



FAR NORTH DISTRICT COUNCIL

ENGINEERING STANDARDS & GUIDELINES 2004 – Revised March 2009

(use in conjunction with NZS 4404:2004)

Engineering Standards & Guidelines 2004



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APPENDICIES

APPENDIX A STANDARD CONSTRUCTION DRAWINGS (INFORMATIVE)

APPENDIX E FNDC REQUIREMENTS FOR INDEPENDENT QUALIFIED PERSONS (IQPS)

APPENDIX F ASSET DATA ATTRIBUTE SHEETS

INTRODUCTION

This document replaces the Far North District Council's *Engineering Standards and Guidelines, April 2006*. It is intended for use by residents, ratepayers, developers, contractors, consultants and other stakeholders involved in land, subdivision and infrastructure development works which connect to or impact on the public infrastructure or environment.

The standard must be read in conjunction with NZS 4404:2004 Land Development and Subdivision Engineering

The standard must also be read in conjunction with the following documents:

-

- Far North District Council Bylaws for Earthworks, Water Supply, Parking & Traffic, Parks
- Far North District Council Partly Operative District Plan for the Far North District 2007 (available from website www.fndc.govt.nz)
- Far North District Council Resource Consents Manual, 2002
- Northland Regional Council Regional Air Quality Plan for Northland 2005
- Northland Regional Council Regional Coastal Plan for Northland 2004
- Northland Regional Council Variation Regional Water and Soil Plan for Northland 2007
- Chip Sealing in New Zealand
- Northland Regional Council Guideline for Land Development, 1983, reviewed 1990.
- Northland Regional Council Guideline for Urban Earthworks 1983 reviewed 1990.

Where the requirements of NZS 4404:2004 differ from the requirements stated in this document or the above documents, this document or the above documents will take precedence.

Where the requirements of this document differ from the requirements stated in the operative District Plan, the operative District Plan will take precedence.

Only new clauses and additions, deletions or amendments to existing clauses in NZS 4404:2004 have been included in this document.

A specific clause in this document takes precedence over any clause with the same reference number in NZS 4404:2004.

Where additional information is added to a clause from NZS 4404:2004, only the additional information is included in this document. The additional information must be read in conjunction with the clause in NZS 4404:2004.

As stated in Clause 1.2.1.4 of NZS 4404:2004, clauses in NZS 4404:2004 prefixed by "C" are comments on the corresponding mandatory clauses, and are not to be taken as the only or complete interpretation of the corresponding clause.

References in NZS 4404:2004 to Territorial Authority or TA, mean references to Far North District Council.

Objectives of the Standards and Guidelines

The objectives of these *Engineering Standards and Guidelines* are to:

- Ensure that engineering services for which Council is, or may be, responsible for in future are designed and installed to the appropriate standards;
- Provide guidelines for designers, some acceptable solutions and some local information;
- Set out a process for inspection, maintenance, reporting and certification of engineering services and qualifications of personnel required for this;
- Define the requirements for engineering services, which Council will assume the management and maintenance of after completion of the development.

1 PART 1 GENERAL REQUIREMENTS AND PROCEDURES

1.1 Scope

ADD

These standards and guidelines provide the methods of complying with the required minimum levels of technical performance and quality for the subdivision and development of land where these activities are the subject of the Resource Management Act 1991.

1.2 Interpretation

1.2.3 Definitions

ADD

URBAN AREA OR URBAN LAND means all area or land called urban in the *Partly Operative Far North District Plan October 2007*, or its successor(s), or an area or land considered by council to be of an urban nature or requiring urban services, whether or not contiguous to an urban area as defined above.

1.5 Approval of design and construction

1.5.1 Documents to be submitted for design approval

DELETE AND REPLACE WITH

The following documents shall be submitted to the Authorised Officer for design approval prior to, or as a condition of granting a Resource Consent for subdivision and/or development of land.

- a) Engineering drawings, specifications and calculations for:
 - Earthworks
 - Roading and Site Access
 - Stormwater Drainage (including catchment and water quality issues)
 - Wastewater Drainage
 - Landscaping
 - Reserves Development
- b) Geotechnical Engineers report on the suitability of the land for subdivision and/or development, including the nature and extent of any fill on site and any indication of any previous or potential earth movement;
- c) Any other reports considered necessary by Far North District Council to demonstrate that the proposed works meet the requirement of these *Engineering Standards and Guidelines*;
- d) A design certificate in the form of the certificate in Schedule 1A of NZS 4404:2004. Two copies off all engineering drawings, specifications, calculations and other documents shall be submitted for approval. The submitted drawings shall show all intended vested assets – lines and sizes and outlines of proposed easements;
- e) No construction shall commence prior to the submitted drawings being stamped as approved, by the Far North District Council Utilities and Roading and Drainage Managers. Shall construction commence

without approved drawings, the cost to rectify any such works to meet both the Engineering Standards and Guidelines and conditions of Resource Consent, as required by the Far North District Council, shall be met entirely by the Developer.

1.5.2 Drawings

1.5.2.1 General

DELETE AND REPLACE WITH

Except where otherwise notified, the requirements for drawings are set out in this section and in parts 2 to 9 of these *Engineering Standards and Guidelines*. Drawings must be approved by the Authorised Officer. Drawings shall be provided in paper format.

Engineering drawings shall have an adequate level of detail to clearly illustrate the proposals and to enable compliance with these Engineering Standards and Guidelines to be assessed, and to enable accurate construction.

1.5.2.2 Composition of Drawings

ADD

The scale of the drawings shall be either 1:500 or 1:1000. Any other scale shall only be used with prior permission of the TA.

1.5.2.5 Recording of Work – As-built information

ADD

As detailed in Schedule 1D of NZS 4404:2004 with the following additions:

The following are to be verified as accurate by the IQP, submitted to and accepted by the Authorised Officer prior to the issue of a Section 224 (c) completion certificate in accordance with the Local Government Act.

GIS 'As Built' drawings – 3 No. Hard copies (A1 size) and 1 No. electronic copy in DXF format – AutoCAD, projection NZTM on NZGD2000. Each plan shall be either a 1:500 or 1:1000 scale and shall be provided for each separate service activity. Multiple service activities on the same GIS as-built documentation or plan will not be accepted.

Long sections of the newly installed pipes upon completion of the works shall also be submitted.

CCTV records – 1 No record of CCTV inspections on CD.

'Asset Attribute Data' information – 3 No. hard copies (A3 size) and 1 No. in electronic form of all assets using the relevant asset data forms. (Sample asset attribute data forms are enclosed at Appendix F). 3 No. Hard Copies of Manufacturer's specification manuals and/or operations manuals to be provided with the asset attribute data forms as follows:

Sewerage Asset Attribute Data Forms

SWRG 1 - Sewerage Asset Attributes Data Form – Coordinates.

XY & Z coordinates for all data points, manholes, pumping stations, connections and pipeline change of directions, valves. Council will require all the graphical data to be located / plotted to the following accuracy: X and Y coordinates: ± 300 mm, Z coordinates: ± 100 mm (e.g. manhole cover, hydrant lid level). Invert Levels: ± 20 mm.

Where there are two or more inlets/outlets in a manhole, invert levels are to be stated on the as built, starting from North, working in a clockwise direction.

SWRG 2 - Sewerage Fixed Asset Attributes Data Form – Treatment & Reticulation.

Component list of all fixed assets for treatment plants and/or process, reticulation including pipeline, sizes, and lengths installed. Manufactures specification manuals and/or operations manuals must be supplied of all equipment.

SWRG 3 - Sewerage Asset Attributes Data Form – Land Information on land to be vested in Council.

Water Asset Attribute Data Forms

WTER 1 - Water Asset Attributes Data Form – Coordinates.

XY & Z coordinates for all data points, any valves, pumping stations, hydrants, connections, water meters and pipeline change of directions. Council will require all the graphical data to be located / plotted to the following accuracy: X and Y coordinates: ± 300 mm, Z coordinates: ± 100 mm (e.g. manhole cover, hydrant lid level). Invert Levels: ± 20 mm.

WTER 2 - Water Asset Attributes Data Form – Treatment.

Component list of all fixed assets for treatment pants and/or process, water take and/or source works, pipeline, valves, pump stations, sizes, lengths installed in the reticulation system.

WTER 3 - Water Asset Attributes Data Form – Land Information on land to be vested in Council.

WTER - Water Meter Asset Attributes Data Form – Service Connection Water Meters.

Water Meter information of serviced properties.

Refuse Asset Attribute Data Forms

RFUS 1 - Refuse Asset Attribute Data Form.

Component list of all fixed assets for any Refuse Landfills and Transfer Stations.

RFUS 2 - Water Asset Attributes Data Form – Land Information on land to be vested in Council.

Stormwater Drainage Asset Attribute Data Forms

SWDR 1 - Stormwater Drainage Asset Attributes Data Form – Coordinates.

XY & Z coordinates for all data points including manholes, pumping stations, connections and pipeline change of directions, valves, inlet and outlet structures, sumps etc. Council will require all the graphical data to be located / plotted to the following accuracy: X and Y coordinates: ± 300 mm, Z coordinates: ± 100 mm (e.g. manhole cover, hydrant lid level). Invert Levels: ± 20 mm.

Where there are two or more inlets/outlets in a manhole, invert levels are to be stated on the as built, starting from North, working in a clockwise direction.

SWDR 2 - Stormwater Drainage Asset Attributes Data Form – River Protection and Land Drainage.

Component list of all fixed assets for River Protection and Land Drainage.

SWDR 3 - Drainage Asset Attributes Data Form – Reticulation.

Component list for all fixed assets including pipeline, sizes, and lengths installed in the reticulation system.

Roading Asset Attribute Form

Street Lighting Coordinates

Roading Asset Attribute Database (supplied on CD)

- Bridges
- Carriageway Section
- Carriageway Surface
- Crossings
- Drainage (Roadway)
- Footpaths
- Islands
- Minor Structures (bus shelters, seats, underpasses etc)
- Pavement Structure
- Railings
- Shoulders
- Signs
- SWC and K & C
- Streetlighting
- Retaining / Sea Wall
- Berm
- Markings

1.5.5.2 Notification of phases of work

DELETE AND REPLACE WITH

- Commencement of work
- Prior to concrete works
- Prepared earthworks and sub soil drainage prior to filling
- Completed earthworks and prepared subgrade
- Water, Stormwater and wastewater drainage reticulation prior to backfilling
- Water, Stormwater and wastewater drainage reticulation prior to testing
- Finished base-course before the commencement of road sealing

The Authorised Officer shall be given at least 24 hours notice of the above. Any inspections shall be carried out within 48 hours of notification if possible. Further phases of work shall not commence until any inspection has been carried out and approval given.

1.5.6 Supervision of work

DELETE AND REPLACE WITH

The level of supervision shall be agreed between the Authorised officer and the developers' professional adviser or IQP, and shall be appropriate to the nature, complexity and importance of the project and construction works, and the experience and skill in quality management of the person carrying out the work. Completion certificates as to construction and supervision shall be submitted to the Authorised Officer on completion of the work. The certificates shall be in the form given in Schedules 1B and 1C of NZS 4404:2004.

1.5.7.2 Notice to Connect

DELETE AND REPLACE WITH

The developer shall give the Authorised Officer at least 10 days notice of intent to connect to an existing service. New services shall be tested and

approved by Council prior to connection. Any work undertaken by Council shall be paid for by the Developer.

1.5.9 ADD

The maintenance period us for 12 months from the date of practical completion.

1.5.10 Completion of documentation

ADD

Operation and Maintenance manual requirements

Operation and Maintenance manuals shall follow the standard FNDC format as follows:

Table of Contents

Quality Assurance

This will be completed by Council or Councils Operations & Maintenance Contractor linking the manuals into the existing Quality Management System and Processes.

Scope

Define the entire facility covered by this manual, who it is to be used by & how (linkage's etc).

This is to also include, land boundaries, access ways and easements.

Description

Briefly describe of the facility including additions e.g. storage tanks, odour control, fencing, sealed drive, building, gardens etc.

Process Overview

Provide brief description of the complete process including a geographical & overall process schematic. There is not a need to go into detail, but must be able to demonstrate the general processes, specific design specifications and how these are interlinked. This must also include a description of the plant control system philosophy & functionality.

Operational Function / Process Control

The purpose of this section is to break down into detail the process overview, how the entire operational function of the facility will be carried out to meet the design parameters. The breakdown is to describe in detail & sequentially, each process & process logic in Normal operation mode.

This must also include instructions on how to operate all plant and/or facilities (emergency storage) in both automatic & manual mode. The instructions are to include where instrumentation settings are to be set including probes, level controls, monitors, alarms etc... to meet the requires design parameters & thresholds to achieve maximum efficiency. Use photos, Sequential Function Chart's & text for instructions must also be interlinked.

Use detailed Process & Instrumentation Drawings, Plant Equipment Numbers (should be linked to Asset Management ID) & photos to clearly identify plant & associated process & control interlocks.

Each process must also include all hazards and recommended procedures to mitigate harm (the hazards must be identified, but the procedures can be linked back to the Site H&S Plan.

Alarms, Fault and Troubleshooting Guide

This is in relation to equipment or process failure during normal operation, and to identify through the sequential process of the Operational Function / Process Control section, if a shutdown or fault occurs in part or all of the system, detailed instructions on how to find the fault, how do you fix it, what is the consequence, and possible short term options (bypassing etc...).

Create a template for fault finding & resolution. Include full sample faults & allowance for operating updating. To simplify fault finding & resolution, use SFC's with photos & text for easy reference.

The faults should cover critical events such as a power failure, and identify linkages back to the SOP for fault fixing, e.g. unblocking pump.

This will include a description of all alarm messages, cause of alarm, control system automatic response, operator checklist, alarm priority & their control logic interlocks

Telemetry & Instrumentation

Briefly describe the overview of telemetry system & functionality. Include I/O Tag list & cross reference Telemetry/Instrumentation I/O, scaling etc
Instrumentation calibration certificates.

Health & Safety

Overall Site Specific Health and Safety Plan and must include operational and maintenance aspects.

Resource Consents

Insert current Resource Consent's (if any).

Operation and Maintenance Tasks & Procedures

Task & Schedules

Provide tabulated schedules on A4 pages (if possible)
Full asset inventory of all assets identified in the Scope (as per Engineering Standards),
Operational tasks daily, weekly, monthly, 3-monthly, 6-monthly, annually etc + a checklist.
Maintenance tasks for each asset listed daily, weekly, monthly, 3-monthly, 6-monthly, annually etc + a checklist. Include ground maintenance e.g. mowing, gardening, roading etc.

How to carry out the tasks on the schedules are to be explained in the SOPs and MOPs. Where applicable, include references to Vendor manuals in Appendices.

Standard Operating Procedures (SOP)

This is in relation to operation process not detailed elsewhere and requires the development of detailed procedures with clear instruction on how to carry

out specific tasks identified in the Operational Function / Process Control, Alarms, Fault and Troubleshooting Guide and Task & Schedules Sections, e.g. clearing pump blockage, replacing probes etc...

Standard Maintenance Procedures (MOP)

This is in relation to maintenance processes not detailed elsewhere and requires the development of detailed procedures with clear instruction on how to carry out specific tasks identified in the Operational Task & Schedules Section. This includes the procedures required to maintain the entire facility and assets, and meet the required design life, and maintain maximum plant efficiency.

Monitoring

This will be completed by Council or Councils Operations & Maintenance Contractor and will describe all monitoring requirements & what/how data is used & who is responsible for collecting data.

Management Plans

The Emergency Management Plan and any other relevant management plans will be completed by Council or Council's Operations & Maintenance Contractor

Appendices

Reference to separate folders for all as-built plans, component manuals, MSD, etc

The level of detail and information provided in the Operations and Maintenance Manuals will be dependent on the nature and complexity of the facility

1.6 Bonds and Charges

1.6.1 Uncompleted works bonds

DELETE AND REPLACE WITH

Uncompleted works bonds may be accepted by Council at Councils sole discretion. Bonds shall be in the sum of 150% of a quotation for the uncompleted work. Council may, if the extent of the uncompleted work is small, accept an estimate in lieu of a quotation.

Bonds shall either be provided by a bank. If the extent of the work is small, a cash bond may be acceptable.

The work that is the subject of the bond shall be completed by an agreed date that shall, in any event, be no longer than two years from the date of the bond. Council may, at their sole discretion, call in the bond to have the work completed, on the agreed date unless otherwise agreed.

The developer is required to advise the Authorised Officer when the work has been completed.

PART 1 - ADDITIONAL CLAUSES

1.7 Construction Noise

Construction Noise shall meet the limits in, and be measured and assessed in accordance with the requirements of NZS 6803P:1984 The Measurement and Assessment of Noise from Construction, Maintenance and Demolition Work. In the event that the Authorised Officer has reasonable concerns regarding compliance with the requirements of the above, the Authorised Officer may require the developer to measure the level of construction noise in accordance with the above Standard, at the developers cost. Work shall not continue on any site where compliance with the above Standard is not achieved.

1.8 CCTV inspection of pipelines

All gravity pipelines of 150mm diameter and above shall be subject to a CCTV inspection, carried out after completion of all construction works.

This shall only apply to pipes to be vested in Council ownership, which cover more than one manhole length.

A professional operator shall carry out the CCTV inspection using a pan and tilt camera, in accordance with the technical specification of the New Zealand Pipe Inspection Manual. The operator shall pan around every joint and check every lateral connection and defect.

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

All pipelines shall be free of debris and flushed within 24 hours prior to inspection. Inspections of dry pipelines are not acceptable.

A pipeline will fail its inspection if:

- the pipe is horizontally misaligned or deformed by more than 5% of the pipe diameter.
- the pipe has visible dips or ponding of water.
- the pipe has visible defects, such as open or displaced joints, defective or protruding laterals, cracked barrels or similar defects.
- there is evidence of infiltration at joints or laterals.

PART 2 LAND STABILITY, FOUNDATIONS AND EARTHWORKS

2.6 Special soil types

ADD

Reference shall be made to Far North District Council and Northland Regional Council hazard maps or information on special soil types in the locality.

3.2 General**3.2.3.1 Road Naming****INSERT NEW CLAUSE**

The naming of roads shall be a requirement of Resource Consent and is advisable that developers obtain Council and Community Board approval prior to commencement.

3.2.6.1 Arterial Roads**DELETE AND REPLACE WITH**

Primary arterial roads provide interconnections between major sectors of a large area linked with external areas and distribute traffic from major inter city links. Access is at grade but may be limited. Traffic volumes are typically 7,000 to 10,000 vehicles per day, with a large number of heavy vehicles.

Secondary arterial roads provide access to primary arterial roads. They have a dominant through vehicular movement and carry major public transport routes. Access to property may be restricted and rear servicing facilities may be required.

3.2.6.3 Local Roads**DELETE AND REPLACE WITH**

Local distributor roads have the function of providing access to adjacent residential/industrial/commercial lots.

Local residential and industrial roads, including cul-de-sacs have the primary function of providing access to abutting properties and through which only traffic having origin or destination there will pass. Low speed vehicle movements, pedestrian and local amenity values predominate.

3.2.7.3 Local Roads**DELETE AND REPLACE WITH**

Local roads have the primary function of providing access to adjacent residential/rural lots.

Minor local roads, including cul-de-sacs, have the primary function of providing access to abutting properties and through which only traffic having origin or destination there will pass. Low speed vehicle movements, pedestrian and local amenity values predominate.

3.3 Design**C3.3.1 Minimum requirements**

DELETE Table 3.1

AND REPLACE WITH Table 3.1A

3.3.2 Road geometric design

AMEND Table 3.1

TO Table 3.1A

TABLE 3.1A

Area	Description of Road	Carriageway (metres)	Formation (metres)	Minimum legal width (metres)	Kerb	Lights to NZS 6701	Footpath and Berm
Rural	Type A: ultimate development 5 to 15 H.E.	6.0	8.5	16.0			
Rural	Type B: ultimate development greater than 15 H.E. All collector roads	6.5	8.5	20.0			
Rural	Type C: all arterial and strategic roads	7.5	9.5	20.0			
Urban	Type A: ultimate development 5 to 15 H.E. All service lanes	6.5	9.0	16.0	Yes	Yes (Minor Road)	Footpath one side, no berm
Urban	Type B: ultimate development greater than 15 H.E. (except service lanes)	8.0	12.5	16.0	Yes	Yes (Minor Road)	One side
Urban	Type C: (see notes)	12.0	18.0	20.0	Yes	Yes (Minor Road)	Both sides
Urban	Type D: roads with cycle paths (see notes)	14.0	20.0	22.0	Yes	Yes (Intermediate Road)	Both sides

NOTES:

1. H.E. is Household Equivalent
2. The legal width is the width that has been declared road in accordance with Section 114 of the Public Works Act. Legal widths shall be greater than those shown as necessary to accommodate earthwork cuts and fills
3. Type C roads are collector roads outside normal commercial or industrial areas that:
 - (a) Do not have significant cycle or pedestrian movements or;
 - (b) For which cyclists and pedestrians can easily use alternative routes (e.g. a nearby parallel minor street).

