A Practical Guide to AutoCAD® Map 3D 2017

Rick Ellis and Russell Martin

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Rick continues to use AutoCAD Map 3D on projects in a production environment, in addition to teaching classes to organizations both large and small.

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Russell also performs graphic design, production mapping and GIS analysis services for a diverse client base, both public and private. He uses AutoCAD, Map 3D and Civil 3D tools on a daily basis, and strives to produce maps and graphics which clearly communicate complex quantitative data.

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Exercise Data

We would like to thank the City of Springfield, Oregon for providing the data for this book. The dataset provided is for illustration purposes only. While it is based on real world information to add relevance to the exercises, it has been altered and modified to more effectively demonstrate certain features as well as to protect all parties involved. The data should not be used for any project work and may not represent actual places or things. It is prohibited to redistribute this data beyond your personal use as a component of training.

A Practical Guide to AutoCAD® Map 3D 2017

Introduction

Congratulations on choosing this course to help you learn how to use AutoCAD Map 3D 2017. The term "practical" is used in the title because this course focuses on what you need to effectively use AutoCAD Map 3D 2017, and does not complicate your learning experience with unnecessary details of every feature in the product. Should you want to pursue aspects of features and functionality in greater detail than provided in this course, you are directed and guided to that information.

Each lesson contains the concepts and principles of each feature to provide you with the background and foundation of knowledge that you need to complete the lesson. You then work through real world exercises to reinforce your understanding and provide you with practice on common tasks that other professionals are performing with AutoCAD Map 3D 2017 in the workplace every day.

You can take the lessons in this course in whatever order is appropriate for your personal needs. If you want to concentrate on specific features, the lesson for those features does not require that you complete prior lessons. With this course organization, you can customize your own individual approach to learning AutoCAD Map 3D.

When you complete this course, you will be armed with the background and knowledge to apply AutoCAD Map 3D to your job tasks, and become more effective and productive in your job.

Course Objectives

The objectives of this course are performance based. In other words, once you have completed the course, you will be able to perform each objective listed. If you are already familiar with AutoCAD Map 3D, you will be able to analyze your existing workflows, and make changes to improve your performance based on the tools and features that you learn and practice in this course.

After completing this course, you will be able to:

- Work with multiple coordinate systems
- Clean drawings with common geometry errors
- Work with COGO tools to accurately map objects
- Insert rectified raster images
- Work with a variety of attribute data
- Apply object classification to your mapping system
- Import GIS data from a variety of sources
- Export geometry and attribute data to other GIS formats
- Connect directly to GIS data and stylize features
- Connect to raster surface data and raster images
- Attach and query source drawings
- Save changes to attached source drawings
- Extract data for reports and quantity takeoffs
- Create, manage and analyze topologies
- Create dynamic scale bars, north arrows and legends
- Produce map books to automate sheet layout

Prerequisites

Before starting this course, you should have a basic working knowledge of AutoCAD®. A deep understanding of AutoCAD is not required, but you should be able to:

- Pan and Zoom in the AutoCAD drawing screen.
- Describe what layers are in AutoCAD, and change the current layer.
- Create basic CAD geometry, such as lines, polylines and circles.
- Use Object Snaps.
- Describe what blocks are, and how to insert them.
- Perform basic CAD editing functions such as Erase, Copy, and Move.

If you are not familiar with these functions, you can refer to the AutoCAD Help system throughout the course to gain the fundamental skills needed to complete the exercises.

Conventions

The course uses the following icons and formatting to draw your attention to guidelines that increase your effectiveness in AutoCAD Map 3D, or provide deeper insight into a subject.

The magnifying glass indicates that this text provides deeper insights into the subject.

The compass indicates that this text provides guidance that is based on the experience of other users of AutoCAD Map 3D. This guidance is often in the form of how to perform a task more efficiently.

The warning indicates that a specific exercise might not function properly on 64 bit operating systems.

Downloading and Installing the Datasets

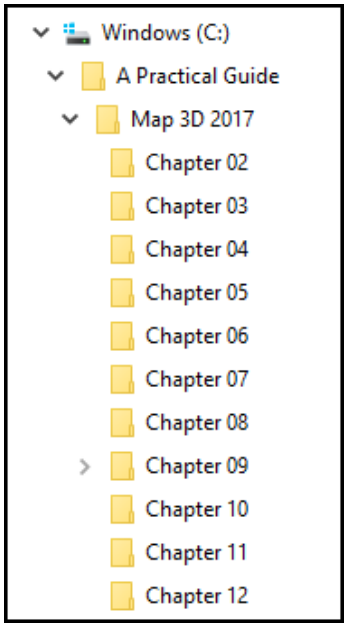
In order to perform the exercises in this book, you must download a zip file and install the datasets.

Type the address below into your web browser to load the page where you can download the dataset.
www.cadapult-software.com/data

Unzip the Files

Unzip the file **APG_Map2017.zip** directly to the C drive. The zip file will create the following folder structure:

C:\A Practical Guide\Map 3D 2017*Chapter Number\Files for Exercises*



Exercises

The exercises in this course have been carefully chosen and designed to represent common tasks that are performed by mapping and GIS professionals. The data included in the exercises are typical drawings and maps used by local governments and municipalities. You work with road networks, parcel maps, sewer collection systems, water distribution systems, aerial photos, raster surfaces, and much more.

Exercises provide higher level process information throughout the exercise tasks. You are given information about not only what to do, but why you are doing it. In most cases, an image is included to help guide you.

64 Bit Database Drivers

On 64 bit systems, exercises that require a connection to an ODBC database need to have the proper drivers from Microsoft installed. If your system does not have these installed, you can download them from Microsoft. Go to [http://www.microsoft.com] and search for Microsoft Access Database Engine.

Be sure to download the 64 bit version of the Microsoft Access Database Engine. You do not need to have Microsoft Office installed to install these drivers or to complete the exercise in this book. However, if you have Microsoft Office installed it will need to be the 64 bit version of Office for the 64 bit drivers to install.

Table of Contents

Chapter 1 AutoCAD® Map 3D User Interface 1

1.1 Lesson: Navigating the AutoCAD Map 3D User Interface 2

1.1.1 Navigating the AutoCAD Map 3D Interface 9

Chapter 2 Creating Map Geometry 13

2.1 Lesson: Establishing Coordinate Systems in Maps 14

2.1.1 Assigning a Coordinate System 19

2.1.2 Coordinate Tracking 21

2.1.3 Digitizing Points 22

2.2 Lesson: Creating and Inquiring COGO Data 24

2.2.1 Drawing with Transparent Commands 27

2.2.2 Line and Arc Information 29

2.2.3 Angle Information 30

2.2.4 Continuous Distance 30

2.2.5 Continuous Distance from a Base Point 31

2.2.6 Add Distance 32

2.2.7 List Slope 32

2.3 Lesson: Using Drawing Cleanup 33

2.3.1 Break Crossing Objects 38

2.3.2 Extend Undershoots 42

2.3.3 Delete Duplicates 43

2.3.4 Zero Length Objects 45

2.3.5 Dissolve Pseudo Nodes 46

2.3.6 Simplifying Objects 47

Chapter 3 Working with Attribute Data 51

3.1 Lesson: Attribute Data Concepts 52

3.2 Lesson: Defining Object Data Tables 57

3.2.1 Creating Object Data Tables 61

3.3 Lesson: Attaching Object Data to Objects 66

3.3.1 Attaching Object Data to Objects 70

3.3.2 Attaching Object Data While Digitizing 72

3.4 Lesson: Editing Object Data and Object Data Tables 75

3.4.1 Editing Object Data 80

3.4.2 Editing Object Data Tables 82

3.5 Lesson: Attaching External Databases 84
3.5.1 Attaching External Databases 88
3.6 Lesson: Working with Data View 89
3.6.1 Navigating in the Data View Table 92
3.6.2 Applying SQL Filters 93
3.7 Lesson: Defining a Link Template and Generating Links 98
3.7.1 Defining a Link Template 105
3.7.2 Attaching Database Data to Existing Objects 106
3.7.3 Attaching Database Data While Digitizing 108
3.7.4 Generating Links to Existing Blocks 110
3.7.5 Highlighting objects by selecting records 111
3.7.6 Highlighting table records by selecting objects 113
3.7.7 Using Spatial Filters 114
3.8 Lesson: Establishing the Dynamic Annotation Environment 115
3.8.1 Defining an Annotation Template 119
3.9 Lesson: Inserting and Managing Dynamic Annotation 122
3.9.1 Annotating Objects 125
3.9.2 Annotating Multiple Values 126
3.9.3 Updating Annotation 129
3.9.4 Rotating Annotation to Align with Objects 131
3.9.5 Adding Text to Annotation Expressions 132
3.9.6 Adding the Inch Symbol (") 134
3.9.7 Adding Length to the Annotation Template 135
3.9.8 Controlling Precision 137

Chapter 4 Object Classification 139
4.1 Lesson: Creating Object Classification Definition Files and Object Classes 140
4.1.1 Log in as SuperUser 145
4.1.2 Create a New Definition File 146
4.1.3 Define an Object Class 146
4.2 Lesson: Classifying Existing Objects and Validating Standards 151
4.2.1 Classifying Existing Objects 155
4.2.2 Validating Classified Objects 156
4.3 Lesson: Creating New Classified Objects 157
4.3.1 Creating New Classified Objects 159

Chapter 5 Importing and Exporting 161
5.1 Lesson: Importing GIS Formats 162
5.1.1 Importing an ArcInfo Coverage 165
5.1.2 Importing Polygons from an ArcView Shapefile 170
5.1.3 Creating Centroids 175
5.2 Lesson: Exporting GIS Formats 177
5.2.1 Exporting Polygons to a SHP file 181
5.2.2 Export to Autodesk SDF 183

Chapter 6 Connecting to Feature Sources 187
6.1 Lesson: Feature Source Concepts 188
6.2 Lesson: Connecting to SDF and SHP 192
6.2.1 Connect to an Add SDF Data 196
6.2.2 Connect to and Add SHP Data 199
6.3 Lesson: Working with Feature Layers 202
6.3.1 Working with Feature Layers 206
6.4 Lesson: Connecting to ODBC Point Feature Sources 208
6.4.1 Create a System DSN 211
6.4.2 Connect to a DSN, and Add Points to a Map 213

