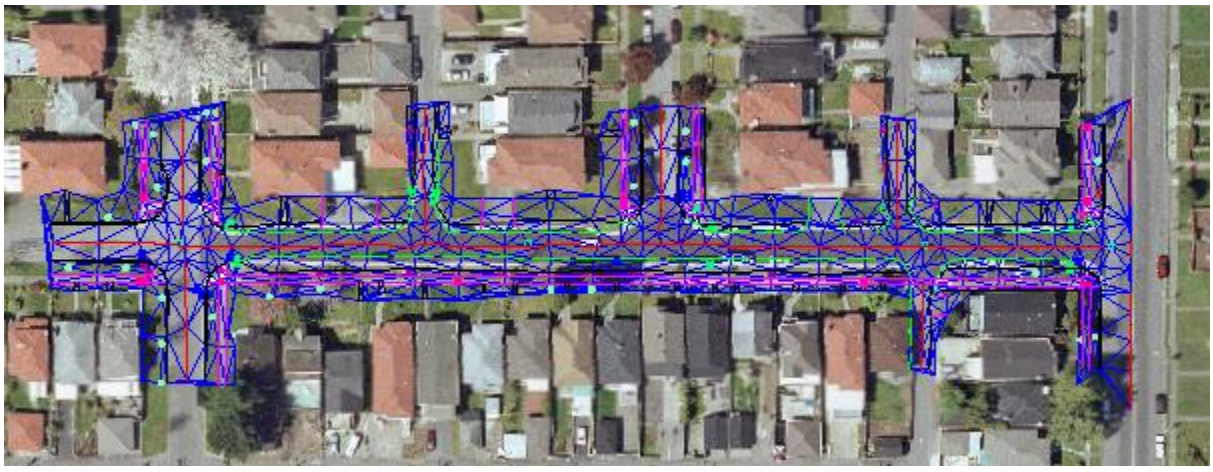
Insert Images

Overview

In this lesson, students learn how to insert external image files into AutoCAD® Civil 3D® software. Image files are typically aerial photographs that show information representing the existing conditions, and they often complement other base mapping generated from points collected with total station and GPS equipment. Image files are also generated from other sources such as Google Earth and USGS (United States Geological Survey) topographical maps.

The following illustration shows an image used to supplement base plan mapping, and an existing ground surface model for a road reconstruction project in Vancouver, Canada.



Objectives

After completing this lesson, students will be able to:

- Explain different methods for inserting images.
- Insert an image representing an aerial photograph to a drawing.
- Remove an image from a drawing.
- Insert an image representing a USGS topographic map to a drawing.
- Insert an image to a drawing from Google Earth.

Exercises

The following exercises are provided in a step-by-step format in this lesson:

1. Insert an Image Using the Insert Image Command
2. Insert an Image Using the Data Connect Utility
3. Import an Image from Google Earth

Introduction to Images

Images are separate files that contain base mapping information for a particular site or location. An image can be an aerial photograph, a scanned map saved to an image file, a USGS (United States Geological Survey) base mapping file, or any other type of raster file that contains mapping data. Images are also foundation data that you see when using Google Earth.

Images exist in many different formats and include, but are not limited to, the following:

- JPEG File Interchange Format (*.jpg, *.jpeg)
- Portable Network Graphics file (*.png)
- Tagged Image File Format (*.tif, *.tiff)
- Windows Bitmap (*.bmp)
- Graphics Interchange Format (*.gif)

Coordinate Systems

A coordinate system is a defined spatial frame of reference used for mapping and coordinating the location of drawing entities, objects, and images. There are many defined coordinate systems that can be assigned to a drawing, or an image, for different locations on the earth.

In the United States, the State Plane coordinate system is commonly used. In areas such as Canada and Mexico, the NAD 83 (North American Datum, 1983) is a commonly used coordinate system. Drawing files can have assigned coordinate systems, and image files can have assigned coordinate systems.

When drawings and data are created to reference a specific coordinate system, the drawings and data are said to be "spatially coordinated." One of the benefits of assembling data to a known coordinate system is that you can overlay other data sources on top of one another. This is useful when you are working with image data that originates from different sources. Prior to beginning a design, it is very important to understand the extent of existing conditions by working with multiple data/image sources. This becomes possible when the multiple data sources are assembled to a known coordinate system.

Civil 3D can address circumstances where the coordinate system assigned to the drawing file is different from the coordinate system assigned to the image file. If this is the case, a coordinate system transformation is performed on the image, so that it is inserted in the correct location, relative to the other base mapping data.

Inserting Images

You can use either of the following methods to insert an image to AutoCAD Civil 3D:

- Insert Image command
- Data Connect utility

Each method offers different options, and you choose the method based on your needs. Both methods are discussed in the following sections.

Insert Image Command

The Insert Image command is available from either the Tool-based Geospatial or Task-based Geospatial workspaces, and is located on the Insert tab.

The Insert Image command is the most common and easiest method for inserting images to a drawing. When you use the Insert Image command, you can specify image correlation information (insertion point, rotation angle, scale, and units), or you can reference correlation information that resides in an external file. For TIFF images, the correlation information is saved in Tiff World File (TWF), which is a separate file that accompanies the image.

The correlation information inserts the image to the correct location, based on the current coordinate system assigned. This command, however, does not perform a coordinate transformation if the coordinate system for the image is different from that of the drawing.

