



QLDC ASBUILT PLANS

USER GUIDE (AUTOCAD)

SUPPLEMENT TO THE ASBUILT PLAN SPECIFICATION REQUIREMENTS

APRIL 2010

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Document Status Sheet	
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Revision Schedule					
Rev No	Date	Description	Prepared by	Reviewed by	Approved by
A	31.3.10	Issued for Final Review	SW	RC	RC
V1	22.4.10	Issued for Use for RM asbuilt projects	SW	RC	RC

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Appendix A – Surveyor's Certification

1. Surveyor's Certificate and Signature of Approval wording
2. Digital Asbuilt File – Producer Statement RM (Resource Consents)
3. Digital Asbuilt File – Producer Statement QLDC Contract (Infrastructure Code)

Appendix B – Required Information, descriptive diagrams:

1. asbuilt measurements - Water - hydrants
2. asbuilt measurements - Water - valves
3. asbuilt measurements - Sewer - manholes, pipes
4. asbuilt measurements - Drainage - manholes, pipes
5. asbuilt measurements - Drainage - mudtanks, inlets, outlets
6. asbuilt measurements - Drainage - channels

SECTION 1 – INTRODUCTION

1.1 BACKGROUND

In 2008 QLDC introduced Hansen as its Asset Management System and converted all Geographic Information System (GIS) data from New Zealand Map Grid to New Zealand Transverse Mercator. Hansen has strict requirements for the assets' attributes, field names and field types. In October 2008 QLDC began updating its Asbuilt Plan Specification Requirements to address these format requirements of Hansen.

To support the new Asbuilt Plan Specification Requirements ("the Specification") QLDC also commissioned an AutoCAD based **drawing template** and this **User Guide**, to facilitate the creation of Asbuilt Plans by Asbuilt producers using the AutoCAD format. AutoCAD is the predominant format presented to QLDC for Asbuilt Plans.

In the first instance the user must read the Asbuilt Plan Specification Requirements and meet those requirements when providing data to QLDC for Asbuilt Plan purposes. A certificate on the plan face and a digital file Producer Statement must be signed to this effect. This User Guide can be read as a supplement to the Specification; as an aid to preparing the AutoCAD drawings via the drawing template provided by QLDC and providing some explanation to how the data is used by the GIS. The Surveyor's Certificate and Producer Statement forms are provided as **Appendix A** of this User Guide. A number of interpretive diagrams are provided as **Appendix B**. They describe the measurement locations for coordinates, levels and depths etc for typical features.

From time to time these documents may be updated and the latest versions will be available through Council's website (www.qldc.govt.nz)

1.2 PURPOSE OF THIS GUIDE

Two key outcomes drive the Specification requirements. These are:

- Measured Asbuilt information must be presented to Council in a prescribed digital format to enable QLDC GIS operators to import the mapped assets and attribute values into the GIS and Hansen Asset Management System in a routine fashion. This includes rigorous use of attribute tables, predefined values, naming conventions, and standardised formats. Spatial coordinates (X, Y) must be in terms of New Zealand Transverse Mercator (NZTM2000) projection and levels (Z) must be provided in terms of metres above Mean Sea Level datum (MSL; Dunedin Vertical Datum 1958).
- Measured Asbuilt information must also be presented to Lakes Environmental in a paper plan format, suitable for copying, scanning and printing for any potential enquiry by interested persons, such as property owners or their agents. The paper plan should present the data as a readable record of the measured infrastructure, suitable for the casual observer, and include such interpretive information as feature descriptions (e.g. pipe type, size), offset dimension text (from boundaries to toby and lateral ends) and the plan and project header details requested under the Specification in Section 2. A PDF version of the paper plan asbuilt should also be supplied.

The **drawing template** provided by QLDC is tailored, as a starting point, to enable the Asbuilt producer to satisfactorily meet both these outcomes.

This User Guide provides assistance, to:

- Identify the pre-planning and field survey requirements to produce robust Asbuilt records
- Set up the AutoCAD drawing framework; and
- Draw the asbuilt plan

The Guide is not intended as a 'How-to guide' in the use of AutoCAD. In that case consult AutoCAD Help screens ('F1') or your AutoCAD user manual.

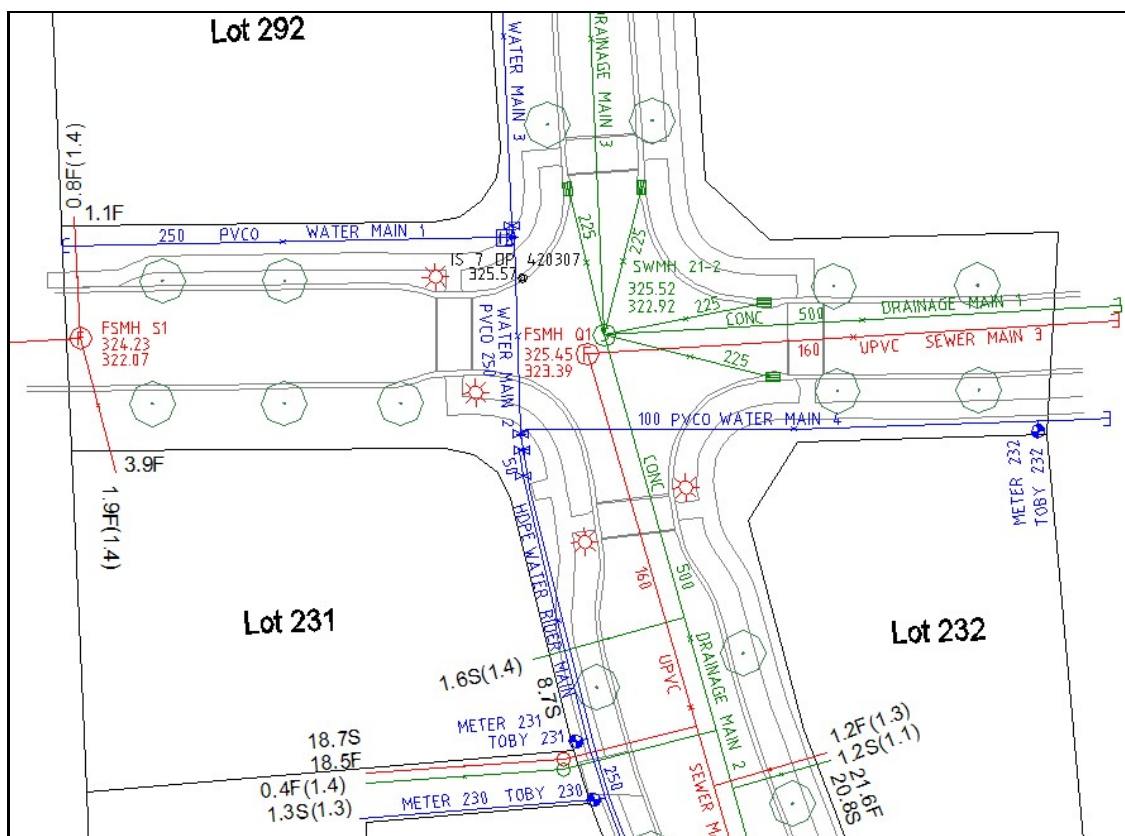


Figure 1: Example asbuilt drawing data

SECTION 2 – PRE-PLANNING & FIELD OPERATIONS

There are a number of elements to the Asbuilt project which can be pre-planned to provide assurances that the final as-built product is a robust deliverable, meets the accuracy requirements, and can be routinely produced and data checked.

2.1 TERMINOLOGY AND PRESCRIBED CONVENTIONS

The Asbuilt Specification uses naming conventions which have their genesis in Hansen and GIS terminology. Take time to familiarise yourself with the specific names and descriptions prescribed in the Specification for the different **Unit Types** (Section 3, e.g. SEWER, TRUNK, MAIN and STORM), the **Attributes** (Section 4, e.g. ZCOORD, HYDIST, ASBUILT, SPECINST), the **Field types** (Section 4) and **Predefined Attribute Values** (Section

5). Some terminology does not appear intuitive at first glance, for example the attribute SPECINST (Special Instructions) = Comments.

