Franklin
DISTRICT COUNCIL

CODE OF PRACTICE
FOR
SUBDIVISION AND DEVELOPMENT

EDITION 5
OCTOBER 2010

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The Franklin District Code of Practice for Subdivision and Development clarifies the engineering requirements of Franklin District Council District Plan, February 2000.

APPENDICES

PART 1: GENERAL REQUIREMENTS AND PROCEDURES

1.1 SCOPE

This part of the code defines terminology used in the code and explains the roles and responsibilities of all parties involved in any development in Franklin District. This part of the code also provides information regarding the documentation requirements, design requirements, quality assurance documentation, completion documentation and information regarding the provision of bonds for uncompleted works.

1.2 GENERAL

This code of practice for subdivision and development gives a means of compliance with the objectives and performance criteria of the Franklin District Council's District Plan; which has been prepared in accordance with the provisions of Resource Management Act 1991 (the Act) and recognises the purpose and principles of the Act.

Part 1 of this code concerns matters of general application and general requirements to be observed.

Parts 2 to 9 of this code define requirements relating to particular types of services to be provided, and the means of compliance.

This code recognises that Council and other network operators will become the owners of the roading and other infrastructure that are created in the subdivision process. Council and other network operators will assume responsibility for ongoing maintenance of these systems. It is therefore imperative that Council is given confidence that the systems are designed and constructed in a manner that ensures that they are fit for purpose at the time of transfer of ownership.

1.3 INTERPRETATION

1.3.1 General

Where any other standard named in this standard has been declared or endorsed in terms of the Standards Act 1988, then:

(a) Reference to the named standard shall be taken to include any current amendments declared or endorsed in terms of the Standards Act 1988; or

(b) Reference to the named standard shall be read as reference to any standard currently declared or endorsed in terms of the Standards Act 1988 as superseding the named standard, including any current amendments to the superseding standard declared or endorsed in terms of the Standards Act 1988.

The word "shall" indicates a requirement that is to be adopted in order to comply with a standard or this code.

1.3.2 Definitions

In this Standard, unless inconsistent with the context, the following definitions shall apply:

AEP	-	Annual Exceedance Probability, which is the probability of exceedance of a given rainfall discharge within a period of one year
CERTIFICATION	-	Means providing certification and accepting responsibility that works have been constructed in accordance with approved drawings, specifications, and sound engineering practice.
CERTIFYING ENGINEER	-	Means the Chartered Professional Engineer appointed by the developer to provide the necessary certifications with respect to design, supervision, and testing required. The Certifying Engineer is one of the developer's representatives.
CHARTERED ENGINEER	-	Means an engineer who is registered under the Chartered Professional Engineers of New Zealand Act 2002 who holds a current Annual Practicing Certificate.
COHESIONLESS SOIL	-	Means a non-plastic soil (sand, gravel) where the strength is derived primarily from interlocking forces between soil grains.
COHESIVE SOIL	-	Means a plastic soil (clay, silt, organic) where the strength is derived primarily from cohesion between the soil particles.
COUNCIL OR TERRITORIAL AUTHORITY	-	Means Franklin District Council or successor organisation with territorial authority over the area of development.
DEVELOPER	-	Means an individual or organization having the financial responsibility for the development project and includes the owner.
DEVELOPER'S REPRESENTATIVE(S)	-	Means the person(s), appointed by the developer to project manage the development proposal during the planning and construction phases of the development.
DEVELOPMENT	-	Means any works that are being undertaken as part of a subdivision and any works that are undertaken on land that is, or will in the future be in public ownership or that the public have or are likely to have access to. Also included are private ways and works that will be vested in the Council on completion.
DIAMETER	-	Pipe diameters refer to the internal diameter of the pipe.
DISTRICT	-	Means the District of the Franklin District Council or succeeding territorial authority.

DISTRICT PLAN	-	Means the Franklin District Council's District Plan pursuant to the Resource Management Act 1991 and includes operative and proposed plan changes or variations once notified.
DRAINAGE	-	Means waste water drainage or storm water drainage, and "drain" has a corresponding meaning.
EARTHWORKS	-	Means earthmoving operations, other than quarrying, carried out by any means for development purposes and includes: the disturbance of land surfaces by moving, removing, placing or replacing soil or earth; or by excavation, cutting or filling operations; contouring; road, driveway and access construction.
ENGINEER	-	Means the Engineer, the Engineer's deputy, the Engineer's nominated inspecting Engineer, or assistant or any other officer or other person appointed by the Council to control the engineering work of the District.
FOOTPATH	-	Means so much of any road, pedestrian accessway or public reserve as is laid out or constructed by authority of the Council primarily for pedestrians; and may include the edging, kerbing and channelling thereof.
GROUND	-	Is used to describe the material in the vicinity of the surface of the earth whether soil or rock.
HOUSEHOLD UNIT	-	Means a building or part of a building intended to be used as an independent residence and includes any apartment, townhouse, dwelling house or home unit.
DWELLING	-	Means a building or part thereof designed and used principally as a self-contained residence.
INDEPENDENT QUALIFIED PERSON (IQP)	-	Means a specialist approved by the Council and having the appropriate skills and qualification to carry out specific procedures.
LAND DRAINAGE SYSTEM	-	Refers to the flow of surface and ground water but concentrates mainly on peak surface discharges and their regulation under urban conditions.
LOOSE SOIL	-	Means cohesionless soil (for example, having a low Standard Penetration resistance, for example, of less than 10 blows per 300 mm). Also refers to uncompacted or poorly compacted fill.
LOW FLOW PATH	-	Refers to the path taken by runoff resulting from ground water discharge and light rainfall. The low flow path is to be kept to the minimum size consistent with ease of maintenance and may be considered to be 2% to 5% of the primary design flow.
NEIGHBOURHOOD RESERVES	-	Are public reserves for the local community recreation.

PEDESTRIAN ACCESSWAYS	-	Are paths between two roads. They do not include paths on road or reserves.
POST CONSTRUCTION SETTLEMENT	-	Means the settlement of the ground surface which takes place after completion of the construction of the earthworks.
PRIMARY DESIGN FLOW	-	Is the estimated storm water runoff selected to provide a reasonable degree of protection to the surrounding land and buildings. In most cases this flow will be piped or contained within relatively narrow confines under public control by reserve or easement.
ROAD	-	Means any route provided to transport people or goods by vehicular transport. Roads can be categorised as lane, private way, local road, collector road, district arterial road or regional arterial road as follows:
PRIVATE WAY	-	Means any way or passage whatsoever over private land within a district, the right to use which is confined or intended to be confined to certain persons or classes of person, and which is not thrown open or intended to be open to the use of the public generally and includes shared access or right of way.
LANE	-	Means an access road to properties that is not intended to be utilised by the public.
LOCAL ROAD	-	All roads servicing residential and rural development other than district arterial and secondary arterial (collector) roads.
COLLECTOR ROAD	-	Locally preferred routes between or within areas of population or activities, generally distributing traffic between the arterial roads and the local road system.
DISTRICT ARTERIAL ROAD	-	Roads connecting the regional arterial routes to industrial or residential zones and can connect one area to another.
REGIONAL ARTERIAL ROAD	-	Roads which form the principal avenues of communication for general traffic movement not catered for by motorways, expressways or rail lines. They predominantly carry through-traffic from one urban area to another.
SANITARY DRAINAGE	-	Has the same meaning as "sewerage drainage" as referred to in the Local Government Act 1974.
SCHEME PLAN	-	A plan lodged with Council pursuant to Section 88 of the Resource Management Act.
SECONDARY FLOW PATH	-	Refers to the path taken by storm water runoff in excess of the primary design flow. It should be capable of producing a reasonable degree of protection to the surrounding buildings (normally a 1% AEP flood for commercial, industrial and habitable residential floor levels). A freeboard above the secondary flow level (normally 0.5m) will be required when determining allowable floor levels. This

		is to cater for inaccuracies in flow estimation methods and for possible failure of the primary system.
SOFT SOIL	-	Means cohesive soil having a low shear strength (for example, less than 25kPa).
SOIL	-	Means the heterogeneous aggregation of particles comprising either peat, clays, silts, sands, gravels, crushed and re-oriented rock fragments, or a mixture of any of the above. The term excludes rock that is intact rock masses whether highly jointed or not.
SOILS ENGINEER	-	Means a person who is currently entitled to practice as a registered engineer and has experience in soils engineering acceptable to the Engineer; or such other person as the Engineer may specifically approve as being competent.
GEOTECHNICAL ENGINEER	-	Means a Chartered Professional Engineer (CPEng) or an Engineering Geologist with recognised qualifications and experience in geotechnical engineering, and experience related to the development.
STABLE GROUND	-	Means ground existing in a state which is unlikely to settle, slip, erode or otherwise move to the detriment of superimposed buildings, services, roads or property generally.
STRATEGIC ROADS	-	Roads, motorways and rail lines which form part of a network of strategic importance nationally, having the highest standards with access control where necessary.
SURVEY PLAN	-	Means a survey plan of a subdivision in terms of Section 223 of the Resource Management Act being a plan of a subdivision for deposit under the Land Transfer Act 1952 or with the Registrar of Deeds, and includes the title plan under the Survey Regulations 1972.
WALKWAYS	-	Are all footpaths on reserves and include pedestrian accessways.

1.4 DEVELOPER'S REPRESENTATIVE

The developer shall appoint a representative or representatives to undertake the responsibilities of:

(a) Design of the development, arranging and obtaining necessary geotechnical investigation and reports, including preparation of and obtaining the approval of engineering documents by Council;

(b) Supervision of the works;

(c) Certification upon completion that the works have been carried out in accordance with the approved documents and sound engineering practice.

Provide necessary certification to Council to obtain S224c Certificate and acceptance of services to vest in Council.

The developer's representative shall be a Chartered Professional Engineer or Licenced Cadastral Surveyor except for minor works as provided below. The developer's representative (the Certifying Engineer) shall not be changed after plan approval without the approval of the Engineer in writing. The Engineer reserves the right to appoint an Inspecting Engineer to monitor construction of the approved development.

Geotechnical investigations, and completion and site stability reports shall be prepared by a Chartered Professional Engineer experienced in geotechnical engineering and who has professional indemnity insurance cover.

Minor works being works associated with land development, for not more than six residential building sites not involving major arterial services infrastructure, may be designed by a holder of the New Zealand Certificate in Engineering (Civil), the National Diploma in Civil Engineering (Applied), a technician surveyor with the National Diploma in Surveying or a suitably experienced and qualified draughtsman approved by Council. Completed minor works must still be certified by a Chartered Professional Engineer or Licenced Cadastral Surveyor.

Drainage lines less than 20m in length situated completely within the lot may be certified by a registered drain layer.

1.5 DESIGN, APPROVAL AND CONSTRUCTION OF A DEVELOPMENT

1.5.1 Design

Any subdivision development proposed in Franklin shall incorporate Urban Design best practice principles. These principle are outlined in the Urban Design Protocol (produced by the Ministry for the Environment) and Franklin District Council's Urban Residential Design Guide.

1.5.2 Documents to be Submitted for Approval

Resource Consent

To enable the granting of a Resource Consent for a development, the Council will require engineering documents to be submitted. These documents shall contain sufficient engineering detail to determine that the land is suitable for the proposed use. The documents shall show that adequate provision can and is intended to be made for services such as roads, vehicular access, storm water drainage, water supply, sewage disposal, power, telephone, and gas reticulations.

It is likely that the documents required will include (but not be limited to) the following:

- Plan(s) showing the site, its context, site features, contours, buildings, existing features, legal details, etc, together with the full layout details of the proposed development.
- Copies of current Certificates of Title, and any relevant previous consents.
- Earthworks plans showing depths of proposed cut and fill, retaining walls etc.

- Roading plans (showing position of kerbs, footpaths, berms, parking, street lights, street trees) including kerb long sections and typical cross-sections.
- Geotechnical, archaeological, ecological, contamination and ITA reports.
- Storm water and sanitary sewer draft reticulation layouts, together with storm water catchments and overland flows (both primary and secondary).
- Any Right of Entry consents required.
- An Integrated Transport Assessment.
- An Assessment of Environmental Effects (AEE).
- Records of consultation with Council Officers, other parties including Iwi.
- Landscape assessment and proposals.

Council will then evaluate the proposals and set appropriate Resource Consent conditions that are to be met.

Figure 1.1 presents the steps to be followed in progressing a proposed development for approval.

Engineering Approval
Where appropriate, engineering approval for a detailed set of design plans to be used for construction will be an approval condition of the Resource Consent. The detailed design is expected to generally be consistent with the draft set of plans that were submitted with the Resource Consent application. Two full sets of plans will be required.

These documents shall include:

(a) Engineering drawings, specifications and calculations, covering the following sections of the work to be carried out:

- Earthworks (including silt control plans)
- Roading and site access
- Street Lighting
- Storm water and Waste water Drainage (including catchment plans)
- Water supply and other services
- Landscaping plans including any proposed planting in roads and reserves and details of any playgrounds
- Signage
- Roadmarking.

A signed copy of the 'Certified Development Checklist Z' shall be submitted along with the design drawings. Copies of Checklist Z are included in Appendix C of this code.

Please note the engineering drawings, specifications and calculations shall be complete and detailed and in accordance with the recognised design standards.

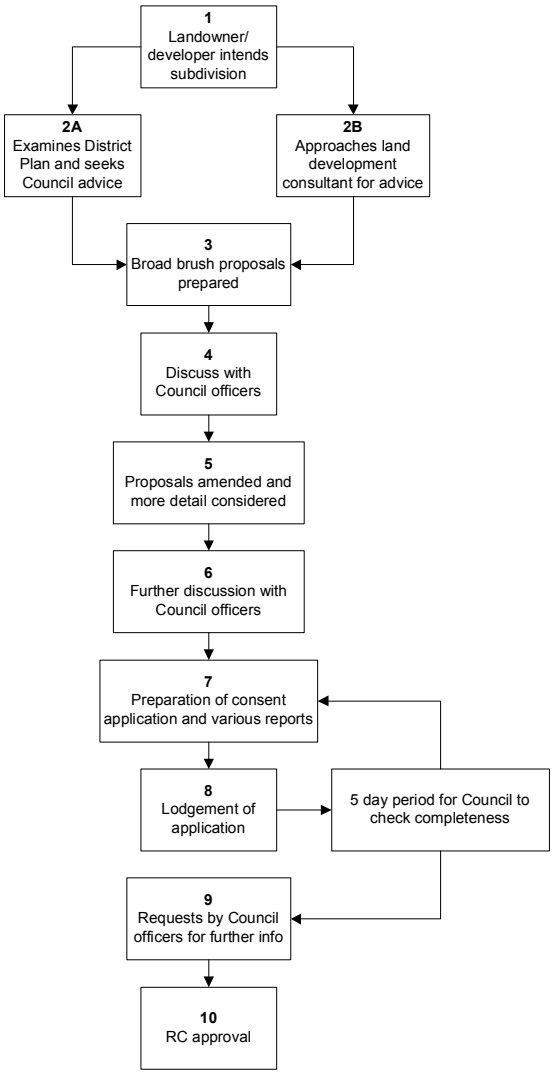
For example the street lighting shall be sufficiently detailed providing:

- *Plans showing the proposed street light location including offset from the face of the kerb to the face of the pole.*
- *Light pole details including mounting height, outreach, country of origin, coating system and coating system warranty.*
- *Luminaire/lantern details including type, IP rating, country of origin, lamp type/wattage and the cost of the luminaire, type of coating system and coating system warranty.*
- *Confirmation that the luminaire is fully compliant with AS/NZS 1158 and that spare parts will be available for a minimum of 10 years.*
- *Photometric data for the proposed luminaires and lamps.*
- *Copy of the lighting software report detailing values of the light technical parameters obtained for each area of road element involved. Isolux plots will be required for roundabouts and other traffic management devices.*
- *Details of the name and source of the programme used to generate the design.*
- *Maintenance factors assumed in calculations and maintenance schedule.*

(b) Other reports and documents as considered necessary by the Council (such reports may have been required prior to subdivisional consent pursuant to Section 92 of the Resource Management Act 1991 and the District Plan) Documents that may be required by Council include:

- Integrated transport assessment.
- Scheme Plan showing all existing site information and services, and subdivision layout identifying roads, reserves and lots.
- Legal description of land being developed and identification of notes on titles, easements etc.
- Copy of the current 'Certificate of Title'.
- Geotechnical Engineer's report on the suitability of the land for development.
- Environmental impact report.
- Assessment of serviceability of each lot with waste water and storm water disposal, water supply (domestic and fire), power, telecommunications, vehicle and pedestrian access.
- Assessment of overland flows from upstream catchments.
- Assessment of secondary flowpaths for a 50 year event.

Figure 1.1: Subdivision Application Flowchart



Category A	Simple boundary adjustment	Steps 1, 2B, 7, 8, 9 and 10
Category B	Minor subdivision, typically less than 5 lots	Steps 1, 2A/2B, 3, 4, 7, 8, 9 (possibly, 10
Category C	Larger Subdivisions	Steps 1 – 10

The divisions between the categories are not definitive. They are shown as a guide only.
Clearly not all subdivision applications will require all 10 steps. As a guide, each proposal will be categorised, generally as noted below:

Notes regarding flow chart:

2	Landowners/developers occasionally seek Council advice before engaging a consultant.
3 – 6	Council strongly encourages early and ongoing engagement with the developer in the design process.
7	Refer to paragraphs 1.5.1 and 1.5.2 of this Code.
9	If steps 3 – 6 are followed, it is possible that this step will not be required.

1.5.3 Draughting Standards and Drawings

Drawings
All drawings produced for any development in Franklin District shall be in accordance with NZS 1100 and shall be produced using an electronic medium compatible with Council's computer system. All line types, thicknesses and weights shall be selected so that the drawings can be easily read and scaled from plans when printed and copied at A3 size. The following electronic draughting mediums are currently considered compatible with Council's computer system.

Plan Scales
The following scales are recommended:

- Plans: 1 to 500 or 1 to 250
- Longitudinal Sections:
- - horizontal 1 to 500
- - vertical 1 to 100
- Cross Sections: 1 to 100
- Details: As required

Datum
All reduced levels shall be in terms of Land Information New Zealand (LINZ) Auckland Vertical Datum 1946. Levels in these terms shall be shown on the drawings. On small jobs, if a LINZ Datum is not available within 500m of any part of the work an assumed datum may be used, at the discretion of the Engineer.

The engineering drawings, specifications and calculations will be examined by the Council. If substantial amendment is required one copy of these documents will be returned to the developers as soon as possible, indicating required amendments. Four copies of the amended documents shall then be supplied to the Council, together with an electronic disc of the proposed works including public water, sanitary sewer, and storm water reticulations. If the documents meet the Council's requirements, the Engineer shall approve the documents, and return two copies to the developer endorsed accordingly along with a copy of the submitted electronic disc amended to indicate Council's reference numbers for all water fittings and manholes

A copy of the approved set of documents shall be available for inspection on site at all times.

1.5.4 Approval of Design

Work shall not commence upon the engineering construction of the development unless:

(a) The Council has approved a Resource Consent application (except in the case where a Resource Consent is not required).

(b) The Engineer has subsequently approved the engineering drawings, specifications and calculations for the specific work that is required as specified in this development code.

Provided that where the Council has entered into an agreement with the developer to enable preparatory work to be undertaken prior to the approval of the subdivision plan, or prior to the approval of all of the engineering plans, the Engineer may, in such circumstances, approve the engineering drawings, specifications and calculations necessary to enable the work to proceed.

(c) All necessary regional consents and approvals have been obtained and copies provided to Council.

(d) A copy of Schedule X tailored to suit the particular development complete with Certifying Engineer's signature is provided to the Engineer. Refer Appendix C.

1.5.5 Notification of Contracts and Phases of Work

The Developer shall advise the Engineer, in writing, of the names and addresses of contractors to whom it is proposed to award the work, and the nature of the work to be awarded in each case.

The developer shall notify the Certifying Engineer when the following phases of the work are reached and such other phases as the Certifying Engineer may determine to enable inspection to be carried out:

- Commencement of work.
- Prior to concrete works
- Prepared earthworks and subsoil drainage prior to filling.
- Completed earthworks.
- Commencement of drainage reticulation.
- Commencement of water reticulation.
- Drainage and water reticulation prior to backfilling
- Drainage and water reticulation during pressure testing
- Prepared subgrade.
- Completed subbase.
- Finished basecourse.
- Before the commencement of road sealing.

Work shall not proceed further until inspection has been made. The approval of the Certifying Engineer is required after each stage prior to the commencement of the next stage.

This requirement shall also apply where different sections of the works are commenced and when work is recommenced after a substantial lapse.

1.5.6 Supervision of Work

The developer shall be responsible, both directly and through their representative, to ensure that work is carried out in accordance with the approved documents and sound civil engineering practice.

1.5.7 Connection to Existing Services

Approval is necessary to extend new roads beyond the site to connect into existing roads.

The formation, metalling, sealing, kerbing and channelling of new roads shall be extended out beyond the site to connect to existing roads and shall include the provision of storm water disposal from the existing road. The cost of connecting to existing roads and services, including the alteration of the same shall be borne by the developer and shall not be a charge against the Council.

Where extensive works external to the project are required, the cost of carrying out these may be the subject of a special agreement between Council and the developer.

Connection of water, drainage and other services to existing systems will be carried out by Council's network utility operator at the cost of the developer, except that at the discretion of the network utility operator connections may be made by the owner, or contractor employed by the owner, if appropriately qualified and under the network utility operator's supervision.

Where a drainage connection has to be carried out within private property not owned by the developer, the developer shall make the necessary arrangements and obtain a written consent to enter from the property owner prior to the work being carried out. A copy of this Right of Entry consent shall be provided to the Engineer prior to the work commencing.

For any proposed deviation from the approved documents due to unforeseen circumstances the developer shall obtain Council's approval by submission of revised engineering documentation to the Group Manager – Environmental Services. A change of conditions pursuant to Sec 127 of the Resource Management Act 1996 may be required.

Where, in the opinion of the Engineer and the Group Manager – Environmental Services, such deviations are minor, an amendment may be agreed to without the need for the provision of revised engineering documentation. In these cases, a variation order may be executed by the Engineer, who shall provide a copy to the developer's representative and the Group Manager – Environmental Services.

The developer shall give the minimum notice required by the Council to connect to existing services. New services shall be tested by the developer under the supervision of the Certifying Engineer prior to connection. If the constructed services differ from the original approved engineering drawings, As-Built plans will be required to be provided prior to testing and connection to existing services.

1.5.8 Testing

Any work required to be tested by or in the presence of the Engineer shall be pre-tested and proved satisfactory to the developer's representative before an official test by the Engineer is requested. Two working days notice shall be given to Council's Engineer for official testing or inspections.

1.5.9 Maintenance of Assets

The developer shall be responsible for the maintenance of all the works until they are formally accepted by the Engineer.

1. The roads, footpaths, drainage systems, street lighting, landscaping, reserve planting and any other assets vested in Council as part of a subdivision must be maintained to the standard required by this Code and any applicable Resource Consent or other subsequent Council approval for the required maintenance periods after the Section 224(c) Certificate.
2. To ensure the performance of the vested assets, the Resource Consent holder must enter into a maintenance bond with Council. This bond must be provided prior to the issue of the Section 224(c) Certificate. The bond must either be a bank bond pursuant to Section 109 of the Resource Management Act 1991 from a registered trading bank or bond agent (to the Council's satisfaction) **or** a cash bond in accordance with the requirements of Sec 10 of the RMA 1996.

   The Council's policy for the level of maintenance bond required for the maintenance of works is 150% of 2.5% of the total construction value of the works under maintenance to Council and a sum of money to cover the cost of CCTV inspections and benklemen beam tests.

   Any cost incurred by the Council in preparing, checking, assessing and release of any bond shall be met by the Resource Consent holder.
3. The maintenance period shall commence from the date of issue of the 224c Certificate pursuant to the Resource Management Act 1991, or if Certificates of Title have not been issued within four (4) months of the Section 224c Certificate date of issue then the maintenance period will commence from the Certificate of Title issuing date.
4. The maintenance period shall be six (6) months for roads, including street lights and footpaths, storm water and sewerage drainage pipe systems and water supply (see 1.5.11).
5. The maintenance period shall be 24 months for street trees, reserves and landscaping and storm water quality ponds. Reference should also be made to the specific requirements of the Parks and Reserves Section and the Storm Water Quality Ponds part of the Storm Water Section (see 1.5.11).
6. On completion of the maintenance period the applicant needs to complete the following requirements:
   - Written confirmation from the Developer's Representative that the assets have been maintained and are in good condition.
   - Prior to the expiry of the maintenance period the developer's representative shall arrange for all berms and reserves on the subdivision to be mown, road carriageway swept and all catchpits cleaned out.
   - Arrange an inspection of the works to be carried out by the Development Engineer.
   - Complete a CCTV video inspection of the storm water pipelines within one (1) month and provide Council with the CCTV video inspection reports and inspection DVD's for approval.

- Complete benklemen beam testing of the road within a month of the request for release of the bond, and provide the test results and report to the Development Engineer for approval.

7. If the vested asset is not completed by the date stated in the Section 224(c) Certificate but is bonded as an uncompleted item (as detailed in 1.6), then the maintenance period shall commence from the date of the uncompleted works bond release.
8. Any faults, defects or damage to any of these works must be remedied at the consent holder's cost.
9. If the Resource Consent holder fails to maintain the vested assets, the Council may undertake the works necessary to bring the assets up to the standard required by the Council and the cost of this work may be deducted from the bond. If there is a shortfall in the bond value and the final cost of the works undertaken by Council, these costs shall be recovered from the Resource Consent holder.

   In addition the cost of maintenance of any replacement works for the following 24 months will be deducted from the bond.

1.5.10 Completion Documentation

Provision of documentation by the developer on completion of the development shall be in accordance with this clause or as required by the Council.

As-Built plans in accordance with Council's requirements are to be submitted by the developer. The details as constructed shall include, but not be limited to:

(a) Waste Water Drainage Reticulation

- Manholes, lid level and invert level to LINZ Datum. Location by distance to two adjoining boundaries, and co-ordinates.
- Diameter, length of pipes laid and, material type.
- House connections and distance from the centre of the downstream manhole cover, or distance to two adjoining boundaries.
- Location of the end of an extended connection.
- Rising main.
- Thrustblocks.
- Pump station including wiring diagrams, pipework details and fully itemised parts inventory and operating manuals.
- Siphon
- Pipes encased or protected.
- Pipes, manholes and pump stations removed or abandoned.

(b) Storm Water Drainage Reticulation:

- Manholes, lid level and invert level to LINZ Datum. Location by distance to two adjoining boundaries, and co-ordinates
- Inlet and Outfall structures, invert levels to LINZ Datum, distance to two adjoining boundaries.
- Diameter, length of pipes laid and, material type.

- Open water table and direction of flow.
- Catchpits.
- Subsoil drains including discharge points.
- House connections and distance from downstream manhole, or distance to two adjoining boundaries.
- Location of the end of an extended connection.
- Pipes and manholes removed or abandoned.
- Driveway pipe crossings.
- Dish drain half pipe.
- Pipes encased or protected.
- Scour protection.
- Storm water detention ponds.
- Open channels including typical cross-section.
- Secondary overland flow paths including flood levels to LINZ Datum.

(c) Water Reticulation:

- Diameter and material type of pipes laid.
- Distance from boundary of water main.
- Depth of line.(if non-standard)
- Valves (noted for type), hydrant Tees, Branches, and Blank Caps. Location by distance to two adjoining boundaries and co-ordinates.
- Pump stations including wiring diagrams, pipework details and fully itemised parts inventory and operating manuals.
- Bores (as for pump stations)
- Rising mains.
- Thermal pipes.
- House connection and distance to nearest side boundary.

(d) Earthworks:

- Extent of fill.
- Depth of fill in the form of depth contours.
- Subsoil drains including discharge points.
- Buried retaining walls.
- Nature of fill (i.e. compacted etc)

(e) Ducts:

- Location and size of ducts installed for power, telephone, gas, or other services.

(f) Roading:

- Kerb and channel.
- Pavement type, materials and layer thicknesses (including details of any special subgrade or basecourse treatments).
- Footpath.
- Catchpits.
- Retaining walls and materials.

- Median islands.
- Extent of formation.
- Subsoil drains including discharge points.
- Extent of seal.
- Extent and depth of any undercutting.
- Road lighting.
- Edges of formation.
- Driveway pipe crossings.
- Open water table and direction of flow.

(g) As-Built plans are to be submitted showing the following standard items:

- North point.
- Legal boundaries and legal descriptions of lots.
- Road names.
- Bench marks.
- Levels of all significant features including, but not limited to, drainage and structural items.
- Existing installations to be identified clearly from new work.
- Schedules of Co-ordinates
- Schedules of Service connections.

As-Built plans shall be presented at a scale of 1 to 500 and shall include on each sheet at least two co-ordinate points on the New Zealand Geodetic Datum 2000 (NZGD 2000).

As-Built plans shall have been submitted to and received the approval of the Engineer prior to the issue of a Certificate of Compliance or a Completion Certificate under Section 224(c).

Four sets of the engineering plans and two sets of the engineering specifications shall be submitted with all relevant calculations for catchments, pipeflows, structural and pavement designs and any other relevant documents. After approval, two sets of plans, suitably endorsed, will be returned to the developer.

Two sets of prints and one electronic disc of the As-Built plans shall be submitted.

Council's electronic recording system is ESRI which will accept information saved in either:

(a) Shapefile; or

(b) DXF (latest AutoCAD version) format/dwg.

If your system uses a different format, please check with Council prior to submitting.

Electronic As-Built Requirements are detailed in the Appendices of this code.

In addition to the above As-Built plans the developer will also be responsible for the supply and delivery of RAMM data required to update the Council's RAMM database. The developer shall engage the Council's Road Network RAMM Consultant to collect and process this data into the RAMM database. The Road Network Consultant will carry out

this task in accordance with the 'Specification for RAMM Updating of Roads' included in Appendix F of this Code. Additionally the developer will need to provide the Road Network RAMM Consultant with the following information:

- Pavement aggregate source.
- Sealing chip source and properties including PSV.
- Sealing record sheets.
- Undercut areas.
- Pavement depths and details.
- Construction dates.

