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4. DRAWINGS (DESIGN & AS-BUILT PLANS) REQUIREMENTS

This section of the Engineering Code of Practice (ECOP) highlights Councils Drawing requirements for both plans submitted for review and As-built plans.

4.1 COUNCIL REQUIREMENTS

Developers and designers shall provide drawings to Council for:

- Resource consent approval (design drawings)
- Engineering Approval and (design drawings)
- Application for Section 224(c) Certificate (as-built drawings)
- Application for Practical Completion (as-built drawings)

Requirements for design drawings are set out in this section of the Engineering Code of Practice (ECOP).

Individual drawing files should generally be less than 20MB. Drawings shall be prepared in accordance with the requirements of this section for compatibility with Council electronic and database systems. This section applies to both design plans for approval and as-built plans post-construction.

4.1.1 Drafting standards

All drawings submitted to Council for review (including capital works projects, subdivisions, and renewals) shall conform to the requirements of the SCIRT Draughting Manual or AS1100.101, AS1100.401, AS1100.501.

Engineering drawings submitted for review must be legible, clear, readable, and complete. They must clearly illustrate the proposal and enable both assessment of compliance with the ECOP and accurate construction.

4.1.2 Coordinate system and datum

All electronic drawing data provided to Council shall be drawn in New Zealand Transverse Mercator 2000 (NZTM200) projection. The level datum to be used will be in terms of the Lyttelton Mean Sea Datum 1937 (pre-earthquake). No assumed datum shall be used on any Engineering Drawings.

Note: **SDC will adopt the NZ Universal Datum (NZDV2016)** to align with LINZ. NZDV2016 will replace the old Lyttelton Mean Sea Datum.

4.1.3 Accuracy

Required accuracy of as-built plans shall be as per the Table 1 (shown below):

Table 1 - Accuracy

Feature	Accuracy
X-Y plane	± 100mm
Z plane (e.g., Manhole Lids)	± 30mm
Levels as detailed	2 decimal places
Invert levels for gravity networks	± 5mm

As-built measurements for all civil features (manholes, pipes, valves, etc.) shall be taken from the centre line of that feature. For example:

- Centre of manhole lid
- Mid-point top of pipe
- Top of spindle
- Mid-point invert of pipe

4.1.4 Pipe labelling convention

All pipe sizes are to be labelled with their Outside Diameter (OD) unless unique pipes are used for special purposes. Instances where Inner and Outer Diameter is used to label pipes the following signifiers shall be included on the drawings:

- ID – Inner Diameter
- OD – Outer Diameter

4.2 DRAWING CONTENT

Drawings submitted to Council for approval and acceptance are expected to contain a level of content and detail that reflects the stage of design development a project is at. Refer NZ Construction Industry Council Design Guidelines for guidance on the level of design content required.

Drawings must contain sufficient detail to allow Council staff to assess a proposal.

In general, drawings submitted for Council acceptance and approval are expected to clearly show as a minimum:

- Location and locality: district, township, and proposed worksite boundaries.
- Property boundaries: land parcels, easements, and significant land (protected, sensitive, archaeological, contaminated land etc).
- Existing site: including site survey, datum, benchmark and showing levels across adjacent properties.
- Terrestrial information: landforms, grades and slopes, and existing buildings and infrastructure.
- Proposed Council infrastructure (including infrastructure to be vested following completion of works): location, size, materials, and relevant particulars. Transportation route corridors are important to resolve early.

- Infrastructure system: clear illustration of key components required to present the operational system at completion. Assets to be decommissioned are to be clearly labelled “Decommissioned” and indicate how it was decommissioned and if it is still in-place.
- Drawing register, documenting revisions and issue date. An updated drawing register shall accompany every issue of new or revised drawings, whether the complete set is re-issued or not.

4.3 AS-BUILT RECORDS

As-built drawings shall be an accurate representation of the constructed location and condition of the physical assets. Council requires that as-built records include not just the Council-owned assets, but all features located within the public reserve – for example utilities such as streetlights, trees, and footpaths. They must also include public assets which have abandoned, decommissioned, or removed because of the project.

For projects that tie into existing infrastructure, as-built records that meet the standards set out in the ECOP are also required to be show on the as-built drawings for the existing infrastructure.