3.3.7 Intersection Design**AMEND FIGURE 3.3**

Design Speeds	Sight Distance	
70	95	As per NZS 4404:2004
80	115	As per Austroads
90	140	As per Austroads
100	170	As per Austroads

3.3.7.1 Access onto Existing Public Roads**3.3.7.2 Crossing of Roads****INSERT NEW CLAUSE**

The crossing of roads that serve an ultimate development of 14 or less household equivalents shall be full intersections or double driveway width

crossings, designed such that the design vehicles do not cross the centreline when turning left into the side road.

The crossing of roads that serve an ultimate development of more than 14 household equivalents shall be full intersections.

Crossings for accesses which carry 60 vehicles per day or more, and have access onto rural roads which are expected to carry more than 1,000 vehicles per day within 10 years shall, in addition to the above requirements, be in accordance with Diagram D of the Addendum to TNZ's "Planning for a Safe and Efficient State Highway Network under the Resource Management Act". For the purposes of these Standards, the "Edgeline of the Existing Road" in Diagram D shall be taken to be the edge of the lane.

Crossing onto urban roads shall be in accordance with drawing FNDC/S/2. Commercial crossings shall be constructed in the commercial zones of the District Plan and for any other developments that generate heavy traffic.

All crossing shall be designed so that no vehicles "bottom out" when using them.

3.3.7.3 Right Turn Bays

INSERT NEW CLAUSE

Full right turn bays shall be provided for all accesses that comply with the warrants in Figure 5.23a of AUSTROADS Part 5 "Intersections at Grade".

3.3.7.4 Rural Accesses

INSERT NEW CLAUSE

Accesses that carry 60 vehicles per day or more, and have access onto rural roads that are expected to carry less than 1,000 vehicles per day in 10 years shall be in accordance with drawing FNDC/S/6D.

The layout of other rural accesses shall be Type 1 in accordance with drawing FNDC/S/6. Crossing onto sealed roads shall be sealed at least to the centreline of the roadside water channel or boundary.

In addition to the above, where an unsealed access way joins a sealed road, the access way shall be sealed a suitable distance from the edge of the carriageway such that loose aggregate will not be spread onto the public road.

3.3.12.1 Urban

ADD

The minimum width of all footpaths shall be 1.5 m.

3.3.12.4 Footpath and cycleway surfacing

AMEND

remove

- (a) Concrete pavers
- (c) Asphaltic Concrete

3.3.13 Traffic services, signage and road furniture

ADD:

The applicant shall select a choice of 3 names for each new public road being constructed and forward them in order of preference to the Authorised Officer with the application for resource consent. A brief explanation of the reasons for the selection shall also be submitted. The Council's decision will

be notified to the applicant so that provision of road name signage, etc, can be made.

Requirements of Street name signs shall be in accordance with the following:

Parameter	Urban and Rural Signs
Background Colour	Blue
Letter Colour	White
Letter Height	100mm
Letter Type Series	C

Road name, walkway and service lane signs shall be erected at all intersections as appropriate. "No Exit" signs shall be erected on all cul-de-sacs or dead-end roads.

3.3.21 Road drainage

DELETE AND REPLACE WITH

3.3.21.1 Minimum size of Drainage pipes

Road drainage shall be designed in accordance with Transit New Zealand's guideline document "Highway Surface Drainage; Design Guide for Highways" with a Positive Collection system: for applicable roads, except that stormwater run off shall not be discharged into any sewer.

Road drainage pipes and culverts shall be at least 300mm internal diameter.

3.4 Construction

3.4.2 Materials for flexible pavements

3.4.2.1 Basecourse Material

DELETE AND REPLACE WITH

The basecourse is the top layer of the pavement and is required in the layer described as "base material" in figure 8.4 of the AUSTRROADS Pavement design Manual. Two types of crushed rock material are acceptable for use as pavement basecourse.

TNZ M4 (AP40) complies with TNZ M/4 Specification or PAP 40 complying with the following:

Grading for PAP 40

Sieve Size (mm)	% passing of maximum	% passing of minimum
37.5	100	100
19.0	81	63
9.5	57	41
4.75	43	26
2.36	33	18
1.18	25	11
.600	19	6
.300	14	3
.150	10 max	
.075	7 max	

Grading Shape control for PAP 40

Fraction	% of material in fraction
37.5 – 09.5	-
19.0 – 4.75	27 - 49
09.5 – 2.36	13 - 34
4.75 – 1.18	7 - 28
2.36 - 600	6 - 22
1.18 - 300	5 - 19
600 - 150	2 - 14

Plasticity Index for PAP 40 – maximum 6

Clay index for PAP 40 – maximum 4

Miscellaneous Quality requirements for PAP 40

Crushing Resistance	Weathering Resistance	Sand Equivalent
130 kN (min)	AA, AB, AC, BA, BB, CA	36

3.4.2.2 Sub base Material

DELETE AND REPLACE WITH

The pavement layer between the base layer (as required by figure 8.4 of the AUSTROADS Pavement design Manual) and a minimum depth of 200mm below the pavement surface shall consist of either basecourse material or GAP 40 sub base material. GAP 40 has the same grading, grading shape control, and plasticity index and clay index requirements as PAP 40 aggregate. However, other requirements are as shown below:

Crushing Resistance	Weathering Resistance	Sand Equivalent
110 kN (min)	AA, AB, AC, BA, BB, CA, CB	15

Material below the 200mm depth shall achieve a soaked CBR that is suitable for the design loadings as indicated by the pavement design. The GAP 4 and/or basecourse depths shall be greater than 200 mm as required to suit the material below the sub base layer.

The materials for other pavement types (e.g. stabilised pavements) shall be specifically designed and/or tested to ensure their suitability for their intended purpose. This may include lime or cement reactivity testing. NZ Heavy Compaction in accordance with NZS 4402 Part 4 shall be used in any laboratory testing of pavement materials.

3.4.3 Road surfacing

ADD

The following roads shall be sealed:

- All urban roads;
- All rural roads which are within 300 metres of an existing sealed road, and/or which will service ultimate development of 5 household equivalents or more, and/or are steeper than 1 in 10 (10%);
- Consideration will be given to segmental concrete pavers on a case-by-case basis. Their use will be at the sole discretion of Councils Authorised Person.

3.4.11 Deflection testing prior to surfacing

ADD

The use of Impact Hammer or Falling Weight deflection testing will be considered on a case-by-case basis.

3.4.14 Footpaths

3.4.14.1 Concrete

3.4.14.2 Asphaltic Concrete

DELETE

3.4.14.3 Concrete Pavers

DELETE

3.4.14.4 Surface finish, tolerances

ADD

The crossfall on footpaths shall be a minimum of 3% and a maximum of 5%.

Tables

3.2 Road design standards – Rural (speed limit up to 100 km/h)

AMEND

Delete columns headed Minimum Road Reserve and Normal Camber and replace with the following:

Classification	Minimum Road Reserve (m)	Normal Camber
Minor Local	16.0	4%
Sub-collector	20.0	4%
Minor collector	20.0	4%
Major collector	20.0	4%
Arterial	20.0	4%

Figures

3.8 Footpath construction – typical sections

AMEND

Delete sections on asphalt and interlocking pavers.

Amend 1400 dimension to 1500.

3.10 Standard light duty vehicle crossing detail

DELETE

3.15 Hillside sump

AMEND

For flows exceeding 20 l/s or on a slope of 5% or greater then specific design is required to be undertaken.

3.16 Add-on to back-entry sump for hillside situations

AMEND

For flows exceeding 201/s or on a slope of 5% or greater, then specific design is required to be undertaken.

3.17 An alternative sump for hillside situations

AMEND

For flows exceeding 201/s or on a slope of 5% or greater, then specific design is required to be undertaken.

3.18 Special entry to double sump in hillside channel

AMEND

For flows exceeding 201/s or on a slope of 5% or greater, then specific design is required to be undertaken.

3.19 Double back-entry sump for road low points

ADD

- FNDC/S/2 Residential and Commercial Vehicle Crossings
- FNDC/S/6 Residential Vehicle Crossings – Unkerbed Roads

With the following note:

For flows exceeding 201/s or on a slope of 5% or greater, then specific design is required to be undertaken.

4.2 General**4.2.3 Local authorities' requirements****DELETE AND REPLACE WITH**

The requirements of the Regional Plan and the District Plan relating to stormwater drainage shall be met as well as any relevant district bylaws, and urban catchment stormwater management plans, if applicable. Regional Plan requirements will generally be limited to effects on the natural environment.

The division of responsibilities between territorial authorities and regional councils is set out in the Resource Management Act. The Far North District Council exercises control over works including drainage works associated with land development and subdivision. Approval of drainage works is required from the council. Natural water quantity and quality, damming and diversion, and natural hazard risk management are controlled by the Regional Council.

Authorisation for the effects of drainage activities is required from the Regional Council. Activities with minor effects may be permitted by a rule in the Regional Plan. Other activities require specific resource consent from the Regional Council.

Authorisation will be required from the Regional Council for the discharge of stormwater unless the discharge is to an existing stormwater drainage system and meets all the conditions that apply to the existing system. This must be confirmed with the Authorised Officer. Other activities often associated with stormwater drainage works which must be authorised by the Regional Council include: the diversion of natural water during construction work, the permanent diversion of natural water as a consequence of the development, activities in the bed or on the banks of a natural waterway, and damming natural waterways. The discharge of clear stormwater and other activities where effects are considered minor may be authorised as a permitted activity subject to certain conditions in the regional plan. Authorisation may also be by way of a comprehensive consent held for a large area or entire catchment.

Other discharge and water permits for works to be transferred to the council upon completion must be discussed with Council. Council will accept for transfer to it within recognised urban stormwater catchments that can be incorporated into existing consents, or which will be included in future consents that Council expects to obtain. Where transfer to Council is desired, Council's prior agreement to such transfer must be obtained.

A 75% contaminant removal efficiency is acceptable as a best practicable option for stormwater treatment devices. For small, impervious catchments stormwater treatment devices which capture the first 10 mm to 15 mm of runoff (depending on local climate) are acceptable. A different level of treatment may be required under a Northland Regional Council Resource Consent.

Operations and Maintenance Manuals shall be provided for any water quantity and/or quality control structures in accordance with Clause 1.5. The Manuals must include recommended means of sediment removal and disposal, plant establishment, vegetation control and nuisance control.

4.2.4 Catchment management planning and Off-Site Effects

DELETE AND REPLACE WITH

The developer must take into account catchment-wide issues at the concept design stage. The implications of future development upstream of the site and the cumulative effects of land development on water quality and flooding downstream are important considerations. The larger the scale of the development the more significant catchment management planning issues are likely to be. The developer must show how these issues are to be addressed and the effects dealt with. Where the discharge is to be into council's system and/or is to be incorporated into council's existing or future discharge consent, then the developer must demonstrate that consent conditions, including quality requirements, will be met.

All stormwater systems shall provide for the collection and controlled disposal of stormwater from within the land being developed together with any runoff from upstream catchments. In designing downstream facilities the upstream catchment shall be considered as being fully developed to the extent defined in the current District Plan. For all land development works (including projects involving changes in land use or coverage) the design of the stormwater disposal system shall include the evaluation of stormwater runoff changes on upstream and downstream properties.

Upstream flood levels shall not be increased by any downstream development unless any increase is small and can be shown to have no detrimental effects on the upstream properties. Downstream impacts investigated shall include (but are not limited to) changes in flow peaks and patterns, flood water levels, contamination levels and erosion or silting effects, and effects on the existing stormwater drainage system. Where such impacts are considered detrimental mitigation measures (e.g. Peak flow attenuation, velocity control, contamination reduction facilities) on or around the development site, or the upgrading of downstream stormwater disposal systems at the developer's expense are likely to be required.

4.2.6 System components

DELETE AND REPLACE WITH

The stormwater drainage system conveys storm surface runoff and shallow groundwater from the point of interception to the point of discharge to receiving waters. Components of the conventional primary drainage system include roadside channels and sumps, stormwater pipelines, subsoil drains, and outlet structures. Secondary surface flow paths to convey primary system overflows must also be provided.

For small rural developments a stormwater drainage network may not be necessary. Piped stormwater discharge from individual lots to soak pits, swales or natural waterways may be acceptable.

All stormwater drainage systems shall be designed as separate systems (i.e. with no inter-connections whatsoever with the wastewater system).

The piping or filling in of natural waterways should be avoided. The natural features and amenity values of highly modified natural waterways should be restored and enhanced respectively. Written approval will be required from the Authorised Officer to fill or pipe a natural waterway. Significant natural waterways should be located within public reserves.

4.2.7 Alternative stormwater systems

DELETE AND REPLACE WITH

Stormwater systems incorporating swales, soakage devices, waterways and wetlands, and water quantity and quality control structures can provide an alternative means of stormwater conveyance and disposal. Well designed

and well maintained alternative systems which replicate the pre-development hydrological regime can not only mitigate the adverse environment effects but also enhance local amenity and ecological values.

(Refer to the latest ARC Tech Pub no 124 “Low Impact Design Manual for the Auckland Region”, SNZ HB 44: 2001 (draft) “Subdivisions for People and the Environment”, and ARC Tech Pub no 10 “Stormwater Treatment Devices” for guidance).

Alternative stormwater systems will require specific approval and should be discussed with the Authorised Officer at an early stage.

Detention ponds and structures for flow attenuation are to be designed in accordance with the NZ Water Environment Research Foundation, “On-site Stormwater Management guideline”.

4.3 Design

4.3.1 Approval of proposed works

DELETE AND REPLACE WITH

The approval process for land development and subdivision design and construction and the documents and supporting information on stormwater drainage works to be provided at each stage of the process shall be in accordance with these Engineering Standards.

New stormwater drainage systems generally require approval from the Council and authorisation from the Regional Council. Authorisation may be by way of a permitted activity or rule in a regional plan or water/discharge permit. In these circumstances it is good practice:

- (a) To consult with Authorised Officers from both local authorities prior to consent application;
- (b) To process subdivision and water related resource consents simultaneously and deal with land and water issues a joint hearing pursuant to clause 102 of the RMA may be held;
- (c) To delay the commencement of site works until a water/discharge permit has been granted.

The following specific information shall be provided to the Authorised officer for approval for developments or subdivisions incorporating stormwater drainage works:

- (a) The location of any natural waterways or wetlands within the site or in close proximity to a boundary. The location in plan and level of the waters edge and shoulder of the banks shall be indicated;
- (b) Typical pre-existing and post development cross-sections through any natural waterways or wetlands;
- (c) The proposed proximity of buildings to the waters edge and/or shoulder of the banks;
- (d) Clear identification of the extent of any river or coastal floodplains on or in close proximity to the site and overland flow paths within the site;
- (e) The level datum;
- (f) A plan showing the proposed location of existing and proposed stormwater works and flow paths;
- (g) Detailed long sections showing the levels and grades of proposed stormwater drains in terms of datum;

- (h) Details and calculations prepared by persons experienced in catchment analysis which prove that the proposed system is of adequate capacity. All applications to build within a flood plain must show boundaries and levels relative to building floor levels;
- (i) Details and calculations prepared by persons experienced in catchment analysis which clearly indicate any impact on adjacent area or catchment that the proposed works shall have;
- (j) Operations and maintenance manuals for any water quantity and or quality control structures shall be submitted to the council for design approval along with other documents;
- (k) Details of any items for which the developer expects Council to take over maintenance responsibility.

4.3.2 System design

4.3.2.1 The designer

ADD

And shall be confirmed by a Hydrologist, if requested by the Far North District Council.

4.3.2.4 Secondary flow paths

ADD

For secondary flow path safety, the maximum allowable product of velocity and depth (in metres) shall be 0.4.

4.3.2.5.1 Design Storms

DELETE AND REPLACE WITH

The return period for Rural and Rural Residential Areas, Residential Areas and Commercial and Industrial Areas, shall be 10 years. All areas where no secondary flow path or secondary protection is available shall be 100 years. Secondary protection shall be satisfied by a combination of the primary protection system and appropriately designed secondary flow paths, controlled flood plains and setting of appropriate building levels.

4.3.2.5.2 Freeboard

DELETE AND REPLACE WITH

Where flood plains, ponding areas or secondary flow paths are identified, the following restrictions shall apply:

- All habitable buildings shall be set above the 100 year return period flood level plus 500mm;
- Areas used for storage of hazardous chemicals or goods be set above or bunded to the 100 year return period flood level plus 500mm;
- In outer catchment areas, habitable floor levels shall be set at least 500mm above the water level of the adjacent identified 100 year return period flood level;
- Buildings to be constructed on the upstream side of roads shall have floor levels set at least 300mm above the crest of the road;
- Buildings in catchments of less than 0.25 hectares, or on land which is free from flooding and not adjacent to a watercourse and

not located in a low lying area or in a secondary flow paths shall be set above the 1 in 10 year return period flood level plus 500mm.

Where the 100 year return period secondary flow path is not otherwise defined, then all floors shall be constructed in accordance with the levels set below:

- All floors shall be constructed at least 200mm above natural ground levels;
- For floors partially set in the ground, the walls surrounding the floors shall be constructed at least 200mm above natural ground levels and of impervious materials and fully drained. The ground shall be graded away from the wall at a slope of 1:10 for a minimum of 1.5 metres;
- Entrances to floors partially set into the ground or below a secondary flowpath leaving the site shall be arranged such that at least 200mm freeboard to surface water is maintained and that the surface water is directed clear of the entrance;
- Drains at entrances below surrounding ground must be designed to capture and discharge the 100-year return period surface flow from the contributing area;
- Where it is necessary to set the floor flush with uphill surfaces for access purposes, adequate consideration must be given to prevent surface water from the 100- year return period event from entering the floor. This may include grilles or gratings next to the entrance and shaping uphill surfaces to convey the flow clear of the entrance to be protected.

4.3.3 Pipelines and Culverts

4.3.3.2 Pipe materials

DELETE AND REPLACE WITH

Pipes shall generally be RRJ Reinforced Concrete to NZS 7649. Other materials will be considered on a case-by-case basis.

Ductile Iron, spiral welded, corrugated steel and corrugated aluminium will not be acceptable.

4.3.3.3 Building over pipelines

DELETE AND REPLACE WITH

Building over pipelines will not be permitted.

4.3.3.5 Minimum Pipe sizes

DELETE AND REPLACE WITH

Minimum pipe sizes shall be:

- (a) 300mm internal diameter for sump outlets
- (b) 300mm internal diameter for stormwater mains

4.3.3.6 Minimum Cover

DELETE AND REPLACE WITH

Minimum cover to pipes shall be in accordance with manufacturer's recommendations, but not less than:

- (a) 600mm in areas not subject to traffic loading
- (b) 900mm under carriageways

4.3.4 Manholes

4.3.4.2 Manhole Materials

DELETE AND REPLACE WITH

Manholes shall be reinforced concrete. Other materials may be considered on a case by case basis.

4.3.4.6 Access

ADD

All access covers shall be painted blue spectrum sunproof F8 (or similar), prior to the assets being accepted by the Far North District Council.

4.3.7 Connection to the public system

4.3.7.1 Individual lots and developments

ADD

For vacant lots the connection shall terminate not more than 250mm inside the boundary with a terminal inspection, plugged, watertight and marked with a blue timber stake.

An as-built shall be submitted upon completion of the works for any connection within an existing footpath, or any other part of the road reserve.

