Franklin
DISTRICT COUNCIL

Franklin District Code of Practice for Subdivision & Development

Approved for release:

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CHIEF EXECUTIVE OFFICER
FRANKLIN DISTRICT COUNCIL

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Code of Practice
for
Subdivision & Development

Edition Four - December 1999

The Franklin District Code of Practice for Subdivision & Development clarifies the engineering requirements of Franklin District Council as per clause 101.1.(b) of NZS 4404. To assist clarity clause reference numbers follow the same numbering system of NZS 4404.

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FRANKLIN DISTRICT COUNCIL
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PART 1 : GENERAL REQUIREMENTS AND PROCEDURES

101 SCOPE

101.1 This Development Code gives a means of compliance with the objectives and performance criteria of the *District Plan*

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

Parts 2 to 6 of this Standard define requirements relating to particular types of services to be provided, and the means of compliance.

102 INTERPRETATION

102.1 General

102.1.1 Where any other standard named in this standard has been declared or endorsed in terms of the Standards Act 1965, then:

(a) Reference to the named standard shall be taken to include any current amendments declared or endorsed in terms of the Standards Act 1965; 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 1965 as superseding the named standard, including any current amendments to the superseding standard declared or endorsed in terms of the Standards Act 1965.

102.1.2 The word "shall" indicates a requirement that is to be adopted in order to comply with a Standard.

102. 4 Definitions

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

AEP Annual Exceedance Probability which is the probability of the 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 registered engineer appointed by the developer to provide the necessary certifications with respect to design, supervision, and testing required.
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.

COLLECTOR ROADS	Locally preferred routes between or within areas of population or activities, generally distributing traffic between the arterial roads and the local road system.
COUNCIL	Means Franklin District Council.
DEVELOPER	Means the person who owns the land on which the development is occurring or his representative.
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.
DISTRICT ARTERIAL ROADS	Roads connecting the regional arterial routes to industrial or residential zones and can connect one area to another.
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 sanitary drainage or stormwater drainage, and "drain" has a corresponding meaning.
EARTHWORKS	Means any alteration to the contours, including the excavation and backfilling or recompaction of existing natural ground and the stripping of vegetation and topsoil.
ENGINEER	Means the Engineer, his deputy 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 a general term used to describe the material in the vicinity of the surface of the earth whether soil or rock.
HOUSEHOLD UNIT OR DWELLING UNIT	Means any building or group of buildings, or part thereof used, or intended to be used principally for residential purposes and occupied or intended to be occupied by not more than one household.
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.
LOCAL ROADS	All roads servicing residential and rural development other than District Arterial and Collector Roads.
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 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 stormwater runoff selected to provide a reasonable degree of protection to the surrounding land. In most cases this flow will be piped or contained within relatively narrow confines under public control.
PRIVATE ROAD	Means any roadway, place, or arcade laid out within a district on private land by the owner thereof intended for the use of the public generally
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.
REGISTERED ENGINEER	Means an engineer who is registered under the Engineers Registration Act 1924 who holds a current Annual Practising Certificate.
REGIONAL ARTERIAL ROADS	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 runoff in excess of the primary design flow and 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 is normally considered advisable 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 25 KPa).
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.
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 1991 or Section 305 of the Local Government Act 1974 being a plan of a subdivision in form for deposit under the Land Transfer Act 1952 or with the Registrar of Deeds, and includes the title plan under the Survey Regulations 1972.
URBAN AREA	Means an area which is used or intended to be used solely or principally for residential, commercial, industrial or any other similar urban purposes or any two or more such purposes.
WALKWAYS	are all footpaths on reserves and include pedestrian accessways.

104 DEVELOPER'S REPRESENTATIVE

104.1 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.

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

104.2 The developers representative shall be a registered engineer or registered surveyor except for minor works as per 103.4.

104.3 Geotechnical investigations, and completion and site stability reports shall be prepared by a registered professional engineer experienced in geotechnical engineering and who has professional indemnity cover.

104.4 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 New Zealand Certificate Engineer (Civil) or New Zealand Certificate Land Surveyor or suitably experienced draughtsman approved by Council. Completed minor works can also be certified by the above.

104..4.1 Drainage lines less than 20m in length situated completely within the lot may be certificated by a registered drain layer.

105 PROCEDURE FOR APPROVAL OF THE DEVELOPMENT AND FOR ITS DESIGN AND CONSTRUCTION

105.5 Documents to be submitted for approval

105.5.1 As a condition of its approval of the scheme plan, 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, stormwater drainage, water supply, sewage disposal, power, telephone, and gas reticulations. Council will then evaluate the proposals and set required scheme plan conditions to be met.

105.5.2 To satisfy the scheme plan conditions two sets of fully detailed engineering documents suitable for construction purposes shall initially be submitted to Council for approval. These documents shall include:

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

Site regrading (including silt control plans)
Roading
Stormwater Drainage (including catchment plans)
Sanitary Drainage
Water supply and other services
Landscaping plans including any proposed planting in roads and reserves and details of any playgrounds.
Soils engineer's report on the suitability of the land for development, or other reports as considered necessary by the Council. (Such reports may be required prior to subdivisional consent pursuant to Section 92 of the Resource Management Act 1991 and the District Plan.)

(b) "As Built" plans to the requirements of 105.5.3 as and when the various aspects of the work of the development have been completed.

(c) (i) Draughting Standards:

All drawings shall be prepared on standard I.S.O.A1 or A2 drawing sheets (841 mm x 594 mm and 594 mm x 420 mm trim sizes). Approval may be given to smaller I.S.O. size sheets.

In order to make half scale file copies the thickness of lines must be suitable for photocopying. When drafting with inks, nibs finer than 0.25 mm are not to be used. Printing should be spaced sufficiently to retain clarity when reduced with letters not less than 2.5 mm in height when reduced.

(ii) Plan Scales:

The following scales shall be used:

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

(iii) Datum:

All reduced levels shall be in terms of the Department of Survey and Land Information Datum. Levels in these terms shall be shown on the drawings. If a Department of Survey and Land Information 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 public water, sanitary sewer, and stormwater reticulations. If the documents meet the Council's requirements, the Engineer shall approve the documents, and return two copies to the developer endorsed accordingly, and the submitted electronic disc amended to indicate Council's reference numbers for water fittings and manholes

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

105.5.3 Upon completion of construction, copies of As Built plans and a completed As Built checklist in the form of (schedule z) Appendix 'D' of this document are to be submitted by the developer showing the following details as constructed:

(a) Sanitary 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) Stormwater 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.
Cesspits and catch pits.
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.
Stormwater 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.

Cesspits and catch pits.
Retaining walls and materials.
Median islands.
Extent of formation.
Subsoil drains including discharge points.
Extent of seal.

Extent and depth of any undercutting.

Road lights.
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.
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 Mapping Grid.

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 Sections 224(c) or 222(1) respectfully of the Resource Management Act 1991, or Section 306 of the Local Government Act 1974.

105.6 Number of copies of documents required

105.6.1 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 MAPIFNO which will accept information saved in either:
(a) MID/MIF format; OR
(b) DXF (Autocad version 12) format.
If your system uses a different format, please check with Council prior to submitting.

Refer to clauses 105.5.2 and 105.5.3 for details required.

105.7 Electronic As Built Requirements

105.7.1 For details see Appendix F.

105.8 Approval before commencing work

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

(a) The Council has approved a scheme plan; and

(b) The Engineer has subsequently approved the engineering drawings, specifications and calculations for the specific work that is required as per clause 104.1.1.

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 scheme plan, or prior to the approval of all of the engineering plans, the Engineer will, in such circumstances, approve the engineering drawings, specifications and calculations necessary to enable the work to proceed, subject to the engineering drawings, specifications and calculations being satisfactory.

105.9 Notification of contracts and phases of work

105.9.1 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.

105.9.2 The developer shall notify the Certifiying 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.
Prepared earthworks and subsoil drainage prior to filling.
Completed earthworks.
Commencement of drainage reticulation.
Commencement of water reticulation.
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.

105.10 Supervision of work

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

105.10.2 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. A field amendment may be agreed to for minor deviations safety issues are of concern.

105.12 Connection to existing services

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

The formation, metalling, kerbing and channeling of new roads shall be extended out beyond the site to connect to existing roads and shall include the provision of stormwater disposal from the existing road. The normal 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 are required, the cost of carrying out these shall be subject of a special agreement between Council and the developer.

The connection to the existing water reticulation shall be made by a Council's approved contractor and the full cost met by the developer.

The connection to the existing stormwater and sanitary drainage reticulation may generally be carried by the developer under the supervision of the Certifying Engineer. Each property connection to the stormwater and sanitary drainage reticulation or system shall be carried out by the developer under the supervision of the certifying Engineer.

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 consent to enter shall be provided to the Engineer prior to the work commencing.

The developer shall give the Council five working days notice of intention 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.

105.13 Emergency procedures

105.13.1 If during the course of construction, a situation arises which may endanger the security of public or private property or the operation of a public facility, the Engineer may instruct the developer to undertake such remedial measures as is considered necessary to abate the danger. Such work will be at the cost of the developer.

105.14 Damage

105.14.1 Damage caused by new works shall be the liability of the developer and shall be repaired on the instruction of the Engineer. If remedial work is not commenced forthwith, the Engineer may carry out the work at the developer's cost. This provision includes the removal of mud and debris from existing roads and environmental damage caused by siltation of stormwater system.

105.15 Testing

105.15.1 Any work required to be tested by or in the presence of the Engineer shall be pre-tested and proved satisfactory to the developers representative before a official test by the Engineer is requested. Two working days notice shall be given to Council's engineer for official testing or inspections. **Note:** In the event of tests proving unsatisfactory, subsequent retesting or re-inspections may result in a charge.

105.17 Road names

105.17.1 The developer shall erect nameplates, as approved by the Engineer, at all road

intersections, in locations which are visible from all approaches. This work will be required to be completed prior to the issue of the Section 224(c) Certificate.

The standard nameplate shall be as shown on Franklin District Council Drawing R 1.

105.18 Maintenance

5.18.1 The developer shall be responsible for the maintenance of all the works until they are formally accepted by the Engineer. The duration of the Maintenance Period shall be:

(a) for the total development a period of three (3) months from the date on which the developer and the Engineer agree that the works have been completed; or

(b) for works that have been bonded for one month after the date of the release of all Bonds for the completion of uncompleted work.

105.18.2 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.

105.18.3 At the completion of the maintenance 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 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.

105.19 Approval of uncompleted work

105.19.1 Where in the opinion of the Engineer it is desirable, the Engineer may approve uncompleted work.

105.20 Certification on Completion

105.20.1 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.

106 BONDS AND CHARGES

106.1 Uncompleted works bonds

106.1.1 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 at the developer's cost.

10.6.1.2 Council may accept in certain circumstances a cash bond for uncompleted works. The amount of bond to be determined by Council.

10.6.2 Charges

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

PART 2 : EARTHWORKS AND FOUNDATIONS

201 SCOPE

201.1 This Part of this Standard 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.

201.2 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.

