

Civil 3D Survey Database Basics

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About Seiler Design Solutions

Seiler Design Solutions provides informative, unbiased solutions to clients who are using Autodesk software, GeoSLAM scanners, PointCab software and drone solutions. We are a business where incredibly talented individuals are empowered to do whatever it takes to provide you the best and most affordable software solutions to fit your needs. Our clients trust us because we consistently provide them with reliable insights from experienced trainers all backed by the best user support in the industry.

Seiler Design Solutions is part of five distinct divisions owned and operated by Seiler Instrument & Mfg. Company, Inc. Our Industry Specialists and Application Engineers are dedicated to understand your firm's workflows, and are experienced in integrating services without sacrificing your productivity.



About the Speaker

- Application Engineer with Seiler Design Solutions
- Michigan Technological University alumnus
- Over 30 years experience in survey drafting, land development, transportation, site and utility design.
- Autodesk Certified Civil 3D Professional
- Autodesk Certified Instructor

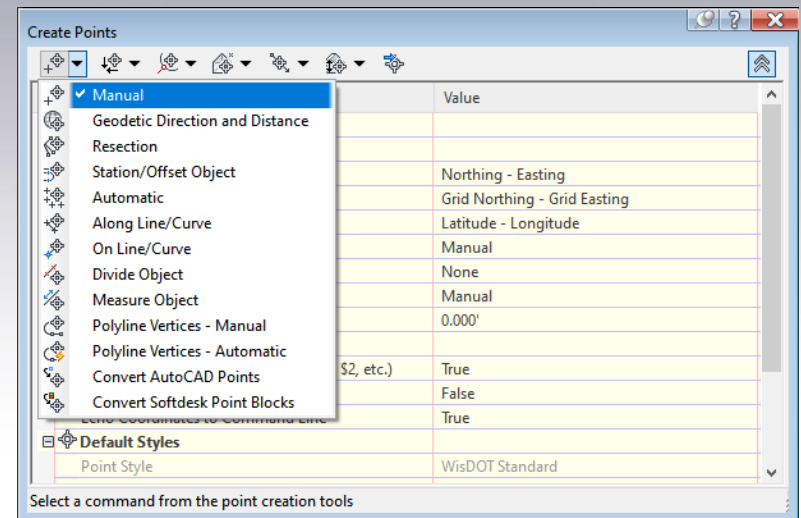


Learning Objectives

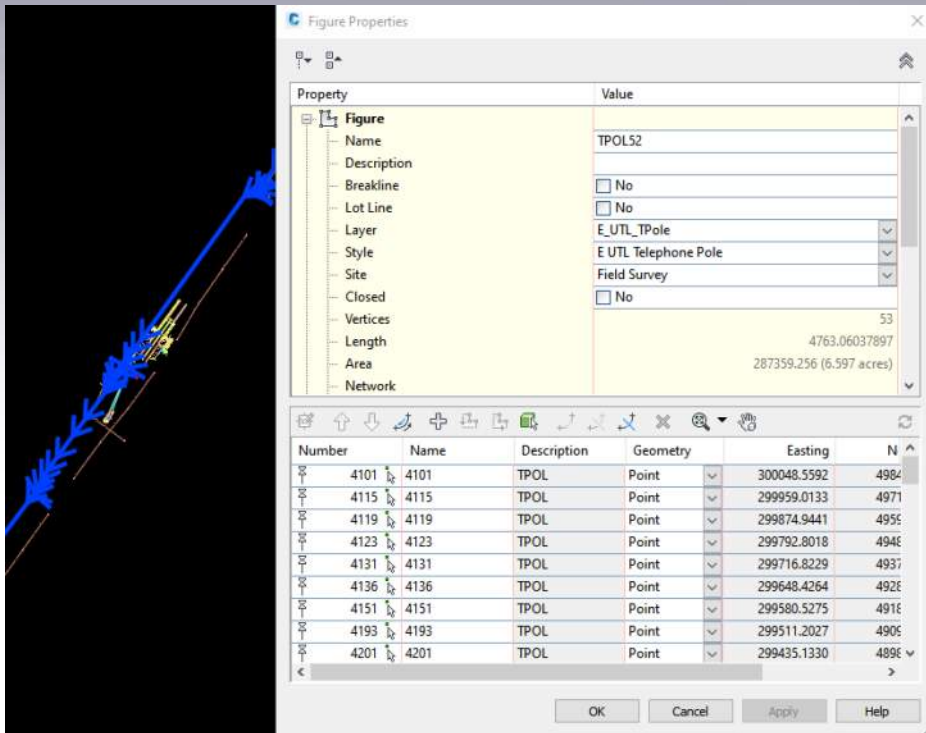
- Understand the role of the Survey Database within Civil 3D both internally and within the WisDOT standards and practices.
- Automate the representation of existing conditions.
- Leverage Survey Queries to convey key site condition information.
- Be able to produce better deliverables to meet project requirements.

