ASDS v2 Survey Support Files

05 April 2024

Document approval and issue notice

Changes will be issued as a complete replacement document. Recipients should remove superseded versions from circulation.

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Build Status

Date	Author	Reason	Sections
V2	19/07/21	Martin Ankor	Initial Release for ASDS v2
V2 (0.01)	27/09/21	Martin Ankor	Improvements based on user feedback
V2 (0.02)	05/10/21	Martin Ankor	RZV/WZV removed
V2 (0.03)	08/03/22	Martin Ankor	AEC added. Macros & template updated
V2 (0.04)	27/09/22	Martin Ankor	Major update to support 3D services
V2 (0.05)	29/11/22	Martin Ankor	Minor bugfix to Block Converter
V2 (0.06)	05/04/24	Martin Ankor	Updates to template and Block Converter

Main Amendments in release V2 0.06 (05/04/2024):

Section Title	Amendment Summary
Codes	No changes
Attributes	No changes
Autocad	Template updated with improved colours for use with imagery backgrounds. Additional scales added to scale bar. Other minor improvements.
Block Converter	Bug fixed which occasionally resulted in the first linework point in the file having the wrong code. Now includes both standard Autocad and BricsCAD versions.

Planned changes for future versions

- Excel macro – add option to turn off automatic attribute generation
- Excel macro – improve line code support
- AEL (Electrical cables) - Add voltage attribute

Files included

TasWater ASDSv2 _050422.lict

ASDS v2 code library for Leica Infinity.

TasWater ASDSv2 _050422_ ####_#######.XCF, TasWater ASDSv2 _270922_ ####_#######.X23 and TasWater ASDSv2 _270922_ ####_#######.X06

ASDS v2 code library for Leica Captivate instruments in DBX format.

TasWater ASDSv2 Stylesheet_point codes and line strings_050422.xsl

A style sheet for Leica Infinity/Captivate that generates a suitable .CSV file for the TW Block Converter.xslm

TasWater ASDSv2 _050422.fxl

ASDS v2 code library for Trimble instruments.

Taswater Codelist_ASDSv2_050422.pdf

A printable version of the code library showing codes, and identifying which have attributes, which are contourable, and other useful information. Designed to fit onto a single A4 sheet.

TasWater_ASDSv2_TEMPLATE_050422.dwt

An AutoCAD/Civil3D template with a complete set of blocks, linetypes, and layers for all the codes and attributes within the TasWater ASDSv2 code library.

Linetypes_ASDSv2.lin

Linetypes for the AutoCAD template. These are already included in the AutoCAD template.

TasWater ASDSv2.fdb_xdef

A figure prefix library for Civil3D designed for the ASDS v2 codelibrary.

TasWater ASDS v2 Block Converter _050422.xslm

An Excel file that can generate an AutoCAD script that inserts blocks and associated attributes into the drawing.
The Excel file requires a .CSV file in the format: (Attributes up to 20). Line features should be sorted by feature order, not time. E.g.,

T0001	PBXX		(point feature)
T0004	PUPP		(point feature)
T0003	BT	001 (or B)	(line feature)
T0006	BT	001 (or E)	(line feature)
T0002	WRM	001 (or B)	(line feature)
T0007	WRM	001 (or C)	(line feature)
T0008	WRM	001 (or E)	(line feature)

Format required (attributes up to 20):

Point ID	Easting	Northing	Height	Code	LineNo	Attr 1	Attr 2	Attr 3	Attr 4…

There are additional requirements with regards to point and linework that are mentioned in the "Notes on Usage" section below.

To use TW Block Converter, enable macros and run the following macros.

Load_CSV – This macro clears the spreadsheet and loads a new data file.

Process Codes – This macro processes all points and lines to generate an AutoLISP command (in column 'AA') that inserts blocks and attributes. For linework it cycles through the line to determine the length and number of segments, then determines whether to place the block in the middle segment of the line, or the middle point. For lines with DSIL/DSSL, USIL and USSL levels, it also calculates the missing attributes based on recorded depths, and line direction.

SaveDataForACAD – Exports the 'AA' column as a .scr file, ready to run within the ASDS AutoCAD template file and exports columns A-F as a CSV file ready for import into Civil3D.

Notes on usage

This field-to-finish system is designed around TasWater's in-house surveying systems and will likely need to be adapted and modified to suit other surveying systems.

This system is designed around projected future surveying requirements and existing GIS data requirements. This approach supports optimisation and potential automation of data processing to generate complete 3D representations of underground services.

