH HYDROPHILIC SEALANT PRIOR TO CONCRETE POUR
3. HYDROSTATIC WATER TEST EACH SEALED MANHOLE PRIOR TO BACKFILLING MANHOLES
4. ALL WORKS TO BE INSPECTED BY COUNCIL PRIOR TO PLACING OF IN-SITU CONCRETE

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	WASTEWATER MANHOLE WATER TIGHTNESS & PIPE RESTRAINT FOR HDPE / PVC PIPES		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	607



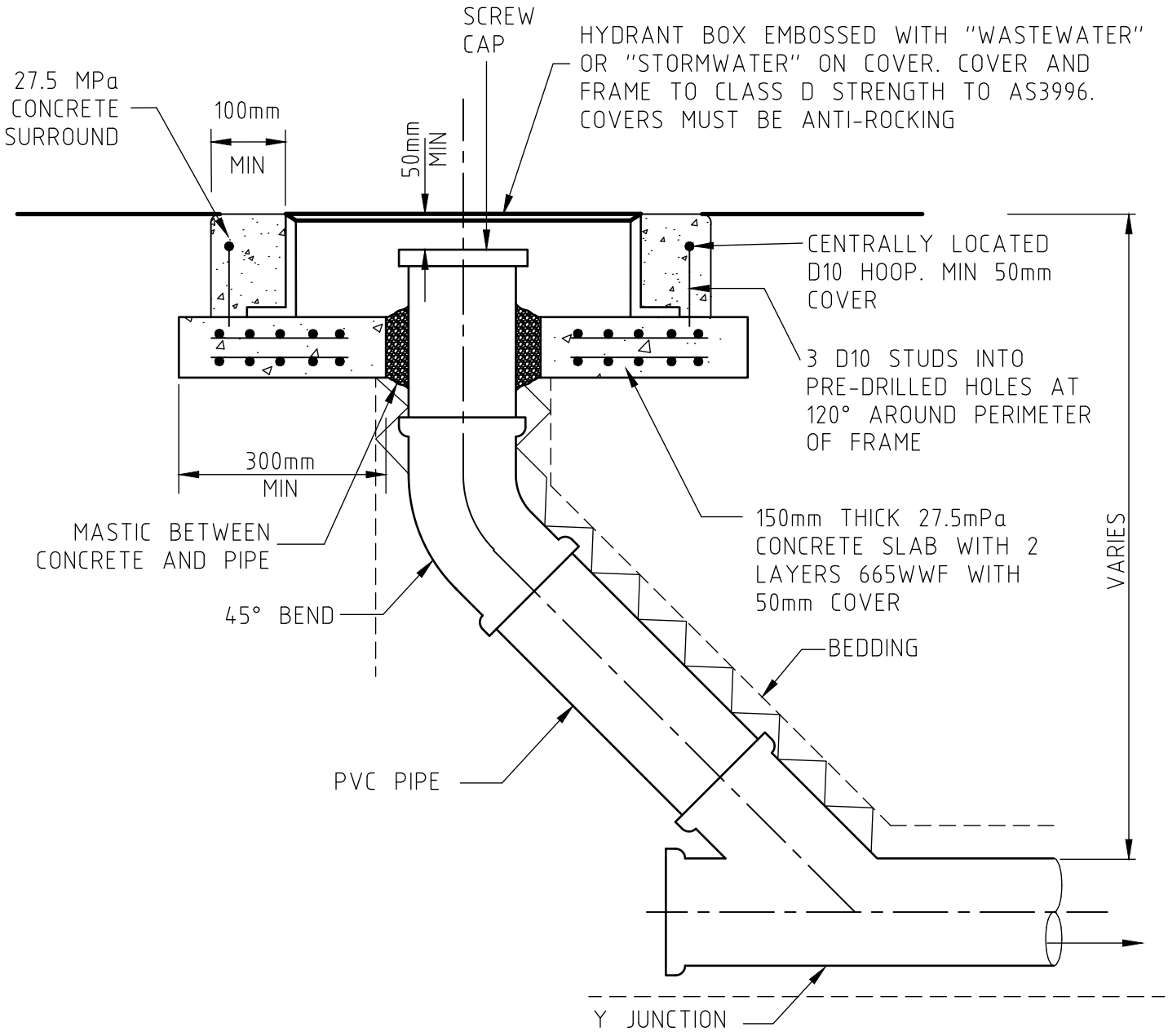
FOR TRAFFIC LOADED RODING POINTS REFER TO DRAWING 610