202 GENERAL

202.1 Refer to Section 4 of Council's District Plan for matters concerning the layout of developments. The choice of final landform is dependant 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.

202.2 The New Zealand Standard Code of Practice for Earthfill for Residential Development (NZS 4431) provides a means of compliance with Council's requirements for earthfills.

The operative document for earthworks in the District is the ARC Environment Proposed Regional Plan for Erosion and Sediment Control, dated October 1993. This document requires that the ARC Environment "Erosion and Sediment Control Guidelines for Earthworks" be adopted by Developers. When the Proposed Regional Plan for Erosion and Sediment Control is adopted the adopted document shall be used.

202.3 The Franklin District Council District Plan may require appraisals of the stability and suitability of the land before development consent is given. Many of the requirements in this part of these standards will therefore be relevant to the pre-consent stages of a development (particularly clauses 204 and 205).

203 TECHNICAL RESPONSIBILITIES

203.1 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.

203.3 The construction control testing shall be carried out by a competent person under the control of the Soils Engineer. All relevant tests shall be made by Telarc registered laboratories.

204 SITE INVESTIGATIONS

204.1 Preliminary site evaluation

204.1.1 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.

204.2 Specialist services

204.2.1 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.

205 PLANNING AND DESIGN

205.1 Landform

205.1.1 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.

205.2 Soil investigations

205.2.1 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.

205.2.2 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.

205.2.3 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.

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

205.3 Stability criteria

205.3.1 *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.

205.3.2 *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.

205.3.3 *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 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 (refer 207.2).

205.3.4 *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. *See also 401.*

205.4 Quality of filling material

The majority of soils, other than organic material, are potentially suitable for fillings under controlled conditions. See also 205.5.1 for compaction standards.

205.5 Compaction standards for fill material

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

(a) *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.

(b) *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 50 kPa on completion of construction.

(c) *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.*

(d) *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.)

205.6 Erosion control

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

205.6.1.1 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. 2 and constructed to the satisfaction of ARC Environment, or Environment Waikato., 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 or Environment Waikato. Such approval shall be obtained by the developer.

205.6.1.2 Two copies of the location and details of the silt retention structures, together with a copy of the ARC Environment or Environment Waikato R.C. approval if required, shall be forwarded to the Engineer prior to his giving approval for any earthworks on

site.

205.6.1.3 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, or Environment Waikato. The obtaining of and compliance with, the water permit will be the responsibility of the developer.

205.6. 1.4 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.

205.6.3 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 stormwater 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 or Environment Waikato.

(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.

205.7 Provision for permanent services

205.7.1 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.

205.7.2 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 stormwater over the batter. Water from stormwater systems shall be prevented from flowing into a fill or into natural ground near the top or sides of a fill and no stormwater soak pits shall be constructed in a fill whereby the stability of the fill might be impaired.

205.7.3 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.

206 CONSTRUCTION PROCEDURES

206.1 Specifications

206.1.1 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). Adequate provision shall also be made for the control of erosion, surface water runoff and siltation.

206.1.2 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 stormwater 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.

206.2 Fill construction

206.2.1 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.

206.2.2 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.

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

206.2.4 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.

206.3 Temporary drainage and erosion control

206.3.1 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 stormwater 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 stormwater 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 retopsoiled and grassed or hydroseeded as soon as possible after completion of the earthworks and drainage works.

206.4 Inspection and quality control

206.4.1 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.

206.4.2 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:-

1. Fill is not placed over soft or organic material

2. All areas of existing ground showing seepage or potential seepage have relief drains provided

3. Compaction operations are systematic, the water content of fill material is suitable and the degree of compaction is consistently satisfactory

4. Unsuitable materials as defined by the Engineer are not being used as fill.

206.4.3 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.

206.4.4 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:

(1) During the first 4000 m^3 of filling carried out on the project.

(2) On the final layer of not less than 1.0 m depth.

(3) When soil type or conditions are variable.

(4) When the Soils Engineer or his inspector is in any doubt about the adequacy of construction methods or soil properties.

(5) When a decision to reject work based on the judgment of the Soils Engineer or his inspector is disputed.

(6) When relatively small quantities of fill are concentrated in localised areas or placed discontinuously over a long period of time.

206.4.5 The locations of tests shall be decided by the Soils Engineer or his 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.

206.4.6 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 his report on completion of construction.

207 FINAL DOCUMENTATION

207.1 'As-built' drawings

207.1.1 On completion of the earthworks an as-built' plan conforming to the requirements of 105.5.3 shall be prepared.

207.2 Soils Engineer's report

207.2.1 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.

PART 3 : ROADS

301 GENERAL DESIGN CONSIDERATIONS

301.1 Introduction

301.1.1 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 Standard 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.

301.1.2 Sections 301 and 302 apply to all roads in the District. Section 303 gives the variations that apply to rural roads.

301.1.3 Road layouts shall comply with the relevant rules in the District Plan.

301.1.4 All roadwork should be in accordance with NZS1428.4 "Design for Access and Mobility" and NZS4121 "Design for access by Disabled Persons".

301.2 The road pattern

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

301.3 Parking

301.3.1 For matters pertaining to parking refer to Table 3.1 and 3.2 herein, and Section 35 of the District Plan and Table 3.2 herein.

301.4 Carriageway, road and formation widths

301.4.1 For matters pertaining to carriageway, road and formation widths refer to Table 3.1 herein, and Franklin District Council Standard Cross Section Plan.

TABLE 3.1 –

MINIMUM ROAD PROFILE

Indicative Traffic Volume (1)	Carriageway Width m (exclusive of parking)	Parking Provisions Within Road Urban Only (4)	Kerbing			Footpath Provision			Cycle path Provision (2)	Berm Width (Each Side) (6)
			Urban	Countryside Living (Town)	Countryside Living (Rural)	Urban	Countryside Living (Town) (5)	Countryside Living (Rural) (5)		
Up to 300 veh/d	6.0 m	0.75 hardstanding berm space per site	Mountable/ upright with drainage channel (3)	Mountable/ upright with drainage channel	Open water table refer detail A sheet 45	1.4 m wide footpath (one side)	1.4 m wide footpath (one side)	Not required	Not required	4.5 m minimum
300 to 1,000 veh/d	6.0 m (7)	1.0 hardstanding berm space per site	Mountable / upright with drainage channel (3)	Mountable/ upright with drainage channel	Open water table refer detail A sheet 45	1.4 m wide footpath (both sides)	1.4 m wide footpath (one side)	Not required	Not required	6.0 m minimum
1,000 to 3,000 veh/d	6.5 m (7)	1.0 hardstanding berm space per site	Mountable / upright with drainage channel (3)	Mountable/ upright with drainage channel	Open water table refer detail A sheet 45	1.4 m wide footpath (both sides)	1.4 m wide footpath (one side)	1.4 m wide footpath (one side)	Not required	6.0 m minimum
More than 3,000 veh/d (with access to residential lots) (Collector Road)	7.0 m (7)	1 hardstanding berm space per site	Upright with drainage channel (3)	Mountable/ upright with drainage channel	Open water table refer detail A sheet 45	1.4 m wide footpath (both sides)	1.4 m wide footpath (one side)	1.4 m wide footpath (one side)	If required by an approved cycleway plan 2.0 m cycle path one side only in the berm or two 1.5 m wide cycle lanes marked on the carriageway	7.0 m minimum
3,000-7,000 veh/d (Arterial Road)	Dual carriageway (2 x 5 m minimum) plus median. Indented bus bays on bus route	If required parking to be provided in areas/locations which can be exited in a forward direction and includes parallel parking	Upright with drainage channel (3)	Mountable/ upright with drainage channel	Open water table refer detail A sheet 45	1.4 m wide footpath (both sides)	1.4 m wide footpath (one side)	1.4 m wide footpath (one side)	2.0 m cycle path one side only in the berm or two 1.5 m cycle lanes marked on the carriageway	7.0 m minimum
Over 7,000 veh/d	Subject to specific design	Subject to specific design	Subject to specific design (3)	Subject to specific design	Subject to specific design	Subject to specific design	Subject to specific design	Subject to specific design	Subject to specific design	6 m

Footnotes:
(1) Indicative traffic volumes includes all potential future traffic generated from the catchment accessed by the road (assessed at 10 v.p.d./dwelling unit).
(2) Where cycle use can be anticipated, an uninterrupted cycle path of 1.5 m in width is required along the kerb (to be delineated by a 150 mm wide white line).
(3) Compliance with Section 331(2) of the Local Government Act 1974 making provision for disabled persons is required.
(4) For dimensions of parking spaces, refer to Table 3.2.
(5) Footpath is to be a minimum of 2.5 m from the kerb.
(6) Berm width includes footpath and off carriageway parking provision.
(7) For all urban through roads minimum carriageway width shall increase by 2 metres, which may satisfy the parking requirements.

TABLE 3.2

PARKING SPACE DIMENSIONS

All dimensions in metres

Type of Parking		Width of Parking Space	Kerb Overhang	Total Depth of Parking Space (including. Overhang)	Maneuvering Space	Total Depth
Angle						One Row
90º	Nose in : left turn	2.5 2.6 2.8	1.0	4.9	7.7 7.0 6.6	12.6 11.9 11.5
90º	Nose in : right turn (or blind aisle)	2.5 2.6 2.8	1.0	4.9	8.4 7.9 7.5	13.3 12.8 12.4
75º	Nose in	2.6 2.7 2.9	1.0	5.2	6.3 5.2 4.1	11.5 10.4 9.3
60º	Nose in	2.9 3.0 3.2	1.0	5.2	4.1 3.5 3.2	9.3 8.7 8.4
45º	Nose in	3.5 3.7 3.9	0.8	4.9	2.6 2.4 2.3	7.5 7.3 7.2
30º	Nose in	4.4 4.6 5.0 5.2 5.6	0.6	4.0	3.0 2.5 2.4 2.4 2.3	7.0 6.5 6.4 6.4 6.3
0º	Parallel	2.1	0.4	6.1	3.7	6.2

From Table 35b District Plan

301.5 Carriageway geometrics

301.5.1 Road alignment

For details of road geometry requirements refer to Section 302.

301.6 Pedestrian and bicycle traffic

301.6.1 Shall be 1.4 m width, 125 mm thick using 20 Mpa concrete on 30 mm compacted layer of GAP 20.

301.7 Road lighting

301.7.1 Road lighting in residential areas is to be designed to provide for road traffic safety, and 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.

301.7.2 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.

301.7.3 Road lighting standards shall preferably be constructed of light break-away material and be positioned on the side of the footpath most distant from the carriageway.

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

301.7.5 Pedestrian accessways shall have road lights located at each end and shall have lights installed at not more than 50 m centres along their length.

301.7.6 Lighting of roads, service lanes and pedestrian accessways shall be in accordance with NZS6701: 1983 and related documents. The recommendations of Section 9, NZS6701 shall apply to all roads and service lanes.