Excel Macro Notes

To enable both conventional detail/SUI survey and GIS style survey in the field, TasWater separates linework codes from point codes (can be set in Leica Captivate as "Allow lines to be coded independently of points"). This allows the surveyor to update linework codes and attributes as they work along a line, for example, changing a line's SUI quality rating, or adding upstream/downstream depth attributes. It also allows a surveyor to build a line from points with different codes.

This type of coding is represented in the CSV file as follows:

Point ID	Easting	Northing	Height	Code	LineNo	Attr 1	Attr 2...
T0180	588771.443	5335492.102	16.048	WDM			
T0181	588773.369	5335490.961	15.998	WDM		0.5	
T0190	588780.956	5335485.901	15.92	WIV		0.6	
T0186	588774.908	5335489.973	15.975	WHYD		0.65	
T0187	588773.995	5335490.529	15.983	WDM			
T0180	588771.443	5335492.102	16.048	WDM	1	0.6	QL-B
T0181	588773.369	5335490.961	15.998	WDM	1	0.6	QL-B
T0190	588780.956	5335485.901	15.92	WDM	2	0.7	QL-C
T0186	588774.908	5335489.973	15.975	WDM	2	0.7	QL-C
T0187	588773.995	5335490.529	15.983	WDM	2	0.7	QL-C

This is the typical output from Captivate or Infinity using the ASDS stylesheet included in the ASDS survey files. Each surveyed point is shown first, followed by the linework. While the linework and points share the same point names, the coding is independent. For example, line WDM1 is constructed from two points, both coded WDM, whereas line WDM2 is constructed from three points, with codes WIV, WHYD and WDM.

The macro is expecting this format. The macro will need to be adjusted to accommodate other file formats. One option would be to add a simple pre-processor to the macro that can convert from a common 'points only' style format to the 'points and lines' expected during the **Load CSV** stage.

This method supports multiple options when it comes to generating 3D services. In the following example, Attribute 1 (Attr 1) is "Depth", referring to the depth to service commonly marked up during service location. The Excel Macro will use the depth attribute for the line unless there is a recorded depth for the vertex. This allows the surveyor to assign a depth to an entire line, while maintaining the option for specific depths as required.

After running the Macro, the results are:

Point ID	Easting	Northing	Height	Code	LineNo	Attr 1	Attr 2...
T0180	588771.4	5335492	16.048	SUIMARK			
T0181	588773.4	5335491	15.998	SUIMARK		0.5	
T0190	588781	5335486	15.92	WIV		0.6	
T0186	588774.9	5335490	15.975	WHYD		0.65	
T0187	588774	5335491	15.983	SUIMARK			
T0180	588771.4	5335492	15.448	WDM	B	0.6	QL-B
T0181	588773.4	5335491	15.498	WDM	E	0.6	QL-B
T0190	588781	5335486	15.32	WDM	B	0.7	QL-C
T0186	588774.9	5335490	15.325	WDM	C	0.7	QL-C
T0187	588774	5335491	15.283	WDM	E	0.7	QL-C

The original points are preserved but recoded as SUIMARK to identify them as service locator marks (General linework points will just be recoded with "LINEPOINT" to prevent duplicates in CAD). The linework vertices have been lowered by the depth recorded at each point, or if there was no depth recorded, by the depth associated with the line. If both attributes are left empty the point remains at its original height. Currently, SUI classification, service type, diameter and size of the conduit/bank are not used in the depth calculations.

The linework strings numbers have been changed to B, C, and E linework codes to better suit Civil3D. The linework translation from string numbers to linework codes is performed at import and can be turned off by simply commenting out the "Call StringsToLineCodes" line in the macro.

This is more complicated when dealing with the USIL, USSL, DSIL and DSSL attributes associated with some codes such as stormwater and sewer pipes.

The basic program flow for general services (that don't have USIL/DSIL attributes) are summarised below (Fig. 1):

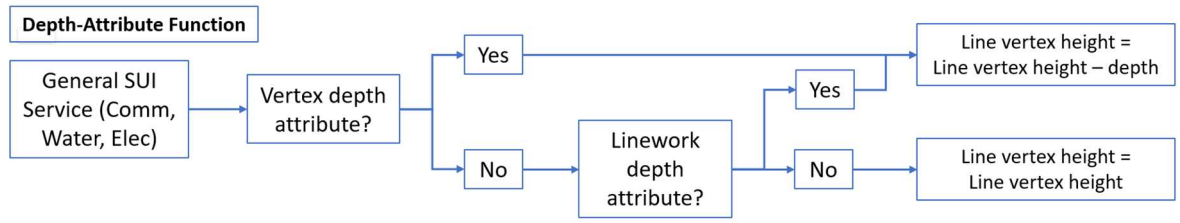

Figure 1: The Depth-Attribute Function. Program flow for typical services.