Field Types and Field Lengths are prescribed in the Specification and must be strictly adhered to, so the data fields correctly transfer to the GIS. The various Field Types are described here:

- Text: any alphanumeric characters a-z and 0-9, spaces, hyphens and underscores. Do not use the following invalid characters (/ : ? * | = ... " < > \$ % #). The field length (number of characters allowed) is prescribed for each attribute.
- Date: dates must be of the form dd/mm/yyyy (the date of practical completion).
- Long Integer: a positive or negative whole number (without a fractional value).
- Float (*Single-precision floating-point number*): a number containing a decimal point (fractional values).
- Double (*Double-precision floating-point number*): a number containing a decimal point (fractional values) to higher precision. It can store numbers to the 5th decimal place

It is important to note that fields with no measured data should be left empty and not have fillers like "0", "NA" or "UNK" added to them if no data exists. Likewise, fields such as PIPEDIAM should not be populated with comments such as "existing" or "not measured". Comments should be added to the SPECINST field. Numeric fields cannot include measurement units i.e. don't include 'm' or 'mm'.

2.2 MANHOLE LIDS AND NAMING CONVENTIONS

Be careful in the use of symbol and naming conventions and the use of abbreviations. Note that Manholes in this district (where named) are marked 'F' on Foul-sewer (Sewer) lids and 'S' on Storm-water (Drainage) lids. You can see the potential for confusion! Symbols on the asbuilt Template Drawing follow this established field practice, being Ⓕ (F) for Sewer Manholes and Ⓖ (S) for Drainage Manholes. This weighs in favour of the layperson matching the convention on the ground with the plan. Likewise laterals (F, S, W) and manholes (FSMH, SWMH) follow this convention. The 'conversion' of terminology to the Hansen conventions of Drainage and Sewer can be left to those who will be aware of the issues. Our suggestion is that if an alternative convention is taken up, a heavy note should be added to the plan alerting users to the disparity between the plan conventions and the 'F' and 'S' letters physically stamped on the Manhole lids.

2.3 MEASUREMENT ACCURACY

Take notice of the accuracy requirements for the particular As-built project. Ensure that the methodology used to measure and record the spatial positions can achieve the Specification accuracy requirements (Specification; Section 1.1). Measurements to any pipes laid at grade flatter than the prescribed threshold need particular attention when measuring levels and depths, and some survey methods may not achieve the required accuracy standards overall (e.g. some GPS methods). The surveyor needs to be able to certify the dataset, including its accuracy, on presentation of the plan to Council.

2.4 SOURCE OF LEVELS

The Benchmark layer should contain the survey benchmark point (origin of levels), with name, x, y, z coordinates and Resource Consent or Contract number for the Asbuilt plan. The Resource Consent or Contract number (i.e. the attribute 'ASBUILT') is a common attribute for all features recorded for that project. If the vertical network is adjusted in the future, the points in each project can be grouped and updated using this field as the

cross-reference. Each Asbuilt plan should have the point origin of levels recorded, including writing the source of levels information into the comments field. If the origin of levels is some distance from the job then also provide a nearby site benchmark point within the plan extents which will display on the plan face.

2.5 FEATURE NAMES

Each point and line feature requires a unique identification code. It can be beneficial to take the engineering design drawings into the field and use the names in the design drawings for continuity of process. For example, as-built diagrams provided by Contractors will often cross-reference to the engineering design drawings. Lateral, water toby and domestic meter naming convention can follow the Lot, Unit or House number.

2.6 RECORDING FEATURE ATTRIBUTES

A diagram can be sketched for each Manhole measured, noting the observation number, point feature names, invert depths, manhole and pipe configurations and any relevant comments (e.g. any non-standard detail). Field records and field sketches should be retained on file. As an option, scanned copies can be submitted to Council with the Asbuilt Plan dataset.

2.7 CONTRACTOR RECORDS

The following information requirements should be communicated to the construction Contractor at the earliest opportunity and should be recorded during the construction phase by the Contractor and supplied on request:

- The Project Reference number (i.e. the QLDC Contract number, or Resource Consent number);
- Running distances to drainage and sewer fittings and lateral connections, from the nearest downstream manhole;
- Running distances to water fittings and water connection tapping bands, from nearest hydrant or valve;
- Depth to invert of drainage and sewer lateral ends, for example, from the top of the marker post to the invert level of the pipe;
- Depth to invert for Lamp holes / cleaning eyes, below lid level;
- Depths of cover over installations such as blanked ends and buried nodes (below ground level); and pipes generally (as a range of depths) if not conforming to design;
- Serial numbers, make and model, on pumps, valves, meters, tobies and relevant infrastructure;
- Pipe details (nominal diameter, material, manufacturer, joint type, pressure rating and typical cover), and detail on other buried infrastructure, particularly where this is contractor specified or varies from the design drawings;
- Comments on detail of connections to existing underground infrastructure;
- Comments on treatment of removed or abandoned underground infrastructure.

This request to the Contractor may include providing to the Contractor plan copies on which to mark up relevant information. The surveyor will often rely on the contractor providing correct, accurate values and detail for significant components of the asbuilt record, in order to be able to certify the final product without limitation or qualification. Again, as an option, scanned copies of this outsourced data can be submitted to Council with the Asbuilt Plan dataset.

SECTION 3 – AUTOCAD SETUP

3.1 AUTOCAD AND TEMPLATE OVERVIEW

Council has undertaken to provide an AutoCAD based **drawing template** to assist the Asbuilt producer. The template sets formats, styles, units and scales for drawing consistency coming back to Council and to facilitate the production of readable paper based Asbuilt plans.

The template contains or sets up the following elements:

- Generic A1 and A3 Plan layouts and Title Blocks;
- AutoCAD feature attribute Blocks for all point and line features listed within the Specification. Default symbology is provided (See Fig 2 below);
- The Point Style is set to a default 'point' symbol. The user can temporarily set this to a more visible symbol (e.g. a cross-circle) while plan checking for erroneous data or checking snap positions to the midpoint of the line, etc;
- All drawing and block format units are set to meters; angles are *Deg/Min/Sec* and Direction Control is clockwise from North (i.e. the typical surveyor reference frame). In AutoCAD this can be verified under *Format/Units*;
- AutoCAD layer colours have been set up according to Section 2 of the Specification. Note that the symbols and attributes within the block definition are coloured 'ByBlock'. On insertion, the user should colour the Blocks 'ByLayer'. If they are placed on the correct layer, they will appear the correct colour. Likewise, if the blocks are inadvertently placed on the incorrect layer they will show up the incorrect colour. This convention is a useful quality assurance feature.
- All Asbuilt information supplied to QLDC must be correctly placed in one of the eight layers defined.

Water Point Blocks			Sewer Point Blocks			Drainage Point Blocks		
Block	Description	Key	Block	Description	Key	Block	Description	Key
	Water Hydrant		FSPH	Sewer Standard Manhole		SWPH	Drainage Standard Manhole	
	Water Flow Meter		FSCAMBER	Sewer Chamber Box		SWCHAMBER	Drainage Chamber Box	
	Water End Cap Node		FSPRESSUREHH	Sewer Pressure Manhole			Drainage Lamphole / IP	
	Water Junction Node			Sewer Lamphole			Drainage Flow Meter	
	Water Sample Node			Sewer Junction (ie Tee or Y)			Drainage Junction (eg Tee or Y)	
	Water Misc Node			Sewer Bend			Drainage End Cap	
	Water Valve (Ball or Gate)			Sewer End			Drainage Miscellaneous Node	
	Water Air Valve			Sewer Weir			Drainage Valve (Ball or Gate)	
	Water Non Return Valve			Sewer Misc			Drainage Muddtank	
TOBY METER	Water Pressure Valve			Sewer Valve (Ball or Gate)			Drainage Sookpit	
	Water Domestic Meter			Sewer Air Valve			Drainage Pollution Interceptor	
	Water Booster Pump			Sewer Non Return Valve			Drainage Outlet	
	Water Intake Pump			Sewer Pump Station			Drainage Storage Basin	
	Water Transfer Pump			Sewer Treatment Plant			Drainage Pump Station	
	Water Treatment Plant							
	Water Reservoir							

Water Line Blocks			Sewer Line Blocks			Drainage Line Blocks		
	Water Main			Sewer Main			Drainage Stormwater Main	
	Water Falling Main			Sewer Trunk Main			Drainage Perforated Subsoil Drain	
	Water Rider Main			Sewer Rising Main			Drainage Muddtank Lateral	
	Water Rising Main			Sewer Outfall			Drainage Culvert Pipe	
	Water Race			Sewer Lateral			Drainage Channel (Formed watercourse)	
	Water Supply/Lateral						Drainage Irrigation Channel	
							Drainage House Lateral	

Figure 2: The Drawing Template, prepared feature attribute Blocks

The Asbuilt data should be provided in Model Space, in world coordinates (the NZTM2000 projection). The paper based Asbuilt plans (including the title block and plan border) can be displayed in Model Space or utilise Paper Space layouts. The latter enables large

areas of Asbuilt data to be plotted in many sheets, or dense Asbuilt data to be plotted as individual layers (e.g. Sewer, Water, Drainage) on separate sheets. (See the *QLDC Asbuilt 2010 User Example.dwg*).

