AI-01-AS-BUILT AND GIS DATA FOR PIPELINES AND STRUCTURES

Ver.1.2 Date: March 2016

1. SCOPE

This standard outlines the data required when new pipelines, structures, and associated facilities are constructed or when alterations are made to existing facilities on Watercare's Transmission infrastructure. Records of changes to the signed-off design shall be updated through the course of the construction and supplied to Watercare for capturing in the engineering record management system (ProjectWise). At completion of the works the full detailed information shall be handed over to Watercare for record keeping purposes.

2. AS-BUILT CONSTRUCTION DRAWINGS

Interim as-built information shall be provided in the form of pdf files of all construction drawings, clearly marked up in red to show all changes.

Drawings shall show the whole of the works as completed, without any reference to equipment or structures that have already been removed. There shall be no reference to "new", "proposed" or similar words that refer to works that have already been carried out by the time the as-built works are being recorded.

The red line drawings shall be signed by the engineer responsible for the supervision of the works and made available before any commissioning work, temporary tie-ins or progressive livening of infrastructure that will become operational for control by Watercare.

On completion of the works, final as-builts shall be supplied as original AutoCAD drawing files together with any required additional drawings and shall be amended or produced in accordance with the current Watercare CAD manual "Standards and Procedures for the Production and Registration of AutoCAD Drawings", document reference no. 7363.

Drawings are to be supplied without any copyright or other restraint on use or modifications of the drawings by Watercare.

For structures, the drawings shall show the:

- Position and dimensions, construction details, and equipment information;
- Coordinates and general information for all connected pipework and services;
- Floor levels and soffit levels;
- Ground levels and cover over underground services;
- Abandoned or decommissioned structures associated with the contract works; and
- Any other approved change from the original contract drawings.

For pipelines (including chambers and manholes), the drawings shall show:

- Pipeline plan and longitudinal section, including ground levels between significant changes in grade;
- Pipe sizes and wall thickness;
- Chamber and manhole position, dimensions, and lid coordinates;
- Position, size and level of all connections to manholes:
- Pipeline bend positions and angles;
- Thrust block dimensions;
- Valve and other fitting positions and functions, including pipeline electrical isolation points such as insulated flanges;

- Electrical cable and fitting positions and functions including cathodic protection, telemetry;
- Any other approved change from contract drawings.

All drawings with any level or position information shall clearly show the coordinate system and level datum that has been utilised.

3. SURVEY AS-BUILT DIGITAL DATA FOR GIS

As-built information shall be confirmed as complete and accurate by a Registered Professional Surveyor or Chartered Professional Engineer.

Digital data of the following features shall be supplied for GIS records:

Pipeline

- Location of pipe centre line by coordinates (See Appendices A and D);
- Reduced level of top of pipe;
- Pipe invert levels inside chamber;
- Depth from ground level to top of pipe (to be included in the point code);
- Topographical features, fences kerbs etc. (at least one).

This data shall be supplied at the following locations:

- Changes in horizontal and vertical directions (by more than a normal pipe deflection);
- Pipe branches, cross-connections, Tee and Y junctions or any other intersection (including pipe intersections with chambers);
- Fittings (e.g. valves, meters, cathodic protection insulated flanges etc.).

Other features

- External extents of chambers: (See Appendices B and C)
 - for straight edged chambers, the external walls and corners,
 - for circular chambers, the centre and one point on the circumference;
- The centre of chamber access lids;
- Electrical cable and fitting positions including cathodic protection and telemetry
- Other services (e.g. power, gas, telephone) that cross over or run parallel to within 1m of a Watercare pipe or chamber and is exposed during construction; and
- External extents of any other structure above or below the ground that is deemed to be part of the contract construction.

3.1 GIS DATA FORMAT

GIS data shall be supplied in the following format.

- Digital data shall be supplied in dwg file format (line work data) and as a text file (survey points data);
- XY coordinates are to be to New Zealand Transverse Mercator (NZTM) Projection;
- Levels are to be to LINZ Auckland 1946 Datum:
- Minimum accuracy is to be to 0.05m in the X, Y, and Z direction, with pipe inverts to 0.01m in the Z direction;
- Point codes are to comply with Watercare standard codes shown in Clause 4;
- Any additional codes used must be documented.