For lines that have USIL/DSIL style attributes (most sewer and stormwater) the program flow can be described in two stages.

In the first, the attributes are determined based on data that has been collected (Fig. 2).

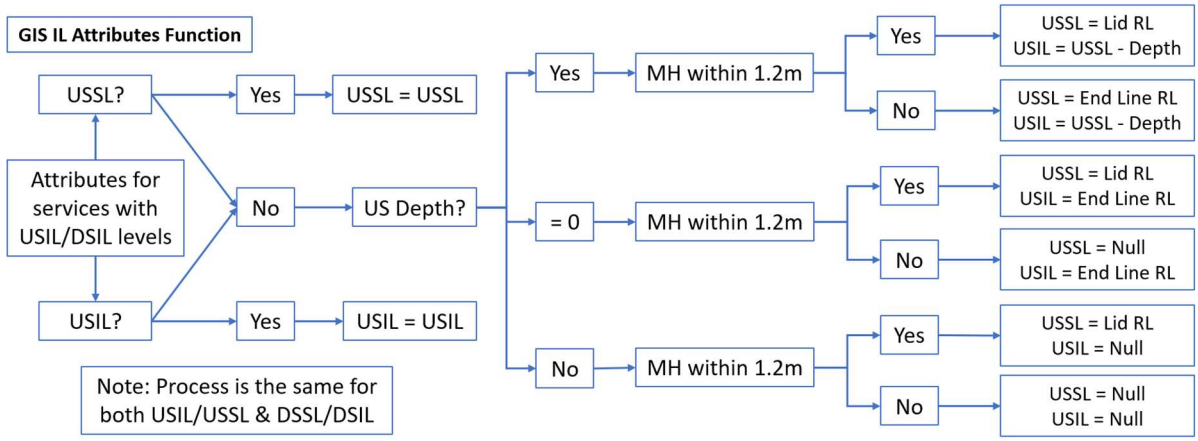

Figure 2: GIS IL Attributes Function. This function determines the attributes based on available recorded data.

This is followed by a second process that uses the calculated or known attribute values to place the line vertices at the appropriate depths (Fig. 3).

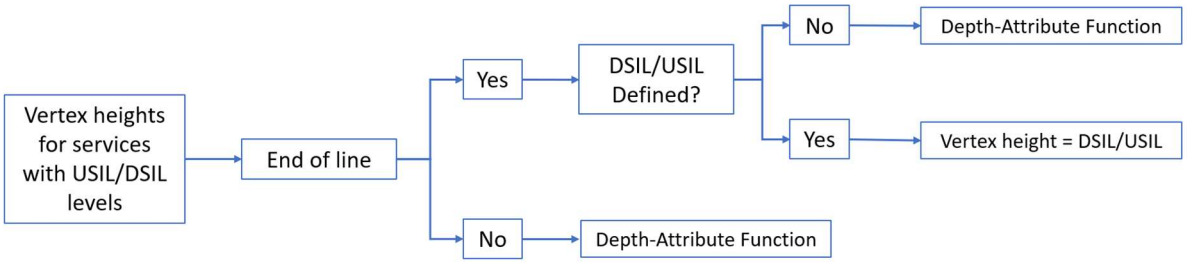

Figure 3: Flow for determining line vertex heights for lines with USIL/DSIL style attributes.

This accounts for three different but interacting data collection methods – conventional surveys of service locations, GIS feature surveys with measured depths, and survey data extracted from laser scans.

Unused attributes

The survey code table has many attributes that are not used in Taswater's GIS. A key example is the use of "Depth" attributes. In general, "Depth" attributes are not transferred to the GIS but are instead used in calculations to derive attributes required for the GIS. Another example is the "Height Recorded" attribute on most valve codes. Please refer to the ASDS Data Structure (HTML) for which attributes are used for the GIS.

Other GIS attributes are currently being investigated for future requirements. For example, the "Bank width", "Bank height", "Material" and "Diameter" attributes for communications and electrical conduits.