The **spatial data** (the positions of points and lines) can be drawn and presented to Council as two dimensional data (X & Y values). Council has no requirement for the Z-dimension to be graphically captured. In other words the digital asbuilt record can be provided with all data projected flat onto a Z-dimension of 0.00. AutoCAD *3D polylines* are not necessary. It is important to note that all of the z-dimension information is conveyed to the GIS through the attributes contained within blocks, such as ZCOORD (Lid-Level), HYDIST and INV_LEVEL (Invert Level) and UPSELEV & DWNELEV (Upstream and Downstream Invert Levels). The vertical accuracy requirement for the asbuilt data translates to accuracy for these values.

3.2 USING THE AutoCAD DRAWING TEMPLATE

The AutoCAD **drawing template** (*QLDC Asbuilt 2010 Template.dwg*) file can be saved as a new name working drawing to the user's project folder. This working drawing then contains all 65 feature attribute Blocks defined within Section 2 of the Specification and contains the defaults set up by the template.

Default symbology is provided, but may be edited to suit producer preferences. If symbols are altered or new symbols created, the producer should note: An insert 'point' for each feature block should be created at the Block origin (X=0, Y=0, Z=0) and set to the appropriate layer and colour (e.g. Sewer, ByLayer), however the linework making up the symbol should be placed in the 'Title block' layer and coloured 'ByBlock'. This allows Council's GIS operators to transfer the insert 'point' for the block containing the attributes to the GIS in the correct layer and attach Council's own standardised symbology. The symbology provided by the Asbuilt producer is displayed on the paper based plans (to the producer's preferences) but is 'blown away' in the import process to the GIS and is not used.

3.3 ADDITIONAL PROGRAMS

An AutoLISP program called 'ATTCOPY.LSP' is available with the Asbuilt 2010 template zipped files. The *ATTCOPY* function can be used as an alternative to using the standard AutoCAD functions *CTRL+C* (copy) and *CTRL+V* (paste) to copy values from one attribute field into another. Once installed into AutoCAD the *ATTCOPY* command allows the user to easily copy an attribute value from one block to another block, without the risk of mistyping a specified value or transposing figures. Section 4.2 of this document provides more detail on the use of *ATTCOPY*.

To install, the user can save the file 'ATTCOPY.LSP' into the user's computer or company server to a 'Support File Search Path' (e.g. *X:\Program Files\AutoCAD XX\support*). To check which support file locations are available in AutoCAD navigate to the *Tools/Options/Files* tab. Copy the file 'ATTCOPY.LSP' to an existing named folder in the search path or create a new search path folder (see Fig. 3). Restart AutoCAD then navigate to *Tools/Load Application...* Select the 'Startup Suite' briefcase, browse to your support file path and select the application ATTCOPY.LSP (select files of type *.lsp if not visible).

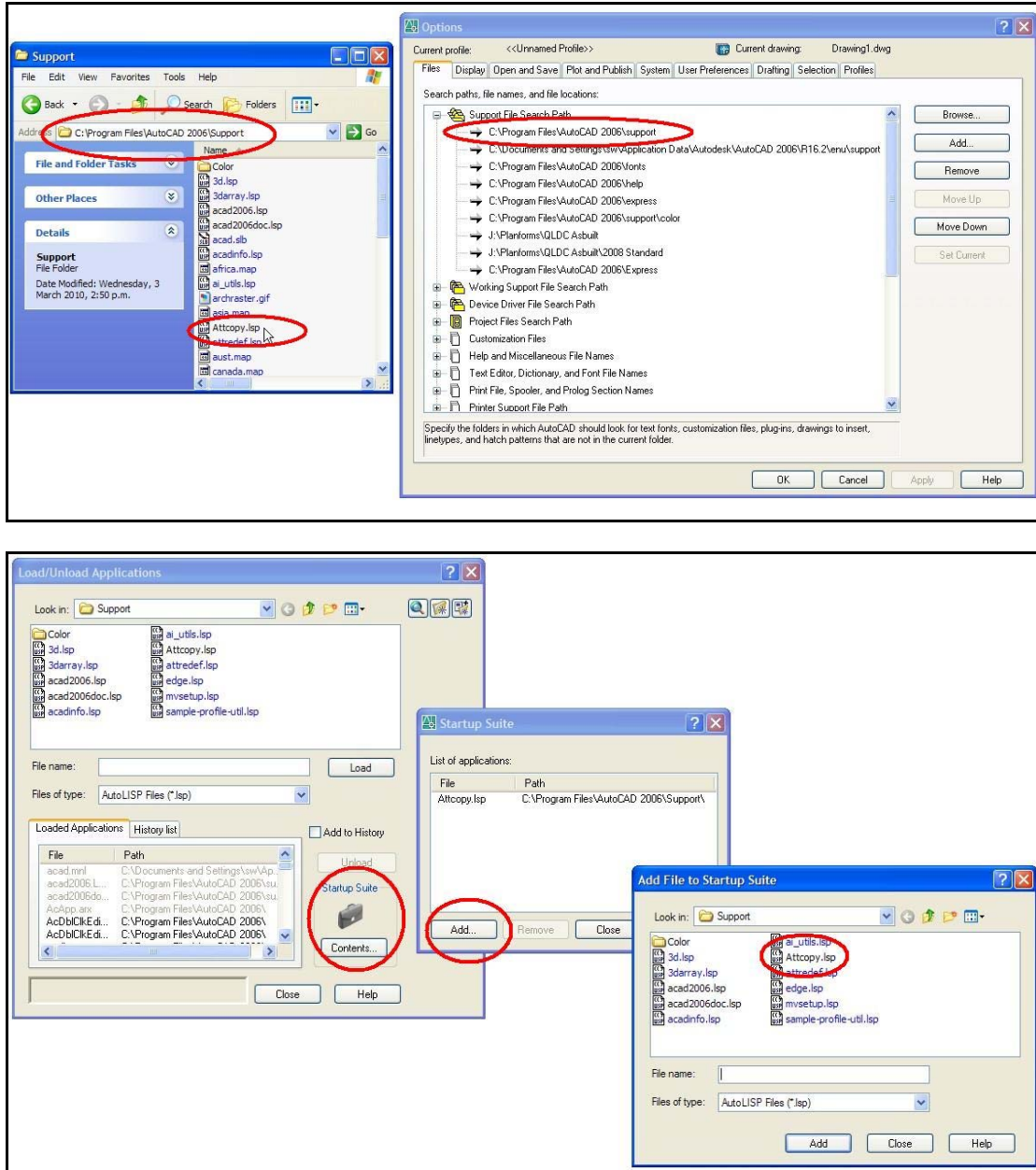


Figure 3: Installing the ATTCOPY program

The user should now be able to type ATTCOPY at the command line prompt to start this straightforward application.

SECTION 4 – DRAWING THE ASBUILT PLAN

4.1 BUILDING THE ASBUILT DRAWING

It is suggested that producers build the as-built information into a working drawing from scratch, ensuring that the data is clean, contains no unwanted elements such as extra layers, blocks, lines or points and adheres to the Specification requirements, for example, that lines are drawn in the correct flow direction and are snapped end on end. A useful

tool is to use the *XREF* command (Xref Manager) to load a base plot drawing into the background, which can then be traced over and the Asbuilt Plan built up cleanly. This base plot drawing (a *.dwg or *.dxf) can be generated from the surveying or engineering software which has captured the surveyed asbuilt positions.