Point Codes are to be structured in the following way:

e.g. **PI1C1.2** = shot taken on top of the pipe, the cover being 1.2m

e.g. VA2C0.5 = shot taken at ground level, over an air valve and the cover being 0.5m

PI Letters from the "Surveying Point Codes" list, or
VA Letters from the "Surveying Point Codes" list

1 1 if shot is taken on the pipe or structure
2 2 if shot is taken at ground level over the pipe or structure
C Cover
1 metre unit
2 decimal point
2 decimal unit

Refer to Appendix A for examples of code format

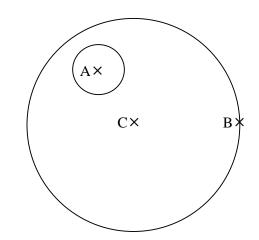
4. SURVEYING POINT CODES

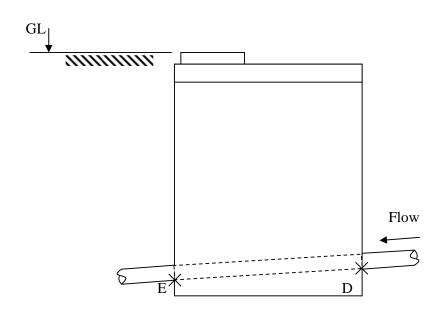
		1	T	
CODE	DESCRIPTION	CODE	DESCRIPTION	
TOPOGR	APHIC	FITTINGS		
BAN	BANK	AHW	ACCESS HOLE WELDED	
DRA	DRAIN	AHB	ACCESS HOLE BOLTED	
FEN	FENCE	HA	AIR HYDRANT	
FOO	FOOTPATH	HS	SCOUR HYDRANT	
GRO	GROUND LEVEL	MH	WASTEWATER MANHOLE	
HED	HEDGE	MET	METER	
ISL	ISLAND	LP	WASTEWATER LAMP HOLE	
KER	KERB	PF	PROBE FLOW POINT	
PAT	PATH	SR	STRAINER	
RAI	RAILWAY	VA	AIR VALVE	
RET	RETAINING WALL	VB	BUTTERFLY VALVE	
ROA	ROAD CL	VG	GATE VALVE	
SEA	EDGE OF SEAL	VF	FLOAT VALVE	
TRE	TREE	VC	CONTROL VALVE	
OTUES S	EDVICES	VR	REFLUX VALVE	
	SERVICES CESSIT	VS VT	SCOUR VALVE	
CESS	CESSPIT	VT	TALBOT, PEA, ANGLECOCK	
GAS	GAS MAIN			
POC POD	POWER CABLE POWER DUCT	PIPE FE	ATLIDES	
POD	POWER DUCT POWER POLE	AQ	AQUEDUCT	
SWL	STORMWATER MAIN	AQ BD	BEND	
SWM	STORMWATER MANHOLE	BP	BYPASS	
TEC	TELECOM CABLE	EC	END CAP	
TED	TELECOM DUCT	JF	FLEXIBLE JOINT	
TRC	TRAFFIC LIGHT CABLE	JG	GIBAULT JOINT	
TRD	TRAFFIC LIGHT DUCT	PI	PIPE	
		1	TAKEN ON TOP OF PIPE	
		2	TAKEN AT GL OVER PIPE	
		3	TAKEN AT GL ON LOCATED POSITION	
		4	TAKEN ON INVERT OF PIPE	
			(Wastewater)	
STRUCT	JRES	ΥI	Ý INTERSEĆTION	
BRI	BRIDGE	SP	SCOUR PIPE	
BUI	BUILDING	SU	PIPE SUPPORT	
CHA C	CHAMBER CENTRE	TB	THRUST BLOCK	
CHA P	CHAMBER PERIMETER	TE	TEE INTERSECTION	
LID	LID	TL	TUNNEL	
HY	HYDRANT LID	TP	TAPER	
TO	TOBY LID			
HD	HEAVY DUTY RECTANGULAR			
	HEAVY DUTY RECT BOLTED			
LD	LIGHT DUTY RECTANGULAR		DIC PROTECTION FEATURES	
LDB	LIGHT DUTY RECT BOLTED	CPTR	C P TRANSFORMER RECTIFIER	
NR	NON-ROC ROUND	CPTP	C P TEST POINT	
SR	STANDARD ROUND	CPIJ	C P INSULATING JOINT	
PS	PUMP STATION STRUCTURE	CPA	C P ANODE BED	
RH	RESERVOIR HATCH	CPCO	C P COUPON / ER PROBE	
RS	RESERVOIR STRUCTURE		C P BURIED REFERENCE ELECTRODE	
OTHER F	EATURES	CPSD	C P SURGE DIVERTER	
	EATURES SAMPLE POY	CPC	C P CABLE	
SB SF	SAMPLE BOX	CPJB	C P JUNCTION BOX	
	SAMPLE FEED			
ST	SAMPLE TAP	CHDVEV	•	
RL MB	RESERVOIR LADDER	SURVEY		
MB	MONITORING BOX	BOU	BOUNDARY DEC SETTING OUT	
TEL	TELEMETRY CABLE OTHER CABLES	PEG	PEG SETTING OUT	
CAB		STA	STATION	
WSB	WATER SUPPLY BOREHOLE			