Chapter 7 Using Raster Images in Maps 217
7.1 Lesson: Inserting Raster Images 218
7.1.1 Inserting a Correlated Image 224
7.2 Lesson: Managing Raster Images 226
7.2.1 Adjust Image Display Properties 229
7.2.2 Clipping Images 229
7.2.3 Adding an Online Map 231
7.3 Lesson: Connecting to Raster and Raster Surfaces 234
7.3.1 Connecting to an Aerial Photo 239
7.3.2 Connecting to a Raster Surface 241

Chapter 8 Stylizing Features 243
8.1 Lesson: Stylizing Lines, Points, and Polygons 244
8.1.1 Stylizing Polygon Features 249
8.1.2 Stylizing Line Features 252
8.1.3 Stylizing and Labeling Point Features 254
8.2 Lesson: Stylizing Raster Surfaces 256
8.2.1 Stylizing Raster Features 261
8.2.2 Creating Contours from a Raster Surface 263

8.3 Lesson: Creating Scale Dependent Styles 264
8.3.1 Working with Scale Dependent Styles 268
8.4 Lesson: Applying Themes to Feature Layers 271
8.4.1 Thematic Mapping of Linear Objects with Object Data 275
8.4.2 Thematic Mapping of Polygon Features 279

Chapter 9 Working with Features 281
9.1 Lesson: Creating Feature Filters and Feature Queries 282
9.1.1 Preforming a Filter to Select 286
9.1.2 Preforming a Feature Query 287
9.2 Lesson: Editing Feature Geometry and Attributes 289
9.2.1 Editing Features 294
9.3 Lesson: Creating Joins 298
9.3.1 Create a System DSN 303
9.3.2 Join Tables, and Create a Thematic Map 305
9.4 Lesson: Using Constraints 310
9.4.1 Working with Constraints 314
9.5 Lesson: Bulk Copy Between Feature Sources 318
9.5.1 Exporting an SHP to an SDF 322
9.5.2 Bulk Copy from an SDF to an SHP 323

Chapter 10 Using Attached Source Drawings and Queries 327
10.1 Lesson: Managing Source Drawings 328
10.1.1 Managing Source Drawings 334
10.2 Lesson: Executing Location and Property Queries 339
10.2.1 Executing Location Queries 346
10.2.2 Executing Property Queries 352
10.2.3 Executing Compound Queries 354
10.3 Lesson: Executing Data Queries 358
10.3.1 Query by Pipe Size from Object Data 361
10.4 Lesson: Altering Properties During Queries 366
10.4.1 Execute a Query with a Property Alteration 369
10.5 Lesson: Using Save-Back 372
10.5.1 Execute Save-Back to Save Changes to an Attached Source Drawing. 378
10.6 Lesson: Working with Multiple Coordinate Systems 381
10.6.1 Working with Source Drawings in Multiple Coordinate Systems 384

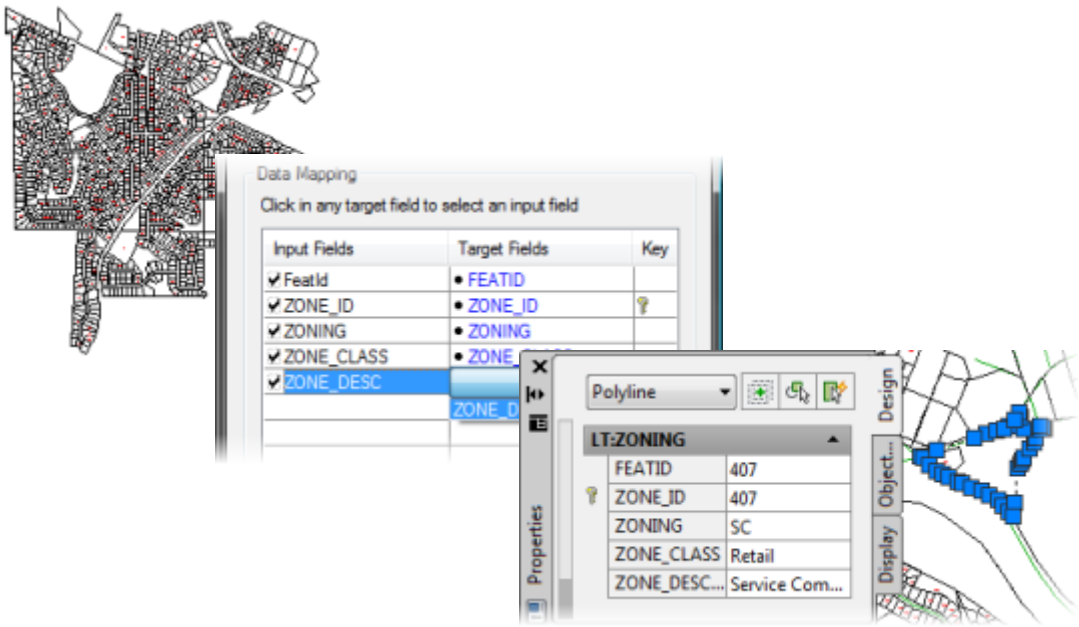
Chapter 11 Working with Topologies 387
11.1 Lesson: Creating Network Topologies 388
11.1.1 Creating a Network Topology 393
11.2 Lesson: Creating Polygon Topologies 397
11.2.1 Creating a Polygon Topology 402
11.3 Lesson: Performing Topology Analysis 407
11.3.1 Network Analysis 410
11.3.2 Preforming a Buffer Analysis 413
11.3.3 Preforming an Overlay Analysis 416

Chapter 12 Map Output 421
12.1 Lesson: Adding Dynamic Legends, Scale Bars and North Arrows 422
12.1.1 Adding a Dynamic Legend to a Layout 426
12.1.2 Adding a Dynamic Scale Bar to a Layout 430
12.1.3 Adding a Dynamic North Arrow to a Layout 432
12.1.4 Adding a Coordinate System Grid to a Layout 434
12.2 Lesson: Creating Map Books 437
12.2.1 Creating a Map Book 441
12.2.2 Navigating Through the Map Book 445
12.2.3 Publishing the Map Book 446

5.1 Lesson: Importing GIS Formats

Introduction

Importing GIS file formats into AutoCAD® Map 3D opens the door to a tremendous amount of data. Much of this data is free, and can be integrated into your mapping system. In this lesson, you begin by learning the formats and types of data that can be imported into AutoCAD Map 3D, and guidelines around integrating other mapping data into your mapping system. You then import an ArcView SHP file into AutoCAD Map 3D.



Key Concepts

Concepts and key terms covered in this lesson are:

- Import
  - Geometry
  - Attributes
  - Coordinate Systems
- Import dialog box

Objectives

After completing this lesson, you will be able to:

- Describe what map Import is.
- List the components that can be imported, and how AutoCAD Map 3D interprets incoming data.
- Identify and explain the tools used to import GIS data.
- Import street segments with Object Data.
- Import zoning polygons with an external data source.

About Importing GIS Data into AutoCAD Map 3D

GIS Data generally contains three types of data: geometry, attributes, and coordinate system data. Using the map import tools, you can define how AutoCAD Map 3D interprets and imports all three types of data.

The Map Import commands are used to convert other GIS formats into AutoCAD Map 3D geometry and attributes with the intent to retain them in the AutoCAD Map 3D format, with no need to maintain them in their original GIS format.

AutoCAD Map 3D can also connect to data as a feature source and work with these files in their native format. This functionality is covered in another lesson.

Geometry

All GIS formats are different. AutoCAD Map 3D imports the data in such a way as to represent the native format as closely as possible. An example of this functionality is when importing line data from an ArcView shape file, any segments in the incoming file that have vertexes are imported as polylines, while those that are simple lines with a start and endpoint are imported as lines.

Points can be imported and mapped to either AutoCAD points, or blocks that are defined in the drawing.

Attributes

Attributes that are associated with incoming data can be mapped to Object Data, or can be imported to an attached data source, such as a Microsoft Access database table, and linked to the objects at the same time.

Coordinate Systems

If the incoming file has coordinate system information associated with it, either within the file itself, or a companion file, AutoCAD Map 3D will read this information and convert the coordinates to the target drawing file. If there is no coordinate system information in the incoming file, you can assign a coordinate system to it during the import procedure.

Spatial Filters

Some GIS applications can manage larger data sets than can be reasonably managed within AutoCAD Map 3D. Spatial filters enable you to limit the amount of data that you import based on a location in the current map.

Guidelines for Preparing for Map Import

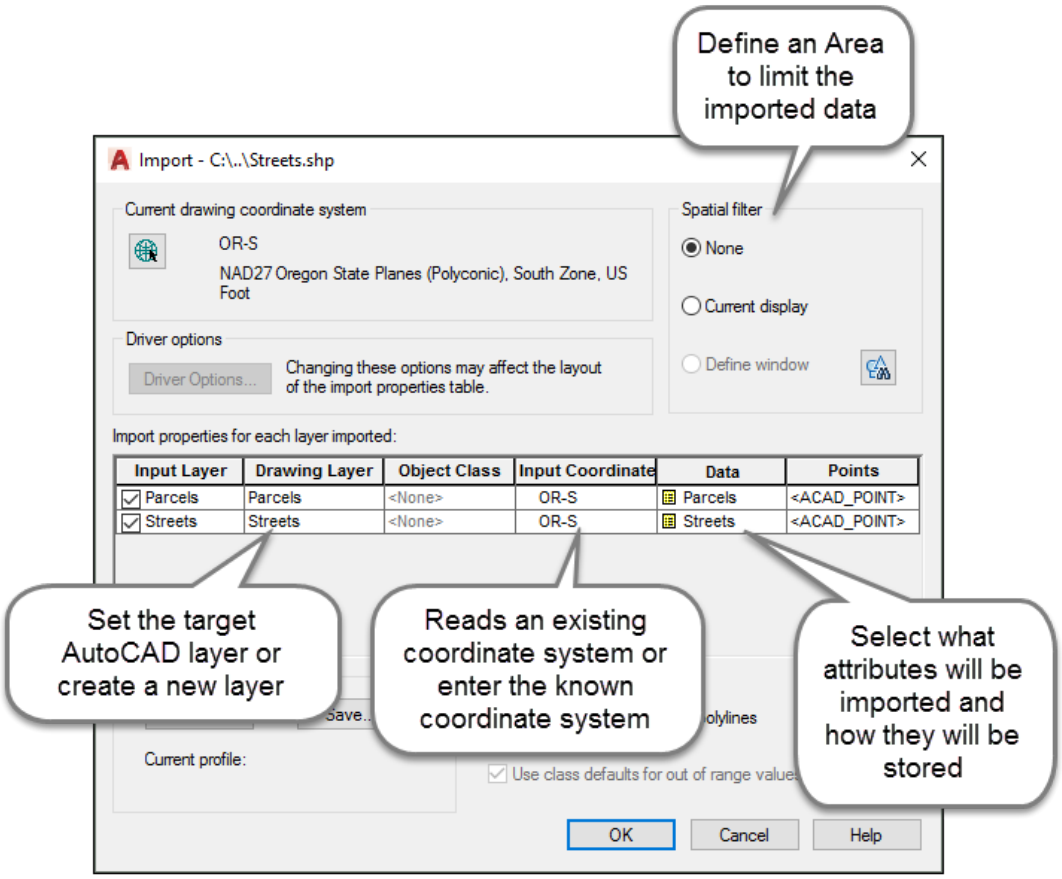
You can start a new drawing and simply import data. In most cases, you want to prepare a target drawing with layers, Object Data tables, or attached data sources that will receive the incoming data. This is especially true if your office has mapping standards that must be adhered to, or if you are importing into an existing drawing that already has all the layers, Object Data tables, or attached data sources present.