The user can choose a feature Block from the lists of Blocks provided or use the *Insert/Block INSERT* command to insert a Block. If the *Insert/Block INSERT* command is used, the prompts and default values are displayed at the command line, providing helpful descriptions and clues for measurement units and formats for each attribute. The user can populate common attribute information (such as RM number, ownership, material etc), then further copy this updated Block to the required locations. The individual feature attributes (such as point ID, Lid level, depth) for each specific block can then be populated.

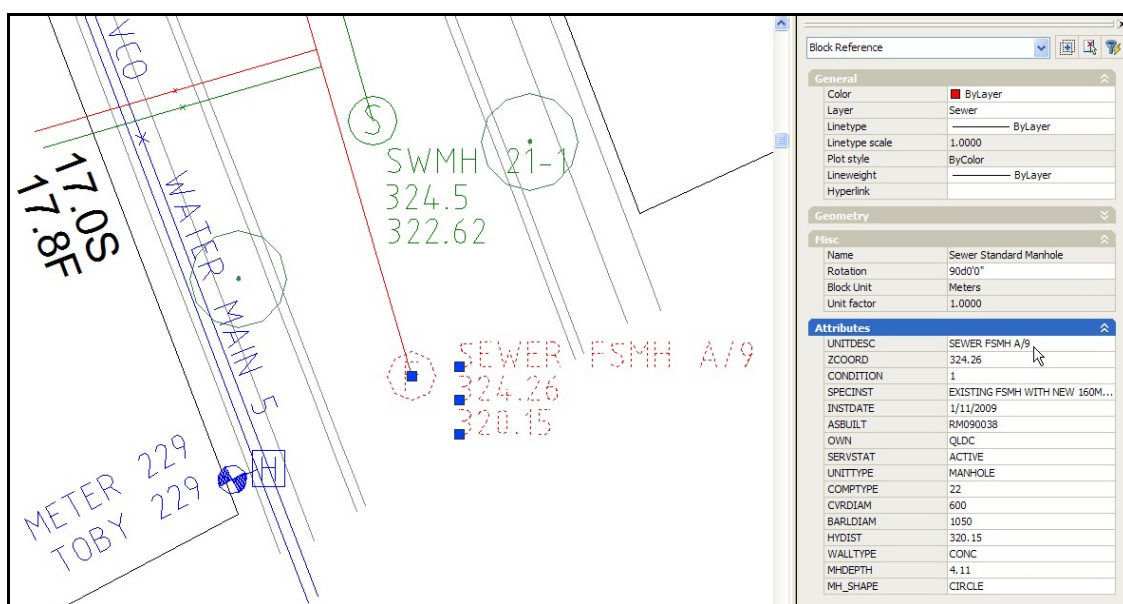


Figure 4: Populating the Blocks & visible and invisible attributes

4.2 USEFUL AUTOCAD FUNCTIONS

Block Attribute Manager (BATTMAN)

The AutoCAD command *BATTMAN* enables each Feature Block to be globally edited. For example, any attributes you wish to be invisible (or visible, See Fig. 4 above) on the plan face – for all blocks of that type – can be edited and the invisible mode set or unset. Some users prefer to write the description onto the plan as text (and leave the attribute data invisible) and some prefer to set the desired attributes to visible and drag and rotate the attributes into position on the plan. Likewise initial default values can be added globally and text styles changed.

Type *BATTMAN* at the Command line prompt, Select the Block you wish to change then double-click the Tag you wish to edit. Select 'Settings...' to amend the settings you wish to observe. Once the Block is edited into the format you prefer, select 'Sync' to update (synchronise) all instances of that Block already inserted in your drawing.

Block Attribute Editor (ATTEDIT)

The AutoCAD command *ATTEDIT* enables the attributes in a Feature Block to be individually edited. Type *ATTEDIT* at the Command line prompt, select the Block you wish to edit attributes on then change the attribute values as required.

Attribute Copy (ATTCOPY)

The *ATTCOPY* command can be used as an alternative to using the standard *AutoCAD* functions *CTRL+C* (copy) and *CTRL+V* (paste) to copy values from one attribute field into another. Loading the program *ATTCOPY.LSP* is discussed in Section 3.3 above.

This function enables attribute values to be copied from one block to another block without the risk of mistyping a predefined value or transposing figures (for example, invert levels). Section 5 of the Specification lists groups of predefined values (look up values) which must be used for some attributes (the underlined attributes in Section 4). The AutoCAD **drawing template** displays a number of Blocks which list the predefined values according to Attribute (see Section 5 of the Asbuilt Specification).

For best use of this function, the Block and attribute being worked on should be set to visible (using the *BATTMAN* command) and updated with a *dummy* value that you can see on the screen. The *ATTCOPY* command can then be used to update the individual values and the attribute then set to invisible if desired.

To use the function, type *ATTCOPY* at the command line prompt, then select the predefined attribute value you wish to copy (for example, PVC0 from the PIPETYPE list). Then select the displayed attribute you wish to paste the value to (the displayed PIPETYPE attribute on your target block). This should update the attribute with the chosen predefined value.

Attribute Extraction Wizard (EATTEXT)

The AutoCAD command *EATTEXT* enables the attributes for selected feature Blocks to be exported to a table in *Microsoft Office Excel* (*.xls).