301.8 Drainage

301.8.1 A stormwater drainage system shall be installed to cope with a 20% AEP storm. The system shall be designed for the road area and all the contributing catchment. The road may act as a secondary flow path and as a flood retention area for storms greater than the 20% AEP storm.

301.9 Landscaping

301.9.1 Berms may be planted provided the placement of the trees complies with the requirements of Franklin District Council Drawings P4 and P5.

301.9.2 Similar types of trees should be planted to give a uniform street appearance.

302 ENGINEERING DESIGN

302.1 Road geometry

Road configuration shall comply with the requirements of the District Plan.

302.1.1 *Longitudinal gradients*

302.1.1.1 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 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 16.5%. 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.

302.1.2 *Vertical curves*

302.1.2.1 Vertical curves shall generally comply with the minimum requirements of clause 3.7 of NRB Code of Practice Design for urban roads except that 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.

302.1.3 *Curvature and sight distance*

302.1.3.1 Where curves of less than 60m 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.

302.1.3.2 Extra Widening shall be applied in mountainous/rolling alignment where curve radii is less than 150m.

302.1.3.3 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 drivers eye, 1.15 metres 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 (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 are not available.

** Distances are based on the Approach Sight Distance and Safe Intersection Sight Distance tables in NAASRA, Intersections At Grade (1) assuming Reaction Times of 1.5 seconds on local roads with operating speeds up to 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.

302.1.4 *Superelevation and crossfall*

302.1.4.1 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.

302.1.4.2 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.

302.1.4.3 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.

302.1.4.4 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.

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

Sealed pavement	3%
Unsealed pavement	6%

302.1.4.6 Superelevation appropriate to the design speed shall be applied on all horizontal curves.

The superelevation shall not exceed 10%.

302.1.5 *Horizontal curves*

302.1.5.1 In urban residential areas horizontal curves may be circular with a minimum centreline radius of 45m, in short cul-de-sacs less than 100m this may be reduced to 15m. For collector routes curves should be a minimum of 80m.

For all industrial areas horizontal curves may be circular with a minimum centreline radius of 80 metres. 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.

302.1.5.2 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.

302.1.6 *Carriageway crossfall*

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

302.1.6.2 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.

302.1.7 *Intersection design*

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

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

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.

302.1.7.2 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 6 m in urban areas.

302.1.7.3 Wherever practicable the longitudinal gradient within 30m of intersections should be less than 5% and preferably less than 2%.

302.1.7.4 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.

302.1.7.5 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 also be specifically designed.

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

302.1.8 *Cul-de-sac heads*

302.1.8.1 The cul-de-sac head shall incorporate a minimum 10 m outside radius turning circle.

302.1.8.2 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.

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

302.1.8.4 Parking shall be provided at the ratio required by Table 3.1 for every lot around the cul-de-sac head to the dimensions contained in Table 3.2. Any central area provided for parking or beautification should be specifically designed.

302.1.9 *Crossfall on grass berms*

302.1.9.1 The shape, slope and vegetation of berms shall be such as to provide satisfactorily for stormwater 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%.

302.1.9.2 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.

302.2 Road pavement

302.2.1 *Design life*

302.2.1.1 The pavement shall have a design life of not less than 20 years.

Types of pavement

(a) Rigid pavement. Design to conform with the State Highway Pavement and Rehabilitation Manual.

(b) 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.

An alternative type of masonry unit so designed as to enable grass to grow through the surface may be accepted for berm parking and similar use. For design information refer to manufacturers specifications.

302.2.2 *Flexible pavement design*

302.2.2.1 The CBR design method as given in "State Highway Pavement Design and Rehabilitation Manual" shall be used. A modified version of Figure 3 of the Manual shall apply and this is shown on Franklin District Council Drawing R3.

Use of other than soaked CBR values of the pavement subgrade will be to the approval of the Engineer.

Specific engineering design of pavements may be permitted with the approval of the Engineer.

302.2.3 *CBR tests*

302.2.3.1 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.

302.2.3.2 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 one metre 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.

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

302.2.5.1 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

302.2.5.2 Aggregate Specifications:

SUMMARY SCHEDULE OF AGGREGATE MATERIAL PROPERTIES

TABLE 1: 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 2: AGGREGATE GRADING ENVELOPE (Test Method NZS 4407 : 1991 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: 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

302.2.5.2.1 The use of alternative aggregates in forming a stabilised pavement may be permitted

with the approval of the engineer subject to specific design and a minimum treated soaked CBR of 100 is obtained.

302.2.5.3 Limerock shall not be accepted as GAP 65 aggregate.

302.2.6 *Pavement-layer construction*

302.2.6.1 The minimum pavement depth on unmodified sub-base is 250 mm.

302.2.6.2 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.

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

302.2.6.4 Unless approved otherwise by the Engineer, Benkleman Beam tests will be made 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 3.4, or any individual reading is more than twice the Maximum Reading, the length of pavement concerned shall be reconstructed to conform with this standard.

TABLE 3.4

MAXIMUM BENKELMAN BEAM READING	
	Maximum Reading mm
All roads with less than 300 v.p.d. potential traffic generated - except industrial roads	2.0
Rural roads not included above	1.5
All other roads	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.

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

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

302.2.7 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 residential and Industrial roads, shall be finished in hot laid asphaltic concrete over a one coat chip seal as set out in 302.2.7.2, unless otherwise approved by the Engineer.

All rural roads shall be finished in first and second coat chip seals as set out in 302.2.7.1, unless otherwise approved by the Engineer.

302.2.7.1 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 Clause 105.

302.2.7.2 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 (see 302.2.6). 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.

302.3 Traffic services

302.3.1 All road construction will require the installation of appropriate painted road markings and delineation aids. The Engineer will specify the requirements in each case. 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).

302.3.2 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 Clause 104.11 and Franklin District Council Drawing R1.

302.4 Bridging

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

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

The width between kerbs or wheelguards shall be as set out in Table 3.8.

All bridges and box culverts over 1 m diameter may be subject to a Building Consent under the Building Act 1991.

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

302.4.3 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.

302.4.4 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.

302.4.5 Installation of bridges or culverts on natural watercourses is generally subject to a Resource Consent from the Auckland (or Environment Waikato) Regional Councils. 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.

302.5 Subgrade drainage

302.5.1 *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.

302.5.2 *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 stormwater system.

302.6 Kerbing and Channelling

302.6.1 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.

302.6.2 Where crossfall is such that stormwater control is required on one side only of the carriageway, kerb and nib only may be installed on the higher side. Special provision for roof water drainage may be required.

302.7 Sumps

302.7.1 Sumps shall be spaced to provide for local rainfall intensities and the channel slope. 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 sump shall be provided:

(1) At the lowest point in a sag vertical curve;

(2) At the end of a cul-de-sac where water falls to the end;

302.7.2 Sumps should normally be connected to a manhole on the stormwater drainage system by 225 mm diameter pipes, except that if the stormwater drain is of greater diameter than 1.2 metres and a manhole is not conveniently located the sump lead may be saddled direct to that drain. A direct connection of the sump lead to a stormwater drain with a diameter between 600 m and 1.2 metres diameter will only be permitted in exceptional circumstances, and at the Engineer's discretion. A typical sump design is shown in Franklin District Council Drawings R17, R18, and R19.

302.7.3 On footpaths and accessways, sumps, 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 150 mm diameter will be required, refer FDC Drawing R17.

302.8 Dished channels

302.8.1 *Dished channels in carriageways and parking bays.*

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

302.8.2 *Dished channels with footpaths or accessways.*

302.8.2.1 Low level footpaths and footpaths in pedestrian accessways shall have a dished channel formed along the path edge. The channel shall lead to a 450 mm x 450 mm sump as set out in Franklin District Council Drawing R17.

302.9 Footpaths/Accessways

302.9.1 *Construction of footpaths*

302.9.1.1 Concrete footpaths shall be constructed of concrete to NZS3109 with a 28 day strength of 20 MPa. The minimum depth of concrete shall be 75 mm. A minimum 30°mm 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 1.4 m. Solid masonry paving units may be used providing permanent concrete edging's are used.

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

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

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

302.9.1.5 Footpaths in cul-de-sac that form part of the required cul-de-sac turning area shall be 200 mm thick (refer 302.1.8.1).

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

302.10 Crossings

302.10.1 *Pram and wheelchair crossings*

302.10.1.1 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".

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

302.10.2 *Vehicle crossings*

302.10.2.1 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 and R8.

302.10.2.2 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.

302.10.2.3 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.

302.11 Berms

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

302.11.2 On completion of all other works, the berms shall be spread with a consolidated depth of 100 mm 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.

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

302.12 Service lanes, parking bays, privateways, accessways and cycle paths

302.12.1 *Service lanes*

302.12.1.1 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 stormwater. The pavement construction and surfacing shall be in accordance with 302.2.

302.12.2 *Industrial service lanes*

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

302.12.2.2 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.

302.12.3 *Parking bays*

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

302.12.4 *Pedestrian accessways*

302.12.4.1 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 1.8 m the width of paving shall be 1.4m.

302.12.4.2 Where stormwater is likely to flow along the length of the pedestrian accessway, provision shall be made for the collection and disposal of stormwater.

302.12.4.3 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.

302.12.4.4 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.

302.12.5 *Privateways*

302.12.5.1 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.

302.12.5.2 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.

302.12.5.3 Pavement shall be constructed of 150mm thick concrete. The width shall be as laid down by the District Plan.

Adequate provision shall be made for the collection and disposal of stormwater 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.

302.12.6 *Cycle paths*

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

302.13 Bus bays

302.13.1 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.

302.14 Utility services within urban road reserve

302.14.1 Services installed within the road land shall be confined to the locations indicated on Franklin District Council Drawing R2, or as specified in NZS 4404:1984.

303 RURAL ROADING

303.1 Scope

303.1.1 This part of the Standards sets out the variations to Sections 301 and 302 that apply to rural developments roading. This section includes Countryside Living Activity Areas. They shall apply to all new formations whether on new or existing unformed legal roads.

303.1.2 Where the Council considers that a development will significantly increase the traffic volume on an existing road, it may require a contribution towards improvements on the road serving the development to the requirements of these standards.

303.2 Related documents

303.2.1 All rural roads shall be designed in accordance with Austroads Rural Road Design, Guide to the Geometric Design of Rural Roads which shall be consulted for all background and additional design guidelines.

303.3 Definition of rural roads

303.3.1 For the purposes of this Part of the Standard, rural roads are defined as all roads other than State Highways which are not subject to a speed restrictions of 80 km/h or less.

303.3.2 Kerbing and channel and footpath requirements in Large Lot Residential or Low Intensity Residential Activity Areas and in Rural Residential or Countryside Living Activity Areas shall comply with the requirements of Table 3.1.

303.4 Traffic volume

303.4.1 For convenience in using Table 3.5, roads are grouped according to the volume of traffic using them. For estimated traffic volumes exceeding 2500 vehicles per day current Transit New Zealand State Highway requirements shall apply.