Another important point when preparing for an import is to have some familiarity with the incoming data. This may come from metadata or documentation of some kind. The best way to qualify the incoming data is to use the native application to review. However, this is not always possible, in which case the import process might be a trial and error process until you can make the correct settings for the final import.

If you perform the same type of import regularly, you can save a profile of the settings and load the profile each time you perform an import. You can also create a drawing template that has all of the definitions such as Object Data tables, layers, blocks and so on.

The Import Interface

Once the target file is prepared, and the incoming data is qualified, the entire import procedure is performed in a single interface with various dialog boxes for the settings.



Exercises: Import Data from Other GIS Formats

In these exercises you will import street centerlines that were sent to you as an E00 file. An *ArcInfo* coverage may either be stored as a directory of related files, or exported into a single E00 export file from ArcInfo or ArcGIS, as in this exercise.

Then you will, import parcel polygons from an ArcView Shapefile and convert their coordinate system.

Finally, you will create centroids and move the attached data from each polyline to the corresponding centroid. This is the first step in the process of cleaning the geometry, an important process whenever base map data is imported.

The use of the import command is very similar for all the different types of supported GIS data file formats. However, there are some differences depending on the type of geometry that is contained in those files (points, lines, or polygons).

You do the following:

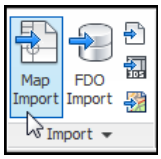
- Import streets from an E00 file.
- Import parcels from an ArcView shape file and convert its coordinate system.
- Create centroids for the parcel polygons.

5.1.1 Importing an ArcInfo Coverage

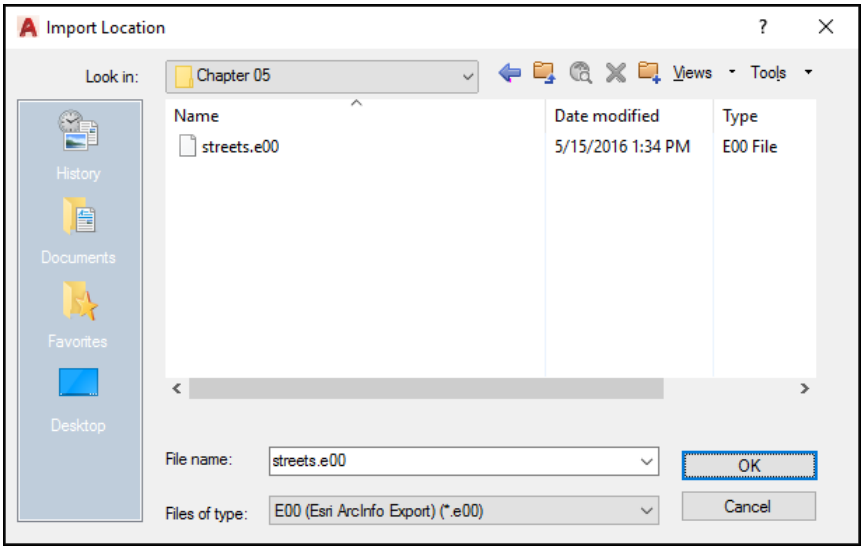
In this exercise you will import street centerlines that were sent to you as an E00 file. An *ArcInfo* coverage may either be stored as a directory of related files, or exported into a single E00 export file from ArcInfo or ArcGIS, as in this exercise.

1. Press **Ctrl + N** and select the default template **map2d.dwt** to start a new, blank drawing.

2. Select **Ribbon: Insert ⇒ Import ⇒ Map Import**.



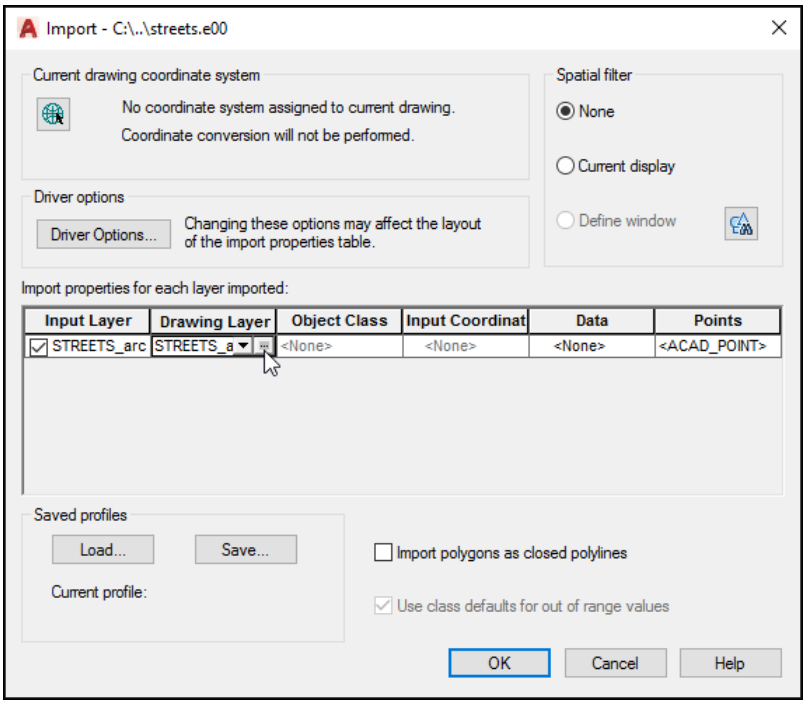
The *Import Location* dialog box opens.



3. Set the file type to **ESRI ArcInfo Export (E00)**.

4. Browse to the **Chapter 05** folder and select **streets.e00.**

In the *Import* dialog box you can configure the *Layer, Coordinate Conversion*, and *Data* options that you wish to use to import the information into *AutoCAD*.



5. Ensure that the **STREETS_arc Input Layer** is selected.

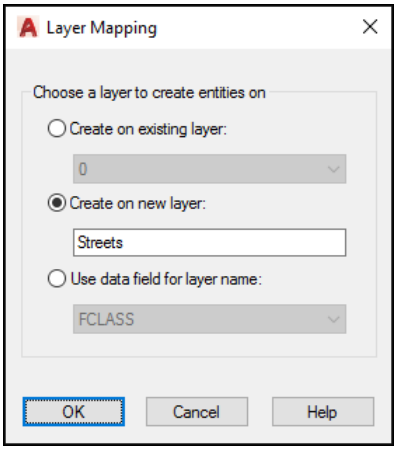
6. Click on the **Drawing Layer** field in the **STREETS_arc** row, to activate the **More button <<…>>**.

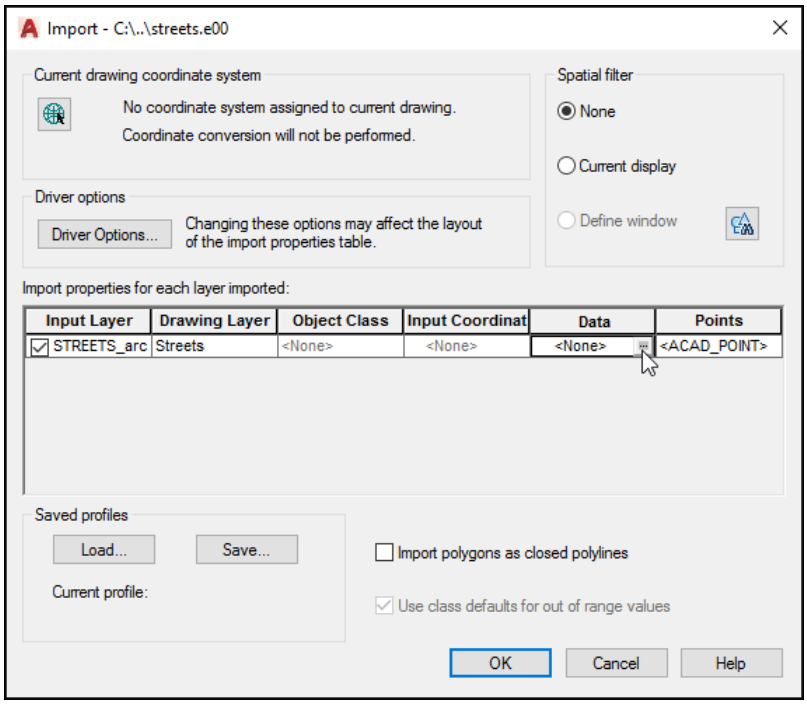
7. Click the **More button <<…>>** to launch the *Layer Mapping* dialog box.

Here you can choose to import the drawing objects onto an existing layer, create a new layer, or select a column of data from the file that you are importing to determine the layer names. This last option will allow you to do some basic thematic mapping during the import of the objects. For example, if you were importing parcel data and that data set had a column for zoning. You could have the import command create a new layer for each zoning type and place each parcel on the appropriate layer for its zoning designation. (See *Additional Exercises* at the end of this chapter for more information).

In this exercise, you will place all of the streets on one new layer.

8. Choose the **Create on new layer** option to activate the text box.
9. Enter **"Streets"** for the layer name.
10. Click **<<OK>>** to return to the *Import* dialog box.