COGO Points & Survey Points

- COGO stands for “Coordinate Geometry”. Basic building block and represent surveyed point objects or calculated positions.
- Can be placed in the drawing file via standard placement and calculation routines.
- Survey Points are COGO points tied to an external survey database and always represent field collected data.



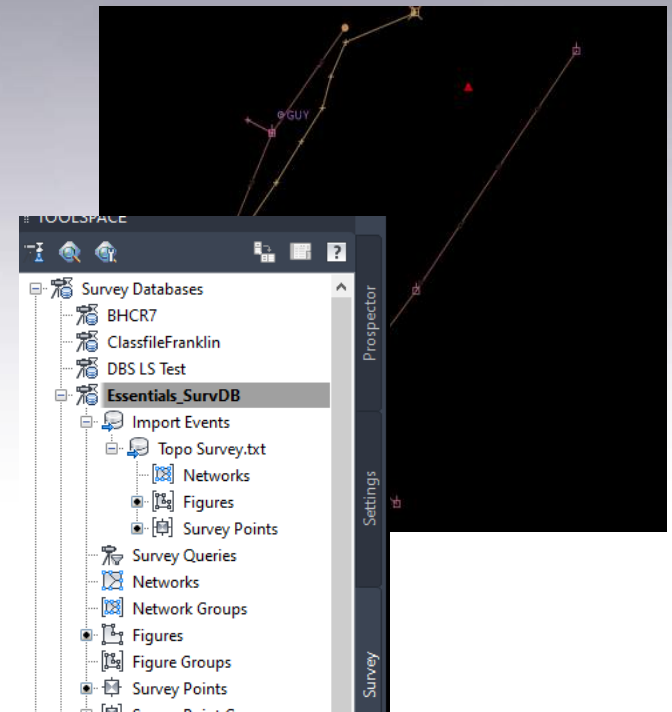
Survey Figures



- Similar to Feature Lines. Represent 3D linework tied to Survey Points and created via the Survey Database.
- Used to represent linear features collected in the field. Both topo and feature objects.
- Chain based Figures are edited via point table
- Vector based Figures can be manipulated similar to Feature Lines

Survey Database

- Database file and folder grouping to store survey point data for use in multiple drawings.
- Used to generate coded line work based on field codes.
- Independent of drawing – can be used to import data over and over again with consistent results.



Survey Database-Requirements

The image shows two parts of a software interface. The top part is a table with columns: Code, Style, Point Label Style, Format, and Layer. The bottom part is a tree view showing a hierarchy of databases and code sets.

Code	Style	Point Label Style	Format	Layer
PILE*	<input checked="" type="checkbox"/> E STRUCT Piling (Concrete-Ste	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_S
PILR*	<input checked="" type="checkbox"/> E FEN Pillar	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_I
PINL*	<input checked="" type="checkbox"/> P DRN Inlet	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> P_I
PIPL*	<input checked="" type="checkbox"/> E UTL Pipeline	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_U
PIT*	<input checked="" type="checkbox"/> E AREA Gravel or Sand Pit	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_J
PLE*	<input checked="" type="checkbox"/> P RW Permanent Limited Ease	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> P_I
PLNT*	<input checked="" type="checkbox"/> E MISCPROP Planter	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_I
PMTR*	<input checked="" type="checkbox"/> E MISCPROP Parking Meter	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_I
POC*	<input checked="" type="checkbox"/> E ALI Point on Curve	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_J
POLE*	<input checked="" type="checkbox"/> E MISCPROP Pole	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_I
POOL*	<input checked="" type="checkbox"/> E MISCPROP Pool	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_I
PORC*	<input checked="" type="checkbox"/> E BLD Porch	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_I
POST*	<input checked="" type="checkbox"/> E MISCPROP Post	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_I
POT*	<input checked="" type="checkbox"/> E ALI Point on Tangent	<input checked="" type="checkbox"/> <default>	S*	<input checked="" type="checkbox"/> E_J