303.4.2 The Engineer will nominate the traffic volume to be considered with regard to the

proposed uses of the land, possible future extensions of the road and the developments anticipated during the design life of the pavement.

303.5 Topography

303.5.1 The standards make an allowance for three types of topography as follows:

303.5.2 *Level Topography*

This includes level or gently rolling country which offers few obstacles to the construction of a road having continuously unrestricted horizontal and vertical alignment.

303.5.3 *Rolling Topography*

This includes rolling, hilly or foothill country where the slope generally rises and falls gently to moderately and where occasional steep slope may be encountered. It will offer some restrictions in horizontal and vertical alignment.

303.5.4 *Mountainous Topography*

This includes rugged hilly and mountainous country and river gorges. This class of country involves definite restrictions on the standard of alignment attainable and often involves long steep grades and limited sight distances.

Where the topography is considered to fall within this category, early consultation with the Engineer, prior to scheme plan submission is recommended.

303.6 Design speed

303.6.1 The design speed of the alignment should be as high as practical and not less than that stated in Table 3.5.

Abrupt changes in the design speed shall be avoided.

The design speed of the alignment shall be derived using the speed environment approach and shall not be less than the design speeds indicated in Table 3.5. Design speed changes greater than 10km/hr on adjacent curves will not be permitted.

303.7 Road land

303.7.1 It is important that adequate road land width be provided. Generally a minimum road land width of 20m will be required, although a reduction to 17m may be permitted by the Engineer on a no exit road with no possibility of extension in the future. This reduction does not apply to the cul-de-sac head area which may require additional widening.

303.7.2 A minimum clearance of 3m shall be provided between the road boundary and the tops of cuttings or the toes of batters.

303.7.3 All road boundaries shall be fenced before the Completion Certificate is issued.

TABLE 3.5
RURAL ROADING - GEOMETRIC STANDARDS

	LOCAL ROADS									COLLECTOR ROAD			ARTERIAL ROADS		
Group	A			B			C			D			E		
TRAFFIC VOLUME (AADT) Annual Average Daily Vehicles Annual Average Heavy Vehicles	Under - 30 Under - 10			30 – 250 10 – 80			250 - 500 80 - 150			500 - 2500 Over 150			500 - 2500 Over 150		
Topography	Level	Rolling	Mountain ous	Level	Rolling	Mountain ous	Level	Rolling	Mount- ainous	Level	Rolling	Mount- ainous	Level	Rolling	Mount- ainous
Number of Traffic Lanes	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
Design Speed (km/h)	As Practicable			As Practicable			80	70	50 or as Practic- able	80	70	50 or as Practic- able	80/ 100	80	50 or as Practic- able
Gradients Desirable	-	5%	6.5%	-	5%	6.5%	-	5%	6.5%	-	4%	6%	-	4%	6%
Gradients Maximum	-	10%	12.5%	-	8%	12.5%	-	8%	10%	-	5%	8%	-	5%	8%
Sight Distance - Minimum (m)	As per Austroads 'Rural Road Design'														
Carriageway Width (m)	5	5	5	7.5	7.5	7.5	8.5	8.5	8.5	9.5	9.5	9.5	10	10	10
Road Land Width (m)	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Bridge Widths (m) Under 6m long	3.7	3.7	3.7	7	7	7	7	7	7	7	7	7	8	8	8
Bridge Widths (m) 6m - 30m long	3.7	3.7	3.7	3.7	3.7	3.7	7	7	7	7	7	7	8	8	8
Bridge Widths (m) Over 30m long	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	7	7	7	8	8	8
Bridge Design Standards	Transit New Zealand "Bridge Design Manual"														
Type of Surfacing M = Metal S = Seal	S or M	S or M	S or M	S	S	S	S	S	S	S	S	S	S	S	S

Notes:
1. Refer to Standard Details sheet 51 of drawings for definition of Carriageway Width.
2. Bridge width is minimum between kerbs.
3. For AADT exceeding 2,500 refer to Transit New Zealand's State Highway Policy and Procedure Manual.
4. Grades in excess of 12.5% may be approved in special circumstances refer 302.1.1.1.
5. Geometric Design shall be in accordance with Austroads "Guide to Traffic Engineering Practice Series" & Guide to Geometric Design for Rural Roads".

303.8 Cul-de-sac heads

303.8.1 Generally rural cul-de-sac roads shall terminate in a simple circular turning circle of 12.5 m minimum outside seal edge radius.

Special attention should be given to crossfall and stormwater drainage around the turning circle.

Adequate additional width shall be provided to the road at the cul-de-sac head.

303.8.2 In the case of a minor cul-de-sac with a low anticipated traffic volume, the Engineer may approve the use of a 'Y' shaped turning head utilising widened vehicle crossings or specially constructed manoeuvring-bays. They are to be designed and constructed so as to ensure the 'Y' head is adequate for a heavy vehicle to execute a 3-point turn without encroaching onto private property.

303.8.3 Off-centre cul-de-sac heads shall be designed by off setting the road carriageway crown to create symmetrical conditions with the channel designed accordingly.

303.9 Private ways

303.9.1 Rural private ways, rights of way and common access lots shall be constructed of 150 mm of 20 MPa concrete as shown on Franklin District Council Drawing G1.

The concreted width shall be a minimum of 2.5m wide with 8m x 5.2m passing sections (exclusive of the tapers which shall be not less than 5m long) on all oververtical and horizontal curves., as per the District Plan.

303.10 Stormwater

303.10.1 Adequate drainage channels shall be formed below subgrade level.

Steep sided ditches, or excessively deep channels will not be accepted.

The Engineer may require the formation of drainage channels along the top of fill batters to control erosion.

303.10.2 Adequate cutouts shall be provided such that the maximum length of flowpath in the road drainage channel does not exceed 200m.

The cutout should discharge to a natural watercourse, by way of an open drain along a lot boundary. Open drains through the body of the lot will generally not be acceptable.

In mountainous terrain the construction of stormwater fluming may be necessary.

303.10.3 Vehicle crossings shall be provided at the entrances to all private ways rights of way and common access lots, and at all gateways in the road boundary fence. Crossing pipes shall be a minimum of 300mm diameter Class Z RCRRJ or heavy walled P.V.C except where otherwise approved by the Engineer and the crossing shall be an adequate. width for the intended use. (Refer Franklin District Council Drawing R29).

303.10.4 Culverts beneath the carriageway shall be adequately sized for the flow, and in no case less than 300mm diameter, made of either Class Z RCRRJ or heavy walled P.V.C.

Culverts should cross the road as directly as practicable and in no case at less than 60 ° to the road centreline. The inlet and outlet of the culvert should be at least 1.5m beyond the feather edge and preferably further, to reduce the traffic hazard and provide adequate support to the road shoulder. (Refer also clause 302.4.2)

303.10.5 All drainage channels located in road within Countryside Living (Town) areas shall be piped.

303.11 Road lighting rural

303.11.1 In Countryside Living Activity areas flag lighting shall be provided at all intersections.

303.11.2 In rural areas flag lighting shall be provided at all intersections where any leg of the intersection has more than 2,000 v.p.d.

PART 4 : DRAINAGE

401 STORMWATER DRAINAGE

The definition of what a Public Stormwater System is and when it is not available is as follows:

1. Public Stormwater SystemThere is no public stormwater system in the Rural Zone.

2. The public stormwater 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 stormwater system in the Residential and Business Zones *includes* the following systems:
   - Piped drains of 150mm diameter or more, and/or servicing 2 or more lots
   - Natural water courses that are maintained by Council

4. The Public Stormwater System in the Residential Zone *does not include* :
   - roadside kerb
   - cess-pit in the road reserve
   - pipes less than 150mm diameter and/or servicing 1 lot
   - open drains less than 300mm diameter and/or servicing 1 lot

5. Where the landuse in the Residential Zone has not been developed for residential purposes, and is used for rural type landuse activities such as market gardening and/or grazing, the open drain in the road reserve adjacent to that lot is not part of the Public stormwater system.

Public Stormwater System is not Available

1. For all landuse activities in the Residential and Business Zones, the public system will be considered 'not available' if the connection to the public system is greater than 30m from the property boundary or greater than 60m from the dwelling.

2. Where subdivision consent is sought, the public stormwater system will always be considered to be available. The applicant must provide an extension and connection to the public system.

Council may exercise its discretion over this requirement, on a case by case basis for 'infill' type urban development. The following guideline will be used in the exercise of this discretion:

- For each new lot, the applicant shall provide for a 30m extension to the public system (ie. 1 lot = 30m extension, 2 lots = 60m extension, 3 lots = 90m etc).
- The public stormwater system will be considered 'not available' in accordance with rule 26.6.12© of the District Plan, if the distance of the connection is in excess of this '30m per lot' requirement.

- Where an extension is required in excess of this standard, because the public system is 'not available' and total on-site stormwater management cannot be achieved in accordance with 26.6.12©, Councill will contribute 50% of the cost of the extension that is needed beyond the '30m per lot' requirement.

401.1 General

Unless approved otherwise, all lots shall be provided with a connection to a stormwater drainage system. The stormwater system shall provide for the collection and control of all stormwater 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.

401.1.1 In the absence of a suitable system stormwater 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.

401.1.2 Stormwater 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.

401.1.3 Public drains will be required to terminate with a manhole and have a minimum diameter of 150 mm.

401.1.4 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.

401.2 Water Permits

401.2.1 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 run off water.

The permanent diversion of natural water as a consequence of the development.

Works within a watercourse.

The discharge of stormwater.

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.

401.2.2 Any Water Permit in respect of the permanent diversion of natural water will be exercised in the name of 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.

401.2.3 Any Water Permit covering the discharge of stormwater will be exercised in the name of 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.

401.2.4 A general authorisation may have been issued by the Regional Council to cover permanent diversions of natural water and discharges of stormwater 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.

401.3 Design requirements

401.3.1 The land drainage system shall be capable of serving the entire catchment upstream of the development. Due regard shall be made of the effect it may have on downstream waterways and adjoining areas. The design shall comply with any approved Comprehensive Water Permit. There should be early consultation with the Council.

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

401.3.2 The design calculations shall be in accordance with the New Zealand Institution of Engineers' Procedure for hydrological design of urban stormwater systems, or other accepted design procedure.

401.3.2.1 *Time of Concentration*

Initial time of entry (te) shall be 8 min 30 sec. Network flow time (tf) shall be time of flow in pipes or channel to design point. Initial time of concentration for design purposes shall be 10 minutes (0.037 mm/sec).

401.3.2.2 *Runoff Co-efficients*

The following composite co-efficients can be used:

Road reserves	C	=	0.85
R.O.W./Access lots	C	=	0.95
Residential lots	C	=	0.75
Industrial/Commercial lots	C	=	0.95

401.3.2.3 Where detention storage is being considered, calculations shall take account of run off volumes from appropriate design storms. The designer shall provide for secondary flow paths for 1% AEP (Annual Exceedence Probability) flows in which case 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.

