

## **2 PROCESS AND INFORMATION REQUIREMENTS**

### **2.1 Introduction**

This section sets out the information that Council requires in order to authorise construction of and vest new infrastructure assets within the Tasman District. This information typically comprises:

- Design drawings and details
- Supporting calculations
- Producer statements and certificates
- Specifications, and
- As-built information.

Prior to approval to commence work, Council requires the submission of fully detailed Engineering Drawings covering the design of all new roads, rights-of-way, access lots and service utilities. These drawings and associated information will be reviewed against these standards by Council.

Appendix 2-1 sets out the scope of these Engineering Standards in the context of subdivision development and the consenting process.

### **2.2 Requirements of the Designer**

Council requires all design, construction and construction supervision of infrastructural assets and subdivisional works to be performed by suitably qualified and experienced individuals. Council Standards, as set out in this document, are intended to reflect the minimum standard required by Council, and should not be seen as a replacement for professional engineering design.

The responsibility for site-specific design relies solely on the Designer of the work and this may include investigation of unusual site conditions and exceptional circumstances. In particular the Designer shall consider all risks to lifeline systems (significant infrastructure) in the event of a major earthquake, flood, tsunami, slope failure and climate change.

At the Engineering Drawing approval stage the Designer is required to complete and submit a Designer's Certificate and Check Sheet with the Engineering Drawings (see Appendix 2-2 and Appendix 2-3 of this section) together with the Designer's details on the plan title block.

At the Engineering Drawing as-built stage the DPA is required to certify that the work has been completed in accordance with sound engineering practice and as shown in the "as-built" information supplied.

## **2.3 Review and Approval Process**

### **2.3.1 Preliminary Discussion**

Council encourages Designers and the Developer's Professional Advisor (DPA) to meet with Council in the early stages of design to discuss any proposed works and how these will meet Council's Standards and integrate with existing services and infrastructure.

In the case of larger subdivision development where Council's future infrastructure is involved, Council may require preliminary Engineering Drawings prior to the approval of subdivision consent (see Section 92 of the Resource Management Act (RMA) and Chapter 19 of the Tasman Resource Management Plan (TRMP)).

### **2.3.2 Review and Approval of Engineering Design Drawings and Supporting Information**

Engineering Drawings and supporting information must be submitted to and approved by Council prior to the commencement of physical works, and prior to the pre-construction meeting. The requirements of the Engineering Drawings and supporting information are described in section 2.4.

Council will review the Engineering Drawings and supporting information and advise the applicant in writing of either:

- a) approval of the Engineering Drawings, and supporting information; or
- b) a request to modify the works or provide further information.

Approval of the Engineering Drawings and supporting information will consist of an Approval Letter and a single copy of each of the Drawings and supporting information, endorsed with the signature of the Engineering Manager or his/her approved representative.

### **2.3.3 Construction by Stages**

Where the landowner proposes to proceed with construction of a subdivision in more than one stage, the Engineering Drawings shall cover the whole scheme in the first instance.

In the case of major staged subdivisions where Council's infrastructure is involved, Council, at its sole discretion, may relax this requirement to the extent that preliminary service layout drawings for the total project may be submitted for initial approval. Fully detailed drawings required for each particular stage shall subsequently be submitted for final approval.

Engineering drawings for each stage shall comply with the Engineering Standards and Policies at the time of the subdivision consent approval; however should an extension of time for the consent be granted, compliance with the current engineering standard at the time of extension may be required.

### **2.3.4 Neighbours' Consent**

Where any construction work is required on another property, the owners' consent for works and easement shall be endorsed on the original drawing in opaque black ink that will permit satisfactory reproduction. Note that biro may not reproduce satisfactorily. Council will need to view the resultant easement documents at "as built" stage to secure legal access over the effected land.

### **2.3.5 Notification of Contracts and Phases of Work**

At least five (5) days prior to the commencement of work the consent holder or their agent shall advise the Engineering Manager in writing of the following information:

- the name(s), addresses and contact telephone numbers of contractor(s) to whom it is proposed to award the work,
- the nature of the work to be awarded in each case,
- the date that work will commence, and
- evidence of contract(s) awarded.

### **2.3.6 Pre-construction Meeting**

The Developer shall arrange a formal pre-construction meeting (agenda and minutes taken) at Council's offices with the DPA, contractor's site representative, the Engineering Manager or representative and the Manager Environmental Compliance or representative. This meeting shall occur after approval of the Engineering Drawings prior to the commencement of any work and will include discussion of the programme of works, the inspections required by Council or their agents and any other relevant matters.

Specifically, matters to be discussed at this meeting will include:

- Type/size of work contemplated and methodology;
- Soil types, ground, environmental, weather conditions, erosion and sediment control;
- Locality of site;
- Consent conditions;
- Hold points and inspections required by Council (Engineering Services and Environment & Planning);
- Traffic effects, consent to access the road (CAR) and effects to neighbours;
- Risk to adjacent services;
- Health and Safety;
- Relevant experience/training of the Contractor(s);
- Relevant experience of the Designer(s) and the DPA and level of construction supervision.

The Designer/DPA shall bring to the pre-construction meeting:

- A construction programme;
- A set of A1 size Engineering Drawings (approved). A2/A3 drawings may be permitted depending on clarity of the drawing;
- The construction specification;
- An outline of the proposed construction supervision approach;
- Any relevant information on how risks, environmental compliance and consent compliance are going to be managed; and
- The design producer statement(s)

An agenda will be prepared and minutes distributed after the meeting by the Council.

There are four levels of monitoring carried out by Council. The appropriate level will be based on the list in Section 2.3.6 above and determined at the sole discretion of Council. Council reserves the right to review the level of monitoring at any stage of the construction activity.

Level 1	One visit per two weeks and at hold points
Level 2	One visit per week and at hold points
Level 3	Two visits per week and at hold points
Level 4	Random visits and at hold points

### **2.3.7 Commencement of Development Work**

Work shall not commence on the engineering construction of the subdivision or development unless:

- a) The Council has granted all appropriate resource consents; and
- b) There are no outstanding appeals or rights of appeal to the Environment Court; and
- c) The Engineering Manager has approved in writing the Engineering Drawings, specifications and calculations for the specific work that is required; and
- d) The Engineering Manager has approved the Traffic Management Plan (TMP) (if required); and
- e) All other necessary consents or permits (eg road access consent, land disturbance consent) have been obtained; and
- f) The pre-construction meeting has been held.

The Engineering Manager may grant staged approval to allow earthworks to commence prior to approval of other works at his/her sole discretion.

The consent holder should be aware that in some cases, the Environment Court has ruled that works must not proceed without the Court's consent in cases where an appeal is lodged against consent conditions and has not been heard, or a right of appeal to the Court still exists, such as in the case of an objection lodged with the Council and still unheard.