Council requires accurate and specific as-built records to be supplied with completion documentation for all vested assets. All electronic and paper as-builts need to be verified as accurate by Council staff and acceptable for Council databases.

Council will not issue a Certificate of Practical Completion or Section 224 Certificate until as-built plans have been reviewed and accepted.

For guidance on supporting documentation required for 224c and practical completion refer to the relevant Asset Type section of the ECOP.

4.3.1 General As-Built Record Guidance

The following as-built information is required by Council:

- Fully detailed and completed as-built drawings of all services in digital drawing format DWG/DXF and PDF format
- Fully detailed and completed as-built drawing of all Earthworks cut/fill in digital format to support the Geotechnical completion report and NZS 4431:1989 Fill Certificate in DWG/DXF and PDF format

The following supporting documentation is also required by Council when submitting as-built records for acceptance:

- Certification from a licensed Surveyor confirming the accuracy of information provided
- A schedule of assets to vest in Council in excel format
- RAMM as-built spreadsheet accurately filled in with Roading and Transport information
- AMS as-built spreadsheet (Bill of Materials) accurately filled in with all Asset Type information

When preparing your as-built drawing package for review by Council all drawings shall meet the following requirements:

- Include a title block with project name, designer/contractor, scale (or scales) being used, legend, and an amendment box
- The legend will clearly define the type of material, size and class used for all pipes
- Be signed, dated and clearly labelled **AS-BUILT**
- Individual PDF drawings supplied for each Asset Type (Council will accept all Asset Types in a single CAD drawing file)
- All asset type and features shall be defined clearly and placed on its own induvial layer in all DWG/DXF drawings
- All layers used in the DWG/DXF drawings shall conform to the naming convention set out in Section 4.3.3 or be suitably named when guidance isn't given
- No use if codes or obscure names are permitted
- Levels and inverts shall be clearly labelled on all drawing files
- **The use of the colour yellow for text shall not be used**
- All assets to be vested to Council must be shown on the as-builts

- Drainage assets within ROWs and private sections shall be included to provide inclusive network to allow complete overall management and picture of drainage system
- Include offset dimensions from legal parcel boundaries to pipes, manholes and laterals for **all** asset types
- **Measurements taken from fence lines, power poles and trees etc. are not permitted**
- All Asset Type reticulation pipes shall be drawn as continuous lines between civil assets or connections
- Watermains plans are to include running distances every 50m and where changes in pipe materials occur
- Plans showing manhole locations are to include running distances, starting 0 at the downstream manhole, picking up Y junctions (laterals at main). Upon reaching the next manhole start at 0 again.
- Clearly mark any decommissioned asset on the as-builts plan. Define if asset was left in the ground removed and/or capped.
- Existing asset that is relocated shall be clearly noted on as-builts plan
- Changes in material types or construction forms are clearly defined (e.g., Piped, open channel and siphon sections of the water race)

Note: As a rule of thumb all as-built information supplied to Council should, at a minimum, have the same level of detail supplied in the Council approved plans.

4.3.2 As-Built Drawings Required

A typical project (including subdivisions) will require the following drawings in the as-built drawing set:

Earthworks:

- Detailed overall scheme plan shown Cut & fill depths, slopes, batters, and volumes
- Retaining walls and subsoil drains clearly shown on the scheme plan and cross-section details supplied where necessary

Roading and transportation layout and details:

- Detailed overall scheme plans showing the holistic road network (including ROWs)
- Corridor cross-section details
- ROW cross-sections

Water supply layout and details including irrigation systems:

- Reticulation scheme plans including all civil structures
- Detailed cross-section drawings of pump stations, Reservoirs, Treatment Plants, etc.

Wastewater layout & details:

- Reticulation scheme plans including all civil structures
- Reticulated mains long sections
- Detailed cross-section drawings of pump stations, flush tanks, low pressure sewer boundary boxes, etc.

Stormwater system layout and details:

- Primary and secondary flow paths and stormwater catchment areas
- Reticulation scheme plans including all civil structures
- Stormwater reticulation mains long sections

- Areas of overland flow/proposed ponding depths and freeboard
- Contours and outlines of any stormwater management areas
- Detailed cross-section of stormwater management areas
- Detailed cross-section of filter pump stations

Water Race system layout and details:

- Reticulation scheme plans including all civil structures
- Detailed cross-sections of headwalls, weirs, gates, etc.

