

CES501365

## **SHP Import/Export Utility for Civil 3D**

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### **Learning Objectives**

- Learn about the purpose of the SHP Import Export Utility for Civil 3D.
- Learn about how the program converts the SHP file data into property set data.
- Learn how photos and documents are linked to SHP file data.
- Learn how the stylization and query tools are used to control how the data is imported.

### **Description**

In January 2014, Autodesk and Trimble worked to establish a different method of collecting survey and asset data that would maximize the strengths of both applications. The goal was to improve data collection methods in the field while providing attribute-rich features that transfer smoothly into Civil 3D software and other asset management systems. The result of these efforts culminated in the creation of Survey Asset Collection using the Autodesk SHP Import/Export Utility. Data is collected using Trimble Access on Trimble data collectors. Transfer the data to Trimble Business Center, where it's processed, edited, and exported to SHP files. SHP files are imported into a Civil 3D drawing, creating AutoCAD points, coordinate geometry points, feature lines, and polylines, all containing embedded property set data. All corrections and edits to the data within Trimble Business Center, export new SHP files, and reimport and update the data in Civil 3D.

### **Speaker**

An Autodesk Expert Elite Alumni  
A Civil 3D Subject Matter Expert  
A Civil 3D Application Creator  
Programmer  
A community college adjunct professor

## Disclaimer

All opinions and views expressed in this presentation are mine and do not represent any other party that I may have an association with.

## Purpose

The SHP Import tool was created to solve Civil 3D Survey workflow problems. In this session, the software platforms are Trimble and Autodesk based. The SHP Import tool works with any SHP file that contains line and point data. Complex line objects are not supported.

## Civil 3D Survey Tools

The Civil 3D Survey Database can be hard to utilize. To correct issues with the survey data, it can take numerous steps. Additionally there isn't a connection between Civil 3D and the original survey data. When changes are made to correct issues, the surveyor would need to go back and also correct it in surveying software products.

Utilizing text files to bring in data has many of the same shortcomings that the Civil 3D Survey Database contains.

## Surveying Software Tools

Often times surveying software tools are better at processing survey data and maintaining the connection between the survey data and any changes made in the surveying software tools. Trimble Business Center is one product that surveyors have found that is easier to use than Civil 3D tools.

## Caltrans Surveys Asset Collection (CSAC)

Autodesk, Trimble, and Caltrans have worked together to develop the CSAC workflow. The workflow starts in the field utilizing Trimble Access and Trimble Data Collectors. In the office the collected survey data is processed utilizing Trimble Business Center (TBC). Trimble has created tools to export the processed data (lines and points) to SHP files.

The SHP Import tool is created to import in the SHP files into Civil 3D.

## Aspects

- Alpha Coding
  - Contains the ability to identify data collected by both numbers and letters.
- Robust Variable Attribute Coding for Points and Line Features
  - Allows for complex coding that goes beyond point descriptions. This data may then be used to populate a database with dense information.
- Surface Types
  - Allows classifications of the data to be surface shots that will be incorporated into a TIN surface, a bridge, or other features such as guardrail or signs.
- Photos and Documents
  - Link photos taken during the survey to the survey point or feature line. Documents used in research, such as right of way maps or corner records, can be linked to the point or line.

- **Multiple Coding at Same Point**  
The variable attribute coding allows for a point or line to represent different objects. For example if you are collecting points along a guard rail, you can also have it represent a line that is to be added to a surface.
- **Symbology of TBC and Civil 3D the Same**  
Have the linework look the same across software programs. So a green dashed line always represents an existing sidewalk line.
- **Feature Code Library**  
Have a feature code library set up so you can query the data as it is imported into Civil 3D and once it is within the drawing.

### **Feature Code Categories**

The Feature Code Categories help organize the data as it is collected in the field. Feature Codes further allow breaking up of the data into logical groups. The Feature Codes are then used to export the data to SHP Files.

## **Import Process**

The first step is to set up the settings that meet your company's requirements.

### **Queries**

Queries allow for the data to be organized correctly. Queries may be used both in the import and in the drawing after importation.

#### **Import**

Using queries during the import process allows for the points and lines to be stylized correctly. The query may also control which property sets are applied to a particular feature line or COGO Point.

#### **Drawing**

Once the data is imported into the drawing, queries are available on the SHP Import Palette to query the Property Sets and the object's geometry.