4.3.9 Easements

DELETE AND REPLACE WITH

Easements shall be provided in favour of Far North District Council here any Council owned pipeline crosses private property, or to provide access over private property to Far North District Councils assets, and around Far North District Council assets for the purposes of maintenance and operation.

Such easements shall be 3 metres wide in the case of pipelines or access, and shall provide at least 2 metres clearance around other Far North District Council assets.

Easements shall also be provided in favour of Far North District Council over land designated as secondary flow paths.

4.4 Construction

4.4.1 Construction standard specifications

DELETE AND REPLACE WITH

A Registered Drainlayer or equivalent recognised qualification shall install all pipelines.

4.4.2 Pipeline construction

ADD

All pipelines shall be installed by a Registered Drainlayer or equivalent recognised qualification.

4.4.6 Testing

DELETE AND REPLACE WITH

Stormwater pipelines should be tested for leaks and pass one of the three drain leakage tests described in E1\VM1. The low pressure air test is the preferred test.

All pipelines shall be inspected and recorded by CCTV on CD. The CD shall also be accompanied by a report on the CCTV footage and shall be included with the "As Built" documentation. No reticulation will be vested to the Far North District Council without this information being received.

5.3 Design**ADD**

Sewage reticulation systems, treatment and disposal facilities shall:

- Be adequate for all estimated domestic, commercial and industrial flows for the ultimate development and;
- Have a design life of at least 20 years for mechanical and electrical plant and equipment of at least 60 years for pipelines and of at least 50 years for manholes, storage tanks and all underground chambers;
- In potentially unstable ground, filled ground, and in marine reclamations or where special protection is required, the sewer pipelines shall be specifically designed to ensure their integrity for the required design life. In flat or rolling country every effort should be made in the design to have the sewers as steep as reasonably possible.

5.3.2 Design of the wastewater system**5.3.2.2 Scheme Layout****DELETE AND REPLACE WITH**

Pipes should be positioned as follows:

- Within the street or road – clear of carriageways and in road berms if practicable;
- Within public land – with permission of the controlling authority;
- Within drainage reserves – outside the in 100 year flood area;
- Within private property – as near as possible to boundaries, and parallel to front, rear and/or side boundaries. 3 metre wide easements in favour of far North District Council will be required.
- No deeper than 3.0 meters unless prior approval has been granted by the Far North District Councils Authorised Officer.

5.3.2.7 Maintenance structure location**ADD**

Maintenance Shafts (MS) will only be accepted by Far North District Council in exceptional circumstances and with the written approval of the Authorised Officer.

5.3.2.9 Buildings or other structures over existing pipes**NEW CLAUSE****General**

With respect to building or loading over buried services, or excavation near public sewers, the following restrictions shall apply. Other restrictions may be applied by the TA for the protection of the public drainage system after consideration of proposed work methods, depth of excavation, soil physical properties, and other site specific factors.

- a) Building over buried services

No building shall be built over a public rising main or trunk sewer, or closer than the greater of

- a)
- 1.5 meters from the centre of any main or sewer, or
 - The depth of the centre line of the sewer, plus the diameter of the sewer, plus 0.2 meters from the centre of that sewer, subject to compliance with 3.1 of NZS 3604
- b) Other public sewers
- No building shall be built over a public sewer, whether on public or private land
 - No building shall be built closer than the greater of:
 - 1.5 metres from the centre of any public sewer, or
 - the depth of the centreline of the sewer, plus the diameter of the sewer, plus 0.2 metres from the centre of that sewer, subject to compliance with 3.1 of NZS 3604
- c) Subject to approval, a building developer may meet the cost of diverting the public sewer (including any manholes) in accordance with WWA standards.

Where (a) (b) and (c) above are found to be impractical and the building cannot be sited elsewhere on the property or modified to conform with the above conditions, and it is essential for the proposed building to be built on that part of the property, approval may be granted subject to the building developer meeting the cost of any specific requirements. These may include the provision of access manholes, pipe strengthening, ducting, additional support of the building's foundations and re-locatable construction.

Loading or material over public sewers

No person shall cause the crushing load imposed on a public sewer to exceed that which would arise from the soil overburden plus a HN-HO-72 wheel or axle load (as defined by Transit New Zealand Bridge Manual).

No person shall place any additional material over or near a public sewer without approval.

Service openings shall not be covered in any way unless approved. Removal of any covering material or adjustment of the opening shall be at the property owner's expense.

Excavation near public sewers

No person shall excavate, or carry out piling or similar work closer than:

- 5 metres from the centre line of any rising main or trunk sewer, or
- 2 metres from the centre line of any public sewer,

without approval from the TA. Such approval may impose conditions on the carrying out of any work near the sewer.

Where such works are granted approval, the developer shall provide evidence of the condition of the existing pipe both prior to and following the works (e.g. by CCTV survey). Where requested by the Far North District Council, new manholes will be installed either side of the structure to enable the maintenance of the pipe. Detailed proposals with regard to the protection of the pipe and any associated structures and access to the pipe for maintenance purposes shall be provided to the Authorised Officer. Work shall only be allowed to proceed on the written approval of the above details and with the written agreement of the Authorised Officer. Any damage either to pipelines, manholes or any other Far North District Council infrastructure, as a result of the development shall be rectified to the satisfaction of the Far North District Council prior to the final sign off.

5.3.3 Clearances

5.3.3.1 Clearance from underground services

ADD

Shared trenching

Shared trenches for water and wastewater services will be acceptable provided that:

- Water mains are laid at a higher level than sewers to avoid cross contamination;
- A minimum vertical clearance of 300mm between the soffit of the sewer and the invert of the water main and a minimum horizontal clearance between the pipewalls of 900mm;
- Shared trenches will not be acceptable for water and wastewater pressure mains;
- No services shall be installed above water mains;
- Water pipes shall be laid closest to the roadside.

5.3.3.2 Clearance from structures

DELETE AND REPLACE WITH

No building shall be built closer than the greater of:

1.5 metres from the centre of any public sewer, or

the depth of the centreline of the sewer, plus the diameter of the sewer, plus 0.2 metres from the centre of that sewer, subject to compliance with 3.1 of NZS 3604.

5.3.4 Easements

DELETE AND REPLACE WITH

Easements shall be provided in favour of Far North District Council where any Council owned pipeline crosses private property, or to provide access over private property to Far North District Councils assets, and around other Far North District Council assets for the purposes of maintenance and operation.

Such easements shall be 3 metres wide in the case of pipelines or access, and shall provide at least 2 metres clearance around Far North District Council assets. Any easements in favour of Far North District Council are to be supplied as part of the DXF Auto Cad File.

5.3.5 Pipe size and gradient

5.3.5.1 Design Flows

DELETE AND REPLACE WITH

The design flow comprises domestic and industrial wastewater, infiltration and direct ingress of stormwater. The design flows shall be calculated as follows:

- Residential flows: Average Dry Weather Flow
- 200 litres/person/day in areas with a reticulated water supply, or in areas likely to have a reticulated water supply in the foreseeable future
- 140 litres/person/day in all other areas
- Number of Persons / House Unit = 4
- Industrial/commercial effluent flows:

Industry Type in terms of Water Usage	Design Flow Litres/sec/hectare
Light	0.4
Medium	0.7
Heavy	1.3*

Where possible, the demand from heavy users, such as abattoirs or market gardens, shall be assessed on the basis of specific information. The above flows shall be taken to occur for eight hours per day.

Peak design Wet Weather flows shall be taken to be 5 times average daily dry weather flow. This may be reduced for large or long catchments when it can be demonstrated that, because of flow attenuation, high peaking factors are unlikely.

Peak Dry Weather flow shall be calculated using a peaking factor of 2.5 times average daily flow. This may be reduced for large or long catchments when it can be demonstrated that, because of flow attenuation, high peaking factors are unlikely.

5.3.5.2 Hydraulic Design of Pipelines

DELETE AND REPLACE WITH

The hydraulic design of sanitary sewer gravity pipelines and rising mains shall be based on Colebrook-White formula or other design method as approved by Council. The pipe roughness coefficient 'k' used in the design of gravity pipelines shall be 1.5mm as an overall coefficient irrespective of pipe material. The pipe roughness coefficient 'k' used in the design of rising mains shall be 0.6mm as an overall coefficient irrespective of pipe material.

The flow velocity in gravity reticulation shall be not less than 0.65 metres per second, at average daily flow. For catchments with ultimate development of less than 250 household equivalents, with no industrial or commercial effluent and where no flow from a pumping station is involved, 150mm diameter pipes laid no flatter than 1 in 150 (0.67%) will normally be adequate without specific hydraulic design.

5.3.5.3 Minimum Pipe Sizes

DELETE AND REPLACE WITH

Gravity sewers, or connection pipes serving more than one residential unit, shall have a minimum internal diameter of 150mm. Connections serving one

residential unit or in-fill development, serving up to 3 dwelling units, via an inspection chamber (subject to Council Approval) shall have a minimum internal diameter of 100mm.

Rising main diameters shall be determined by the minimum and maximum design flows and shall be shown on proposed drawings (1.5.2).

The effect of water hammer pressures on rising mains shall be addressed and measures to limit its impact incorporated in the design as necessary. Rising mains shall be rated appropriate to the maximum design head (including water hammer), but not less than PN12.5. The design shall include the requirement for air valves, including odour considerations.

5.3.5.5 Minimum grades for self cleansing

ADD

Rising mains shall be designed with a minimum flow velocity of 1 metre per second at peak pumping rate.

5.3.5.6 Maximum velocity

ADD

Rising mains shall be designed with a maximum flow velocity of 2 metres per second at peak pumping rate.

5.3.5.7 Minimum cover

DELETE AND REPLACE WITH

Minimum cover to pipes shall be:

- (a) 600mm in areas not subject to traffic loading
- (b) 900mm under carriageways

5.3.6 Maintenance structures

5.3.6.2 Location of Maintenance Structures

ADD

Maintenance Shafts (MS) will only be accepted by Far North District Council in exceptional circumstances and with the written approval of the Authorised Officer.

5.3.6.3 Maintenance Structure spacing

DELETE AND REPLACE WITH

The maximum distance between any two consecutive maintenance structures shall be 90m.

5.3.6.4 Manholes

5.3.6.4.9 Manhole details

NEW CLAUSE

Sewer manholes shall:

- Have lids above all likely flood levels or shall be banded to prevent flood water reaching them;
- Have lids raised at least 50mm above the surrounding ground levels in fields;
- Have water tight connections;
- When installed on new fill or soft, under-consolidated soil shall be specifically designed;
- Have invert details, which minimise energy loss;
- Have an invert channel, which is at least the same diameter as the outlet pipe;
- Have a minimum internal diameter of 1050mm;
- Have bases that are pre-cast into the lowest riser. Cast in-situ bases are not acceptable;
- Be stable under all load conditions likely to be imposed, including when completely empty;
- Consist of a single riser if shallower than 2.5 metres;
- MDPE manholes shall be permitted;
- Have galvanised steel non-slip step irons or ladder installed over the outlet (or immediately alongside the outlet if its diameter is greater than 450mm);
- Where pipe sizes change at the manhole, the soffit of the lowest inlet pipe shall be level with or above the soffit of the outlet pipe;
- Where manholes are more than 3 metres deep they shall be a minimum of 1.2m in diameter and be specifically designed and shall incorporate intermediate landing platforms or grills not more than 3 metres from the surface and not more than 3 metres apart. These platforms shall be designed to carry two people with an adequate factor of safety;
- Manholes, which have a drop in excess of 500mm from the soffit of any inlet to the soffit of the outlet, shall have a drop connection into the base of the manhole;
- All manholes shall be watertight and shall require testing;

5.3.6.5 Maintenance Shafts

ADD

Maintenance shafts will only be accepted by Far North District Council under exceptional circumstances.

5.3.7 Venting

ADD

Odour control measures will be required for all pumping stations, storage facilities, manholes where rising mains discharge into a gravity pipeline and air valves situated within 50m of a property or habitable dwelling or within a residential area.

5.3.8 Structural design

5.3.8.1 Pipe Materials

ADD

The following pipe materials and fittings complying with the relevant standards may be used for sanitary sewer reticulation:

- uPVC AS/NZS 1477
- mPVC AS/NZS 4765
- PE100 AS/NZS 4130
- Ductile Iron AS 2280

Pipes manufactured from other materials may be permitted subject to the approval of the Council.

Ductile Iron pipes shall have a spun concrete lining not less than 6mm thick, and an approved external coating. Care shall be taken to ensure that the concrete lining and external coating are not damaged during construction.

All pipes shall have a manufacturing date that is less than 12 months old at the time of installation.

5.3.9 Connections and Joints

5.3.9.1 Service Connections

ADD

Service Connections shall be located such that each property is serviced by gravity from ground level when the private foul water drains are laid at a gradient of 1V:120H.

For vacant lots the connection shall terminate not more than 250mm inside the boundary with a terminal rodding point, plugged, watertight and marked with a red timber stake.

Ramped risers shall be used for sewerage greater than 1.2 metres deep. They shall rise at an angle of 45 degrees until a depth of 1.2 metres is reached.

For existing sewers greater than 3.0 metres deep, connections shall be by a manhole. Multiple connections can be made to the same manhole in this case. Note that new sewers are required to be less than 3.0 metres deep.

5.3.9.2 Joints

ADD

All pipe joints shall be flexible. Steel pipes may be flange jointed providing that each flange is protected in accordance with section 4.4.

Gibault joints shall be of approved manufacture and Denso wrapped.

uPVC gravity and pressure sewers shall be rubber ring jointed. Part lengths of uPVC pipe shall be joined with approved slip-ring couplers.

All PE welded pipe joints shall have the internal beads removed and held for inspection. The beads shall be removed by a method that removes the bead in one cut.

In Saline Soils and other Aggressive ground conditions, all bolts, nuts and washers shall be of grade 316 stainless steel or aluminium-bronze and be wrapped in Densotape or equal approved.

5.3.10 Pumping stations

DELETE AND REPLACE WITH

5.3.10.1 Pumping Station Details

All pumping stations shall comply with the following requirements:

- The pumping station and its all weather access from the nearest public road shall have its own separate lot vested in Council;
- The pumping station shall be designed to withstand flotation when empty;
- Pump stations serving 3 household equivalents or more shall be connected to Council's telemetry network.
- The reticulation including pump stations and rising mains shall be designed to provide for the peak domestic flow and industrial flow, as above, without any use of any emergency storage capacity;
- The top surface of the station, and its electrical equipment and switch board, shall be located above all possible flood water levels and shall be raised at least 150mm above the surrounding ground level. Alternatively, the entire station shall be bunded to prevent flood water reaching it or the wells shall be made completely water-tight and the electrical controls located in a remote location above all possible flood levels;
- The pump well, valve chamber, power box and all control boxes shall be lockable;
- All internal metal hardware (eg: guide rails and hook plates) and any fastenings and anchors shall be Grade 316 stainless steel;
- Where there is a reticulated water supply available, fresh water shall be supplied from a standard 25mm connection at a minimum static pressure of 300 kPa. If the same water supply is used for drinking, backflow prevention shall be provided in accordance with the NZ Building Code Approved Document G12;
- A lockable galvanized steel, hinged, water tight lid covering an opening of 600mm (minimum) clearance and able to be opened by a single person by hand, shall be provided in the top of the wet well and over all storage tanks. The opening shall be large enough to accommodate the pump when removed;
- Power supply shall be three phase and entirely underground. All power shall be supplied and connected in accordance with the Electricity Act;
- The pump motors shall be adequately protected from electrical power surges or phase failures;
- An electrical switch box shall be provided in a lockable, weather proof box within two metres of the pump station. Copies of drawings showing the pump and valve control circuit diagram and switchboard layout shall be kept permanently inside the switch box;
- Fencing requirements shall comply with FNDC S11;
- A management plan shall be provided that covers all aspects of the operation and maintenance of the stations including contingency measure for emergency overflows, As Built drawing including circuit diagrams and switch locations, pump duty information and other relevant data and information referred to in section 1.5.10.
- Where required by the Authorised Officer, a lifting davit shall be installed for future maintenance;
- Venting of pumpstation chambers and emergency storage facilities shall comply with Section 5.3.7;
- All internal pumpstation pipe work including the valve chambers shall be either ABS or stainless steel;

5.3.10.2 Pumps

Unless agreed otherwise by Council, the pumps shall be Flygt or Mono/ABS submersible pumps. Each pump shall be removable and re-installable from above using a guide rail system.

One standby pump shall be provided per station.

5.3.10.3 Emergency Storage

Emergency storage shall be provided with a capacity of 12-hour average dry weather flow for the ultimate development of the station's catchment. Emergency storage tanks shall be self-draining back into the wetwell by gravity.

5.3.10.4 Pump control

Irrespective of the inflow into the wetwell, the rising main shall be sized, and the duty pump controlled, such that at least the volume of the rising main is pumped at least once each day. If there is insufficient inflow into the pump station in the early stages of development to achieve that, then one of the following two measures shall be incorporated into the design to control odours at the outlet of the rising main:

- (a) Sufficient clean water shall be introduced into the pump well to enable the full volume of the main to be cleared. Appropriate controls will be necessary to ensure that water is only introduced when the sewage inflow is inadequate;
- (b) or the chamber into which the rising main discharges shall be sealed to prevent the escape of gases, located at least 50 metres away from any houses, have a 50m+ buffer zone surrounding it, and be vented with a vertical pipe of minimum diameter 100mm and minimum height 5 metres above the lid of the chamber.

The volume between the pump-on and off levels shall be a minimum of 6% of the design peak hourly flow rate. An automatic changeover of the pumps if the duty pump breaks down shall be provided. A clearly marked switch shall be provided on the switch board that manually switches control between pumps while not overriding the future automatic changeovers.

A manual override of the automatic controls shall be provided by means of a clearly marked switch on the switch board.

Pump control shall include:

- Duty standby system;
- One reverse switch per pump;
- Inhibit system;

5.3.10.5 Rising Mains/ Pressure Mains

ADD NEW CLAUSE

Rising mains shall meet the requirements for the construction of water supply pipes except that disinfection is not required.

Rising mains shall be fitted with suitable ball type non-return valves to prevent emptying of the main when the pumps are not operational.

All rising mains shall be specifically designed to:

- Withstand all surge pressures such as may result from an emergency shutdown or power failure. The class of piping selected must have a minimum rating of PN 12.5 and is to have a minimum safety factor against rupture under surge pressures of 2.0;

- Accommodate all out of balance forces on the main and shall incorporate suitable anchorage at all changes in direction.

5.3.10.6 Valves on Rising Mains

ADD NEW CLAUSE

All gate, non return and air valves on sewage rising mains shall be suitable for use in contact with sewage and shall be to the approval of the Authorised Officer.

5.3.11 On Site Treatment and Land Application Systems

ADD NEW CLAUSE

The design of new on-site sewerage systems for individual properties shall be carried out by Chartered Professional Engineers or equivalent who have experience and a track record of similar works.

The design shall be undertaken utilising a Site and Soil Evaluation Report, prepared in accordance with AS/NZS 1547:2000 that covers the property.

The report must contain, as a minimum:-

- i. Site and Soil Check report in accordance with Clause 4.1A3 of AS/NZS 1547:2000
- ii. Assessment of terrain-soil combinations, including identification of areas unfavourable for land application of effluent (Clauses 4.1B3.1 and 4.1B3.6)
- iii. Assessment of water run-on and run-off from the site (Clauses 4.1B3.2 and 4.1B3.3)
- iv. A plan showing the details of the proposed subdivision, including
 - a. Areas that are favourable for land application
 - b. Areas that are unfavourable for land application
 - c. Contours and gradients
 - d. Overland flow paths, including neighbouring areas
 - e. Soil and terrain areas
 - f. Location of site investigation boreholes/trial pits
- v. A statement indicating which treatment and land application systems would be appropriate for the sections created by the subdivision.

Detailed design shall be carried out in accordance with the Auckland Regional Council's design Guideline "On-Site Wastewater disposal from Households and Institutions (TP 58).

A Building Consent will be required for the installation of any or all parts of the on-site wastewater treatment and effluent disposal.