1.5.11 Completion Tasks

Prior to the final acceptance, at the completion of the maintenance period, the developer shall have the following works carried out:

(a) Grass to be mown on berms and any reserve within the development.

(b) Carriageways swept.
(c) Channels and catchpits cleaned out.

(d) All gardens and plantings to be mulched and free of weeds.

At the completion of the defects liability period, an inspection of the development shall be carried out by the Engineer prior to acceptance. The developer shall arrange a time for the final acceptance inspection with the Engineer at least seven (7) working days in advance so that the Council's relevant maintenance contractors may be invited to attend to familiarise themselves with the new works.

Further testing of works such as road formation, drainage and water supply systems may be required to be carried out in the course of the inspection. Any section of the works that does not comply with the approved plans and specifications or approved variations must be rectified by the developer before the development will be accepted.

1.5.12 Certification on Completion

On completion of the works, and prior to the commencement of the maintenance period, the developers certifying engineer shall certify that the works have been completed in accordance with the requirements of the Franklin District Council District Plan, Franklin District Development Code, the approved plans and sound engineering policies. The Certification shall be completed in the form attached as Appendix B to these documents. Signed copies of the 'Certified Development Checklists Y and Z' shall be attached to this signed certificate. Copies of Checklist Y and Z are included in Appendix C of this code.

In addition to the Y and Z schedules the developer shall provide signed 'Subdivision Assets to Vest in Council' forms for all assets that are to be vested in Council. Copies of the 'Subdivision Assets to Vest in Council' forms are included in Appendix D, these forms are not an exhaustive list of assts to vest, additional pages should be used if necessary.

1.5.13 Approval of Uncompleted Work

Where work is uncompleted, and in the opinion of the Engineer it is appropriate, the Engineer may recommend that the Group Manager, Environmental Services approves the release of the 224 Certificate, subject to satisfactory bonds being arranged.

1.6 BONDS AND CHARGES

1.6.1 Uncompleted Works Bonds

The Engineer will be required to be satisfied as to the nature and amount of the bond and the Engineer will instruct the Council's solicitors to prepare where necessary bond documents and attend to registration all at the developer's cost.

1.6.2 Type of Acceptable Bond

The normal bond will be by way of a registered trading bank guarantee, however for uncompleted works with a cost of not more than $50,000 (excluding GST and loading) Council may accept in certain circumstances a cash bond for uncompleted works.

1.6.3 Bond Calculation

The value of the amount of uncompleted work shall be submitted to the Engineer for approval. When approved, the amount of the bond is calculated by multiplying the approved value of the uncompleted work by 1.5 and adding GST.

1.6.4 Bond Release

Uncompleted works bonds will only be released once the Engineer is satisfied that all uncompleted work is complete to the standard required in the original approval and all the necessary forms have been completed and any charges have been paid.

It is recognised that in some cases, partial bond releases may be sought. Any partial release will be at the discretion of and require the approval of the Engineer. In such cases, the bond itself shall clearly detail the amounts for all the separable portions of the uncompleted work. Partial release will only be considered if consistent with the details on the bond.

1.6.5 Charges

For schedule of charges refer to the Council's Consents and Environmental Services fee schedule.

PART 2: EARTHWORKS AND FOUNDATIONS

2.1 SCOPE

This part of the code sets out the requirements for the carrying out of earthworks or preparation for foundations, or both, including:

(a) The excavation and filling of land to form new contours

(b) The assessment and protection of slope stability

(c) The suitability of both natural and filled ground for the founding of roads, buildings, services and other works

(d) The control of erosion and siltation during and after earthworks.

Because of the wide range of soil types, physical conditions and environmental factors applying in different areas it is not possible to lay down precise requirements which will be applicable in all situations. The criteria set out in this section will be subject in particular instances to the judgment of the Engineer, developer or Soils Engineer.

2.2 GENERAL

Refer to the Council's District Plan for matters concerning the layout of developments. The choice of final landform is dependent on many factors which may be specific to the subdivision. These include:

(a) Relation with surrounding landscape

(b) Size

(c) Roading pattern

(d) Preservation of natural and cultural features

(e) Stability

(f) Damage by flood or other natural occurrences such as erosion by sea, river, or surface water runoff.

The New Zealand Standard NZS 4431 ‘Code of Practice for Earthfill for Residential Development’ provides a means of compliance with Council's requirements for earthfills. The New Zealand Standard NZS 4402 defines and describes the methodology for all tests for fill material.

The New Zealand Standard ‘Methods of Testing Soils for Civil Engineering Purposes’ provides details and methodology for the various tests used to determine the strength of in-situ and constructed soil formations.

Attention is also drawn to the Franklin District Council Document 'Building Roads on Peat'. This is not to be regarded as a design guide but provides some information as to past experience on peat formations in the Franklin District. All development on peat formations will require specific design by the developer.

The operative document for earthworks in the District is TP 90, Erosion and Sediment Control. This document requires that "Guidelines for Land Disturbing Activities in the Auckland Region" be adopted by Developers. When the Proposed Regional Plan for Erosion and Sediment Control is adopted the adopted document shall be used.

The Franklin District Council District Plan requires appraisals of the stability and suitability of the land before development consent is given. Many of the requirements in this part of this code will therefore be relevant to the pre-consent stages of a development in particular the clauses covering 'site investigations' and 'planning and design'.

Earthmoving activities are subject to both Regional and District Council approvals. Resource and earthworks consents shall be obtained before commencement of site work.

2.3 TECHNICAL RESPONSIBILITIES

Where any development involves the carrying out of bulk earthworks, the assessment of slope stability, or the detailed evaluation of the suitability of natural ground for the foundations of buildings, roads, services or other works, then a Soils Engineer shall be appointed by the developer to carry out the following functions:

(a) Prior to detailed planning of any development to undertake a site inspection and such investigations of subsurface conditions as may be required to satisfy the requirements of the Franklin District Council District Plan.

(b) Before work commences review the drawings and specifications defining the earthworks proposed and submit a written report to the Engineer on foundation and stability aspects and any proposed departures from this standard.

(c) Before work commences and during construction determine the extent of further specialist Soils Engineering services required (including investigation and geological work).

(d) Before and during construction the Soils Engineer shall:

(i) determine the methods and frequency of construction control tests to be carried out
(ii) determine the reliability of the testing
(iii) evaluate the significance of test results and field inspection
(iv) assess the quality of the finished work.

(e) During construction to provide such regular and sufficient inspections to ensure that the requirements of (f) below are met.

(f) On completion to submit a statement of professional opinion as to suitability of land for building development as shown in Appendix A.

The construction quality control testing shall be carried out by a competent person under the control of the Soils Engineer.

Quality control is defined as "the operational techniques and activities that are used to fulfil requirements for quality", and shall include the provision by the Developer of testing of materials and workmanship in accordance with the project specification.

All sampling and testing shall be undertaken under the supervision of personnel who have signatory authority for such operations from IANZ, and all results shall be submitted through an IANZ Accredited Registered Laboratory. The results shall carry the IANZ marking where applicable.

The Certifying Engineer will be required to ensure compliance with the quality assurance and quality control requirements of the project as specified by the Soils Engineer. All materials sampling and testing shall be carried out under the signatory of an IANZ accredited materials testing laboratory.

2.4 SITE INVESTIGATIONS

2.4.1 Preliminary Site Evaluation

Prior to any detailed planning or design, the developer or Soils Engineer, as applicable, shall undertake a preliminary evaluation of the site to determine the likely requirements for earthworks or the need for further investigations into the suitability of foundation conditions, and the stability of the natural ground. The preliminary evaluations should be carried out in the context of the total surroundings of the site and should not be influenced by details of land tenure, territorial or other boundary considerations.

2.4.2 Specialist Services

Where a Soils Engineer has been appointed as required by Section 203, then prior to or at the time of submission of a scheme plan shall submit to Council a written report setting out the particulars of any investigations carried out including details of contours, natural features and modifications proposed thereto; and shall furnish to Council a statement of professional opinion as to the suitability of the land for the proposed development with details of any special conditions that should be imposed.

2.5 PLANNING AND DESIGN

2.5.1 Landform

The final choice of landform should represent the most desirable compromise between the factors referred to above and the preservation of natural features and the natural quality of the landscape including the retention of natural watercourses.

The choice of a suitable landform is dependent on many factors which may be specific to a particular site. In general, unnecessary earthworks should be avoided and every effort made to maintain the natural landform but considerations which may justify the carrying out of earthworks include:

(a) The minimisation of the possibility of damage to property occurring through ground movement in the form of slips, subsidence, creep, erosion or settlement and damage to the land.

(b) The minimisation of the possibility of damage to property occurring through flooding, or surface water runoff.

(c) The development of a more desirable roading pattern with improved accessibility to and within the site and the creation of a better sense of orientation and identity for the area as a whole.

(d) The efficiency of overall land utilisation including the quality of individual sites and amenity areas around buildings, the economics of providing engineering services and the standard of roading and on-site vehicular access.

(e) The need to create suitably graded areas for neighbourhood reserves and other community facilities.

(f) The enhancement of the general environmental character of the area by softening the landscape or by artificially creating or emphasising landforms of visual significance particularly on flat sites or on areas devoid of landscape features.

2.5.2 Soil Investigations

Where appropriate the general nature and shape of the ground shall be studied and particular note taken of:

(a) The geological nature and distribution of soils and rock

(b) Existing and proposed drainage conditions and the likely effects on ground water

(c) Previous history of ground movements in similar soils in the area

(d) Performance of comparable cuts and fills (if any) in adjacent areas.

Soil data should be obtained for areas which:

(a) Are intended to form in situ bases for fills

(b) Are intended to yield material for construction of fills

(c) Are intended to be exposed as permanent batters.

Sufficient borings, probings, or open cuts shall be made to:

(a) Classify the soil strata by field and visual methods

(b) Evaluate the likely extent and variation in depths of the principal soil types

(c) Establish the natural ground water levels.

The soil information thus obtained shall form the basis for:

(a) Further sampling and testing which may be required on representative soil types

(b) Relating subsequent soil test properties to relevant strata over the site.

The appropriate test data in different areas shall be determined by the Soils Engineer.

2.5.3 Stability Criteria

Settlement
The most important factor in ensuring satisfactory performance of stable fills is the limiting of post-construction differential settlement. The design and construction of fills shall be such that these settlements are kept within acceptable limits.

Bearing Capacity
The strength of the ground resisting general shear failure (and resulting gross deformation) under the footings of a house is a local phenomenon distinct from settlement. Fill constructed to minimise settlement in accordance with this code will have adequate shear strength.

Shrinkage and Expansion
Because some clay soils are likely to undergo shrinkage and swelling when subjected to seasonal or other changes in water content, special examination of swelling and shrinkage characteristics should be made in the case of highly plastic soils. Where peat soils are present in the area of the subdivision then special provisions shall be made to limit drainage of the peat which would lead to shrinkage. Where applicable, the need for a foundation depth or design sufficient to minimise these effects, particularly for continuous brittle walls, should be noted in the completion report and statement of the Soils Engineer.

Slope Stability
In most cases, it is unnecessary or impracticable to measure quantitatively the factor of safety of a slope against shear failure. Maximum slopes of cuts and fills may be determined by the Soils Engineer from experience and from observation of slopes in the vicinity which have a long-standing history of stability, are of similar height to the proposed slope and are of apparently similar geological formation. Where necessary or a precedent is not available, a special Soils Engineering investigation should be carried out by the Soils Engineer to determine acceptable limits to cut and fill slopes. In assessing slope stability account should be taken of possible future changes in ground water level or other conditions. Where a fill may be required to act under extreme conditions as a detention dam, investigation should include the ability of the fill to act as a detention dam and upstream effect of the fill.

2.5.4 Quality of Filling Material

The majority of soils, other than organic material, are potentially suitable for fillings under controlled conditions. Compaction standards for fill material are covered in the next clause of this code.

2.5.5 Compaction Standards for Fill Material

As described in NZS 4431, the standard of compaction shall be measured in terms of one of the following:

Relative Compaction
That is, the ratio of the field dry density of fill to the maximum (laboratory) dry density expressed as a percentage. Unless otherwise required by the Soils Engineer, fill should be compacted to at least 95% relative compaction, in terms of the standard method of compaction.

Air Voids and Shear Strength
Used for cohesive soils, where specific test methods and criteria should be determined by the Soils Engineer, who may, for example, require air voids to be less than 10% and shear strength to be not less than 50kPa on completion of construction.

Relative Density
That is, the field dry density expressed in terms of maximum minimum densities established by laboratory test (used for cohesionless soils). The specific minimum value should be determined by the Soils Engineer who may, for example, require a minimum relative density of 80%. See NZS 4431.

Field Relative Compaction (Field Proctor Test)
This is the ratio of the density of the compacted fill material at its in situ moisture content, relative to the density of the same material at the same moisture content after standard compaction (New Zealand Standard compaction) in terms of Test 14 of NZS 4402. (This method gives a quick determination of the actual field compaction effort being applied, relative to New Zealand Standard compaction, without need for drying in the testing procedure and this may be adequate control provided the material is close to optimum moisture content.)

2.5.6 Erosion Control

Development work shall be carried out in such a manner as to restrict soil erosion by water and wind action to acceptable levels.

Before commencing any site works, adequate silt retention structures as detailed in the Auckland Regional Council Technical Publication No. 97 "Erosion and Sediment Control Guidelines for Earthworks", shall be designed to ARC Technical Publication No. 90 and constructed to the satisfaction of ARC Environment, and the Engineer. These structures shall be maintained and cleaned out as necessary until complete grass cover has been re-established over the site to the satisfaction of the Engineer. Earthworks on sites exceeding 1 hectare in area require the specific approval of ARC Environment. Such approval shall be obtained by the developer.

Two copies of the location and details of the silt retention structures, together with a copy of the ARC Environment approval if required, shall be forwarded to the Engineer prior to their approval for any earthworks on site.

The discharge of sediment laden runoff from earthworks must comply with the ARC Environment Proposed Regional Plan for Erosion and Sediment Control.

The diversion of natural water is only permitted for those activities listed in the Auckland Regional Council Transitional Plan. All other diversions will require a Water Permit from ARC. The obtaining of, and compliance with, the water permit will be the responsibility of the developer.

Earthworks operations shall be carried out in such a manner that a dust nuisance is not created to adjoining properties.

Stripped areas of the site shall at all times be kept to a minimum and all bare surfaces not to be bulk earthworked for a period of two months or more shall be topsoiled and grassed, or otherwise sealed.

In dry windy conditions haul roads shall be watered and in extreme conditions operations on site shall cease immediately if a dust nuisance to adjoining properties exists.

Without prejudice to the conditions of any water permit the following practices shall be adopted in the planning and design of developments involving earthworks:

(a) Large projects shall be programmed for construction in self-contained stages which can be largely completed within one earthworks season. Where possible, the upper part of a catchment should be developed first.

(b) Where possible, the permanent storm water system shall be designed so it can be constructed at an early stage in the project and be used to collect runoff from the site during construction in conjunction with silt control measures.

(c) The specifications shall require the use of construction procedures which minimise concentration of runoff and excessive velocities, which could otherwise result in erosion.

(d) Silt retention ponds shall be constructed and maintained in all earthwork projects as required by ARC Environment.

(e) Graded 'V' drains (also called contour drains) shall be used to divert runoff water from non-construction areas past site-works, or to divert runoff from exposed areas into silt retention ponds and reduce overland flow distances on bare surfaces. Such drains should have a maximum slope of 1% and a maximum design velocity of flow of 1 m/s.

(f) Cut and fill areas shall be re-topsoiled and sown as soon as possible after earthworks and drainage works.

(g) The batter faces of cuts and fills shall be protected as soon as possible after construction by grassing, hydroseeding, tree planting, or other suitable surfacing.

(h) Existing shelter belts, wind fences and standing vegetation shall be maintained in order to reduce wind erosion.

2.5.7 Provision for Permanent Services

Where settlement is expected to occur, all service pipes installed within or under earthfilling shall be designed and constructed to ensure adequate capacity, strength and water-tightness to withstand the loads due to settlement and to prevent leakage into the fill.

Where surface water could cause erosion of batters or internal instability through soakage into the soil, open interceptor drains shall be constructed in permanent materials, benches in batter faces shall be sloped back and graded longitudinally to reduce spillage of storm water over the batter. Water from storm water systems shall be prevented from flowing into a fill or into natural ground near the top or sides of a fill and no storm water soak pits shall be constructed in a fill whereby the stability of the fill might be impaired.

All drains required permanently to protect the stability of fillings or to prevent flooding and erosion shall be clearly identified as such on the As-Built drawings.

2.6 CONSTRUCTION PROCEDURES

2.6.1 Specifications

Before any earthworks are commenced, areas of cut and fill shall be clearly defined. Where necessary, sufficient fencing or barriers shall be provided around trees or other features to be protected. All site activities including clearing, storage, cutting and filling must be kept away from the root zone of trees (best defined as the extent of the canopy plus 2m). Adequate provision shall also be made for the control of erosion, surface water runoff and siltation.

Specifications including the following are to be prepared to control the earthwork construction as follows:

(a) All rubbish, vegetation and debris shall be removed from earthworks areas prior to the commencement of topsoil stripping. Areas on which fill is to be placed, or from which cut is to be removed and haul roads shall be stripped of all topsoil and such unsuitable soft or organic material as determined by the Soils Engineer. Special care shall be taken to ensure the organic materials and areas of old uncompacted filling are not overlooked through being overlaid by other soils.

(b) Stripping shall be carried out as a specific operation with areas being stripped in large enough increments to ensure that there is an adequate margin of stripped ground beyond any current cutting or filling operation. Particular care shall be taken to ensure that overspill is not left in an uncompacted state anywhere on the site, when constructing temporary haul roads.

(c) All stripped material shall be deposited in temporary stockpiles or permanent dumps, in locations where there is no possibility of the material being unintentionally covered by, or incorporated into, structural fills.

(d) Where a fill abuts against sloping ground, benches shall be cut into the ground to prevent the development of a continuous surface of low shear strength.

(e) Pervious drains or similar subsoil seepage control systems shall be installed (as necessary) to lead seepage away from all springs and potential areas of ground water under or adjacent to fills in order to -

- Prevent saturation of the fill before construction of the fill is complete;
- Prevent internal erosion (piping); and
- Prevent internal ground water pressures which would detrimentally reduce shear strengths.

(f) Subsoil drains shall discharge via flexible jointed pipes to an outlet approved by the Engineer, preferably a stable watercourse or a piped storm water system. The position of all subsoil drains shall be recorded on the As-Built plan.

(g) The stripped ground surface shall be prepared and then inspected by the Soils Engineer before any fill is placed thereon.

2.6.2 Fill Construction

The quality of fill material and required control testing shall be determined and specified before the placing of fill commences. Fill shall be placed in a systematic and uniform manner with near horizontal layers of uniform thickness (less than 225 mm) of material being deposited and compacted progressively across the fill area.

Before any loose layer of fill is compacted, the water content shall be suitable for the compaction required and as uniform as possible. Any compacted layer which has deteriorated after an interruption in the earthmoving operation, shall be rectified before further material is placed over it.

Fill batter faces shall be compacted as a separate operation or alternatively, overfilled and cut back.

Where testing shows the compaction achieved in the field to be below the specified minimum, all material represented by the test shall be further compacted or removed as necessary.

2.6.3 Temporary Drainage and Erosion Control

During the construction period, measures shall be taken to prevent excessive water logging of surface materials yet to be to be excavated or compacted or both and to prevent fill material from being eroded and redeposited at lower levels. Such measures shall include:

(a) The surface of fills and cuts shall be graded to prevent ponding.

(b) Temporary drains shall be constructed at the toe of steep slopes to intercept surface runoff and to lead drainage away to a stable watercourse or piped storm water system.

(c) Surface water shall be prevented from discharging over batter faces by drains formed to intercept surface runoff and discharge via stable channels or pipes, preferably into stable watercourses or piped storm water systems.

(d) The upper surface of fills shall be compacted with rubber tyred or smooth wheeled plant when rain is impending, or when the site is to be left unattended.

(e) The completed battered surfaces of fills shall be compacted with sheepsfoot or similar non-smooth compaction plant to reduce runoff velocities.

(f) Silt traps and retention ponds shall be constructed where they are feasible and necessary. These shall be cleaned out, as required to ensure that adequate silt storage is maintained.

(g) Temporary barriers or fences choked with brush, sacking or the like, shall be used to reduce flow velocities and to trap silt.

(h) Sections of natural ground shall be left unstripped to act as grass (or other vegetation) filters for runoff from adjacent areas.

(i) All earthwork areas shall be re-topsoiled and grassed or hydroseeded as soon as possible after completion of the earthworks and drainage works.

2.6.4 Inspection and Quality Control

The Soils Engineer shall provide an adequate level of inspection and testing, in order to be able to properly evaluate the general quality of the finished work and to be able to furnish a report as to the compliance of the work with the specifications.

Visual inspection shall be made by the Soils Engineer or a competent inspector acting on their behalf at the following times:

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

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

(c) At such other times as the Soils Engineer considers necessary to be able to assess the general standard of earthworks and to reasonably satisfy himself/herself that:

- Fill is not placed over soft or organic material
- All areas of existing ground showing seepage or potential seepage have relief drains provided

- Compaction operations are systematic, the water content of fill material is suitable and the degree of compaction is consistently satisfactory
- Unsuitable materials as defined by the Engineer are not being used as fill.

During the construction of earth fills the following quantitative control tests shall be made on fill material:

(a) Tests to determine whether the water content is at optimum

(b) In situ density tests to determine whether the degree of compaction is up to the specified minimum

(c) Where appropriate tests to determine the maximum dry density for the soil tested in each in situ field density test

(d) Such other tests as may be specified by the Soils Engineer for control testing of fills or particular soil types, providing that the soil property tested shall be related to in situ density or water content of the fill by a laboratory investigation. Such tests to include shear strength tests, cone penetrometer tests and Proctor needle tests.

Once the filling work is progressing as a steady operation with uniform compaction methods and provided that -

(a) Adequate compaction effort is being maintained

(b) Adequate visual inspection is being maintained

(c) The specification requirements are being met,

then the minimum frequency of control testing shall generally be one in situ density test (or equivalent) for each 2,000 m^3 or 1.0m lift of fill. Testing shall be more frequent than specified above, under any of the following circumstances:

- During the first 4000 m^3 of filling carried out on the project.
- On the final layer of not less than 1.0 m depth.
- When soil type or conditions are variable.
- When the Soils Engineer or their inspector is in any doubt about the adequacy of construction methods or soil properties.
- When a decision to reject work based on the judgement of the Soils Engineer or their inspector is disputed.
- When relatively small quantities of fill are concentrated in localised areas or placed discontinuously over a long period of time.

The locations of tests shall be decided by the Soils Engineer or their inspector, who shall select them so as to test the material that is likely to have had the least compaction. In addition, a proportion of tests shall be taken at random locations to check the average standard being obtained.

All field and laboratory test data shall be recorded in a systematic manner that will allow the results to be identified and allow the calculations to be checked at a later date, if necessary. All control test results shall have recorded the time, date, location and elevation. Where work is rejected on the basis of either test results or visual appraisal, the Soils Engineer shall record the extent of the rejected work and the type of remedial work. This information shall be furnished in their report on completion of construction.

2.7 FINAL DOCUMENTATION

2.7.1 As-Built Drawings

On completion of the earthworks an As-Built plan conforming to the requirements of this code of practice shall be prepared. The As-Builts shall include a site plan showing the borelog and test positions and a plan showing the extent of all certified and uncertified fills, the location of any building restriction lines, an extent of the cut and fill contour plan at 1m intervals and the position of all sub-soil drains or other constructed features underground.

2.7.2 Soils Engineer's Report

On completion of construction the Soils Engineer shall furnish for the Engineer two copies of a report together with a statement of professional opinion in the form prescribed in NZS 4431, describing the extent of the inspection and the results of testing together with a statement of professional opinion as to the compliance of the filled ground for specified types of building construction and where applicable, the suitability of original ground for specified types of building construction and that it complies with the relevant rules in the District Plan of the Council.

A suitable format for the statement of opinion is included as Appendix A.

2.7.3 Asset Data Standard Specification

A technical specification for the supply of GIS data in electronic format is provided in Appendix E of this code. This data shall be provided at the same time as the As-built drawings, Road Asset Data forms and the Soils Engineer’s Report.

PART 3: ROADS

3.1 SCOPE

This part of the code of practice sets out requirements for the design and construction of roads associated with land development and improvement projects within the District. This part of the Code must be read in conjunction with the standards and guidelines relevant to the road network as listed in Appendix H.

3.2 GENERAL

Road design guidelines set out herein cannot be expressed entirely in performance terms nor can any single set of design standards be suitable for all local conditions. This code is not intended to be a comprehensive design guide but focuses on a number of considerations which are regarded as significant factors in the design process.

Road layouts shall comply with the relevant rules in the District Plan and shall also be in accordance with Franklin District's Urban Residential Design Guide – For a Rural District' – April 2009.

All roadwork should be in accordance with NZS/AS1428.4 "Design for Access and Mobility".

3.2.1 The Road Pattern and Hierarchy

For matters pertaining to road layout refer to Part 9 of the District Plan and Table 3.1 herein.

The road network is categorised by a hierarchy of roads which serve a variety of purposes and have differing requirements with respect to access and maintenance levels. Within the district the following roads and their functions have been classified in the District Plan as follows:

- National Routes – includes State Highways 1, 2 and 22 including sections of motorway.
- Arterial Roads – includes roads serving as links of strategic importance between or within regions and between districts. Such roads provide links between the main urban centres and are important for the movement of goods and produce. They may also function as 'local' roads, providing access to land use activities. However, access standards for activities along these roads are determined principally on the basis of the road's strategic function and traffic volumes.
- Collector Routes – Locally preferred routes between or within areas of population or activity. These roads compliment district arterial roads but have property access as a higher priority. In rural areas they provide links between arterial and local roads.
- Local Roads – All other roads servicing land use activities, with standards appropriate for their traffic volumes.

The RAMM Inventory (Council's inventory of roads) should be consulted if there is doubt as to the status of any particular road.

3.2.2 Parking

For matters pertaining to parking refer to Tables 3.1 and 3.5 herein, and Part 51 of the District Plan.

Provision shall be made for the parking of vehicles on all roads. Alternative widths and layouts may be suitable which provide for parking in defined areas clear of the through traffic. Access by emergency vehicles (e.g. fire engines) must be maintained at all times.

Carriageway Parking
As the traffic function of a road becomes more dominant, it is necessary to provide more specifically for vehicle parking so that moving traffic is not impeded.

On industrial roads, because of the mixing of light vehicles with long, less manoeuvrable, heavy vehicles, parking width shall be provided on each side of the carriageway to leave a clear line for moving traffic.

Refer to Table 3.5 and Figure 3A for specific requirements with respect to angle parking on residential urban streets.

Indented Parking
To facilitate a clear traffic pathway, indented parking bays and parking in the middle of cul-de-sac heads may be considered.

Mobility Parking
Mobility parking spaces shall be designed according to NZS 4121 Design for Access and Mobility – Buildings and Associated Facilities.

Unless modified in this code all parking shall be designed in accordance with Austroads Guide to Traffic Engineering Practice Part II – Parking.

3.2.3 Carriageway, Road and Formation Widths

For matters pertaining to carriageway, road and formation widths refer to:

- Table 3.1 and standard drawings R12, R33 – 36.
- NZS 4404:2010 (Section 3.3)
- FDC Urban Residential Design Guide.

It is important to ensure that the function of a road is recognised and reflected in its design. Roads serve a number of purposes and in many cases vehicular use is not the primary use. Roads serve the following functions:

- A place for access and interaction.
- A link for connection and movement of people and goods.
- A corridor for utility and amenity infrastructure.