Auckland Regional Council Technical Publication No. 108, "Guideline 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.

401.3.3 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.

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

Each stormwater 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.

401.3.5 The stormwater connection will be to a piped stormwater system or

Where the ground conditions are suitable and subject to the prior approval of the Engineer, a system of stormwater disposal 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 stormwater pipelines to be constructed to the upper limits of the development.

401.3.6 Where the Council has a Comprehensive 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.

401.3.7 Where no Comprehensive Catchment Management Plan exists the rainfall figures given in Auckland Regional Council's TP19 Summer rainfall Pukekohe, shall be used.

401.4 Open watercourses

401.4.1 Major watercourses should preferably be retained, and be located together with secondary 1% overload flow paths in public reserves. Piping more than dry weather flow in large watercourses is generally not required.

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

401.5 The hydraulic design of pipelines

401.5.1 The hydraulic design of stormwater pipelines shall be based on Hydraulic Research Paper No. 4 "Tables for Hydraulic Design of Storm Drains, Sewers, and Pipelines" or on graphs or other representation of the same or similar accepted method.

The pipe roughness coefficient ks used in the hydraulic design shall be as 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 coefficient ks shall not be less than 0.6 mm. As a guide Ks should be taken as 1.5 for pipes up to 1000 mm diameter and 0.6 for pipe greater than 1000 mm diameter.

401.5.2 Where the pipe is to carry the whole design flood flow, the pipe gradient shall be taken as the hydraulic gradient.

401.5.3 The design shall provide that:

(a) No stormwater sewer other than connections is less than 150 mm diameter;

(b) Road sump outlets shall be not less than 225 mm diameter; or exceed 40 m in length.

(c) Sump leads shall not be connected to other sumps.

A minimum velocity of 0.7 m/s for pipes when flowing full is desirable but lower velocities are at times unavoidable and may be permitted by the Engineer.

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

401.5.5 Pipe entry conditions are to be considered at all pipe entries.

401.6 Location of pipelines

401.6.1 Stormwater drainage pipelines shall generally be sited in front, side or rear yard areas of building 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 1 m 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.

If stormwater pipelines are required to be laid within the road reserve they should be laid within the road berms where ever possible.

401.6.2 Road crossings to be at 90^{o} where ever possible.

401.6.3 Manhole lids shall be clear of all boundary lines.

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 not less than 7 MPa. The depth of bedding shall be as for Type B described in NZS 4452 and shall be broken at pipe joints to maintain flexibility.

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

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

401.7 Pipes

401.7.1 The following pipes may be used for stormwater drainage work, provided they comply with the relevant New Zealand Standard:

(a) Concrete pipes to NZS 3107.

(b) UPVC pipes to NZS 7649.

(c) Concrete lined mild steel to NZS 4442.

(d) Polyethylene to NZS 7610.

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

401.8 Joints

401.8.1 All pipes less than 1 m diameter shall have an approved flexible sealed joint. Pipes 1 m diameter and larger may have flush joints, although the latter will not be permitted in water bearing sands or gravels or other aquifers or peat areas or elsewhere where the consequences of any leakages through the joints may be serious.

401.8.2. Flush jointed pipes should normally be adequately sealed with epoxy mortar. Any joints deliberately left unsealed to allow subsoil drainage should have the joints surrounded by granular material of an appropriate filter grading, or approved filter fabric, in order to prevent the entry of silt or clay into the pipeline.

401.9 Structural strength of pipes and bedding

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

401.9.2 The type of bedding and class of pipes adopted shall be in accordance with the pipe laying tables and bedding diagrams in NZS 3725 except that a specific design may be required for flush jointed pipe bedding.

401.9.3 Under normal ground condition pipes, except UPVC, shall be bedded and haunched with fine granular material, as for Type B bedding, as set out in NZS 4452.

401.9.4 The requirements for PVC shall be as set out in SAA CA 68 and NZS 7643.

401.9.5 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.

401.10 Pipeline construction

401.10.1 The construction of pipelines shall be carried out in accordance with the requirements of NZS 4452 and NZS 7643.

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

401.11 Minimum cover over pipes

401.11.1 *General*

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 NZS 4451. The cover shall not be less than 600 mm except as otherwise required by 401.11.2 and 401.11.3.

401.11.2 *Private Property*

401.11.2.1 The minimum cover over unreinforced pipes in private property shall be 600 mm. Where due to the topography this cover cannot be provided, reinforced or unreinforced concrete protection shall be provided for the pipelines to the satisfaction of the Engineer.

401.11.2.2 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 future services and any future driveway construction.

401.11.3 *Under carriageways*

401.11.3.1 Unreinforced concrete pipes are not permitted under carriageways.

401.11.3.2 The minimum cover shall be 1200 mm. Where this cannot be achieved, suitable protection shall be provided for the pipeline to the satisfaction of the engineer.

401.12 Manholes

401.12.1 *General*

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 100 m. Manholes shall be made of precast concrete except in special circumstances where the Engineer may approve cast in situ manholes.

401.12.2 *Standard manholes*

401.12.2.1 These are to be circular manholes with a minimum internal diameter of 1,050 mm (refer Franklin District Council Drawing SW11) and are to be used on pipelines up to and including 600 mm diameter.

401.12.2.2 Precast manholes shall consist of centrifugally spun 1,050 mm, or larger diameter concrete pipes to Class S or greater standard. They shall have holes cast in the side for step irons.

All wall joints in manholes shall be epoxy mortared. The joint between the wall and concrete lid may be either epoxy mortared or sealed with Bostick Titan Seal. The mixing and application of the epoxy mortar shall be in conformity with the manufacturer's directions to provide a watertight and rootproof structure to the satisfaction of the Engineer.

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

401.12.3 *Deep manholes*

401.12.3.1 Where manholes are more than 5 m deep they shall be specifically designed and shall incorporate intermediate landing platforms or grills in order to prevent a free-fall of more than 5 m. Refer Franklin District Council Drawing SS3 for typical detail.

401.12.4.1 *Shallow manholes*

Where the stormwater line does not exceed 250 mm diameter, the depth to invert does not exceed 750 mm, 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 of mini-manholes.

401.12.4.1 Mini-manholes shall consist of a single length of centrifugally spun 675 mm diameter concrete pipe to a minimum of Class S standard, fitted with a standard cast iron frame and lid. The invert shall be fully benched as for standard manholes.

401.12.5 *Stormwater manholes on larger pipelines*

401.12.5.1 Manholes on stormwater pipelines more than 600 mm diameter and on smaller pipelines where the use of standard manholes is not suitable, should be specifically designed.

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

401.12.5.3 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.

401.12.5.4 On stormwater pipelines equal to or greater than 1 m diameter, the spacing of manholes may be extended to up to 200 m and 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 of specific approval by the Engineer.

401.12.5.5 Manholes on straight sections of stormwater lines of 1.2 m diameter and above may be constructed using offset intakes which may also be used in conjunction with bends, formed using epoxy mortar adhesive.

401.12.6 *Hydraulic flow in manholes*

401.12.6.1 In addition to the normal pipeline gradient all manholes shall have a minimum drop of 20 + 5 mm per 10^{o} of the angle of change of flow within the manhole. Manholes on pipelines greater than 1 m 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.

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

401.12.7 *Manhole requirements*

401.12.7.1 Sumps should normally be connected to a manhole on the stormwater drainage system by 225 mm diameter pipes, except that if the stormwater drain is of greater diameter than 1.2 metres and a manhole is not conveniently located the sump lead may be saddled direct to that drain. A direct connection of the sump lead to a

stormwater drain with a diameter between 600 mm and 1.2 metres diameter will only be permitted in exceptional circumstances, and at the Engineer's discretion. A typical sump design is shown in Franklin District Council Drawings R17, R18, R19 and SW13.

401.12.7.2 Branch lines 300 mm diameter and smaller may be saddled on to pipelines 1.2 m diameter or larger, providing a manhole is supplied on the branching line within 50 m of the main line.

401.12.8 *Steps irons, steps, and ladders*

401.12.8.1 All manholes other than shallow manholes 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.

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

401.12.9 *Manhole covers and frames*

401.12.9.1 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 a bituminous protective compound are illustrated in Franklin District Council Drawing SS3.

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

401.12.10 *Drop connections*

401.12.10.1 Drop connections on stormwater manholes may be avoided by allowing pipes up to and including 300 mm diameter to have an open 'cascade' inside the manhole, providing the steps are clear of any cascade.

401.12.11 *Manholes in soft ground*

401.12.11.1 Where a manhole is to be constructed in soft ground, the area under the manhole shall be undercut down to solid and back-filled with suitable hardfill to provide an adequate foundation for the manhole base.

401.13 Connections

401.13.1 The connection provided for each residential lot shall be of a type capable of taking the spigot end of an approved drainpipe of 100 mm 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.

401.13.2 Where a stormwater line is outside the body of the lot to be served a 100 mm 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.

401.13.3 If the above conditions cannot be met, then the connection shall be a 150 mm diameter line branching from a manhole on the main line. An extended 150 mm

diameter connection may be terminated without a manhole provided it is not more than 40 m 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.

401.13.4 Where the design data is available, connections for commercial and industrial lots shall be designed to take the full design flow from the area served by the connection.

401.13.5 Each connection shall be marked by a 50 mm x 50 mm timber stake (treated pine or better) extending to 300 mm above ground level with the top painted blue. This marker post shall be placed alongside a timber marker installed at the time of pipelaying and extending from the connection to 150 mm 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.

401.13.6 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.

401.14 Ramped risers

401.14.1 Unless required otherwise by the Engineer, or necessary to meet the requirements of clause 401.3.4, where a connection is deeper than 1.2 m below ground level a ramped riser shall be constructed to bring the connection to within 1.2 m of ground level.

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

401.14.2 Where an extended connection is to be taken from a stormwater 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 sewer, to terminate just inside the lot to be served at sufficient depth to drain the building site.

401.15 Connections to deep lines

401.15.1 Where an existing or proposed stormwater pipeline 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 pipeline shall be laid from a manhole on the deep stormwater line and connections provided to the lots to be served.

401.16 Inlet and outlet structures

401.16.1 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. 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.

401.17 Testing

401.17.1 The pressure testing of stormwater 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 as set out in NZS 4452, if the Engineer has any doubt over the soundness of pipeline construction or if infiltration of groundwater is observed.

401.18 Secondary Flow Paths

401.18.1 Secondary flow paths shall be provided for the flow which is in excess of the capacity of the piped stormwater system up to the 1% AEP storm.

Secondary flow paths shall where practicable be located in roads and reserves.

401.18.2 Where secondary flow paths cross private property (they shall where possible be sited clear of building sites), the Council will require a consent notice pursuant to RMA Section 221.

401.19 Counterfort and bored drains

401.19.1 Counterfort and/or bored drains that are installed for stability reasons shall be constructed in such a manner as to provide satisfactory access for future maintenance purposes. These drains shall be connected to and form an integral part of the reticulated public system.