### **Styles**

As the data is imported from the shape files, styles, layers, and names may be applied to imported objects. Object types include AutoCAD points, COGO Points, Feature Lines, 2d Polylines, and 3D Polylines.

### **Property Sets**

Data contained within the SHP files is transformed into Property Sets.

#### **Import**

Additional property sets may be applied to data that is not included in the SHP file. For example if you have quality control information you want included as a property set, it may be applied during the import process.

#### **AutoCAD Properties**

Once in the drawing the property set information may be seen using the AutoCAD Properties Palette.

### **Enhanced Tooltips**

Enhanced Tooltips may be turned on in order to view the data when the mouse hovers over the linework. The Enhanced Tooltips work through XREFs. Additionally the Enhanced Tooltips may also be used on Property Sets on objects that are not created by the SHP Import Utility.

### **Shape File Information**

Information about the SHP file that was used to create the object is added to the object. This way a user may find out about the state of the object or if newer data is available.

## **Photos and Documents**

Holding down the Ctrl key while clicking on an object that contains photo or document data will open the files. Three circles next to the cursor indicate the presence of photos or documents, if the “Show Linked Files” option is turned on from the Toolbox. The program looks for photos or documents in the current folder and subfolders.

### **Single File**

If there is only one file, and the file is found, then the file is opened with the default program set in Windows.

### **Missing Links**

If the file is not found then a dialog box will be displayed allowing for the user to set which folder the file is located in. This folder setting is then used for all of the files in the current drawing.

### **Multiple Links**

If multiple files are found, then a dialog box is shown with a list of the files found. Double clicking on a row will open the file in the default Windows program.

## **Export**

There is a feature that will export feature lines and COGO Points to SHP files along with the object's Property Sets.

### **Feature Lines**

Since SHP files do not support curves, there is an option to control how the curves should be converted to line segments.

## **Other Features**

There are other features included in the SHP Import Utility that assists in surveying workflows.

### **Settings**

There are commands to setup the settings for the SHP Import Utility. The setting tools are found in the Toolbox after installing the utility.

### **Crossing Breaklines**

A report to run on feature lines. This prevents the user from having to create a surface to run the out of the box crossing breaklines report.

### Trim Feature Lines

This command allows for the trimming of feature lines in a manner similar to the AutoCAD Trim command. The Civil 3D Feature Line trim command only allows for the selection of a single feature line at a time. The SHP Import Utility version allows for the other AutoCAD selection methods, such as crossing and fence.

### XREF Copy

The XREF Copy command allows for the copying of Civil 3D objects from an XREF. This also works on AutoCAD objects.

### COGO Point Tables with Alignment Data

In Civil 3D there is not a method to show both COGO Point and alignment information in a single table. The COGO Point Table with Alignment Data allows for the combining of this information. This tool was developed before Project Explorer for Civil 3D was purchased by Autodesk.

### Future

Transfer data across platforms using a Database. Connect between ArcGIS, Trimble, and Civil 3D.

### Sample Data

Sample files may be found on this page: <https://misc-external.dot.ca.gov/cadd/webpage.php>

- Caltrans Customized Resource Files for Civil 3D 2016
  - Contains an example of a Feature Class Classification
- Caltrans Customized Resource Files for Civil 3D 2020
  - Templates that are set up to import SHP data.
  - "C:\Caltrans\HQ\C3D\_2020\Templates\Ct\_2020\_Topo\_Surveys\_MTLS.dwt"
  - A folder containing SHP Import settings
  - "C:\Caltrans\HQ\C3D\_2020\Survey\SHP\_Import"
- Github: [https://github.com/C3DReminders/Civil\\_3D\\_SHPImport](https://github.com/C3DReminders/Civil_3D_SHPImport)
  - Contains sample SHP file data and files.

### Download

Download the SHP Import\Export Utility on the <https://Manage.Autodesk.com> website.

### YouTube Videos

Videos showing the SHP Import process:

- Downloading the data sets: <https://youtu.be/zeYOfQXUu6w>
- Example 1: <https://youtu.be/3CJQKrWLMgg>
- Example 2: <https://youtu.be/jE85JR714t4>
- Settings: <https://youtu.be/GX7iUD7xZs8>

Here are two videos showing earlier versions of this presentation:

- [https://youtu.be/DcL87\\_gHmEY](https://youtu.be/DcL87_gHmEY)
- <https://youtu.be/cM4a07AtwSU>