NOTES

1. RODING POINTS MAY BE USED IN LIEU OF MANHOLES IN ANY OR ALL OF THE FOLLOWING CIRCUMSTANCES:

   A) AT CHANGE OF DIRECTION OR GRADE. (BURIED, PRE-FORMED BENDS MAY BE USED IN LIEU OF RODING POINT WHERE THE CHANGE ON DIRECTION OR GRADE IS CLOSER THAN 20m FROM A RODING POINT OR MANHOLE
   B) AT THE HEAD OF A WASTEWATER SYSTEM
   C) AT THE TOP OF STEEP BANKS WHERE A STANDARD MANHOLE WOULD BE IMPRACTICAL

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	RODING POINT (NON TRAFFIC LOADED)		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	608

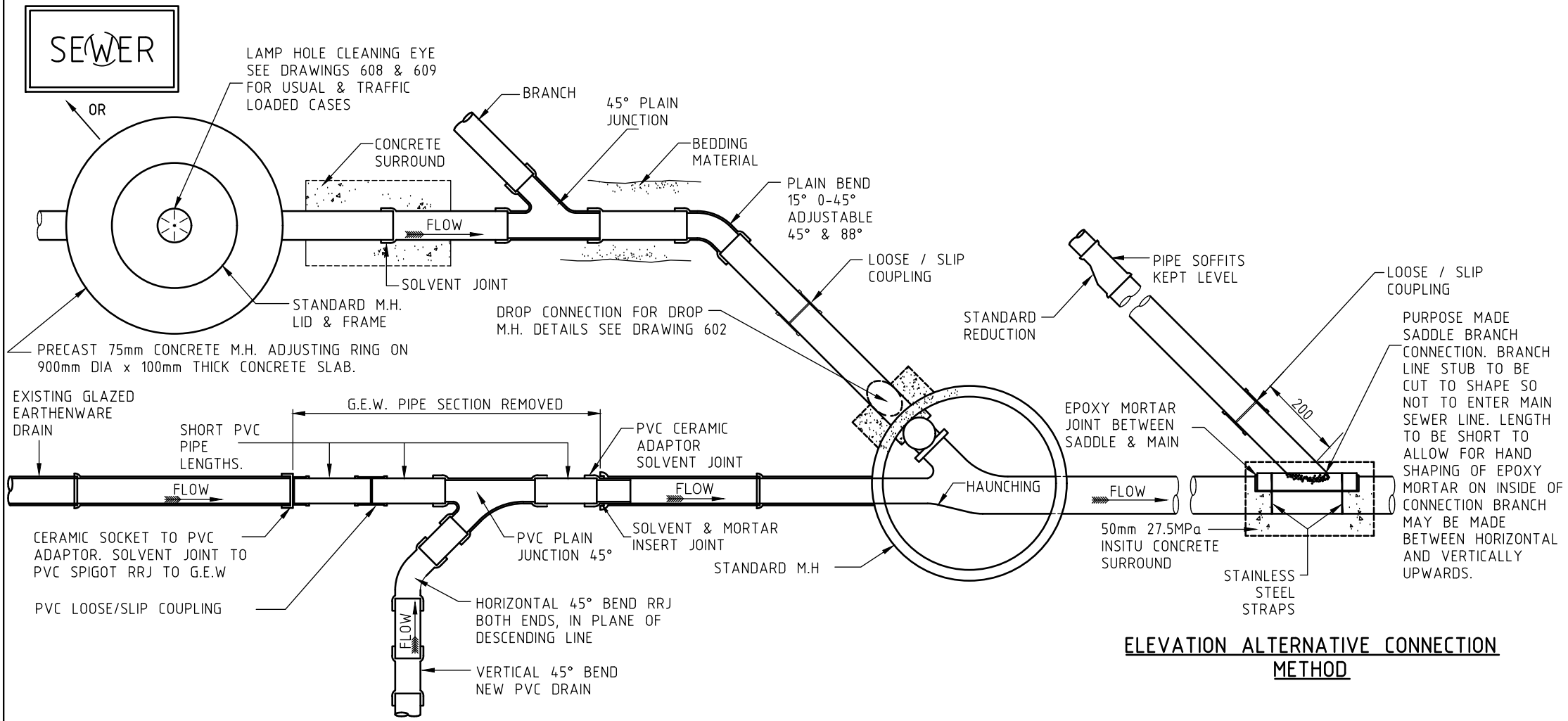


FOR NON TRAFFIC LOADED RODING POINTS REFER TO DRAWING 608

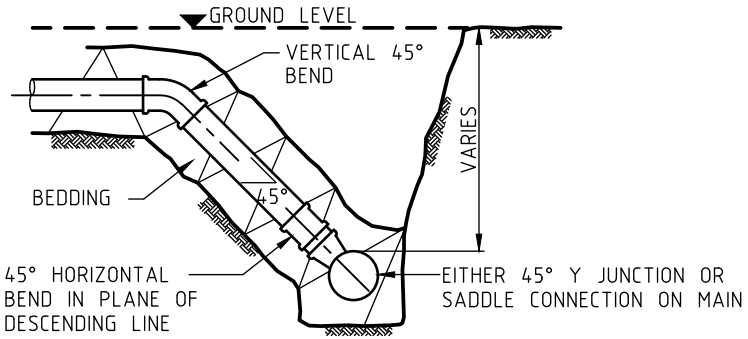
NOTES

1. RODING POINTS MAY BE USED IN LIEU OF MANHOLES IN ANY OR ALL OF THE FOLLOWING CIRCUMSTANCES:
   - A) AT CHANGE OF DIRECTION OR GRADE. (BURIED, PRE-FORMED BENDS MAY BE USED IN LIEU OF RODING POINT WHERE THE CHANGE ON DIRECTION OR GRADE IS CLOSER THAN 20m FROM A RODING POINT OR MANHOLE
   - B) AT THE HEAD OF A WASTEWATER SYSTEM
   - C) AT THE TOP OF STEEP BANKS WHERE A STANDARD MANHOLE WOULD BE IMPRACTICAL

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	RODING POINT (TRAFFIC LOADED)		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	609