TABLE 3.1 – MINIMUM ROAD PROFILE

Land Use	Typical X-sect Reference	Road Type	General Road Limits		Cross Section Widths (m) (see R33 – R36 for illustrations)											Design Speed km/h	Maximum Gradient %
			Lots Served	Typical Traffic Volume (vpd)	Total Road Reserve m	Movement Width	Traffic Lanes (e)	Median	Preferred Intersection (f)	Parking (g)	Bike Lane	Total Berm Width	Footpath (f)	Services	Streetscape Features (g)		
Residential	R 33 A1	Rear lane	Up to 10	100	12	5.5	2 x 2.75	-	Y – Turning Head	-	-	1 x 4.5 1 x 2.0	1 x 1.4 (a)	1x1.8, 1 x 2.0 Grassed Back Berm	1 x 1.3 Planting Strips Front Berm	20	20
	R33 A2	Cul-de-sac	Up to 20	200	17	5.5	2 x 2.75	-	10m Radius Turning Head	1 x 2.5 (formed)	-	2 x 4.5	2 x 1.4 (b)	2 x 1.8 Grassed Back Berm	2 x 1.3 Planting Strips Front Berm	30	15
	R33 A3	Link Road	300	3000	20	6	2 x 3.0	Allow for Speed Calming	Staggered T	Formed Bays 2 x 2.3	-	2 x 4.7	2 x 1.4	2 x 1.8 Grassed Back Berm	2 x 1.5 Planting Strips Front Berm	30	12.5
	R34 A4	Collector	1000	10000 (c)	26.4	7	Marked 2 x 3.5	Mid- Block Ped. Refuge Flush < 2.0	Roundabout (d)	Marked Bays 2 x 2.5	Marked 2 x 1.5	2 x 5.7	2 x 1.4	2 x 1.8 Grassed Back Berm	2 x 2.5 Planting Strips Front Berm	50	10
	34 A5	Arterial (e)	-	-	25 - 30	7	Marked 2 x 3.5	Flush varies ≤ 3.0	Aux. Lanes & Signals	Parking & Bus Bays 2 x 2.5	Marked 2 x 1.5	2 x 6.0	2 x 1.4 + Bus Shelter	2 x 2.1 Grassed Back Berm	2 x 2.5 Planting Strips Front Berm	60	8
Business (Industrial)	R34 B1	Link Road	-	-	22	7	Marked 2 x 3.5	-	Large Radius Roundabout designed for Trucks or Staggered T	Marked Bays 2 x 2.5	-	2 x 5.0	2 x 3.0 Landscaped Front Berm	Under Footpath	Subject to District Plan rules, good practice and relevant design guides	50	6
Business (Commercial)	R35 C1	Cul-de-sac	10	250	17	6		-	12.5m Radius Turning Head	Marked Bays 2 x 2.5	-	2 x 3.0	2 x 3.0	Under Footpath		30	10
	R35 C2	Link Road	-	500 - 5000	22	7	Marked 2 x 3.5		Staggered T	Marked Bays 2 x 2.5	-	2 x 5.0	2 x 3.5 shared	Under Footpath		50	10
	R35 C3	Collector	-	5000 plus	25 - 30	15	Marked 2 x 3.5	Flush ≤3.0	Staggered T	Marked Bays 2 x 2.5		2 x 6.0	2 x 4.0	Under Footpath		50	10
		Arterial (e)	-	-	30 plus	15 - 20	Marked	Raised & Flush ≤ 3.0	Aux. Lanes & Signals	Parking & Bus Bays 2 x 2.5	-	2 x 6.0	2 x 4.0 + Bus Shelter	2 x 2.0 Grassed Front Berm		50	10
Rural	R36 D1	Cul-de-sac	Up to 20	250	16	6	2 x 3.0	-	10m Radius Turning Head	Shoulders (metalled) 2 x 1.0	-	2 x 4.0	-	V - Drains 2 x 4.0		50	12.5
	R36 D2	Local Road	-	3000	20	7	Marked 2 x 3.5	-	Staggered T	Shoulders 2 x 1.0	-	2 x 5.5	Metalled 2 x 1.5	V - Drains 2 x 4.0		100	10
		Collector & Arterial (e)	-	-	20 - 30	10	Marked 2 x 3.5	-	Staggered T / Roundabout	Shoulders 2 x 1.5	-	2 x 5.0	Metalled 2 x 1.5	V - Drains 2 x 3.5		100	10

a) In some cases a footpath may not be required, or may be placed adjacent to the kerb
b) In some cases, footpath one side only may be acceptable
c) For collector roads at the upper end of the vpd spectrum, specific design may be appropriate
d) Where collector roads intersect, roundabouts suitable for buses are preferred. For minor streets staggered T intersections are preferred
e) It is expected that all arterial roads will require specific design – the information shown is of a general nature only. Typical cross-sections have not been drawn for either C4 or D3 arterials.
f) Where indicated (Marked), traffic lanes will be defined by a painted centre line and edge lines. Where medians are provided only the edge lines will be marked
g) Intersections and end treatments will preferably be of the type indicated unless directed otherwise by the Council. The need for any auxiliary lanes at approaches to intersections will be determined by Council
h) Parking in urban areas will generally be defined as recessed bays or as marked out bays as indicated. On rural roads parking will be permitted on the metalled road shoulder
i) Bike lanes where indicated will be line marked. Roads that do not have a requirement for bike lanes must still be designed with cyclists in mind.
j) In lower order residential roads, streetscape features are encouraged, and may include (but not limited to) landscaped central islands (possibly raised), widened front berms, carriageway pinch points, chicanes, tighter kerb intersection radii, paved rumble strips and recessed parking bays. Street trees add considerable amenity to streetscapes. Trees shall generally be planted in the front berm. Refer to 301.9 of the Franklin District Council Code of Practice
k) Carriageway is kerb face to kerb face and includes a 300mm allowance for a drainage channel on each side

3.2.4 Requirements for Safety Audit

A post construction safety audit shall be carried out by a suitably qualified road safety engineer. All findings of the audit shall be addressed by the developer.

3.2.5 Extent of Upgrading

The developer is responsible for any necessary upgrading to the existing roads along the full length of their property frontage and for up to 30m beyond the frontage.

The extent of road upgrading required may include the carrying out of road carriageway widening and/or reconstruction of the existing carriageway.

The extent of reconstruction of the existing carriageway is limited to being to the centre line of the road or to 6m from the edge of the sea, whichever is the lesser.

The extent of works may include reshaping of the berm, the provision of kerb and channel and associated drainage works, footpath, street lighting, road marking, traffic signage and under-grounding of existing overhead cables. Additional responsibilities may also include the extension of transport networks such as walking and cycleways in the vicinity of the development.

3.2.6 Subgrade Testing

Subgrade
Subgrade improvement may be possible by compaction of the subgrade, stabilisation or removal of soft material.

The subgrade surface shall be trimmed and compacted. Testing shall be carried out in accordance with TNZ F/1. Testing of the subgrade shall be carried out and test results reviewed prior to commencing on to the placement of any subsequent pavement layer. The subgrade shall be shaped at all times to ensure all areas are not ponding water. Precautions shall also be taken during wet conditions to prevent damage to the subgrade.

When the excavation or filling is at subgrade level, proof rolling using an 8 to 10 tonne steel wheeled roller shall be undertaken in the presence of the Engineer. Any yielding or otherwise unsatisfactory areas which become evident during such testing shall be undercut and backfilled as directed by the Engineer. The Engineer may also require the placement of geotextile filter fabric or other material on selected areas prior to pavement construction.

Testing of Fill Materials
The following tests shall be undertaken on each material with the results approved by the Engineer prior to placement:

(a) The Dry Density/Water Contents relationships shall be obtained in accordance with Tst 4.1.1 of NZS 4402 for material proposed to be used in the fills.
(b) The soaked CBR shall be determined for each material in accordance with Test 6.1.1. of NZS 4402 after standard compaction at optimum water content. The Scala CBR equivalent shall be determined on each material, compacted using standard compaction and at optimum water content.

Wetting or drying may be necessary to achieve the specified compaction standard. All subgrade fill material shall be compacted to achieve 100% of the maximum dry density as determined in NZS 4402 Test 4.1.1.

The average of the air voids measured at the five consecutive test sites shall not exceed by more than 2% the air voids at optimum water content (as determined in NZS 4402 Test 4.1.1).

Testing of Finished Subgrade
The following tests shall be undertaken on completed subgrade layer and submitted to the Engineer for approval. No pavement aggregate shall be placed until all of the relevant tests have been undertaken and are in accordance with the specifications. The test results shall show that the required level of compaction has been achieved and that the founding material is of sufficient strength to support the overlying pavement.

(a) Nuclear Densometer Dry Density tests shall be undertaken once at completion of formation, once at 500mm below finished levels, and at randomly staggered transverse positions at 20m intervals throughout.

(b) CBR Dynamic Cone (Scala) Penetrometer tests shall be undertaken once at completion of layer at randomly staggered transverse positions at 20m intervals throughout.

3.2.7 Signing and Marking

A Signage and Road Marking Plan shall be submitted for approval by the Engineer.

In general, the following markings should be considered:

(a) Priority control at intersections (Stop and Give Way)
(b) No Stopping markings on cul-de-sac heads and turning areas, at pedestrian crossings and at island and kerb extensions.
(c) Centre line markings
(d) Edge lines
(e) Bus stops
(f) Cycle paths
(g) Pedestrian crossings.

In general the following signs should be considered:

(a) Keep Left on all approaches to median and splitter islands
(b) Give Way and Stop at intersections
(c) Bus Stop
(d) Roundabout
(e) Chevrons at intersections and roundabouts
(f) Street name blades
(g) Edge markers (rural, collectors and arterials only)

3.2.8 Carriageway Geometrics

All road alignments shall be designed in accordance with the 'Rural Road Design – Guide to the Geometric Design of Rural Roads' and the 'Guides to Traffic Engineering Practice Parts 1 – 14' – Austroads.

3.2.9 Pedestrian and Bicycle Traffic

Footpath shall be 1.4 m width, 125 mm thick concrete using 20 MPa concrete on a 30 mm compacted layer of GAP 20 as a minimum.

Where allowance is to be made within the roadway for a cycle lane then the width of the cycle lane shall be 1.5m in a 50km/hr speed zone, in higher speed zones the width of the cycle lane shall be 2.0m.

Where two way cycle lanes are to be constructed on berms or on land other than roadway then the minimum width of each cycle lane shall be 2.0m allowing for 1.0m in each direction. Such cycle lanes shall be specifically designed in terms of pavement, geometry and its relationship with other road features including signage, traffic signals etc.

3.2.10 Road Lighting

Road lighting in residential areas is to be designed to provide safety, security and convenience for pedestrians. Accessways in public areas or other locations away from roads should be illuminated and amalgamated with the detailed area plan or layout, enabling visual surveillance of the accessway from the road.

Road and path lighting is to have a high illuminating efficiency and to provide no more illumination than is necessary for security and safety. Road lighting and bicycle or pedestrian path lighting is to be located or mounted so as to minimise light shining upon residential windows, or into the eyes of drivers, pedestrians, or cyclists.

All road lighting requirements are to be installed by the developer and be in operation at the time Council accepts responsibility for the development.

Pedestrian accessways shall have road lights located at each end and shall have additional lights installed at not more than 70m centres along their length.

Lighting of roads, service lanes and pedestrian accessways shall be in accordance with NZS 6701 and related documents. The recommendations of Section 9 of NZS 6701 shall apply to all roads and service lanes. NZS 1158 shall be utilised in the design of all lighting.

The lighting category shall be in accordance with the requirements of Table 3.2. Estimated or actual traffic count information is to be provided to support the category chosen for each road. A copy of the As-Built plans is to be provided with the site audit on completion of the commissioning of the lights. Generally poles will be octagonal galvanised poles 6.0 to 7.5m in height and with a 1 or 2m outreach for P4 category and 8 to 10m in height with 1 to 3m outreach for P3 category.

All street, accessway and pedestrian lighting shall be on stand alone light standards. Attachment to buildings or other service poles will not be permitted.

TABLE 3.2: SUGGESTED CATEGORIES AND SPACINGS

Road (general description)	Basic Operating Characteristic	Minimum Lighting Category	Typical Lighting Installation
Principal (6,000-12,000 vpd)	Commercial area	V3	Dedicated pole (8.3/11.3m) 150W/250W HPS
Collector/Local (3,000-6,000 vpd)	Commercial area	V4/P3	Dedicated (7.3/10.3m), 100/150W HPS
Local (1,000-3,000 vpd)	Residential (busy)	P3	Dedicated or power pole (7.3/8.3m), 100W HPS
Local (200-1,000 vpd)	Residential (average)	P4	Dedicated or power pole (7.3/8.3m), 70W HPS
Local (<200 vpd)	Residential/semi rural (quiet)	P5	Dedicated (6.0/7.3m), 70W HPS

3.2.11 Drainage

The stormwater drainage system shall be designed for the road area and all the contributing catchment. Surface drainage design shall be in accordance with 'Highway Surface Drainage – Design Guide for Highways with a Positive Collection System': National Roads Board, 1977.

Culvert design criteria:

- Pass 5% AEP flood without surcharge – principal and collector roads.
- Pass 10% AEP flood without surcharge – local roads.
- Pass 1% AEP flood with surcharge to a maximum of 0.5m below road crest or 2.0m above culvert soffit, whichever is lower – all roads.

If in a flood plain and the road is to be overtopped, specific design and the Engineer's approval is required. In cases where overtopping is approved, the maximum permitted critical depth will be 200mm.

Part 7 of this Code provides specific requirement for storm water quality devices for implementation in sensitive areas as required by consent conditions.

3.2.12 Street Trees

Front berms shall be planted. The placement of the trees should comply with the requirements of Franklin District Council Drawings P4 and P5. Similar types of trees should be planted to give a uniform street appearance.

Attention is drawn to Franklin District Council's 'Street Tree Policy', copies of which are available on request. Part 7 of this code provides more detail regarding Council's requirements for landscaping on reserves including road reserve. Table 7.1 provides a schedule of acceptable street trees.

3.2.13 Standards and Guidelines

Appendix H provides a complete list of standards and guidelines relevant to the road network of Franklin District, some additional documents are also listed for information.

3.2.14 Bylaws

Bylaws do or may affect the development of, or impact on the road network of Franklin District Council. These bylaws have been developed to protect the community and the environment. The bylaws that do or may impact on roads include:

- Waste Bylaw 2009
- Speed Limit Bylaw 2005
- Traffic Control Bylaw 2006
- Control of Signs Bylaw 2007
- Water Supply Bylaw 2008
- Livestock on Roads Bylaw 2010
- Public Places Bylaw 2007
- Trading in Public Places Bylaw 2008

3.3 ENGINEERING DESIGN

3.3.1 Road Geometry

Road configuration shall comply with the requirements of the District Plan. All roads in the District shall be designed and constructed such that they can be used by emergency vehicles at all times, thus, the minimum unimpeded carriageway width, taking all legal parking options into account, will be 3.5m between the parked vehicles.

3.3.2 Longitudinal Gradients

The choice of a longitudinal gradient will depend principally on the type of terrain. The volume and extent of earthworks in developments is influenced by the maximum and minimum gradients adopted. The minimum acceptable gradient will normally be 0.5%, but in exceptional conditions, a flatter minimum gradient may be accepted. Road gradients should not be steeper than 1:8 (i.e. 12.5%). On all roads likely to carry significant volumes of public transport or heavy vehicles, the maximum gradient should not be above 8%. For cul-de-sac and minor local roads Council may on application approve steeper grades to a maximum of 1:5, cul-de-sac heads however shall have a maximum grade of 1:12 (i.e. 8%). Where grades steeper than 12.5% are unavoidable, they should be restricted to sections of the road alignment that are straight and should be kept as short as possible. In special cases the Council may by special order procedure approve steeper gradients (refer to Table 3.1).

3.3.3 Vertical Curves

Vertical curves shall generally comply with the minimum requirements of ‘Rural Road Design – Guide to the Geometric Design of Rural Roads: Austroads, 1989’ and ‘Guide to Traffic Engineering Practice, Part 1-14: Austroads, 1988’ for urban roads.

Shortening of undervertical (sag) curves may be necessary to ensure that the gradient in the channel is not less than 1:500. Shortening of the vertical curve on a road adjacent to intersections may be required where the gradient of the road is more than 5%. Change of grade in flat land should have vertical curves of 60 m minimum length where drainage permits.

The safe stopping sight distance (SSSD) shown in Table 3.3 shall apply to all roads, unless specifically advised otherwise by the Engineer.

The safe stopping sight distance is the minimum line of sight distance measured from the driver's eye, 1.15m above the road, to an object on the road situated in the centre of the same traffic lane.

TABLE 3.3: SAFE STOPPING SIGHT DISTANCE

	SAFE STOPPING SIGHT DISTANCE (metres)**		
* Operating Speed (km/h)	*** < 1,000 v.p.d.	*** 1,000 - 3,000 v.p.d.	*** > 3,000 v.p.d.
40	30	70	70
50	40	90	90
60	55	115	115
70	85	140	140
80	105	175	175
90	130	210	210
100	160	250	250
110	190	290	290
120	230	330	330

* Operating Speed = 85th percentile speed on frontage road. This can be taken as the speed limit plus 15% if survey data is not available.

** Distances are based on the Approach Sight Distance and Safe Intersection Sight Distance tables in Austroads, Intersections At Grade (1) assuming Reaction Times of 1.5 seconds on local roads with operating speeds up to 60 km/h and 2.0 seconds for all other speeds and all collector and arterial roads.

*** The ultimate v.p.d. are the traffic volumes on the road at the intersection with the highest vehicular count and not necessarily the vehicular count on the road being considered.

3.3.4 Horizontal Curves

Where curves of less than 60m radius are necessary for topographical or other reasons extra widening of between 0.5m and 1.5m shall be applied according to the width of carriageway normally available to moving traffic, the radius of curvature and to the traffic function of the road. Should it be necessary to preserve the minimum berm width extra widening shall also be applied to the land set aside for road.

In urban residential areas horizontal curves may be circular with a minimum centreline radius of 45m, in minor roads this may be reduced to 15m. For collector routes curves should be a minimum of 80m in radius.

For all industrial areas horizontal curves may be circular with a minimum centreline radius of 80m. Local non collector roads of less than 2,000 vehicles per day the radius may be progressively reduced to a minimum of 15 m as traffic volume decreases.

In roads which may have a higher speed limit in the future, the Engineer may require transition curves with a specified speed value. Transition curves shall be calculated in

accordance with clause 3.5 of the NRB Code of Practice Design for Urban Streets. Transition curves will not normally otherwise be required in local roads.

3.3.5 Superelevation and Crossfall

Normal camber of 3% shall be used in 50 km/hr zones, or in areas that, in the opinion of the Engineer, are likely to become 50 km/hr zones, except where superelevation is required by the Engineer. In the future, certain roads may have increased speed limits, if this is a possibility, the Engineer may require superelevation to be constructed to a speed value nominated at the time of the request. Any superelevation shall comply with Austroads Rural Road Design.

Superelevation requirements may require adjustment to ensure flowing kerb profiles. Generally the best results are obtained from a graphical plot of each kerb profile, using a horizontal/vertical scale ratio of the order of 10 to 1.

The ruling profile gradient is to be developed along the shortest or inside kerb. Where applicable, superelevation is added to the inside profile to obtain the profile of the outside kerb.

Reverse curves are to be separated by sufficient length of straight to allow for a satisfactory rate of superelevation reversal, consistent with the design standards.

Crossfall to assist surface drainage shall be applied at the following rates:

Sealed pavement	3%
Unsealed pavement	6%

Superelevation appropriate to the design speed shall be applied on all horizontal curves. The superelevation shall not exceed 10%.

3.3.6 Carriageway Crossfall

The normal crossfall shall be 3% in both directions at right angles to the carriageway centreline.

Where a differential level between kerblines is adopted to suit the existing topography of adjoining private property, crossfalls varying from 2% to 4% from the crown may be permitted, coupled with a lateral shift in crown position of up to one quarter of the carriageway width. Where a uniform crossfall is adopted from kerb to kerb this should not exceed 6% unless on a curve where superelevation would otherwise be permitted.

3.3.7 Intersection Design

Intersections shall be designed in accordance with Austroads Guide to Traffic Engineering Practice, Part 5, Intersections at Grade.

Intersections shall be sited such that the side road enters the through road at preferably 90° and generally no less than 80° at a location with adequate sight distance in both directions on the through road.

T-intersections shall be offset, centreline to centreline, by at least 12m. Crossroad intersections will not be approved.

In addition to the District Plan, Transit New Zealand document 'Planning for a Safe and Efficient State Highway Network under the Resource Management Act 1991' is to be consulted in the selection of intersection layouts.

The designer shall show on the engineering plans, the sight distance provided at each intersection, plus the following information:

- Design speed
- Design Vehicle
- LV – Distance from limit lines to viewpoint
- ASD – Approach Sight Distance
- ESD – Entering Sight Distance
- SISD – Safe Intersection Sight Distance
- All radii.

For the SISD determination an object height of 0.6m shall be used. Roundabouts shall be designed in accordance with Austroads Guide to Traffic Engineering Practice Part 6 – Roundabouts.

The size of a roundabout has a significant role in the performance for capacity, traffic safety and turning movements of vehicles.

Roundabouts shall be designed in accordance with Austroads Guide to Traffic Engineering Practice, Part 6, Roundabouts. The following minimum design criteria shall be applied:

TABLE 3.4: MINIMUM DESIGN CRITERIA FOR ROUNDABOUTS

Road Type	Central Island Diameter	Circulating Width	LV Distance
Local Road	16m including a 2m concrete collar	Single lane – 7.0m	5.0m
Collector Road Industrial	20m including a 2m concrete collar	Single lane – 7.0m Dual lane – 10.5m	9.0m
Arterial Road	24m including a 2m concrete collar	Single lane – 7.0m Dual lane 10.0m	9.0m

The edge of seal radius at an intersection shall be not less than 15 m in rural areas and face of kerb radius shall be not less than 10m in urban areas. Lesser radius kerbs down to a minimum of 6m may be permitted subject to the approval of the Engineer.

Wherever practicable the longitudinal gradient within 30m of intersections should be less than 5% and preferably less than 2%. All major intersections shall be designed to accommodate heavy vehicle usage. Turning circles for a 15m truck and trailer unit will be used for design purposes unless specified otherwise by the Engineer. The Engineer shall decide if each intersection falls within the category of a major intersection.

Where traffic islands are deemed necessary at intersections these shall be specifically designed and shall be lit during the hours of darkness. Appropriate lighting shall be specifically designed for the site.

Intersections on curves, particularly on the inside of curves, should be avoided.

The requirements of the TNZ Manual of Traffic Signs and Markings shall be met for priority intersections, as either “Give Way” or “Stop”.

All side roads which have direct access to an arterial road (primary or secondary) either existing or proposed, shall be channelised using either kerb extensions and/or a central throat island at the intersection with the arterial road.

Visibility at intersections shall be to Austroads standards.

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

Traffic modelling shall show that the design can mitigate the effects of traffic generation due to the development. Where applicable, consideration should be given for future network growth and development. This could include intersection modelling using software such as SIDRA.

Prior to submitting Engineering Plans the designer shall have a Stage 3 “Detailed Design” current version of Transfund’s Safety Audit Procedures completed by an approved auditor. Any issues rated as serious must be rectified prior to submitting Engineering Plans. Items rated important will be evaluated and considered for inclusion with consent conditions.

3.3.8 Cul-de-Sac Heads

The cul-de-sac head in residential areas shall incorporate a minimum 10m outside radius turning circle. In industrial areas a 12.5m outside radius will be permitted. In both residential and industrial areas the maximum grade of the cul-de-sac head shall be 8%. Standard details are presented in Appendix G on R13 and R14.

In residential areas alternative turning areas of lesser radius or using T, L or Y shaped heads may be used, at the discretion of the Engineer, requiring a reversing movement of vehicles.

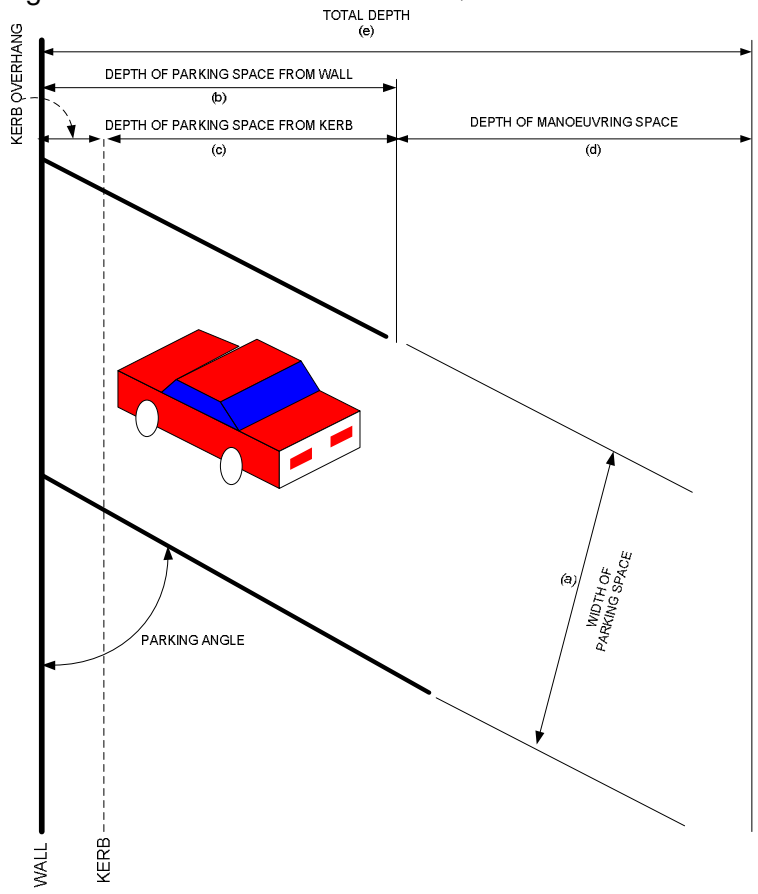
The cul-de-sac shall have sufficient grade to ensure that ponding of water does not occur.

On-street parking shall be provided to the dimensions required by Table 3.1 and for every lot around the cul-de-sac head to the dimensions contained in Table 3.5. Any central area provided for parking or beautification should be specifically designed.

TABLE 3.5: PARKING SPACE DIMENSIONS

Type of Parking		Stall Width (a)	Stall Depth		Manoeuvre Aisle Width (d)	Total Depth (e)
Parking Angle	Type		From Wall (b)	From Kerb (c)		
		ALL MEASUREMENTS ARE IN METRES				
90º	Nose in: left turn	2.5 2.6 2.8	4.9	3.9	7.7 7.0 6.6	12.6 11.9 11.5
90º	Nose in: right turn	2.5 2.6 2.8	4.9	3.9	8.4 7.9 7.5	13.3 12.8 12.4
75º	Nose in	2.5 2.6 2.8	5.2	4.2	6.3 5.2 4.1	11.5 10.4 9.3
60º	Nose in	2.5 2.6 2.8	5.2	4.2	4.1 3.5 3.2	9.3 8.7 8.4
45º	Nose in	2.5 2.6 2.8	4.9	4.1	2.6 2.4 2.3	7.5 7.3 7.2
30º	Nose in	2.5 2.6 2.8	4.0	3.4	2.4 2.4 2.3	6.4 6.4 6.3
0º	Parallel	2.5	Stall length 6.1m		3.7	

Figure 3A: ANGLE PARKING REQUIREMENTS



3.3.9 Crossfall on Grass Berms

The shape, slope and vegetation of berms shall be such as to provide satisfactorily for storm water runoff, maintenance, location of services and vehicle crossings to properties (unless acceptable alternative parking is provided). To achieve satisfactory drainage the crossfall should be at least 3%.

Grassed areas for tree planting which are additional to the minimum berm width shall be specifically designed, in these areas steeper gradients may be permitted to a maximum of 20% providing the area can be mown or otherwise maintained by Council.

3.3.10 Road Pavement

Design Life

The pavement shall have a design life of not less than 25 years. The following types of pavement may be used within Franklin District:

Flexible Pavement

All flexible pavements shall be designed in accordance with the Austroads Pavement Design Guide and the New Zealand Transport Agency Supplement. The designer shall produce a 'Pavement Design Report' which shall include:

- Results of soils investigations
- Design assumptions and figures
- QA measures and recommendations for construction.

Rigid Pavement

All rigid pavements shall be designed as prescribed in the Austroads Pavement Design Guide (Pavement Design – A Guide to the Structural Design of Road Pavements) and the New Zealand Supplement, 1995.

Pavement Units

With adequate support solid masonry paving units may be accepted in normal roadway situations and may also be a suitable alternative in light duty areas such as shopping malls and courtyards, where surface appearance is a consideration. For design information refer NZS 3116.

Masonry units so designed as to enable grass to grow through the surface will not be accepted for berm parking on road reserve.

CBR Tests

CBR values shall be determined in the laboratory according to test 18 of NZS 4402: Part 2P. Samples should be manufactured in the laboratory to a dry density equal to that in the field. The CBR values used in the pavement design shall be soaked values unless otherwise approved by the Engineer. Other values may be submitted for approval with sufficient evidence with reference to equilibrium moisture content to show that the value chosen should be the minimum strength value likely to be achieved by the subgrade material over the life of the pavement.

The CBR value used in the design shall be the 10-percentile value of the CBR tests taken on the subgrade material. The subgrade is the top 1m of material, either occurring naturally on the site or imported, on which the pavement is constructed.

To obtain the 10-percentile value, collate CBR test results from samples taken at the same level relative to the subgrade.

Where CBR values are required for aggregates these shall be based on laboratory tests prepared on the fraction passing the 19 mm sieve.

Subgrade improvement may be possible by re-compaction of the subgrade, chemical stabilisation or removal and replacement of soft material.

Aggregate requirements are presented in Table 3.5.

TABLE 3.5: PAVEMENT AGGREGATE REQUIREMENTS

Road Type	Traffic Volume	Basecourse Type	Sub-base Type
Arterial Roads	All	AP40	GAP 65
Collector Roads	>2000 vpd	AP40	GAP 65
	<2000 vpd	PAP40	GAP 65
Local Roads	>2000 vpd	AP40	GAP 65
	150-2000 vpd	PAP40	GAP 65
	<150 vpd	GAP 40	GAP 65

The aggregate strength and quality, grading envelopes and aggregate grading shape control are specified in Tables 3.6, 3.7 and 3.8.

SUMMARY SCHEDULE OF AGGREGATE MATERIAL PROPERTIES

TABLE 3.6: AGGREGATE STRENGTH & QUALITY

Material Description	Crushing Resistant	Weathering Resistance	Sand Equivalent
TNZ M/4 1995 (AP40)	130 kN	AA, AB, AC, BA, BB, CA	40
PAP 40	130 kN	AA, AB, AC, BA, BB, CA	34
PAP 20	130 kN	AA, AB, AC, BA, BB, CA	34
GAP 65	110 kN	AA, AB, AC, BA, BB, CA, CB	28
GAP 40	110 kN	AA, AB, AC, BA, BB, CA, CB	25

TABLE 3.7: AGGREGATE GRADING ENVELOPE (Test Method NZS 4407 Test 3.8.2 Dry Sieving)

	Percentage Passing			
Test Sieve Aperture	TNZ M/4 (AP 40)	GAP 65	PAP 40 GAP 40	PAP20
63.0 mm	-	100	-	-
37.5 mm	100	70-85	100	
19.0 mm	66-81	46-68	63-81	100
9.5 mm	43-57	31-54	41-57	52-75
4.75 mm	28-43	20-41	26-43	31-55
2.36 mm	19-33	13-32	18-33	21-42
1.18 mm	12-25	9-23	11-25	13-31
600 micron	7-19	6-16	6-19	7-23
300 micron	3-14	3-12	3-14	5-16
150 micron	10 max	10 max	10 max	12 max
75 micron	7 max	6 max	7 max	8 max

TABLE 3.8: AGGREGATE GRADING SHAPE CONTROL

	Percentage of Material in Fraction			
Fractions	**TNZ M/4 (AP 40)**	**GAP 65**	**PAP 40 GAP 40**	**PAP20**
37.5 - 9.5 mm	-	24-46	-	-
19.0 - 4.75 mm	28-48	15-37	27-49	-
9.5 - 2.36 mm	14-34	10-31	13-34	19-47
4.75 - 1.18 mm	7-27	7-25	7-28	8-35
2.36 mm - 600 micron	6-22	6-19	6-22	6-27
1.18mm - 300 micron	5-19	5-16	5-19	3-21
600 - 150 micron	2-14	2-12	2-14	2-17

The use of alternative aggregates in forming a modified or cemented pavement may be permitted with the approval of the Engineer subject to specific design and a minimum treated soaked CBR of 100 is obtained.