The tree view shows the following structure:

- Equipment Databases
 - Figure Prefix Databases (highlighted)
 - AIW Features
 - Ameren demo
 - CES Figure Prefix
 - Franklin
 - Sample
 - VEC Features
 - WisDOT Topography
 - Linework Code Sets (highlighted)
 - CES Linework Codeset
 - Franklin
 - Sample
 - VEC Codeset
 - WisDOT
 - WisDOT Proposed

- Drawing Template complete with all required point styles, point label styles and Survey Feature Styles
- Descriptor Key Set within Template. Maps feature codes to point styles and point label styles
- Figure Prefix Database and Line Code Library. Independent files that work in tandem with the drawing template to complete linework within the survey database.

Descriptor Key Set

DescKey Editor

Code	Style	Point Label Style	Format	Layer
PILE*	<input checked="" type="checkbox"/> E STRUCT Piling (Concrete-Ste	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_S
PILR*	<input checked="" type="checkbox"/> E FEN Pillar	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_F
PINL*	<input checked="" type="checkbox"/> P DRN Inlet	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> P_I
PIPL*	<input checked="" type="checkbox"/> E UTL Pipeline	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_U
PIT*	<input checked="" type="checkbox"/> E AREA Gravel or Sand Pit	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_A
PLE*	<input checked="" type="checkbox"/> P RW Permanent Limited Ease	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> P_I
PLNT*	<input checked="" type="checkbox"/> E MISCPROP Planter	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_I
PMTR*	<input checked="" type="checkbox"/> E MISCPROP Parking Meter	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_I
POC*	<input checked="" type="checkbox"/> E ALI Point on Curve	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_I
POLE*	<input checked="" type="checkbox"/> E MISCPROP Pole	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_I
POOL*	<input checked="" type="checkbox"/> E MISCPROP Pool	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_I
PORC*	<input checked="" type="checkbox"/> E BLD Porch	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_I
POST*	<input checked="" type="checkbox"/> E MISCPROP Post	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_I
POT*	<input checked="" type="checkbox"/> E ALI Point on Tangent	<input checked="" type="checkbox"/> < default>	\$*	<input checked="" type="checkbox"/> E_I

- Part of Drawing Template complete with all required point styles, point label styles and Survey Feature Styles
- Multiple Key Sets can exist in a drawing, Civil 3D uses in preferred order
- Can include special parameter codes like scale and rotate.

Figure Prefix Database

- Created as independent file, but tied to a template when created.
- Custom file typically located at:
C:\ProgramData\Autodesk\C3D 20XX\enu\Survey
- Collection of feature codes associated with linear features.