ELEVATION ALTERNATIVE CONNECTION METHOD



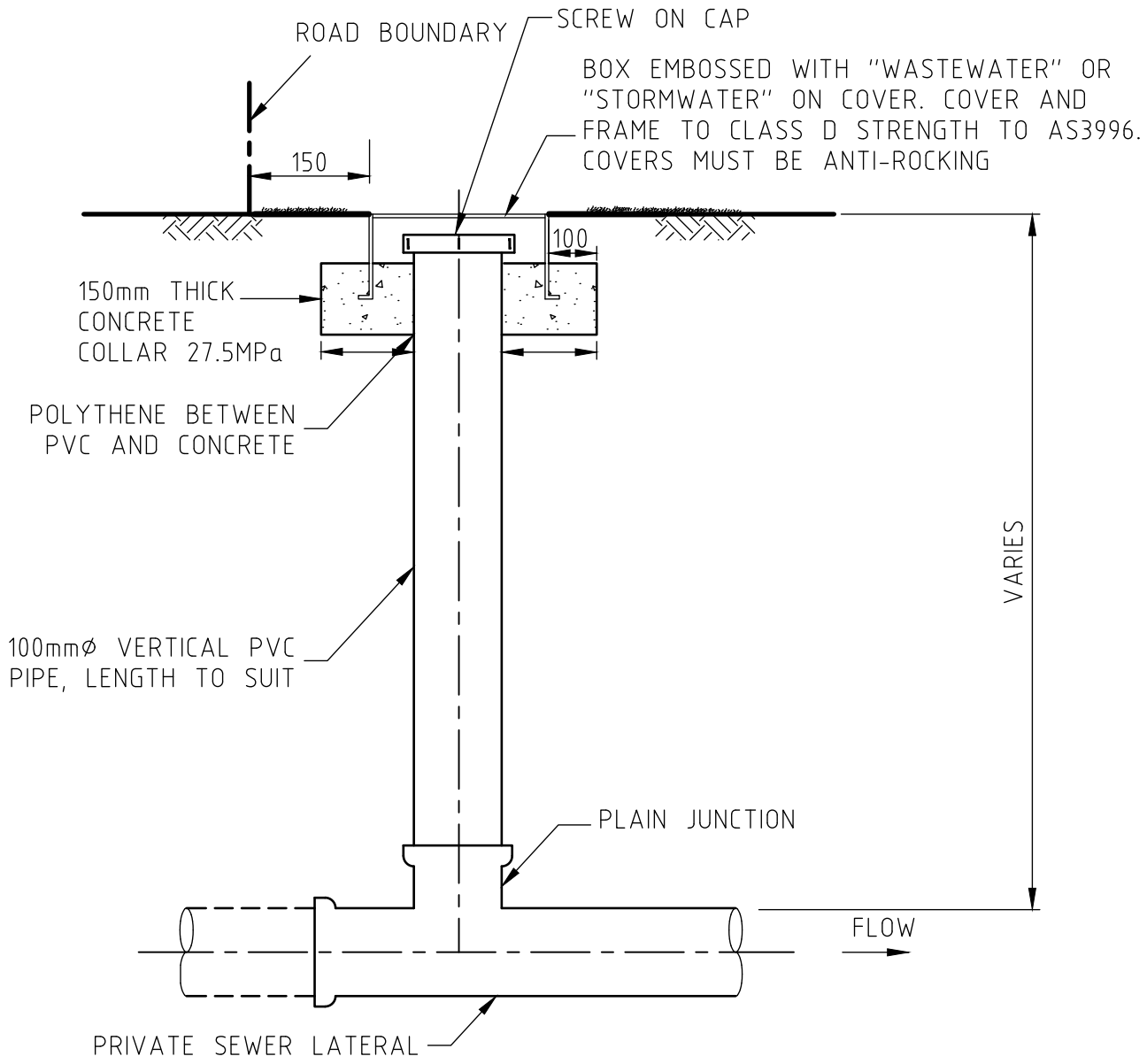
RAMPED CONNECTION ELEVATION

SCHEMATIC OF ELEMENTS USED IN PVC DRAIN CONSTRUCTION

PREFERRED CONNECTION METHOD

SIMILAR SYSTEM TO BE USED CONNECTING INTO EXISTING PVC PIPELINES.