Limerock shall not be accepted as GAP 65 aggregate.

Pavement-layer Construction
The minimum pavement depth of granular pavement on unmodified sub-grade is 250mm regardless of the results of any pavement design which concludes a lesser granular depth.

Sub-base
When the subgrade is completed and ready for the placing of the pavement layers it shall be inspected by the Engineer. The Engineer shall require the subgrade to be inspected under the action of the compaction equipment or to be tested with Benkelman Beam tests.

The lower basecourse or sub-base shall be spread, graded and rolled to the correct formation level. The completed sub-base shall be inspected and approved by the Engineer prior to placement of the basecourse.

Basecourse
The basecourse layer shall be placed to full depth compacted and graded to shape at the optimum moisture content.

Unless approved otherwise by the Engineer, Benkleman Beam tests will be completed on the pavement before surfacing. The test axle load shall be 8.2 tonne.

Where 5% of readings exceed the stated Maximum Reading in Table 3.9, or any individual reading is more than twice the Maximum Reading, the length of pavement concerned shall be reconstructed to conform to this standard.

TABLE 3.9: MAXIMUM BENKELMAN BEAM CHART

Road Type	**Maximum Reading (mm)**
Local Roads	1.5
Arterial and Collector Roads and all roads in industrial areas	1.0

Where underlying deflection is evident the amount shall be determined following completion of specified testing by the Engineer and the resultant pavement deflection compared with the above table.

When subgrades have been modified with lime or cement the Engineer shall require Benkelman Beam uniformity testing prior to the application of pavement aggregates.

All testing required under these clauses shall be at the cost of the developer.

Surface Sealing
Immediately prior to any form of surfacing a strip 600mm wide adjacent to each channel shall be sprayed with an approved ground sterilising weed killer at the manufacturer's recommended rate of application.

All urban residential and Industrial roads, shall be finished in hot laid asphaltic concrete over a one coat chip seal, unless otherwise approved by the Engineer.

All rural roads shall be finished in first and second coat chip seals, unless otherwise approved by the Engineer.

First and Second Coat Chip Seals
First coat sealing with asphaltic cutback shall be to TNZ specifications P/3 and M/1. Sealing chips used are to comply with the TNZ specification M/6 provided that local stone may be used where the loss by the Los Angeles abrasion test does not exceed 40%.

The developer may either complete both seal coats at the time of construction or may negotiate for the Council's Contractor to complete the second coat seal within 12 months at the developer's full cost.

Where the second coat seal is to be laid after the development is formally accepted by the Council a bond will be required pursuant to this code.

Hot Laid Asphaltic Concrete Surfacing
All roads, cul-de-sacs and service lanes shall be surfaced with a minimum compacted thickness 30mm of asphaltic concrete complying with TNZ Specification M/10. The method of laying is specified in TNZ P/9. The 30mm thickness shall be the total depth from the top of the metal basecourse to the hotmix surface.

A first coat chip seal shall first be applied to the prepared basecourse surface at least one month before the asphaltic concrete surfacing is laid. The chip seal shall use either grade 3 or grade 4 chips. The first coat seal shall use an appropriate asphaltic binder, but with the requirement of a minimum of 1.0 l/m² residual penetration grade bitumen.

Asphaltic surfacing of new road pavements at heavily trafficked intersections shall require special consideration and may require specific design.

If, in the opinion of the Engineer, any newly constructed road is deemed to be rough, the Developer shall arrange for roughness tests of the completed pavement.

3.3.11 Traffic Services

All road construction will require the installation of appropriate painted road markings and delineation aids. All traffic service installations shall be in accordance with Transit New Zealand's Manual of Traffic Signs and Markings.

Painted road markings shall be reinstated following the application of the second coat seal and the cost shall be included in the Bond (if any).

Once the road names have been approved by the Council the developer shall arrange through the Council's road signs contractor the erection of the appropriate signs and shall meet all charges incurred. Refer to Franklin District Council Drawing R1.

3.3.12 Bridging

Should bridging be necessary, early discussions should be held with the Engineer.

Bridge design shall conform to the technical requirements of the New Zealand Transport Agency's Bridge Design Manual.

All bridges and all box culverts with a waterway area greater than 1.5m^2 may be subject to a Building Consent under the Building Act 1991.

Traffic guard rails of an approved type and layout shall be installed over the culvert embankment.

For a culvert, the design shall allow for the passage of the 10 year flood without heading up. The design shall allow for the passage of the 100 year flood by heading up to a maximum level 0.5m below the road surface, but not more than 2m above soffit level. Where the road crosses a defined flood plain and overtopping is to be provided for, specific design shall be provided to the satisfaction of the Engineer. If the heading up condition is considered, the design shall ensure embankment stability under flood conditions, and adequate protection to safeguard against piping. This clause includes accessways and right of ways.

In all cases where heading up or overtopping is a design feature, attention shall be given to back water effects upstream to ensure that flooding of adjoining land is not adversely affected.

Installation of bridges or culverts on natural watercourses is generally subject to a Resource Consent from the Auckland Regional Council. The design and construction shall comply in all respects with the requirements of the Consent. In some cases the works may be covered by General Authorisations and not require consents. The advice of the relevant Regional Authority should be sought at an early stage.

3.3.13 Subgrade Drainage

Underground Drainage
Where subsoils are not free draining, subsoil drains are required under road channels. The underchannel drains shall consist of an approved filter drainpipe 100 mm diameter in a trench backfilled with an approved free-draining material. The trench shall be 300 mm wide, the pipe invert not less than 600 mm below subgrade level, the trench bottom 50 mm below pipe invert.

Additional Subgrade Drainage
Any wet spot in the subgrade shall be drained to the underchannel drainage system. Where the wet area is below the level of the underchannel drain, it shall be drained using approved filter drainpipes connected to the nearest storm water system.

3.3.14 Kerbing and Channelling

Where kerbs and channels, or equivalent approved concrete, ceramic or stone edging, are to be provided on carriageways, they are to comply with standard Franklin District Council Drawing R16. Cast in situ concrete shall be to NZS 3109 with a 28 day strength of 20 MPa.

String lines set up for kerbing shall be inspected and approved by the Certifying Engineer prior to construction.

Where crossfall is such that storm water control is required on one side only of the carriageway, kerb and nib only may be installed on the higher side.

3.3.15 Catchpits

Catchpit spacing shall be designed to provide for the 20% AEP flow off the road surface. It will also depend on the channel slope and catchpit entry characteristics. Typical spacings are:

(a) In channels draining one lane, in such a position that the run of water in any channel is a maximum of 90 m, for channels draining two lanes, a maximum of 60 m.

(b) Where required at intersections, at the kerbline tangent points.

(c) At changes of gradient or direction in the channel where there may be a tendency for water to leave the channel.

(d) A double catchpit shall be provided:

- At the lowest point in a sag vertical curve;
- At the end of a cul-de-sac where water falls to the end;

Catchpits should normally be connected to a manhole on the storm water drainage system, except that if the storm water drain is of greater diameter than 1.2m and a manhole is not conveniently located the catchpit lead may be saddled direct to that drain. A direct connection of the catchpit lead to a storm water drain with a diameter between 600m and 1.2m diameter will only be permitted in exceptional circumstances, and at the Engineer's discretion. A range of typical catchpit designs is shown in Franklin District Council Drawings R17, R18, and R19.

Catchpit leads shall be designed to cater for the 20% AEP flow entering the catchpit, but shall not be less than 300mm in diameter except with the approval of the Engineer.

Catchpit leads shall not exceed 25m in length.

On footpaths and accessways, catchpits, if not required to take a design flow of more than 15 litres per second may be 450mm by 450mm internal dimensions. An outlet of at least 150mm diameter will be required, refer FDC Drawing R17.

3.3.16 Dished Channels

Dished Channels in Carriageways and Parking Bays
To provide setback parking a 600mm wide dished channel shall be constructed and shall be as set out in Franklin District Council Drawing R16.

Dished Channels with Footpaths or Accessways
Low level footpaths and footpaths in pedestrian accessways shall have a dished channel formed along the path edge. The channel shall lead to a 450mm x 450mm catchpit as set out in Franklin District Council Drawing R17.

3.3.17 Footpaths/Accessways

Construction of Footpaths
Concrete footpaths shall be constructed of concrete to NZS 3109 with a 28 day strength of 20MPa. The minimum depth of concrete shall be 75mm. A minimum 30mm compacted depth of fine granular material shall be placed under the concrete. Where mountable kerbs are used minimum depth of concrete shall be 125mm. The width shall be 1.4m. The minimum crossfall on any footpath shall be 2%. Solid masonry paving units may be used providing permanent concrete edgings are used.

Footpaths in shopping areas shall be specifically designed for the particular circumstances which apply.

For details of fencing and bollard requirements for pedestrian accessways refer to Franklin District Council Drawings P1 & P2.

In general footpaths are to be located away from the kerb (not adjacent to the kerb).

Footpaths in cul-de-sac that form part of the required cul-de-sac turning area shall be 200mm thick.

Footpath construction joints or saw cuts to a minimum depth of 30 mm shall be formed at 4m centres.

Accessways
All accessways shall be constructed to the same standard as footpaths.

3.3.18 Crossings

Pram and Wheelchair Crossings
Wheelchair ramps shall be constructed as shown on Franklin District Council Drawing R21. Maximum gradient shall be 1 in 12. Where required by the Engineer a contrasting surface shall be constructed on the ramp in accordance with NZS1428.4 "Design for access and Mobility".

The crossings shall be sited to facilitate normal pedestrian movements in the road. Where possible catchpits shall be sited so as to reduce the flow of storm water in the channel at the crossing entrance.

Vehicle Crossings
A vehicle crossing shall be provided between the kerbline and back of the footpath at the entrance to all entrance strips to rear lots, privateways and service lanes and at any other place where the location of the future driveway to a section can be

determined with reasonable certainty. Details of recommended forms of crossing are indicated in Franklin District Council Drawings R4, R5, R6, R7, R8, and R29.

Where crossings may be expected to carry heavy traffic, these shall be specifically designed and the depth increased or reinforcing provided, or both, to the Engineer's satisfaction.

Concrete driveways shall generally not exceed a gradient of 20%, however in special circumstances gradients of up to 25% may be approved by the Engineer. Changes of gradient shall be in accordance with Franklin District Council Drawing R9.

Concrete driveways shall generally not exceed a gradient of 20%, however in special circumstances gradients of up to 25% may be approved by the Engineer. Changes of gradient shall be in accordance with Franklin District Council Standard Detail Drawings as appropriate.

Where the vehicle crossing is to serve a property on an Arterial Road, the vehicle crossing will be located in accordance with the Franklin District Council Standard Drawing R9 'Location of Vehicle Crossings on Arterial Road'.

Where the property is located at an intersection, the vehicle crossing shall be located on the minor rather than the major road.

Vehicle crossings shall, wherever possible, be located such that they are wholly located on the frontage of the property to which they are providing access.

Vehicle crossings shall be located clear of all existing street furniture, service covers, signs and catchpits. If any of these need to be relocated for the crossing, then this will be at the Constructor's cost.

Vehicle crossings shall not interfere with the profile of an existing footpath.

All crossings shall be surfaced with an appropriate waterproof surfacing (chip seal, asphalt or concrete) between the edge of seal (or lip of kerb) and the property boundary.

Number of Crossings Allowed for Each Property and Locations

(a) Each property (contained in one Certificate of Title) shall be permitted one vehicle crossing.
(b) Any property having a frontage in excess of 15 metres but less than 60 metres shall be permitted a second crossing.
(c) Any property with a street frontage exceeding 60 metres in length shall be permitted one further crossing (a maximum of three crossings for sites in excess of 60 metres).

Minimum Dimensions

(a) Residential crossings in kerbed situations in the urban areas of Pukekohe, Waiuku and Tuakau shall extend from the kerb line to the property boundary.
(b) Residential crossings in kerbed situations in all other areas shall be consistent with the local situation, but shall extend at least from the kerb line to the back of the footpath of for a distance of 1.4 metres, whichever is the greater.
(c) The standard crossing in residential situations shall be three metres wide at the property boundary and four metres wide at the kerb line or seal edge.

(d) A double crossing (two properties with individual boundary divided driveways sharing a common crossing) shall be five metres wide at the property boundary and six metres wide at the kerb line of sealed edge. Where such crossings are serving petrol stations, transport company depots, and other such land uses which require extraordinarily large vehicles, the boundary dimension may be increased to nine metres, only at Council's discretion.

Where the vehicle crossing is constructed with concrete, the surface should have a lightly broomed finish. A construction joint shall be installed at the property boundary.

3.3.19 Berms

The minimum width of berm shall be as given in Table 3.1.

On completion of all other works, the berms shall be spread with a consolidated depth of 100mm of quality topsoil. The topsoil shall be graded to kerb top and footpath edges, and may be finished 15 mm high to allow for settlement except on the low side of the footpath where the topsoil shall be finished flush to prevent water ponding.

After topsoiling the berms shall be sown with amenity type rye grass seed and fertilised.

3.3.20 Service Lanes, Parking Bays, Privateways, Accessways and Cycle Paths

Service Lanes
Service lanes shall have a kerb and channel on at least one side, a concrete edging strip flush with the surface may be used on the other side. Provision shall be made for the disposal of storm water. The pavement construction and surfacing shall be in accordance with 302.2.

Industrial Service Lanes
Industrial service lanes and private ways shall be subject to specific design.

Where an industrial service lane serves properties on one side only, the surface may have a single crossfall with kerb and channel on the lower side and a concrete edging strip flush with the surface on the high side.

Parking Bays
Parking bays shall be constructed to the same design standards as the roads of which they are a part.

Pedestrian Accessways
Pedestrian accessways shall be paved to their full width when the pedestrian accessway is less than 1.8m wide. When the pedestrian accessway is wider than 2.0m the width of paving shall be 1.4m.

Where storm water is likely to flow along the length of the pedestrian accessway, provision shall be made for the collection and disposal of storm water.
Both sides of a pedestrian accessway should be bounded by a fence to a standard not less than as shown on Franklin District Council Drawing P2.

Steep grades shall be avoided as far as practicable. Where grades exceed 1 in 6 or steps proposed the prior approval of the engineer is required.

Privateways

The minimum widths between boundaries shall be as in the District Plan and shall include a grassed strip on either side to provide for the construction of underground services.

Privateways are to be constructed in accordance with the details set out in Franklin District Council Drawing G1. Alternative construction details will be permitted at the discretion of the Engineer.

Pavement shall be constructed of 150mm thick concrete. The width shall be as laid down in Part 26 of the District Plan.

Adequate provision shall be made for the collection and disposal of storm water to a piped system.

Adequate turning area shall be provided on all privateways. Passing bays shall be provided where there is not a clear line of sight from one end to the other, in which case the passing bay shall be located at a point visible to either end. Gradients shall not exceed 1 in 5. Transverse slope shall be 3% and the minimum inside radius of curves shall be 6m.

Cycle and Pedestrian Linkage Paths

Paths for bicycle use shall be constructed to standards specified for footpaths. Storm water disposal, fencing, handrails, lighting shall be provided as appropriate to the specific situation. Refer to Franklin District Council Drawing P1 for accessway vehicle barrier details.

Linkage paths shall be aligned with the Franklin District Walking and Cycling Strategy and Reserves Acquisition and Development Plan.

The Developer should seek to provide attractive walking and cycling routes and surroundings taking into account public safety. They should be designed and developed to encourage people to use them and in a safe manner. The following design guidelines are recommended:

(a) Width 6m with splayed entry points to provide good sight lines for safety and crime prevention.
(b) Length generally less than 80m (2-3 properties deep).
(c) Grade less than 1:12 to encourage usage by cycles and wheelchairs.
(d) No steps.
(e) Maximise sight lines. Avoid blind corners or bends. Widen paths at intersection of linkages.
(f) Property boundary fence height and transparency conditions required on property titles as outline in Appendix 5 or Reserves Acquisition and Development Plan. This specifies that any fence located on or within 1.0 metres of the common boundary between Lot and Local Purpose/Recreation Reserve shall be limited to a 1.20 metre high close-boarded fence, although a higher fence of a transparent nature only, will be permitted with the written approval of the Engineer.
(g) Planting should maintain a degree of openness to achieve safety whilst providing an attractive setting for the route consistent with its location, function and degree of use.
(h) Landscape features such as stream edges should be retained.
(i) Areas for shelter, shade and resting should be considered.

(j) Lighting should be considered.
(k) Clear and coherent signage should be included.
(l) Linkages should be at least 2m wide to provide a dual purpose facility (in accordance with the Franklin District Walking and Cycling Strategy).
(m) Linkages and paths are to be constructed in accordance with the Footpath Construction Standard as specified in this Code.

Bus Bays

On roads that are likely to become future bus routes, bus bays shall be installed. These shall be as detailed on Franklin District Council Drawing R24. The recommendations of the Engineer shall be sought on the need for bus bays.

Utility Services within Urban Road Reserve

Services installed within the road land shall be confined to the locations indicated on Franklin District Council Drawing R2, or as specified in NZS 4404.

PART 4: DRAINAGE

4.1 SCOPE

This part of the code covers the provision of storm water drainage in urban subdivisional developments. This section describes and provides guidelines for the design of piped and open drainage systems and the connection of these to the public storm water system.

The overall objectives of the public storm water system, which are to be taken into account during the design process, are:

- To provide a system that safely manages, treats and disposes of storm water runoff within acceptable risk limits.
- To provide a primary system with capacity to convey runoff from 20% AEP storms and a secondary system with capacity to convey runoff from 1% AEP storms.
- To encourage soakage and thereby minimise the flow entering the piped system and overland flow paths.
- To treat runoff to minimise adverse environmental effects on downstream properties and receiving waters.
- To provide clearly defined overland flow paths that are an integral part of the storm water network.

The definition of a public storm water system is as follows:

1. There is no public storm water system in the Rural Zone.
2. The public storm water system in the Rural Residential Zone is identical to that of the Residential Zone but does not include the following:
   - Open drains in the road reserve
   - All natural watercourses.
3. The public storm water system in the Residential, Industrial, Industrial Services and Business Zones includes the following systems:
   - Piped drains of 150mm diameter or more, and/or servicing two or more lots.
   - Natural water courses that are maintained by Council.
   - Natural and man-made ponds that are maintained by Council.
   - Open drains greater than 300mm deep and/or servicing two or more lots.
4. The public storm water system in the Residential, Industrial, Industrial Services and Business Zones does not include:
   - Roadside kerb
   - Catchpits in the road reserve
   - Pipes less than 150mm diameter and/or servicing only one lot
   - Open drains less than 300mm deep and/or servicing only one lot.
5. Where the land use in the Residential Zone has not been developed for residential purposes, and is used for rural type land use activities such as market gardening and/or grazing, open drain passing through the lot or in the road reserve adjacent to that lot is not part of the public storm water system.
6. Designated overland flow paths are an integral part of the storm water system and managed by Council. Ownership and maintenance rests with the landowner.

Where subdivision consent is sought in zones other than Rural, the public storm water system will always be considered to be available. The applicant must provide an extension and connection to the public storm water system.

Council may exercise its discretion over these requirements on a case by case basis for 'infill' type urban development. It will be guided by the District Plan in the exercise of this discretion.

4.2 GENERAL

4.2.1 General Requirements for Public Storm Water

Storm water management shall comply with the Franklin District Plan. Unless approved otherwise, all lots shall be provided with a connection to a public storm water drainage system. The storm water system shall provide for the collection and control of all storm water within the land being developed together with drainage from the entire catchment upstream of the proposed system.

Where settlement is expected to occur, all service pipes installed within or under earthfilling shall be designed and constructed to ensure adequate capacity, strength and water-tightness to withstand the loads due to settlement and to prevent leakage into the fill.

In the absence of a suitable system, storm water disposal may be approved by way of total on site soakage. The soakage system shall be capable of containing a 5% AEP 10 minute storm without overflowing and completely soak away within 24 hours of the end of the storm.

Storm water pipelines which collect water from public roads or serve two or more properties may, at Council's discretion and on satisfactory completion, be taken over by the Council as part of the public system.

Public drains will be required to terminate with a manhole and have a minimum diameter of 150mm; except that in cases where the 150mm pipeline is less than 25m long and services no more than two lots, a terminal manhole is not required.

All lots in rural areas that do not have direct physical access to existing natural watercourses shall provide a drainage system approved by the Engineer.

In general, the design of a storm water system shall be guided by Low Impact Design (LID) principles as described in the Auckland Regional Council's TP124 "Low Impact Design Manual for the Auckland Region" (2000).

4.2.2 Storm Water Quantity

As a general principle, appropriate measures shall be taken to ensure that the quantity of storm water run-off after development of an area is not greater than it was prior to development.

In some cases, storm water run-off may need to be reduced, such as when required by a resource consent or catchment management plan, or to reduce flooding and/or erosion.

4.2.3 Storm Water Quality

Storm water treatment by ponds or other means approved by the Engineer, will be required where there is high environmental risk and/or where a total impervious area of more than 1,000m^2 is developed.

Storm water quality devices shall be designed in accordance with the Auckland Regional Council's TP10 "Design Guideline Manual Stormwater Treatment Devices" (2003).

Landscaping aspects of the design of storm water ponds shall comply with Section 7.16, "Landscape Engineering Stormwater Services" of this Code. Access for maintenance shall be provided to all storm water quantity and quality devices. Accessways shall be a minimum of 3m wide, with gradients suitable for the passage of trucks and machinery. Areas to be mowed shall not be steeper than 1:5.

4.2.4 Water Permits

Water permits from the Regional Council are likely to be required for the following work:

- The diversion of natural water during construction work.
- The control and discharge of silt laden runoff water.
- The permanent diversion of natural water as a consequence of the development.
- Works within a watercourse.
- The point discharge of storm water to a stream, lake, sea or other water body.

For the diversion of natural water during construction, the necessary water permit shall be applied for by the developer and exercised in the name of the developer, and shall arrange for the permit to be transferred to the Council on acceptance as complete.

Any water permit in respect of the permanent diversion of natural water shall be transferred to the Council once the development has been accepted as complete by the Council. The developer shall make the initial application in the name of the developer.

Any water permit covering the discharge of storm water shall be transferred to the Council, when the system has been accepted as completed by Council. The developer shall make the initial application in the name of the developer.

A general authorisation may have been issued by the Regional Council to cover permanent diversions of natural water and discharges of storm water within certain limits. The advice of the Regional Council should be sought on all water permit matters, at the earliest stage of planning the development.
The Council should also be consulted as it may hold a comprehensive water permit for the whole catchment, in which case a separate permit will not be required from the Regional Council.

4.2.5 Design Flow Requirements

The land drainage system shall be capable of serving the entire catchment upstream of the development allowing for the upstream catchment to be fully developed as designated on the current District Plan and the District Growth Strategy. Due regard shall be made of the effect it may have on downstream waterways and adjoining areas.

The design shall also comply with the District Growth Strategy and any approved structure plans, integrated catchment management plans (ICMP), catchment management plans (CMP) and storm water network discharge consents.

The design may incorporate aspects of the Auckland Regional Council's Low Impact Design Guidelines.

The design calculations shall be in accordance with the New Zealand Building Code Clause E1 Procedure for Hydrological Design of Urban Storm Water Systems, or other accepted design procedure.

Time of Concentration
Initial time of entry (te) shall be 10 minutes. Network flow time (tf) shall be time of flow in pipes or channel to design point. Initial time of concentration (tc) for design purposes shall be 10 minutes (0.037 mm/sec).

Runoff Coefficients
The following composite coefficients can be used:

Road reserves	C	=	0.85
R.O.W./Access lots	C	=	0.95
Residential lots	C	=	0.85
Industrial/Commercial lots	C	=	0.95
Reserves	C	=	0.30

The primary design flow shall generally be based on the following minimum storm frequencies:

- Residential Areas 20% AEP
- Commercial and Industrial Areas 20% AEP

The Engineer may require longer design return periods where a development is in the lower part of a catchment, where no adequate overland flow path exists, or where a greater degree of protection against flooding is required.

Where detention storage is being considered, calculations shall take account of runoff volumes from appropriate design storms. The designer shall provide for secondary flow paths for 1% AEP (Annual Exceedance Probability) flows.

Auckland Regional Council Technical Publication No. 108, "Guidelines for the Estimation of Flood Flows in the Auckland Region" shall be used for calculating peak flows in rural catchments. Other methods of calculation of peak flows may be approved by the Engineer.

Where open watercourses are to form part of the land drainage system this shall be determined at scheme plan approval stage, and the developer shall submit sufficient engineering design to enable Council to evaluate the proposals.

Each lot on the development shall be served by a storm water connection located within the main body of the lot.

Each storm water connection shall be capable of serving the whole of the building area of the lot by gravity from a ground level discharge, except where this requirement seems unreasonable and it can be shown that the proposed connection is adequate for a predetermined building location.

The storm water connection will be to a piped public storm water system or where the ground conditions are suitable and subject to the prior approval of the Engineer, a system that partially disposes of storm water by soakage into the ground may be permitted.

Where further development, upstream of the one under consideration, is provided for in the District or Regional Plans, the Engineer will require storm water pipelines to be constructed to the upper limits of the development.

Where the Council has a Catchment Management Plan prepared for the catchment, whether it has been formally issued by the Regional Council or not, the recommendations contained within the Management Plan shall be followed. This includes the recommended rainfall intensity, runoff coefficients and discharge flows.

Where no Catchment Management Plan exists the Council's depth-duration-frequency charts shall be used.

4.2.6 Open Watercourses

Major watercourses should preferably be retained, and be located together with secondary 1% overload flow paths in public reserves.

The extent of stream improvement work shall be agreed with the Engineer in order to achieve a satisfactory compromise between the retention of the natural topography and vegetation, maintenance, hydraulic and safety considerations, and the downstream effects of the work.

Riparian margins shall be planted with suitable plant species, subject to the prior approval of Council's Open Spaces Manager.

Access to watercourses for maintenance shall be provided for by incorporating esplanade reserves or easements in the layout of the development. Accessways shall be a minimum of 3m wide, with gradients suitable for the passage of trucks and machinery.

4.2.7 The Hydraulic Design of Pipelines

The hydraulic design of storm water pipelines shall be based on HR Wallingford's "Tables for Hydraulic Design of Pipes, Sewers, and Channels" or on graphs or other representation of the same or similar accepted method.

The pipe roughness co-efficient k_s used in the hydraulic design shall be nominated by, or agreed upon, with the Engineer on the basis of commonly adopted modern engineering design practice, and will take into account the increased roughness resulting from age. The co-efficient k_s shall not be less than 0.6mm. As a guide k_s should be taken as 1.5 for pipes up to 750mm diameter and 0.6 for pipes greater than 750mm diameter.

The hydraulic gradient shall be the pipe gradient at design flow (20% AEP), with no surcharging at manholes.

The design shall provide that:

(c) No storm water sewer other than connections is less than 150mm internal diameter.

(d) Road catchpit outlets shall be not less than 225mm internal diameter; or exceed 25m in length.

(e) Catchpit leads shall not be connected to other catchpits.

A minimum velocity of 0.7m/s at 50% of design flow is desirable but lower velocities are at times unavoidable and may be permitted by the Engineer.

Special measures to dissipate energy may be required at connections and outfall structures.

Pipe entry conditions are to be considered at all pipe entries and entry and exit losses calculated.

4.2.8 Location of Pipelines

Storm water drainage pipelines shall generally be sited clear of buildings and fences, 0.5m to 1.0m from boundaries in front, side or rear yard areas of development sites or in reserve areas.

In cases where pipelines are laid within the building area on lots, the Council will require Consent Notice pursuant to RMA Section 221 restricting the erection of buildings over or within 1m of the pipeline, requiring specific design of building foundations located within a horizontal distance of the pipeline equal to the invert depth of the pipeline. Pipelines greater than 450mm diameter shall generally be located within overland flow paths.

If storm water pipelines are required to be laid within the road reserve they should be laid within the road berms wherever possible.

Road crossings to be at 90° wherever possible and in no case less than 45°.

Crossing of other services shall be at not less than 45°.

Manhole lids shall be clear of all boundary lines.

4.2.9 Pipe Materials

The following pipes may be used for storm water drainage work, provided they comply with the relevant New Zealand Standards:

(a) Concrete pipes to AS/NZS 4508.

(b) PVC-U pipes to AS/NZS 1477.

(c) Polyethylene to AS/NZS 4130 .

Other pipes may be permitted subject to the specific approval of the Engineer.

4.2.10 Joints

All storm water pipes shall have approved flexible sealed joints.

4.2.11 Structural Strength of Pipes and Bedding

The pipe bedding shall be selected to meet the requirements of the class of pipe to be used and the design loading conditions.

The type of bedding and class of pipes adopted shall be in accordance with the pipe laying tables and bedding diagrams in NZS 3725.

Concrete pipes shall be bedded and haunched with fine granular material in compliance with AS/NZS 3725.

The requirements for PVC shall be set out as in NZS 7643.

Where a pipeline is to be constructed through soft ground in unsuitable foundations such material shall be removed and replaced with other approved material or alternatively, other methods of construction shall be carried out to the approval of the Engineer to provide an adequate foundation for the pipeline. Specific design of bedding and backfill is required where a pipeline is to be constructed through peat.