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Name	ASBUILT	UNITDESC	UNITTYPE	COMPTYPE	OVN	SERVSTAT	INSTDATE	SPECNOST	CONDITION	ZCOORD	HYDIST	INDEPT	WALLT	MM_SHAPE	BARLDV	CVRDIAM	MFG	MODEL
2	Drainage End Cap Node	RM090038	DRAINAGE END CAP 1	END CAP	32	QLDC	ACTIVE	1/11/2009											
3	Drainage End Cap Node	RM090038	DRAINAGE END CAP 2	END CAP	32	QLDC	ACTIVE	1/11/2009											
4	Drainage Lamphole Manhole	RM090038	DRAINAGE LAMPHOLE 230	LAMPHOLE	30	PRIVATE	ACTIVE	1/11/2009			1	325.26						300	
5	Drainage Mudtank	RM090038	DRAINAGE MUDTANK 2	MUDTANK	29	QLDC	ACTIVE	1/11/2009			1	325.38							
6	Drainage Mudtank	RM090038	DRAINAGE MUDTANK 4	MUDTANK	29	QLDC	ACTIVE	1/11/2009			1	325.70							
7	Drainage Mudtank	RM090038	DRAINAGE MUDTANK 3	MUDTANK	29	QLDC	ACTIVE	1/11/2009			1	325.71							
8	Drainage Mudtank	RM090038	DRAINAGE MUDTANK 1	MUDTANK	29	QLDC	ACTIVE	1/11/2009			1	325.36							
9	Drainage Standard Manhole	RM090038	SWMH 21-1	MANHOLE	30	QLDC	ACTIVE	1/11/2009			1	324.50	322.62	1.88	CONC	CIRCLE	1050	600	
10	Drainage Standard Manhole	RM090038	SWMH 21-2	MANHOLE	30	QLDC	ACTIVE	1/11/2009			1	325.52	322.92	2.60	CONC	CIRCLE	1050	600	
11	Sewer End Cap Node	RM090038	SEWER END CAP NODE 1	END	24	QLDC	ACTIVE	1/11/2009			1								
12	Sewer Lamphole	RM090038	SEWER LAMPHOLE 230	LAMPHOLE	22	PRIVATE	ACTIVE	1/11/2009			1	325.26						300	
13	Sewer Standard Manhole	RM090038	SEWER FSMH A/9	MANHOLE	22	QLDC	ACTIVE	1/11/2009	EXISTING FSMH WITH N		1	324.26	320.15	4.11	CONC	CIRCLE	1050	600	
14	Sewer Standard Manhole	RM090038	FSMH Q1	MANHOLE	22	QLDC	ACTIVE	1/11/2009	THE EXISTING END CAP		1	325.45	323.39	2.98	CONC	CIRCLE	1050	600	
15	Sewer Standard Manhole	RM090038	FSMH S1	MANHOLE	22	QLDC	ACTIVE	1/11/2009	THE EXISTING END CAP		1	324.23	322.07	2.16	CONC	CIRCLE	1050	600	
16	Sewer Standard Manhole	RM090038	FSMH S2	MANHOLE	22	QLDC	ACTIVE	1/11/2009	EXISTING FSMH WITH N		3	320.01	315.01	5.00	CONC	CIRCLE	1050	600	
17	Water Domestic Meter	RM090038	METER 231	DOMESTIC	42	QLDC	ACTIVE	1/11/2009	Sample		1							SENSUS 620MC	
18	Water Domestic Meter	RM090038	METER 292	DOMESTIC	42	QLDC	ACTIVE	1/11/2009	Sample		1							SENSUS 620MC	
19	Water Domestic Meter	RM090038	METER 230	DOMESTIC	42	QLDC	ACTIVE	1/11/2009	Sample		1							SENSUS 620MC	
20	Water Domestic Meter	RM090038	METER 229	DOMESTIC	42	QLDC	ACTIVE	1/11/2009	Sample		1							SENSUS 620MC	
21	Water Domestic Meter	RM090038	METER 232	DOMESTIC	42	QLDC	ACTIVE	1/11/2009	Sample		1							SENSUS 620MC	
22	Water End Cap Node	RM090038	WATER END CAP NODE 2	END	43	QLDC	ACTIVE	1/11/2009			1								
23	Water End Cap Node	RM090038	WATER END CAP NODE 1	END	43	QLDC	ACTIVE	1/11/2009			1								
24	Water End Cap Node	RM090038	WATER END CAP NODE 3	END	43	QLDC	ACTIVE	1/11/2009			1								
25	Water Hydrant	RM090038	WATER HYDRANT 1	HYDRANT	12	QLDC	ACTIVE	1/11/2009			1	325.55							
26	Water Hydrant	RM090038	WATER HYDRANT 2	HYDRANT	12	QLDC	ACTIVE	1/11/2009			1	324.18							
27	Water Valve	RM090038	WATER VALVE 5	VALVE	46	QLDC	ACTIVE	1/11/2009			1	325.67						HUMES	
28	Water Valve	RM090038	WATER VALVE 4	VALVE	46	QLDC	ACTIVE	1/11/2009			1	325.56						HUMES	
29	Water Valve	RM090038	WATER VALVE 1	VALVE	46	QLDC	ACTIVE	1/11/2009	GATE VALVE FOR IRR		1	325.36						HUMES	
30	Water Valve	RM090038	WATER VALVE 3	VALVE	46	QLDC	ACTIVE	1/11/2009	SLUCE VALVE		1	325.37						HUMES	
31	Water Valve	RM090038	WATER VALVE 2	VALVE	46	QLDC	ACTIVE	1/11/2009	GATE VALVE		1	325.39						HUMES	
32	Water Valve Toby	RM090038	TOBY 232	TOBY	46	QLDC	ACTIVE	1/11/2009			1	325.67						ACUFLO GM900	
33	Water Valve Toby	RM090038	TOBY 292	TOBY	46	QLDC	ACTIVE	1/11/2009			1	325.62						ACUFLO GM900	
34	Water Valve Toby	RM090038	TOBY 229	TOBY	46	QLDC	ACTIVE	1/11/2009			1	325.71						ACUFLO GM900	
35	Water Valve Toby	RM090038	TOBY 230	TOBY	46	QLDC	ACTIVE	1/11/2009			1	325.38						ACUFLO GM900	
36	Water Valve Toby	RM090038	TOBY 231	TOBY	46	QLDC	ACTIVE	1/11/2009			1	325.60						ACUFLO GM900	
37	survey benchmark	RM090038	IS T DP 420307					1/11/2009	IS flush in top of Kerb		1	325.57							
38																			
39																			

Figure 5: Attribute information, extracted to a table

This function is a useful checking procedure at the completion of the asbuilt plan. The attribute data for the selected Blocks is extracted to a table where the data can be rigorously reviewed for correctness (check the units, fields and values). Type EATTEXT at the Command line prompt and select the Blocks you wish to export. (Tick the boxes to *Exclude blocks without attributes* and *Exclude general block properties*.) For ease of checking, we suggest selecting all the 'point' features to export to one file and then repeating the wizard to select all the 'line' features to export to another file.

Sort the columns if desired and select *Extract attribute data to External file*. Select your file path to save to, and save as type *.xls as required. Open the files with *Microsoft Office Excel* (or similar) for checking.

4.3 DIGITAL PLAN GUIDELINES

The Council's GIS requires some items to be handled in a specific manner:

- Where new reticulation connects to existing infrastructure, the existing infrastructure must be surveyed and the positions shown on the Asbuilt plan. The **UNITDESC** attribute field should be prefixed with the text **EXTG** (e.g. EXTG_FSMHA). This means the feature will not be misidentified and reintroduced into the GIS. Populate the ASBUILT attribute field with the text **EXTG** also, so it is not grouped with the new assets. For EXTG features please include **known** attributes i.e. diameter, material to aid asset identification and improve accuracy of Council's database. Council's GIS operators will update the surveyed position and existing feature information where these are provided. Further comments can be added to the comments field SPECINST. Do not populate unknown fields with fillers such as "0" "UNK", "not measured" or "existing", just leave the fields empty;
- The **ASBUILT** attribute field should include **no spaces** in the RM or contract number, for example the field should be populated RM12345 or 10-001-001;
- Draw pipe lines in the **direction of flow** (i.e. start drawing the line from the source node and end at the destination node). Use AutoCAD *polylines* to draw pipelines with bends (e.g. water mains);
- Pipe lines should be split only at Junctions (node), Valves, and Meters and at Manholes. Pipes should not be broken at bends or any other places where point features are absent. If pipe attributes change (e.g. diameter, material) a node should be placed at that junction. Note Laterals can be shown extending into the property (beyond the toby or lamphole location) if that is what is built, and if so the lateral should not be split at toby/meter location. This can be useful to show which house or unit the lateral connects to;
- Use AutoCAD snapping tools to ensure lines are connected in a contiguous (unbroken) fashion. The flow networks in the GIS are based on flow direction and connectivity;
- Each line or polyline must have its feature attribute Block attached (snapped) to the midpoint of the line or to the midpoint of a segment of the polyline;
- The manhole symbol should be surveyed to the centre of lid position and the pipes emanating from that manhole should be snapped to the same position. Pipelines should not stop short of connecting to make room for the Node or Manhole symbol. Refer to the Diagrams in **Appendix B**. These describe the measurement locations in detail;
- All drainage and sewer mains need the fields for Upstream and Downstream invert levels to be populated. Whilst the pipe line representation is drawn to the centre of the manhole lid, upstream and downstream invert levels for the pipe

- represent the z values of the pipe at the point of exit and entry of the manhole. The upstream and downstream inverts in particular are used by Council to model the capacity of pipe networks. Because pipe capacity modelling has higher sensitivity to z-value inaccuracies at flatter grades, pipes laid at flat grades need to be surveyed and measured with particular attention to accuracy;
- Mudtank laterals need to be drawn in the direction of flow from the mudtank to the manhole centre and a 'Drainage MT Lateral' feature Block is required at the midpoint of the line. The convention for naming can be the same as the mudtank's engineering design name. Likewise, house connection laterals for water, sewer and drainage also need to be drawn in the direction of flow and a 'lateral' feature Block is required at the/a midpoint on the line/polyline;
 - If a domestic meter is fitted in the toby valve, the valve symbol and the meter symbol should be in the exact same position. The symbol designs should be complimentary (compound symbols) so the plan user can differentiate graphically which toby valves have domestic meters and which do not.

4.4 PAPER PLAN/PDF PLAN GUIDELINES

The following information should be conveyed on the paper plan/PDF version of the Asbuilt Plan.

Title Block information

Please ensure all Asbuilt plans have a Title, Reference number (resource consent or contract number), Key (of symbols & abbreviations), Scale, Date, North Arrow, Surveyor's certification and signature of approval. The Surveyor's Certificate wording is provided in **Appendix A**. The Surveyor's certification also encompasses a Producer Statement to go with the digital asbuilt file (as with the 2003 Asbuilt Standard). The form of Producer Statement is also provided in **Appendix A**; one for Council Contract works and one for Resource Management (consented) works subject to RMA Section 224c.

A scale bar and notes stating the coordinate system, vertical datum and source of levels, the construction contractor and the design engineer (if relevant) should also be included.