401.20 Acceptance and As Builts

401.20.1 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)

402 SANITARY DRAINAGE

402.1 General

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

402.1.2 The sanitary drainage system shall be designed to serve the whole of the natural upstream catchment area. Also 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. However, where part or all of the catchment is serviced or will be served by a trunk sewer to be constructed at a later date, the Engineer may agree to this area being excluded from the calculation. The flow from all portions of the upper catchment within the regional urban boundary shall be calculated assuming complete urbanisation except for those areas permanently set aside for recreation reserves.

Where further development, upstream of the one under consideration, is provided for in the district or regional planning scheme, sewer pipelines will be designed assuming the maximum upstream development permitted by the planning schemes and the sewer pipeline shall be constructed to the boundaries of the development.

In cases where substantial costs are likely to be incurred in providing extended sewer lines that will not serve the development under consideration, the Council may contribute towards these costs.

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

402.1.4 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.

402.2 Calculation of flows

402.2.1 *Domestic flows*

Domestic sewerage 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.

402.3 Industrial domestic flow and trade wastes

402.3.1 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.

402.3.2 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.

402.3.3 The industry type will not necessarily coincide with the zoning classification shown in the district scheme, but the zoning, may be used to indicate the minimum design flow where more detailed information is not available.

402.3.4 It may be desirable to provide additional capacity if the developer wishes to widen the range of industries which are to be located in the development. However, the capacity of the existing receiving facility may be a controlling factor.

402.3.5 The design of sewage disposal systems for 'wet' industries (very heavy water uses) is to be based on the specific requirements for that industry.

402.4 The hydraulic design of pipelines

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

402.4.2 The pipe roughness coefficients 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 1.5 mm as an overall coefficient allowing for joints and so on.

402.4.3 The minimum flow velocity in 150 mm 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.

402.4.4 Gradients flatter than 0.72% for 150 mm 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 appropriate Asset Co-ordinator.

402.4.5 A 150 mm diameter pipeline at a gradient of 0.72% has 14 litre/second capacity (equivalent to 300 houses or 1,200 people).

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

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

402.5 Location of pipelines

402.5.1 Sanitary drainage shall generally be sited in front, side or rear yard areas of building sites or in reserve areas.

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 1 m 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.

402.5.2 Manhole lids shall be clear of all boundary lines.

402.5.3 If sanitary sewerage pipelines are required to be laid within the road reserve, they should be laid within the road berms wherever possible.

402.5.4 Road crossing shall be at a 90° angle where ever possible, and have at least one manhole within 2m of road reserve boundary.

402.6 Pipes

402.6.1 mPVC, UPVC, or HDPE, pipes may be used for sanitary drainage provided they comply with the relevant New Zealand or Australian Standards as follows:

NZS 3107
NZS 4442
NZS 7643
NZS 7649
AS 2280

402.6.2 In potentially unstable ground or where special protection is required, the sewer pipelines should be specifically designed.

402.6.3 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.

402.6.4 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.

402.6.5 UPVC pipes spigot and socket rubber ring (Z joint) joints may be used for sanitary drainage. The pipe, fittings and pipe laying shall comply with the relevant standards as follows:

NZS 7649 and NZS 7643.

Solvent cement pipes shall not be used.

402.6.6 UPVC 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.

402.7 Joints

402.7.1 All pipes shall have flexible joints of an approved type and complying with the relevant New Zealand or Australian Standard. Steel pipes may be either flange jointed or flexible (gibault or approved rubber ring). Gibault joints shall be of approved manufacture, and shall have galvanised steel bolts. All gibault or flanged joints shall be wrapped or taped with rust preventative materials.

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

402.7.3 Joints shall be provided adjacent to manholes to requirement of NZS 4452, and as shown on the Franklin District Council Drawing SS2.

402.7.4 Mortar joints will not be permitted.

402.7.5 Joints to existing lines, and repairs to existing lines shall use Class B couplers to AS4327.

402.8 Structural strength of pipes and bedding

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

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

402.8.3 The requirements of PVC pipes shall be as set out in NZS 7643 and SAA CA 68.

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

402.8.4 Under normal ground conditions, sewer pipelines shall be bedded with fine granular material as in NZS 4452 except that in lieu of the construction of a specified depth of selected compact fill, the granular material may be haunched up to a height level with the mid height of the external diameter of the pipeline.

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 not less than 7 MPa.

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 4 m intervals constructed in accordance with the Franklin District Council Drawing SS5.

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

402.8.5 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.

402.9 Pipeline construction

402.9.1 The construction of the pipelines shall be carried out in accordance with the requirements of NZS 4452 and NZS 1900 : Chapter 9.3.

402.10 Minimum cover over pipes

402.10.1 *Private property*

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

402.10.1.2 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.

402.10.2 *Under carriageways*

402.10.2.1 Reinforced pipes shall be specifically designed to support the pavement design loading appropriate to the minimum cover to be provided.

402.11 Manholes

402.11.1 *General*

402.11.1.1 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 100 m.

402.11.2 *Standard manholes*

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

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

402.11.2.3 Precast manholes shall consist of centrifugally spun 1,050 m diameter concrete pipes to Class S or greater standard. They shall have holes in the side for step irons.

All wall joints in pre-cast sanitary sewer manholes shall be epoxy mortared. The joint between the wall and concrete lid shall be sealed with Bostick Titan Seal, or approved equivalent. The mixing and application of the epoxy mortar shall be in conformity with the manufacturer's directions to provide a watertight and rootproof structure to the satisfaction of the Engineer.

402.11.3 *Deep manholes*

402.11.3.1 Where manholes are more than 5 m 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 5 m (refer Franklin District Council Drawing SS3.

402.11.4 *Shallow manholes*

402.11.4.1 Where the depth to invert of the sanitary sewer line does not exceed 900 mm, 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 of mini-manholes.

402.11.4.2 Mini-manholes shall consist of a single length of centrifugally spun 675 mm diameter concrete pipe to a minimum of Class S standard, 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).

402.11.5 *Step irons and steps*

402.11.5.1 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.

402.11.5.2 Step irons shall generally be located above the outlet branch of the manhole.

402.11.6 *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.

402.11.7 *Drop connections*

Internal drop connections shall generally be used. If more than one drop connection is required the internal diameter shall be increased by 150 mm for each additional drop connection installed.

402.11.8 *Manholes in soft ground*

402.11.8.1 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 bases.

402.11.9 The fall to be provided through each manhole shall be 10 mm in excess of the grade fall for any incoming line. The soffit of the outlet pipe shall be a minimum of 20 mm plus 5 mm per 10 degree angle of change lower than that of the incoming line.

402.12 Connections

402.12.1 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 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 maximum depth of any connection shall be not greater than 1.2 m, unless a greater depth is necessary to serve the whole of the building area of the lot.

The connection provided for each lot shall be of a type capable of taking an approved drainpipe of 100 mm internal diameter, unless the Engineer requires a larger size connection to be provided.

402.12.2 Where the sanitary sewer line is outside the body of the lot to be served by it, a 100 mm diameter connection shall be extended to 1 m 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 3 meters from lot boundary shall be protected by an easement.

In exceptional cases the engineer may approve the provision of an extended length 100 mm diameter connection as a private line protected by an easement to service up to 3 lots provided maximum potential number of units will not exceed 3 and a chamber provided at a suitable location for cleaning purposes.

402.12.3 Each connection shall be marked by a 50 mm x 50 mm timber stake (treated pine or better) extending to 300 mm 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 150 mm 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.

402.12.4 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.

402.13 Ramped risers

402.13.1 Unless required otherwise by the Engineer, or necessary to meet the requirements of clause 402.12.1 a ramped riser shall be constructed to bring the connection to within 1.2 m of ground level.

402.13.3 Ramped risers shall be constructed as shown in Franklin District Council Drawing SS4.

402.13.4 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.

402.14 Connections to deep lines

402.14.1 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.

402.15 Testing

402.15.1 All sanitary sewer main and branch pipelines, including extended connections, 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 NZS 4452.

402.15.2 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 600 ml per 25 mm of pipe diameter per 1,000 m of pipe in 5 min.

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

402.16 Pumping stations and treatment plants

402.16.1 For the design of these, early consultation with the Engineer and ARC Environment (or Waikato equivalent) is required.

402.16.2 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.

402.16.3 Design criteria are as follows:

1. Sufficient duty pumping capacity 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 4 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 150 mm 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. All pumps are to be fitted with non-clogging impellers capable of passing a 76 mm diameter solid.

17. 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 ARC Environment for the emergency overflow.

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

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

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

402.17 Rising mains

402.17.1 Rising mains shall meet the requirements for the construction of principal mains as set out in Section 501, Water supply, of this Code. Rising mains in private property shall be sited clear of building sites. The test pressure shall be twice the maximum working pressure.

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

402.18 Private pump stations

402.18.1 Where a lot is such that a dwelling can not 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.

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

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

PART 5 : WATER SUPPLY AND OTHER SERVICES

501 WATER SUPPLY

501.1 General requirements

501.1.1 *Standard of supply*

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

501.1.1.2 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.

501.1.2 *Level of Service*

501.1.2.1 The water supply reticulation shall be to Water Supply Classification E, or such higher classification as appropriate, in terms of the Fire Services Code of practices for fire fighting water supplies 1992.

501.1.2.2 The design of the reticulation shall conform to the Fire Service Code of practices for fire fighting water supplies 1992, and 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.

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

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

501.2 Water demand and pressure

501.2.1 *Domestic supply*

501.2.1.1 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/head/day with a peak flow of five times this amount, or other quantities and peaks derived from records of the present district supply.

501.2.2 *Commercial and Industrial supply*

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

501.2.3 *Fire fighting supply*

501.2.3.1 The water reticulation shall be designed to comply with the requirements of the Fire Services Code of practices for fire fighting water supplies 1992 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.

501.2.3.2 The fire risk classification shall be as follows:

Detached or semi-detached housing in suburban areas	Class E Risk
Schools, local suburban shopping areas and equivalent development	Class D risk
Suburban industrial areas	Class C risk

501.2.3.3 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 100 kPa is required.

Risk	Flow - litre/second	Maximum Number of hydrants from which the required flow shall be obtained within a 270 m radius
Class E	25	2
Class D	50	3
Class C	100	4

With 100 kPa running pressure available at the inlet of the hydrant, the flow from a single squat, medium or tall hydrant is of the order of 28, 30.5, and 33 litre/second respectively. A single hydrant therefore would generally be adequate for any Class E risk providing it is sufficiently close to the fire risk.

501.2.4 *Design basis*

501.2.4.1 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.

501.2.5 *Pipe working pressures*

501.2.5.1 Working pressure classes are as follows:

Class of pipe	Maximum working pressure	
	Metre/head	kPa
C	90	900
D	120	1200
E	150	1500

501.2.5.2 Pipes or fittings of less than Class D shall not be used without the specific approval of the engineer.

501.3 Reticulation

501.3.1 A water main of not less than 100 mm 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 of 501.9.2 regarding hydrant spacing.