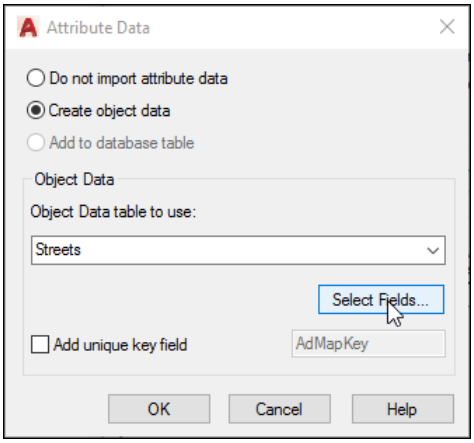
11. Click on the **Data** field in the **STREETS_arc** row to activate the **More button <<…>>**.
12. Click the **More button <<…>>** to launch the *Attribute Data* dialog box.

Here you specify what attribute data to import and where to store it. You can enter the desired name for the *Object Data Table* and select the desired fields to import. This is the step that allows you to bring the intelligence of the GIS file along with the geometry into *AutoCAD*. By creating the object data table and populating it with the information provided in the coverage you will be able to click on a street and find the street name, type, speed limit, and any other information that was added by the GIS department. This will also allow you to edit the geometry and data from the GIS file in *AutoCAD* and then export it back to any of the supported GIS formats without losing any of the attached data. If you leave the *Data* option set to *None* or *Do not import attribute data*, then you will only import the geometry of the file and you will lose all of the attached information.

13. Choose the **Create object data** option to activate the *Object Data* section.

14. Change the **Object Data** table name to **"Streets"**.

15. Click **<<Select Fields>>**.



Here you specify which fields to import into the *Object Data* table.

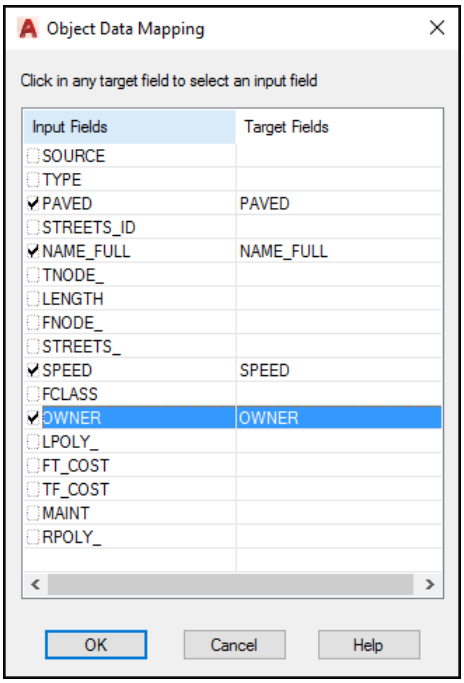
16. Deselect all **Input Fields** except **NAME_FULL, TYPE, SPEED, OWNER, PAVED, and FCLASS**.

You only need to import the fields that you want to have available. So if there is extraneous data that you don't need, you can skip it and keep the file size smaller.

It is also important to understand that many GIS programs store geometric data, like length and area, in data tables, while in *AutoCAD* the geometry is a physical property of the object. In this example, if you were to import the length field, it would be a static value in the object data table and would not update if the length of the line is altered.

17. Click **<<OK>>** to dismiss the *Object Data Mapping* dialog box.

18. Click **<<OK>>** to dismiss the *Attribute Data* dialog box.

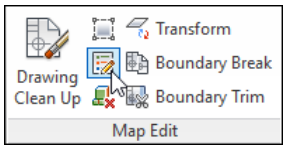


19. Click **<<OK>>** in the **Import** dialog box to import the file.

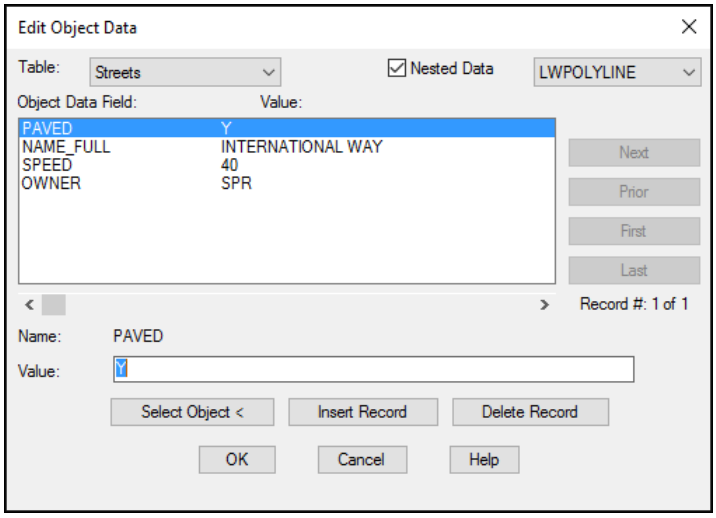
The streets are imported into the drawing as polylines, with the GIS data attached as *Object Data*.

20. Once the 287 objects are imported, zoom to Extents.

21. Select **Ribbon: Tools ⇒ Map Edit ⇒ Edit Object Data**.



22. Pick a line segment anywhere in the drawing.



Here, you can view the object data associated with the line segment you picked. You can also change the value of any field in this object's data, or even add a record to a new or existing object. It is also possible to view and edit object data using the *AutoCAD Properties* command.

23. View the object data associated with a few other line segments.

24. Click **<<Cancel>>** once you are through viewing the fields, to avoid saving any inadvertent changes.

25. **Save the** drawing as **"Streets"** in the **Chapter 05** folder

5.1.2 Importing Polygons from an ArcView Shapefile

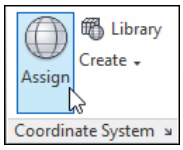
In this exercise you import parcel polygons from an ArcView Shapefile. This Shapefile geometry resides in a different coordinate system, and will be converted during the import process.

1. Open **City Taxlots OD.dwg** from the **Chapter 05** folder.

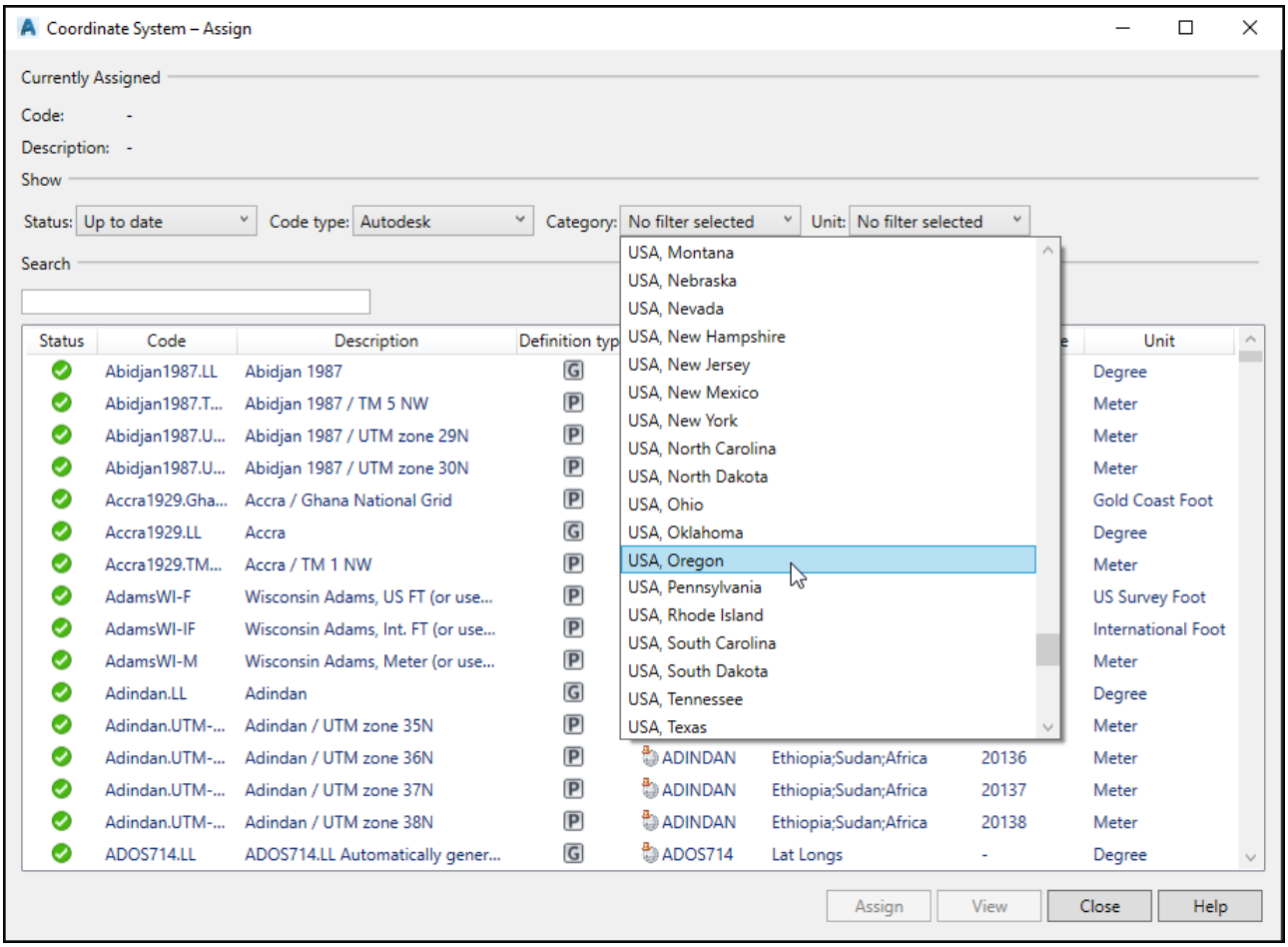
This drawing contains the city taxlots file that you worked with in previous chapters, with the *Taxlot* attribute data as object data.

The county taxlots you are about to import are in a different coordinate system, which Map 3D will convert during the import process. The first step is to assign the correct coordinate system to the base map.

2. Select **Ribbon: Map Setup ⇒ Coord System ⇒ Assign**.



3. Click **<<Select Coordinate System>>** in the **Current Drawing** section, to open the *Coordinate System - Assign* dialog box.