Where the gradient of the pipeline exceeds 10%, or ground conditions, or both, in the opinion of the Engineer, merit the need, sufficient cement shall be added to the granular bedding material to provide a weak concrete with a strength of 7 MPa. The depth of bedding shall be as described in AS/NZS 3725 and shall be broken at pipe joints to maintain flexibility.

Where the pipeline gradients are equal to or greater than 20%, anti-scour blocks shall be constructed of ordinary grade 20MPa cast in situ concrete blocks as shown on Franklin District Council Drawing SW16. Such blocks shall be placed at a maximum of 4.0m centres.

Where the pipeline gradients are equal to or greater than 33% the anti-scour blocks shall extend 150mm over the top of the pipeline.

4.2.12 Pipeline Construction

The construction of pipelines shall be carried out in accordance with the requirements of NZS 6743 and AS/NZS 3725.

All testing required under these clauses shall be a charge on the developer.

4.2.13 Minimum Cover Over Pipes

All pipelines shall be specifically designed to support the likely loadings in relation to the minimum cover to be provided in accordance with the terms of AS/NZS 3725 and/or AS/NZS 2566. The cover shall not be less than 600mm except as otherwise required by the clauses below.

The minimum cover over pipes in private property shall be 600mm. Where due to the topography this cover cannot be provided, approved protection shall be provided for the pipeline.

Where reticulation lines are located in the front yard of lots the invert level shall be deep enough so as not to interfere with future services and any future driveway construction.

The minimum cover under road carriageways shall be 900mm. Where this cannot be achieved, suitable protection shall be provided for the pipeline to the satisfaction of the Engineer.

4.2.14 Manholes

Manholes shall normally be provided at each change of direction or gradient, and at each branching line and at a spacing of not more than 100m. The Engineer may also approve cast in situ manholes. The Engineer may approve greater manhole spacing where the pipe diameter is 1m or larger.

Standard manholes are to be circular with a minimum internal diameter of 1,050 mm (refer Franklin District Council Drawing SW11). Precast reinforced concrete manholes shall generally be used. The Engineer may also approve cast in situ manholes. They shall have holes cast in the side for step irons.

On pipelines 600mm or greater in diameter, or on pipelines greater than 450mm diameter where the line changes direction at the manhole, manholes are required to be larger than 1,050mm and shall be specifically designed.

The Engineer may approve of the use of mini-manholes where the storm water line does not exceed 250mm in diameter, the depth to invert does not exceed 1.0m, the upstream grade does not exceed 10% and not more than two lines or connections enter the manhole (i.e. three including the discharge).

Mini-manholes shall be 675mm diameter pre-cast reinforced concrete manholes or reinforced concrete pipe, fitted with a standard cast iron frame and lid. The inverts shall be fully benched as for standard manholes.

All wall joints in manholes and the joint between the wall and concrete lid shall be sealed with Bostik Titan Bond or an equivalent sealant approved by the Engineer. The application of sealant shall be in conformity with the manufacturer's directions to provide a watertight and root-proof structure to be satisfaction of the Engineer.

For deep special manholes it may be more economical to construct the lower portion to the required larger dimensions with the standard 1,050mm diameter riser supported on a reinforced concrete slab on the lower large diameter chamber.

The use of fixed steel ladders instead of separate step irons is acceptable. Recessed steps without rungs may be permitted below pipe benching level, provided the lowest rung can be easily reached by a person standing at invert level.

On storm water pipe lines equal to or greater than 1m diameter curvature on the pipeline may be permitted providing that joint deflections are within the limits of the manufacturer's recommendations. Any pipeline curvature is subject to specific approval by the Engineer.

Manholes on straight sections of storm water lines of 1.2m diameter and above may be constructed using offset intakes which may also be used in conjunction with segmented bends, formed using epoxy mortar adhesive. Offset intakes and glued segmental bends shall be specifically designed and shall be subject to the specific approval of the Engineer.

Where there is a change of direction at a manhole, the channel between inlet and outlet pipes, whether formed in the benching or employing half round pipes, shall follow a smooth curve of constant radius. The following table shall be used as a guide.

Radius of Curvature of Manhole Channels

Manhole diameter	1050	1200	1350	1500	1650	1800	2050	2300
Deflection*								
10	6000	6860	7720	8570	9430	10290	11720	13140
20	2980	3400	3830	4250	4680	5100	5810	6520
30	1960	2240	2520	2800	3080	3360	3830	4290
40	1440	1650	1850	2060	2270	2470	2820	3160
45	1270	1450	1630	1810	1990	2170	2470	2780
50	1130	1290	1450	1610	1770	1930	2200	2470
60	910	1040	1170	1300	1430	1560	1780	1990
70	750	860	960	1070	1180	1290	1460	1640
80	630	720	800	890	980	1070	1220	1370
90	525	600	675	750	825	900	1025	1150

* Change of direction between incoming and outgoing pipe, in degrees.

Note: Given radius (mm) is to pipe/channel centrelines.

Hydraulic flow in manholes shall be designed such that in addition to the normal pipeline gradient all manholes shall have a minimum drop of 20 + 5mm per 10^{o} of the angle of change of flow direction within the manhole. Manholes on pipelines greater than 1m diameter shall have the drop through the manhole designed to compensate for the energy lost due to the flow through the manhole at the design radius.

Where a change in pipe diameter occurs soffits shall be matched unless approved by the Engineer.

Catchpit Connections

Catchpits should normally be connected to a manhole on the storm water drainage system , except that if the storm water drain is of greater diameter than 1.2m and a manhole is not conveniently located, the catchpit lead may be saddled direct to that drain. A direct connection of the catchpit lead to a storm water drain with a diameter between 600mm and 1.2m will only be permitted in exceptional circumstances, and at the Engineer's discretion. A range of typical catchpit designs are shown in Franklin District Council Drawings R17, R18, R19 and SW13.

Catchpit leads shall be designed to cater for the 20% AEP flow entering the catchpit, but shall not be less than 225mm in diameter except with the approval of the Engineer.

Catchpits leads shall not exceed 25m in length.

Branch lines 300mm diameter and smaller may be saddled on to pipelines 1.2m diameter or larger, providing a manhole is supplied on the branching line within 25m of the main line.

Step Irons, Steps and Ladders

All manholes more than 1.2m deep shall be provided with approved galvanised steel step irons, steps or ladders in order to give reasonable access. Step irons shall be of the 'dropper' or 'safety' type such that a foot will not slide off them, and shall be spaced as shown on Franklin District Council Drawing SS3. All fittings used shall be hot-dip galvanised after fabrication.

Step irons and ladders should generally be located above the outlet branch of the manhole provided the outlet does not exceed 400mm diameter. Where the outlet exceeds 400mm diameter the step irons and ladders shall be located midway between the inlet and outlet.

Manhole Covers and Frames

Manhole covers and frames shall be of a design approved by the Engineer, manufactured from a strong and durable material. Typical examples of heavy duty, light duty, covers supplied in high quality grey or ductile iron, coated with bituminous protective compound are illustrated in Franklin District Council Drawings SS1 and SS3.

The throats and lids of all manholes shall be painted blue.

Drop Connections
Drop connections are not required on storm water manholes. The design of the system should, however, avoid having open cascades in manholes for pipes greater than 300mm in diameter. Manhole steps shall be placed clear of any cascade.

Manholes in Soft Ground
Where a manhole is to be constructed in soft ground, the area under the manhole shall be undercut down to firm ground and back-filled with suitable hardfill to provide an adequate foundation for the manhole base. Specific design of foundations is required where a manhole is to be constructed in peat.

4.2.15 Service Connections

The connection provided for each residential lot shall be of a type capable of taking the spigot end of an approved drainpipe of 100mm internal diameter unless the Engineer requires a larger size connection to be provided. The connection shall be located within the body of the lot and shall be capable of serving the whole of the site by gravity from a ground level discharge.

Where a storm water line is outside the body of the lot to be served, a 100mm diameter connection shall be extended to terminate 1m inside the lot. Where at all possible the connection line shall commence from a manhole on the main line. The connection line shall not cross more than one lot boundary. If the connection extends more than 3m outside of the lot, it shall be protected by an easement.

If the above conditions cannot be met, then the service shall be a 150mm diameter line branching from a manhole on the main line. An extended 150mm diameter line may be terminated without a manhole provided it is not more than 25m long (or possibly longer at the discretion of the Engineer) and also that it does not serve more than two houses, otherwise a manhole shall be provided on the upstream end.

Connections for commercial and industrial lots shall be designed to take the full design flow from the area served by the connection.

Each connection shall be marked by a 50mm x 50mm timber stake (treated pine or better) extending to 300mm above ground level with the top painted blue. This marker post shall be placed alongside a timber marker installed at the time of pipe laying and extending from the connection to 150mm below finished ground level. The lower end of the marker post shall be adjacent to, but not touching, the connection. Connections shall be accurately indicated on ‘As-built’ plans.

All connections, whether to reticulation lines or to manholes, shall be sealed either by a factory sealed stopper or a plug fixed with a rubber ring and held with stainless steel wire.

Ramped Risers
Unless required otherwise by the Engineer, where a connection is deeper than 1.2m below ground level, a ramped riser shall be constructed to bring the connection to within 1.2m of ground level.

A typical example of a ramped riser is shown on Franklin District Council Drawing SW14.

Where an extended connection is to be taken from a storm water pipeline to the boundary of another lot, a ramped riser need not be used, and the extended connection may be sloped up at a continuous gradient from the pipeline, to terminate just inside the lot to be served at sufficient depth to drain the building site.

Connections to Deep Lines
Where an existing or proposed storm water pipeline is more than 5m deep to the top of the pipe, connections shall not be made directly to it, but a new, shallower branch pipeline shall be laid from a manhole on the deep storm water line and connections provided to the lots to be served.

4.2.16 Inlet and Outlet Structures

Approved type structures shall be constructed at the inlets and outlets of pipelines. An acceptable type of concrete structure is shown on Franklin District Council Drawing SW12. Alternative designs will be permitted subject to the approval of the Engineer. Provision must be made for energy dissipation unless it is demonstrated by the developer that outlet velocities and soil conditions are such as to make this unnecessary. The design shall ensure non-scouring velocities at the point of discharge.

4.2.17 Testing

The pressure testing of storm water sewers or branch drains will not normally be required. Acceptance will be on the basis of the quality of materials and the standard and accuracy of construction. However, testing may be required if the Engineer has any doubt over the soundness of pipeline construction or if infiltration of groundwater is observed.

4.2.18 CCTV Inspection

Before the Council accepts any storm water pipe system as complete, the developer shall arrange for a CCTV inspection to be carried out and the video record passed to the Engineer. Unless the Engineer chooses to select specific pipe sections to be CCTV inspected, the following sample sizes shall be observed:

No. Pipe Sections in System (manhole to manhole or CP)	No. Pipe Sections to be CCTV Inspected (minimum)
1 – 3	1
4 – 8	2
9 – 15	3
16 – 30	4
>30	10%

The Engineer may require further CCTV inspection and/or order appropriate remedial action if not satisfied with the quality of the works.

4.2.19 Overland (Secondary) Flow Paths

Overland flow paths shall be provided to cater for the flow arising from 1% AEP storm.

Overland flow paths shall where practicable be located in roads and public open spaces.

Where it is unavoidable for them to be located in private property, the following is preferred:

- They should be located on drives and right of ways.
- They shall be sited clear of building sites.
- They should not straddle boundaries.
- They should not have sharp changes of direction.
- The flow shall not exceed 500 l/s.
- The flow depth shall not exceed 0.4m, except that in any accessway, it shall not exceed 0.2m.

Design drawings of overland flow paths shall include:

- Locality map showing contributing catchment.
- Plan, longitudinal section and cross sections.
- Structures or other means of minimising the impact on the downstream receiving environment.
- Provision for access for maintenance.

Where overland flow paths cross private property, the Council will require a consent notice pursuant to RMA Section 221 for flows of between 50 and 100 l/s. Overland flow paths on private property for flows in excess of 100 l/s shall be the subject of easements in favour of the Council. These conditions may be waived or altered at the discretion of the Engineer.

The terms of such consent notices and easements shall prohibit the erection of buildings, fences etc or the storage of materials or planting that will impede water flow in the overland flow path. Owners shall be made aware of their responsibilities to keep overland flow paths clear of obstructions.

4.2.20 Counterfort and Bored Subsoil Drains

Counterfort and bored subsoil drains shall be specifically designed by a suitably qualified geotechnical engineer. Subsoil drains that are installed for stability reasons shall be constructed in such a manner as to provide satisfactory access for future maintenance purposes and CCTV inspection. These drains shall be connected to, and form, an integral part of the reticulated public system. They must be terminated at the upstream end by a marked flushing device finished at ground level.

A manhole must be installed at each change of direction.

Subsoil drains must be accurately surveyed and shown on the As-built plans submitted to Council, a CCTV inspection must be carried out on all subsoil drains before being handed over to Council.

4.2.21 Acceptance and As-Builts

Prior to acceptance of the completed land drainage system, the developer's representative shall have provided Council with 'As-built' drawings of the works including any overland flow paths and open channel systems (refer Appendix D).

Table 4.1 List of Storm Water Catchment Management Plans September 2009

Management Plan	Description	NDC Consent/ Expiry	Comments
Pukekohe South CMP	Covers existing urban zonings excluding DGS.	31 December 2041.	CMP approved and discharge consents issued.
Pukekohe North CMP	Covers existing urban zonings excluding DGS.		CMP approved and discharge consents issued.
Patumahoe ICMP	Covers existing urban zonings excluding DGS.	31 December 2041.	ICMP approved and discharge consents issued.
Pokeno CMP	Includes proposed development areas under Plan Change 24.	14 November Current 2028	CMP approved, discharge consents granted for developed area only.
Tuakau CMP	Includes proposed development areas under Plan Change 22 and DGS.	14 November Current 2028	CMP approved, discharge consents granted for developed area only.
Waiuku South CMP (EW area)	Covers existing urban zonings excluding DGS.	14 November Current 2028	CMP approved, discharge consents granted for developed area only.
Waiuku North CMP (ARC area)	Includes proposed development area, DGS for total Waiuku catchment.		Updated, ready for public notification by ARC.
Glenbrook Beach CMP	Covers existing urban zonings including designated growth area.		Work in progress (s.92). To be upgraded to ICMP.

Management Plan	Description	NDC Consent/ Expiry	Comments
Clarks and Waiau Beach	Covers existing urban zonings excluding DGS.		Work in progress (s.92). To be upgraded to ICMP, and to include DGS.
Kingseat (includes Te Hihi)	Storm Water Management Plan for Kingseat plan change area.		Work in progress, to produce full ICMP for catchment.
Awhitu Peninsula	Existing outfalls identified.		Work in progress (s.92). To be upgraded to ICMP.

PART 5: WASTE WATER

5.1 SCOPE

This part of the code provides Franklin District Council's requirements for sanitary sewage/waste water to be designed and constructed in subdivisional developments within the District.

5.2 GENERAL

Unless otherwise approved, all lots shall be provided with a connection to a sanitary drainage system.

The sanitary drainage system shall be designed to serve the whole of the natural upstream catchment area unless otherwise approved by the Engineer. Where required by reason of sound engineering design practice the system shall be designed and built to include pumped flow to and from adjacent areas. The flow from all portions of the upper catchment within the urban boundary (including future boundaries shown in the District Growth Strategy) shall be calculated assuming complete urbanisation except for those areas permanently set aside for recreation reserves.

The minimum diameter for public gravity sewer lines is 150mm.

All sewer lines of 150mm diameter or larger and service two or more lots that are laid to this standard will be taken over by the Council as part of the public system on satisfactory completion.

Note: Specific design is required for sewer lines that are to be laid in or under earthfill to ensure adequate capacity, strength and water-tightness, to withstand the loads due to settlement and to prevent leakage into the fill.

5.2.1 Calculation of Flows

Domestic Flows
Domestic sewage flows can be calculated on the basis of an average dry weather flow of 230 litres per day per person, with the population figures based on the district planning scheme forecast. A minimum peaking factor of 5 is required.

Industrial Domestic Flow and Trade Wastes
Where the industrial, domestic waste and trade waste flows from a particular industry are known, these shall be used as the basis for the sewer design. When the above information is not available, the following may be used as a design basis:

Industry type (water usage)	Minimum design flow (litres/second/hectare)
Light	0.4
Medium	0.7
Heavy	1.3

The above design flows include both normal sanitary sewage and trade wastes.

Unless the long term future occupancy of the land is known with certainty, a minimum design flow of 0.6 litres/second/hectare shall be adopted.

The design of sewage disposal systems for 'wet' industries (very heavy water uses) is to be based on the specific requirements for that industry and with the specific approval of the Engineer and the Council's Trade Waste Officer.

5.2.2 The Hydraulic Design of Pipelines

The hydraulic design of sanitary sewer pipelines shall be based on Hydraulics Research Paper No. 4, *Tables for the hydraulic design of storm water drains, sewers, and pipelines*, or on graphs or other representation of the same method, or on Mannings formula.

The pipe roughness co-efficients ks used in the design shall be those nominated by or agreed upon with the Engineer on the basis of commonly adopted modern engineering design practice. For preliminary design purposes it is recommended that ks be assumed 1.5mm as an overall coefficient allowing for joints and so on.

The minimum flow velocity in 150mm diameter pipes when full shall be not less than 0.75 metres/second (minimum gradient 0.72%). The upper ends of the catchment are to have minimum pipeline gradients of 1% unless it can be shown that a velocity of 0.75 metres/second is achieved at least twice per day.

Gradients flatter than 0.72% for 150mm diameter pipes may be permitted in special cases where otherwise pumping would be required, but will in each case be subject to special approval of the Engineer. In any event, gradients must be such that a self-cleaning velocity is achieved at least once per day.

A 150mm diameter pipeline at a gradient of 0.72% has 14 litre/second capacity and will be adequate to serve 300 households.

In practical terms, unless the catchment exceeds 300 houses, dwelling units, or their equivalent, and where no flow from a pumping station is involved, 150mm diameter pipes laid within the above limits will be adequate without specific hydraulic design.

In flat or rolling country every effort should be made in the design to have the sewers as steep as reasonably possible.

5.2.3 Location of Pipelines

Sanitary drainage shall generally be sited clear of buildings and fences, 0.5m to 1.0m inside boundaries in front, side or rear yard areas of building sites or in reserve areas.

Pipelines should be of the correct depth to provide a gravity connection for all sanitary services on a lot once the lot has been fully developed. This is particularly important on sloping lots where cutting or filling of the building site may take place sometime after the pipeline is laid.

In cases where pipelines are laid within the building area on lots, the Council will require consent notices pursuant to RMA Section 221 on the lots affected prohibiting the erection of buildings over or within 1m of the pipeline, and requiring specific design of building foundations located within a horizontal distance of the pipeline equal to the invert depth of the pipeline.

Manhole lids shall be clear of all boundary lines and structures.

If sanitary drainage pipelines are required to be laid within the road reserve, they should be laid within the road berms wherever possible. Road crossings shall normally be at right angles except with the approval of the Engineer and have at least one manhole within 2m of road reserve boundary. Where sanitary drainage lines cross other utility services, they must do so at a minimum angle of 45°.

5.2.4 Pipe Types and Joints

Types

The following types may be used for sanitary drainage provided they comply with the relevant New Zealand or Australian Standards as follows:

- Precast Concrete to AS/NZS 4058, manufactured with sulphate resistant cement.
- Steel to NZS 4442, concrete lined (using sulphate resistant cement), external coating:
  - Polyken Synergy or approved equivalent for buried application.
  - Zinc-rich paint coat followed by epoxy paint coat/or above ground application.
- PVC-M to AS/NZS 4765, SN16.
- PVC-U to AS/NZS 1477, SN16.
- PVC-O to AS/NZS 4441, SN16.
- Polyethylene to AS/NZS 4130

In potentially unstable ground or where special protection is required, the sewer pipelines should be specifically designed.
Steel pipes shall be used where additional strength is required, however, the construction of pipelines on steep gradients, at shallow depths or under carriageways are not necessarily criteria requiring the use of steel pipes.

Steel pipes shall be to the NZS 4442 and shall have a spun concrete lining not less than 6 mm thick, and an approved external protective coating. Care shall be taken to ensure that the concrete lining remains undamaged during installation.

PVC pipes with spigot and socket rubber ring (Z joint) joints may be used for sanitary drainage. Pipe laying shall comply with AS/NZS 2032 and AS/NZS 2566 Part 2. Solvent cement joints shall not be used.

PVC pipe shall be laid with a sliding joint to the manhole as shown on the Franklin District Council Drawing SS2.

The trench width at the top of the pipe must be kept to minimum and particular care must be taken that the pipe is correctly aligned and not disturbed by the backfilling operation.

Joints

All pipes shall have flexible joints of an approved type and complying with the relevant New Zealand or Australian Standard. Gibault joints shall be of approved manufacture, and shall have galvanised steel bolts. All gibault joints shall be wrapped or taped with rust preventative materials.

Other methods of flexible jointing shall be to the specific approval of the Engineer.

Joints shall be provided adjacent to manholes as shown on the Franklin District Council Drawing SS1 unless otherwise approved by the Engineer.

PVC joints shall be spigot and socket rubber ring joints to AS/NZS 1260. Solvent cement joints are not permitted.

Mortar joints will not be permitted.

Repairs to existing lines shall use Type B couplers to AS/NZS4327.

5.2.5 Structural Strength of Pipes and Bedding

Pipe bedding will be designed to meet the requirements of the class of pipe used under the design loading conditions.

The type of bedding and class of concrete pipe shall be in accordance with the pipe laying tables and bedding diagrams in NZS 3725.

The requirements of PVC pipes shall be as set out in NZS 7643.

PVC pipes shall be bedded in, and covered by a minimum 100 mm of AP7 scoria or metal. Coarse sand may be used provided the pipe gradient is less than 5%.

Under normal ground conditions, sewer pipelines shall be bedded with fine granular material as in AS/NZS 2566.

Where the gradient of the sewer pipeline is steeper than 7.5%, or where, in the opinion of the Engineer, conditions merit the need, sufficient cement shall be added to the granular bedding material to provide a weak concrete with a strength of 7MPa.

Pipeline gradients greater than 16.7% shall not be used except with the approval of the Engineer, and then subject to the provision of anti-scour blocks located at 4m intervals constructed in accordance with the Franklin District Council Drawing SS5.

Pipeline gradients steeper than 33% for any length greater than 3m will only be permitted with the specific approval of the Engineer.

Where a pipeline is constructed through soft ground, the area under the pipes shall be undercut down to solid ground and backfilled with suitable material to provide adequate foundations for the pipe bedding.

Alternatively, such other means of providing a satisfactory foundation and support for the pipeline as may be approved by the Engineer, shall be adopted.

The construction of the pipelines shall be carried out in accordance with the requirements of AS/NZS 2566.

5.2.6 Minimum Cover Over Pipes

Private Property, Reserves and Road Berms
The minimum cover over pipes in private property, reserves and road berms shall be 600mm. Where due to the topography, this cover cannot be provided, approved protection shall be provided for the pipeline. Where the reticulation lines are located in the front yard of lots, the invert level shall be deep enough so as not to interfere with any future driveway construction.

Under Carriageways
Reinforced pipes shall be specifically designed to support the pavement design loading appropriate to the minimum cover to be provided. Cover less than 900mm shall require the specific approval of the Engineer.

5.2.7 Manholes

General
Manholes shall normally be provided at each change of direction or gradient, at each change of pipeline diameter, and at each branching sewer, and at a spacing of not more than 100m.

All incoming sewer lines shall connect at a minimum angle of 90^{o} to the manhole outlet. Manholes shall be located away from areas likely to pond water and away from potential building sites.

Standard Manholes
These are to be circular precast manholes with a minimum internal diameter of 1,050mm (refer Franklin District Council Drawing SS1).

Cast in situ manholes may not be used, except with the specific approval of the Engineer.

Precast manholes shall consist of 1,050m or larger diameter reinforced concrete pipes. They shall have holes in the side for step irons.

Manholes up to 2.4m deep shall be constructed using a single riser with a pre-cast flange base. Manholes in excess of 2.4m deep shall be constructed using a 2.4m long riser and then completed to final ground level using no more than a single subsequent riser for manholes up to 4.8m deep. Three risers are allowable for manholes more than 4.8m deep.

All wall joints in pre-cast sanitary sewer manholes and the joint between the wall and concrete lid shall be sealed with Bostik Titan Bond, or approved equivalent. The mixing

and application shall be in conformity with the manufacturer's directions to provide a watertight and root proof structure to the satisfaction of the Engineer.

Deep Manholes
Where manholes are more than 5m deep they shall be specifically designed and shall incorporate an intermediate landing platform or grille in order to prevent a free-fall of more than 5m (refer Franklin District Council Drawing SS3).

Shallow Manholes
Where the depth to invert of the sanitary sewer line does not exceed 900mm, the upstream grade does not exceed 10% and not more than two lines or connections enter the manhole (i.e. three including the discharge) the Engineer may approve of the use mini-manholes.

Mini-manholes shall consist of a single length of centrifugally spun 675mm diameter reinforced concrete pipe, fitted with a standard cast iron frame and lid. The invert shall be fully benched as for standard manholes (refer Franklin District Council Drawing SS2).

Step Irons and Steps
All manholes other than shallow manholes shall be provided with approved step irons or steps in order to give reasonable access. These shall be of the 'dropper' or 'safety' type such that a foot will not slide sideways off them, and shall be spaced as shown on Franklin District Council Drawing SS1. Step irons shall generally be located above the outlet branch of the manhole.

Manhole Covers and Frames
Manhole covers and frames shall be of a design approved by the Engineer, manufactured from a strong and durable material. Typical examples of heavy duty and light duty cover supplied in high quality grey iron, coated with a bituminous protective compound are illustrated in Franklin District Council Drawing SS3. The throats and lids of all manholes shall be painted red.

Heavy duty covers are required in commercial/industrial areas, and in carriageways and driveways in residential areas.

Drop Connections
Internal drop connections shall generally be used where the difference of soffit levels is greater than 600mm. If more than one drop connection is required the internal diameter shall be increased by 150mm for each additional drop connection installed. A maximum of three drop connections is permitted in any manhole.

Manholes in Soft Ground
Where a manhole is to be constructed in soft ground, the area under the manhole shall be undercut down to solid and backfilled with suitable hardfill to provide an adequate foundation for the manhole base. Where undercutting exceeds 1.5m, specific design is required.

Fall Through Manholes
In addition to the normal pipeline gradient all manholes shall have a minimum drop of 20 + 5mm per 10º of the angle of change of flow within the manhole. Manholes on pipelines

greater than 1m diameter shall have the drop through the manhole designed to compensate for the energy lost due to the flow through the manhole at the design radius.

Where a change in pipe diameter occurs soffits shall be matched.

Specific design is required for manholes at which two or more significant lines join, or where steep gradients may affect hydraulic efficiency at pipe junctions.

5.2.8 Service Connections

Each lot on the development shall be served by a sanitary sewer connection located within the main body of the lot. Each connection shall be capable of serving the whole of the lot by, except where this requirement seems unreasonable and it can be shown that the proposed connection is adequate for all potential building locations on the lot. Allowance must be made for adequately graded sewer lines within the lot and the depth of the gully traps.

The standard depth of any connection shall be 1.2m (range 0.9 to 1.5m), unless a greater depth is necessary to serve the whole of the building area of the lot. The connection invert level shall be a minimum of 1.2m below the overflow level of the lowest gully trap on the lot.

The standard size and material for a single lot connection is 100mm RRJ SN16 PVC-U. The Engineer may require a larger size connection.

Where the sanitary sewer line is outside the body of the lot to be served by it, a 100mm diameter connection shall be extended to 1m inside the boundary of the lot. Where at all possible the connection line shall commence from a manhole on the main line. Such a connection shall not cross more than one lot boundary. If further than 3m from lot boundary it shall be protected by an easement.

In exceptional cases the Engineer may approve the provision of an extended length 100mm diameter connection as a private line protected by an easement to service up to three lots provided maximum potential number of units will not exceed three and a chamber is provided at a suitable location for cleaning purposes.

Each connection shall be marked by a 50mm x 50mm timber stake (treated pine or better) extending to 300mm above ground level with the top painted red. This marker post shall be placed alongside a timber marker installed at the time of pipe laying and extending from the connection to 150mm below finished ground level. The lower end of the marker post shall be adjacent to, but not touching the connection. Connections shall be accurately indicated on As-Built plans.

All connections, whether to reticulation lines or to manholes, shall be sealed either by a factory sealed stopper or ceramic plug, complying with AS4327 Class B. Rubber ring plug held with stainless steel wire is not acceptable.

5.2.9 Ramped Risers

Unless required otherwise by the Engineer, a ramped riser shall be constructed to bring the connection to within 1.2m of ground level or to such depth that will permit a gravity connection to service the whole lot. Ramped risers shall be constructed as shown in Franklin District Council Drawing SS4.

Where an extended connection is to be taken from a sewer to the boundary of another lot, a ramped riser need not be used, and the extended connection may be sloped up at the continuous gradient from the sewer to terminate just inside the lot to be served, at a sufficient depth at the boundary to drain the building site.

5.2.10 Connections to Deep Lines

Where an existing or proposed sewer is more than 5 m deep to the top of the pipe, connections shall not be made directly to it, but a new shallower branch sewer shall be laid from a manhole on the deep sewer and connections provided to the lots to be served.

5.2.11 Pumping Stations and Treatment Plants

Specific design is required for all pump stations and treatment plants. Early consultation with the Engineer and the Regional Council is required.

The Engineer is concerned with all aspects of operation, maintenance, access and security and will require the mechanical, electrical and alarm installations to be compatible with existing installations.

Design criteria for all pump stations and treatment plants will be as follows:

1. Sufficient duty pumping capacity will be provided to handle the design peak flow rate.

2. At least one stand-by pump equal in capacity to the largest duty pump. A Flygt or alternative approved type of submersible pump is preferred.