PVC CONNECTIONS AS DETAILED TO BE USED IN NEW PVC DRAINS.

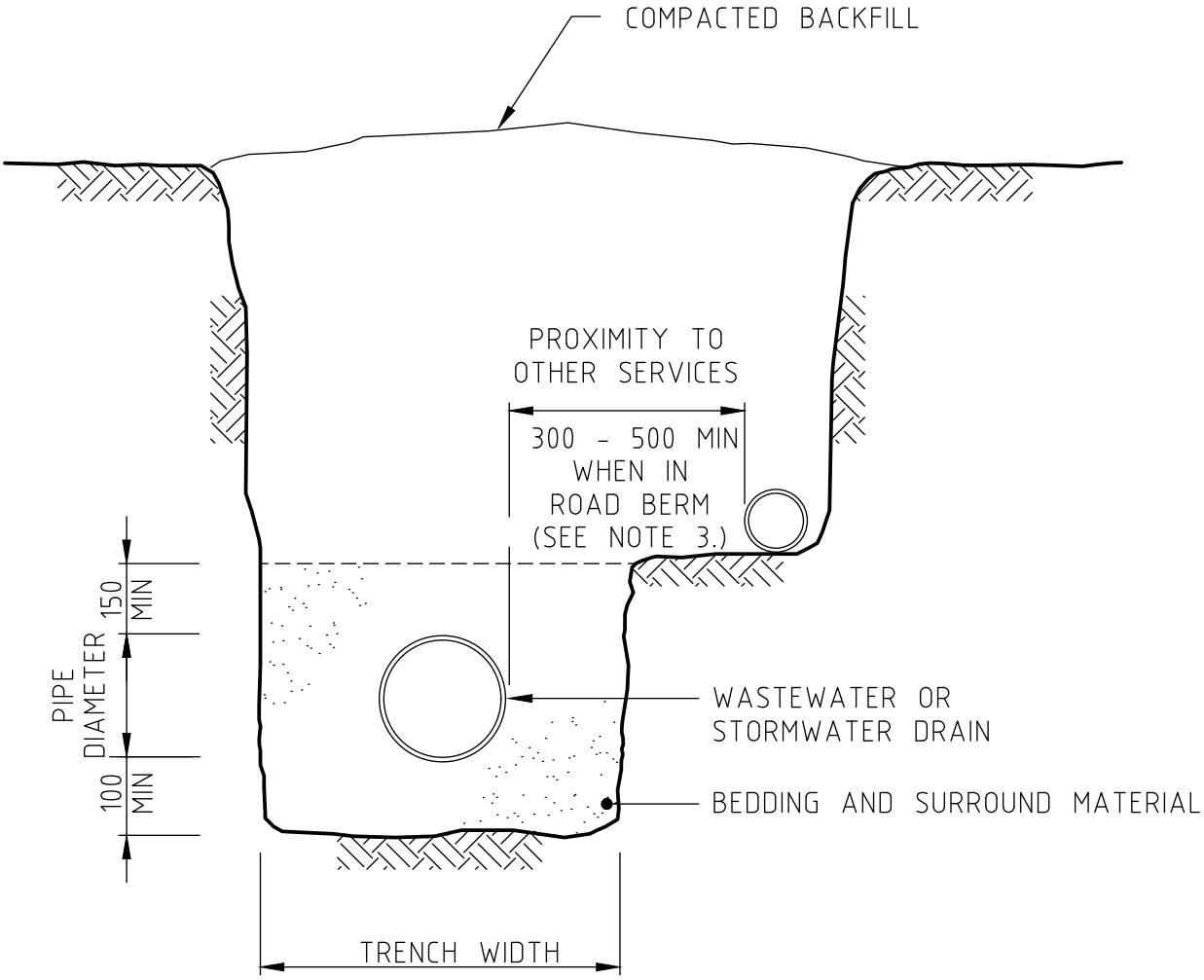
NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	STANDARD PVC PIPE DETAILS		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	610