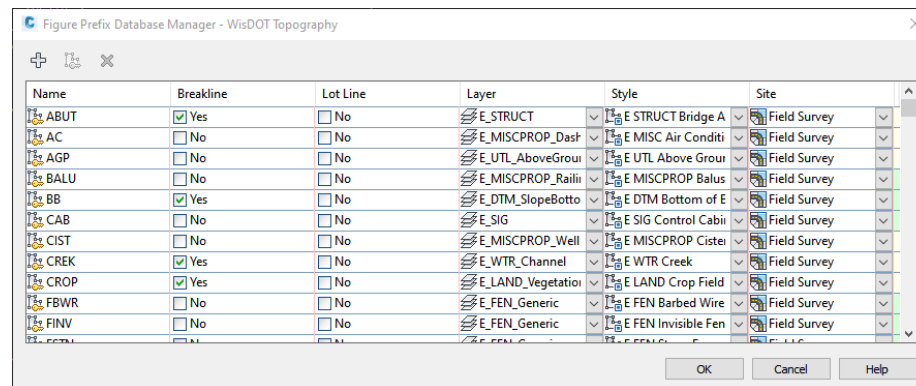


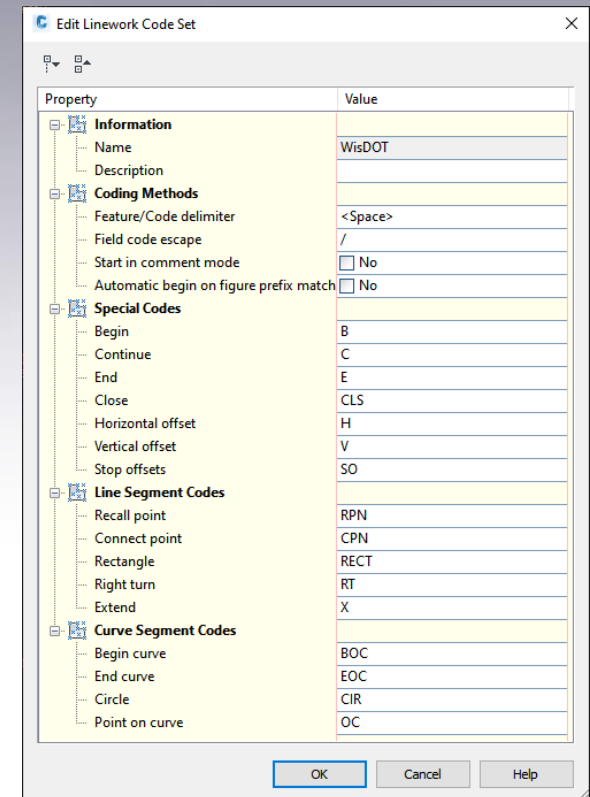
Figure Prefix Database Manager - WisDOT Topography

Name	Breakline	Lot Line	Layer	Style	Site
ABUT	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	E_STRUCT	E STRUCT Bridge A	Field Survey
AC	<input type="checkbox"/> No	<input type="checkbox"/> No	E_MISCPROP_Dash	E MISC Air Condi	Field Survey
AGP	<input type="checkbox"/> No	<input type="checkbox"/> No	E_UTL_AboveGrou	E UTL Above Grou	Field Survey
BALU	<input type="checkbox"/> No	<input type="checkbox"/> No	E_MISCPROP_Raili	E MISCROP Balus	Field Survey
BB	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	E_DTM_SlopeBotto	E DTM Bottom of E	Field Survey
CAB	<input type="checkbox"/> No	<input type="checkbox"/> No	E_SIG	E SIG Control Cabie	Field Survey
CIST	<input type="checkbox"/> No	<input type="checkbox"/> No	E_MISCPROP_Well	E MISCROP Cister	Field Survey
CREK	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	E_WTR_Channel	E WTR Creek	Field Survey
CROP	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	E_LAND_Vegetatio	E LAND Crop Field	Field Survey
FBWR	<input type="checkbox"/> No	<input type="checkbox"/> No	E_FEN_Generic	E FEN Barbed Wire	Field Survey
FINV	<input type="checkbox"/> No	<input type="checkbox"/> No	E_FEN_Generic	E FEN Invisible Fen	Field Survey

OK Cancel Help

Line Code Set

- Created as independent file.
- Custom file typically located at:
C:\ProgramData\Autodesk\C3D 20XX\enu\Survey
- Collection of special line control codes.



Starting a new Survey Database

- Two methods, standard create or WisDOT method.
- Either method: Set a Working Folder.

Create Method:

1. Navigate to Survey Database tab on Toolspace
2. Right Click on “Survey Databases”
3. Choose “New Local Survey Database...”
4. Creates Database with standard settings
5. Change survey database settings as needed.