3. Acceptable wet-well volume and shape, aimed at limiting the frequency of pump starts and minimising potential odours. The capacity of the wet-well shall be designed to such dimensions that under maximum flow conditions the number of starts for the pumps shall not exceed fifteen per hour. Depths of pumping stations shall be kept to a minimum. A minimum storage volume of four hours average dry weather flow is to be provided above the normal pump cut-in level.

4. Proper ventilation of wet-wells, and dry-wells where appropriate.

5. Ground floor levels, and slab levels of underground structures, at least 150mm above finished ground levels in order to exclude surface water.

6. A control building of adequate size to house electrical equipment, in order to facilitate servicing under all weather conditions is required. However, for small stations it may be waived on application.

7. Phase fail protection for each pump motor, together with soft starters and thermal overload.

8. Automatic control of pump operation, together with a manual override facility.

9. Automatic changeover of duty pumps.

10. All electrical switch gear is to be located above ground level, and any potential flood level to the satisfaction of the Engineer. The electrical control system of the pumping station must include hour meters and resetable start counters for the pumps and all necessary equipment for the efficient operation of the station.

11. All weather access in order to facilitate maintenance of station equipment. The actual site of the pumping station will be on a separate lot on the development with an accessway (if required) to a formed road. The lot shall be transferred to the Council.

12. A properly protected water supply for the purposes of washing down the station interior, including meter and backflow preventer. Minimum supply to be 25mm. The connection of the water supply needs to be applied for together with a building consent, as a certificate of compliance is required for this work.

13. Means of lifting pumps and other heavy equipment, or alternatively access to enable mobile plant to perform this task.

14. Alarms for the detection of duty pump failure, high and low wet well level and imminent overflow. For the large installations, a high dry well alarm is also required.

15. The Council monitors all pump station alarms through a telemetry system and the necessary equipment will be required to be installed and connected at the developer's cost both at the station and any necessary additional works at Councils base station.

16. The rising main, should not be less than 100 mm in diameter.

17. All pumps are to be fitted with non-clogging impellers capable of passing a 76mm diameter solid.

18. All pumps are to operate between 60% and 100% of best efficiency point.

19. The stations shall have an overflow in case of mechanical or electrical failure or blockage of the pumps or rising main. The overflow must be located at such a level as to prevent overflow from any manholes or gully traps on the reticulation. A Discharge Permit is required from the Regional Council for the emergency overflow.

20. Non-return valves designed for use on sewers are to be provided on the rising main.

21. The power supply to the station will be underground.

22. All control cabinets, buildings, and chambers shall be fitted with approved Franklin District Council locks.

23. Pump station designs shall make adequate provision for safe working by operation and maintenance staff.

5.2.12 Rising Mains

Rising mains shall meet the requirements for the construction of principal mains as set out in Section 5, Water Supply, of this code. Rising mains shall generally not be sited in private property. Where this is unavoidable, they shall be sited clear of building sites.

The test pressure shall be twice the maximum working pressure.

Rising mains shall be a minimum of 100mm diameter and pumps shall be sized such that the minimum velocity during the pumping cycle is 1.0m/sec.

5.2.13 Private Pump Stations

Where a lot is such that a dwelling cannot be located at any point on the lot and obtain a gravity connection to the sewer a private pump station may be approved by the Engineer.

Where a private pump station is to be provided the developer shall provide a minimum 50mm rising main from the gravity sewer to service the lot.

Where practical rising mains shall connect to gravity system via a manhole.

5.2.14 CCTV Inspections

All sanitary drainage pipelines shall be inspected by CCTV to satisfy the Engineer that they are clear of silt and other debris, and fit for service, prior to takeover by Franklin District Council.

CCTV inspection shall specifically locate each private lateral (to provide As-built measurements).

Inspections shall comply with the New Zealand Pipe Inspection Manual.

5.2.15 Testing

All sanitary sewer main and branch pipelines, including extended connections and manholes, shall be pre-tested during construction. On completion of all other engineering work within the development, there shall be a final test witnessed by the Certifying Engineer. This test shall be any one of the tests set out in AS/NZS 2566 or other test approved by the Engineer. Manholes shall be tested either by a water test or a low pressure air test in a similar manner to concrete pipes.

The Engineer shall be advised 48 hours prior to the final test in order to have opportunity to witness the test.

No visible infiltration through manhole roof, walls or floors will be permitted. The total infiltration in any portion of a sanitary sewer system shall not exceed a rate of 600ml per 25mm of pipe diameter per 1,000 m of pipe in 5 min.

All tests shall be carried out in accordance with the bylaws of the Council.

PART 6: WATER SUPPLY

6.1 SCOPE

This part of the code provides Franklin District Council's requirements for water supply for residential, commercial and industrial purposes including fire fighting within the District.

6.2 GENERAL

6.2.1 General Requirements for Water Supply

Standard of Supply
For urban developments, an urban water supply system shall be installed, adequate for fire fighting purposes and for estimated domestic, commercial and industrial consumption.

Developments in a rural setting may be adequately served by individual rainwater tanks, or where an adequate aquifer exists, by individual privately-owned bores or wells, provided that adequate fire protection can be arranged through the Fire Service.

Level of Service
The water supply reticulation shall be to Water Supply Classification FW3, or such higher classification as appropriate, in terms of the latest New Zealand Fire Services Fire Fighting Water Supplies Code of Practice (SNZ PAS 4509).

The design of the reticulation shall be such that a water supply connection can be readily provided for each allotment.

Provision shall be made in the design for the maximum potential development in every lot served.

The minimum fire fighting residual running water pressure shall be 100kPa (1 atmosphere, 10 m head of water) at any hydrant.

The minimum working residual water pressure, in other than fire fighting conditions shall be 300kPa (3 atmospheres, 30m head of water) at the ground level at the normal house site in each lot.

6.2.2 Water Demand and Pressure

Domestic Supply
In developments of an average size, the domestic demand is not critical and the supply of water for fire fighting purposes will generally determine the pipe sizes required. For more extensive areas however the pipe network shall be designed to provide for annual, seasonal and peak demand. The design shall provide for a domestic demand of 230 litre/person/day with a peak flow of five times this amount, or other quantities and peaks derived from records of the present district supply.

Commercial and Industrial Supply
The water demand for commercial and industrial areas shall be analysed and specifically allowed for in the design, if relevant.

Fire Fighting Supply
The water reticulation shall be designed to comply with the requirements of the latest revision of SNZ PAS 4509 and amendments, and in particular shall meet the code requirements with regard to the fire fighting flows, running pressure and the spacing of hydrants, together with any additional requirements set out herein, including storage where applicable.

The fire risk classification shall be as follows:

- Detached or semi-detached housing in suburban areas - Class FW3
- Schools, local suburban shopping areas and equivalent development – Class FW4
- Suburban industrial areas - Class FW6

The minimum standard of water supply for fire fighting shall be as set out in the following table. A minimum residual running pressure (at the hydrant) of 100kPa is required.

TABLE 6.1: MINIMUM STANDARD OF WATER SUPPLY FOR FIRE FIGHTING

Class	Flow – litre/second	Maximum number of hydrants from which the required flow shall be obtained within a 270m radius
FW3	25	3
FW4	50	4
FW6	100	8

With 100kPa running pressure available at the inlet of the hydrant, the flow from a single hydrant is of the order of 30 litre/second . A single hydrant therefore would generally be adequate for any Class FW3 risk providing it is sufficiently close to the fire risk.

Design Basis
The Council may provide details of the working pressure or pressures at the point or points of connection to the existing reticulation, in which case these will be used for design purposes. The Council shall have the right to specify the diameters to be used for the principal water mains within the development.

Pipe Working Pressures
Pipes or fittings of less than PN12 shall not be used without the specific approval of the Engineer.

6.2.3 Reticulation

A water main of not less than 100 mm internal diameter fitted with fire hydrants (hereinafter referred to as the principal main) shall be laid on one side of all through roads and one side of every cul-de-sac to within 65m of the end of the cul-de-sac, subject to the requirements regarding hydrant spacing.

A rider main of not less than 50mm internal diameter shall be laid to the road frontage of all lots not fronted by a principal main. Ridermains may also be required for service connections where principal main is a trunk main greater than 250mm

Rider mains shall continue to the ends of private ways serving more than two lots.

Rider mains shall be supplied from a principal main at both ends, except for private ways and minor roads. Rider mains supplied from only one end shall have a 50mm flushing valve at the terminal end.

The principal main and the rider main on a cul-de-sac shall both be connected to the principal main on the main road, thus providing a two way supply to the cul-de-sac.

In the case of arterial and dual carriageway roads, the Engineer may require principal mains to be laid both sides of the road.

In industrial and commercial areas, fire mains shall be sized according to demand, but shall be at least 150 mm diameter and laid on each side of the road or at least 200 mm diameter laid on one side of the road with a rider main sized according to demand on the other side.

6.2.4 Alignment of Water Mains

Position in Road

The location of a water main in the road shall conform to Franklin District Council Drawing R2.

In areas of steep terrain, such that the area between the back of the footpath and the road reserve boundary is too steep for any form of vehicular access, the water main may be laid under the footpath or under the carriageway.

If the water main is under the carriageway, it shall be on an alignment at a prescribed distance from the kerb face. In any case, the Engineer shall approve a logical combined layout for all underground services in the road.

In private ways the water main should be laid within the grass verge, or if the entire width of the private way is concreted, the water main shall be laid in a duct.

Setting Out

The water mains are to be laid with reference to permanent land transfer pegs or temporary boundary marks placed by the Licenced Surveyor responsible for the final land transfer pegging.

Laying tolerances shall be up to 50 mm on straight roads, and up to 100 mm on curves. Any problems due to misalignment shall be resolved by the developer to the satisfaction of the Engineer and other underground service authorities.

6.2.5 Intersections

Intersection details shall be as per Franklin District Council Drawing W1.

Where the principal water main is to be laid around the corner, then 45º or similar bends should be used. Franklin District Council Drawing W1 sets out the general principles, including the positioning of the valves.

6.2.6 Water Mains with Fire Hydrants (Principal Mains)

General
Principal mains shall not be less than 100 mm diameter.

Pipe Standards and Types
The following pipes may be used for principal mains, providing they comply with the latest relevant New Zealand Standard:

- Polyethylene PE100 and PE80 to AS/NZS 4130
- PVC-U to AS/NZS 1477
- PVC-M to AS/NZS 4765
- PVC-O to AS/NZS 4441

For all plastic pipes, tracer wire shall be taped to the pipe, whether laid by open trenching or directional drilling.

Asbestos cement pipes are not permitted for use anywhere in Franklin District.

Concrete lined steel pipes may be required in potentially unstable ground, for lengths of exposed pipe, or in other special cases, and should be the subject of specific design. Except where corrosive ground conditions exist, concrete lined steel pipes may be laid under road carriageways and accessways to industrial and commercial premises.

Galvanised steel pipes shall not be used.

Cast iron pipes may be appropriate for lengths of exposed pipe, or in other special cases. Their use shall require specific approval by the Engineer. All cast iron pipes or fittings shall be concrete or epoxy lined.

Pipe Pressure Classes
Pipes for water mains shall be not less than PN12 although a higher class shall be used if necessary to provide for the maximum working pressures in the area in which they are to be laid.

Joints
Joints for PVC pipes shall be spigot and socket rubber ring type. An approved bactericidal lubricant shall be used on all joints. Solvent cement joints are not permitted. Joints for PE pipes may be butt welded or use electrofusion couplers or “System 2000” type couplers.

Bolts, nuts and washers for flanged joints shall be either 316 stainless steel, with a nickel or molybdenum based anti-galling lubricant or hot dip galvanised. Buried flanged joints shall be wrapped in densotape.

6.2.7 Rider Mains

Pipe Sizes

Rider mains shall be a minimum 50 mm internal diameter. Table 6.2 sets out the desirable maximum number of domestic connections which may be permitted to be served by a rider main. This will depend on the level of service required by the Council, and on Council's requirements for service connection diameter.

TABLE 6.2: RIDER MAINS

Maximum Number of Dwelling Units to be Served

High pressure areas (1)		**Medium pressure areas (2)**		**Low pressure areas (3)**	
One-ended supply	Two-ended supply	One-ended supply	Two-ended supply	One-ended supply	Two-ended supply
20	40	15	30	7	15

Note: (1) High-pressure means normal working pressure in the principal mains (other than when fire fighting) usually not below 600kPa.

(2) Medium-pressure means normal principal main working pressure usually 600kPa to 400kPa.

(3) Low-pressure means normal principal main working pressure usually below 400kPa.

Pipes for rider main construction shall normally be either PVC-U to AS/NZS 1477, with spigot and socket rubber ring type joints, or PE80 to NZS 4130.

Use of other pipes will only be permitted in special circumstances and will require the specific approval of the Engineer.

6.2.8 Connection of Rider Main to Principal Main

Where a rider main is to be extended at right angles to a principal main, this shall be connected either with a cast iron tee with a female threaded branch (or an elongated gibault joint, tapped) and with a PVC valve socket (for a PVC rider main) or with a tapping band.

Where a rider main is to be extended along the same alignment, beyond the end of the principal main, it shall normally be connected as shown in the Franklin District Council Drawing W2.

In very soft ground, an additional length of pipe of the principal main diameter, filled with concrete, may be laid beyond the last cast iron tee. This pipe should be well anchored by compaction along its length, and terminated with a blank-end gibault and an adequate concrete anchor block.

Taper reducers shall be used only in firm ground where the taper can be adequately anchored to the sides of the trench, and with the specific approval or requirement of the Engineer.

The method of jointing shall be to the approval of the Engineer.

6.2.9 Hydrants

Hydrant Type
Hydrants shall be screw-down type, to NZS/BS 750:1984. Normally the tall pattern shall be used, except where the Engineer may approve or require the short or medium pattern.

No drain hole is permitted in the casting on the outlet side of the valve.

Hydrant Spacing
Hydrants shall be spaced at not more than 90 m intervals along industrial and commercial roads, and 135 m along residential roads.

In cul-de-sac or other terminal roads the last hydrant shall be not more than 65 m from the end of the road.

Where houses or residential units are situated on private ways, there shall be a hydrant within 135 m of the rear of any site, measured along the run-of-hose.

Where a residential private way is more than 65 m long a hydrant shall be sited at the road end of the private way or on the other side of the road immediately opposite the entrance.

If necessary a 100 mm diameter principal main shall be constructed and a hydrant placed within the private way in order to ensure the rear of any site is within 135m of a hydrant.

Hydrants must be readily accessible for fire appliances and should generally be positioned in road berms near road intersections, not less than 6 m from any building and clear of driveways.

Ideally, hydrants should be positioned at high points in the pipeline to flush air and at low points to flush sediment.

Single end feed 100 mm diameter fire mains longer than 100 m within Class FW3 areas shall only be used with the approval of the Engineer.

Hydrant Installation
Hydrant tees shall be flanged if laid next to other cast iron fittings. Otherwise flexible joints are permitted (gibault or rubber ring).

Hydrant risers shall be used, or the water main laid deeper, where necessary, in order to ensure that the top of the spindle is between 150 mm and 250 mm below finished surface level.

Hydrant Boxes
The manufacture and installation of hydrant boxes shall be ductile or cast iron to NZS/BS 750 and as shown in Franklin District Council Drawing W4. Where located in grass

berms, approved PVC. may be used, both types of hydrant boxes shall have a minimum 150mm x 150mm cross section concrete surround.

Location Marking of Fire Hydrants
The location marking of the fire hydrants shall be to NZS 4501, with such variations as may be approved by the Engineer.

Along rural roads PVC indicator posts shall be used, of an approved type, set vertically in the ground within 230 mm of the lot boundary and immediately opposite the hydrant which it indicates. Each post shall be firmly set to a depth below ground level of at least one third of its overall height, and shall bear the inscribed letter 'H'. Hydrant indicator posts shall be painted yellow. PVC posts shall have a pin at least 200 mm long through a hole near the bottom end to make removal difficult.

In all cases a yellow isosceles triangle of 600 mm side length 'pointing' to the hydrant shall be painted 150 mm to the left of the centreline of all sealed roads.

All paint used for marking valves and hydrants shall be NZTA approved "Road marking paint". Hydrant yellow to Protective Paints Limited Way Code 880-403 or Resene M7-W, white valves to Protective Paints Ltd Way Code 880 and Blue valves to Protective Paint Ltd Way Code 880-703.

The position of the hydrant shall also be marked by a blue RRPM fixed to the road midway between edges of seal, and by the letter “H” cut in the top of the kerb.

6.2.10 Valves

Sluice Valves (80mm and larger)
The valves on the principal main shall be Class 1 to NZS/BS 5163 and shall be resilient seat type anticlockwise closing with non-rising spindle.

Valves shall be flanged when laid next to another cast iron fitting or when required by the Engineer. 'On line' valves may be spigotted to take flexible joints, (gibault or rubber ring).

Gate Valves (also known as peet valves, 50mm and smaller)
Gate valves shall be to NZS/BS 5163, resilient seated and clockwise closing.

Scour Valves
These shall be either a hydrant or a 20 mm diameter ferrule. A permanent cover is required for the latter.

Air Release Valves
Automatic air release valves shall be provided where required by the Engineer, and positioned so that ground water cannot enter the main at negative pressure.

Positioning of Valves
Valves shall generally be placed on two of the three legs leading from each tee intersection. Where required by the Engineer, valves shall be placed on all three legs if this is necessary in order to limit the number of houses without water in the event of a

shutdown. Generally the spacing and location of valves shall be such as to limit the number of dwelling units affected by a shutdown to no more than 30.

Valve Boxes
Valve boxes shall be as in Franklin District Council Drawing W6.

Valve boxes shall be oblong and of ductile or cast iron. The rim should be clearly notched at two opposite points, and these notches aligned with the direction of the water main. Where oblong boxes are used, they should be aligned with the water main. Valve boxes shall have a minimum 150mm x 150mm cross section concrete surround.

Valve Indicator Posts
The position of all valves on fire mains and rider mains in rural areas shall be indicated by means of PVC indicator posts, as described in 501.9.5.2 except that the posts shall bear the inscribed letters 'SV' or 'PV' to indicate either sluice valves or 'peet' (gate) valves. Valve indicator posts shall be painted white.

In all cases a white isosceles triangle of 300 mm side length pointing to the valve shall be painted on all sealed roads adjacent to the channel edge. The position of valves shall also be marked by the letter “V” cut in the top of the adjacent kerb.

Butterfly valves are not permitted.

6.2.11 Depth of Water Mains

Both principal mains and rider mains shall have the following minimum cover, except in circumstances requiring special protection. Greater depth shall be provided if required by the Engineer:

- Under grass berms and footpaths: top of pipe 600 mm below finished surface.
- Under carriageways: top of pipe 900 mm below finished surface level at the lowest point over the pipe.

Service connection pipes shall have minimum cover of 400 mm. The sections of main adjacent to a carriageway crossing shall be gradually deepened, to allow the required cover under the carriageway, without the provision of vertical bends. Similar provision shall be made to give the necessary cover over valve and hydrant spindles.

6.2.12 Pipe Bedding

Water main pipes shall be bedded on suitable fine granular material, either natural (for example fine damp clay chippings) or imported. All water mains under carriageway shall have sand or fine granular bedding and surround. The requirement for bedding and surrounding of PVC-U pipe is set out in AS/NZS 2032.

The same bedding and surround shall also be used in rock country or where the trenching has brought out hard lumpy clay. There shall be no sharp stones or large clay lumps in the bedding or surround. Each pipe shall be laid so that the barrel of the pipe is supported for 60º to 90º of its circumference along its entire length. The bottom of the trench shall

be cut out to sufficient size to permit jointing of the pipes, and all pipes shall be supported upon their barrels only.

6.2.13 Pipe Fittings

Pipe fittings such as tees, hydrant tees, crosses, tapers, hydrant risers, blank caps, plugs, bends of various degrees, and surface boxed (where applicable) shall be of epoxy or concrete lined cast iron.

The use of fittings of other metallic material shall be subject to the specific approval of the Engineer.

Solvent cement, PVC-U fittings may not be used. Small diameter MDPE connectors shall be either Pushlok or Plassim.

Cast iron fittings will be cast from high quality grey iron coated with a proven corrosion preventative compound applied after adequate preparation.

Flanges shall be to table D of BS10. Fittings laid adjacent to other fittings shall have flanged joints, or flexible joints where permitted (gibault or rubber ring).
All bolts and nuts shall be galvanised or 316 stainless steel.
Gaskets for flanged joints shall be to BS 5292.

6.2.14 Anchor or Thrust Blocks

Cast in situ concrete anchor blocks shall be provided at all points where an unbalanced thrust occurs on mains exceeding 50 mm diameter. The Engineer may require blocks on 50 mm mains if rubber ring joints are used.

The design of anchor blocks shall be based on the bearing value of the site soil conditions, except that the maximum value used shall be 75kPa. The inner face of the block shall not be of a lesser thickness than the diameter of the fittings, and shall be so constructed as not to impair access to the bolts on the fittings. Concrete shall have a minimum compressive strength of 17.5 MPa at 28 days.

A protective membrane to protect abrasive damage to the water main should be provided between the pipe (irrespective of the pipe material) and the concrete anchor and thrust blocks.

6.2.15 Connections to Private Property

Note: **Connections will not normally be installed by the developer**. However, where in exceptional circumstances it may be preferable for the developer to install the connection and subject to the prior approval of the Engineer, the following requirements will apply.

When laid the point of supply to the consumer will be 300 mm outside the property boundary. In the case of shared private ways with a rider main, the point of supply will be on the boundary with the private way outside the dwelling unit where possible, rather than in the street.

(a) The service connection shall be taken through to 300 mm outside the property boundary, terminating with a gate valve with a female thread. A plug shall be screwed into the gate valve to ensure that it does not leak.

(b) Back lots (or dwelling units without individual road frontage) of up to two dwelling units shall have separate service connections at the road frontage, as in (a) above. In private ways serving three or more dwelling units, a rider main shall be provided of minimum 50mm diameter extending to the end of the private way to serve all lots or dwelling units. This main shall be ducted wherever it passes beneath vehicle accessways. It shall be contained within a designated service area.

(c) All pipes up to the meters, although on private property, shall be part of the Council's reticulation in terms of the Local Government Act 2002. No easement is needed, as such.

Where a connection involves cutting into an existing Council main, the developer shall forward to the Engineer a sample of the cut-out pipe (300mm long maximum).

In general, all connections shall be left until a water meter application is made, so that appropriately sized and placed connections can be made and backflow preventers, etc. installed.

Diameter of Service Connections
In all areas, service connections shall be a minimum of 20mm internal diameter for all dwelling units, or larger in special cases.

Tapping Bands and Ferrules
Each service connection to a principal main or rider main shall be by means of a tapping band and a ferrule with the flow of water controlled by a screwed brass plug.

The tapping band for each service connection shall be on the house side of, and clear, of the driveway to rear lots and shall be installed at the time of the water meter connection.

Tapping bands and ferrules shall be made of LG2 gun metal.

Construction
In those cases where Council requires the developer to lay the service connections, this shall include the gate valve and meter box. This work shall not be done until after the electric power or any other reticulation between the water main and the boundary has been laid. Service connections shall normally be laid at right angles to the frontage.

Service Connection Materials
Service connection pipes of copper or polyethylene are permitted. If polyethylene is used "pushlok" fittings are required. For details of service connections refer to Franklin District Council Drawing W9.

Galvanised steel pipes are not permitted.

Toby Boxes
Where toby boxes are required, these shall be approved by the Engineer prior to installation.

Water Meters
The type and manufacture of water meters and backflow preventer tailpiece shall be Kent brand or equivalent approved by the Engineer.

Backflow Preventers
At residential properties, a dual check valve shall be installed immediately after the water meter and shall comply with AS/NZS 2845.1. Businesses operated from residential properties will be treated as commercial/industrial and backflow preventers shall be installed to suit the applicable risk.

6.2.16 Testing

Each section of the completed reticulation, together with all specials and fittings connected shall be tested by the developer in the presence of the Certifying Engineer. The test shall be carried out, and all necessary apparatus supplied, by the developer.

For pipes other than polyethylene, the reticulation shall withstand a pressure of 1400kPa measured at the lowest point of the section under test, or 1.5 times the working pressure at any point in the system, whichever is the greater. The pressure shall be maintained for a period of 15 min, and during the period of the test, the leakage shall not exceed one litre per ten millimetres of pipe diameter per kilometre length of pipeline per hour.

For polyethylene pipelines, testing in compliance with AS/NZS 2566.2 M6 is required.

The Engineer shall be advised 48 hours prior to any pressure test in order to have opportunity to witness the test.

6.2.17 Backfilling and Reinstatement

Carriageways and Driveways
In general, open cutting of existing paved carriageways and existing paved driveways, will not be permitted where pipes can be horizontally bored or thrust under them. Paved surfaces include sealed, asphalt, concrete and paving stones.

If open cutting cannot be avoided, saw-cuts shall be made along both edges of the trench in continuous lines parallel to the pipeline. Areas surfaced with paving stones would require careful dismantling and reinstatement. Trenches shall be reinstated in compliance with Auckland Region Code of Practice for Working in the Road.

Bored or Thrusted Pipes.
Thrusting or horizontal boring shall be carried out by specialists using approved means to provide a straight pipeline at the required depth.

Diameters of thrusts and horizontal bores shall be as close as possible to the outside diameter of the pipe. If the thrust or horizontal bore diameter excessively exceeds the diameter of the pipe, the cavity around the pipe shall be filled with a sand and cement slurry.

Berms
Pipe trenches under grass berms and footpaths shall be backfilled in accordance with the requirements of the Auckland Region Code of Practice for Working in the Road.

6.2.18 Disinfecting

After backfilling and before being put into service, all pipes, valves, house connections and other fittings shall be disinfected as specified in Appendix C of NZS 4404.

6.2.19 Water Mains to be Kept Charged

After any water main has been laid and tested and disinfected, it shall be kept continually charged with water, and under pressure. If the permanent connection to the existing reticulation is delayed, a temporary small diameter connection shall be made from the existing reticulation. The pressure must be maintained while electric power and other underground services are being laid in the vicinity of the main.

6.2.20 Connection to Existing Water Reticulation

After new reticulation has been laid, Developer's representative shall provide provisional 'As-built' plans (less final connection details), and certification that the reticulation has been laid according to approved plans and that the complete system has passed the required pressure test. Council will then provide consent to the physical work of disinfecting and connection to the existing reticulation being undertaken by one of Council's approved Contractors. All excavation, backfilling and reinstatement of the connection point is the responsibility of the developer. All costs involved including shutdown costs (if any) shall be met by the developer.

After completion of the connections, final "As-built" plans shall be produced showing details of the valves and tees making up the connections. Photographs of the connections shall be provided with the "As-built" plans.

6.2.21 Special Measures in Corrosive Soils

Corrosive soils are found in some parts of the District. If such soils are found special measures shall be taken to protect the main and fittings.

6.2.22 Special Measures for Pumping or Storage or Both

The provision of service storage or reticulation pumping installations or both together will normally be the responsibility of the Council.

If pumping and/or storage is required wholly or principally to serve a specific development the provision of that pumping and/or storage shall be provided by the developer.

PART 7: PARKS AND RESERVES

7.1 SCOPE

Where reserves are provided this standard sets out the requirements for such reserves and sets minimum requirements for landscape plans, fencing and planting. This section applies to landscaping within road reserves and parks which will vest in Council, including street tree planting and street gardens.

This standard is intended to ensure that the development of parks and reserves is to a standard that will not create future maintenance problems and will be compatible with other reserves in the district.

Consultation with Council's Community Assets Manager at the preliminary planning stage, or earlier, should be undertaken to determine any specific requirements.

7.2 GENERAL

7.2.1 Reserves

Siting of reserves should be in accordance with the Reserves Acquisition and Development Plan. The location of any reserve should be visually prominent and located, if possible, in association with other public facilities with a significant road frontage. The extent of a road frontage to a neighbourhood reserve should be at least 50% of the external boundaries of the reserve. The reserve should also have high visibility from the street network as adjacent residential lots provide passive surveillance.

Reserves should be north facing to optimise daylight and of a minimum size of 1200m^2 or larger when not adjacent to a sports park. The general shape is to be proportionally equal sided with flat topography to allow for play. Good pedestrian/cyclist access is required within walking distance for most residents in a centrally located part of the subdivision.

Incorporation of site features is encouraged in order to preserve heritage/landscape features, views and significant trees, as long as areas of open space that can be used for passive recreation are also provided.

Where a reserve is to be constructed by a Developer, the design should be included in the landscape plan in order to gain approval from the Unit Manager, Open Spaces.

7.2.2 Landscape Plans

Landscape plans shall be in accordance with Council's:

- Residential Urban Design Guide
- Reserves Acquisition and Development Plan

Landscape plans shall be submitted with other engineering plans of development for approval. The plans shall show the proposed finished levels of the reserves, and any proposed planting, features, bins, furniture, lighting and any drainage that is to be installed.

Landscape planning shall consider both the short and long term maintenance requirements for the areas to be planted.

Landscape planning is to consider the whole of the adjacent area and not just the immediate area of the development. It must fit in with adjacent developments and any future stages of the proposed development and adjacent land.

7.3 STREET LANDSCAPING

7.3.1 Street Trees

Street trees should generally be planted so that minimum separation and site distances are in accordance with Drawing P4 and P5 in Appendix G.

Where possible existing trees should be retained. Where existing trees are to be retained, current best practice supported by a qualified arborist's advice shall be applied to protect them from damage during development.

Trees identified for retention shall have a protection zone extending to 1m beyond the drip line during the construction phase.

Trees that may become invasive in water courses should not be planted. These include, but are not limited to, Pussy Willow (Salix reinhardtii) and Black Alder (Alnus glutinosa). Refer also to the ARC's Invasive Species List.

Refer to Table 7.1 for a list of acceptable street trees.

Council's Community Asset Manager must be consulted before trees are planted.

7.3.2 Street Gardens

Street gardens are seen as a valuable asset in the built environment, and as such they are encouraged. The most suitable locations are generally found in residential and commercial zones.