Utilities layout and details

- Detailed overall scheme plan of the Electrical and phone network and Streetlight pole location

Refer to Section 4.4 for guidance on Council's asset specific as-built information requirements.

4.3.3 Drawing Digital Layers

The information shown below in Table 2 - Table 6 shall be used to define the DWG/DXF layer naming convention.

Assets not listed below shall be given clear and precise layer names in the digital file.

Table 2 - Water Drawing Layers

Layer	Description – *linetype*
WTRMAIN	Water pipelines – *polyline*
WTRLAT	Water laterals – *polyline*
WTIRRMAIN	Water irrigation pipelines – *polyline*
WTRTXT	Pipe details (size, material, pressure rating, dimensions, offsets etc.) – *text*
WTRHYD	Fire hydrants – *point*
WTRVALVE	Water valves – *point*
WTRMETER	Water supply points – *point*
WTRWELL	Water wells – *point*
WTRDIAG	Water diagrams, schematic details, cross sections, outline of structure features etc.

Table 3 - Sewer Drawing Layers

Layer	**Description – *linetype***
SWRMH	Sewer manholes – *point*
SWRMAIN/SWMAINPRESSURE	Sewer main pipeline – *polyline*
SWRLAT	Sewer lateral – *polyline*
SWRPUMP	Sewer rising main and pump station
SWFLUSH	Sewer Flush tank – *point*
SWVALVE	Sewer valves – *point*
SWRTXT	Text pipe details (size, type, gradient, dimensions, offsets etc)
SWRDIAG	Sewer diagrams, schematic details, cross sections, etc
SWRLEVELS	Sewer Lid and invert levels – *text*

Table 4 - Stormwater Drawing Layers

Layer	Description – *linetype*
STWMH	Stormwater manhole – *point*
STSUMP	Stormwater inlet sumps creespits- *point*
STMISC	Stormwater misc. (filters, basins, oil traps, treatment devices etc.) – *point and polyline*
STSOAKHOLE	Stormwater soakage – *point and polyline*
STWMAIN	Stormwater main pipes – *polyline*
STWCHANNEL	Stormwater open drain, channel and/or swale – *polyline*
STWLAT	Stormwater lateral – *polyline*
STWTXT	Pipe size, type, gradient, details etc. – *text*
STWDIAG	Diagrams, schematic details, cross sections etc
STWLEVELS	Stormwater Lid and invert levels – *text*

Table 5 - Water Races Drawing Layers

Layer	Description – *linetype*
WTRMAIN	Water race channel – *polyline*
WTRPIPE	Water race pipe – *polyline*
WTRMH	Water race manhole – *point*
WTRMISC	Water race structures such as gates, weirs, divides
WTRSOAK	Water race soakage - *point and polyline*
WTRTXT	Text details, size, type, gradient – *text*
WRTLEVELS	Water Race Lid and invert levels – *text*

Table 6 - Misc. Drawing Layers

Layer	Description – *linetype*
PARCELS	Land boundaries – *polyline*
RDNAME	Road names – *text*
RDEDGE	New kerb & channel, edge of seal, islands – *polyline*
FOOTPATH	Footpath, tracks, pathways – *polyline*
IRRIG	Water irrigation pipes – *polyline*
IRRIGPNT	Water irrigation points, pop-ups, sprinklers, drippers etc – *point*
IRRIGTXT	Text pipe details, size, type, control valves, details etc – *text*

4.3.4 Schedule of Vested Assets

An electronic schedule of all assets (including roading, street lighting, landscaping, water, irrigation, sewerage, and stormwater, water race) constructed and being vested to Council shall be submitted to Council, with the as-built plans. All schedules of assets supplied to council must be an excel spreadsheet and in the same format as the Council template as well as include the following information:

- Asset structure
- Asset value
- Asset supplier
- Material type
- Material class
- Diameter
- Length
- Width
- Area
- Volume
- Number

Itemise the construction cost into the major asset types, and into separate assets (e.g., costs of each of two basins) within the asset types when preparing the schedule of assets.