### **2.3.8 Documentation to be Held**

Throughout the construction period, the contractor's site representative shall have the following material on site at all times:

- a) signed copies of the approved Engineering Drawings, and the initial letter from Council setting out hold points, the inspection regime, and engineering administration matters;
- b) a verified Health and Safety Plan and the letter of verification;
- c) copies of the Resource Consent;
- d) copies of any Tasman District Council Consents or permits necessary for the works;

- e) signed copies of all Consents to enter land for construction for works on land not owned by the Developer; and
- f) plans and details of the approved sedimentation and erosion control plan measures to be implemented.
- g) An approved traffic management plan from the Road Controlling Authority.

### **2.3.9 Variations**

No variations from the approved Engineering Drawings shall be made without the proposed amendments being first submitted to, and approved by, the Engineering Manager or his approved representative.

The Designer shall identify and fully document the nature and position of the amendments.

In the case of emergencies where immediate action is required to safeguard safety and health, property and infrastructure assets, such action shall be taken. At the earliest opportunity after the event, the Council shall be notified for approval.

### **2.3.10 Council Inspections and Construction Hold Points**

The DPA shall notify the Engineering Manager, or representative at least five (5) working days (or as mutually agreed) before any of the following phases of the work are reached (and such other phases as have been determined) to enable inspection to be carried out by the Engineering Manager or representative.

- a) Earthworks starting, (for checking of erosion and sediment control measures).
- b) Street Works
  - i. subgrade preparation and subsoil drains;
  - ii. basecourse prior to sealing;
  - iii. footpath and kerbside prior to sealing or concreting.
- c) Stormwater and Wastewater
  - i. inspection of pipelines prior to backfilling;
  - ii. inspections at a series of hold points determined by the Engineering Manager or representative to suit the particular situation and level of monitoring (refer Section 2.3.6.).
- d) Water Supply
  - i. Inspection of each line prior to backfill and trench reinstatement, including pressure testing;
  - ii. Chlorination.

Note: Connection to Council's system shall be by Council's nominated contractor.

- e) Final  
After completion of all works including sweeping of roads and channels, clearing all drains, manholes and sumps, checking all valve and hydrant operations, planting riparian areas and appropriate inspections, eg, CCTV, gauging or any other testing as required by Council as appropriate.

**Note:**

1. It is the responsibility of the DPA, being a Chartered Professional Engineer or Registered Professional Surveyor, for the supervision of and to certify the works at various stages in accordance with Section 2.3.10.
2. Council reserves the right to determine the inspection/monitoring regime on each project and the appropriate testing method of services/infrastructure.

**2.3.11 Completion Certificate and Supply of As-built Drawings**

On completion of the construction of a subdivision/development or where any future Council infrastructure is to be installed or constructed\*, the DPA (being a Chartered Professional Engineer or Registered Professional Surveyor), shall submit to Council a Completion Certificate certifying that the work has been constructed in accordance with:

- these Engineering Standards and Policies;
- the approved Engineering Drawings and specifications;
- any approved amendments; and
- manufacturer's instructions.

\*This includes repairs to Council services which require stand-over inspections by Council contractors.

The "certifier" may be required to provide sufficient evidence at the written request of Council to demonstrate to Council's satisfaction that they have experience and competence in the work they are certifying, that they have sufficient professional indemnity insurance and run-off cover, and they have sufficient documented observation and testing records to adequately certify the works.

The Work Completion Certificate shall be accompanied by "as-built" drawings, showing all works as actually constructed and drawn to the standards specified by Council.

The Certificate shall be in the form as shown in Appendix 2-4 and must be received by the Council before it decides whether to issue a certificate under Section 224(c) of the Resource Management Act.

**2.3.12 Approval of Engineering As-Built Drawings**

When the "as-built" Engineering Drawings have been approved and signed by the Engineering Manager, the DPA shall submit them along with electronic copies of the drawings and electronic coordinate files.

The DPA is responsible for collecting and documenting information set out in the as-built plans. Disclaimers or endorsement negating responsibility will render the plans unacceptable and the 224 Certificate will be withheld. Further, if underground asset locations are found to be inaccurate on excavation or otherwise, the Developer may be liable for rectifying the situation.

**2.3.13 Maintenance Certificate (Council-Vested Assets)**

On expiry of the twenty four (24) month maintenance period, the DPA (after Council acceptance of the asset) shall issue a maintenance certificate confirming that all outstanding maintenance has been completed.

The performance bond for maintenance will not be released by Council until the work covered by the maintenance certificate is verified by Council.

### **2.3.14 Licence-to-Occupy**

Where private services are proposed to be located within road reserve at the approval of Council on Council-owned land, the applicant is required to enter into a Licence-to-Occupy (LTO) agreement. This agreement is entered into by the applicant (a generic draft document is available on request).

The agreement will include, but not be limited to:

- a yearly licence fee if required;
- bond amount;
- public liability insurance; and
- an administration fee and actual costs incurred by Council in completing the agreement.

The applicant should arrange this document to be compiled by Council at an early stage and prior to a 224 certificate.

## **2.4 General Drawing Standards and Details Supporting Information Requirements**

This section sets out Council's requirements for the preparation and submission of engineering design and as-built drawings and supporting design details and information.

Engineering design and as-built drawings are required by Council in all instances where an asset is constructed that will become a Council asset or attached to a Council asset.

Each and every plan must be signed by the Designer of the work. The Designer's signature is taken as evidence that the plans have been checked against and comply with Council's current Engineering Standards and Policies. Unsigned plans are not acceptable.

Approval of engineering design drawings and as-built plans together with specifications and supporting calculations where requested by Council, is required prior to approval of the survey plan of the subdivision pursuant to Section 223 of the Resource Management Act. This is to show that practical pipeline alignments and legal easements are consistent with each other. For large subdivisions, full Engineering drawings may be required by Council prior to subdivision consent being granted.

Table 2-1 sets out Council's requirements for any proposed works at the Engineering Plan approval and as-built stages.

**Table 2-1: Council's Requirements**

	<b>Design Engineering Plan submission</b>	<b>Section 223 and 224 As-built Engineering Plan submission</b>
Engineering Drawings and As-builts - hard copies - electronic copies	2 copies	Required
Electronic coordinate and attribute information	1 copy required as per template on the Council's website	Required as per template on the Council's website
Specifications (electronic or hard copies)	2 copies	Changes only
Supporting calculations (electronic or hard copies)	Required	Changes only
Producer statements / certificates (where required)	Design Design Review	Construction Construction Review
Designer documents	Designer's certificate and check sheet	

**2.4.1 General Format Requirements**

- a) The symbols and arrangements shown on TDC Drawings 200 and 201 shall be used (refer to drawings at end of this section).
- b) The standard approval signature block (TDC Drawing 200) shall be placed on the bottom right hand side of all plans, with the resource consent number where applicable.
- c) A site location, in the form of a locality plan, including major street names and site identification shall be shown.
- d) Where more than five sheets are involved a title sheet shall be included showing sheet numbers, individual sheet titles and site location plan.
- e) Existing property boundary lines that abut the work and a north point shall be shown as a reference.