A TP58 report for each system must be completed and forwarded to Council with the Building Consent application for each system accompanied by the following:-

- i the Site and Soil Evaluation Report
- ii detailed design report covering the treatment system and the land application system accompanied by a Producer Statement signed by a person who meets the requirements of an Independent Qualified Person (On-site wastewater treatment and disposal) as defined in Council's Engineering Standards and Guidelines, Appendix E.
- iii plans showing the treatment and land application systems
- iv operation and maintenance guidelines for the proposed system
- v proposals with regard to as built information

TP58 Reports must be prepared by a person who is on a list of approved TP58 writers maintained by Far North District Council.

Persons on the approved list must be either a Chartered Professional Engineer or a Registered Drainlayer who has attended and passed a TP 58 writers course approved by Far North District Council.

Far North District Council will audit at least the first five TP58 Reports prepared by each person on the list against the requirements of the Engineering Standards. Any person whose TP58 Report fails to comply with the requirements of TP58 or the Engineering Standards on two out of the first five audits will be removed from the list and will not be permitted to re-apply until the person has attended and passed a further approved TP 58 writers course.

Following the first five audits as described above, random audits will be carried out on each persons TP58 Reports. Any person whose TP58 fails to comply with the requirements of TP58 or the Engineering Standards in a random audit will be removed from the list and will not be permitted to re-apply until the person has attended and passed a further approved TP 58 writers course.

Septic tanks shall be completely watertight and be designed to withstand soil loads and the load of a light vehicle running over the top of them and to withstand flotation when empty under winter groundwater conditions.

Septic tanks shall have a minimum capacity of 4,500 litres and incorporate the following

- a) a proprietary effluent filter installed on the septic tank outlet. The installation shall be strictly in accordance with the manufacturers instructions.
- b) A 600mm minimum diameter riser between the top of the tank and the finished ground level, with a watertight cover
- c) Inlet pipe vented to outside the tank
- d) Effluent distribution pipes shall be a minimum of 80mm diameter, with 20mm diameter perforations at 300mm centres on a single side of the pipe

5.3.12 Electrical Specifications

ADD NEW CLAUSE Statutory Requirements and Regulations

The construction and testing of all works shall comply with all New Zealand Standards, Acts and Regulations including all amendments. In the absence of any New Zealand Standard, the appropriate Australian, British or International Standard in order given will apply.

These shall include but not be limited to:

The health and Safety act

- (a) Relevant OSH codes of practice
- (b) AS/NZS3000:2000 – Wiring Rules
- (c) AS 3439:1993 Low voltage switchgear and control gear assemblies
- (d) AS/NZS 4898:1998 – Circuit breakers for overcurrent protection
- (e) AS/NZS 3100:1997 – Approval and test specification
- (f) AS/NZS 61000 – Electromagnetic Compatibility

- (g) NZCEP 36:1993 New Zealand Electrical Code of Practise for Harmonic Levels
- (h) BS 6121:1989 Mechanical cable glands
- (i) BS 6231 : 1998 Specification for PVC – insulated cables for switchgear and control gear wiring
- (j) IEC 60269 Low voltage fuses
- (k) IEC 60529 Degrees of protection provided by enclosures
- (l) IEC 60947 Low voltage switchgear and control gear

5.3.12.1 Switchboard, cabling, wiring, cable bracket and ducting

ADD NEW CLAUSE

The Control panel shall be housed in a box that is fabricated Aluminium, stainless steel or Aluminium Montrose type with a Perspex viewing window for remote reading of power meters. It shall be fully lockable and have an anti-condensation heater and single-phase power point.

The switchboard shall be built so as to withstand a maximum prospective through fault current for the site for a period of one second.

Cable ducts of 100mm diameter shall be installed from the base of the switchboard, to the pump station chamber. The pump and control cables shall be terminated in an external terminal box so that fumes from the wetwell do not enter the Control Box.

The float, sensors and motor cables shall be secured by a stainless steel bracket. The bracket shall be mounted in such a position as to be easily accessible from the lid opening.

.All cables are to be terminated using the correctly sized and appropriate gland. All cables are to be individually glanded, according to the recommendations of the cable and gland manufacturer and the appropriate standard. PVC weatherproof shrouds are to be fitted to all external glands.

The conductors of all field cables are to be terminated in terminal strips, as per detailed connection diagrams. All terminals are to be correctly marked.

All wiring within the switchboard is to be neatly routed, within correctly sized slotted electrical trunking. All components are to be mounted on DIN rail where possible. All wires are to be terminated using correctly sized pre-insulated electrical crimp on ferrules. All wires are to be marked with the correct full circle wire numbers on both sides.

All cabling is to be correctly marked on both sides with plastic cable markers. All buried cables are to be clearly marked, and all relevant codes are to be adhered to.

All components within the switchboard, are to be clearly marked with labels, which are black letters on white background, these labels are to be fixed above the component.

The following cable colours are to be used:

- (a) 400/230 VAC power wiring
 - Phases Red/White/Blue
 - Neutral Black
- (b) 230 VAC control wiring
 - Phase Orange
 - Neutral Black
- (c) 24 VAC control wiring

- Phase Brown
- Neutral Grey
- (d) DC control wiring for telemetry inputs
 - Positive Purple
 - Negative Yellow
- (e) Signal wiring – twisted pairs
 - Positive White
 - Negative Black
- (f) Intrinsically safe
 - All conductors will be blue
 - Earthing and earth links
 - Green or Green/Yellow

The size of all the conductors shall be adequately rated for the through current of the associated protective device without damage to the insulator or conductor. Copper PVC insulated cable with multistrand copper conductors shall be used with a minimum cross sectional area as follows:

- a) Control circuits 1.5mm
- b) Main power circuits 2.5mm

The contractor is to ensure that these minimum sizes are used, or the appropriate size cable should higher capacity be needed.

Wires and cables shall not be joined or teed between terminal points. All wires are to be individually terminated.

5.3.12.2 Instruments and instrument cables

ADD NEW CLAUSE

The following installation practices will be used for all signal and instrument cabling:

- (a) Cable shields will be electrically continuous. When two lengths of shielded cable are connected together at a terminal block, an insulated point on the terminal block shall be used for connecting the shields;
- (b) Shields shall be isolated and insulated except at their selected grounding point to prevent stray and multiple ground connections to the shield;
- (c) At the point of termination, the shield will only be stripped back far enough to allow for termination;
- (d) For signal circuits the shield will not be used as part of the circuit;
- (e) Signal cables will only be grounded at one point;
- (f) Telemetry digital and analogue circuit's shields shall be grounded only at the RTU equipment earth bar;
- (g) Analogue signal cables shall be physically segregated from all power and control cables and from unshielded cables carrying digital or pulse type signals.

All display instruments shall be of a suitable sealing type for the application, 90 degree nominal scale, and of continuous service. Minimum size is to be 72mm by 72 mm.

They shall comply with BS 89, accuracy class index 2.5 for industrial grade instruments.

Ammeters shall be scaled so that 75% of full scale deflection corresponds to 100% of circuit current.

All ammeters of less than 25 A shall be directly connected, greater than 25 A shall be connected to a suitable current transformer.

5.3.13 Equipment

5.3.13.1 Telemetry equipment

ADD NEW CLAUSE

All telemetry shall be approved by the Authorised Officer prior to installation. It shall be installed as per the manufacturer specification. It is the contractor's responsibility to ensure that it is connected to the Council's Telemetry system. All scaling and setting are to be recorded and supplied to the Far North District Council.

As a minimum, the system shall monitor pump hours, start and stop times, major electrical equipment, daily flows, alarm details, high and low water levels, pump failure/faults and overflows.

Council shall be consulted about the means of connecting to the Telemetry.

The contractor is to supply and install a correctly sized backup battery capable of lasting 12 hours for the RTU. This is to be correctly mounted.

5.3.13.2 Pump Controller and level devices

ADD NEW CLAUSE

A Milltronics Multiranger Unit is to be supplied and installed, according to the manufacturer's recommendation unless otherwise approved by the Authorised Officer.

It is preferred that the matched ultrasonic transducer be used. However a Swedmeter Level probe can also be supplied and installed as an option. This Swedmeter Level probe must be 4-20 mA and separately loop powered. The unit must be scalable across its entire range.

A high level float is to be installed and wired to the control unit.

The control unit is to be connected to the CELCOM RTU via Modbus protocol.

5.3.13.3 Moulded case Circuit breakers – Miniature Circuit Breakers

ADD NEW CLAUSE

MCCB's shall have a rated breaking capacity at 50kA symmetrical and 90 kA asymmetrical.

MCB's shall have a rated breaking capacity of not less than 6 kA.

They shall be of the manually operated trip free type incorporating thermal and magnetic tripping mechanisms and shall be rated P2. Three phase circuit breakers shall be 400 volts, and single-phase circuit breakers shall be 230 volts.

5.3.13.4 Power / Motor isolators

ADD NEW CLAUSE

These shall be of the rotary type, preferable PDL 56SW432/2. Four pole fitted as close as possible to the corresponding pump control gear. All switches shall be a minimum AC3 rating.

5.3.13.5 Mains switch, generator socket, change over switch and spike arrestors

ADD NEW CLAUSE

The Far North District Council wishes to have the facility, whereby the station can be powered from an external suitably sized generator.

The main switch shall be at least 100-amp AC3 rating. The rating of the mains switch is sized by the contractor for rating above the minimum.

A flush mounted, SCAME type socket, correctly sized for the pump station shall be provided for the connection of a generator.

A K&N change over switch, of the C125 A212 type shall be fitted for the generator / mains selection.

OBO Betterman spike arrestors are to be fitted as per manufacturer's specification on the mains.

5.3.13.6 Motor starters and controls

ADD NEW CLAUSE

The contractor is to supply and fit suitable sized Soft Starters to each pump. Either the Rockwell SMC2 or PDL softstarters are acceptable.

The softstarters are to be continuously rated. The softstarters are to be installed to manufacture's specification.

Each pumpset is to be provided with a manual and automatic circuit, the selection switch is to be clearly indicated. Each pumpset is to be also fitted with an emergency stop, a start and a stop push-button.

A 72mm square analogue ammeter is to be provided per pump. All control relays are to be of the Omron type LY2.

- One hour meter per pump shall be provided;

5.3.13.7 Switchboard Sundries

ADD NEW CLAUSE

The contractor is to supply and fit a double socket outlet, which has an approved RCD protection.

A 60 watt cabinet heater is to be supplied and installed, the heater is to be controlled using a thermostat, type Honeywell model T4060 B.

A cabinet light which is individually switched is to be supplied and fitted. This light is to be totally enclosed, and rated at a minimum of 25 watt.

5.13.8 Materials

ADD NEW CLAUSE

All materials shall be new. Should the contractor wish to supply any equivalent equipment of a similar type, written permission from the Far North District Council must be obtained.

The contractor shall arrange for his Supplier to confirm the suitability of all materials for the application and duty specified.

5.13.9 Certificates of Compliance

ADD NEW CLAUSE

The contractor shall provide copies of Practising Licences of all personnel, who will undertake electrical work.

The contractor shall note the requirements of self-certification under the Electricity Act, and shall provide to the Far North District Council, a written

procedure of checking, testing and Quality Assurance for the scope of the work.

The contractor shall ensure a Certificate of Compliance is purchased within 10 days of contract award. The certificate shall be completed and copies with a full schedule of test results appended shall be provided to the Far North District Council's Utilities Manager.

5.3.14 Inspections

ADD NEW CLAUSE

The Contractor shall allow for inspections to be undertaken by the Far North District Council, or an appointed representative. Part of the inspections, will be a fully witnessed commissioning test, to prove compliance to all specifications and operational requirements. The contractor will also prove to the individual undertaking the inspection, that all alarms are operational and correctly set.

5.3.14.1 As-built Information

ADD NEW CLAUSE

The contractor is to supply to the Far North District Council, complete as-built information. The following information is to be supplied as a standard:

- (a) A CAD electrical drawing, showing all power and control circuits;
- (b) A CAD schematic showing the layout of all equipment in the electrical enclosure;
- (c) A CAD schematic showing the layout of all auxiliary equipment, such as floats, level probes, etc.
- (d) A full and detailed test and commissioning sheet, attached to the electrical compliance certificate;
- (e) A detailed operation and maintenance manual , which must include all set points and calibration information, for the electrical equipment on site and set points used in setting the telemetry system.

5.3.14.2 Seismic Strength

ADD NEW CLAUSE

The seismic strength of fixings shall be so sized to withstand normal operating loads, plus acceleration forces of not less than 0.75G horizontally and 1.0G vertically acting simultaneously through the centre of gravity of the item fixed.

Hence provision will be made to restrain all plug-in devices and modular elements. Full details of how the contractor proposes to achieve this requirement shall be submitted to the Far North District Council for comment.

5.4 Construction

5.4.1 Sewer Installation and Testing

ADD NEW CLAUSE

A Registered Drainlayer or equivalent recognised qualification shall install all pipelines.

Each separate pipe shall set true to line and grade and each joint shall be completed before the next section of pipe is commenced.

All sewer pipes including connections shall be tested before the joints are backfilled. The pipeline test procedure is as follows:

- a. The pipeline under test shall be effectively plugged, particular care being taken to fix the plugs against movement, and air introduced by suitable means (such as hand pumps) until a pressure of 300mm of water is indicated by a suitable manometer (such as a 'u'-tube) connected to the system;
- b. After the air has attained a uniform temperature, as indicated by the pressure becoming steady, the source of air supply shall be physically disconnected and the pressure drop measure after a test period of five minutes;
- c. The wetting of pipelines before test, where applicable and practicable, is recommended;
- d. The acceptance limit shall be a pressure drop not exceeding 20mm in 5 minutes.
- e. In wet conditions, should the low-pressure air test pass and there be signs of infiltration, this shall not exceed 600ml/hr/25mm pipe diameter/1000metres length of pipe.
- f. Sewer manholes will be tested by plugging and filling the manhole with water (including time allowed for absorption). On inspection of the test the level of water in manhole shall not drop more than 5mm in 20 minutes.

Should any leaks be discovered, these shall be made good and the test reapplied.

New sewer reticulation must be completely and permanently isolated from the "live" sewer reticulation until all the tests are passed, and authority from the Council to connect to the live sewer is obtained.

All sewer pipes shall be installed with "sewer" marker tape laid continuously above the pipe.

6.2 General requirements**6.2.1 Objectives****ADD**

The design shall also ensure that water supplies:

- Are adequate for all estimated domestic, commercial and industrial consumption for the ultimate development, such that full supply is available during a 20 year ARI drought;
- Are adequate for fire fighting purposes in accordance with the New Zealand Fire service's Code of Practice;
- Achieve a "B" grading in accordance with the Ministry of Health water supply grading system;
- Have a design life of at least 20 years for mechanical and electrical plant and equipment of at least 50 years for pipelines and 50 years for all underground chambers.

Where the existing reticulation or a proposed extension cannot comply with the minimum flow requirement, the applicant may be required to provide and install elevated storage and/or booster pumping systems to the approval of the Authorised Officer.

6.3 Design**6.3.7.2.3 Nominated Pipe Class****ADD**

Pipes shall have a minimum pressure rating of PN 12.5 and all fittings shall have a minimum pressure rating of PN 16.

6.3.7.3 Pipe Materials**DELETE AND REPLACE WITH**

The following pipe materials and fittings complying with the relevant standards may be used for water services:

- PE AS/NZS 4130
- Steel NZS 4442
- Ductile Iron AS 2280

All bolts and nuts shall have washers and be fully coated as above or hot dipped galvanized in accordance with BS4772: 1988, plus protective wrapping. This shall be "Denso" primer paste covered with "Denso" tape wrap, followed by "Denso" MP/HD tape or "Greensleeve" over wrap, or approved alternatives complying with the same standards. Gaskets or flanged joints shall be to NZS/BS5292.

6.3.8 Fire Flow**6.3.8.1 Fire Fighting Supply Requirements****DELETE AND REPLACE WITH**

The water infrastructure must be designed to ensure that the following requirements with regard to fire fighting supplies are met. All water infrastructure must also comply with SNZ PAS 4509:2003.

6.3.8.2 Fire Risk Classifications

As detailed in Table 1 of SNZ PAS 4509:2003 – Simplified method of determining required water supply classification.

6.3.8.3 Isolated Risks

ADD NEW CLAUSE

An isolated risk within a reticulated area that has a significantly higher fire risk category than the surrounding area may use auxiliary water to make up the balance of the water supply required. When this is done the auxiliary supply shall provide the required flow for the category of the isolated risk for 1 hour and access to that water shall be available within 90m of the risk. Hydrants, connections and access to the auxiliary supply shall be provided to the standard required by the local New Zealand Fire Service Area Commander.

An isolated risk classified B, C, D or E, within a non-reticulated area, shall have sufficient auxiliary water provided to meet the required flow for the category of the isolated risk for 1 hour and access to this auxiliary water shall be available within 90m of the risk. Hydrants, connections and access to the auxiliary supply shall be provided to the standard required by the local New Zealand Fire Service Area Commander.

6.3.8.4 Fire Fighting Flows

ADD NEW CLAUSE

As detailed in Table 2 SNZ PAS 4509:2003 – Simplified method for determining fire fighting water supply.

The minimum fire fighting residual running water pressure shall be 100 kPa at any fire hydrant.

6.3.8.5 Fire Hydrants

ADD NEW CLAUSE

Fire hydrants shall be clockwise closing, screw-down type in accordance with BS750, and shall wherever practicable be medium or tall pattern. Hydrants and hydrant risers are to be fully polymeric coated to AS/NZS 4158.

Hydrants shall be fixed opposite the common boundaries of lots and spaced at intervals not exceeding 135m within residential areas and 90m within commercial and industrial areas. The terminal hydrant shall be within 135m of the furthest portion of any building site. Where necessary a 100mm diameter principal main shall be constructed within a private road to ensure coverage.

Fire hydrants shall be readily accessible for fire appliances and should generally be positioned near street and private way intersections and not less than 6m from any building.

Hydrant risers shall be used where necessary to ensure that the top of the spindle is not less than 175mm nor greater than 250mm below finished surface level. Hydrants are required at all dead ends and low points to enable mains flushing if a normal washout cannot be fitted.

The location of fire hydrants shall be marked with yellow plastic marker posts which are fixed 225mm from the street boundary at the closest point to and facing the hydrant, with the top of post 600mm above finished ground level.

A concrete mowing strip 150mm wide shall surround the post and the distance between marker and hydrant in metres (bottom number) shall be stencilled in black paint at the top of the post. For maximum night visibility, a blue raised pavement marker shall be installed on the road centreline at each hydrant location.

6.3.9 Hydraulic design

6.3.9.3 Peak Flows

DELETE AND REPLACE WITH

In many parts of a water reticulation system, the water demand for domestic areas is not critical, with the supply of water for fire fighting purposes generally determining the size of reticulation. However, the system shall also be checked to ensure it has sufficient capacity for general supply purposes.

Design Average Daily residential demand shall be taken to be 300 litres per person per day. The minimum flow for an individual connection shall be 25 litres per minute for a 20mm connection.

In the absence of specific information, the average daily demand from commercial and industrial usage shall be in accordance with the table below.

AVERAGE DAILY DEMAND	FLOW RATES (cubic litres/sec/hectare)
Light Water Usage	0.5
Medium Water Usage	0.8
Heavy Water Usage	1.5*

* Where possible, the demand from heavy users, such as abattoirs or market gardens, shall be assessed on the basis of specific information.

The above flows shall be taken to occur for eight hours per day.

The average demand from institutions, such as schools and hospitals, shall be taken to be 10 litres per person per hour of normal occupation.

In all cases, the peak flow shall be taken to be 2.5 times the average daily demand. Special attention is required for places where seasonal fluctuation of population is present or expected.

6.3.9.5 Pressure Zones

ADD

The minimum acceptable pressure shall be 300kpa at any point in the system.

6.3.9.7 Flow velocities

DELETE AND REPLACE WITH

Pipelines shall be designed for flow velocities between 0.5m/sec and 2.0m/sec. The following factors shall be taken into account in determining the flow velocity:

- Stagnation
- Turbidity
- Pressure
- Surge
- Pumping facilities

- Pressure reducing devices
- Pipe lining materials

6.3.10.2 Mains layout

ADD

- A principal main fitted with fire hydrants shall be laid on one side of all through streets and one side of every dead-end road. Principal mains shall be laid both sides of roads which service large developed areas so that supply can be maintained to that area if one of the pipes breaks or is otherwise shut down. Appropriate valving shall be installed so that breakages in either main can be isolated and supply maintained to the area;
- A rider main shall be laid along the road frontage of all lots not fronted by a principal main, including cul-de-sac heads, and shall be designed as ring mains.