4.3.5 AMS As-built Spreadsheet (Bill of Materials)

To support the information provided with the schedule of vested assets an AMS as-built spreadsheet (bill of materials) will also need to be submitted with the as-built records. Please apply to the Development Engineer or Council Project Manager for a copy of the template used by Council.

4.3.6 RAMM As-built Spreadsheet

Resource Consent holder's who are vesting roads to council as part of the proposed development will be required to fill in the RAMM as-built spreadsheet in full and submit it to Council as part of the as-built records supporting documentation.

4.4 ASSET-SPECIFIC AS-BUILT REQUIREMENTS

The following sub-sections is intended to outline the general Council's asset specific as-built requirements. If an asset type is not covered in the following sections seek guidance directly from Council regarding specific requirements. The information detailed below is not an extensive list and Council may ask more information relating to a specific asset type as required. Refer to Section 4.3.1 for general as-built requirements guidance.

4.4.1 Earthworks As-built requirements

If NZS 4431 was applicable to the project, prepare as-built plans with the following information:

- It must show the extent and depth of a level of fill in the form of CLOSED INDIVIDUAL POLYGONS that join all points of equal depth of fill at vertical intervals of 100mm.
- It must show the location of areas of filling of low density, any fill areas that the geotechnical engineer considers as not complying with the ECOP requirements, and areas where the standards have been varied from the original construction specification.
- The as-built plan must record the position, type and size of all subsoil drains and their outlets (supply detail drawings where necessary)
- The as-built plan must record the location of retaining walls (retaining wall detail drawings are also required)
- As-builts must also provide information about any under runners and springs located as part of the project
- The closed polygon of fill contours shall be on a digital layer called **Fill**. No other assets, lines, or points data to be given on this layer
- Fill labels annotation shall be on layer called **FillLabel**. No other text shall be included on this layer
- The legend should include the type of fill installed earth or engineered.

4.4.2 Stormwater Land Drainage and Water Race As-Built Requirements

The following stormwater, land drainage and water race information is required to be shown on as-builts supplied to Council for review:

- Pipes and Laterals – Invert, gradient, diameter, material, pipe type/class, invert, and position
- Swale/Open Channel/Drain - Length, depth, width, and position
- Valves – size, type, and position
- Manholes/Inspection Chamber/Flush Tanks – top/lid level, invert level, type, diameter, and position
- Sump/Inlet Divides, headwalls – type, top level, invert level, pipe type/size for outlet, headwall detail and description, and position
- Stormwater Management Areas (Retention Basins/Rain Gardens/Wetlands) – Volume, contour layers, levels, outline, special features, and position
- Miscellaneous (Humeceptors, oil traps, filter beds, weirs, gates headwalls, veristanks, soakhole, and soakpits) – include any relevant information associated with the feature (volume, outline, detail, etc.) and position of the asset
- Pump Station, monitoring site, treatment structure – structures, and position
- Water Race and Land drainage open channel – Length, depth, levels, outline, and flow direction

4.4.3 Wastewater As-Built Requirements

Figure 1 (shown below) is an example of some of the details required to be shown on wastewater as-built drawings.