On roundabouts less than 10m in diameter, one single-trunked specimen tree in a specially constructed tree planting pit may be provided.

On roundabouts over 10m in diameter may be treated as any other street garden.

No irrigation systems are to be installed, plants should be of a species and variety that suitable for the environment and require minimum maintenance.

Structures (including sculptures, walls, fences, screens and entranceways) shall be located so as not to obstruct signs, sight lines at intersections and pedestrian crossings.

TABLE 7.1: FRANKLIN DISTRICT COUNCIL STREET TREE PLANTING

Category	Native Trees Common name	 Species name	Exotic Trees Common name	 Species name
Larger lanes, 1.3m berms, cul-de-sac planting.	Cabbage tree Kowhai Rewarewa Manuka Titoki Akiraho	*Cordyline australis* *Sophora spp* *Knightia excelsa* *Leptospermum scoparium* *Alectron excelsus* *Olearia paniculata*	Ornamental Cherry Rhododendron Bead Tree Silver Birch	*Prunus spp* *Rhododendron spp* *Melia azedrach* *Betula spp*
Link roads, 17m - 20m wide, double 1.5m berms.	Cabbage tree Kowhai Rewarewa Lacebark Titoki Akiraho	*Cordyline australis* *Sophora spp* *Knightia excelsa* *Hoheria spp* *Alectron excelsus* *Olearia paniculata*	Ornamental Cherry Bead Tree Silver Birch Silk Tree Rhododendron	*Prunus spp* *Melia azedrach* *Betula spp* *Albizia julibrissin* *Rhododendron spp*
Collector streets, 25m+ wide, double 2.5m Berms.	Kowhai Rewarewa Lacebark Titoki Pohutukawa Puriri Golden Totara Kohekohe Kahikatea Karaka Five Finger Lemonwood Taraire Pittosporum	*Sophora spp* *Knightia excelsa* *Hoheria spp* *Alectron excelsus* *Metrosideros excelsa* *Vitex lucens* *Podocarpus totara'*Aurea*'* *Dysoxylum spectabile* *Dacrycarpus dacrydioides* *Corynocarpus laevigatus* *Pseudopanax spp* *Pittosporum eugenioides* *Belschmiedia tarairi* *Pittosporum eugenoidies*	Bead Tree Silver Birch Oak Sweetgum Tulip Tree Ginko Black Locust Maple Liquidambar Acer	*Melia azedrach* *Betula spp* *Quercus spp* *Liquidamber styraciflua* *Liriodendron tulipifera* *Ginko biloba* *Robinia pseudoacacia'* Frisia' *Acer spp* *Liquidambar styraciflua* *Acer palmatum*

7.3.3 Walkways

Walkways shall comply with the National Guidelines for Crime Prevention Through Environmental Design (CPTED) and current best practice.

Walkways shall have concrete paths installed that shall comply with the requirements of this code for thickness and reinforcing. Any variation in finish e.g. exposed aggregate, cobbles etc will require the prior approval of Council.

The maximum gradient on walkways shall where possible comply with the requirement of the Disabled Persons Act. Where possible steps should be avoided.

Footpaths shall be laid with sufficient fall and drainage to ensure that storm water does not pond on the path.

Where being used as access for the maintenance of reserves, concrete shall be thickened and reinforced to allow for maintenance equipment.

7.3.4 Drainage

Sufficient storm water drainage shall be provided to ensure that water does not pond excessively on the reserves and that the reserves are able to be mown throughout the year without damage from tractor tyres.

7.3.5 Park Furniture

Park furniture shall be robust and shall not be installed without prior Council approval. All furniture shall be treated with a Council approved graffiti guard.

Playground equipment shall comply with NZS 5828 "Specification for Playground Equipment and Surfacing" and the "New Zealand Playground Safety Manual", and meet Council's levels of service guidelines.

Developers must provide the Parks Manager of Franklin District Council with a list of all features including furniture, objects and assets which to become publicly owned assets for approval. This list will include, but not be limited to, the attributes and values as follows:

- Feature type.
- Material composed of.
- Location in accordance with NZTM (NZGD 2000) datum.
- Value when installed.
- Make/model/supplier/manufacturer.
- Number of items.
- Length/dimensions.
- Area fixing method.

An As-Built plan showing the layout and placement of all features must also be provided on completion.

7.3.6 Street Berm Planting

Proposals for street berm planting will require a detailed plan that considers the location and possible effects on underground services, effects on sightlines, long and short term maintenance costs and will require the prior approval of Council.

7.4 SITE PREPARATION

All irrigation and drainage works, utilities installation, signs or landscape structures shall be completely installed and approved prior to planting.

Sawcutting of existing seal where required shall be undertaken between 250mm to 300mm from the back of the kerb. The cut line shall be parallel to the kerb lines wherever possible. Small radius curves shall be cut using a series of short incisions to approximate as best as possible the curve arc.

7.4.1 Excavation of Planting Areas

Excavation shall be carried out where necessary to achieve either of the following required soil profiles where depths indicated are post consolidation:

a) Landscape Bedding (refer to Figures 7.1 and 7.2):
- 150mm of base soil
- 150mm composite topsoil, being 70% topsoil and 30% manure or compost incorporated (refer below)
- 75mm of bark or 10mm biodegradable fabric mulch (refer to Clause 7.8) (to be maximum of 25mm below top of kerb)
- Total depth of excavation 400mm below top of kerb.

b) Annual Bedding (refer to Figure 7.3):
- As per the Landscape Bedding profile
- Total depth of excavation 325 mm below top of kerb

All waste material shall be removed from site and disposed of to an approved facility or site.

Exposed subgrade shall be trimmed and levelled so that no part of the subgrade shall be above the required depth of cut.

The subgrade of the proposed planting area shall be firm but free draining. If required by the Development Engineer the subgrade strata shall be made permeable by the insertion of vertical holes to permeable layers, by scarifying of the surface to ensure free draining through the underlying material, or by undercutting the existing subgrade to a greater depth than specified. In this case, the unsuitable material shall be removed and replaced by imported pit sand to top of subgrade level.

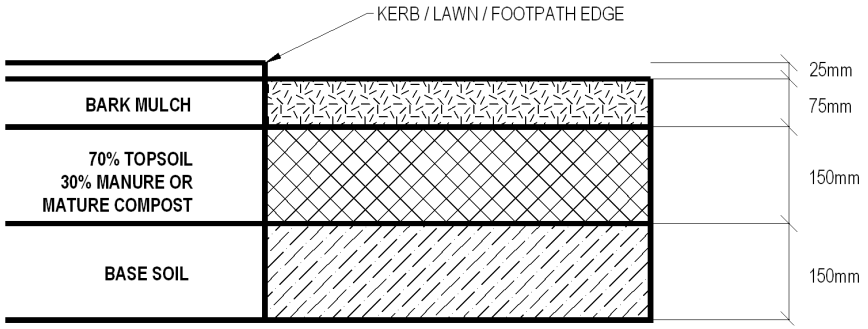


Figure 7A Option (A) Planting Area – Topsoil & Mulch Profile, post-consolidation, for slopes less than 1:3 gradient.

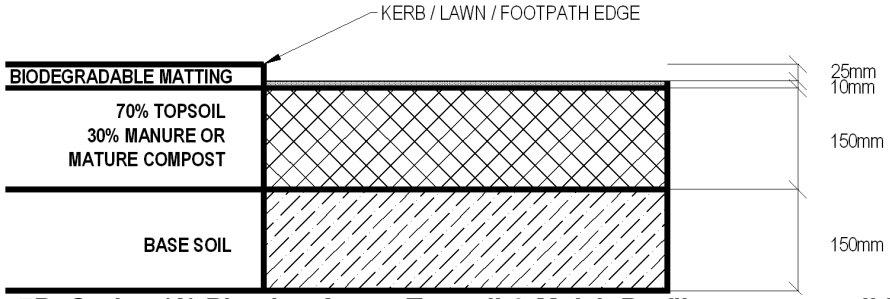


Figure 7B. Option (A) Planting Area – Topsoil & Mulch Profile, post-consolidation, for slopes more than 1:3 gradient.

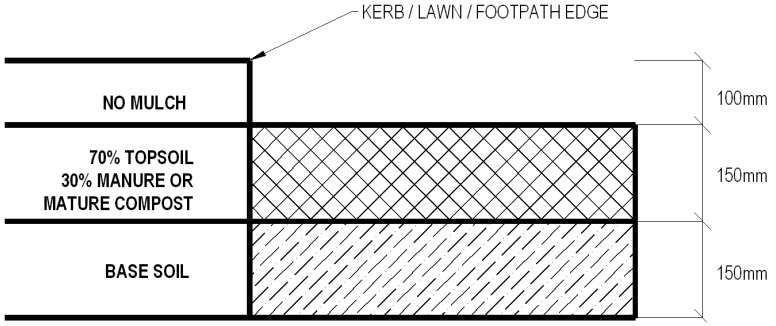


Figure 7C Option (B) Annual Bedding Planting Area – Topsoil Profile, post-consolidation.

In areas of new planting, base soil (either 2nd grade topsoil or pit sand) shall be placed evenly over the prepared subgrade and consolidated to a depth of 150mm. The sand/soil shall be free of debris and perennial weeds. No sand/soil shall be placed without the Development Engineer's prior consent.

In all sites, except natural gully systems, where the slope gradient is steeper than 1:3, it is preferable that the embankment is either scarified or grooved on an angle to a depth of 200mm, from the top of the bank to the base. This assists topsoil adhesion and prevents separation of the top 150mm topsoil from the base material due to gravity and/or glazing and planing of base material.

Should site conditions, such as gradient or compaction, prevent scarifying, the embankment sub-base shall be benched to develop an adequate topsoil profile. The horizontal benching depth is dependent on the slope gradient.

7.4.2 Soil for Planting Areas

Topsoil, either imported or existing on site, shall be a loam soil of good quality, free draining, free of perennial weeds and debris and capable of sustaining the required plant growth. All topsoil shall be inspected at its source and shall not be placed without the Engineer's consent. All topsoil must be free from contaminants.

Soil importation and stockpiling must meet resource consent requirements rules in terms of volume and handling.

Imported or site topsoil to be used in planting areas shall be left to grow vegetation and sprayed by the contractor to eliminate perennial weeds prior to their seeding and prior to the soil's use. A knock-down systemic herbicide without long term residues shall be used (see Clause 7.11). Treated soil shall not be placed without the Development Engineer's consent. If, after placing the topsoil and prior to any final cultivation, there is evidence of vegetation growth, the surface shall again be sprayed by the Contractor with a knock-down systemic herbicide. Areas so treated shall not be planted for at least two weeks.

All new planting areas on in-situ topsoil shall be deep ripped to 300mm prior to planting. Heavily compacted soils shall be deep ripped to 600mm. If in the Development Engineer's opinion, at time of planting, the soil has consolidated to a density unsuitable for planting out, re-cultivation of the soil to a depth of 150mm shall be undertaken by the contractor.

All new planting areas shall be filled with topsoil or excavated (as appropriate), to be 100mm below adjacent paving, kerbs or lawns after cultivation and reasonable consolidation.

Prior to planting, all planting areas shall be cleaned of rubbish, stones, unwanted vegetation and other debris.

At planting, all planting areas shall have a minimum uniform soil moisture level of greater than 50% to 200mm depth.

Soil Laboratory Testing

When an area of 100m^2 or more is to be planted with shrubs and/or trees, the topsoil shall require nutrient laboratory testing. The minimum number of sample sites depends on the following criteria:

a) If the topsoil has already been installed on site or existing insitu topsoil is being used for planting, a minimum of 10 soil samples shall be taken throughout the site.

(b) If the topsoil has yet to be installed then a minimum of 3 soil samples shall be taken at its source, ensuring that the same topsoil tested is installed on the site after Council has approved its use.

Soil samples shall be taken as per sampling instructions provided by the soil testing laboratory.

The laboratory results and a plan indicating sample site locations shall be provided to Council prior to planting. Planting shall not proceed without Council soil test approval. Council reserves the right to undertake further topsoil sample testing prior to soil test approval should it be deemed necessary.

Where sample results are beyond acceptable parameters, the topsoil shall be modified to ensure that it aligns within these parameters or another conforming topsoil source shall be identified to be used for planting. Soils with a high pH level may require Extractable Aluminium testing at Council's discretion.

The following soil testing is required per sample:

Soil Component	Acceptable Parameter	
pH	5.8 – 6.3	(dependent on plant species requirements)
Phosphorus	30 – 80	ug/mL
Potassium	0.5 – 1.0	me/100g
Calcium	6 – 12	me/100g
Magnesium	1 – 3	me/100g
Sodium	0 – 0.5	me/100g
CEC	12 – 25	me/100g
Base Saturation	50 – 85	%
Volume Weight	0.60 – 1.00	g/mL
Available Nitrogen (15cm depth)	150 – 250	kg/ha
Organic Matter	7-17	%
Total Nitrogen	0.2 - 0.5	%

In made-up ground and where poor plant growth has been experienced previously, the topsoil may require laboratory testing for areas smaller than 100m^2, at Council's discretion.

7.5 PLANT MATERIALS

All plants shall be supplied true to the species and grades specified on the approved landscape plans and shall comply with the Council's tree policy. All street trees, unless specified otherwise, shall be of a minimum grade of 2.0m with a 30mm calliper. Other tree grades shall be supplied as follows:

1.5m - 2.5m specimens shall have a calliper of 30 - 50mm
2.5m - 3.5m specimens shall have a calliper of 50 - 70mm
3.5m - 5m specimens shall have a calliper of 70 - 100mm

All other stock shall be of minimum pb3 grade for groundcover and pb5 grade for shrubs.

All plants to be advanced specimens for their grade and to be well furnished and rooted relative to container size.

No substitution of species or grade shall be made without the written approval of the Development Engineer. If species or grades specified are unobtainable, the Development

Engineer may approve alternatives. Smaller grades may require an increased planting density and numbers, which shall be at the Contractor's expense.

All plant material supplied shall be clearly labelled stating the plant's Latin name and the supplier's name, (one label per plant group planted). These labels shall be removed on completion of planting.

The Contractor shall give the Development Engineer not less than five days notice of dates upon which plants are to be delivered on site, so that arrangements can be made for quality inspection and confirmation of identification of plant material.

Plants shall be well branched, symmetrical and of typical habit for the species. All plants shall be nursery stock of good form, healthy and vigorous with strong fibrous root systems and free of all pests and diseases.

All trees shall be supplied with the central leader intact - no pruning of the central leader shall have taken place. All torn or damaged roots shall be pruned before dispatch. All stock shall be well rooted but not root bound. Open ground stock shall be well-wrenched. All root balls and containers shall be free of all weeds. Plants shall be well 'hardened –off' prior to supply.

The Contractor shall ensure that all plants and their roots shall be maintained in a moist environment, protected from adverse conditions such as drying winds, frost or water logging. All roots must be covered during transit and storage to prevent desiccation or damage.

7.6 INSTALLATION OF PLANTS

All of the planting shall normally be undertaken between April 1 and October 1. Planting for deciduous stock shall take place between 1 June and 15 September. Planting not undertaken in this period is subject to additional maintenance requirements.

All plants shall be planted on the day of delivery to the site. Plants shall be planted in the locations shown on the plans and in accordance with good horticultural practices. Unless otherwise indicated on the plans all plants shall be planted in a random pattern at the densities specified.

Planting holes shall be excavated, a minimum of 150mm wider and 150mm deeper than the root ball. For large trees the planting hole minimum dimensions shall be:

1.5 - 2.5m trees: 300 x 300 x 300
2.5 - 3.5m trees: 750 x 750 x 500
3.5 - 5.0m trees: 1m x 1 m x 500

The base of the planting hole shall be forked to a minimum depth of 100mm and any stones over 50mm diameter or poor quality soil shall be removed from the hole. The sides of the planting hole shall also be loosened, and the surrounding ground to two times the root ball diameter to be 'forked' over to reduce compaction.

Where topsoil is unsuitable for backfilling the Contractor shall use imported or modified top soil for backfilling. The imported topsoil shall be a free draining loam of a quality complying with that specified in Clause 7.4.2 and subject to inspection prior to placement. Modified backfill soil shall consist of a homogenous mixture of the following:

- 7 parts by volume of good quality, friable topsoil from the site or imported.
- 3 parts by volume of approved compost.
- 2 parts by volume of coarse river sand.
- Appropriate levels of fertiliser where specified.

The Contractor shall not plant into waterlogged soil or holes that are full or part full with water. If the water table is high and the Contractor cannot disperse the water from the hole, the Contractor shall consult the Engineer as to whether planting can continue.

All plant containers or wrapping and if necessary any root bound roots shall be removed prior to planting. Leaves and branches shall be pruned to assist plant establishment if necessary. Generally, the nursery soil level is clearly identifiable on the main stem of the plant and replanting should not exceed this level.

The hole shall first be backfilled with 150mm of consolidated soil or soil mix, mounding the soil in the centre to aid even spread of the roots.

The plants shall be placed in the hole ensuring that the final soil level is equal to or not exceeding 10mm above the nursery soil level and at an appropriate depth to ensure sustained growth. Roots shall be spread evenly to their natural extent without touching the sides of the hole, or being distorted in any way. Bare rooted material shall be shaken to ensure even root spread.

For trees, the hole shall be backfilled with topsoil or soil mix in 150mm layers, firming each layer. For container plants and shrubs, the hole shall be filled to half its depth and firmed and then completely filled and firmed again. Upon completion of backfilling the plants shall be well watered in.

All road reserve planting installation is to comply with 7.3 – Street Landscaping.

7.7 IRRIGATION

During installation and establishment, the contractor shall ensure that soil in all planting areas is moist enough to maintain active plant growth throughout the growing season (September – May). To achieve a high level of site presentation or in areas of annual bedding display planting, irrigation systems may be required to achieve this. Where an irrigation system is required to be installed, ‘Toro’ brand or a similar approved brand shall be used. The system shall be capable of providing a minimum soil moisture level of 50% to 200mm depth, throughout the planted areas or within the drip line of trees specified. It shall be capable of fully re-wetting the root zone to 200mm depth when the irrigation is applied; and shall be fully automated to operate between 1am and 6am when moisture levels drop below 50%.

7.8 FERTILISER

Generally, some form of fertiliser shall be applied to planting. For shrubs and trees, all fertiliser shall be well mixed with the backfilled soil. For bedding or groundcover all fertiliser shall be well mixed with the site topsoil prior to planting. Fertilisers shall be either an approved pelletised natural or organic fertiliser or an approved synthetic fertiliser.

The following synthetic fertilisers are acceptable unless alternatives have been approved:

- For bedding or perennial (groundcover) planting – 'Nitrophoska Blue' at 100g/m2
- For shrub planting – 'Mag Amp' at 40g/shrub
- For tree planting – 'Mag Amp' at 80g/tree

An exception to these is for Proteaceous species and ferns which should on no account be fertilised with Phosphate (P) containing fertilisers.

7.9 MULCH

Where indicated in the schedule and on the plans, the Contractor shall provide mulching to newly planted areas. In addition, all individual trees including street trees shall be mulched to a radius of 500mm.

Flat Site Mulch
On sites flatter than 1:3, bark mulch shall be spread evenly to minimum depth of 75mm and maximum of 100mm except that around tree trunks a slight hollow shall be left. The mulch shall be either coarse or fine, untreated, shredded pine bark as scheduled, and shall be approved by the Engineer prior to spreading. The bark mulch shall be clean and free of soil or sawdust. Coarse bark should have an average diameter of 50mm and with no pieces longer than 100mm. Fine bark should have no pieces longer than 40mm and be evenly graded. Coarse bark is appropriate to most locations. Fine bark may be specified by Council in Commercial zones, or for other specified locations.

All care shall be taken in placing the bark mulch so as to protect the plants and any irrigation system. All damage to the plants or irrigation system shall be rectified at the Contractor's expense.

Steep Site Mulch
On slopes steeper than 1:3, mulching for weed control shall consist of approved matting with the following criteria:

a) The matting consists of biodegradable mulching fabric or material without synthetic geonet or synthetic geotextile content.

b) It shall be installed according to manufacturer's instructions prior to planting, ensuring that the mulch will not uplift due to inundation or wildlife exposure (from, for example, Pukeko birds).

c) The mulching fabric shall have a minimum 24 month life expectancy and be fully biodegraded into soil within six years.

At the Engineers discretion, mat rounds may be used instead of matting. These shall be a minimum 500mm diameter and have the same characteristics as the matting.

On steep slopes with erosion issues that are to be planted, a biodegradable netting with no geotextile or geonet content shall be used at the Engineer's discretion. The netting will have an expected lifespan of at least 36 months. This may be placed on top of the mulch matting and shall be installed according to manufacturer's instructions. The netting is not intended to suppress weeds and should be used in conjunction with mulch matting or rounds.

7.10 STAKING AND PROTECTION

Newly planted trees shall be firmly staked and tied as follows:

- 1.5 - 2.5m trees shall be staked with 2 no. 50 x 50 x 1.8m stakes with at least 1m exposed
- 2.5 – 5.0m trees shall be staked with 2 no. 75 x 75 x 2.4m stakes with at least 1.5m exposed, or with a system of ground anchors approved by the Engineer and specified in the landscape plans.

All street trees shall be staked with 2 no. 50 x 50 x 1.8m stakes.

All stakes shall be rough sawn Pinus H5 treated. Stakes shall be placed with at least one third of their length in the ground.

Two flexible ties per stake shall be attached. Ties shall be tensioned to avoid chafing of the tree against the stakes. All ties shall be fixed to the stakes. Ties shall be of a type approved by the Engineer prior to tying.

Newly planted areas shall be protected from any possible construction or other damage. To ensure protection for the duration of the site works, the Contractor shall if necessary, provide and maintain a 1m minimum height barrier around the plants.

Similarly, during planting, existing structures, turf, other planting, or irrigation system shall be protected by appropriate means from possible damage.

7.11 PRUNING

Ongoing pruning during the contract maintenance period shall concentrate on producing good plant form, ground coverage, removal of spent flowers, healthy growth, preventing plants smothering other planting, keeping access ways clear of growth and maintaining visibility.

Trees shall be pruned up to provide good visibility for vehicles and pedestrians at all times (long term, trees should have a clear stem to 2.4m). Pruning should be carried out in accordance with acceptable modern arboricultural practices.

Shrubs shall be pruned down to 450mm height maximum, for good visibility at intersection and other visibility splays.

Pruning of shrubs and groundcovers shall use techniques which maintain the natural form and habit of the plants. Pruning shall avoid "hedging" techniques which create strong visual lines and detract from the natural texture and form of the plants. Groundcover plants shall be pruned by undercutting at the edges.

Planting designed as hedges shall be clipped only after Spring or Autumn growth flushes. Hedges grown for flowers shall be clipped only after completion of flowering. Hedge trimming shall be carried out in a way that will promote even growth to the specified height and width.

All prunings shall be removed from the planted areas and the site, to maintain these in a clean and tidy condition.

7.12 CHEMICAL APPLICATIONS (WEED & PEST CONTROL)

All chemical application on planted areas shall be carried out by qualified, trained personnel and according to the Growsafe Code of Practice for Safe Use Pesticides and Herbicides, NZS 8409, 'Management of Agrichemicals' and any manufacturers' directions.

All spraying operations shall be carried out in windless, dry conditions, when rain is not imminent for at least 12 hours and at times which minimise possible hazards or disruption to the public, animals or other beneficial fauna. Care shall be taken to prevent spray drifting onto non-target areas or plants and comply with notification requirements as required by any local register of 'no spray zones' or Regional Council requirements.

Herbicides may be used to control weeds or excess grass growth over structures, surfaces or into planting areas. Approved herbicides are:

- Glyphosate with Codacide oil or Pulse Penetrant for general use.
- Glyphosate + "Versatil" for persistent perennial weeds.
- Tordon Brushkiller or Escort for spot spraying of woody weeds only.

All use of any other herbicides shall be first approved by the Engineer.

All trees in grassed areas shall have a weed release spot spray applied between four and six months after planting. General weed control shall be carried out whenever necessary to maintain the planting weed-free.

Chemical weed control in planting areas shall be kept within the edge of the planting beds, within a maximum of 500mm of tree trunks, within 50mm of the edge of any undefined mulch surface, and within 50mm of any posts or the base of any landscape structures.

Pesticide use shall be effected to the minimum level required for healthy plant growth to be maintained. All pesticides shall be approved for use by the Engineer. Pesticides used shall be selected for the lowest oral and epidermal toxicity rating possible and shall be types which pose a minimum risk to bees or other beneficial insects.

7.13 MAINTENANCE REQUIREMENTS

The Contractor (or Developer) shall be responsible for the routine maintenance of the landscape planting works including weeding, mulching, replacement of plants and watering during the defects liability period.

7.13.1 Defects Liability Period

The planting defects liability period shall be two (2) years from completion and acceptance of the landscape planting works or upon release of any implementation bond held for uncompleted landscaping, except that if planting is carried out between October 1 and April 1 the defects liability period shall be extended for an additional 6 months.

During and at the end of the defects liability period, the following minimum standards are required:

- all topsoiled areas prior to planting and mulching shall be weed-free
- all planted areas shall be kept weed-free
- all planted areas including street trees shall be mulched with clean fabric, fibre or loose
- fill mulch
- all trees and other planting shall be vigorous and healthy, free of disease and free of dead growth or dead flowers
- all planted areas shall be moist to at least 200mm depth
- planting is becoming well established. Any plants failing during this period shall be replaced to the specification, to ensure adequate establishment of the planting
- plant growth shall be trimmed to the extent and height required for any visibility splays
- all tree stakes and ties shall be intact and correctly installed.

7.13.2 Weed Free Requirement

At the end of the defects liability period, no individual weed must be larger than 30mm x 30mmx 30mm high. Furthermore no weeds that are at least 10mm x 10mm x 10mm in size shall exceed five per square metre. Furthermore, no perennial grass weeds will be accepted.

7.13.3 As-Built Plans

The Contractor shall supply one copy of the As-Built plans recording all features (natural, constructed and installed) and any variation from the approved landscape plans and this specification.

7.13.4 Defects Liability Period Inspection

The Contractor, after completing all proposed works, shall advise the Community Assets Manager of Franklin District Council, at least 7 working days prior to the proposed

commencement of the defects liability period and shall be available for a joint pre-defects liability period inspection.

7.13.5 Defects Liability Period – Final Inspection

The Contractor at the end of the required defects liability period shall advise the Community Assets Manager of Franklin District Council, at least 7 working days prior to the proposed commencement of Council acceptance of the asset and its ongoing maintenance.

7.14 GRASSING AND TURFING

7.14.1 General

This section covers the preparation and sowing of any new grassed areas or those requiring reinstatement, or turfing of such areas. It includes berms, lawns and banks.

7.14.2 Preparation for Sowing or Turfing

Grassing and fertilising shall be carried out over all existing grassed areas disturbed by contract activity and other specified areas which may require reinstatement. In existing grassed areas, excessive compaction of the subsoil shall be relieved by subsoiling or similar as required, to achieve satisfactory long term growing conditions.

All topsoil removed to permit contract works to be carried out shall be stockpiled for reuse.

All new grass areas shall be built on subgrades prepared to a CBR of not less than 5 and no greater than 7. A minimum 75mm layer of clean, friable peat loam or sandy loam topsoil, free of all perennial weeds, stones and rubbish shall be placed on the subgrade. If the subgrade has been backfilled with sand or if the existing subgrade material is of a sandy nature then the 75mm topsoil shall be of a heavier silt loam.

The topsoil shall be lightly compacted or consolidated, and may be laid proud of adjoining features (such as kerb & channel, path, crossings etc) by not more than 25mm to allow for settlement, provided that it does not cause water to pond on any footpath or vehicle crossing area. All finish levels shall be those specified on the plans or to a 2-2.5% slope. New areas shall be neatly contoured into adjoining grassed areas. The top 25mm of topsoil shall have a loose tilth. No soil shall be cultivated or handled when the moisture content is at a level where soil structure damage will result.

Perennial weeds shall be sprayed with Glyphosate plus "Versatil", if clover, thistles, etc are a problem, according to manufacturer's instructions and at least 14 days before cultivation. All stones, rubbish and other foreign materials shall be removed from the areas to be grassed, and the whole area rotary hoed to a depth of 150mm or such lesser depth of topsoil as may be approved by the Engineer.

7.14.3 Fertilisers

All fertilisers shall be delivered to the site immediately before they are required for spreading and shall be thoroughly mixed on the site. The Engineer may prohibit the use of any fertilisers which have deteriorated because of interaction, wetting, etc. Fertilisers shall be lightly harrowed into the topsoil, 2-3 days prior to seed sowing, at the following rates:

• 30% Potassic Superphosphate	150 kg/ha	(15g/m2)
• Sulphate of Ammonia	50 kg/ha	(5g/m2)
	200 kg/ha	

This shall be followed one month after sowing, with an application of the following:

- Di-ammonium Phosphate (DAP) 100 kg/ha

7.14.4 Sowing

With the exception of the New Zealand Browntop component, all seed shall be certified and less than 12 months old at the time of sowing. Ryegrass component to be certified as having greater than 80% live endophyte content. The Engineer may prohibit the use of seed which has deteriorated because of wetting, fertiliser-burning, etc.

Seed mixture to be:

- NZ Browntop 10 kg/ha (approximately 5%)
- High endophyte Turf Rye 210 kg/ha (approximately 95%).

On large areas, the seed shall be "check" sown in at least two directions to ensure an even spread and covered by brush harrowing. The surface shall then be rolled with a suitable flat roller.

On small areas, grass seed shall be evenly applied to the prepared surface and raked thoroughly into the soil so that little seed remains exposed.

7.14.5 Establishment of Sown Areas

The Contractor shall ensure that the newly established grass is protected from damage by pedestrian and vehicular traffic until such time as the grass growth has reached a self-sustaining state.