6.3.10.3 Water mains in easements

DELETE AND REPLACE WITH

Easements shall be provided in favour of Far North District Council where any Council owned pipeline crosses private property, or to provide access over private property to Far North District Councils assets, and around other Far North District Council assets for the purposes of maintenance and operation.

Such easements shall be 3 metres wide in the case of pipelines or access, and shall provide at least 2 metres clearance around Far North District Council assets. Any easements in favour of Far North District Council are to be supplied as part of the DXF Auto Cad File.

6.3.10.6 Shared trenching

ADD

Shared trenches for water and wastewater will be acceptable provided that:

- Water mains are laid at a higher level than sewers to avoid cross contamination;
- A minimum vertical clearance of 300mm between the soffit of the sewer and the invert of the water main and a minimum horizontal clearance between the pipewalls of 900mm;
- Shared trenches will not be acceptable for water and wastewater pressure mains;
- No services shall be installed above water mains;
- Water lines shall be laid closest to the roadside.

6.3.11.4 Pipe selection or special conditions

ADD

In Saline Soils and other Aggressive ground Conditions all bolts, nuts and washers shall be of grade 316 stainless steel or aluminium-bronze.

6.3.11.5 Above ground water mains

ADD

To be approved by the Far North District Council on the submitted drawings prior to construction.

6.3.11.7.1 Pipe cover

ADD

Service connection pipes shall have minimum cover of not less than 600mm in carriageways and not less than 350mm under footpaths and berms terminating at a depth of 225mm at the boundary. The sections of pipe adjacent to a carriageway crossing shall be gradually deepened, to allow the required cover under the carriageway without provision of vertical bends.

6.3.12 Reservoirs and pumping stations

DELETE AND REPLACE WITH

All new or upgraded service storage reservoirs shall completely isolate the water from the ground, and be covered. Reservoirs shall be sized to provide a minimum of one hour's fire fighting supply or as specified in the New Zealand Fire Service Code of Practice for Fire Fighting Water Supplies. The reservoir shall in addition to the above, have sufficient storage for two days supply at average demand for the design population. A Council approved telemetry link shall be provided for control of pumps and reservoir levels. The reservoir site and access shall be vested in the council and be large enough to provide for future additional storage as assessed by the Council.

Pumps shall be designed to achieve the pressures and flows required under normal operation. Identical duty and standby pumps shall be provided. No pump shall be equipped with a direct connection for priming or other purposes. Priming may be arranged by means of a discharge point and funnel where the discharge point is a minimum of 25mm above the funnel as defined by the air gap.

6.3.13.2 Clearance from underground services

ADD

Refer to clause 5.5.3.1. Site specific clearances between water mains and other services may be determined by the utility operator, depending on site conditions and the nature of the services.

6.3.13.3 Clearance from structures

ADD

Structures must not be constructed over existing water mains.

6.3.14 Water quality

ADD

Backflow prevention shall be installed at all new connections. The type of backflow prevention shall be decided according to the risk factor and be shown on the submitted drawings. Other than residential water meters installed in accordance with Council Engineering Standards and Guidelines, all backflow preventers shall be tested annually and the results submitted to the Far North District Council.

6.4 Valves

6.4.1 General

ADD

- All valves shall be designed so that they can be opened and closed manually by a single person with a spanner in not less than one minute;

- A permanent spindle extension to 100mm below cover level shall be provided on valves, which are more than 500mm deep;
- Valves located at intersections shall be fixed on all legs of a tee or cross installation and shall be located in the berm areas free of the carriageway;
- The position of all valves on water mains shall be indicated by a white plastic indicator post to the Council's approval bearing the inscribed letters 'SV', 'AV', 'PV' in black to indicate either sluice valves, air valves or peet valves respectively.

6.4.2 Valve types

6.4.2.1 Gate Valves

DELETE AND REPLACE WITH

Gate valves shall be in accordance with NZS/BS 5163 on principal mains. They shall be Resilient Seated valves with 'Levasint' or equivalent coating, suitable for working pressures up to 1600 kPa and also complying with the following requirements:

- They shall be anti-clockwise closing, and shall be provided with cast iron spindle caps;
- The stem material shall be Grade 431 Stainless Steel in accordance with AS 2837, with an integral thrust collar;
- The wedge shall be cast in Ductile Iron and fully encapsulated in an approved synthetic rubber. Partially coated wedges are not acceptable;
- The valve body, bonnet and top castings shall be manufactured from Ductile Iron and fully enveloped with a fusion powder coating, applied by the fluidized bed technique, conforming to AS4158;
- Alternatively, components may be manufactured from an approved corrosion resistant material without protective coatings;
- All external fasteners shall be Denso wrapped;
- The stem shall be sealed by a minimum of two "O" rings, which can be replaced under full working pressure;
- Peat valves used on rider mains shall be in accordance with BS5163 and shall be resilient seated, clockwise closing and have cast iron spindle caps;
- Service gate valves between 20mm and 32mm diameter shall be DR brass in accordance with AS1628 and AS 2345;
- Quick closing valves of any kind shall not be used on any piping directly connected to the service pipe, that is, in any position where they are required to close against mains pressure. In circumstances specially approved they may be used, provided a suitable air chamber is fitted in the supply pipe at the stoptap or next to the fitting as may be required in the particular case. In special circumstances non-concussive types of valve may be used as approved by the TA.

6.4.2.2 Butterfly valves

DELETE AND REPLACE WITH

Butterfly valves or plug-type valves (including ball valves) shall not be used.

6.4.2.4 Pressure reducing valves

DELETE AND REPLACE WITH

Where pressure reducing valves are required, they shall be to the approval of the Authorised Officer.

6.4.2.6 Scour and pump out branches

ADD

Where scouring of mains is needed as a frequent operation, a connection to the stormwater system shall be provided from scour points. A non return valve and gate valve shall be provided in a valve chamber on the connection to the storm water system to prevent backflow. Automatic air release valves shall be provided and positioned so that ground water cannot enter the main at negative pressure.

6.5 Hydrants

6.5.6 Hydrant Flow Test

ADD NEW CLAUSE

Following completion of the pipe test and connection to the main, the developer shall provide certification from the Fire Service or other approved independent certifier, of the static pressure, the maximum flow and the residual pressure at maximum flow for each hydrant.

6.6 Connections

6.6.1 Connection of new mains to existing mains

ADD

Connections to a principal main or rider main shall be with a tapping band and a ferrule with the flow of water controlled by a screwed brass plug. The tapping band shall be LG2 gun metal to BS 1400. The tapping band, ferrule and valve shall be covered in a protective wrapping such as "Denso" tape prior to backfilling. The tapping band for each services connection shall be sited at the central point of the front boundary or on the house side, and clear of any driveways or access ways. The position shall be marked on the kerb with a 125mm square of blue paint; in addition a notch 12mm wide and 12mm deep shall be cut in the top of the kerb before painting.

6.6.2 Property service connections

DELETE AND REPLACE WITH

All service connections shall include backflow prevention in accordance with the NZ Building Code Approved Document G12.

Service connections to households shall be in accordance with drawing FNDC/S/26 and be a minimum of 20mm in diameter.

In industrial areas, the connections shall not be made until the Building Consent stage, to ensure that the backflow prevention is appropriate.

For private ways and private roads, a single connection, with size determined as for a rider main shall be provided to the left hand boundary and to within 250mm of the public road boundary. Separate connections shall then be provided to each lot from that boundary. Where appropriate, because of the number and length of connections required, or to provide for fire fighting coverage where the furthestmost most building site is greater than 135mm

from the public road, approval may be given for reticulation of the private way or road. In such cases, an easement in favour of Council over the private way or road will be required.

Connections to a principal main or rider main shall be with a tapping band and a ferrule with the flow of water controlled by a screwed brass plug. They shall be at right angles to the lot frontage, shall be generally central on the front boundary and clear of driveways.

The physical work of connecting to the existing reticulation after the new reticulation has been tested and passed as satisfactory shall have prior approval of the Council before onsite work commences. Connection shall only be made by Council-approved contractors at the applicant's expense.

Upon connection the new reticulation shall be flushed to the satisfaction of the Council, and then left operational.

The position of the service connection shall be marked on the kerb top with a 125mm square of blue paint; in addition, a notch 12mm wide and 12mm deep shall be cut in the top of the kerb before painting.

Domestic service connection pipes shall be blue or predominantly blue PE 80 of minimum size 20mm NB AS/NZS 4130:1997. The size of the pipes shall depend on the pressure available in the water main and the water supply demand of the building. Only approved water supply fittings and pipe inserts shall be used and jointing shall be carried out in accordance with the manufacturer's instructions. Appropriate PTFE tape or Loctite 567 or 592 shall be used with threaded joints to ensure leak free connection.

Toby boxes shall be as per FNDC/5/26 or similar approved box. Standard meter boxes (for use on grass berm) shall be rectangular, with minimum dimensions 200mm x 300mm clear access, and be at least 200mm deep. The meter box material shall be black polyethylene to the Authorised Officer's approval. Larger boxes accommodating up to three meters shall be used when meters are installed side by side. Heavy-duty meter boxes (for use in trafficked areas) shall be designed and constructed in special cases. Where four or more meters are to be installed side-by-side a combination of boxes shall be used.

6.6.3 Tapping Bands

ADD NEW CLAUSE

All tapping bands shall provide a total encirclement of the pipe and shall be able to be installed without shutting down the pipe. Tapping bands on uPVC pipes shall be LG 2 gun metal to BS 1400. Tapping bands on other pipes shall be specifically designed.

6.6.4 Water Meters

ADD NEW CLAUSE

Unless agreed otherwise by the Authorised Officer, separate water meters shall be installed for each residential or commercial or industrial unit. Water meters shall be located in a position previously agreed by the Authorised Officer. Council shall retain ownership of the meter. Council shall be responsible for the repair, maintenance and replacement work up to the consumer side of the meter, except where malfunction or damage is the result of actions by the consumer.

Water meters shall be Kent or Sensus water meters.

6.10 Construction of pipelines

ADD

A set of drawings which clearly and accurately show the locations of all water mains, valves, hydrants and bends constructed including any modifications made to the existing system shall be submitted in accordance with Clause 1.5.2. Locations shall be indicated by offset measurements from property boundaries where possible at regular intervals and direction changes. Where PE 80/PE 100 pipe has been used, as-built drawings shall provide details of the person who did the welding, and relevant weld details that include:

- Name
- Company name
- Welding registration number
- Type of welds
- Number of welds
- Weld parameters
- Welding equipment used.
- Pipe details
- ID
- Wall thickness
- Material
- Manufacturer

6.10.4 Pressure testing of water mains

DELETE AND REPLACE WITH

All pipes, valves, service connections, storage reservoirs and other fittings shall be pressure tested.

On completion of the pipe laying and jointing, sufficient backfill materials shall be placed over the pipes to prevent movement during pressure testing, leaving joints and fittings and anchor blocks visible.

No connections of a permanent nature between existing mains and the new work will be allowed until testing has been satisfactorily completed and approved by the Authorised Officer.

PE 80 rider mains are not to be connected to mains of a different material before testing.

To flush out and complete the preliminary test, all valves on the new main shall be fully opened and all hydrants, stop taps and valves on the consumer end of the service pipes shall be shut. Water for all tests may be obtained from the existing system provided prior Council approval is obtained and a metered standpipe with a check valve is used.

Using the temporary supply, the new reticulation system shall be flushed out and any air eliminated. A visual inspection of the line including joints and fittings shall be made and any apparent flaws and leaks shall be remedied. The pipe shall be left full overnight before pressure testing.

After flushing out has been completed the system shall be pressure tested. Pressure tests shall be carried out by means of an approved pressure pump at a steady rate without shock loading. Pressure gauges used shall be accurate and read to a minimum of 10kPa intervals. The specified test pressure is that to be applied to the lowest point in the section and if the pressure gauge is not located at the lowest point a correction shall be made

for the difference in levels. Pressure testing against valves will not be permitted.

The test period shall be one hour. Test sections shall not exceed 500m in length. For PVC pipe the test is acceptable if a visual inspection shows no evidence of leaks and if the rate of pressure drop does not exceed 10% of test pressure per hour when allowance is made for any pressure change due to temperature change.

- All PE 80/100 water mains must be a minimum of PN.12.5. Test pressures shall be limited to the pressure rating.
- The Contractor shall give the Authorised Person 48 hours notice before carrying out the above testing. Upon request for such testing, the contractor shall advise of the length and diameter of the test pipe at which time the required test method as described in Appendix B of NZS 4404:2004, shall be agreed upon.

6.10.6 Disinfection of water mains

DELETE AND REPLACE WITH

After backfilling and before being put into service, all pipes, valves, house connections and other fittings shall be disinfected. All disinfection testing will be at the developers cost.

The main shall firstly be thoroughly flushed via a temporary supply in sections through hydrants or washouts with sufficient volume of water to develop a velocity of 0.8 m/s in the main to remove all foreign matter. The main shall then be drained and slowly filled with potable water to which sufficient free chlorine is added to produce a concentration of 50 parts per million in the main.

It is recommended this is done via a water tanker of known volume.

The point of water application shall be at the beginning of the section of main to be sterilized.

Chlorine may be added to the pipe in on of the following ways:

- Chloride of lime solution
- Calcium hypochlorite solution
- Sodium hypochlorite solution
- HTH dry chlorine granules dissolved in water before put into the main.

The main shall be left full of the chlorinated water for 24 hours, during which time all valves, hydrants and other fittings on the section shall be operated.

The residual chloride concentration must not be less than 10 ppm after 24 hours.

The main shall then be flushed out until the chlorine concentration of the issuing water is between 2 and 0.2 parts per million.

If the chlorination is found to be unsatisfactory, the Contractor shall repeat the procedure until the water is of acceptable quality.

The testing of the chlorine concentration is to be carried out on site by a Council approved laboratory. It is the Contractors responsibility to arrange for the laboratory representative to be on site. At least 24 hours notice is required for the initial chlorine application. The representative shall return 24 hours later for the second residual chlorine test and will stay on site while the line is flushed till the chlorine concentration is down to between 2 and 0.2 ppm.

The laboratory shall provide a written report to Council on the results of the tests.

Upon approval of the test results from the Council the applicant shall keep the new reticulation continuously charged with water under pressure and request in writing Council approval to connect to the existing reticulation. Such requested shall include the name of the approved contractor, and the Council file and property identification numbers.

The connection shall only be made by Council approved contractors. Upon connection the new reticulation is to be flushed to the satisfaction of the Council, and then left operational.

6.10.7 Discharge of water containing chlorine from pipelines

DELETE AND REPLACE WITH

All water must be discharged in a manner and to a site approved by Council.

6.11 Means of Compliance with this Standard

6.11.2 Minimum pipe sizes

ADD

Minimum acceptable sizes for Service Connection shall be 20mm diameter.

6.11.3 Allowable operating pressures (heads)

ADD

Minimum operating pressure:

- Residential 300 kPa
- Industrial 300 kPa

PART 8 RESERVES

8.3 Design and Construction

8.3.5 Park furniture/structures

DELETE the last paragraph and **REPLACE WITH** the following:

Playground equipment and surfaces shall comply with NZS5828:2004
Playground Equipment and Surfaces.

PART 9 POWER, TELECOMMUNICATIONS, GAS

9.2 General

The developer is required to make all arrangements with the appropriate network utility operators for the supply and installation of electric power and to the extent applicable for the provision of telecommunication and gas reticulation.

The developer shall provide satisfactory evidence to the TA that the network utility operator is prepared to reticulate the subdivision and that agreement on the financial arrangements for the installation of the supply has been reached.

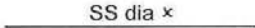
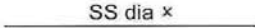
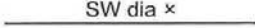
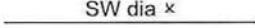
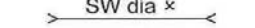
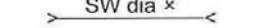












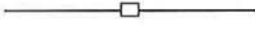
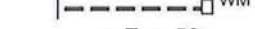










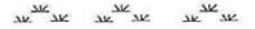


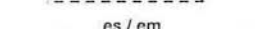





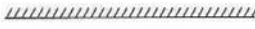




- a) **Electric power.** The supply of electric power shall generally be by means of an underground system. Ducts shall be installed at the time of road construction to the requirements of the electrical supply authority;
- b) **Telecommunications.** Arrangements shall be made with the telecommunication supplier for the reticulation of telecommunication facilities. Where only part of this reticulation is being supplied initially the arrangements shall include the requisite space being maintained for the installation of the remainder of the reticulation at a later date. Ducts are to be supplied by the developer at the time of road construction for installation in the carriageway formation at locations where cables may be required at a later date. Telecommunications may share trenches with water and wastewater services;
- c) **Gas.** Where an existing gas supply is available or likely to be available to serve a subdivision, the developer may make appropriate arrangements with the gas supply authority and at the time of road construction, install such duct pipes as may be required.

APPENDICIES

Appendix A Standard construction drawings (Informative)

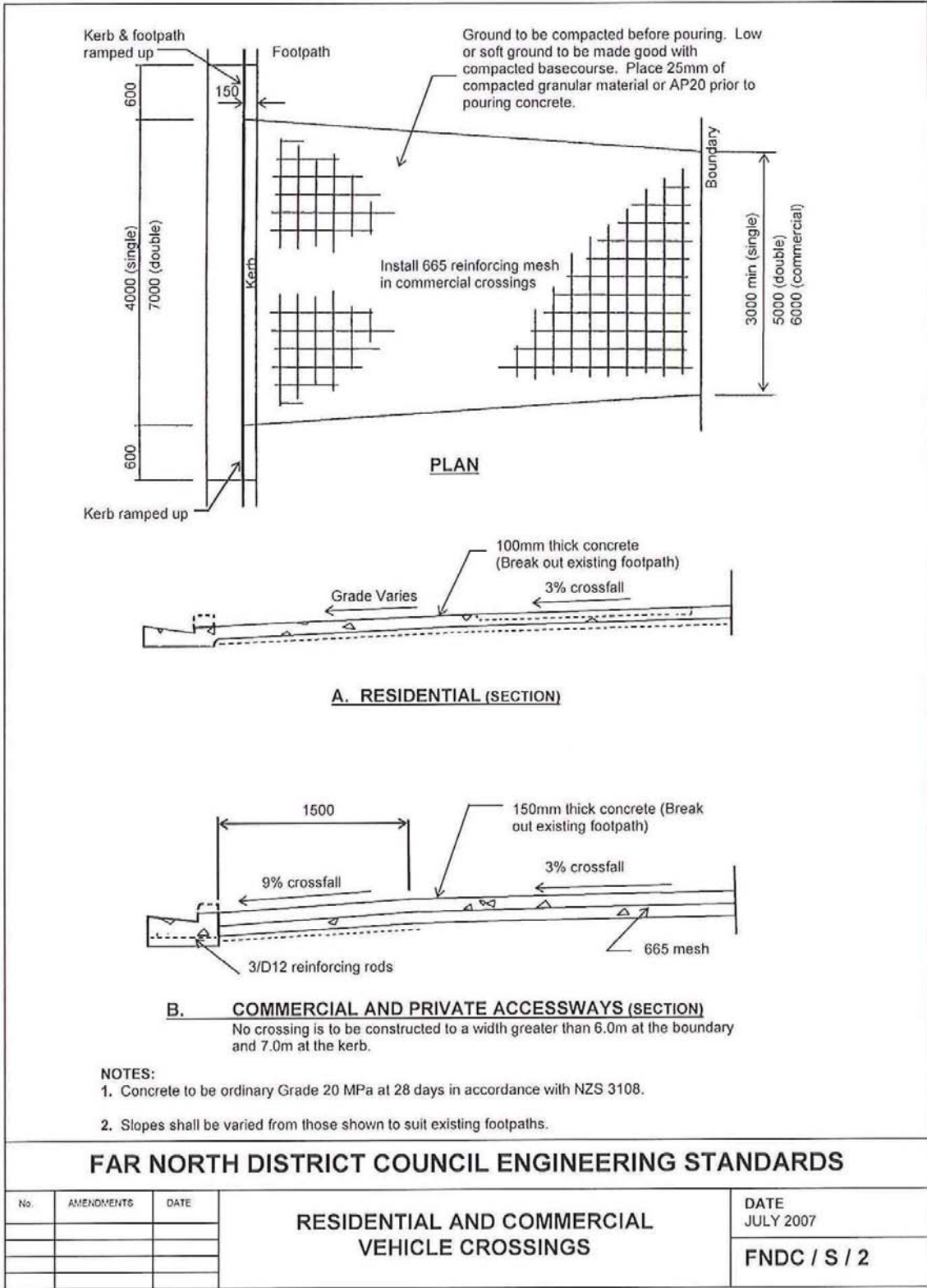
As detailed in the same named Appendix of NZS 4404:2004, with the following additions which, in the event of any discrepancy or conflict, shall take precedence over of NZS 4404:2004:

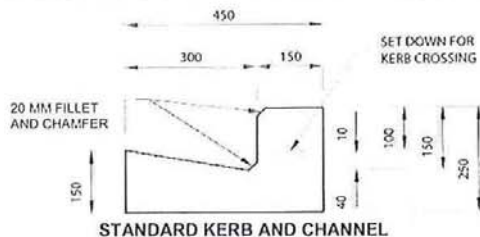
FNDC/S/1	Standard Symbols
FNDC/S/2	Residential and Commercial Vehicle Crossings
FNDC/S/3	Kerb & Channel, Dished Channels, Mountable Kerb & Channel
FNDC/S/4	Set Back Cesspits
FNDC/S/5	Single Sump, Double Sump, and Field Sump
FNDC/S/6	Residential Vehicle Crossings – Unkerbed Roads
FNDC/S/6B	Domestic Crossing Layout (rural and unkerbed road))
FNDC/S/6C	Farm/Commercial Crossing Layout – Local Road
FNDC/S/6D	Farm/Commercial Crossing Layout – Arterial/Collector Road
FNDC/S/7	Road Standards and Definitions
FNDC/S/12	Scour Valve Installation
FNDC/S/13	Precast Catchpits
FNDC/S/15	Culvert Inlet/Outlet Structures
FNDC/S/21	Pipe Protection
FNDC/S/24	Far North District Rainfall Depths
FNDC/S/25	Pram Crossing Details
FNDC/S/27	Street Catchpit 800 x 500
FNDC/S/30	Embedment and trench fill – Typical arrangement

Sanitary Sewer		
Stormwater Pipeline		
Stormwater Culvert		
Manhole		
Cesspit		
Catchpit		
Watermain		
Sluice or Scour Valve		
Peet Valve		
Air Valve		
Fire Hydrant		
Water Meter		
Pumping Station		
Communication Cable		
Communication Pole		
Power Cable		
Power Pole		
Gas Main		
Watercourse		
Bridge		
Fence & Gate		
Hedge		
Bank		
Swamp		
Rock Wall		
Vehicle entrances - concrete		
- metal		
Edge of sealed, metallated carriageway		
Traverse		
Bench mark		
Survey mark		
Kerb & Channel		
Dish Channel		
Building		

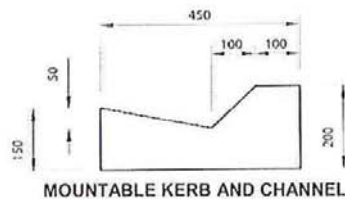
FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

No.	AMENDMENTS	DATE	STANDARD SYMBOLS	DATE
				JULY 2007
				FNDC / S / 1

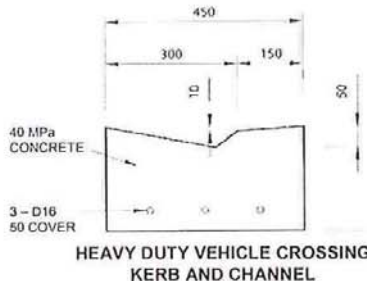




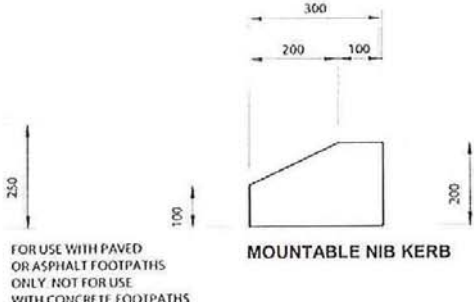
STANDARD KERB AND CHANNEL



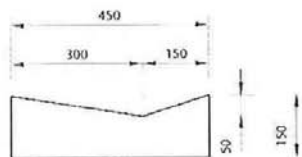
MOUNTABLE KERB AND CHANNEL



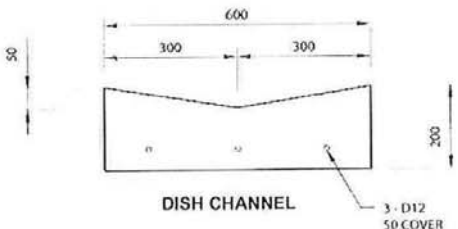
HEAVY DUTY VEHICLE CROSSING KERB AND CHANNEL



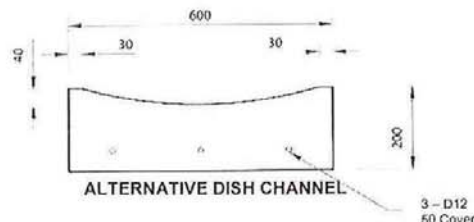
MOUNTABLE NIB KERB



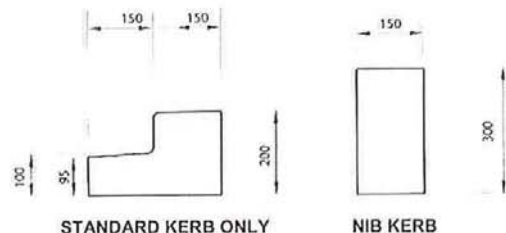
PRAM CROSSING KERB AND CHANNEL



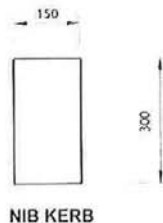
DISH CHANNEL



ALTERNATIVE DISH CHANNEL

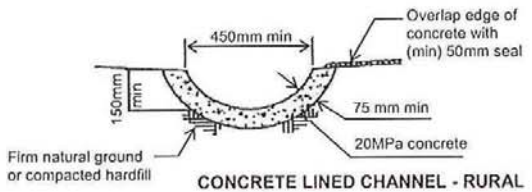


STANDARD KERB ONLY



NIB KERB

- NOTES:**
1. All concrete shall be Ordinary Grade 20 MPa if cast insitu & 25 MPa (slip formed) at 28 days.
 2. Crack control joints to be formed at maximum of 3 metre intervals.
 3. Profiles may be modified slightly to suit kerbing machine provided that the same strength is achieved.
 4. All kerbs and channels shall be underlain by a minimum 75mm of compacted AP 40 pavement aggregate.
 5. Pavement drains and channels are required whenever the channel can collect water.
 6. Channels and drains may be omitted if the carriageway slopes away from the kerb perpendicular to the road centerline.



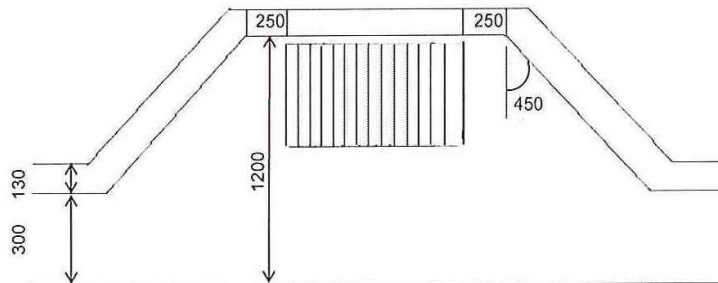
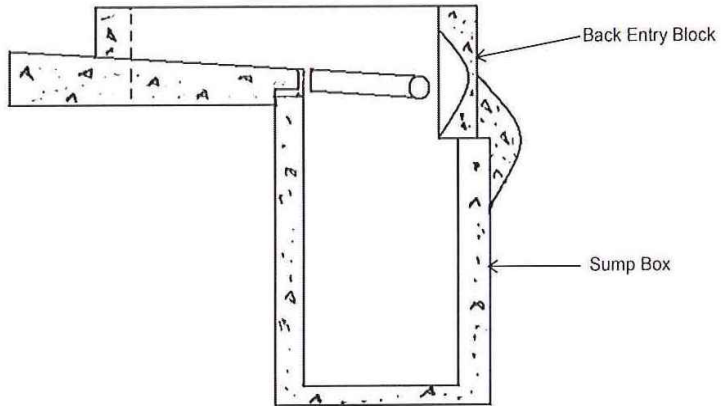
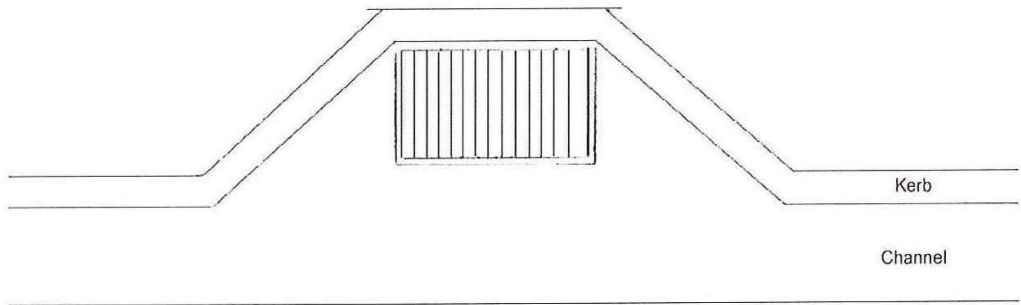
CONCRETE LINED CHANNEL - RURAL

FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

No.	AMENDMENTS	DATE

KERB & CHANNEL, DISHED CHANNELS, MOUNTABLE KERB & CHANNEL

DATE
JULY 2007
FNDC / S / 3



NOTES:

1. All concrete to be 20MPa if cast insitu and 25MPa (slip formed) at 28 days.
2. Profiles maybe modified slightly to suit kerbing machines providing same strength is achieved.
3. All kerb and channels and apron areas, shall be underlain with a minimum of 75mm compacted AP40 Pavement Aggregate.

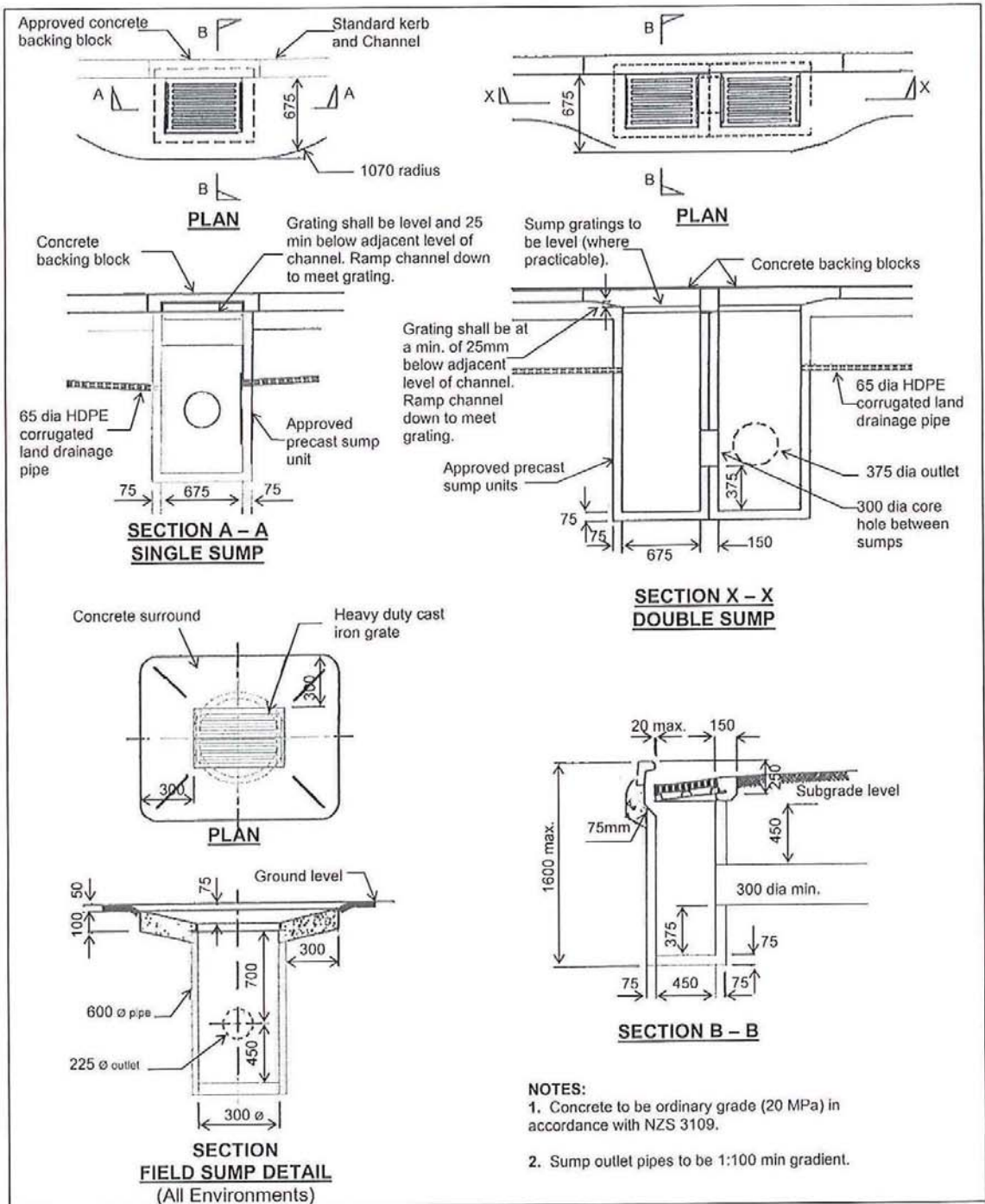
FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

No.	AMENDMENTS	DATE

SET BACK CESSPITS

DATE
JULY 2007

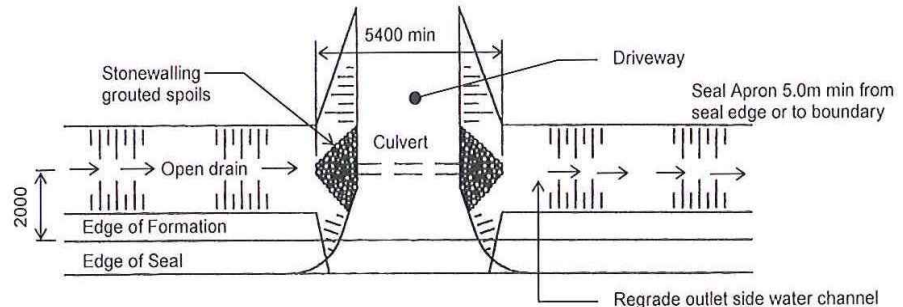
FNDC / S / 4



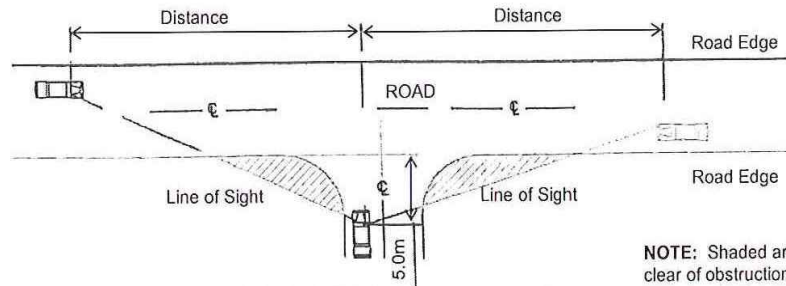
- NOTES:**
 1. Concrete to be ordinary grade (20 MPa) in accordance with NZS 3109.
 2. Sump outlet pipes to be 1:100 min gradient.

FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

NO.	AMENDMENTS	DATE	SINGLE SUMP, DOUBLE SUMP, AND FIELD SUMP	DATE
				JULY 2007
				FNDC / S / 5



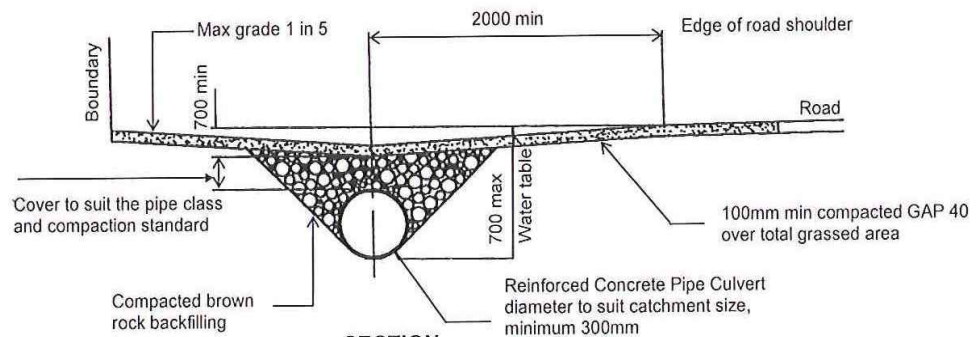
PLAN – TYPE 1 CROSSING AND DRAINAGE



PLAN – TRAFFIC SIGHT LINES NTS

ROAD OPERATING SPEED (km/h)	50	60	70	80	90	100
MINIMUM SIGHT DISTANCE (m)	65	75	95	115	140	170

MINIMUM SIGHT DISTANCE



SECTION

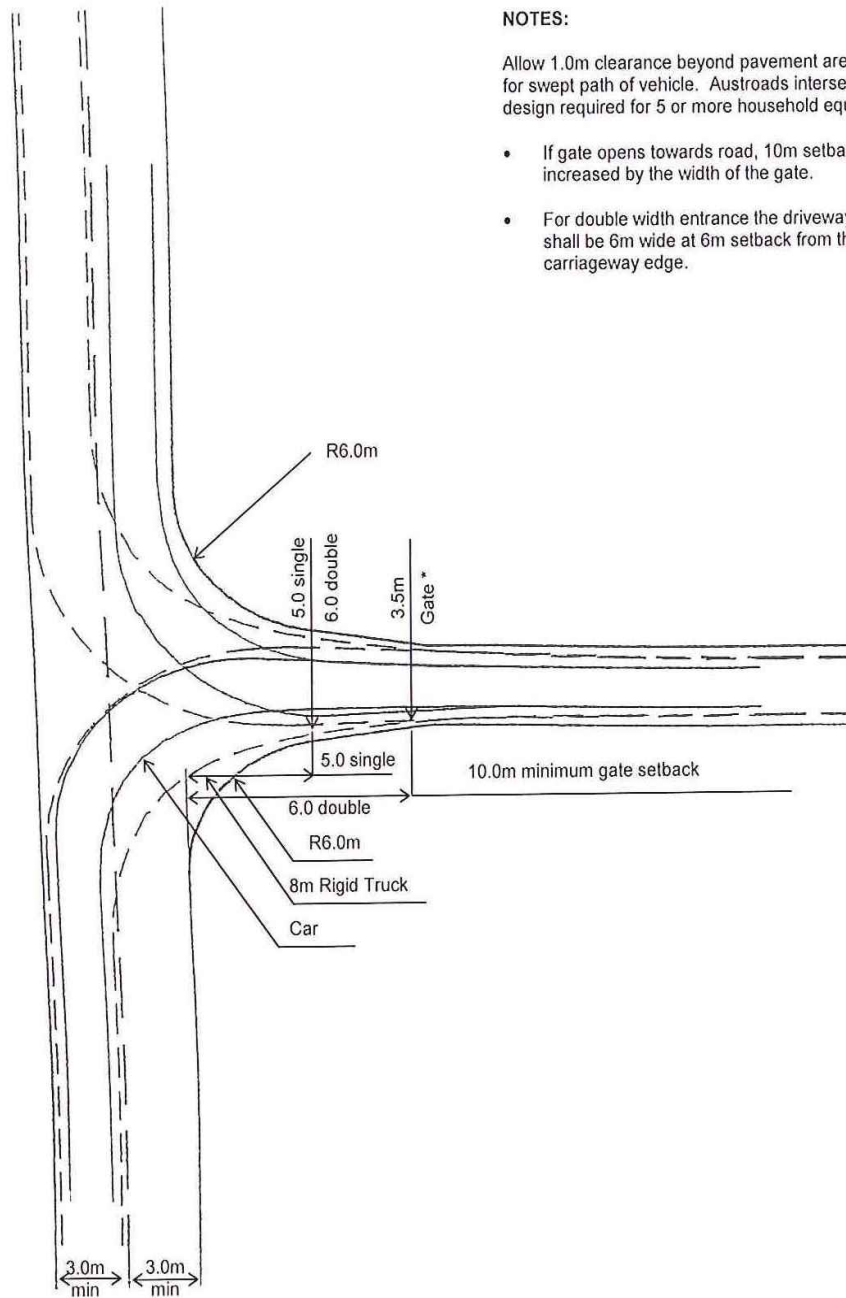
NOTES:

1. Width sufficient to allow a vehicle to turn in from the left on an 8 metre inside radius without crossing the centerline. On commercial vehicle crossings (including farms), this radius shall be increased to 15 metres.