**2.4.2 Hard Copy Format Requirements**

Hard copies of Engineering Drawings are retained by Council as a permanent record of the proposed and as-built assets. The following is required to facilitate scanning of drawings and to ensure that a durable record of the works remains:

- a) Two sets of Engineering Drawings shall be submitted on standard A1- or A2- (or A3- with the approval of the Engineering Manager) sized sheets of high quality paper (80 gsm or greater).
- b) Final sheets submitted to Council for signing must not be folded or creased.
- c) All draughting shall be in opaque black ink (not pencil).
- d) All lettering shall be ISOCP, Arial or similar approved font style.
- e) Minimum line thickness shall be 0.25mm.



- f) A minimum letter height of 2.5mm for A1 and 2.0mm for A2 and A3 (including the actual height of lower case text) is required for all data specified by these Engineering Standards and Policies, in accordance with the relevant section of AS/NZS1100.101.
- g) The use of colour on drawings should be avoided. However, where this is necessary for clarity and prior approval from the Engineering Manager is gained then the standard convention is used ie wastewater – **red**, water – **blue**, stormwater – **green**.

### **2.4.3 Electronic Drawing Format Requirements**

At the submission of hard copies plans Council may, at its discretion, require the submission of supporting electronic drawing or image files. When requested by Council, any such files shall be provided before the plans are approved.

### **2.4.4 Electronic Coordinate and Attribute Data Requirements**

The supply to Council of electronic coordinate and attribute data is essential for the maintenance of Council's asset management system. The correct supply of this data for all new or modified assets is compulsory. This electronic data shall be submitted at the same time as the hard copy plans. Plans will not be processed until electronic data is supplied. Electronic data should be in the form specified by the template in Appendix 2-8 available electronically from Council.

The data (coordinate table) supplied must be a complete and accurate representation of the coordinates, levels and attribute data shown on the physical as-built drawings.

A separate tabulation of all the point coordinates and levels specified in these standards shall be shown on the drawing set as a cross-referenced table. This table will be used to assist in the distribution of the data in hard copy format.

Spot heights and boundary coordinate information are not required in this table.

Electronic data must be submitted as a Microsoft Excel .xls spreadsheet. Other formats may be accepted by specific approval of the Engineering Manager. Coordinates and heights should be formatted to two (2) decimal places.

The following are the data format requirements:

- Each asset record shall have a unique identifier, and this identifier must exactly match that shown on the hard copy plan supplied.
- Each asset point (coordinated location) shall appear on a separate line.
- Each asset record shall include asset attributes such as:
  - asset type;
  - asset location
  - Northing, and Easting;
  - asset levels (lid level and/or invert level);
  - asset dimensions;
  - asset material;
  - date installed; and
  - any comments (if applicable).

Asset types are specified in Appendix 2-9 and Appendix 2-10.

## 2.4.5 Coordinate and Elevation Standards

Easting and Northing coordinates shall be accurate to two decimal places and in terms of the following (in preference):

- Local Circuit GD2000
- Local Circuit NZGD49 (where GD2000 is unavailable).

The local circuit origin shall be stated on all plans.

The origin of levels and height shall be recorded, for example “Origin of levels BP11 SO12345 = 4.26 AMSL”.

A number of years ago heights were in terms of Mean Sea Level. However sea level rise over the last few years may have altered this level by up to 80 mm. Nelson vertical datum, 1955 or in Golden Bay, Tarakohe vertical datum 1982 shall continue to be used and are accurate to two decimal places. Known benchmarks and survey levels recorded by Council are all in terms of either Nelson datum 1955 or Tarakohe datum 1982 and are available during office hours.

## 2.4.6 Orientation of Plans and Sections

- Plans should generally be orientated with either north or west to the top of the sheet. North point shall always be shown.
- In the case where a layout plan and longitudinal section appear on one sheet, the layout plan is to be orientated to suit the longitudinal section.
- Plans and longitudinal sections shall generally have the lowest distance on the left hand side of the sheet. In drainage longitudinal sections, the lowest end of the drain shall be at the lower distance and the plan should be orientated correspondingly.
- Cross-sections of a street shall commence at the bottom left hand corner of the sheet and proceed upwards where this is possible.

## 2.4.7 Scales

**Table 2-2: Table Scales to be used for all Engineering Drawings**

1	Consent applications	At recognised scales
2	Location plan	Not less than 1 in 20,000 Not larger than 1 in 5,000
3	Site contours	1:1000 or 1:500 or 1:250 or 1:200
4	Road/Streetworks plan	1:500 or 1:250 or 1:200
5	Longitudinal sections of channels - Horizontal - Vertical	1:500 or 1:250 or 1:200 1:50 or 1:25 or 1:20
6	Cross Sections - Horizontal - Vertical	1:50 1:50 or 1:20
7	Wastewater, stormwater and water plans - Longitudinal section - Horizontal - Vertical	1:500 or 1:250 or 1:200 1:500 or 1:250 or 1:200 1:100 or 1:50
8	Details	1:20 or 1:10 or 1:5
9	Other services (eg streetlights) - Plans - Cross section	1:500 or 1:250 or 1:200 1:50

Note: Longitudinal and cross sections should be drawn at appropriate exaggerated vertical to horizontal scale ratio.

#### **2.4.8 Special Scales**

Special scales (other than the above) may be approved by the Engineering Manager for rural areas and special cases, but only on prior application.

### **2.5 Engineering Design Details Required**

The following plans and drawings of each street are required showing:

- proposed and existing survey lots and Land Transfer (LT) numbers (if known);
- street numbers;
- names of new streets; and
- the location of services, including the necessary manholes, fittings and similar features (on separate plans for each service).

New services shall be located as shown on TDC Drawing 200, generally along with benchmarks and survey mark levels.

The Designer shall make every endeavour to locate existing power and telecommunication services. Where proposed pipes cross under or over existing or proposed services, these services shall be shown on the plan and section with reduced levels.

Plans shall show the location of services in existing streets which abut the subdivisions.

A TMP is required by Council for any work on or immediately adjacent to a public road for works that will or may pose a risk to road users. Council requires demonstration that the consent holder and agents are in compliance with requirements of the Health and Safety in Employment Act 1992.

#### **2.5.1 Earthworks Design Drawings**

Earthworks drawings shall be provided and show:

- original and finished contours;
- proposed earthworks (cut and fill);
- erosion and sedimentation control;
- geotechnical engineers input; and
- property boundaries, kerb lines and street names.

A contour plan of the site at an appropriate interval in terms of LINZ datum shall be provided for all subdivisions and developments of 0.25 hectares or greater. In rural areas, these levels may be interpolated from existing contour plans produced by LINZ or equivalent.

Erosion and sediment control may be shown schematically at the Engineering Drawing approval stage, but must be shown in detail prior to commencement of work on site and approved by either the Engineering Manager or the Environment & Planning Manager.

#### **2.5.2 Road/Street Works Design Drawings**

A road/street works plan shall be provided and show:

- property boundaries;
- kerbs and channels;
- road/street names;
- footpaths;
- longitudinal and cross sections of the existing ground;
- proposed road/street levels with batters;
- existing and proposed survey benchmarks;
- road marking; and
- signs (where relevant).

Left-hand and right-hand top of kerb shall be shown separately unless they are identical, in which case this shall be stated.