Displayed Attributes

Ensure all relevant attributes such as diameters, materials and levels are clearly shown for each pipe and point feature (scale of text appropriate, not overlapping and clearly associated with its feature). The feature name or Identification number / code (ID) for each point and pipe feature can also be shown on the plan face. The *BATTMAN* function can be used to make relevant attributes visible, or text can be added to the plan according to producer preferences.

Offset Text

All drainage and sewer lateral markers and water tobies should have boundary offset dimensions, for example, text displaying the dimension along a boundary line and the dimension perpendicular from the boundary to the marker or toby. The lateral depth below the ground can be shown in brackets. Text and dimensions must be contained on the layer Title block. Dimensions can be prefixed F (foul-sewer), S (Stormwater drainage)

and W (Water supply) for clarity, with a corresponding note added to the plan margin or the legend. Refer to Section 2.2 for discussion on these naming conventions.

Survey Control

The completed Asbuilt record needs to include the survey mark which is the origin of levels (including a description of the source of levels). If this survey mark is some distance away, include a site benchmark in the vicinity of the Asbuilt data (i.e. visible within the plan extents) to which users of the plan can refer. For large projects other control marks can be shown for reference. The standard template drawing includes the required Block.

4.5 DATA CHECKING AND QUALITY ASSURANCE

On completion of the AutoCAD plan final checks should be made to ensure the integrity of the data, particularly:

- That the coordinates of the dataset represent NZTM2000 Projection coordinates;
- That the attribute Blocks snap to mid points of lines or to the point as appropriate (set the *point style format* for points temporarily to a visible cross or similar);
- That each layer contains only the elements which should be on that layer. This can be checked by turning off all the layers, then turning on each layer in turn and checking the elements are on their corresponding layers (e.g. that water supply features are on the water supply layer). Note all the linework making up the symbol will appear on the 'Title block' layer;
- That the attribute values have been entered correctly into the feature Blocks. This can be checked using the *EATTEXT* wizard in AutoCAD to export the attribute data to a table which can be rigorously reviewed. Export all the 'point' features to one file, then all the 'line' features to another file for checking. Open the files using *Microsoft Office Excel* (or similar). Check:
 - o That the data entered into each column is in the correct field and in the prescribed units;
 - o That the Predefined Values in Section 5 of the Specification (the look up values) are correct;
 - o That no unauthorised values are used (NA, 0, UNK, etc); and
 - o That all required fields are filled in;
- That all unnecessary blocks, layers and styles have been deleted then purged from the AutoCAD drawing (To purge the drawing type PURGE at the command line);
- That all files to be sent with the dataset are named using the relevant Resource Consent number.

Perform any other Quality checks and reviews you would normally complete before printing the plan for signing (and scanning), printing a PDF version, completing the Producer Statement for the digital file and emailing the completed dataset.

APPENDIX A

SURVEYOR'S CERTIFICATION & PRODUCER STATEMENT

Surveyor's Certification and Signature Of Approval

This certificate is to be recorded on all Asbuilt Plans

I of **certify** that –
(Name) (Company)

1. This asbuilt plan has been produced in accordance with the *QLDC Asbuilt Plan Specification Requirements, April 2010*;
2. The measurements to which this asbuilt plan relates are accurate, and appropriate methods and equipment have been employed to ensure the data meets the horizontal accuracy requirement of $\pm 300\text{mm}$ for X & Y coordinates and the vertical accuracy requirement of $\pm 40\text{mm}$ (normal accuracy) and/or $\pm 20\text{mm}$ (high accuracy for flat grades) for Z coordinates;
3. The attributes assigned to asbuilt features are correct, as determined by me or under my direction or from information supplied to me. Where supplied to me by the Contractor/installer or others, those records are retained on my file;
4. This Asbuilt Plan matches the digital asbuilt file and a *Digital Asbuilt File Producer Statement* has been completed in relation to that data.

Signature: Designation/Qualification:

Date:

Note: This asbuilt plan relies on measurements and/or attributes descriptions that have been supplied by:

- (i) *e.g. contractor/installer*
- (ii) *e.g. manufacturer*

Digital Asbuilt File – Producer Statement RMXXXXXX

Project/Client: **NAME OF PROJECT/CLIENT**

Location: **NAME OF LOCATION**

I _____ of _____
(Name) (Company)

certify the following in relation to the enclosed digital asbuilt DXF/DWG/SHP file:

1. The Asbuilt files have been produced in accordance with the QLDC Asbuilt Plan Specification Requirements, April 2010.
2. The Asbuilt files are identical to the hardcopy/PDF supplied to Lakes Environmental for approval.
3. _____ (Company) does agree to complete or pay charges associated with any further work required to ensure compliance with the QLDC Asbuilt Plan Specification Requirements provided that the issue of a Section 224(c) Resource Management Act 1991 Certificate by Queenstown Lakes District Council shall be conclusive evidence that Queenstown Lakes District Council accepts that the asbuilt file complies with its Asbuilt Plan Specification Requirements and there will be no further financial obligations.

QLDC to complete

Date File Received: _____

Date File Checked: _____

I _____ of Queenstown Lakes District Council
(GIS Officer) (Council)

hereby certify the digital asbuilt file for RM _____ complies with the QLDC Asbuilt Plan Specification Requirements.

Date Notification sent to Lakes Environmental of compliance: _____

Digital Asbuilt File – Producer Statement

QLDC Contract XX-XXX-XX

Project: **NAME OF CONTRACT**

Location: **NAME OF LOCATION**

I _____ of _____
(Name) (Company)

certify the following in relation to the enclosed digital asbuilt DXF/DWG/SHP file:

4. The Asbuilt files have been produced in accordance with the QLDC Infrastructure Code, Section 3.16 - As-Builts.
5. The Asbuilt files are identical to the hardcopy/PDF supplied to QLDC for approval.
6. _____ (Company) does agree to complete or pay charges associated with any further work required to ensure compliance with the Queenstown Lakes District Council's Infrastructure Code, Section 3.16 - As-Builts, provided that one month after the start of the contracts maintenance period shall be conclusive evidence that Queenstown Lakes District Council accepts that the asbuilt file complies with its Infrastructure Code and there will be no further financial obligations.

QLDC to complete

Date File Received: _____

Date File Checked: _____

I _____ of Queenstown Lakes District Council
(GIS Officer) (Council)

hereby certify the digital asbuilt file for Contract _____ complies with the QLDC Infrastructure Code.

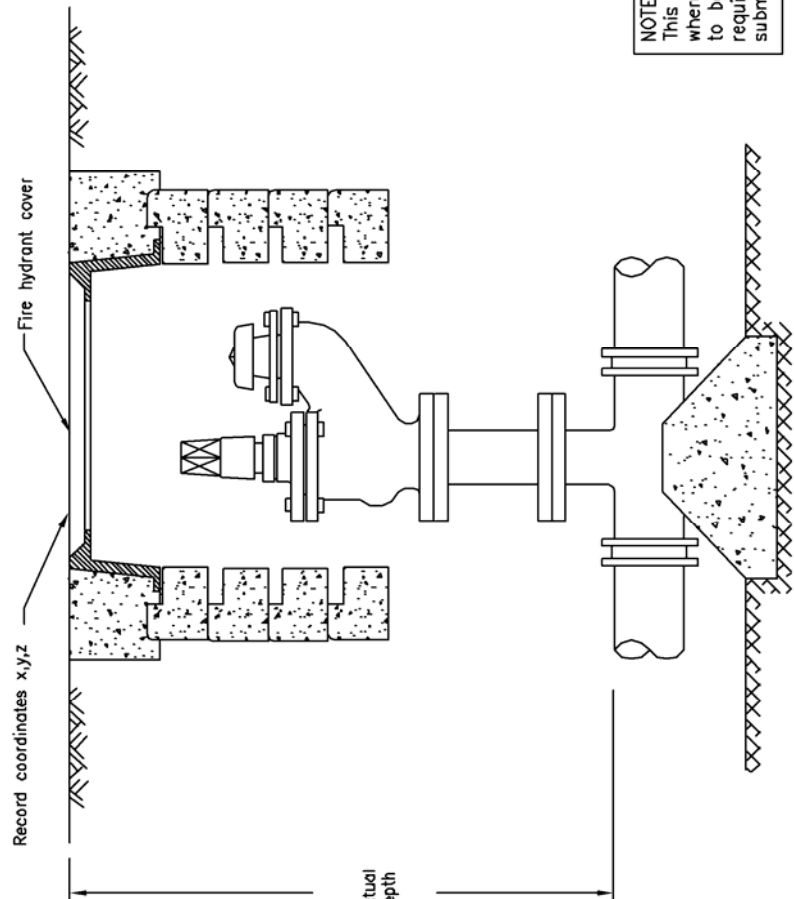
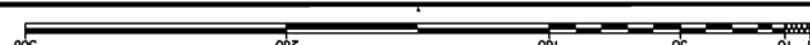
Date Notification sent to QLDC Infrastructure Services of compliance: _____