NOTES

1. IF USED IN AREAS SUBJECT TO VEHICULAR TRAFFIC, THEN USE A TRAFFIC LOADED LID DESIGN, AS PER DRAWING 609
2. INSPECTION TEES SHALL BE POSITIONED 150mm ON THE ROAD RESERVE SIDE OF THE BOUNDARY

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	INSPECTION TEE		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	611



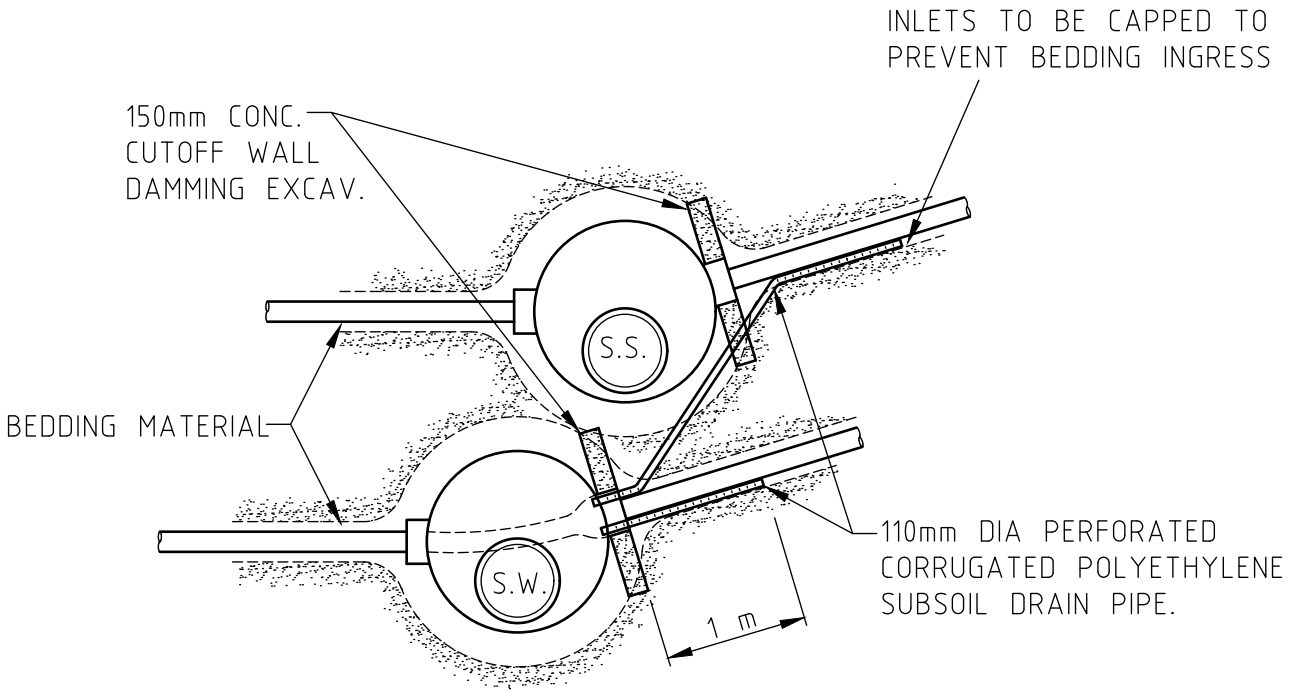
NOTES

1. SEE DRAWING 614 FOR TRENCH WIDTHS