4. From the **Category** list, select **USA, Oregon**.

5. From the list, select **OR-S NAD27 Oregon State Planes (Polyconic), South Zone, US Foot**.

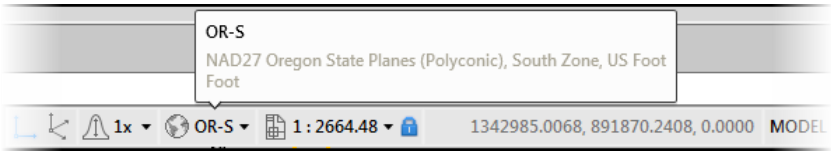
Notice the column of codes on the left, and that the code for the selected coordinate system is *OR-S*.

Once you become familiar with commonly used coordinate systems in your region, you can learn the short codes and simply enter them in the *Coordinate System - Assign* dialog box.

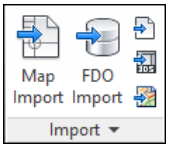
6. Click **<<Assign>>** to assign the **Global Coordinate System**.

The drawing is now identified with the *NAD 27 State Plane* coordinate system - no conversion has occurred, you have a simply assigned that coordinate system to this base map. Next, you will import the county GIS data, which is in a different coordinate system, and *AutoCAD Map 3D* will convert it to this coordinate system.

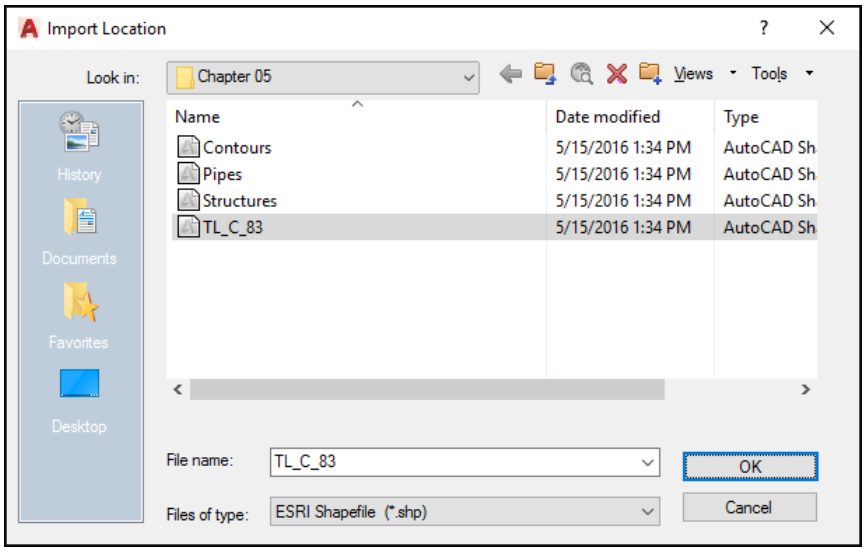
Notice that the code for this coordinate system, *OR-S* now appears on the *Status Bar*:



7. Select **Ribbon: Insert ⇒ Import ⇒ Map Import**.



The *Import Location* dialog box opens.

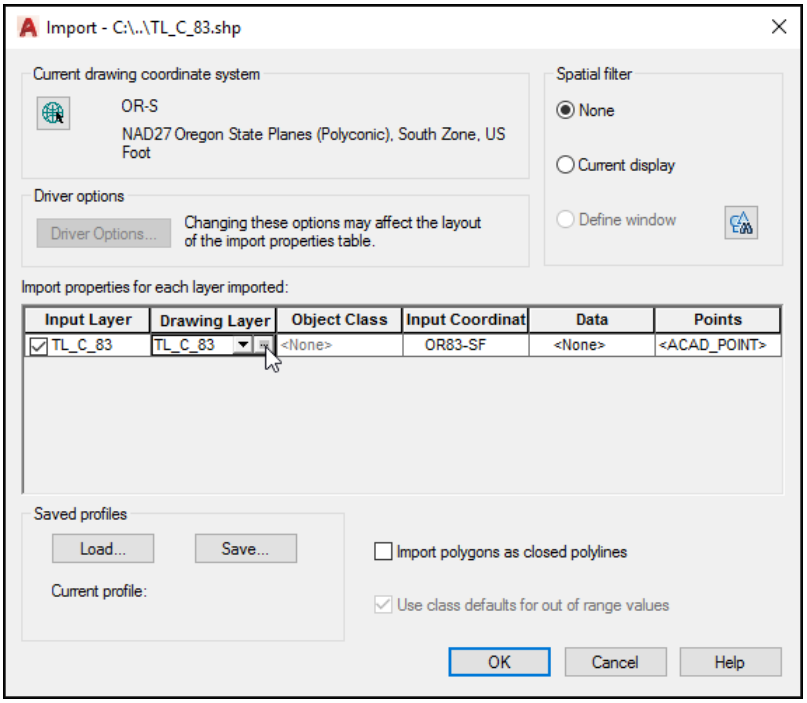


8. Set the file type to **ESRI Shapefile (*.shp)**.

9. Navigate to the **Chapter 05** folder and select **TL_C_83**.

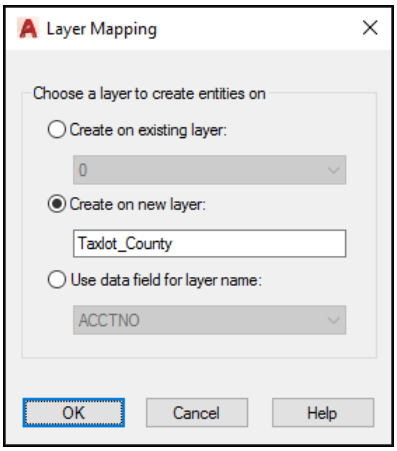
10. Click **<<OK>>** to launch the *Import* dialog box.

Here you specify all import parameters.



11. Click on the **Drawing Layer** field in the **TL_C_83** row to activate the **More button <<…>>**.

12. Click the **More button <<…>>** to open the *Layer Mapping* dialog box.



13. Choose the **Create on new layer** option to activate the text field.

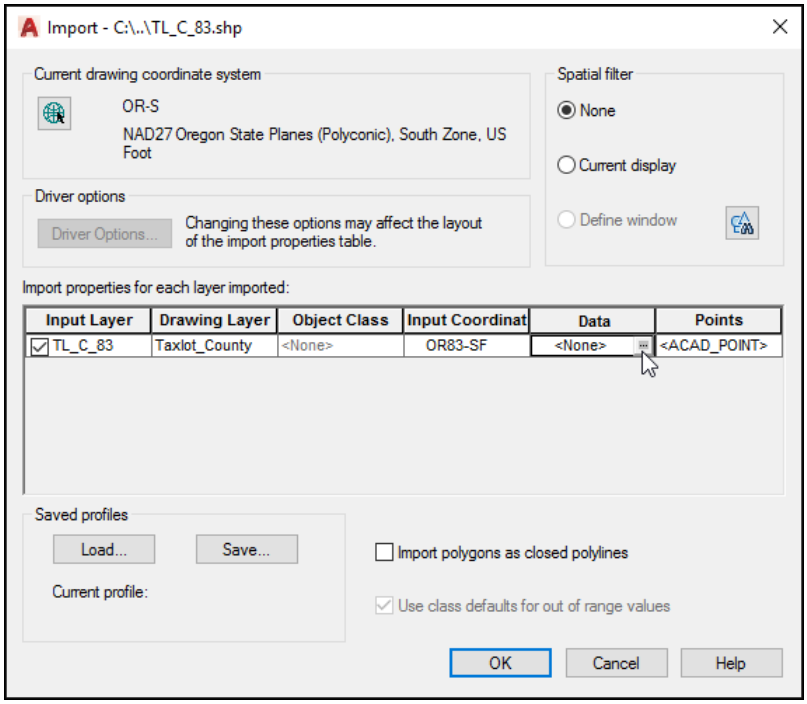
14. Enter **Taxlot_County** for the new layer name.

15. Click **<<OK>>** to return to the *Import* dialog box.

Notice that the *Current drawing coordinate system* (the base map into which you are now importing this *ESRI Shapefile*) is in NAD27, which you set at the beginning of this exercise.

Also notice that the *Input Coordinate System* is showing *OR83-SF*, which is the code for *NAD83 Oregon State Planes (Polyconic), South Zone, US Foot.*

Map 3D is getting this information from the .PRJ file, that accompanies the .SHP file. This file contains the coordinate system information. When you acquire Shapefiles from others, always ask for coordinate system information. If there is not an accompanying .PRJ file, but the coordinate system is known, you could use the More button <<…>> in the *Input Coordinates* field to select it manually, using the *Coordinate System Library*.

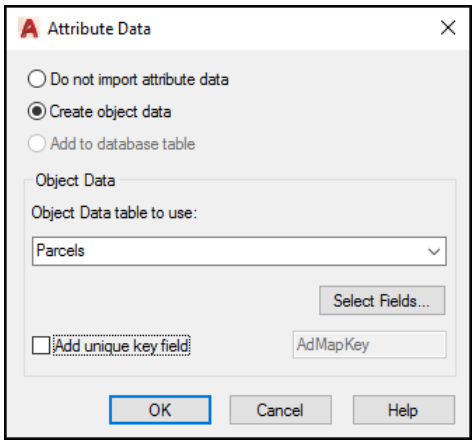


16. Click on the **Data** field to activate the **More button <<…>>**.

17. Click the **More button <<…>>** to open the *Attribute Data* dialog box.

18. Choose the **Create object data** option to activate the *External Database* section.

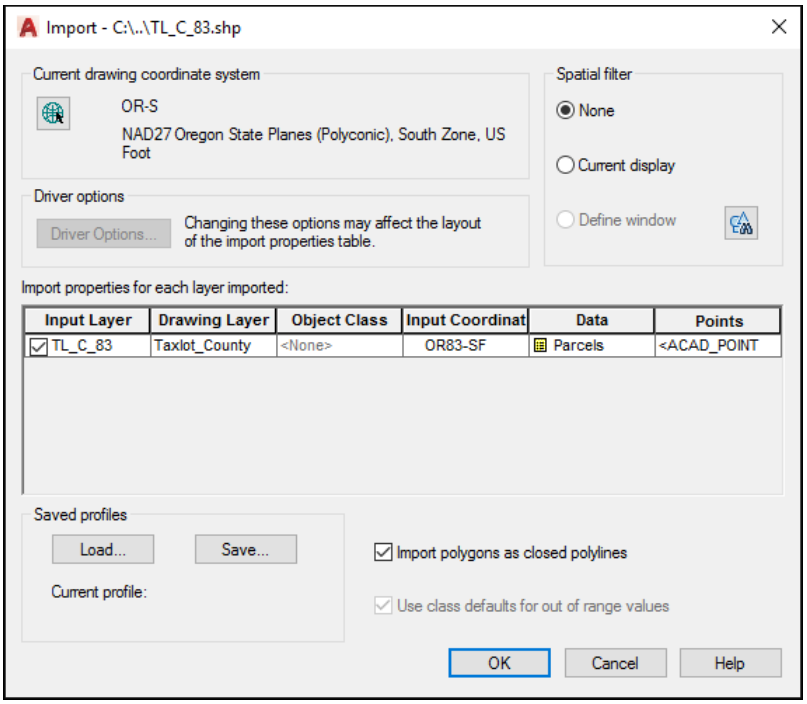
19. Select **Parcels** from the **Object data table** list.