The levels of the proposed services shall also be shown on sections. Longitudinal sections shall extend 40.0m beyond the extent of the works.

### **2.5.3 Wastewater Design Drawings**

Wastewater services drawings shall be provided and show:

- wastewater pipes and manholes (in plan and long-section);
- pipe size, length and gradient in long section;
- pump stations;
- stormwater pipes and manholes (for proximity purposes, with a thick line for wastewater and thin line for stormwater); and
- property boundaries, kerb lines and road/street names.

Wastewater discharge calculations complying with Council's Engineering Standards and Policies shall be submitted.

### **2.5.4 Stormwater Design Drawings**

Stormwater services drawings will be provided and show:

- property boundaries;
- stormwater pipes, channels, manholes and structures (in plan and long-section), pipe size, length and gradient in long section;
- secondary flow paths and proposed easements;
- wastewater pipes and manholes (for proximity purposes, with a thick line for stormwater and thin line for wastewater); and
- property boundaries, kerb lines and road/street names.

Drainage drawings submitted for checking shall be accompanied by:

- catchment plans showing all the catchment areas to be served; and
- stormwater discharge calculations for each and every proposed pipe and channel.

### **2.5.5 Water Supply Design Drawings**

Water supply services drawings shall be provided and show:

- water main and fittings;
- pump stations, and
- property boundaries, kerb lines and road/street names.

## 2.5.6 Streetlighting and Power Utilities Design Drawings

Streetlighting and power utilities drawings shall be provided and show:

- power cables and substations;
- street lighting; and
- property boundaries, kerb lines and road/street names.

Power plans may be submitted separately to Council as these are designed by specialists.

## 2.6 Engineering As-built Details Required

- As-built drawings shall be provided and approved before the 223 certificate pursuant to the RMA is issued. For Council's physical works contracts, as-built drawings are required prior to the issue of the Practical Completion certificate (see Appendix 2-4 and Appendix 2-8) or within an agreed timeframe with the Engineering Manager's approval. This includes obtaining as-built plans in "stand-over" situations when Council's contractors supervise other works.
- Separate Plans to be Submitted for Each Infrastructural Asset
- All non-standard structures (eg pump stations, reservoirs, bridges, low impact stormwater devices) shall be shown as an outline and all lids and surface openings shall be shown and separately located. The position of all pipe connections to a structure shall also be located with coordinates and invert.

### 2.6.1 Earthworks As-built Drawings

Where bulk earthworks have been carried out, sufficient additional levels, coordinates and break lines to regenerate contours on earthworks plans at 1.0m intervals shall be provided.

Ground level in terms of the LINZ datum shall be shown on an appropriate plan at all boundary pegs for all subdivisions regardless of size.

### 2.6.2 Road/Street Works As-built Drawings

In **addition** to the road/street works design drawing requirements, as-built plans shall show:

- a) All kerbing (including traffic islands/traffic calming), channels where separate from kerb, or edge of seal or formed carriageway in the absence of kerbing. Points shall be located at top of kerb, centre of channel or edge of seal and in terms of coordinates and level at changes of type, direction or grade. All curves are to be located using the tangent points and at least one central point on each curve.
- b) The location and width of footpaths. Locations in terms of coordinates are preferred but are acceptable in terms of offset from boundaries or kerb.
- c) Road signs in terms of sign type and coordinates.
- d) Road markings in terms of symbol type and coordinates. Coordinates shall be positioned at ends and changes of type and/or direction. All curves are to be positioned using the tangent points and at least one central point on each curve. Offsets from the front face of kerb and channel will be acceptable. Road marking symbols need only be positioned to their centres.

- e) Bridge abutments, piers, carriageway, kerbing and footpaths in terms of outline coordinates and level, as per above specifications.
- f) New or altered benchmarks and survey standards in terms of coordinates and level in terms of LINZ datum. The points shall be clearly defined as either a benchmark or survey standard and shall be levelled/coordinated back to known benchmarks or reference points. The work must be undertaken in accordance with LINZ requirements.
- g) Any road/street works removed or relocated shall be noted on the plans to the same level of detail as new assets.

Further road construction information, Road Assessment and Maintenance Management System (RAMM) data, as required on the standard form (Appendix 2-5) shall be provided. **Note** the RAMM information forms part of the “as-built” plan criteria. Streetlight data shall be provided on the electronic streetlight data collection form available via the Tasman District Council website. Paper forms will not be accepted.

### 2.6.3 Wastewater As-built Drawings

In **addition** to the wastewater design drawing requirements, as-built plans shall show:

- a) Material, class and size (diameter, or height and width) and date installed for all assets.
- b) Manholes, chambers, storage tanks, and pump station wet wells in terms of coordinates, lid level, invert level and size and dimensions to lot boundaries.
- c) Lamp Hole Cleaning Eyes (LHCEs) and valves in terms of coordinates and lid level size and dimensions to lot boundaries.
- d) Pump stations, non-standard manholes, underground chambers, storage tanks, intake structures and outlet structures in terms of outline and pipe connection coordinates. Invert levels on all chambers, storage tanks, wet wells, intakes and outlet points.
- e) Coordinates and inverts on all pipe connections to non standard structures (eg pump stations, outfalls, intakes).
- f) Upstream and downstream invert levels on each length of pipeline. At drop manholes the invert is required for both the upper and the lower level entry point.
- g) Any change in direction, grade or type not located by the above information is to be defined in terms of coordinates and invert level.
- h) The blank end of pipe laterals or connection point to existing house drains. These shall be in terms of as coordinates and reduced level, depth to the blank end from the final ground level and distance from two readily defined permanent points (usually boundary pegs).
- i) Junction of laterals to mains in terms of coordinates or running distances along mains between surface features.

Details of any pump, automated valve, or motor components and electrical control equipment shall be incorporated into four sets of operations and maintenance instruction manuals enclosed in a hard-copy A4 bound folder. The folder shall include as-built plans of the pump station including electrical wiring, operational schematic diagrams, valves, flow meters and the like.

#### **2.6.4 Stormwater As-built Drawings**

In **addition** to the stormwater design drawing requirements, as-built plans shall show:

- a) Material, class and size (diameter, or height and width) and date installed for all assets.
- b) Manholes, chambers, storage tanks, and pump station wet wells in terms of coordinates, lid level, invert level and size and dimensions to lot boundaries.
- c) LHCEs and valves in terms of coordinates lid level, size and dimensions to lot boundaries.
- d) Pump stations, non standard manholes, underground chambers, storage tanks, intake structures and outlet structures in terms of outline and pipe connection coordinates. Invert levels on all chambers, storage tanks, wet wells and intake and outlet points.
- e) Coordinates and inverts on all pipe connections to non standard structures (eg pump stations, outfalls, intakes).
- f) Upstream and downstream invert levels of each length of pipeline (at node points). At drop manholes the invert is required for both the upper and the lower level entry point.
- g) Any change in direction, grade or type not located by the above information is to be defined in terms of coordinates and invert level.
- h) The blank end of pipe laterals or connection point to existing house drains in terms of depth to the blank end from the final ground level and measurements from two readily defined permanent points, usually boundary pegs, and as coordinates and reduced level.
- i) Junction of laterals to mains in terms of coordinates or running distances along mains between surface features.
- j) Subsoil drains in terms of coordinates and invert level at all changes in direction and grade.
- k) Watercourses, streams, rivers, secondary flow paths and easements are to be defined by coordinates and levels at the centre line of water course and the top and bottom of both banks.
- l) Detention dam structures (inlet, outlet, spillway, dam crest) are to be specifically surveyed in terms of coordinates and level. Reservoir areas are to be defined by 0.2m contour data to maximum operating level.