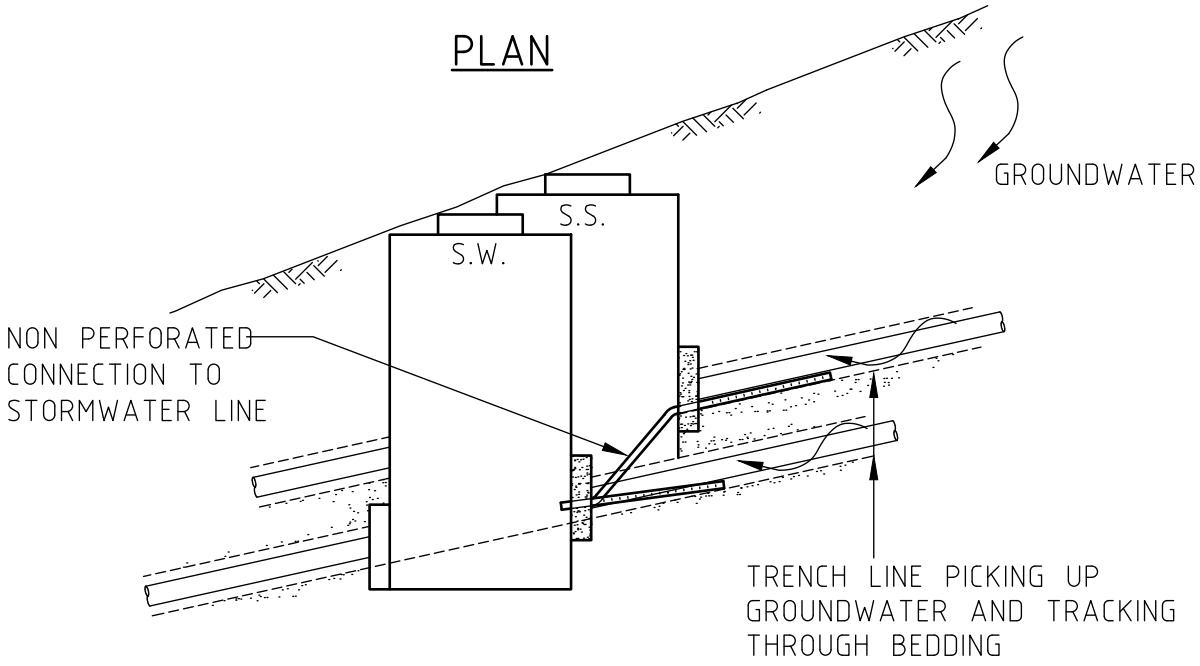
2. THE TRENCH WIDTH SHALL BE THE MINIMUM NECESSARY TO ADEQUATELY AND SAFELY LAY THE PIPE AND TO COMPACT THE SIDE SUPPORT ZONE

3. A MINIMUM HORIZONTAL SEPARATION OF 300mm MAY BE USED WHERE 500mm IS NOT PRACTICAL

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	DRAINAGE SHARED TRENCH CLEARANCES		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	612