The object data table exists in the City Taxlots OD drawing.

AutoCAD Map 3D will add the new records to the existing object data table during the import process.

20. Click **<<OK>>** to return to the *Import* dialog box.



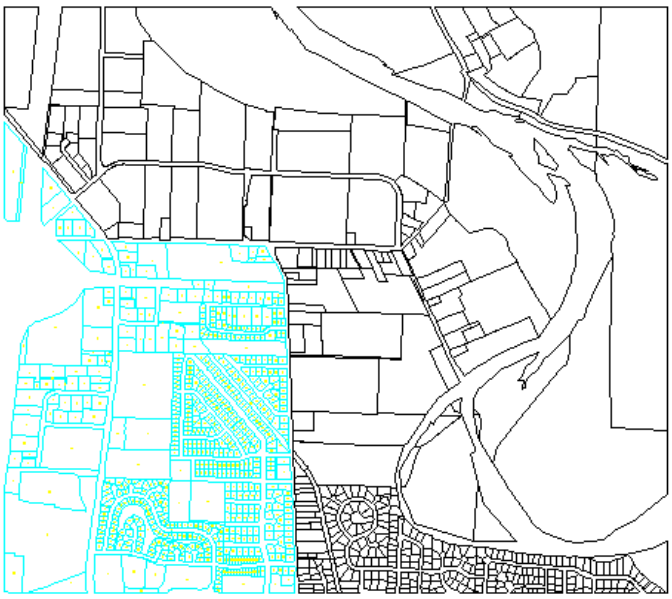
21. **Enable** the **Import polygons as closed polylines** option.

This will create each taxlot as a closed polyline, as opposed to a polygon object.

22. Click **<<OK>>** to import the file.

AutoCAD Map 3D will process 396 objects and import them into the current drawing, and append 396 corresponding records to the attached database.

23. Zoom to Extents. Your drawing should look like this:



The county parcels have been imported and converted to the coordinate system of the city taxlots drawing.

24. Save the drawing as **Regional Taxlots.dwg** in the **Chapter 05 folder**.

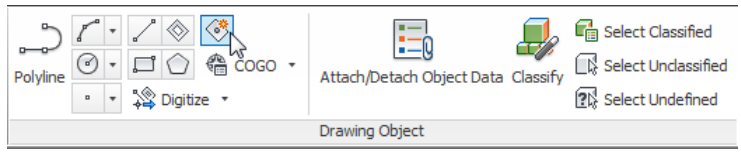
5.1.3 Creating Centroids

In this exercise you will first create centroids and move the attached data from each polyline to the corresponding centroid. This is the first step in the process of cleaning the geometry, an important process whenever base map data is imported.

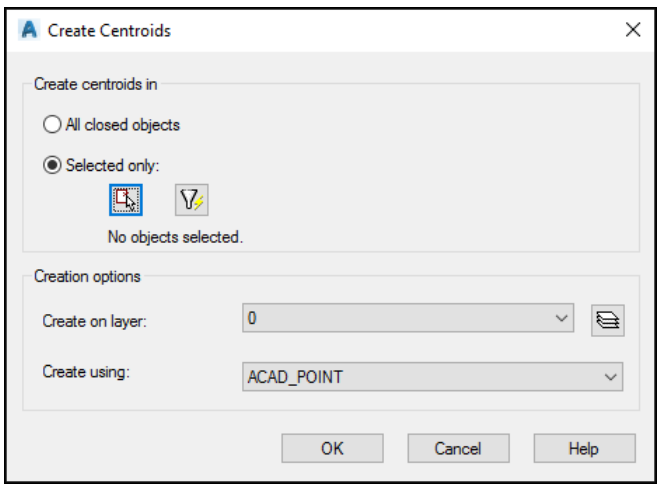
1. Continue working in the **Regional Taxlots.dwg** that you created in the last exercise.

2. **Freeze** the **Taxlots** and **Centroid** layers to isolate the *Taxlot_County* layer.

3. Select **Ribbon: Create ⇒ Drawing Objects ⇒ Create Centroids**.



The *Create Centroids* dialog box opens.

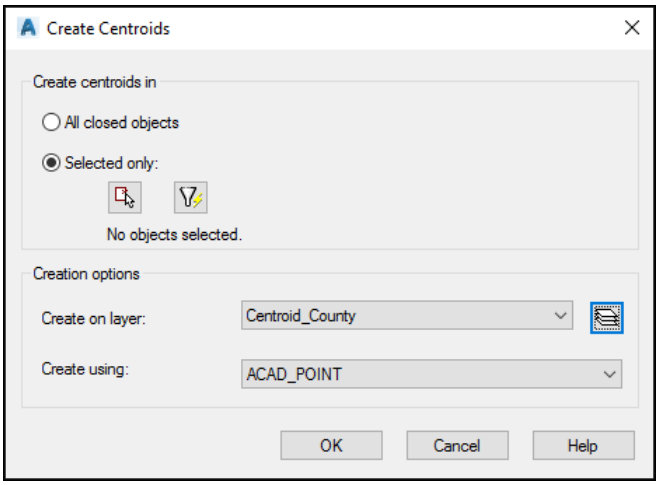


4. In the **Create Centroids in section**, choose **Selected only**:

5. Click the **select objects** button

This temporarily closes the dialog box so you can pick the objects.

6. Pick all the polygons with a crossing window and press **Enter.**



7. Click the New Layer button to make the layer **Centroid_County** on which to create the centroids.

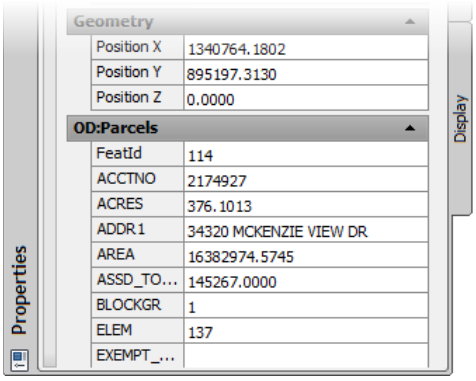
8. Confirm that **ACAD_POINT** is selected in the **Create using** field.

9. Click **<<OK>>** to create a centroid for each closed polygon.

This creates a point at the geometric center of each polygon and moves the data from the polyline to the new centroid.

10. Pick one of the new centroids, then right-click and select ⇒ **Properties**.

11. In the *Properties* palette, scroll to the bottom and notice the attribute data from the SHP file is now attached to the tax lot centroids.



12. Save the Drawing.

Lesson Review

In these exercises you imported street centerlines that were sent to you as an E00 file. An *ArcInfo* coverage may either be stored as a directory of related files, or exported into a single E00 export file from ArcInfo or ArcGIS, as in this exercise.

Then you imported parcel polygons from an ArcView Shapefile and converted their coordinate system.

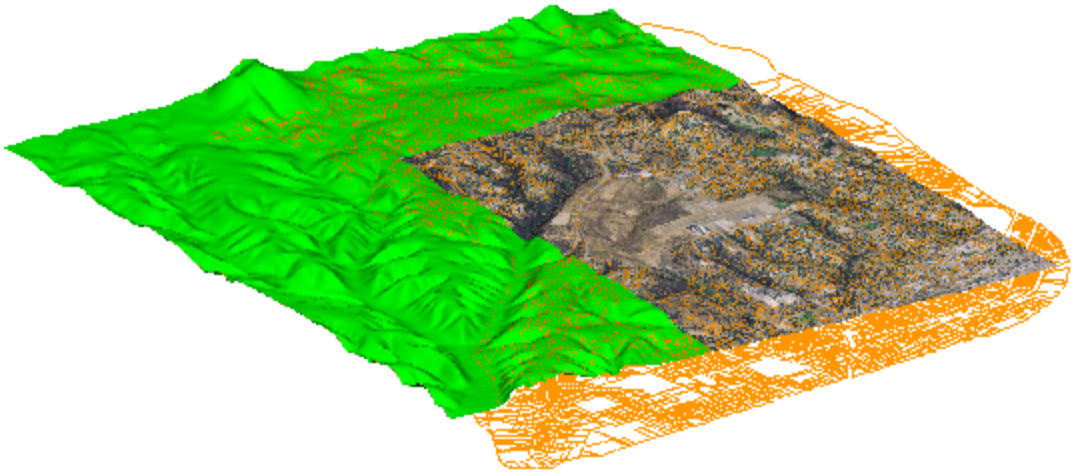
Finally, you created centroids and moved the attached data from each polyline to the corresponding centroid. This is the first step in the process of cleaning the geometry, an important process whenever base map data is imported.

7.3 Lesson: Connecting to Raster and Raster Surfaces

Introduction

Connecting to raster data as a feature source is similar to inserting images using AutoCAD® Map 3D Image Insert. In each case, the file is only referenced and not part of the drawing itself. In this lesson, you learn the differences between these two methods and the advantage of using the feature source connection. You also learn some of the tools that are used to connect to a raster image, and then connect to a raster image.

Connecting to raster surfaces is similar to connecting to raster images. The main difference is that raster surfaces contain elevation data associated with each pixel. AutoCAD Map 3D uses this method for simple surface analysis and visualization as part of the feature source. In this lesson, you learn the basic concepts of raster surfaces, the types of files that you can access, and how raster surfaces can be used as part of your mapping system. You then connect to a digital elevation model, and add it to your map.



Key Concepts

Concepts and key terms covered in this lesson are:

- Raster feature sources
- Raster surfaces
- Viewing raster surfaces in 3D
- Draping raster and vectors over surfaces

Objectives

After completing this lesson, you will be able to:

- Describe what a raster feature source is.
- List the types of raster formats that can be accessed.
- Explain how raster surfaces can be used.
- Connect to an ortho photo.
- Connect to a raster surface.
- Drape vectors and raster over a raster surface.