APPENDIX A: EXAMPLE OF SURVEY LIST FILE

Project Name				
Date of survey				
Surveyor				
POINT	NZTM mE	NZTM mN	RED_LEV	SUR_CODE
1	1761073.59	5915981.66	62.106	BD1C1.00
2	1761074.25	5915985.55	75.721	YI1C1.10

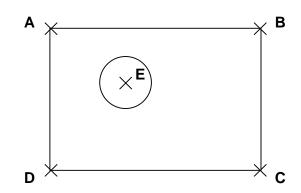
APPENDIX B: AS BUILT DIGITAL DATA FOR CIRCULAR MANHOLES

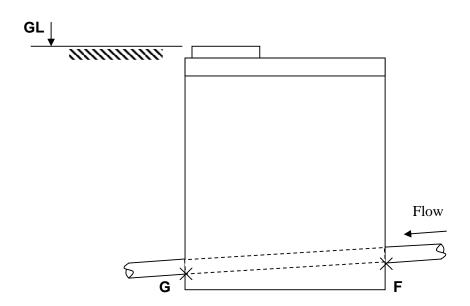




Point	Northing	Easting	Reduced level	Code
A				LID
В				CHAP
С				CHAC
D				P4
Е				P4
GL				GRO

APPENDIX C: AS BUILT DIGITAL DATA FOR SQUARE MANHOLES

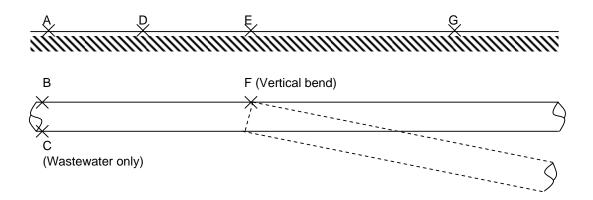




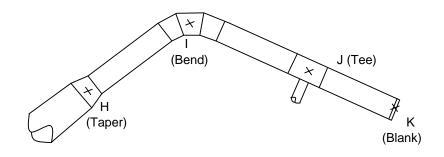
Point	Northing	Easting	Reduced level	Code
A				CHAP
В				CHAP
С				CHAP
D				CHAP
Е				LID
F				P4
G				P4
GL				GRO

APPENDIX D: AS BUILT DIGITAL DATA FOR PIPE LENGTHS

Long section:



Plan:



Point	Northing	Easting	Reduced level	Code
A				PI3
В				PI1
C				PI4
D				PI2
Е				PI3
F				PI1
G				PI2
Н				TP
Ι				BD
J				TE
K				EC