Details of any pump, automated valve, or motor components and electrical control equipment shall be incorporated into four sets of operations and maintenance instruction manuals enclosed in a hard copy A4 bound folder. The folder shall include as-built plans of the pump station including electrical wiring, operational schematic diagrams, valves, flow meters together with all other relevant components of the pump station. The plans shall be in a form that can be electronically scanned.

An operation and maintenance manual is required for all detention dam structures. This manual shall include key design parameters (such as reservoir catchment areas, inflows and reservoir and spillway operation) and ongoing maintenance and dam safety inspection requirements.

Operation and maintenance information may be required for non-standard stormwater components (such as water treatment devices, ponds, wetlands or swales). This information would include any special maintenance or servicing requirements.

### **2.6.5 Water Supply As-built Drawings**

In **addition** to the water supply design drawing requirements, as-built plans shall show:

- a) Material, class, type and size (diameter, or height and width) and date installed for all assets.
- b) Valves and hydrants in terms of coordinates and lid level size and dimensions to lot boundaries.
- c) Meter boxes in terms of coordinates and lid level and by distance to two adjoining boundary pegs. In addition the meter number and meter reading information is required – refer Appendix 2-7.
- d) Manholes in terms of coordinates, lid level size, invert level and dimensions to lot boundaries.
- e) Water mains and rider mains, in terms of coordinates at any change in horizontal direction or material or type or diameter. Curves to be located either using the tangent points and at least one central point on each curve or points at regular intervals.
- f) Pump stations, storage tanks, reservoirs, chambers and non-standard manholes in terms of outline, pipe connection and lid coordinates, lid level and pipe connection tank/wet well inverts as well as floor and overflow levels.
- g) Any horizontal change in direction or type not covered by the above information is to be defined in terms of coordinates. Curves are to be located using the tangent points and at least one central point on each curve. Offsets from the front face of kerb and channel maybe acceptable.
- h) Junctions of laterals to mains in terms of coordinates or running distances along mains between surface features.

Details of any reservoir, pump, motor components, automated valve or electrical control equipment shall be incorporated in four sets of operation and maintenance instruction manuals enclosed in a hard-copy A4 bound folder. The folder shall include as-builts, plans



of the pump station including electrical wiring and operational schematic diagrams. The plans shall be in a form that can be scanned.

### **2.6.6 Telecommunication and Power Utilities**

Electrical, telephone and other reticulation drawings shall be supplied to the relevant network line operator(s). Council may require evidence or certification from the relevant network line operators that the as-built plans have been received and are fit-for-purpose and the service has been provided.

### **2.6.7 Road/Streetlights**

Council will require an as-built plan of all road/streetlights and cabling installed, and completion of the electronic data collection form available via the Tasman District Council website. Paper forms will not be accepted. This should be provided on a separate “as built” sheet and shall include:

- a) Location of lights and codes in terms of coordinates.
- b) Light type, dimensions, wattage and date installed.
- c) Ballast and central information may be required.

### **2.6.8 Redundant Assets**

In addition to new assets, as-built information shall show all existing assets that have been made redundant. The assets shall be marked as either “abandoned” or “removed”. Where an existing pipe or asset has been made partially redundant the coordinates and invert of the disconnection point are required.

### **2.6.9 Existing Assets**

The location and level of all existing drainage and water services encountered during construction shall be verified and recorded on as-built plans.

As a minimum, at least one asset feature (such as a manhole lid and invert, valve or hydrant lid) adjacent to each new service shall be surveyed and recorded on the as-built plans.