Raster Feature Source Concepts

You can use raster data in AutoCAD Map 3D through the Map Image Insert command and by connecting to raster as a feature source. There are some very powerful reasons to use a feature source connection rather than inserting raster:

- Performance
- File formats
- Coordinate conversion

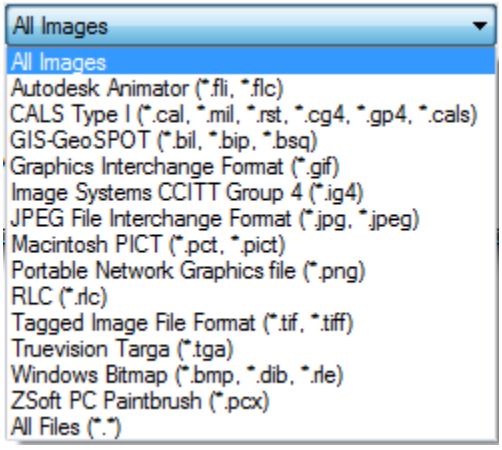
Performance

The performance of raster as a feature source is much better than that of raster inserted in a drawing. In some cases this performance enables access to raster that otherwise cannot be used because of file size.

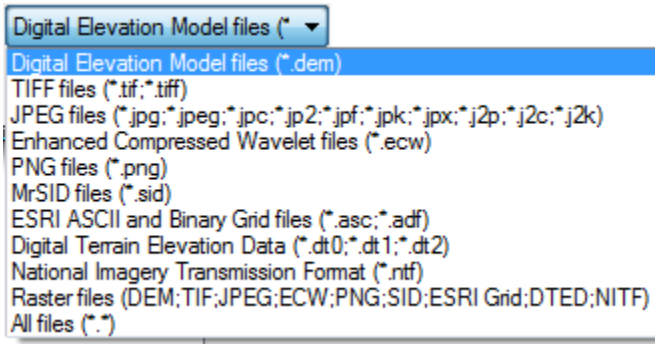
File Formats

Connecting to raster as a feature source opens a larger selection of geospatial-based file formats to work with. In addition to the formats that are offered directly in standard AutoCAD Map 3D, the fact that the feature data objects (FDO) technology is open source enables developers to write additional FDO providers to access even more file formats.

The following illustration shows the file formats available in the Map Image Insert command. While it offers a wide variety of file formats to select from, when considering the geospatial specific formats, it is fairly limited.



The following illustration shows the file formats available when connecting to raster as a feature source. The formats available through this method are especially useful for geospatial applications.



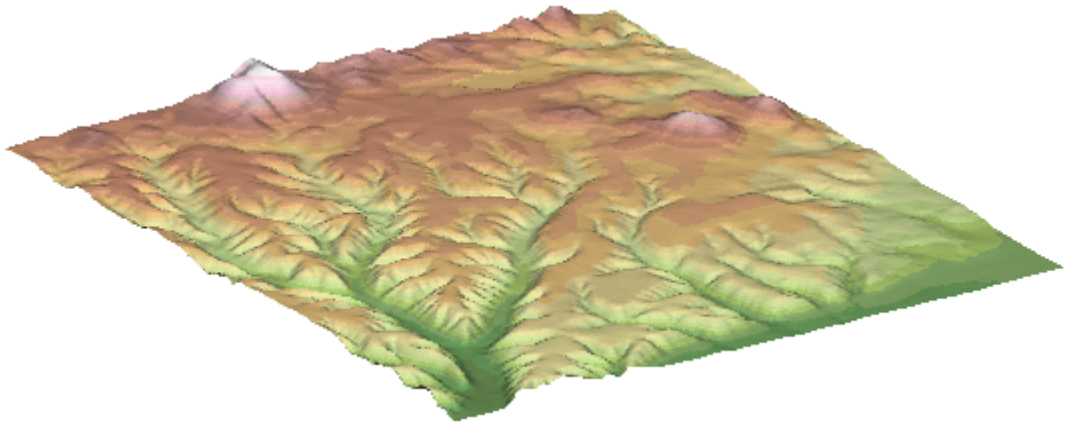
Coordinate Conversion

Connecting to raster as a feature source enables the coordinates of the raster to be converted to the coordinates of the current drawing. This is a very important distinction between connecting and inserting raster. When using Map raster insert, whatever the coordinates of the raster are determines the coordinates of your map. This is very limiting when compared to the coordinate conversion available using a raster feature source connection.

Raster Surface Concepts

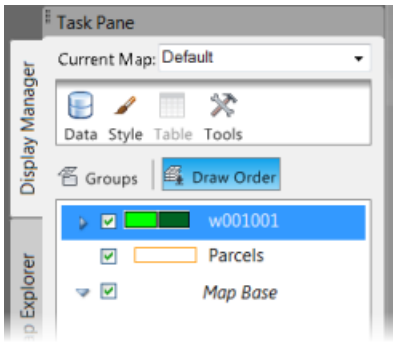
When working with raster as feature sources, the process and procedures to connect and add both standard raster and raster surfaces are the same.

Both types of raster are composed of pixels. In the case of raster surfaces, each pixel has a Z value rather than a value such as grey scale or color that produces a “picture”. AutoCAD Map 3D can interpret the Z values in a raster surface, and produce three dimensional views and analysis.



Raster Feature Layers

When a raster is connected to, and added to a map, the management of the feature layer is the same as that of vector based feature layers.



Working with Raster Surfaces

There are several tools available to take advantage of the elevation data that is inherent in a raster surface. These tools include creating contours, slope, aspect, and elevation analysis, draping, and assigning exaggeration values to the elevations. In this lesson, you work with draping and exaggeration.

Draping

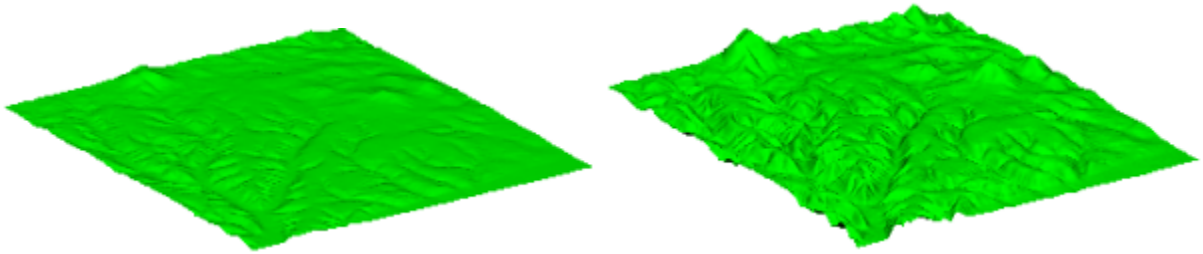
Draping refers to vector and raster objects which adopt the three dimensional characteristics of the underlying surface. By default, when a raster surface feature layer is present in a drawing, all other feature layers, both vector and raster drape over the raster surface depending on the draw order of the feature layers.

AutoCAD objects do not drape over raster surfaces.

Exaggeration

Exaggeration can be applied to raster surfaces to create a more impactful representation of the terrain when needed.

In the following illustrations, the image on the left is a raster viewed in 3D with no exaggeration. The image on the right is the same raster surface with an exaggeration value of 3x.



Exaggeration should be used sparingly. It often dramatically misrepresents the map.

Exercises: Connecting to Raster and Raster Surfaces

In these exercises, you start in a drawing that has a parcel feature layer connected. You connect to a raster image of an ortho photo of the area of interest. You then connect to a raster surface, change the draw order, and view the map in 3D.

You do the following:

- Connect to a raster image and add it to the map.
- Change the draw order to view the parcels on top of the raster.
- Connect to and add a raster surface to the map.
- Set the draw order to drape the parcels and ortho photo over the surface.

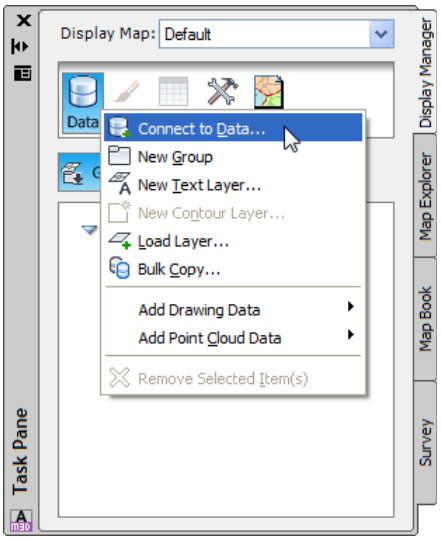
7.3.1 Connecting to an Aerial Photo

1. Open the drawing **Connect to Raster.dwg** from the **Chapter 07** folder.

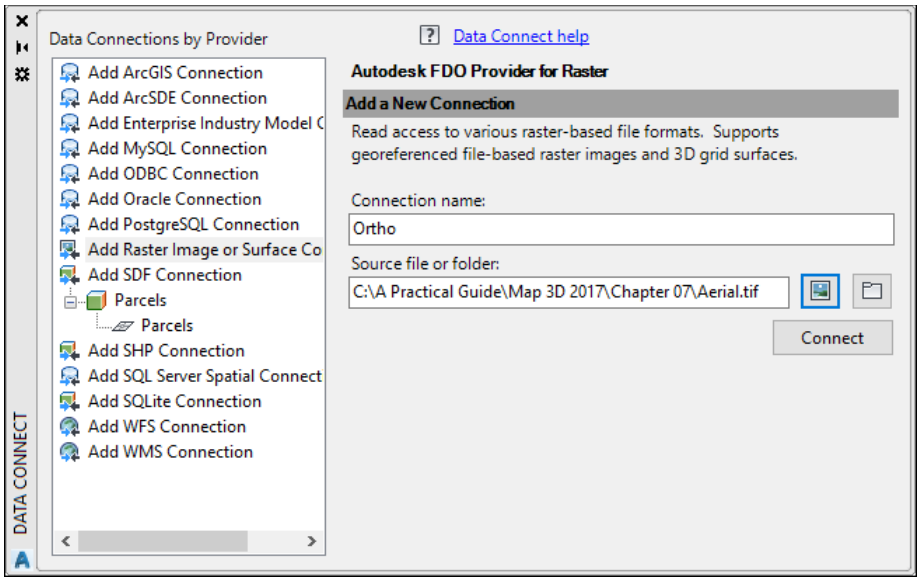
In the first series of steps, you connect to the raster image and add it to the map.