PLAN

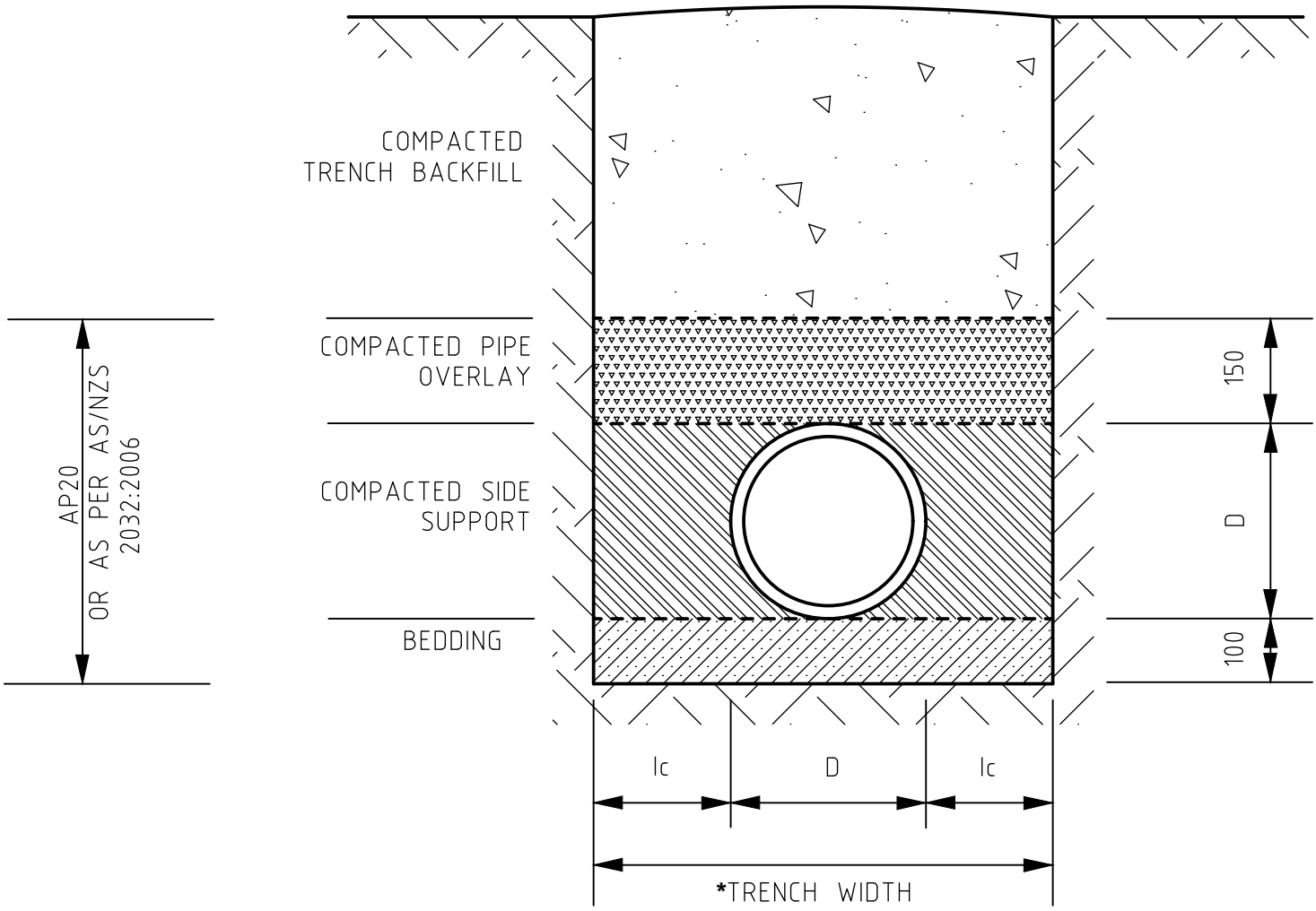


ELEVATION

NOTES

1. SIMILAR PROVISION FOR DRAINAGE OF CABLE AND WATER TRENCHS MAY BE REQUIRED
2. STORMWATER TRENCHES TO BE LAID SLIGHTLY DEEPER THAN SEWER TRENCHES WHERE POSSIBLE.
3. WHERE DRAINAGE OF THE WASTEWATER IS NOT POSSIBLE, ADDITIONAL WATERTIGHT CONSTRUCTION WILL BE REQUIRED. ALTERNATIVELY, AN APPROVED THERMOPLASTIC MANHOLE MAY BE PERMITTED.

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	TRENCH DRAINAGE DETAILS		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	613