501.3.2 A rider main 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

501.3.3 Rider mains shall be supplied from a principal main at both ends, except for private ways and minor roads.

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

501.3.5 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.

501.4 Alignment of water mains

501.4.1 *Position in road*

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

501.4.1.2 In areas of steep terrain, such that the area of the road between the back of the footpath and the boundary is normally too steep for topsoiling and grassing or for any form of vehicular access, the water main would be appropriately laid under the footpath (assuming that in such cases the footpath is next to the kerb) or under the carriageway.

501.4.1.3 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.

501.4.2 *Setting out*

501.4.2.1 Where the alignment is governed by relation to the road boundary, the water mains are to be laid with reference to permanent land transfer pegs or temporary boundary marks placed by the registered surveyor responsible for the final land transfer pegging.

501.4.2.2 Laying by reference to the kerbline should only be carried out where the surveyor has confirmed that it is the correct designed distance from the land transfer peg positions.

501.4.2.3 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.

501.5 Intersections

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

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

501.6 Water mains with fire hydrants (principal mains)

501.6.1 *General*

Principal mains shall not be less than 100 mm diameter.

501.6.2 *Pipe standards*

501.6.2.1 The following pipes may be used for principal mains, providing they comply with the relevant New Zealand Standard:

UPVC	AS/NZS 1477
Polyethylene (HDPE & MDPE)	NZS 7602
MPVC	NZS .....

501.6.2.2 Acceptability of pipe materials

501.6.2.2.1 Asbestos cement pipes are not permitted.

501.6.2.2.2 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.

501.6.2.2.3 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.

501.6.2.2.4 UPVC pipes of not less than Class D are acceptable in all normal circumstances.

The installation shall be to NZS 7643 with particular attention to the anchoring of valves, hydrants and bends against displacement in operation.

UPVC pipes shall be bedded in, and covered with a minimum 100 mm of AP7 scoria or sand.

501.6.3 *Pipe pressure classes*

501.6.3.1 UPVC pipes for water mains shall be not less than Class D 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.

501.6.4 *Joints*

501.6.4.1 Joints for UPVC pipes shall be spigot and socket rubber ring type (Z joints), except that solvent cement joints may be permitted where necessary at thrusts, bends, tees or other fittings. For thrusts the pipes shall be jointed 24 hours prior to installation.

501.6.4.2 An approved bactericidal lubricant shall be used on all joints.

501.7 Rider mains

501.7.1 *Pipe sizes*

501.7.1.1 Rider mains shall be a minimum 50 mm internal diameter. Table 5.1 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 5.1

RIDER MAINS

MAXIMUM NUMBER OF DWELLING UNITS TO BE SERVED

High pressure areas (1)		Medium pressure areas (2)		Low pressure areas (30)	
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 firefighting) usually not below 600 kPa.

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

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

501.7.2.1 Pipes for rider main construction shall normally be either UPVC to AS/NZS 1477, with spigot and socket rubber ring type joints (Z joint), or MDPE to NZS 7602.

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

501.8 Connection of rider main to principal main

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

501.8.2 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.

501.8.3 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.

501.8.4 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.

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

501.9 Hydrants

501.9.1 *Hydrant type*

501.9.1.1 Hydrants shall be screw-down type, to BS 750. Normally the medium or tall pattern

shall be used, except where the Engineer may approve or require the short pattern.

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

501.9.2 *Hydrant spacing*

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

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

501.9.2.3 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.

501.9.2.4 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.

501.9.2.5 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 135 m of a hydrant.

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

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

501.9.3 *Hydrant installation*

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

501.9.3.2 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 175 mm and 250 mm below finished surface level.

501.9.4 *Hydrant boxes*

501.9.4.1 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 P.V.C. may be used, both types of hydrant boxes shall have a minimum 150 mm x 150 mm cross section concrete surround.

501.9.5 *Location marking of fire hydrants*

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

501.9.5.2 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.

501.9.5.3 All paint used for marking valves and hydrants shall be Transit NZ "Road marking paint". Hydrant yellow to Protective Paints Ltd 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.

501.10 Valves

501.10.1 *Sluice valves*

501.10.1.1 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.

501.10.1.2 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).

501.10.2 *Gate valves (also known as peet valves)*

501.10.2.1 Gate valves shall be to NZS/BS 5163 or AS 1628.

501.10.3 *Air release valves and scour valves*

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

501.10.4 *Positioning of valves*

501.10.4.1 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.

501.10.5 *Valve boxes*

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

501.10.5.2 Valve boxes shall be square or oblong of ductile or cast iron to NZS/AS 1831, 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. Where located in grass berm approved P.V.C. may be used, both types of valve boxes shall have a minimum 150 mm x 150 mm cross section concrete surround.

501.10.6 *Valve indicator posts*

501.10.6.1 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

501.10.7 Butterfly valves are not permitted.

501.11 Depth of water mains

501.11.1 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.

Metallic detector tape shall be installed within 200 - 400 mm of the surface for all mains. No metallic tape is required for steel mains.

501.11.2 Service connection pipes shall have minimum cover of 350 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.

501.12 Pipe bedding

501.12.1 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 UPVC pipe is set out in NZS 7643.

501.12.2 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 60^{o} to 90^{o} 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.

501.13 Pipe fittings

501.13.1 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, UPVC fittings may not be used. MDPE connectors shall be either Pushlok or Plassim.

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

501.13.3 Flanges shall be to table D of NZS 1560. Fittings laid adjacent to other fittings shall have flanged joints, or flexible joints where permitted (gibault or rubber ring).

501.13.4 All bolts and nuts shall be galvanised.

501.13.5 Gaskets for flanged joints shall be to BS 5292.

501.14 Anchor or thrust blocks

501.14.1 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.

501.14.2 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 75 kPa. 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.

501.15 Connections to private property

501.15.1 Connections will not normally be installed by the developer. They are only to be installed where the connection will be covered by concrete, or otherwise not accessible after the development has been completed.

501.15.1.1 When laid the point of supply to the consumer will be 300 mm outside the property boundary.

(a) The service connection shall be taken through to 300 mm outside the property boundary, terminating with a female gate valve. 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 five or more dwelling units, a rider main may be provided of minimum 50 mm diameter 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 1974. No easement is needed, as such.

501.15.1.2 In general, all connections shall be left until the building consent stage, so that appropriately sized and placed connections can be made and back flow preventers, etc. installed.

501.15.2 *Diameter of service connections*

501.15.2.1 In all areas, service connections shall be a minimum of 20 mm internal diameter for all dwelling units, or larger in special cases.

501.15.3 *Tapping bands and ferrules*

501.15.3.1 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.

501.15.3.2 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

501.15.3.3 Tapping bands and ferrules shall be made of LG2 gun metal.

501.15.4 *Construction*

501.15.4.1 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.

501.15.5 *Service connection materials*

501.15.5.1 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.

501.15.5.2 Galvanised steel pipes are not permitted.

501.15.6 *Toby boxes*

501.15.6.1 Where toby boxes are required, these shall be approved by the Engineer prior to installation.

501.15.7 *Water Meters*

The type and manufacture of water meters and backflow preventer tailpiece shall be Kent brand.

501.16 Testing

501.16.1 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. The reticulation shall withstand a pressure of 1400 kPa 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.

501.17 Backfilling and reinstatement

501.17.1 *Carriageways and driveways*

501.17.1.1 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 includes sealed, asphalt, concrete and paving stones.

501.17.1.2 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 using GAP65 from immediately above the pipe surround and compacted in layers not exceeding 150 mm in depth. The depth of basecourse and type of seal shall conform to the standard of the existing road construction and to the Engineer's requirements.

501.17.1.3 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.

501.17.2 *Berms*

501.17.2.1 Pipe trenches under grass berms and footpaths shall be backfilled in accordance with the requirements of 12.5 to 12.9 of NZS 4452.

501.18 Disinfecting

501.18.1 After backfilling and before being put into service, all pipes, valves, house connections and other fittings shall be disinfected.

501.18.2 The method to be adopted shall be as approved by the Engineer.

501.19 Water mains to be kept charged

501.19.1 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.

501.20 Connection to existing water reticulation

501.20.1 After new reticulation has been laid, Developer's representative shall provide As Builts, 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.

501.21 Special measures in corrosive soils

501.21.1 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.

501.22 Special measures for pumping or storage or both

501.22.1 The provision of service storage or reticulation pumping installations or both together will normally be the responsibility of the Council.

501.22.2 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.

502 POWER, TELEPHONE AND GAS

502.1 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 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 100 metres 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..

502.2 Approval conditions

502.2.1 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.

502.3 Licensed network operators

502.3.1 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.

502.3.2 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.

502.4 Underground cabling

502.4.1 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.

502.4.2 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.

502.4.3 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.

502.4.4 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.

502.4.5 Reference should be made to each network utility operator for their specific requirements.

502.5 Power transformers and switching stations

502.5.1 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.

502.6 Conversion to underground on existing roads

502.6.1 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, Telecom New Zealand, and the Council.

502.7 Industrial and commercial developments

502.7.1 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.

503 LOCATION OF SERVICES

503.1 The position of services in the road shall conform to Franklin District Council Drawing R2. All services shall be level with ± 100 mm of the recommended location.

503.2 Trenches

Trenches shall be built up in 150 mm 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.

PART 6 : PARKS AND RESERVES

601 PARKS AND RESERVES

601.1 Scope

601.1.1 Where reserves are provided this standard sets out the requirements for such reserves and sets minimum requirements for landscape plans, fencing and planting.

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 Asset Co-ordinator: Open Space Amenities and Recreation at the preliminary planning stage, or earlier, should be undertaken to determine any specific requirements.

601.2 Landscape plans

601.2.1 Landscape plans shall be submitted with other engineering plans of development for approval. The plans shall show the proposed finished levels of the reserves, the proposed trees to be planted and any drainage that is to be installed. (Refer to Section 104.1 for details of all documents to be supplied.)

601.2.2 The landscape planning shall consider both the short and long term maintenance requirements for the areas to be planted.

601.2.3 The 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 the adjacent developments and any future stages of the proposed development and adjacent land.

601.3 Trees

601.3.1 Where possible existing trees should be maintained. Where existing trees are to be maintained protection measures shall be taken to protect them from damage during development.

Trees identified as to be preserved shall have either a 6 metre protection zone, or extending to the drip line, whichever is the largest.

601.3.2 Trees that may become invasive in water courses should not be planted. These include Pussy Willow (Salix reinhardtii) and Black Alder (Alnus Glutinosa).

601.4 Walkways

601.4.1 Walkways shall have concrete paths installed that shall comply with the requirement of Section 302.9 for thickness and reinforcing. Any variation in finish eg exposed aggregate, cobbles etc will require the prior approval of the Asset Co-ordinator: Open Space Amenities and Recreation.