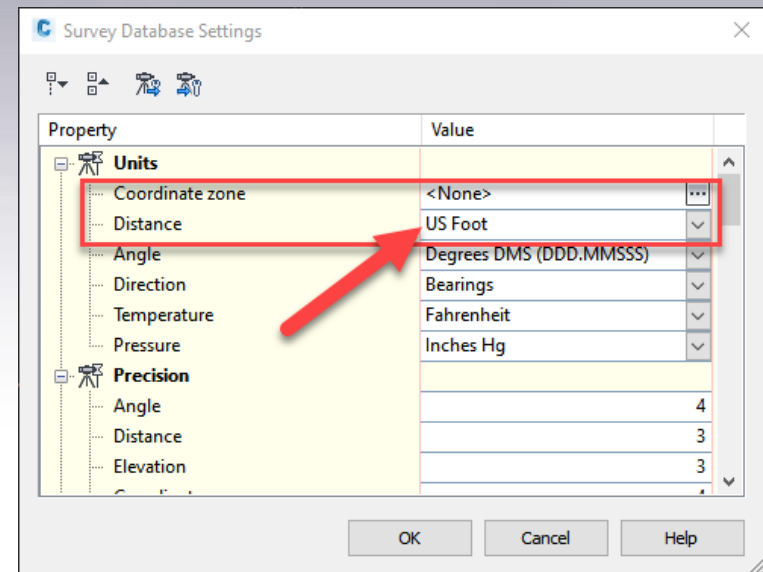
WisDOT method

1. Create project folders system per WisDOT Project Template
2. Navigate to Survey Database tab on Toolspace
3. Set working folder to appropriate project folder under
..\ProjNo\BaseData\Survey
4. Create “New Local Survey Database...”
5. Set additional survey database settings as needed



Attention – Important Detail!

- Make sure Survey Database settings are set. Right Click on Survey Database name, choose “Edit Survey Database Settings”
- Make sure Distance is set properly to match drawing, typically US Foot
- Coordinate Zone can be set or left alone.
- Any differences between these settings and drawing will cause a transformation of coordinates in drawing.