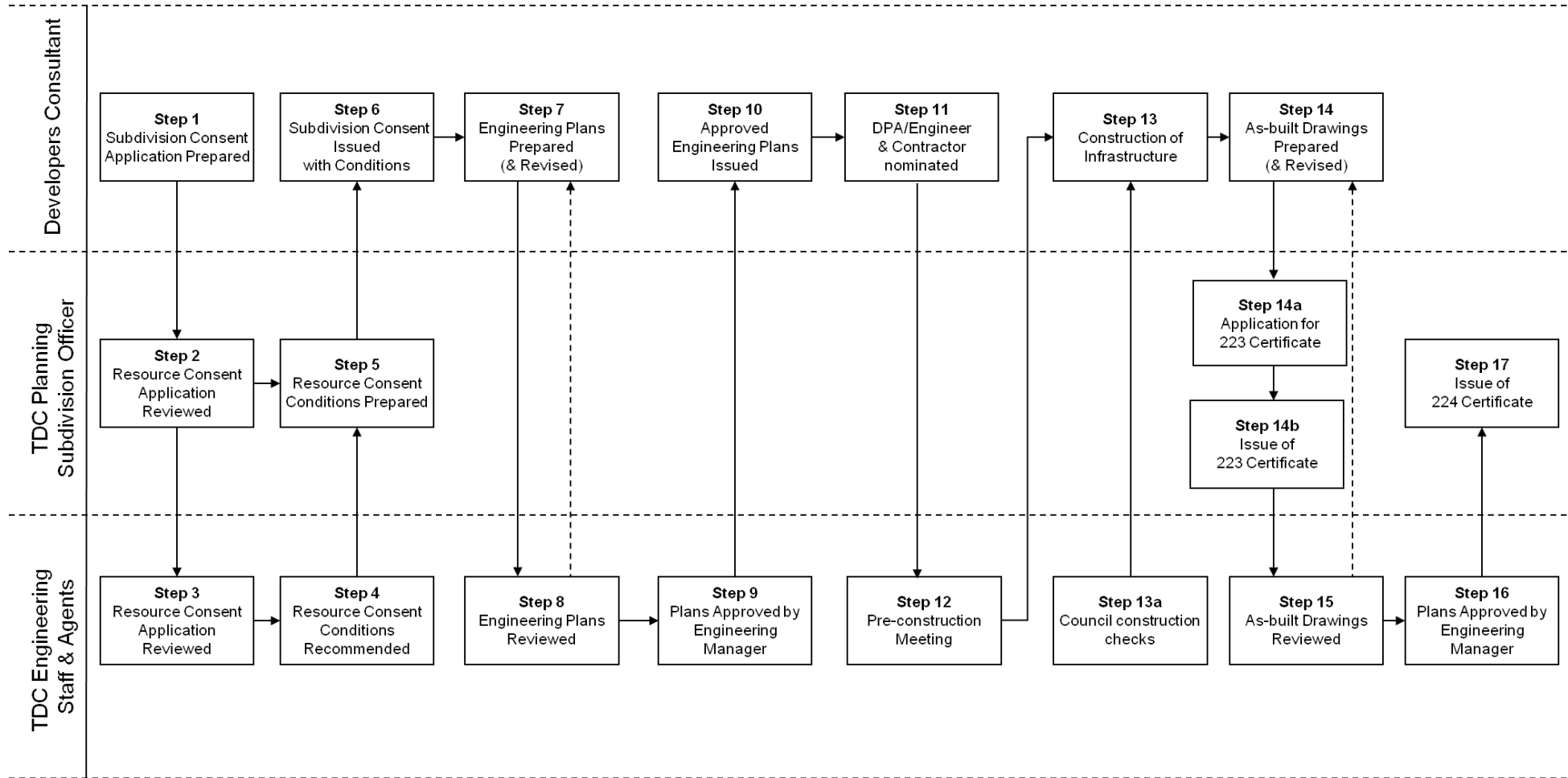
## **2.7 Disclaimer**

As-built plans held by Council are to the best of Council’s knowledge and information received from DPA’s. Council takes no responsibility for inaccurate information or unknown infrastructure found on site.

All contractors, consultants, surveyors, designers and owners have a duty to investigate further and pothole if necessary to verify the position of services.

Council will not be liable for any damages or loss whatsoever suffered from the use of information held by them.

## Appendix 2-1: Engineering Design Drawing and As-built Drawing Approval Process



Last changed: 7 April 2008

File Location: G:\Asset Administration\Engineering Standards

File name: Flow Chart-08-04-08

Process Approved

All changes to this procedure must be agreed by TDC Engineering Manager and must be notified to the following:  
TDC Planning Team, All Engineering Department Staff, MWH Asset Management System Implementation Manager.

**Appendix 2-2: Design Certificate – Land Development/Subdivision Work**

ISSUED BY: \_\_\_\_\_  
*(Approved certifier)*

TO: \_\_\_\_\_  
*(Developer/Owner)*

TO BE SUPPLIED TO: \_\_\_\_\_  
*(Territorial authority)*

IN RESPECT OF: \_\_\_\_\_  
*(Description of land development/subdivision work)*

AT: \_\_\_\_\_  
*(Address)*

\_\_\_\_\_ has been engaged by \_\_\_\_\_  
*(Consultant/Designer) (Developer/Owner)*

to provide \_\_\_\_\_ services in respect of the land development and/or subdivision work described above.

I \_\_\_\_\_ have the qualifications and experience relevant to this project as set out herein and have designed the subject works and confirm that the design is to current good engineering practice, and that it satisfies all relevant resource consent conditions, all relevant Tasman District Council requirements and applicable codes and standards. I/My practice holds professional indemnity insurance in the sum of \$ \_\_\_\_\_ and run-off cover.

\_\_\_\_\_ Date \_\_\_\_\_  
*(Signature of approved certifier)*

\_\_\_\_\_ Member  
*(Professional Qualifications)*

\_\_\_\_\_ *(Address)*

- |                       |                          |            |                          |
|-----------------------|--------------------------|------------|--------------------------|
| RPSurv                | <input type="checkbox"/> | CPEng      | <input type="checkbox"/> |
| <i>Practice field</i> |                          |            |                          |
| Civil                 | <input type="checkbox"/> | Mechanical | <input type="checkbox"/> |
| Structural            | <input type="checkbox"/> | Electrical | <input type="checkbox"/> |
| Geotechnical          | <input type="checkbox"/> | Industrial | <input type="checkbox"/> |
| Environmental         | <input type="checkbox"/> |            |                          |

**Outstanding Works**

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## Appendix 2-3: Designer's Check Sheet

TDC Consent No: \_\_\_\_\_ Date: \_\_\_\_\_

Site Address:		
Site Legal Description:		
Designer:	Name	
	Address	
Qualification:	Phone No:	
	Fax No:	
Engineer/Surveyor Contact:		
Landowner:	Name:	
	Address:	
	Phone No:	

Place a tick in a box if information is provided, otherwise write NA for not applicable

Reason for Submission:	Subdivision	<input type="checkbox"/>	ROW	<input type="checkbox"/>
	Development	<input type="checkbox"/>	Other	<input type="checkbox"/>
Design Certificate provided		<input type="checkbox"/>		
Drawing Sheet size and number of sheets	A1	<input type="checkbox"/>	A2	<input type="checkbox"/>

Draughting to AS 1100.101 and TDC Standards Section 2.4.

Levels to LINZ Datum	<input type="checkbox"/>	Locality Diagram	<input type="checkbox"/>
Contour Plan	<input type="checkbox"/>	Spot Levels	<input type="checkbox"/>
Overall Site Plan	<input type="checkbox"/>		
Plans and Sections Road/street works	<input type="checkbox"/>		<input type="checkbox"/>
Drainage	<input type="checkbox"/>	Telephone	<input type="checkbox"/>
Water	<input type="checkbox"/>	Earthworks	<input type="checkbox"/>
Sewerage Catchment Plans and Discharge Calculations			<input type="checkbox"/>
Stormwater Catchment Plans and Draughting Calculations			<input type="checkbox"/>
Road/Streetworks Pavement Design			<input type="checkbox"/>
Specific Design – specify aspect:			<input type="checkbox"/>
Owner's Consent for Work in Private Property			<input type="checkbox"/>

**Appendix 2-4: Certification upon completion of Subdivisional Work**

**ISSUED BY:** \_\_\_\_\_  
*(Approved certifier)*

**TO:** \_\_\_\_\_  
*(Developer/ Owner)*

**TO BE SUPPLIED TO:** \_\_\_\_\_  
*(Territorial Authority)*

**IN RESPECT OF:** \_\_\_\_\_  
*(Description of land development/subdivision work)*

**AT:** \_\_\_\_\_  
 \_\_\_\_\_  
*(Address)*

\_\_\_\_\_ has been engaged by \_\_\_\_\_  
*(Consultant/Designer)* *(Developer/Owner)*

to provide construction observation, review and certification services in respect of the above subdivisional work which is described in the specification and shown on the drawings numbered

TDC \_\_\_\_\_ approved by \_\_\_\_\_  
*(Territorial Authority)*

I have sighted the \_\_\_\_\_ consent and conditions of consent to the  
*(Territorial Authority)*  
 subdivisional works and the approved specification and drawings.

“I believe on reasonable grounds that the works other than those outstanding works listed below, are complete and have been constructed in accordance with:

- (a) The approved engineering drawings and specifications and any approved amendments;
- (b) The Council’s Engineering Standards; and
- (c) Manufacturer’s Instructions.”