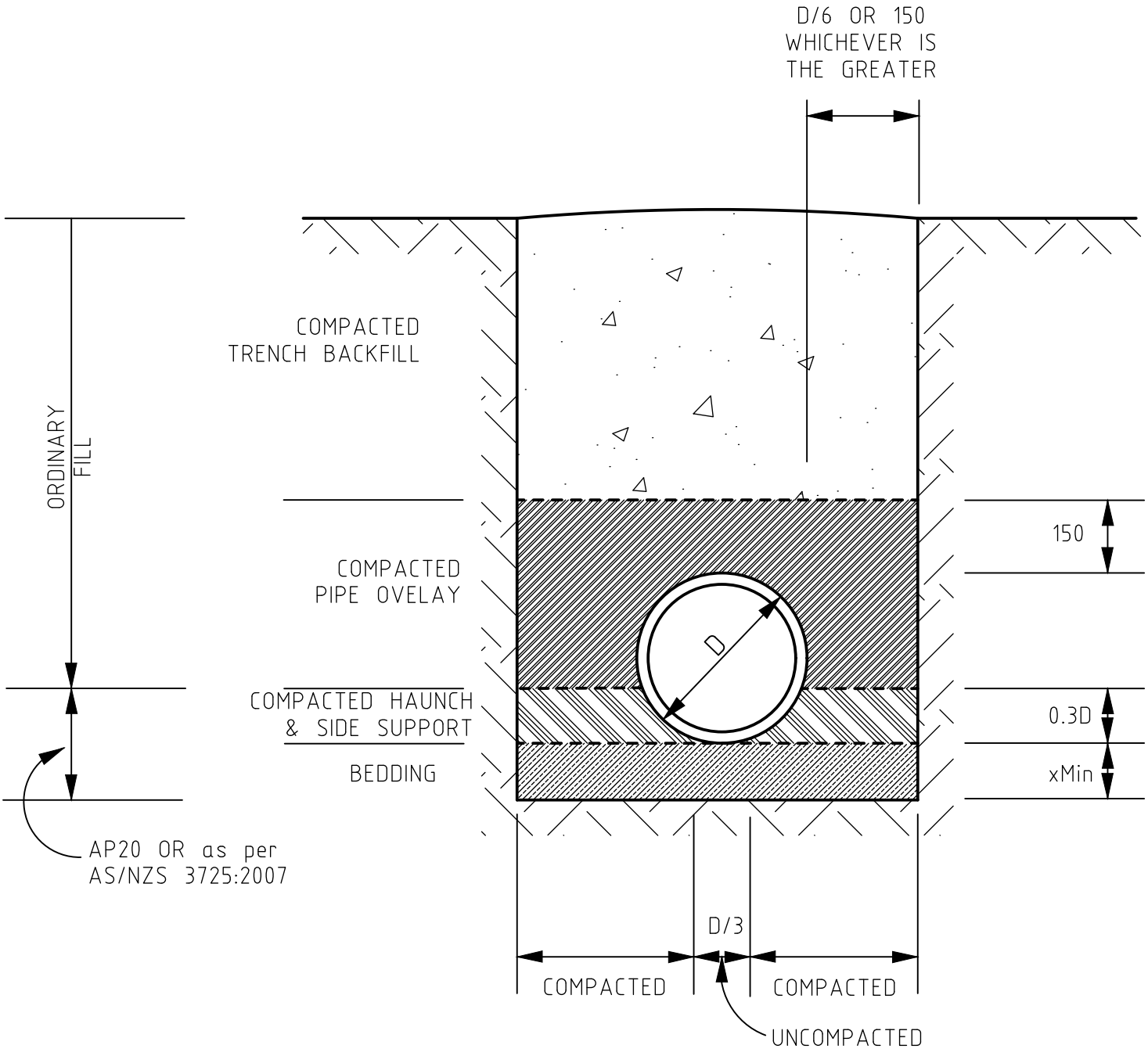


*TRENCH WIDTH

NOMINAL DIAMETER DN (mm)	MINIMUM TRENCH SIDE CLEARANCE " lc " TO AS/NZS 2566	* MAXIMUM
UP TO 150	100	600
200 - 250	150	600
300 - 375	200	775

THE TRENCH WIDTH SHALL BE THE MINIMUM NECESSARY TO ADEQUATELY AND SAFELY LAY THE PIPE AND TO COMPACT THE SIDE SUPPORT ZONE

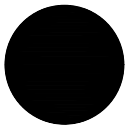
NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	PIPE BEDDING FOR PVC, PE & OTHER FLEXIBLE PIPES		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	614



x = 100mm if D <= 1500
x = 150mm if D > 1500

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	PIPE BEDDING FOR CONCRETE PIPES		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	615

WASTEWATER VALVE CODING:



RISING MAIN SCOUR

SWALLOW CONNECTION
to GRAVITY MAIN

RISING MAIN
LINE VALVE

SWALLOW MAIN
LINE VALVE

GRAVITY MAIN LINE
VALVE at PUMPSTATION

NOTES:

1. PAINT FOR WASTEWATER MARKINGS SHALL BE NZTA M07 "ROAD MARKING PAINT" - RED

NELSON CITY COUNCIL GROUP MANAGER INFRASTRUCTURE, NELSON	WASTEWATER VALVE ROAD MARKINGS		
TASMAN DISTRICT COUNCIL ENGINEERING SERVICES MANAGER, TASMAN	DATE 01/07/19	NELSON - TASMAN LAND DEVELOPMENT MANUAL	616