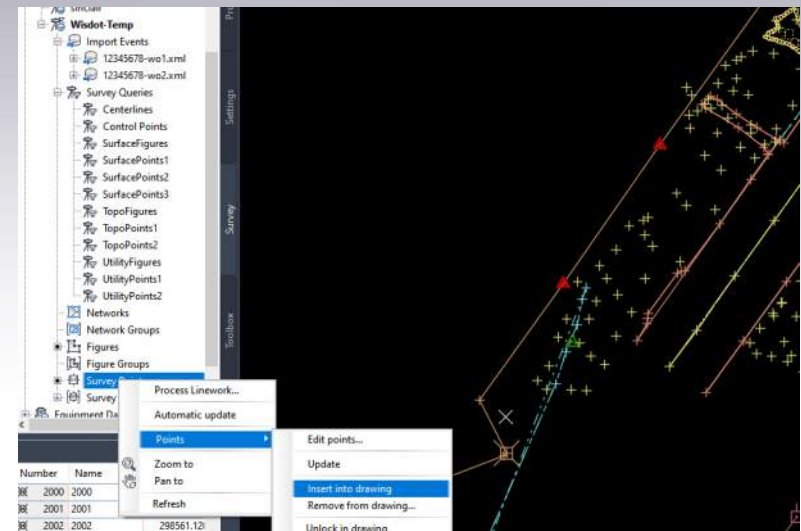
Import Data

- Typically CSV or XML file
- Data is already in corrected final coordinates, PNEZD
- First word of description is feature code. Line Codes are reserved and cannot be used for other parts of the description.
- Right Click on Database name>Import>Import Survey Data, follow the Wizard.

```
1 4000,48697.2695,299291.6975,21.1970,CP
2 4001,49793.6414,300082.2162,-0.9690,GAS
3 4002,49762.0361,300058.8966,-1.7500,GAS
4 4003,49755.5610,300054.0479,-1.2420,GAS
5 4004,49760.2915,300047.2631,0.1430,GAS
6 4005,49789.7271,300005.9724,-1.7500,GAS
7 4006,49799.0936,300002.8511,-2.6080,GAS
8 4007,49806.1346,299993.2072,-3.0500,GAS
9 4008,49762.0302,300058.9328,-1.4980,GAS
10 4009,49757.2453,300066.1001,2.5860,GAS
11 4010,49755.6786,300053.9192,-1.2840,GAS
12 4011,49692.0585,300007.1182,2.3640,GAS
13 4012,49654.0250,299979.2167,1.9500,GAS
14 4013,49648.8977,299985.3719,3.4200,GAS
15 4014,49653.7152,299978.7536,1.9880,GAS
16 4015,49625.0900,299957.6804,2.2370,GAS
17 4016,49626.6323,299966.0170,3.4680,GAS
18 4017,49625.1379,299957.8536,2.2370,GAS
19 4018,49513.1853,299877.4506,4.3710,GAS
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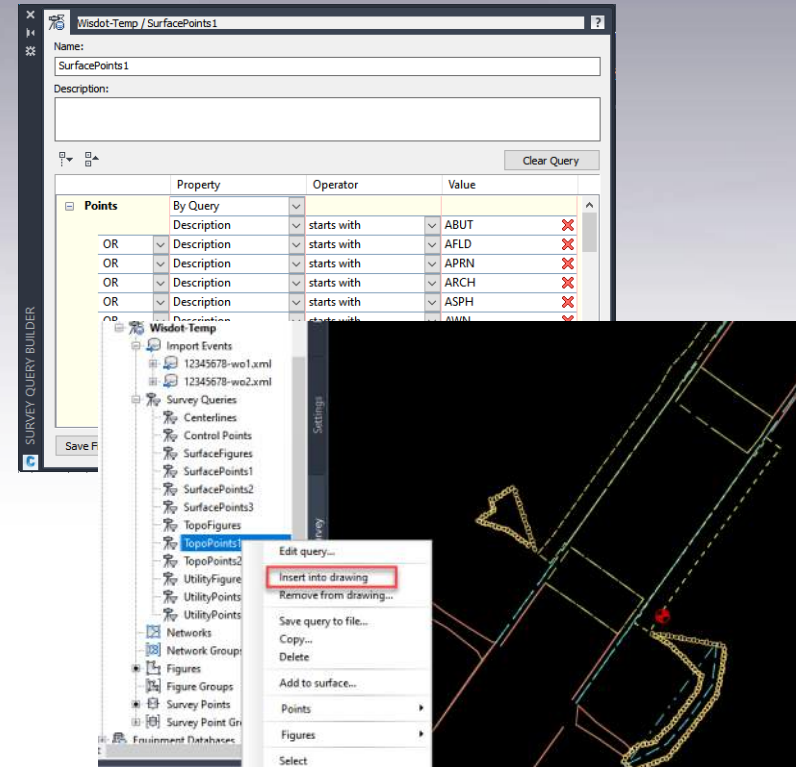
Import Survey Figures and Points into Drawing

- Points and Figures get inserted into drawing from database either directly or through queries.
- Check and fix Points and Survey Figures.
- Points can be Unlocked in drawing to move, but must be corrected IN database.
- Figures can be edited using Survey Figure Properties or by using Feature Line Editing Tools
- Figures can be written back to database.



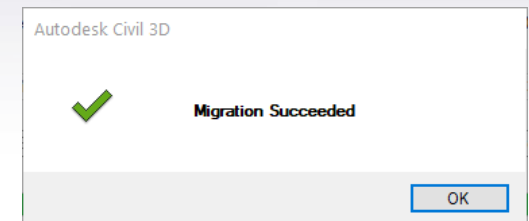
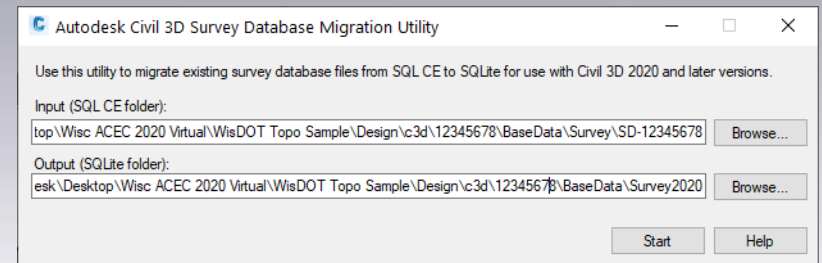
Survey Queries

- Organized method to import Points and Figures into a drawing (WisDOT preferred)
- Filter Points and Figures in a variety of methods.
- Limit of 25 definitions per query, use multiple queries as needed.
- Points and figures read directly into Surface definition via query.



Converting Old Databases

- Pre Civil 3D 2020 databases are in SQL CE .sdbx format
- Civil 3D 2020 databases are in .sqlite and are not backward compatible.
- Older Survey databases must be migrated using a standalone migration tool. Download this tool from your Autodesk account.
- Migrated databases must be pathed to a new folder. This preserves the original as backup.



Thank You.

Questions?

Contact us

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