\_\_\_\_\_ Date \_\_\_\_\_  
*(Signature of approved certifier)*

\_\_\_\_\_ Member RPSurv  CPEng   
*(Professional Qualifications)* Practice field  
 Civil  Mechanical   
 Structural  Electrical   
 Geotechnical  Industrial   
 Environmental   
 \_\_\_\_\_  
*(Address)*

**Outstanding Works**

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

## Appendix 2-5: RAMM (Road Assessment and Maintenance Management) Data Contract/Work Details

Road Name			
Brief description of work (ie, Subdivision, Reconstruction, Kerb and Channel etc)			
Start Name		Start Displacement	
End Name		End Displacement	
Carriageway Width		Carriageway Length	
Completion Date			

### Pavement Construction Details

Subgrade Material		Subgrade CBR	
	Material	Depth	Source
Sub-base			
Basecourse			
Pavement Construction Completion Date			

### Surfacing Details

#### Chip Seal

Type of Chip Seal		Source of Chip	
Size of Chip (1 <sup>st</sup> )		Size of Chip (2 <sup>nd</sup> )	
	Quantity (pph)		Type
Cutter			
Adhesion Agent			
Additives			
Flux			
Binder Type			
Binder Residual Application Rate			
Sealing Date		Sealing Contractor	

#### Asphaltic Concrete

Type of Asphalt		Depth of Asphalt	
Size of Aggregate		Source of Aggregate	
Binder Type			
Binder Percentage			
Asphalting Date		Asphaltic Contractor	

#### Contractor Details

Contractor Name	
Contractor Address	
Consultant	

## Appendix 2-6: Streetlight Data Collection Form

Site code	Plot no	Easting	Northing
Type /	Attribute	Location / Value	Notes
Date Acquired	dd/mm/yyyy		
Date Installed	dd/mm/yyyy		
Date of Last Inspection	dd/mm/yyyy		
Date of Routine Maintenance	dd/mm/yyyy		
Distance from boundary	m		
Distance from edge of seal	m		
Distance from kerb	m		
Lamp Wattage			
Lamps per luminaire			
Luminaire mounting height	m		
Luminaire tilt angle	degrees		
Number		1.00	
Number of luminaires			
Outreach length			
Ballast type			
Column colour			
Column make / model			
Column mounting			
Column ownership			
Column type			
Control type			
Data Source			
Group control position			
Isolation point			
Isolation point Service box no			
Lamp type			
Light metered?			
Luminaire make / model			
Origin of power supply			
Outreach shape			
Plan reference			
Confidence - Location			
Shield			

Do Not Use Example Only

Legend	
	heading
	fill in if known
	leave blank

**Appendix 2-7: Water Meter Location**

**Tasman District Council**

To: Water Meter Officer

Subdivision/Meter Location: .....

**Resource Consent No (if applicable)** .....

The following table defines information required by the Tasman District Council for all new water meters.

In the Meter Type Column, please indicate whether the meter is an Invensys/Sensus 620m or Kent (MSM Qn 1.5 class C) water meter. Indicate either S or K.

In the Meter Reading Column show the reading to the nearest whole cubic meter only (BLACK NUMBERS on the meter).

In the Location Column, indicate whether the measurement is from the right or left boundary when facing the lot from the road (R or L). Show one measurement to the meter from either the right or left boundary (measured along the front boundary) and one measurement to the meter from the front boundary (measured perpendicular to the front boundary).

Lot No	DP No	Road/Street No	Road/Street Name	Meter Type S/K	Meter No	Meter Reading (m <sup>3</sup> )	Reading Date	Location (Distance from)		
								R/L	Side Bdy (m)	Front Bdy (m)

(Use additional page if required)

Name:	
Signature:	Date:
Address:	



**Appendix 2-8: Engineering Works Sheet**

**ENGINEERING WORKS CHECK SHEET**

**SUBDIVISION** \_\_\_\_\_ **CONSULTANT/  
SURVEYOR** \_\_\_\_\_

**CONSENT No** \_\_\_\_\_

**LOCATION** \_\_\_\_\_ **CONTRACTOR** \_\_\_\_\_

Stage	Date Inspected	Test carried out	Test results achieved	Signature	
				Consultant	Tasman DC
Earthworks incl. subsoil drainage					
Subgrade					
Water					
Stormwater					
Sewer					
Kerb & channel					
Basecourse					
Footpaths					
Berms					
Cables					
Sealing					
As Built Plans					
Others					
Final Engineering check (Development Engineer)				Date	
Engineering Manager				Date	

## Appendix 2-9: Coordinate Table Format to Accompany Hard Copy Plans

Asset identifier/ Reference	Asset type	Eastings	Northing	Lid level	Nominal diameter	Material	Invert in 1	Invert in 2	Invert in 3	Invert in 4	Invert out	Length	Width	Depth	Install date/ practical completion	Asset location	Notes/ additional information	Consent / Plan number
Match to that on hard copy plan		Local circuit (please specify)	Local circuit (please specify)	Elevation	Circular features (mm)		For pipes - elevation	For pipes - elevation	For pipes - elevation	For pipes - elevation	For pipes - elevation	Rectangular features (mm)	Rectangular features (mm)	Features with depth (mm)	Format e.g. 23/04/2008	Street address	Any other information	From reference given

### One feature per line, no blank lines

- Points are needed for bends, junctions and ends as well as standard surface features
- No separate information needed for pipe features, material and diameter to be indicated on face of plan, also any special notes about material or construction details.

## Appendix 2-10: Asset Types in Use at Tasman District Council

### Asset types in use at Tasman District Council

*Italicised items are line features*

#### **Stormwater**

Chamber  
*Channel*  
Cleaning eye  
Collection pond  
Control cabinet  
*Culvert*  
Detention dam  
Electrical  
Floodgate  
Inlet  
Inlet structure  
Inspection point  
Manhole  
Miscellaneous item  
Node  
Outlet  
Outlet structure  
*Pipe*  
Pump  
Pump station  
Soakpit  
Sump  
Tank  
Telemetry  
Valve  
Valve chamber

#### **Water supply**

Backflow preventer  
Break pressure tank  
Building structure  
Chamber  
Chlorinator  
Contact tank  
Control cabinet  
Electrical  
Filter  
Fire pipe  
Firewell  
Flowmeter  
Generator  
Hydrant  
Intake  
Intake structure  
Lime dosing tank  
Miscellaneous item  
Node  
*Pipe*  
Pressure cylinder  
Pump  
Pump station  
Reservoir / dam  
Restrictor  
Settlement tank  
Supply meter  
Tank  
Tap  
Telemetry  
Treatment plant  
Ultra violet steriliser  
Valve  
Valve chamber  
Vent  
Well / bore  
Well structure

#### **Wastewater**

Aeration pond  
Aerator  
Bio filter  
Building structure  
Caravan dump point  
Chamber  
Cleaning eye  
Control cabinet  
Electrical  
Flowmeter / meter  
Flushing point  
Generator  
Inlet/outlet structure  
Inspection point  
Manhole  
Miscellaneous item  
Monitoring point  
Mooring anchor  
Node  
Outlet weir  
Oxidation pond  
*Pipe*  
Pump  
Pump station  
Structure  
Telemetry  
Treatment plant  
Valve  
Valve chamber  
Vent  
Wetlands