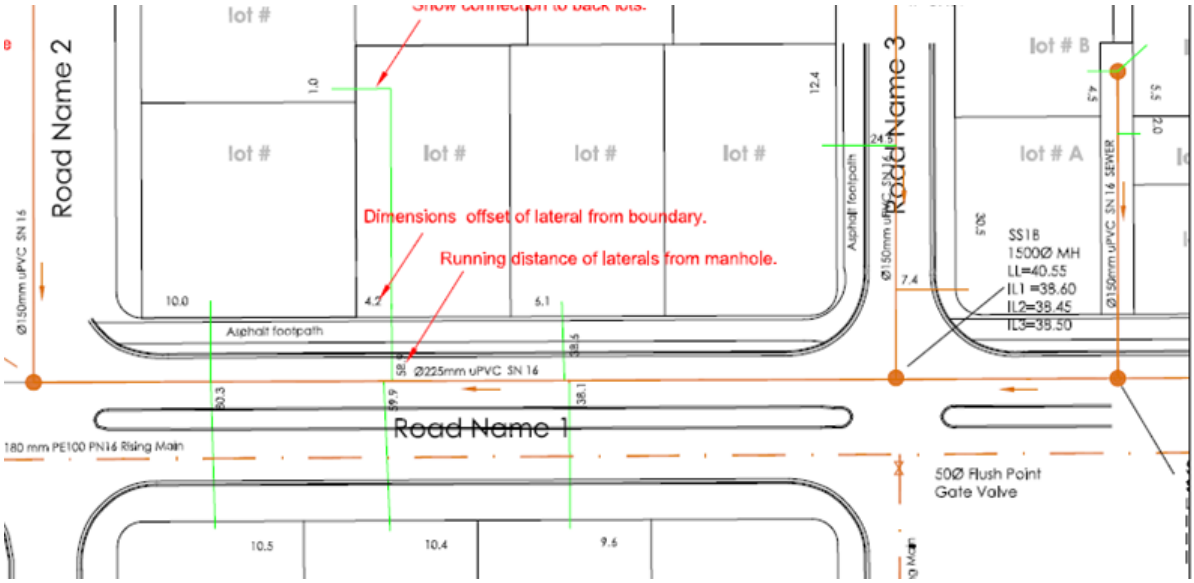

Figure 1 - Sewer As-built Example

The following wastewater information is required to be shown on as-builts supplied to Council for review:

- Pipes and Laterals – Invert, gradient. diameter, material, pipe type/class and position
- Manholes/Inspection Chamber/Flush Tanks – Top/lid level, invert levels, type, diameter, and position
- Manholes with vented lids or inside wire arrangements shall be clearly marked and labelled
- Valves – Size, type, and position
- Boundary Kits, Flush Tanks, etc. – Standard detail, size, type, and position

4.4.4 Water Supply As-built Requirements

Figure 2 (shown below) is an example of some of the details required to be shown on water supply as-built drawings.

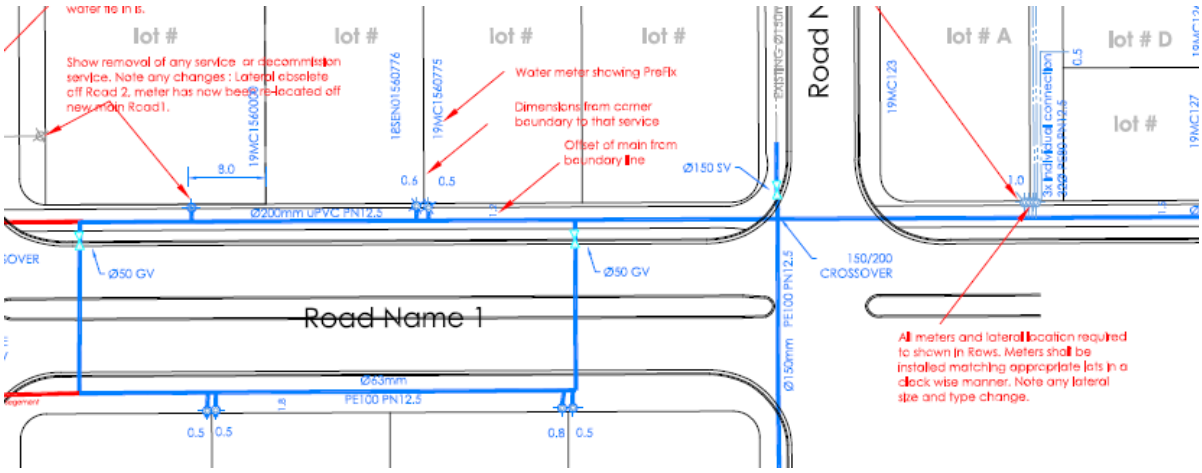

Figure 2 - Water Supply Layout

The following water supply information is required to be shown on as-builts supplied to Council for review:

- Pipes and Laterals – Diameter, material, pipe type/class and position (the digital drawing shall clearly illustrate when a pipe joins into another pipe or crosses over)
- Each water mains shall be drawn as one continuous line until it ties into another main. Bends shall be drawn as polylines. *The water main shall not be drafted in small separate sections.*
- Offsets are to be shown every 50 meters along a water main or where changes occur in pipe size or bend. Tie in all valves, fire hydrants and laterals etc. in an offset to the nearest boundary.
- Valves - Size, type, and position. Note shall be place on the water line they control not to be shown on centre of Tee join
- Meters, manifolds, flow controls - Size, type, and position make, model, meter number
- Fire Hydrants – make, model and position
- Irrigation pipe, head works and popups - Diameter, material, pipe type/class and position
- Water Miscellaneous (BFP, brake pressure tank, strainer, flow meters etc.) – location and position
- Pump Station, monitoring site, treatment structure – structures and position
- Where water meters are installed the meter number must be provided and the label should be placed in the correct section/ lot e.g., 95M672596. This text is to be on the WTRTXT layer.

4.4.5 Roading As-Built Requirements

The following roading information is required to be shown on as-builts supplied to Council for review:

- Details of type of kerb and channel, carriageway width and materials used (pavers, ac, chip seal etc.)
- Structures within the carriageway such as footpaths, bridges, signs, retaining walls, fencing etc. shall be shown and labelled with appropriate information given on length, width, area, type, and details.
- Entranceways and ROWs shall be shown.
- Entranceway (Pipe/Drainage/ headwalls) shall be clearly shown and labelled, and detail drawing supplied where necessary
- Types and locations of signage
- Approved Road Names shall be clearly labelled on as-builts digital drawings
- Road markings including RRPMs shall also be shown

4.4.6 Reserves, Streetscape & Open Spaces As-Built Requirements

The list below gives an indication of the types of reserves assets currently owned and managed by the Council:

- Play & Sports Facilities
- Buildings
- Bridges & Structures (including walls & fences)
- Plantings (including grass areas)
- Trees
- Car Parks & Drives
- Paths & Tracks
- Artworks & Monuments
- Furniture
- Park Utilities (e.g., paddling pool pumps, storage tanks, irrigation systems etc)

Collect each of the above assets recorded within the spreadsheet in GIS. Collect different asset types in different GIS layers. In GIS attribute tables, enter **only** the sequential unique ID and Consent Number captured above for each asset, to identify which GIS feature matches which entry in the spreadsheet.

Data rules around the capture of GIS data for reserves, open spaces and landscape works will be available on request from the Council.

GIS layers must be in in an acceptable format (SHP, GeoDatabase, MapInfo TAB, GeoMedia or similar approved) and must be in terms of New Zealand Transverse Mercator 2000. Where development or landscaping occurs on an existing Council Park or Reserve, the Council will provide where necessary a spreadsheet and accompanying GIS layers (if available) of the existing assets to update. Capture all new assets constructed or installed as part of the development as above. Provide updated planting plans, with planting schedules amended to record actual plants installed, including source of supply. Include any amendments to structures and furniture.

Provide an electronic spreadsheet giving details of all assets on reserves to be vested in Council and the associated GIS layers of these assets. A data dictionary will be available on request from the Council, giving details required for different asset types.

The information required includes:

- Consent Number associated with asset
- Name of adjoining main street
- Ward name in which the park/reserve is located
- A sequential unique ID for each new asset collected (e.g., N1, N2, N3 etc.)
- Location description on-site or global navigation satellite system (e.g., GPS)
- Co-ordinates (latter required only if the former is too difficult)
- Measurements (length, area, height etc - see data dictionary for details)
- Construction materials (see data dictionary for details)
- Manufacturer’s name
- Date of construction/installation in park/reserve
- Maintenance/warranty period
- Asset Type (see data dictionary for details).

4.4.7 Non-pipe assets

The following additional as-built information is required for non-pipe assets that are part of the over-all network arrangement (e.g., pumps, stormwater treatment device biofilter):

- Electronic copy of the product manual
- Master drawings in PDF format
- Engineering drawings in DWG/DXF and PDF format
- Building, Reticulation, Pumps, Reservoirs, Cables and Wells drawing in TIF format
- Operations & Maintenance Manuals for Electrical and Mechanical components
- Diesel generator capacity details
- Power connection details (ICP number)
- Digital photos of new assets
- Grounds maintenance plans in PDF format
- Pickup sheets in electronic format (reservoirs, cables, and wells)
- Well information (well consent details, well log, water quality results) in electronic format