APPENDIX B

REQUIRED INFORMATION, DESCRIPTIVE DIAGRAMS

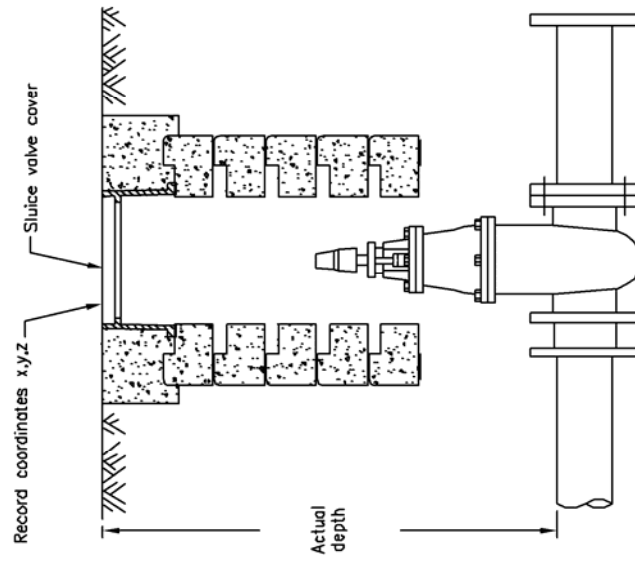
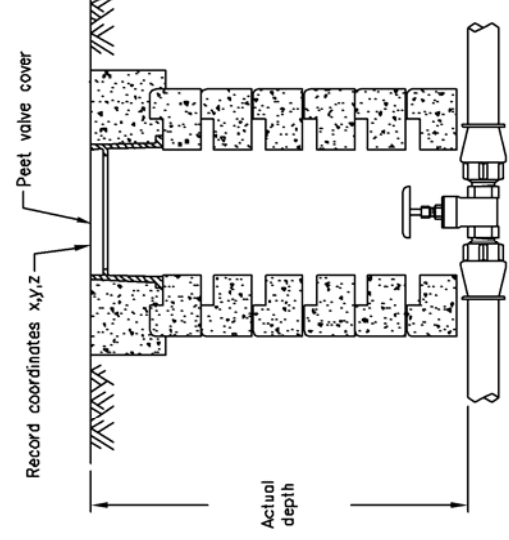
1. Asbuilt measurements - Water - hydrants
2. Asbuilt measurements - Water - valves
3. Asbuilt measurements - Sewer - manholes, pipes
4. Asbuilt measurements - Drainage - manholes, pipes
5. Asbuilt measurements - Drainage - mudtanks, inlets, outlets
6. Asbuilt measurements - Drainage - channels

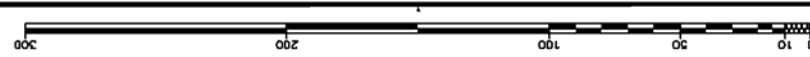
1. Asbuilt measurements - Water - hydrants


 <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>NOTE: This drawings is to show where measurements should to be taken and is <u>NOT</u> a requirement for as built submission.</p> </div>	<p>WATERSUPPLY AS-BUILT PLAN REQUIRED INFORMATION FOR FIRE HYDRANTS</p>
<div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p>0 10 20 100 200 300</p> </div> </div>	<p>A4</p>

SAMPLE ONLY

2. Asbuilt measurements - Water - valves

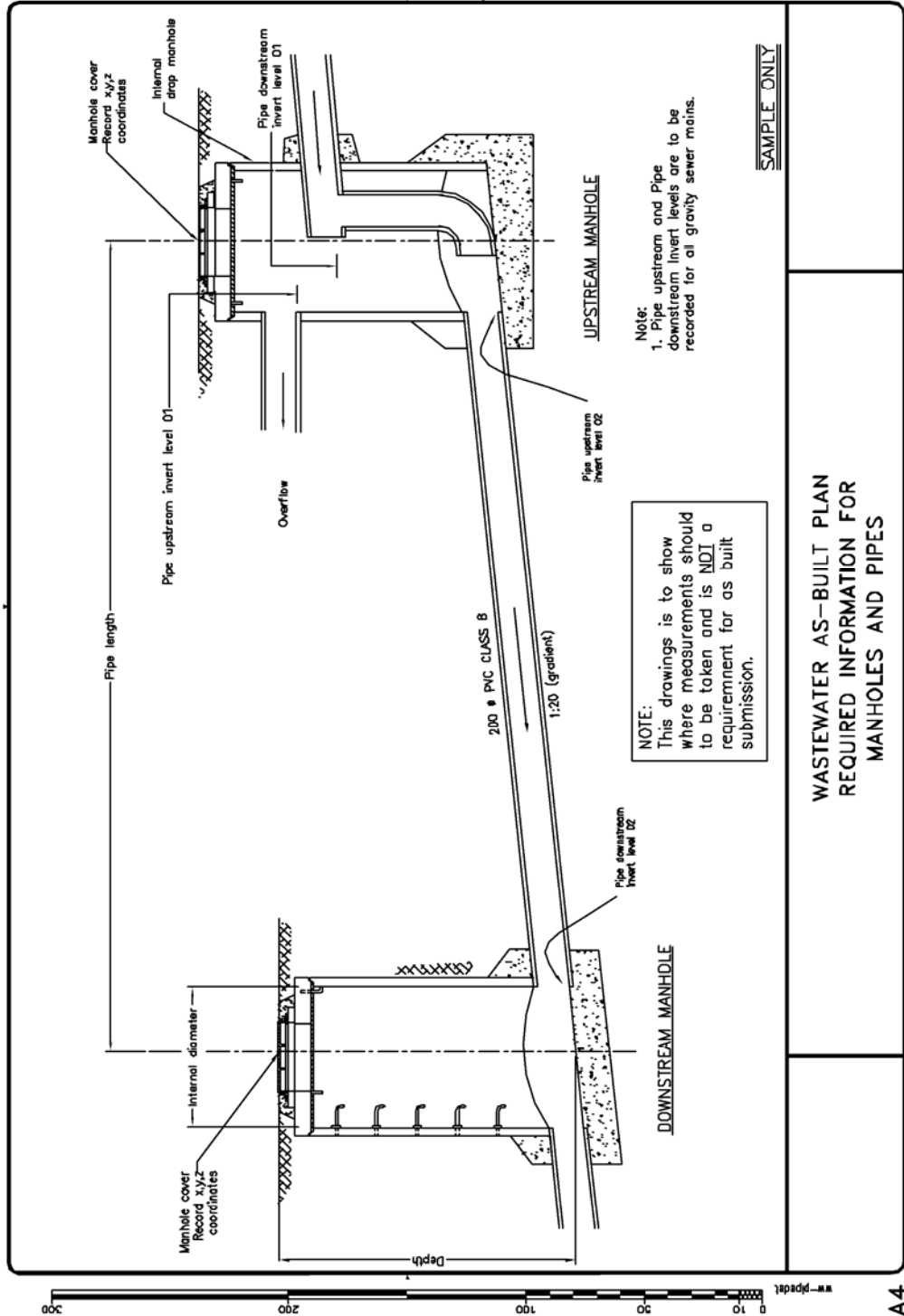
 <p style="text-align: center;">Sluice valve cover</p> <p style="text-align: center;">Record coordinates x,y,z</p> <p style="text-align: center;">Actual depth</p> <p style="text-align: center;">SLUICE VALVE</p>	 <p style="text-align: center;">Peet valve cover</p> <p style="text-align: center;">Record coordinates x,y,z</p> <p style="text-align: center;">Actual depth</p> <p style="text-align: center;">PEET VALVE</p>
<p>NOTE: This drawings is to show where measurements should be taken and is <u>NOT</u> a requirement for as built submission.</p>	
<p>WATERSUPPLY AS-BUILT PLAN REQUIRED INFORMATION FOR VALVES</p>	