601.4.2 The maximum gradient on walkways shall where possible comply with the requirement of the Disabled Persons Act.

601.4.3 Where possible steps should be avoided.

601.4.4 Footpaths shall be laid with sufficient fall and drainage to ensure that stormwater does not pond on the path.

601.4.5 Where being used as access to maintain reserves, concrete shall be thickened and

reinforced to allow for maintenance equipment.

601.5 Fencing

601.5.1 Any neighbourhood reserve with a road frontage of in excess of 5 metres shall have a standard park fence or bollards as shown on Franklin District Council Drawing P1.

601.6 Drainage

601.6.1 Sufficient drainage shall be installed to ensure that water does not pond excessively on the reserves and that the reserves are able to be mown throughout the year.

601.7 Park Furniture

601.7.1 Parks furniture shall be robust and shall not be installed without having first been approved by the Asset Co-ordinator: Open Space Amenities and Recreation. All furniture shall be treated with an approved graffiti guard.

601.7.2 Playground equipment shall comply with NZS 5828 "Specification for playgrounds and playground equipment" and the "New Zealand Playground Safety Manual", and approved by the Asset Co-ordinator: Open Space Amenities and Recreation.

601.8 Street Berm Planting

601.8.1 Proposals for street berm planting will require a detailed plan that considers the location and possible effects on underground services, and will require the prior approval of the Asset Co-ordinator: Open Space Amenities and Recreation.

Appendix A

Statement of professional opinion as to suitability of land for building development

Appendix B

Certificate of Completion of Development Works

FRANKLIN DISTRICT COUNCIL

Certificate of Completion of Development Works

I, ... being registered under the provisions of the Engineers Registration Act 1924/Survey Act 1986 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.

_____

Registered Engineer

_____

Registered Surveyor

Date: .....

Appendix C

Standard Details

Appendix D

Certified Check Lists

Appendix E

Assets to Vest Sheets

Appendix F

Electronic As Built Requirements

"As Built" Plan Check List

The "As Built" Plan to be submitted by the Subdivider's Representative shall record the following information:-

a. The "Title Plan" boundaries, Lot numbers, road names, and north point.

b. All sanitary sewers (coloured red), stormwater and land drainage (coloured blue, including overland flow paths), water supply, ducting for power, telephone and gas, together with all relevant surface structures.

c. All stormwater and sanitary services, labelled as to:-

i. Manhole number and diameter if other than 1050 mm diameter
ii. Direction of flow
iii. internal diameter of pipe (in mm)
iv. Pipe material, PVC, RC, EW, CLS, etc
v. Manhole lid level and invert levels
vi. Manhole offset distances to nearest Lot boundaries

d. All water reticulation services, labelled as to:-

i. Internal diameter of pipe (in mm)
ii. Pipe material, and class and/or type of main
iii. Parallel distance of pipe from nearest Lot boundaries
iv. Type and diameter of valves
v. Fire hydrants and water meters
vi. Position of bends, street crossings and fittings from nearest lot boundary.

e. All power and telecom ducts, labelled as to:-

i. Number of, diameter, and type of duct

f. Typical cross-section through the full road reserve width recording the following details:

i. Seal type and thickness
ii Metal layer type and thickness

In addition the plans submitted shall record the following:

g. A schedule of all stormwater and sanitary sewer reticulation detailing manhole number, manhole co-ordinates, co-ordinates for branch line ends (where the branch is greater than five metres in length) and invert levels, including stormwater inlet and outfall pipe ends or structures.

h. A schedule of all stormwater and sanitary sewer lines detailing Lot number, distance of house connection from centreline of downstream manhole, distance perpendicular, and diameter of connection

i. A schedule of water "As Builts" detailing type and co-ordinate of all values, and hydrants.

j. Certification by a registered engineer or registered surveyor that the information supplied on the "As Built" is accurate within normal acceptable engineering and surveying tolerances. Council will accept "As Built" plans prepared by a person holding a NZ Certificate in Engineering and/or Surveying, provided the person is working under the direction of a registered engineer or registered surveyor.

k. All "As Built" plans are to be drawn at 1:500 scale.

l. All co-ordinate information is to be in terms of geodetic datum 1949.

m. All reduced levels are to be in terms of an approved Lands and Survey level datum.

n. Such other details as may be required by the Appropriate Asset Manager.

NOTES:

1. Receipt of "As Built" plans and Council's acceptance thereof does not absolve the subdivider from any responsibility for their inaccuracy.

2. In the event of a connection not being provided although shown on the "As Built" plan, or a connection not being in the position shown on the "As Built" plan, it shall be the responsibility of the subdivider or his representative to locate or provide the connection for any purchaser of the Lot.

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 Registered 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: ……..……

ELECTRONIC AS BUILT REQUIREMENTS

The following details the requirements necessary to ensure compatabilility with Council's GIS System.

- **Format of Data File**
  Currently asbuilt data transfer from the CAD systems of surveyors or contractors to Council, involves data format change to MAPINFO format. Ideal format for data exported from AUTOCAD or other CAD system is the standard MAPINFO format (*.mid/*.mif).
  AUTOCAD and other systems do not currently support *.mid/*.mif format.
  MAPINFO then requires data to be in the format of DXF vers 12 or 13.

  REQUIREMENT 1: Format of Electronic As Built to be in *.MID/ *.MIF format or DXF version 12,13.
  NB. If a CAD system is not used, plans must have co-ordinate information displayed for every point feature (including pipe bends).

- **Layer Problems**
  Currently many layers are exported from AUTOCAD into DXF format, which is very difficult for GIS administrators at FDC to decipher. In order to establish some procedure, layers of data should be named standard names at time of creation.

  REQUIREMENT 2: Naming of data layers to be consistent, using the names listed in Table 1 (attached).

- **Linework**
  Linework depicting pipes should be standardised so that they are either ONE line or ONE polyline. Currently pipe linework is varying in its arrangements and we need to avoid the current problem of there being hundreds of pipe segments for asbuilts that in actuality have perhaps 20 pipes.

  REQUIREMENT 3: Linework depicting pipes to be combined between single points. These points being *Manholes* for sewers, and *Nodes* for water pipes.

- **Node Creation**
  Where a pipe changes attribute (eg. pipe diameter or pipe type) there needs to be a Single Point allocated, being a pipe node.

  REQUIREMENT 4: Points where pipe attributes change need to be indicated with co-ordinate points for water and sewer pipe systems* and stored in the W_NODE or SS_NODE layer*.

It is enough for stormwater that the feature is marked with a point and put into the SW_POINTS layer.

- **Dual Indication of Point Features**

Currently symbols when imported are made up of many lines and polygons. This is useless when converting the data to MAPINFO format. These symbols have to be removed and recreated in approximate centre of the symbol.

We therefore require two forms of symbol for each feature. One symbol being a single point object for the purpose of importing the symbol in the exact location, the other symbol being of the currently provided type for the purpose of hard copy output.

REQUIREMENT 5: Point features be indicated with both a single point object, and as (currently given) linework symbols.in their respective layers

REQUIREMENT 6: Asbuilt Plans must express the projection used for X and Y co-ordinates and also the datum used for Z co-ordinates (lid levels and invert levels).

REQUIREMENT 7: Engineering Drawings (ED) and Asbuilt Plans for all Pipe Networks to be provided in both hard copy and digital format. For Water and Waste Water Pipe Networks FDC will then allocate internal (PAMS) numbers to point features and linework and return a copy of the ED to surveyor. Asbuilt to be produced complete with FDC allocated numbers in hard copy and digital format. For Stormwater Pipe Networks, with requirement for surveyors to number Asbuilt plans with FDC internal numbers.

Undecided:
Data possibly to be supplied directly to Council once a plan for asbuilt supply has been approved. Data transfer to involve transfer via email, floppy disk or CD with the file size being a determinant.

TABLE 1: REQUIRED LAYER NAMES FOR SURVEYORS

SEWER

LAYER CODE	INCLUDES	DATA TYPE
SS_MANHOLE	New Sewer Manholes	Single Point
SS_PUMP_STN	New Sewer Pump station	Single Point
SS_CONNECT	New House Connection Pipe	Linework
SS_NODE	New Pipe Connection Point (*or change in attribute*)	Single Point
SS_PIPE	New Sewer Pipes	Linework
SS_OTHER	New Other Sewer Features	Line/Point
EX_SS_POINTS	Existing Single Point Features	**SINGLE POINT**
EX_SS_LINES	Existing Linework Features	Linework
EX_SS_OTHER	Existing Other Sewer Features (eg. ponds)	Line/Point/Polygons

WATER

LAYER CODE	INCLUDES	DATA TYPE
W_NODE	New Pipe Connect Point (*or attribute change*)	Single Point
W_HYDRANT	New Fire Hydrant	Single Point
W_VALVE	New Valve (all varieties)	**SINGLE POINT**
W_PUMPSTATION	New Pumpstation	Single Point
W_PIPE	New Water Pipe	Linework
W_CONNECT	New Private Connection Pipe	Linework
W_SOURCE	New Water Source (eg. Spring)	Single Point
W_STORAGE_BDY	New Water Storage Facility	Single Point
W_OTHER	New Other Water Features	Line/Point
EX_W_POINTS	Existing Single Point Features	Single Point
EX_W_LINES	Existing Linework Features	Linework
EX_W_OTHER	Existing Other Water Features	Line/Point

STORMWATER

LAYER CODE	INCLUDES	DATA TYPE
SW_POINTS	All New Stormwater Point Features EXCEPT MANHOLES, including cesspits, inlet/outlet structures, floodgates	Single Point
SW_MH	All New SW Manholes	Single Point
SW_LINES	All New Stormwater linework, including pipes	Line work
SW_OTHER	All Other New Stormwater features, including ponds	Line work/Points

SW_OVERLAND	All new overland flow directional linework and insets (complete)	Linework/Points/ Text in insets.
EX_SW_POINTS	Existing SW Point Features (cesspits, inlet/outlet structures, floodgates)	Single Point
EX_SW_MH	Existing SW Manholes	Single Point
	Existing SW Linework (pipes)	Linework
EX_SW_LINES		
EX_SW_OVERLAND	All new overland flow directional linework and insets (complete)	Linework/Points/ Text in insets.
EX_OTHER	Existing Other Stormwater features (eg. ponds)	Line work/ Points/polygons

OTHER LAYERS

LAYER CODE	INCLUDES	DATA TYPE
TEXT	All Text on Asbuilt (EXCLUDING INSETS) including: road names, addresses, pipe attribute information, asbuilt reference information, co-ordinates, Projection information, legal description, dimension figures.	Text
SYMBOLS	Symbology currently provided(Manholes made up of 15 line segments etc., fire hydrants, valves, flow direction, pumpstations, cesspits, etc.)	Linework/ Polygons
CLOSEUP	Closeup diagrams, inclusive of ALL information in the diagrams	Linework, Points, Text, Polygon
PARCEL	Parcel Line work	Line work
OTHER	Trees, Buildings, Arrows, North pointer, scale bar, any other polygon not related to pipe networks.	Polygon/linework