2. On arterial roads, vehicle access to properties which generate more than 60 vehicles per day shall be in accordance with Diagram D of the Transit NZ document "planning for a Safe and Efficient State Highway Network Under the Resource Management Act".

FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

No.	AMENDMENTS	DATE	RESIDENTIAL VEHICLE CROSSINGS UNKERBED ROADS	DATE
				JULY 2007
				FNDC / S / 6



NOTES:

Allow 1.0m clearance beyond pavement area shown for swept path of vehicle. Austroads intersection design required for 5 or more household equivalents.

- If gate opens towards road, 10m setback shall be increased by the width of the gate.
- For double width entrance the driveway width shall be 6m wide at 6m setback from the road carriageway edge.

FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

No.	AMENDMENTS	DATE

**DOMESTIC CROSSING LAYOUT
(RURAL OR UNKERBED ROAD)**

DATE
JULY 2007

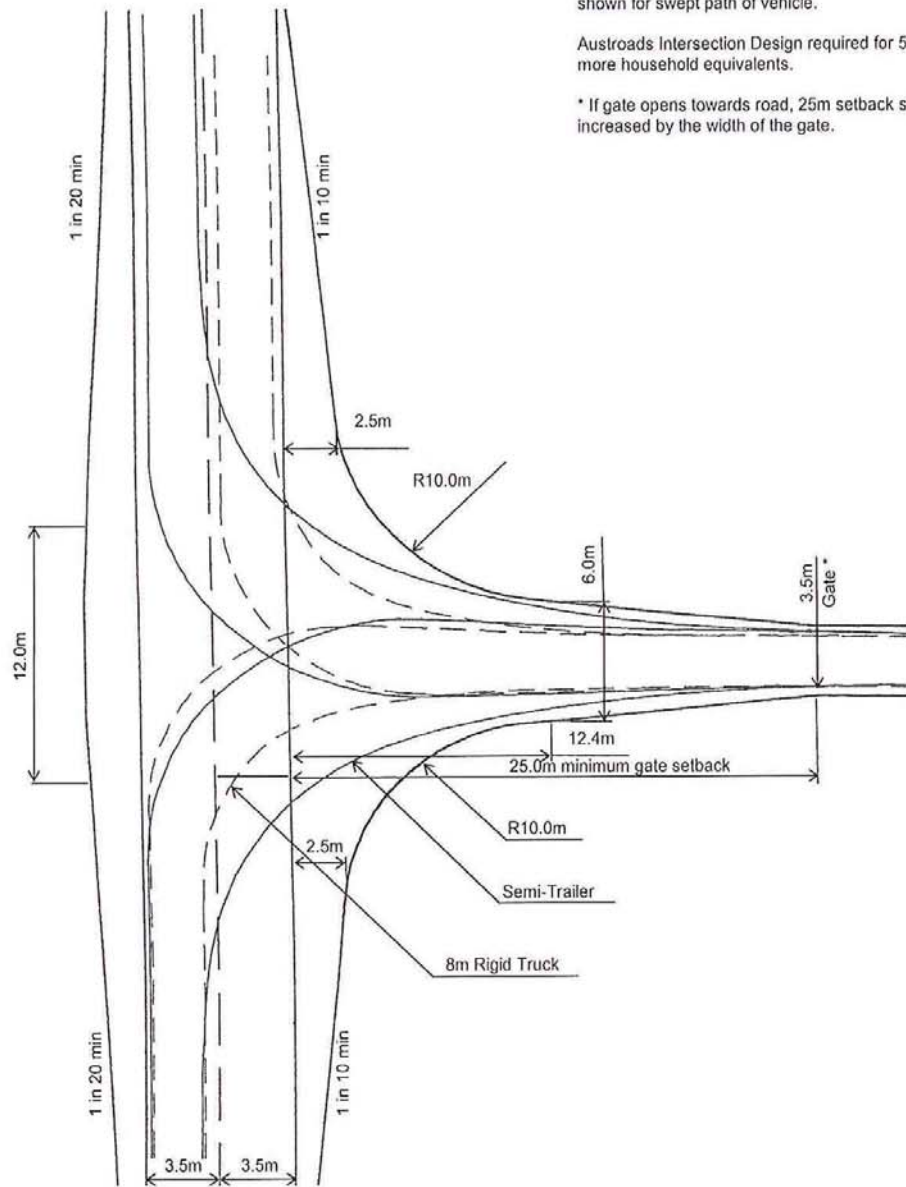
FNDC / S / 6B

NOTES:

Allow 1.0m clearance beyond pavement area shown for swept path of vehicle.

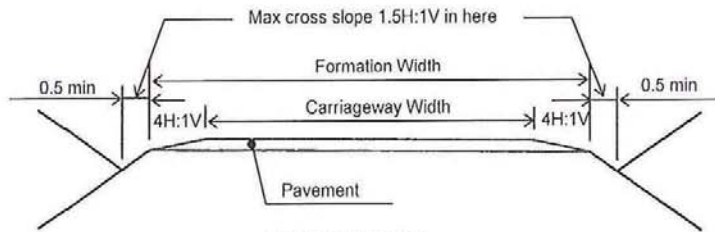
Austroads Intersection Design required for 5 or more household equivalents.

* If gate opens towards road, 25m setback shall be increased by the width of the gate.

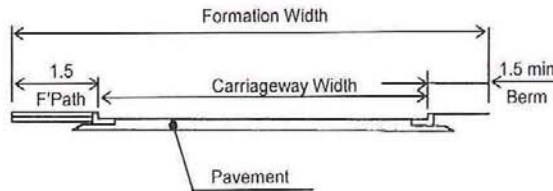


FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

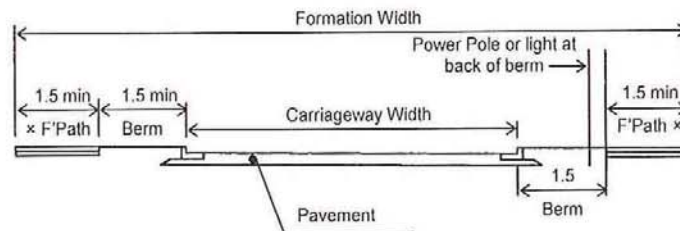
No.	AMENDMENTS	DATE	FARM / COMMERCIAL CROSSING LAYOUT ARTERIAL / COLLECTOR ROAD	DATE
				JULY 2007
			FNDC / S / 6D	



RURAL ROADS



TYPE A URBAN ROADS



TYPE B TO D URBAN ROADS

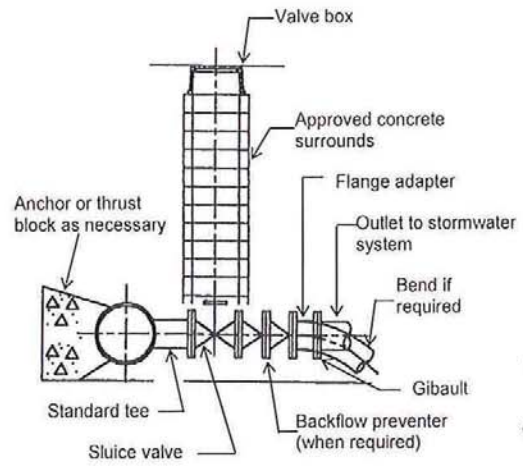
* Required one side only in Type B Roads

NOTES:

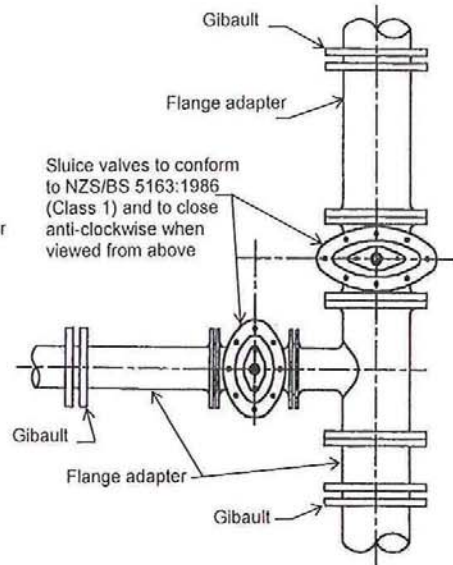
1. Kerb shall be non-mountable with a 75mm depth of compacted basecourse and sub-soil drains underneath. It shall include a 300mm wide channel unless on the high side of the super elevation.
2. The entire upper subgrade surface shall have a minimum 4% slope perpendicular to the road surface. This shall slope away from the road under unsealed shoulders.
3. Footpaths and/or berms shall be placed on the most suitable side of the road (if not required on both sides). All berms and footpaths shall have a 3% to 5% cross-fall towards the carriageway.
4. The widths of Type A and Type B roads can be reduced under certain conditions. Refer to table 3.1A *Road Cross Section Standards* of the Engineering Standards and Guidelines.

FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

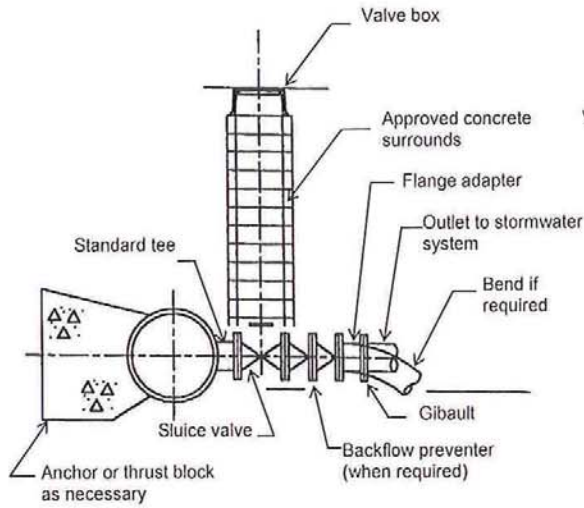
No.	AMENDMENTS	DATE	ROAD STANDARDS AND DEFINITIONS	DATE
				FNDC / S / 7



FOR MAINS UP TO 300mm DIAMETER

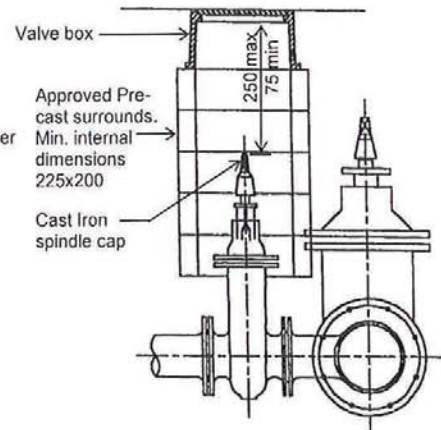


PLAN



FOR MAINS UP TO 375mm DIAMETER & OVER

SLUICE VALVE INSTALLATIONS



ELEVATION

SCOUR VALVE

NOTES:

1. Diameter of scour to be specified by the Council.
2. Valve boxes are to have long side parallel to main.
3. Outlet to have appropriate scour protection and all necessary consents.

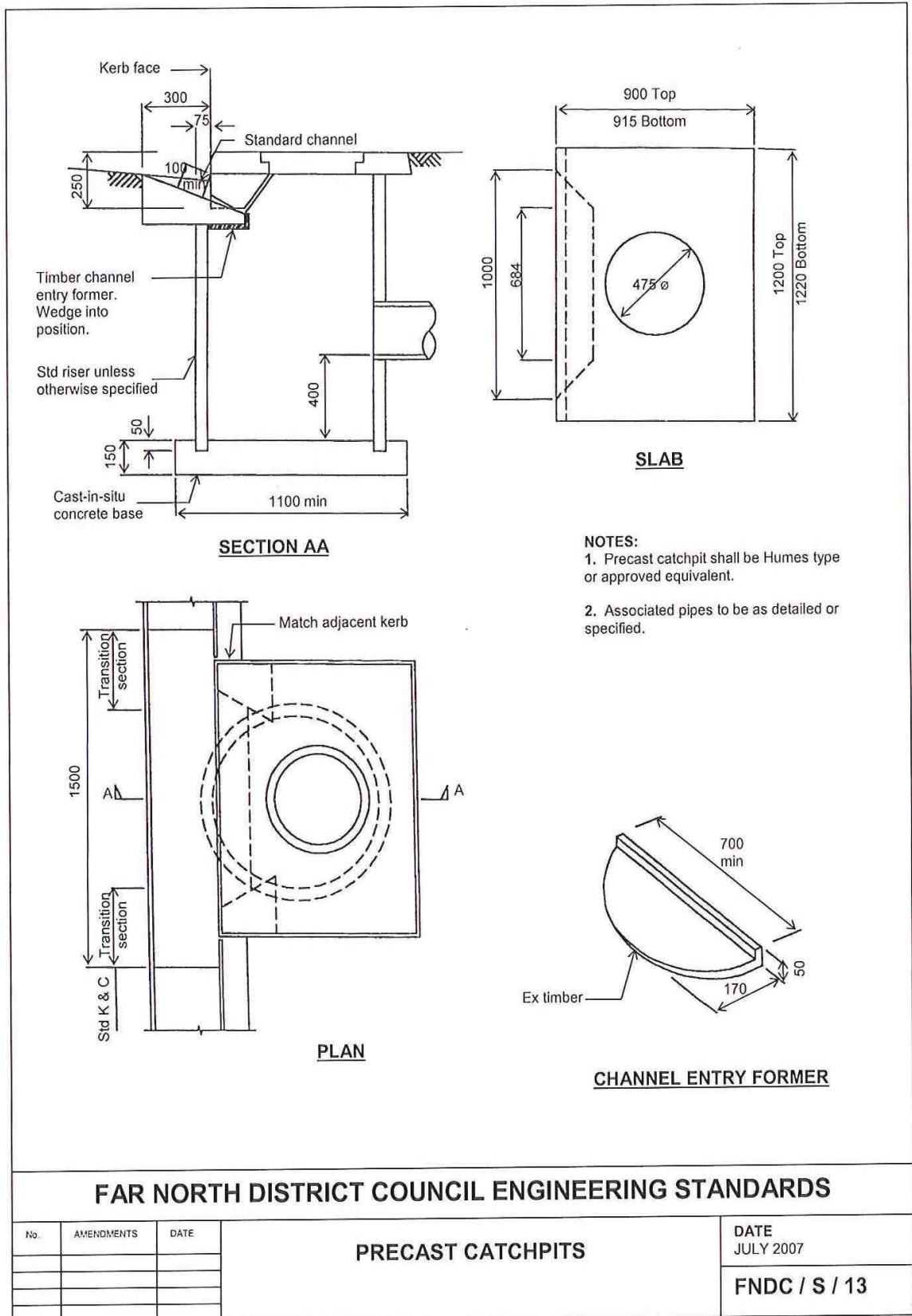
FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

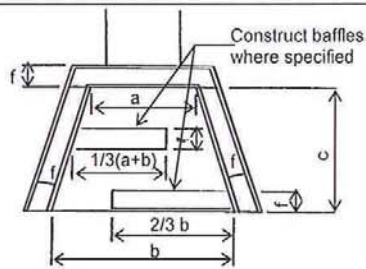
No.	AMENDMENTS	DATE

SCOUR VALVE INSTALLATION

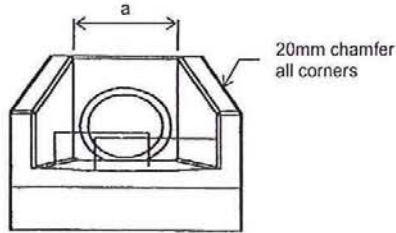
DATE
JULY 2007

FNDC / S / 12

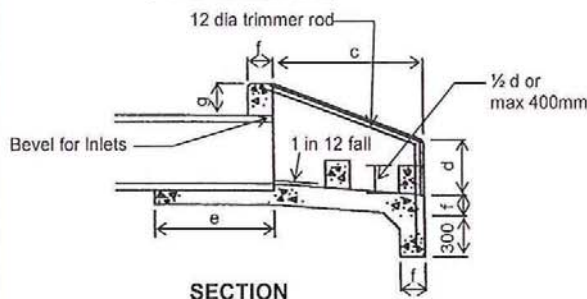




PLAN



END ELEVATION



SECTION

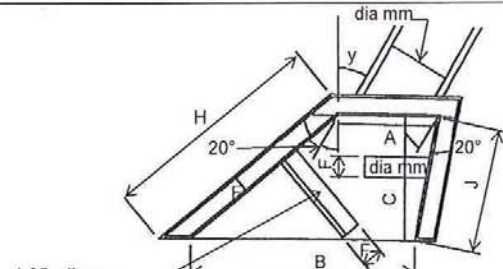
- A. $Sea\ y \times (a)$
- B. $C \tan (y + 20^\circ) + [A - C \tan(y - 20^\circ)]$
- H. $C \times \text{Sec}(y + 20^\circ)$
- J. $C \times \text{Sec}(y - 20^\circ)$

NOTES

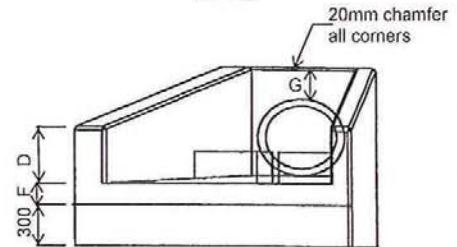
1. Reinforce floors & walls with:
 - 150 – 375 665 mesh
 - 450 – 600 633 mesh or D10 rods at 250 crs
 - 675 – 900 D12 rods at 250 crs
 - 1050 – 1350 D12 rods at 150 crs

All reinforcement shall be placed centrally in walls and floor, and shall be continuous between walls and floor.

2. These structures are subject to the approval of the Northland Regional Council.
3. Laps in structural grade bars to be 300 min.



PLAN



END ELEVATION

DIA OF PIPE	PRINCIPAL DIMENSIONS (mm)						
	a	b	c	d	e	f	g
150	300	450	600	200	325	100	150
230	380	600	700	250	425	100	150
300	450	750	750	300	525	100	150
375	550	900	850	350	625	100	150
450	630	1100	900	400	725	150	230
525	700	1200	1000	450	825	150	230
600	800	1400	1100	550	900	150	230
750	1000	1700	1200	600	1050	150	300
900	1170	2000	1450	650	1225	150	300
1050	1380	2300	1700	750	1375	150	300
1200	1520	2600	2100	750	1550	150	450
1350	1680	2800	2400	750	1725	150	450

4. There shall be at least 2 bars in each direction over the top of the pipe.
5. Concrete shall be high or special in accordance with NZS 3104, constructed in accordance with NZS 3108.
6. Baffles shall be constructed as shown when outlet velocities and soil conditions dictate, in extreme cases specific design may be required by the Council.
7. Inlet structures shall have reverse apron fall and no baffles.