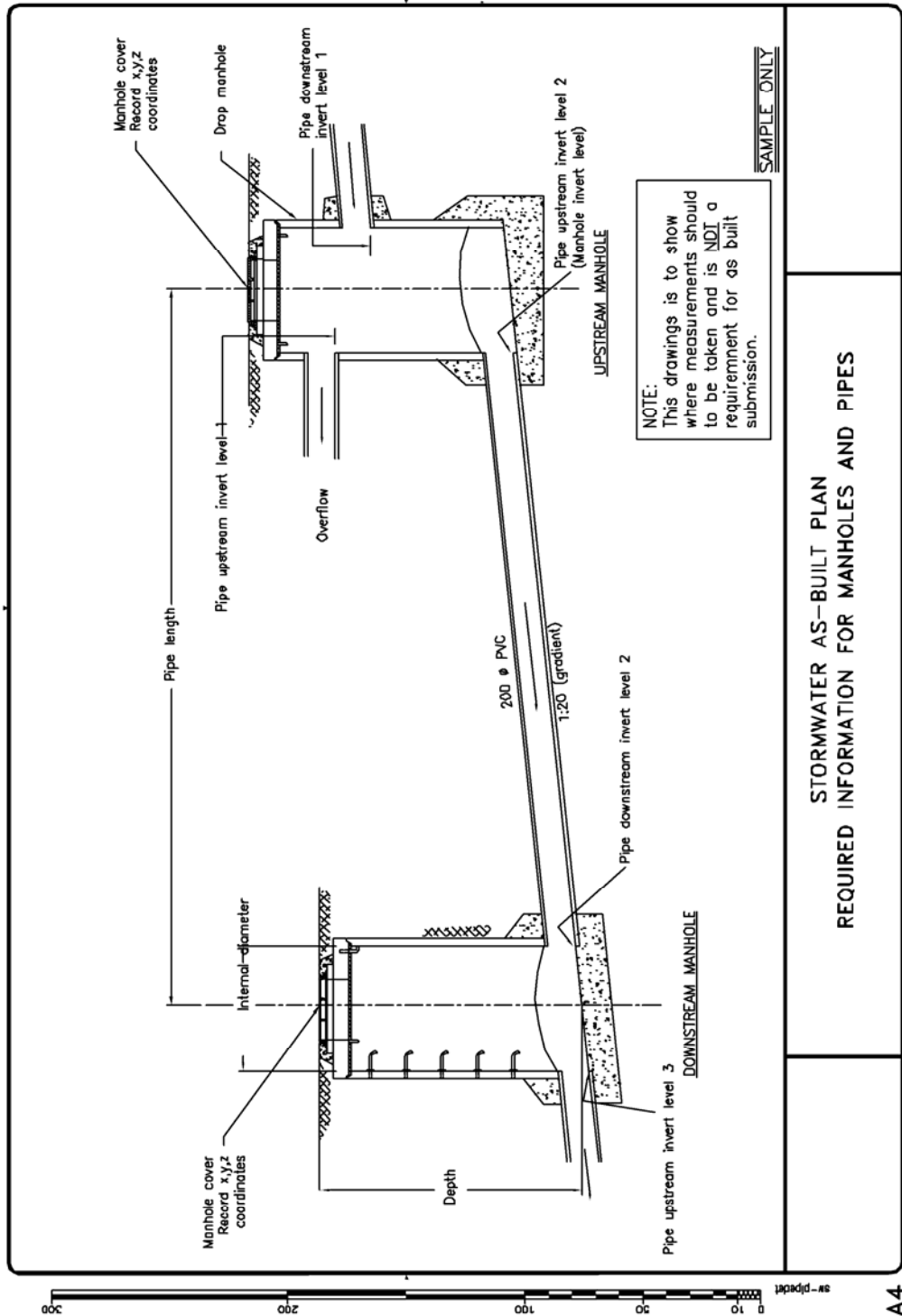


 A4

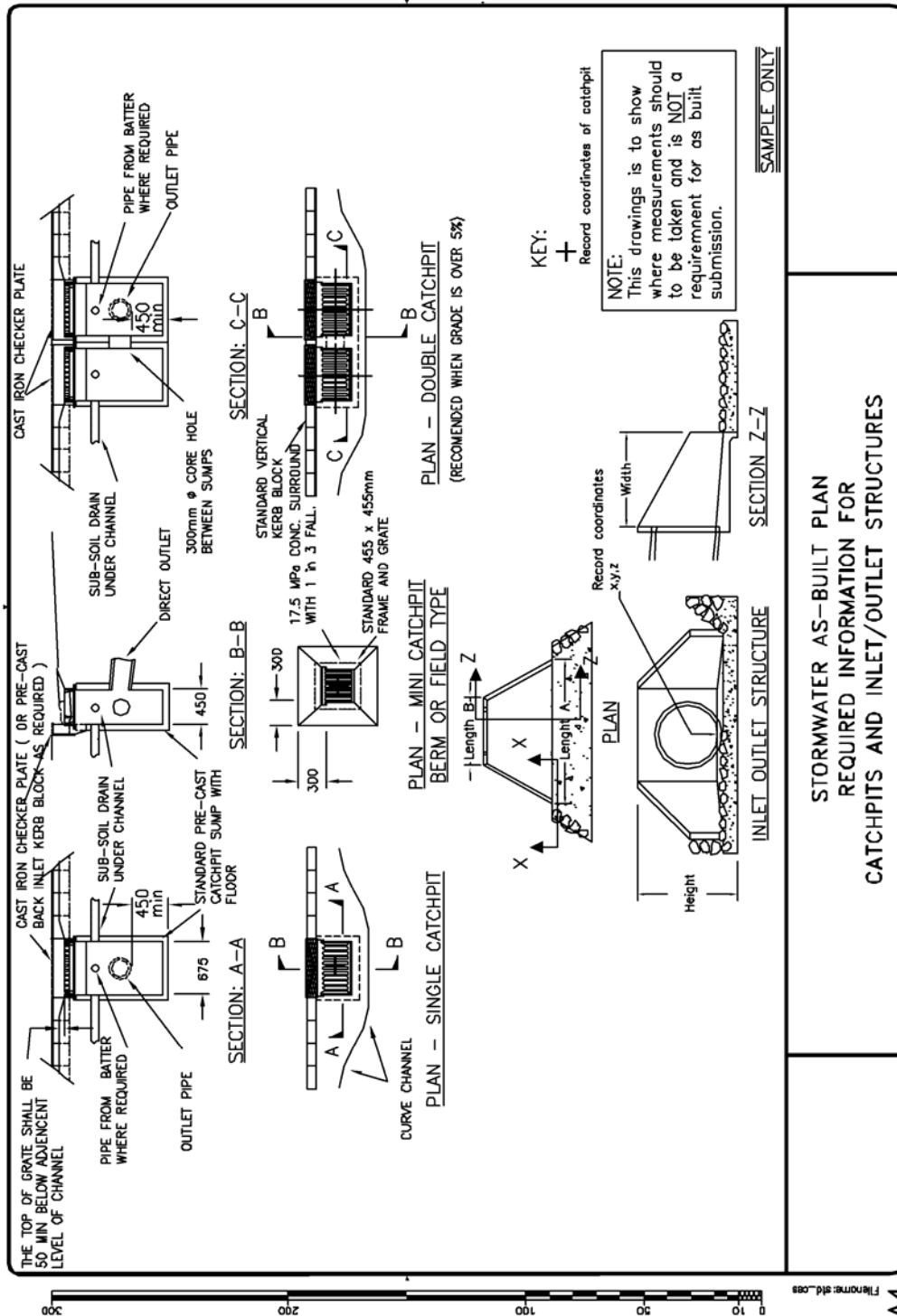
3. Asbuilt measurements - Sewer - manholes, pipes



4. Asbuilt measurements - Drainage - manholes, pipes



5. Asbuilt measurements - Drainage - mudtanks, inlets, outlets



6. Asbuilt measurements - Drainage - channels