# Drawing 200 – Draughting Symbols and Scales

<b>STANDARD SYMBOLS</b>	
<u>SURVEY LINES</u>	LINEWEIGHT 0.25mm CIRCLE DIA 2mm
<u>LAND BOUNDARIES</u>	LINEWEIGHT 0.25mm
<u>NEW WATERMAINS (BLUE)</u>	LINEWEIGHT 0.50mm
<u>EXISTING WATERMAINS</u>	LINEWEIGHT 0.35mm
<u>HYDRANTS</u>	PIPE DIAMETER AT PERIODIC INTERVALS ALONG THE LINE
<u>VALVES &amp; METERS</u>	LINEWEIGHT 0.50mm
<u>NEW SEWER (RED)</u>	LINE LENGTH 20mm
<u>EXISTING GRAVITY</u>	LINE GAP 10mm
<u>EX. SWALLOWS OR PRESSURE</u>	LINEWEIGHT 0.35/0.5mm
<u>EX. RISING OR PUMPING</u>	DIA'S 2&3mm
<u>EX. MANHOLE</u>	LINEWEIGHT 0.50mm
<u>NEW STORMWATER (GREEN)</u>	LINEWEIGHT 0.35/0.5mm
<u>EXISTING MAIN</u>	LINEWEIGHT 0.35/0.5mm
<u>EX. MANHOLE</u>	DIA'S 2&3mm
<u>OPEN DRAINS</u>	LINEWEIGHT 0.25mm
<u>CABLES</u>	
<u>TELEPHONE UNDERGROUND</u>	LINEWEIGHT 0.35/0.5mm
<u>OVERHEAD</u>	DIA 2mm
<u>ELECTRICITY UNDERGROUND</u>	LINEWEIGHT 0.25mm
<u>OVERHEAD</u>	DIA 2mm
<u>KERB &amp; CHANNEL</u>	
<u>SUMPS</u>	LINEWEIGHT 0.5mm
<u>RETAINING WALLS</u>	LINEWEIGHT 0.25mm
ANNOTATED e.g CRIBWALL	
<u>TYPICAL SIGNATURE BLOCK</u>	
 <b>tasman</b> district council <b>ASSET MANAGEMENT ENGINEERING</b> ENGINEERING MANAGER ..... DATE .....	TDC PLAN No. .... SHEET ..... OF ..... RESOURCE CONSENT No. .... .....
<u>SITE CONTOURS</u> 1:1000 1:500 1:250 1:200 <u>STREETS KERB &amp; CHANNEL AND FOOTPATHS</u> PLAN 1:500 1:250 1:200 LONGITUDINAL SECTION : HORIZONTAL 1:500 1:250 1:200 VERTICAL 1:50 1:25 1:20	<u>SOIL SEWER &amp; STORMWATER</u> PLAN 1:500 1:250 1:200 LONGITUDINAL SECTION : HORIZONTAL 1:500 1:250 1:200 VERTICAL 1:50 1:100 DETAILS 1:20 1:10 1:5
<u>CROSS SECTIONS</u> HORIZONTAL 1:50 VERTICAL 1:100 1:50 1:20	<u>SERVICES GENERAL</u> PLAN 1:500 1:250 1:200 CROSS SECTIONS 1:50
ANY VARIATION FROM THESE SCALES AS SHOWN SHALL HAVE THE PRIOR APPROVAL OF THE COUNCIL SHEET SIZES: A1 594mm x 841mm A2 420mm x 594mm A3 420mm x 297mm	
MAIN SHEETS REQUIRED: 1. ROADING 2. SEWERS - STORMWATER - KERBS 3. WATER - TELEPHONE - POWER - KERBS	
ALL INKS AND LETTERING USED SHOULD BE SUITABLE FOR SCANNING REPRODUCTION.	
<b>DRAUGHTING SYMBOLS &amp; SCALES</b>	
 <b>ASSET MANAGEMENT ENGINEERING</b> APPROVED  ENGINEERING MANAGER .....	DRAWING No. <div style="font-size: 2em; font-weight: bold; text-align: center;">200</div> NOVEMBER 2013 DATE .....

# Drawing 201 – Draughting Standards and Symbols

<u>LONGITUDINAL SECTION</u>	
<b>ROADS</b>	
H.A.D (T.D.C.)	
OTHER LEVELS ( E.G. EXISTING SERVICES )	
TOP OF KERB LEVEL R.H. SIDE	
TOP OF KERB LEVEL L.H. SIDE	
GROUND LEVEL PEG LEVEL	
HORIZONTAL DISTANCE	
GRADIENT R.H SIDE ( % OR 1 IN __ )	← V.C. →
GRADIENT L.H SIDE	
HORIZONTAL CURVE	← H.C. →   ← %S.E. →
<b>SEWER &amp; STORMWATER</b>	
H.A.D (T.D.C.)	
OTHER LEVELS (E.G. SERVICES CROSSING THE LINE)	
HYDRAULIC GRADE LEVEL (IF APPLICABLE)	
GROUND LEVEL PEG LEVEL	
CUT (GROUND LEVEL TO INVERT.)	
SEWER INVERT	
SEWER DISTANCE (TRUE HORIZONTAL DISTANCE ALONG SEWER)	
GRADIENT (% OR 1 IN ...)	
DIAMETER (MILLIMETERS INTERNAL) & PIPE TYPE/MATERIAL	
<b>COLOUR CODE FOR EARTHWORKS IN SECTION</b> (WHEN REQUIRED)	
FILLING	GREEN      SYMBOL =
CUTTING	RED          SYMBOL =
REPLACEMENT GRAVEL	BROWN      SYMBOL =
BASECOURSE	BLUE        SYMBOL =
EARTH (TOPSOIL)	SYMBOL =
<b>NOTE</b>	
1. ALL LEVELS IN TERMS OF HEIGHT ABOVE T.D.C. DATUM IN METRES i.e. MEAN SEA LEVEL = 0.00	
2. ALL DISTANCES IN METRES.	
3. GROUND OR PEG LEVELS SHOWN ON SECTIONS ARE TO BE THOSE ON THE LINE OF THE SERVICE.	
4. PIPELINES DESIGNED TO OPERATE UNDER PRESSURE SHALL INCLUDE THE HYDRAULIC GRADE LINE, ITS LEVELS AND GRADIENTS.	
5. BLOCKS MAYBE EXTENDED TO ALLOW "AS BUILT" DATA TO BE ADDED. e.g: AS BUILT SEWER INVERT AS BUILT DISTANCE AS BUILT GRADIENT	
6. LOWEST LEVEL ON LONGITUDINAL SECTION ON LHS.	
<b>COLOUR CODE</b>	
COLOUR CODE PRIMARILY FOR USE ON WHITE PAPER. ALL INKS USED SHOULD BE SUITABLE FOR PHOTOCOPYING AND REPRODUCTION.	
SYMBOL IS FOR WHEN COLOURS ARE TO BE REPRODUCED IN BLACK	
<b>DRAUGHTING STANDARDS &amp; SYMBOLS</b>	
	<b>ASSET MANAGEMENT ENGINEERING</b>
APPROVED  ENGINEERING MANAGER	DRAWING No.  <b>201</b>
NOVEMBER 2013 DATE	