Data Connect Command

You use the Data Connect command to connect with multiple data sources, including images. If the coordinate system referenced by the drawing is different from the coordinate system referenced by the image, the Data Connect command performs a coordinate transformation so that the image and the drawing line up. You can also assign a coordinate system to images using the Data Connect command.

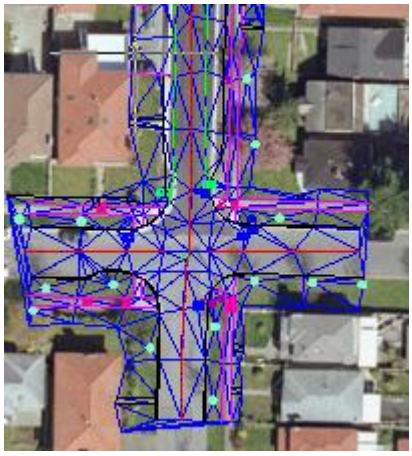
The Data Connect command is available from either the Tool-based Geospatial or Task-based Geospatial workspaces.

Key Terms

Image	A separate file that contains base mapping information, such as an aerial photograph or a scanned image of a hardcopy map.
Raster	A data structure represented with an array of pixels. A pixel contains coordinate information (X, Y) and color information.
Coordinate System	A defined spatial frame of reference used for mapping and coordinating the location of drawing entities, objects, and images.
Correlation	A means to establish the insertion point of an image that includes specifying insertion coordinates, rotation angle, and scale.

Exercise 1: Insert an Image Using the Insert Image Command

In this exercise, students insert an image using the Map 3D Insert Image command.



For this exercise, open …*M_Images-EX1.dwg.*

Exercise 2: Insert a USGS Image Using Data Connect

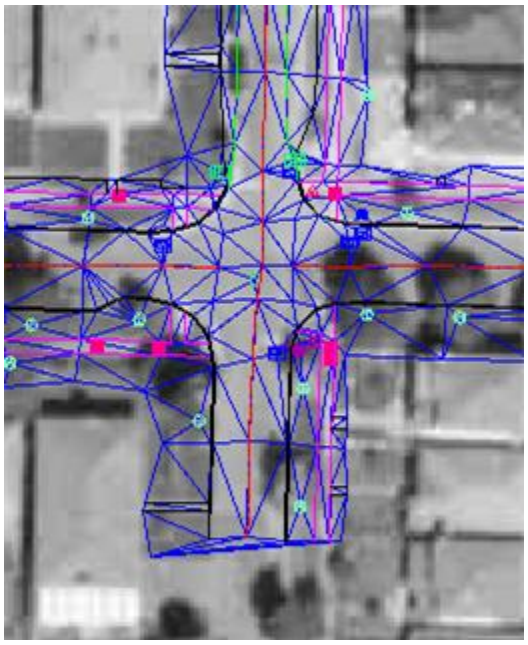
In this exercise, students insert an image using the Map 3D Data Connect utility.

For this exercise, open …*M_Images-EX2.dwg.*

Begin by changing the workspace. Students load a Map 3D geospatial workspace to display the commands they require to insert an image using the Data Connect utility.

Exercise 3: Insert an Image from Google Earth

In this exercise, students insert an image from Google Earth. This exercise requires that students have Google Earth installed. Students can install Google Earth by visiting http://earth.google.com/.



For this exercise open *…\M_Images-EX3.dwg.*

The drawing contains the base map with the surface.

The drawing has a UTM coordinate system assigned. First, begin by reviewing the coordinate system.

Assessment

Challenge Exercise

Instructors provide a master or challenge exercise for students to do based on this lesson.

Questions

1. What are some common sources for image files?
2. Why is it important to consider coordinate systems when inserting images?
3. What is image correlation?
4. How do you specify image correlation data?
5. When would you use the Insert Image command to insert an image? What is the main limitation with this command?
6. When would you use the Data Connect command to insert an image? What is the advantage of using this command?
7. What is the primary data type referenced in Google Earth?

Answers

1. Image files can be generated from aerial photography, Google Earth, and USGS and other government sources.
2. Images are usually used to supplement AutoCAD entity data. If the same coordinate system is assigned to both the drawing and the image, the image will overly directly on top of the drawing data. If the image and drawing have different coordinate systems, a coordinate transformation is performed on the image so the drawing and image data overlay properly.
3. Image correlation is the specification of the image insertion parameters such as coordinates, rotation angle, and scale.
4. Image correlation data can be specified in either an external file, or you can manually specify the correlation data when inserting images.
5. The Insert Image command is a simple method for inserting images to a drawing. When you use the Insert Image command, you cannot perform coordinate transformation on the image if the coordinate system for the image is different from the coordinate system for the drawing.
6. The Data Connect command enables you to connect to multiple data sources from a within a single interface. When you use the Data Connect command to insert an image, you can perform a coordinate system conversion on the image if the image coordinate system is different from the drawing coordinate system.
7. Google Earth uses images generated from aerial photographs.

Lesson Summary

In this lesson, students learned how to insert images into AutoCAD Civil 3D software. Students inserted an image using the Insert Image command. Students then inserted an image representing a USGS topographic map using the Data Connect command. Finally, students inserted an image to the drawing from Google Earth.