The Contractor shall be responsible for watering the grassed areas as required, to achieve an efficient germination of the seed and maintain satisfactory growth throughout the Maintenance Period. Watering shall commence when root zone moisture is depleted to 50% and shall ensure full re-wetting of the root zone to 200mm depth.

During the establishment, the Contractor shall maintain the newly grassed areas as follows:

a) Upon the grass reaching 100mm in height, it shall be cut to 50mm high.

b) For subsequent mowings, the mowing frequency shall be governed by growth rate. Minimum grass height to be 20mm - maximum grass height to be 30mm.

c) The turf shall be maintained free of all broadleaf weeds.

d) Areas where there has been a poor strike of grass shall be either re-cultivated and re-sown or undersown at the Contractor's expense.

e) Upon completion of mowing, all grass clippings shall be collected and removed from all sown grass areas except non kerb-and-channelled berms. All clippings shall be removed from adjacent hard surfaces.

f) Edges of all sown grass adjoining cultivated gardens, borders, hand paving, sealed surfaces or landscape structures shall be trimmed to the edge or controlled by herbicide to within 25mm of flat surfaces or 50mm of vertical structures. Grass shall not be allowed to encroach over flat, sealed or paved surfaces by more than 25mm.

7.14.6 Turfing

The turf shall be of good quality, free of weeds and pests, with an even thickness of approximately 20mm, 450mm wide and of a consistent length. The constituent grasses of the turf should include Browntop and Fescue to provide grass of a close texture of even density and green in colour, i.e. "Readylawn" or similar approved by the Engineer. The turf should be sufficiently fibrous for turves to hold together when handled but excess fibre or thatch is undesirable.

Turf should be packed to avoid drying out in transit. In hot weather it shall be sprayed with water and covered with hessian as required. Turf shall be delivered to the site within 24 hours of lifting and shall be off-loaded by hand unless arranged on pallets for mechanical handling. Any turf permitted to dry out shall be rejected when, in the opinion of the Engineer, its survival after placement is doubtful. All turf should be laid immediately after delivery to site. Where this is not possible, the turves shall be unloaded and stacked on clear ground to maximum height of 1m and suitably protected.

No turf shall be laid in exceptionally hot dry weather, or in exceptionally wet or frosty soil or weather conditions, nor shall any turf be laid until the topsoiling has been satisfactorily completed by being brought to an even tilth and firmness.

Turf shall be handled carefully to ensure minimum breakage to prevent soil dropping from the roots. The turf shall be laid from planks working over turves previously laid.

The turves must be thoroughly watered until the turf mat and top 50mm of soil is wet. After allowing a "soaking in" period the turves shall be lightly and evenly firmed with a wooden tamper so that the underside of the turf mat and the wet soil surface are thoroughly bonded.

The finished level of the turf shall conform to the levels indicated. Where the turf meets paths, mowing strips etc the finished level shall be 12mm above. Any inequalities in finished levels owing to variation in turf thickness or uneven consolidation of soil shall be adjusted by raking and/or packing fine soil under the turf, not by topdressing the lawn surface.

7.14.7 Establishment of Turf

During the establishment the Contractor shall maintain the turf as follows:

a) Prevent any pedestrian traffic until grass is well established and uniformly covered with a strong sward of grass.

b) Apply lawn fertiliser e.g. "Readylawn Food", at a rate according to manufacturer's instructions, at monthly intervals during the growing season.

c) Remove weeds and replace soil if necessary.

d) Water regularly: The turf shall not be allowed to dry out for at least three weeks after laying, then it shall be watered normally. 'Normal' watering shall commence when the root zone moisture is depleted to 50% and shall ensure full re-wetting of the root zone to 200mm depth. In summer this will require watering at least daily. Watering shall normally be carried out prior to 7am and shall not be done in hot sunny conditions.

e) Initial mowing shall be carried out when first growth is apparent, with blades set no lower than two-thirds of the height of the grass. Use roll-type mower for first cuts. Grass shall be in a reasonably dry condition. All clippings shall be collected and removed from site. All clippings shall also be removed from adjacent hard surfaces.

f) Edges of all turf areas adjoining cultivated gardens, borders, hand paving, sealed surfaces or landscape structures shall be trimmed to the edge or controlled by herbicide to within 25mm of flat surfaces or 50mm of vertical structures. Grass shall not be allowed to encroach over flat paved or sealed surfaces by more than 25mm.

Areas of turf where there has been a poor establishment shall be re-laid at the Contractor's expense.

7.14.8 Chemical Applications (Weed and Pest Control)

All chemical weed and pest control shall be in accordance with 7.11. Weed control, apart from edge maintenance, shall be by manual not chemical means.

7.14.9 Defects Liability Period

After initial establishment, during and at the end of the two (2) year defects liability period, the following minimum standards shall be maintained:

- All kerb-and-channelled verges shall have grass growth no more than 50mm high, non kerb-and-channelled verges shall have grass growth no more than 200mm high and banks shall have grass growth not more than 250mm high.
- The sward shall be maintained in a healthy, weed-and-disease free state without bare patches.
- Trees and other plantings shall be protected from damage by maintenance or mowing operations and if damaged shall be reinstated within 1 week of the damage occurring.
- Maintenance and mowing operations shall be carried out at times which minimise disruption to the public.

- Maintenance and mowing operations shall be carried out only in conditions with equipment that ensures maintenance of good soil structure, minimum deformation of ground surfaces and ongoing establishment of the grass sward.
- Litter shall be removed prior to commencing maintenance or mowing operations. Highly visible shredded litter shall be removed following maintenance and mowing.
- Grass clippings, when not required to be collected during mowing, shall be spread evenly over the sward.

7.15 LANDSCAPE STRUCTURES INSTALLATION

7.15.1 General

All landscape installations shall be constructed to the appropriate standards (including legal, national or Franklin District Council standards) and according to good practice within the relevant industry.

All installations shall use good quality, low maintenance materials.

At the completion of the work the site must be clean and free of debris.

7.15.2 Fencing

Any reserve with a road frontage in excess of 5m long shall have an appropriate fence composed of materials that will allow visibility through to and into the reserve and not compromise the safety or security of park users.

Bollards and/or planting can be in front of the fence, planting can alternatively be placed behind. Planting must be spaced according to the guidelines and be comprised of species that will not provide opportunity for the concealment of people.

The fence must comply with National Guidelines for Crime Prevention Through Environmental Design in New Zealand (CPTED), part of the New Zealand Urban Design Protocol. All reserve fencing design must be approved by the Manager Parks Assets prior to installation to ensure that it meets the above guidelines. CPTED guidelines are available from Council's Parks and Reserves department.

Fencing may include open weave trellis or wire/grille/pool fencing or any other 'permeable' (i.e. see through) design to a height of 1m with open grill/pool fencing style above 1m in height to a maximum of 1.8m.

Surveillance and sightlines must be maintained so that areas of the reserve are not cut off or shielded by solid fencing.

Solid wall fencing is only permitted to a height of 800mm. Above that height, other design elements such as wire, pool fencing, open trellis must be used.

Where there is a demand for fencing, the Developer must ensure that the construction of fences abutting public reserves adds to the amenity of the public open space and provides

security through the mechanism of passive resident surveillance. In order to assist passive resident surveillance main living rooms of dwellings should be located to ensure that views of adjoining open space are available.

The above house orientation requirements will be registered as a consent notice on the title of all lots abutting reserves. The condition of subdivision will read: *"Register on the title of Lots x – xx (inclusive), a Consent Notice specifying that any dwelling erected or located on the affected lots shall be located and orientated so as to achieve a reasonable standard of passive surveillance of the adjoining public open space".* Council's Solicitor will prepare the Consent Notice at the consent holder's expense.

Where lots directly abut reserves, design treatments such as landscaping, changes of level, use of different ground surface treatments or low plantings should be used to demarcate the common boundary. Fencing forward of the building line is discouraged.

Where fencing is provided at the subdivision stage, uniform or complimentary fencing heights and style should be utilised along subdivided properties, where these properties abut reserves. The length of the boundary fence abutting the reserve shall either be transparent (as defined in Figure 7D) or designed to the satisfaction of the Council.

The above fencing requirements will be registered as a consent notice on the title of all lots abutting reserves. The condition of subdivision will read: *"Register on the title of Lot x, a Consent Notice specifying that any fence located on or within 1.0 metre of the common boundary between Lot x (Local Purpose/Recreation Reserve to vest in Council) and Lot xx shall be limited to a 1.20 metre high close boarded fence, although a higher fence of transparent nature only, will be permitted with the written approval of the Director – Regulatory Services". ".* Council's Solicitor will prepare the Consent Notice at the consent holder's expense.

A *transparent fence* is one that is see through when viewed from most angles such as post and rail fences, trellis fences and metal pool fences. A transparent fence may be solid up to 1.20 metres and then transparent between 1.20 and 1.80 metres:

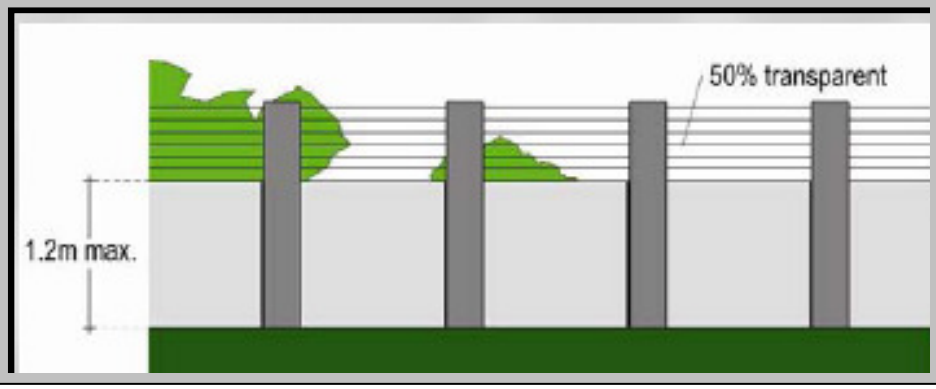


Figure 7D Definition of a Transparent Fence

Disturbance of, or inconvenience to, existing farming activities caused by contract works or traffic shall be minimised at all times. In some cases this may require erection of

suitable fencing. Gates, other fences, and water supplies shall be protected from damage by contract activity and reinstated immediately if damaged. Access of stock to water shall not be interrupted at any time.

The Contractor shall initiate discussion with the Engineer before commencing the fencing operation to clarify style, details, variations and the like.

Stock Proof Fence
The stock proof fence shall be a durable fence which achieves the required purpose of preventing access of all livestock to the contract works area.

At road frontages the fence shall meet the following minimum standard:

- Strainers No. 1 - 2.4m long with stay
- Angles No. 1 - 2.1m long with stays (if required) at fence line
- Stays No. 2 - 2.4m long
- Posts No. 2 - 1.8m long placed at 4.5m c/c max
- Battens 50 x 40 equidistant placing, 0.8m maximum spacing
- Wire High tensile wire, 8 wires

The wires shall be facing the roadside with posts and battens behind.

Strainers shall be set to lean away from the angle of the fence to some extent or at worst be vertical upon completion of the tensioned fence.

In poor soil conditions or variable topography, longer posts, longer strainers and more substantial footings and stays shall be used where necessary to achieve a stable fence.

Additional works/materials due to poor soil conditions are a variation. Anchor or support posts required due to topography are not a variation.

All waste, particularly wire off cuts and the like shall be collected and removed from the site at completion of the fence.

Temporary Stock Proof Fence
The temporary stock proof fence shall achieve the purpose of preventing access to all livestock as required by the adjacent land users, for the duration of the required fence, or the duration of the contract.

At road frontages, no hot wires shall be used unless they are attached at 300mm inside a physical barrier.

The consequences of stock escaping due to inadequate fencing shall be the Contractor's responsibility.

Temporary fences shall be removed from the site at the completion of the contract.

7.15.3 Defects Liability Period

During and at the end of the defects liability period the following minimum standards shall be maintained:

- All permanent or temporary landscape structures shall be structurally sound, safe, function or operational and in a presentable finished form.
- Paint work and other finishes shall be maintained in a clean and presentable finished form. Bolts and other fixtures shall be maintained sound and without loose parts or rough edges.
- All structures shall be free of litter, graffiti, grime, weeds and plant growth or any other foreign matter.
- Borders, footing edges or paving shall be maintained so that no more than 25mm of grass or other vegetation is allowed to encroach. Vertical elements without mowing edges shall have vegetation maintained clear of the structure by no less than 25mm and no more than 75mm.

7.16 LANDSCAPE ENGINEERING STORM WATER DEVICES

7.16.1 General

This section covers the preparation, installation and maintenance of all new and existing engineered storm water devices that have a designed landscape component (LESD). This includes, but is not restricted to, storm water ponds, rain gardens, vegetated filters and swales.

7.16.2 Standard Landscape Specifications

The specifications in this section are supplementary to and take precedence over Sections 7.1 to 7.14 of this document which are to be followed in the site preparation, establishment and maintenance of all LESDs.

7.16.3 Mulch

All LESDs shall be mulched except for areas that are grassed or turfed. All mulch is to be approved by the engineer prior to spreading. Specific LESD mulch applications are as follows:

Amenity Planting
Landscape planting shall only be mulched with bark or aged woodchip mulch where there is no possibility of surface ponding, flooding or mulch travel. Where surface ponding, flooding and mulch travel is possible within this area, biodegradable weed matting shall be used for all landscape planting.

Storm Water Ponds
No synthetic geotextile weed matting is to be utilised in the installation of the landscaping portion of landscaping engineered storm water devices. However, synthetic geotextiles

and other materials may be used, as applicable, to meet functional engineering requirements; for example, for inlets, outlets and high velocity channels.

Mulching
All plants shall be mulched with Council approved 0.5 metre diameter biodegradable weed mat rounds that shall be secured around plants, allowing adequate room around the stem for future growth. Firmly secure fabric mulch with wooden or other biodegradable pegs as per the manufacturer's instructions so that the fabric mulch does not detach from the soil, during inundation and high winds.

Rain Gardens
Rain gardens shall be mulched with Council approved biodegradable weed matting. River rocks (with a diameter of between 50mm and 150mm) may be permissible depending on storm water engineering requirements and long term maintenance requirements.

Swales
Roll-on turfed swales are not to be mulched.

Non-turfed swales are to be mulched according to the surface treatment and storm water flow velocities, swale design, site location and long-term maintenance requirements. Mulching shall be installed as per the manufacturer's instructions.

Vegetated swales planted with Carex sedges shall be mulched with biodegradable weed mat or secure biodegradable mat rounds.

Swales mulched with river rocks shall either be constructed with loose 50-150mm diameter river rocks on biodegradable weed mat

Vegetated Filters
Vegetated filters shall be mulched with biodegradable weed mat. Grassing and roll-on turfing does not require mulching.

7.16.4 Planting

All LESD landscaping shall be designed and approved by the Council's Parks and Reserves Manager.

Grassing
All areas of engineered storm water devices that are to be permanently grassed instead of vegetated with shrubs and/or trees shall be established in accordance with Sections 7.1 to 7.14 of this Code. With the exception of storm water ponds and turfed swales, the grass seed mix shall be as specified in Section 7.13: Grassing and Turfing.

During establishment and maintenance, ensure that no grass debris enters any water body or watercourse.

Storm Water Pond Planting
Permanent storm water ponds shall be planted as soon as possible after the completion of civil works construction. Where site conditions such as unstable soil structures require a

more rapid ground cover than shrubs and trees provide, pond slopes shall be stabilised with grassing first and a staged pond planting permitted as detailed below.

Staged Pond Planting
The staged pond planting shall be:

Stage 1: Grassing
Pond banks shall be prepared and sown with grass seed to establish rapid ground stabilisation.

Where ponds are to be established in nitrogen-deficient soils and at the Engineer's discretion, the seed mixture shall be:

Annual Rye Grass	150kg/ha
Sweet Clover	100kg/ha

All seed shall be certified and less than 12 months old at the time of sowing. The rye grass component is to be certified as having greater than 80% live endophyte content. The Engineer may prohibit the use of seed that has deteriorated because of wetting, fertiliser burning etc.

Otherwise the standard landscaping grass seed specifications shall apply.

The site shall be grassed for at least three months and meet establishment requirements for sown areas prior to landscaping. Marginal zone planting and mulching shall be established at Stage 1.
Stage 2: Landscape Planting
Stage 2 planting shall occur within the Council planting season (2 April to 30 September) once Stage 1 (sown grass) has established. Ensure that no weed species exist throughout the site. Where weed species need to be eradicated either carefully spot spray and/or hand-pull in such a manner that erosion is minimised and surrounding ground cover remains undamaged. The sown grass ground cover shall be spot sprayed to 0.50m diameter for each location where individual plants are to be planted four weeks prior to planting, ensuring that the established grass between spot sprays remains undamaged. Maintain sprayed areas so that no new weed growth exists at time of planting. Install and establish planting and mulching in accordance with this Code.

Rain Gardens and Vegetated Filters
Rain gardens and vegetated filters are to be planted in accordance with this Code.

Swales
Turfed swales shall be prepared, established and maintained in accordance with this Code. Both during and post-establishment, the height of the turf shall be consistently maintained at least fortnightly to designed storm water engineering requirements. Turf shall be of a drought-resistant hard-wearing rye grass based variety with no weed species.

Swales planted with Carex species shall be planted in accordance with this Code.

Spraying and Weed Control
Ensure that no spray enters any water body or watercourse. In respect to storm water ponds where weed species exist both on and within 2.5m adjacent to the normal standard waterline, weeds shall be controlled by either hand pulling or weed eating in such manner that no debris enters any water body or watercourse.

Tree Staking and Protection
Trees shall be tied to two stakes on opposite sides to the tree using biodegradable flexible ties made from either cloth or flax. The ties are to be positioned one third up the tree's main stem and with enough give to move in the wind to ensure adequate trunk development.

7.16.5 Maintenance Requirements

The Developer shall be responsible for the routine maintenance of the landscape planting works including weeding, mulching, replacement of plants and watering during the defects liability period.

Defects Liability Period
The planting defects liability period for all LESDs except storm water ponds, shall be six months from practical completion and council acceptance of landscape planting works or upon release of any implementation bond held for uncompleted landscaping, except when planting is carried out between October 1 and April 1 the defects liability shall be extended for an additional six months.

Where storm water ponds are to be permanently grassed, the defects liability period is a minimum of six months if sown between 2 April and 30 September, if sown between 1 October and 1 April the defects liability shall be extended for an additional six months.

Where a storm water pond planting is implemented according to the staged pond planting (refer to clause above), the Stage 1 defects liability period will extend for a minimum of six months or until such time as the Stage 2 planting is instigated.

The storm water pond Stage 2 defects liability period shall be a minimum of 12 months except when planting is carried out between 1 October and 1 April, the defects liability shall be extended for an additional six months.

The minimum standards required during and at the end of the defects liability period shall be as per this Code.

Weed Free Requirement
The permissible weed regime within an LESD is:

- No plants that are mulched with Council approved biodegradable weed matting, are permitted to have weeds within the mulched area.
- All LESDs other than storm water ponds shall have no individual weed larger than 100mm wide x 100mm high. Furthermore no weeds shall exceed more than five per square metre. Neither perennial grass weeds nor plant pests recognised by the Regional Council shall be accepted at any size.

- Grasses sown as part of landscape planting are permitted. However, no other perennial grass weeds will be accepted.
- Storm water ponds shall have no individual weed larger than 300mm wide x 300 mm high. Furthermore no weeds that are 100mm x 100mm x 100mm or lesser in size shall exceed more than five per square metre. Neither perennial grass weeds nor plant pests recognised by the Regional Council shall be accepted at any size.

Defects Liability Period Inspection

The Developer, after completing all proposed works, shall advise the Parks and Reserves Manager of Council, at least seven working days prior to the proposed commencement of the defects liability period and shall be available for a joint pre-defects liability period inspection.

Defects Liability Period – Final Inspection

The Developer, at the end of the required defects liability period, shall advise the Parks and Reserves Manager of Council, at least seven working days prior to the proposed commencement Council acceptance of the asset and its ongoing maintenance, and shall be available for a joint post-defects liability inspection.

TABLE 7.1: MAINTENANCE SCHEDULE

ITEM		REGIME	FREQUENCY	TERM	SEASON
1.	**Mulching** in groundcover planting areas for bark mulch	Check that mulch has not deteriorated nor travelled and replace where quality has diminished below specification requirements.	Only once after planting.	-	Winter-Spring
2.	**Swale Inspections** for weed and pest control, channel and planting maintenance	Check for problem weeds, dead plants, pest damage, replacement and remediation needs. If turfed, mow to required height.	Monthly	Up to 10 years	Late Spring or early Autumn
3.	**Other LESD Inspections** for weed and pest control, planting maintenance, tree maintenance	Check for problem weeds, dead plants, pest damage, pruning and replacement needs.	6 Monthly	Up to 10 years	Early Autumn
4.	**Compliance Inspections**	Inspect that the planting scheme meets the design intentions (screening, views etc). (See also 6 below).	Annually	The life of the planting scheme	Early Autumn
5	**Weed Control**	Manual removal of weeds or 'knock down' herbicide. No spraying near waterways.	6 Monthly	Up to 10 years.	Late Spring and early Autumn if possible.
6	**Weed Control**	Manual removal of weeds or 'knock-down' herbicide. No spraying near waterways.	Annually	The life of the planting scheme.	Late Spring or early Autumn.
7	**Weed Control – Marginal and Wet Zones**	Manual removal of weeds only ensuring minimal bank erosion and damage to existing plantings occur. No spraying permitted. Ensure no debris enters waterways.	6 Monthly	Up to 10 years.	Late Spring and early Autumn if possible.

ITEM		REGIME	FREQUENCY	TERM	SEASON
8	**Weed Control – Marginal and Wet Zones**	Manual removal of weeds only ensuring minimal bank erosion and damage to existing plantings occur. No spraying permitted. Ensure no debris enters waterways.	Annually	The life of the planting scheme	Late Spring or early Autumn
9.	**Fertiliser** (in planting areas)	'Nitrophoska Blue' at 100g/m^2 on shrub planted areas or 100g/tree.	Once only at start of second growing season or after replacement planting.	-	Late Spring.
10.	**Restaking Trees**	Replace damaged stakes and re-tie where ties are damaged.	Annually	Up to three years from planting.	Autumn
11.	**Plant Replacements**	As per the planting plan.	Annually	Up to three years.	Winter
12.	**Plant Replacements**	When plants are removed for any reason, re-planting options should be considered, taking into account the original design intent of the planting scheme or resource consent. (See also 8 below). Species selected should be based on the existing species range.	Periodically as determined from inspections.	From three years for the life of the planting scheme.	Winter
13.	**Pruning Plants**	Limb or trim only where necessary to maintain visibility to site or growth of other species. Maintenance of full ground cover is essential. Prune large specimen trees according to good arboricultural practice, maintaining their natural form. *No topping of trees permitted.*	Periodically as determined by inspections.	For the life of the planting scheme.	Spring/Autumn

ITEM		REGIME	FREQUENCY	TERM	SEASON
14.	**Plant Removal** (where necessary to retain visibility, reduce overcrowding or for replacement of over-mature trees or plants).	Complete removal is generally preferable. Avoid damage to other plants while undertaking the removal.	Periodically as determined by implementation programme or inspection.	For the life of the planting scheme.	Autumn

PART 8: POWER, TELEPHONE AND GAS

8.1 SCOPE

The technical specifications of the network utility organisations shall be deemed to be an appendix to this code.

8.1.1 General Requirements

(a) The developer is required to make all arrangements with the appropriate authorities for the supply and installation of electric power, and to the extent applicable for the provision of telephone and gas reticulation.

(b) Electric Power.
The supply of electric power shall generally be made by means of an underground system. Ducts shall be installed at the time of road construction to the requirements of the network utility operators. Sites for power transformers and switching stations shall be provided as and where required. Power transformers shall not be placed over other services in the berm.

Adequate provision shall be made for road lighting to all roads within the development.

Access to power line support structures is necessary for maintenance purposes and as provided for by the Electricity Act 1992. Because this access may require the use of heavy vehicles, development plans should be discussed at an early stage with the network company concerned. Consultation should also be sought on the likely effect of power conductors above future buildings.

(c) Telephone.
Arrangements shall be made with Telecom New Zealand (or other approved agency) for the telephone reticulation. 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 will be supplied to 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.

(d) Gas.
Where an existing gas supply is within 100m of a development, the developer shall arrange for gas reticulation within the development unless it can be demonstrated that it is not practicable or economically feasible to do so.

8.1.2 Approval Conditions

Before a Certificate of Compliance is issued, either the relevant reticulated services shall have been completed or the developer shall provide satisfactory evidence to the Council that the network utility operator is prepared to reticulate the development and that agreement on the financial arrangements for the installation of the supply has been reached.

8.1.3 Licensed Network Operators

Network services shall be installed, operated and maintained by licensed network utility operators and the developer shall certify which licensed network utility operator such network services within the development have been vested in for installation, operation and maintenance.

Should the vesting of network services within a development rest with a licensed network operator other than the owner of a network to which such network services are to be connected, Council will require written confirmation of the following, prior to issuing a certificate of completion.

(a) That agreement has been reached with the licensed owner of the network to which the development network is to be connected and that a connection can be made available to the boundary of the development; and

(b) That agreement has been reached that all the needs of the licensed owner of the network to which the development network is to be connected have been met for future extension to that network including increased capacity.

8.1.4 Underground Cabling

Where the supply is by underground means the cable laying shall be facilitated by the installation of pipe ducts. These are to be installed by the developer at road crossings in the positions required by the network utility operator. Duct pipes in the line of a proposed cable may also be required under paved drives, private ways, and accessways if the installation of the paving cannot be deferred until after the installation of the cables. Materials for ducting and the sizes of ducts shall comply with the requirements of the network utility operator.

Where a water or gas main is on the kerb side of a proposed cable, delaying the installation of service connection pipes will facilitate laying of the cable.

Copies of the scheme plan of the subdivision shall be forwarded by the developer to the network utility operator at an early date to facilitate the design of the reticulation.

It is important that the network utility operator be advised by the developer of any amendments to the scheme plan. Information, when available on the type of dwellings and likelihood of more than one dwelling on any lot, will be valuable for design purposes.

In preparing the engineering plans due regard shall be given to the requirements of the network utility operator as to:

(a) Minimum cover to cables.

(b) The network utility operator's desired position for the cable within the road berm.

(c) The minimum separation distances between power or telephone cables, and gas or water mains.

(d) The width of berm which must be clear of other services and obstructions to enable efficient cable laying operations.

Reference should be made to each network utility operator for their specific requirements.

8.1.5 Power Transformers and Switching Stations

These should be sited within the road berm or on land which will legally become part of the road but which is set back outside the normal road line. Alternatively separate lots (public utility reserves) or easements over private property may be used.

8.1.6 Conversion to Underground on Existing Roads

Where a proposed development fronts on to an existing road, the conversion of overhead reticulation to underground will in some instances be desirable. Agreement on the feasibility and benefit will first be agreed between the network company and the Council.

8.1.7 Industrial and Commercial Developments

The servicing requirements for industrial and commercial areas are often indeterminate. Close liaison between the developer and the network company is advisable, particularly immediately before cabling is installed so that changes can be incorporated to accommodate extra sites or the requirements of a particular industry.

8.2 LOCATION AND BACKFILLING OF SERVICES

8.2.1 Location

The position of services in the road shall conform to Franklin District Council Drawing R2. All services shall be within 100mm of the recommended location.

8.2.2 Backfilling of Trenches

Trenches shall be built up with an approved backfill material in 150mm layers placed and compacted simultaneously on each side of the pipes, in order to give a balanced loading. Full use shall be made of hand operated compaction tools.

Appendix A

Statement of Professional Opinion as to Suitability of Land for Building Development

FRANKLIN DISTRICT COUNCIL

Statement of Professional Opinion as to
Suitability of Land for Building Development

Subdivision ……..……..……..

Owner ……..……..……..

Location ……..……..……...

I, ……of ……..……..……..
(full name)

……..……
(Name and address of firm)

Hereby confirm that:

1. I am a Chartered Professional Engineer experienced in the field of soils engineering and was retained by the subdividing owner as the Soils Engineer on the above subdivision.

2. The extent of my inspections during construction, and the results of all tests carried out are described in my report dated …… .

3. In my professional opinion, not to be construed as a guarantee, I consider that:

* (a) The earth fills shown on the attached Plan No. ……. have been placed in accord with sound and accepted principles in compliance with the Approved Engineering Drawings and Specifications.

* (b) The completed works give due regard to land slope and foundation stability considerations.

* (c) The filled ground is suitable for the erection thereon of residential buildings not requiring specific design in terms of NZS 3604 and related documents providing that:

(i) ……..
(ii) ……..
(iii) ……..

* (d) The original ground not affected by filling is suitable for the erection thereon of residential buildings not requiring specific design in terms of NZS 3604 and related documents providing that:

(i) ……..
(ii) ……..
(iii) ……..

4. This professional opinion is furnished to the Council and the subdividing owner for their purposes alone on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any dwelling.

Signed: …… Date:

(Member ID ……)

Appendix B

Design Certificate – Land Development/Subdivision Work

FRANKLIN DISTRICT COUNCIL

Certificate of Completion of Development Works

I, ... being registered under the provisions of the Chartered Professional Engineers of New Zealand Act (2002)/ Cadastral Surveyors Act (2002) and currently holding an Annual Practicing Certificate, hereby certify that all works (including services and roading) shown on plans numbered ..... and relating to the subdivision/development of .....
.....
.....
.....
have been constructed in accord with sound and accepted principles and in accordance with the approved drawings (and approved amendments thereto). All works comply with the provisions of the Standard Requirements of the Franklin District Council for the Construction of Development Works.

_____
Chartered Professional Engineer

_____
Licenced Surveyor

Date: .....

Appendix C

Certified Development Check Lists

Appendix D

Assets to Vest Sheets

Appendix E

Electronic As-Built Requirements

Appendix F

Road Asset Data Standard Specification

Appendix G

Standard Detail Drawings

Appendix H

Standards and Guidelines Relevant to the Road Network