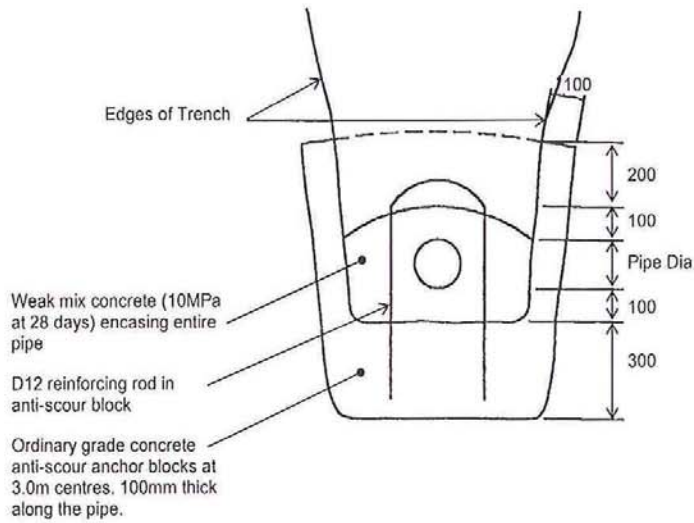
FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

No.	AMENDMENTS	DATE

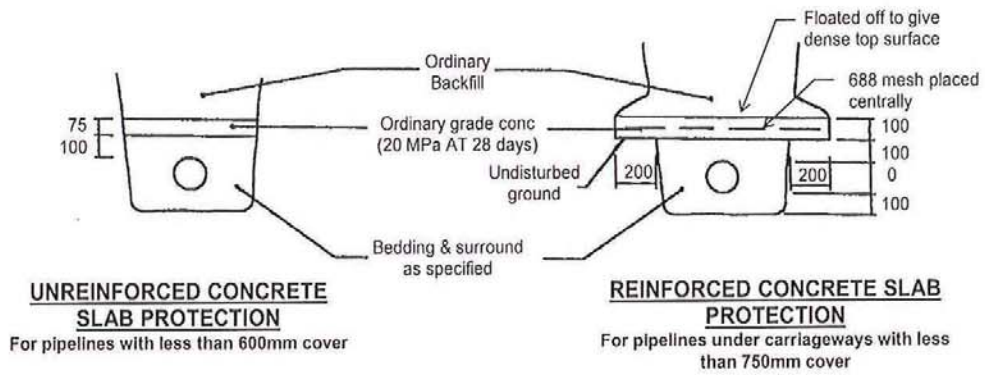
CULVERT INLET/OUTLET STRUCTURES

DATE
JULY 2007

FNDC / S / 15

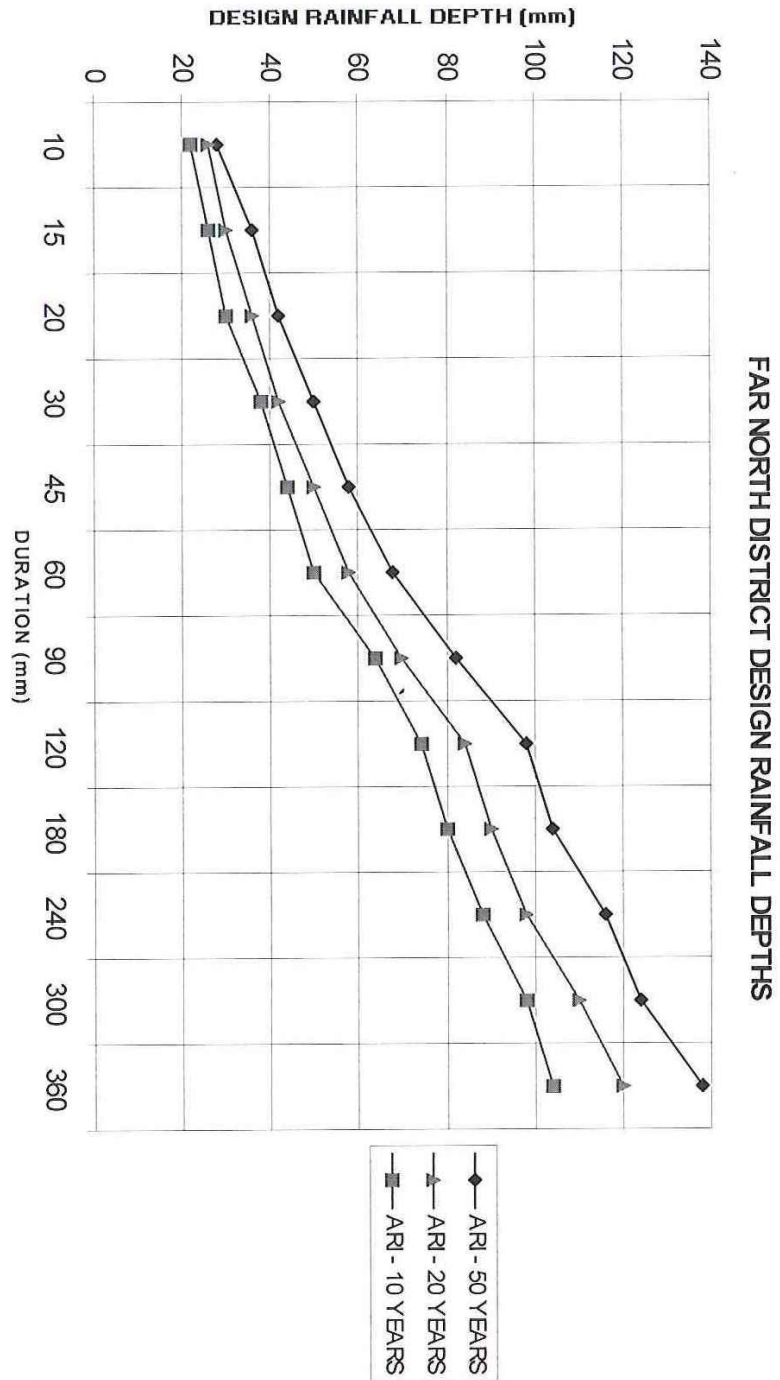


SCOUR PROTECTION – STEEP PIPES
(For pipelines with gradients between 1V:8H and 1V:3H)



FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

No.	AMENDMENTS	DATE	PIPE PROTECTION	DATE	
					JULY 2007
					FNDC / S / 21



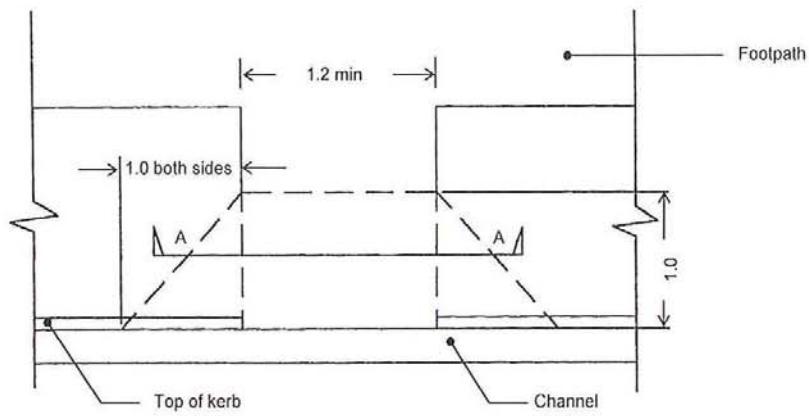
FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

No.	AMENDMENTS	DATE

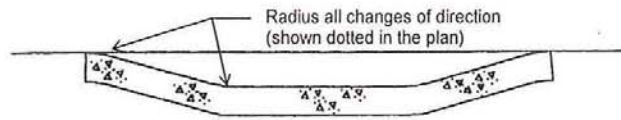
FAR NORTH DISTRICT DESIGN RAINFALL DEPTHS

DATE
JULY 2007

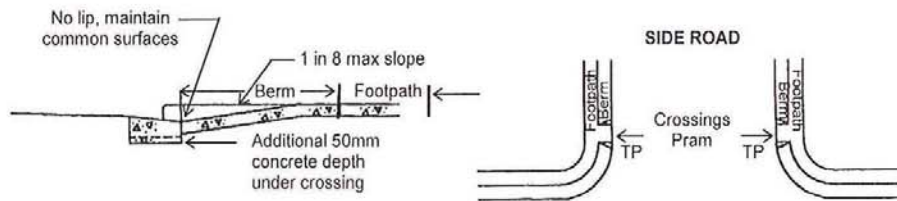
FNDC / S / 24



PLAN



SECTION A - A



TYPICAL CROSS-SECTION THROUGH PRAM CROSSING

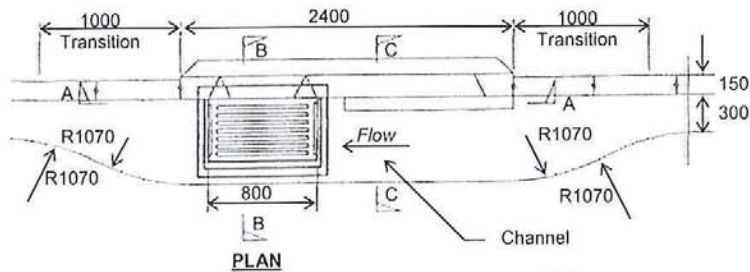
PRAM CROSSING LOCATION AT TEE INTERSECTION
 "TP" = Tangent point of intersection radius

NOTES:

1. At pedestrian crossings, the crossing width shall be same as the crossing bars.
2. Pram crossings to be located downstream of the nearest sump, and such that visibility is maximised.

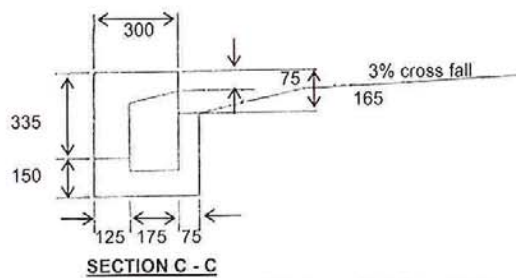
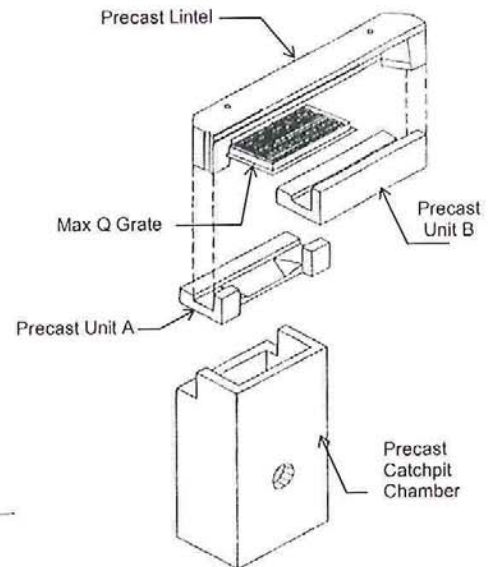
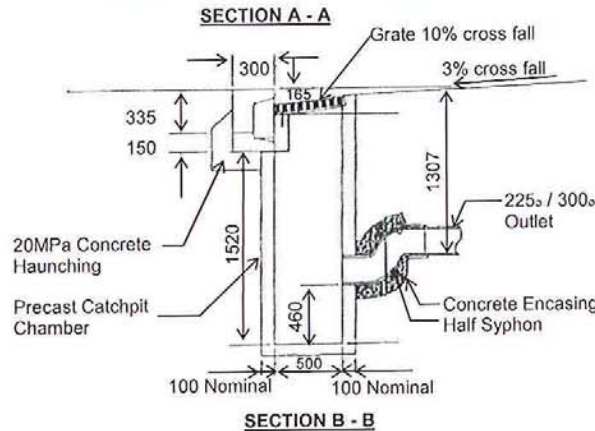
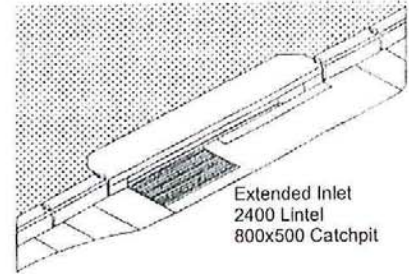
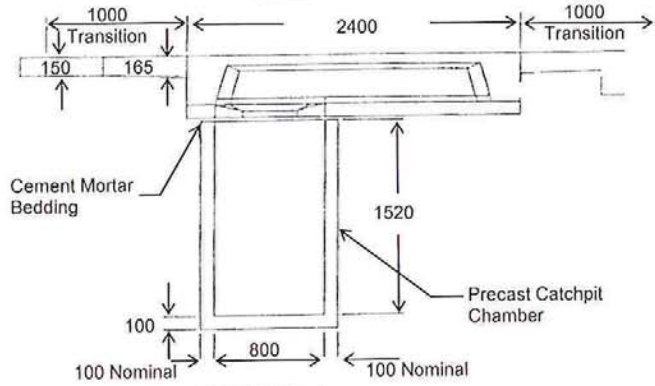
FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

No.	AMENDMENTS	DATE	PRAM CROSSINGS	DATE
				JULY 2007
				FNDC / S / 25



NOTES:

1. Concrete to be 25 MPa
2. Catchpits to be 1.8 m deep
3. Half Syphon to be used in all cases
4. Grates shall be Max Q 800 X 500
5. Transition – kerb height changes from 150 to 165
6. Capacity of 225 ø Syphon outlet – limit to 50 L/S
7. Precast units A and B with Lintel can be retrofitted to existing catchpit



NOTE:

When retrofitting Unit A to existing catchpit, trim back existing catchpit as above. Place Unit A centrally over back of catchpit on concrete bedding.

FAR NORTH DISTRICT COUNCIL ENGINEERING STANDARDS

No.	AMENDMENTS	DATE

**STREET CATCHPIT
800 X 500**

DATE
JULY 2007

FNDC / S / 27

Appendix E

FNDC Requirements for Independent Qualified Persons (IQPs)

Introduction

This is Council policy for IQPs from whom Council will accept certification of design and/or construction.

Engineers chartered in accordance with the Chartered Professional Engineers Act are chartered because their qualifications are appropriate and an independent assessment has found their experience and ability to be of the necessary standard. In addition, they are bound by a code of ethics that requires them to certify only work for which their experience and training is appropriate. Chartered Professional Engineers are therefore regarded as acceptable IQPs to Council in all aspects covered by the Standards and Guidelines.

There are also people who, although not Chartered Professional Engineers, have qualifications and experience that provide adequate assurance to Council that the work they certify is of the required standard. The following sections recommend minimum qualifications and experience that should be required of IQPs who are not Chartered Professional Engineers. With the exception of Chartered Professional Engineers, people who have less than three years relevant experience are unlikely to be accepted as IQPs, irrespective of their qualifications.

These requirements do not preclude non-IQPs from carrying out the work described. However, non-IQPs will need to call on approved IQPs to certify the work. If non-IQPs carry out any work it is recommended that they do so with the overview of an approved IQP throughout the entire design or construction process.

In this list, the term “construction” refers to certification that construction is in accordance with the Standards and Guidelines, and sound and accepted engineering practice.

E1 Appropriate IQPs: Earthworks

For design of:

- all earthworks which require District Plan land use consents, or would do so if the earthworks were not allowed by some other consent (e.g. a designation or subdivision consent);
- all earthworks in land defined as Stability Sensitive in the District Plan;
- The IQP shall be an appropriately experienced Chartered Professional Civil Engineer.

For construction of the above earthworks, or the design of all other earthworks, the following minimum qualifications and experience are required of IQPs who are not Chartered Professional Engineers:

- Registered Surveyors with a minimum of five year's relevant post registration experience in earthworks design and construction;

- Registered Engineering Associate (Civil) with a minimum of five year's relevant post registration experience in earthworks design and construction or;
- New Zealand Certificate in Engineering (Civil) or Draughting and a minimum of five year's relevant post qualification experience in earthworks design and construction or;
- Bachelor of Engineering or equivalent qualification and a minimum of three year's relevant post qualification experience in earthworks design and construction.

For construction of all earthworks not listed in the first list, the following minimum qualification and experience are required of IQPs who are not Chartered Professional Engineers:

- Registered Surveyor with a minimum of three year's relevant experience in earthworks construction;
- Registered Engineering Associate (Civil) with a minimum of three year's relevant post registration experience in earthworks construction or;
- Bachelor of Engineering or equivalent qualification and a minimum of three year's relevant experience in earthworks construction.

E2 Appropriate IQPs: Roading

For design of:

- (1) *strategic and arterial roads;*
- (2) *urban collector roads or;*
- (3) *intersections which have design daily traffic volumes greater than 3,000 vehicles per day through them.*

The following minimum qualifications and experience are required IQPs who are not Chartered Professional Engineers:

- Registered Surveyor with a minimum of five year's relevant post registration experience in roading and traffic design or;
- Registered Engineering Associate (Civil) with a minimum of five year's relevant post registration experience in roading and traffic design or;
- New Zealand Certificate in Engineering (Civil) or Draughting and a minimum of five year's relevant post qualification experience in roading and traffic design or;
- Bachelor of Engineering or equivalent qualification and a minimum of three year's relevant post qualification experience in roading and traffic design.

For design of other roads, and all road and bridge construction, the following minimum qualifications and experience are required of IQPs who are not Chartered Professional Engineers:

- Registered Surveyor with a minimum of three year's experience in roading design and construction or;
- Registered Engineering Associate (Civil) with a minimum of three year's relevant post registration experience in roading design and construction or;
- New Zealand Certificate in Engineering (Civil) or Draughting and a minimum of three year's relevant post qualification experience in roading design and construction or;
- Bachelor of Engineering or equivalent qualification and a minimum of three year's relevant experience in roading design and construction.

E3 Appropriate IQPs: Water Supply

For the design of the following water supply components:

- (1) *pipelines greater than 100mm diameter and all associated valves;*
- (2) *any pipelines of the same diameter with a length of greater than 500 metres between pumps and/or reservoirs;*
- (3) *service storage reservoirs or;*
- (4) *treatment plants.*

The IQP shall be an appropriately experienced Chartered Professional Civil or Environmental Engineer.

For construction of the above components and the design of all other water supply components, the following minimum qualifications and experience are required of IQPs who are not Chartered Professional Engineers:

- Registered Surveyor with a minimum of five year's relevant post registration experience in water supply design and construction or;
- Registered Engineering Associate (Civil) with a minimum of five year's relevant post registration experience in water supply design and construction or;
- New Zealand Certificate in Engineering (Civil) or Draughting and a minimum of five year's relevant post qualification experience in water supply design and construction or;
- Bachelor of Engineering or equivalent qualification and a minimum of three year's relevant post qualification experience in water supply design and construction.

For all other water supply construction, the following minimum qualifications and experience are required of IQPs who are not Chartered Professional Engineers:

- Registered Surveyor with a minimum of three year's experience in water supply construction or;
- Registered Engineering Associate (Civil) with a minimum of three year's relevant post registration experience in water supply construction or;
- New Zealand Certificate in Engineering (Civil) or Draughting and a minimum of three year's relevant post qualification experience in water supply construction or;
- Bachelor of Engineering or equivalent qualification and a minimum of three year's relevant experience in water supply construction.

E4 Appropriate IQPs : Stormwater

For the design of:

- (1) *stormwater manholes on lines of 300mm diameter or greater;*
- (2) *all stormwater components on ground with a maximum slope of 10% or more or;*
- (3) *water quality treatment devices.*

The IQP shall be an appropriately experienced Chartered Professional Civil or Environmental Engineer.

For the design of all other stormwater components, and construction of pipelines greater than 375mm diameter and all associated manholes, the following minimum qualifications and experience are required of IQPs who are not Chartered Professional Engineers:

- Registered Surveyor with a minimum of five year's relevant post registration experience in stormwater design and construction or;
- Registered Engineering Associate (Civil) with a minimum of five year's relevant post registration experience in stormwater design and construction or;
- New Zealand Certificate in Engineering (Civil) or Draughting and a minimum of five year's relevant post qualification experience in stormwater design and construction or;
- Bachelor of Engineering or equivalent qualification and a minimum of three year's relevant post qualification experience in stormwater design and construction.

For all other stormwater construction, the following minimum qualifications and experience are required of IQPs who are not Chartered Professional Engineers:

- Registered Surveyor with a minimum of three year's experience in stormwater construction or;
- Registered Engineering Associate (Civil) with a minimum of three year's relevant post registration experience in stormwater construction or;
- New Zealand Certificate in Engineering (Civil) or Draughting and a minimum of three year's relevant post qualification experience in stormwater construction or;
- Bachelor of Engineering or equivalent qualification and a minimum of three year's relevant experience in stormwater construction.

E4 Appropriate IQPs: On-site Wastewater Treatment and Disposal

The IQP shall be an appropriately experienced Chartered Professional Civil or Environmental Engineer or a registered drainlayer that has attended and passed the required training course.