2. In the **Display Manager**, confirm that the **Groups** button is selected.

3. In the **Display Manager**, click the **Data** button, and then **select ⇒ Connect to Data…** .



The *Data Connect* palette opens. Here you can select from many different data providers or sources. In this exercise you will be connecting to a raster image file.

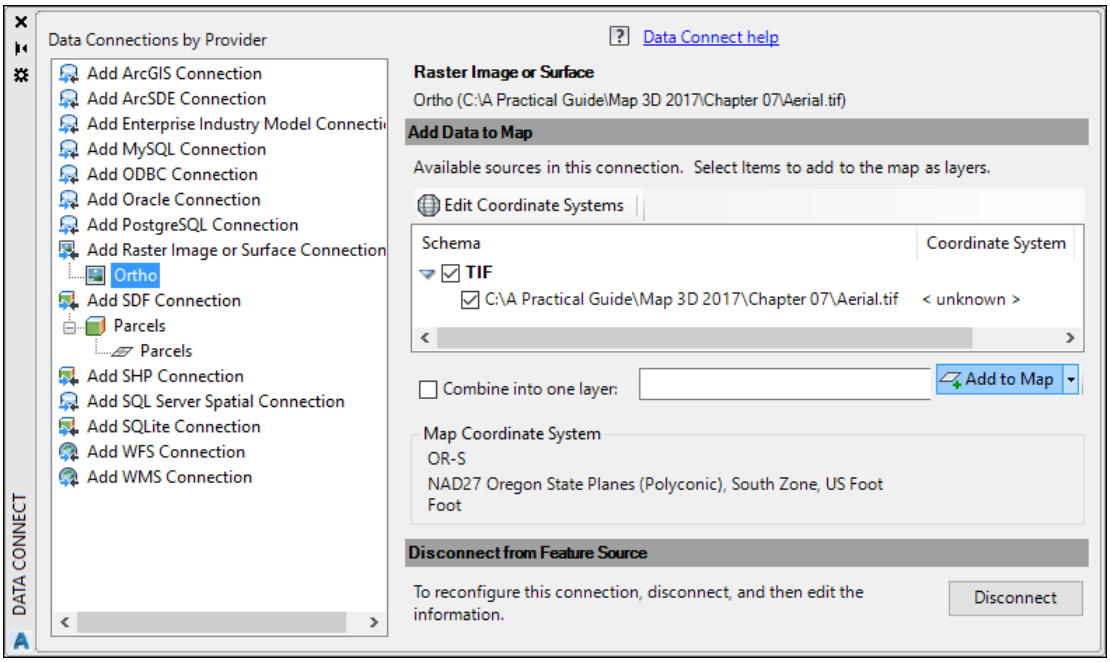


4. From the *Data Connections by Provider* list, select **Add Raster Image or Surface Connection**.

5. Change the *Connection name:* to **Ortho**.

6. Click the file button and browse to the **Chapter 07** folder, and select **Aerial.tif**.

7. Click **<<Connect>>**.



8. Click **<<Add to Map>>**.

9. Close the *Data Connect* palette.

Notice the *feature* layer *Aerial* now appears in the *Display Manager*. A layer in the Display Manager is different than an *AutoCAD* layer; it is the name of a data source and where you manage its properties.

Notice the aerial photo is on top of the parcels.

10. In the **Display Manager**, select the **Draw Order** button.

The list of feature layers is displayed in the current draw order. The order these are listed in matches the feature layers in the drawing.

11. Drag the Parcels feature layer above the Aerial layer.

12. Zoom into the map to view the image with the parcels overlaid.

13. Save the drawing for use in the next exercise.

7.3.2 Connecting to a Raster Surface

In this exercise you connect to and add to the map an elevation enabled raster, or raster surface. Once the surface raster is added to the map, you change the draw order, and view the map in 3D. Any feature layer that is on top of the surface will automatically drapes over the surface.

1. Continue working in **Connect to Raster.dwg** from the previous exercise.

If you did not complete the previous exercise you can open the drawing **Connect to Surface.dwg**.

2. Connect to a Raster Surface. Repeat Steps 3-9 from the previous exercise using the following information:

- For the Connection Name enter **Elevation**
- Connect to the file **Existing Ground.dem** in the **Chapter 07** folder

3. In the **Display Manager**, select **Draw Order**.

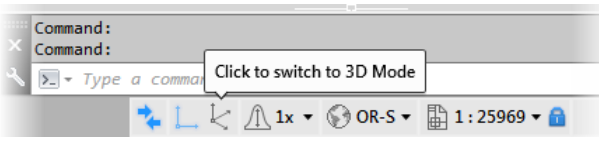
The list of feature layers is displayed in the current draw order. The order these are listed in matches the feature layers in the drawing.

4. Drag the feature layers to match the following order:

- Parcels
- Aerial
- Existing Ground

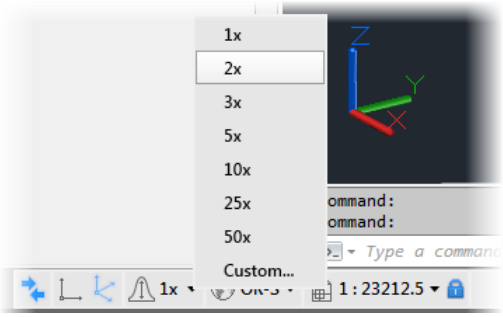
5. In the Status bar, click 3D.

The map is displayed in 3D.



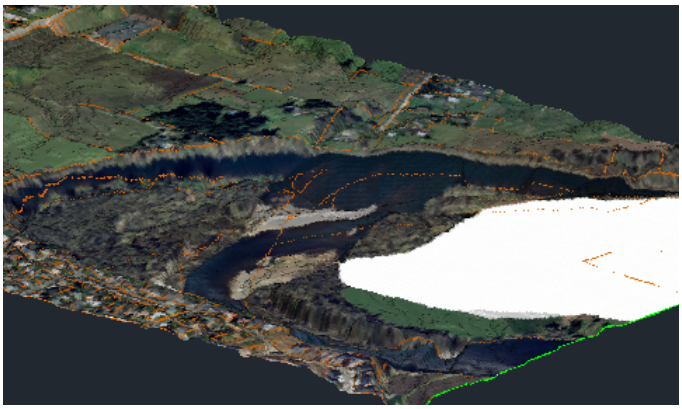
6. In the Status bar, for Vertical Exaggeration, select 2x.

Note: It might take a few moments to optimize the layer.



7. Zoom into the map to view how the raster and parcels are draped over the surface raster.

8. Experiment with various Vertical Exaggeration values and 3D viewing angles.



NOTE: Be careful when applying Vertical Exaggeration, and use it sparingly. While it can help visualize terrain in relatively flat areas, it can dramatically misrepresent actual conditions.

Lesson Review

In these exercises you integrated three different sources of data. Vector based parcels, an ortho photo, and a surface. Together, these sources of data were combined to view how the parcels and the image drape over the existing ground terrain.

Index

2D Drafting 7
3D Navigation 257
Add Data to a Map 196
Adding New Features 292
Altering Properties 366
Anchors 36
Angle Data 26
Annotation Blocks 117
Annotation Template 117
Attach Object Data 59, 66, 69
Attribute Data 52, 53
AutoCAD Image Insert 222
AutoCAD Map 3D Image Insert 222
AutoCAD Options 8
AutoCommit 90
Automatic Check In 290
Automatic Checkout 290
AutoSave 8
Best Route 409
Bitonal 220
Block Attributes 55
Bulk Copy 318
Cancelling Checkout 291
Centroid 398
Check-In/Checkout 290
Classifying Existing Objects 152
Clustered Nodes 35, 392
COGO Inquiry 26
Command Line 9
Compound Queries 344
Connecting to ODBC 208
Connecting to Raster 238
Constraints 310
Contextual Ribbons 4
Contours 260
Convert Coordinate Systems 383
Coordinate Conversion 236
Coordinate Geometry 25
Coordinate System 17, 163, 194, 210, 381
Coordinate System Grid 434
Coordinate Tracker 18
Correlation Files 221
Create Scale Ranges 268
Creating New Classified Objects 157
Creating New Features 291
Crossing Objects 34, 392
Current Drawings 329
Data Panel 377
Data Queries 358
Data Source 85
Data Source Name 210
Data Table 203
Data Table Tools 204
Data View 89
Datums 15
Define Object Data 59
Digital Elevation Model 234, 256
Display Manager 5
Drafting Settings 8
Draping 237, 259
Draw Order 205, 227
Drawing Cleanup 391
Drawing Locks 333
Drive Aliases 330
Duplicate Objects 35
Dynamic Annotation 115
Edit Feature Attributes 289
Edit Feature Geometry 289
Edit Object Data 59, 75, 76, 78
Editing Attributes 291
Editing Existing Features 292
Editing Object Data Tables 79
Editing Transaction Model 373
Error Markers 401
Export File Types 178
Export Process 180
Exporting 177
Expression Builder 283, 284
External Data Sources 53
External Databases 84
Feature Class 194
Feature Filters 282
Feature Joins 299
Feature Layer 195, 202
Feature Layer Selectivity 205
Feature Queries 282
Feature Source 188, 191
Feature Source Connect 192, 222
Feature Styles 244
Feature Thematic Maps 272
Filter to Select 286
Flood Trace 409
Generating Links 86, 98, 99, 102
Global Coordinate Systems 15
Grey Scale 220
Hillshading 258
Image Behavior 227
Image Correlation 223
Image Frames 227
Import Attributes 163
Import Coordinate Systems 163
Import Geometry 163
Import Interface 164
Import Spatial Filters 163
Inserting Dynamic Annotation 122
Joins 298

Layout Elements 423
Legend 423
Line Feature Styles 248
Link Template 85, 98, 99, 100
Linking External Databases 85
Links 389, 398
Location Queries 339, 342
Maintenance 7
Manually Link 101
Map Book Dialog 440
Map Book Template 438
Map Books 421, 422
Map Classic 8
Map Explorer 5, 312
Network Analysis 408
Network Topologies 388
Nodes 389, 398
North Arrow 424
Object Class Objects 158
Object Classes 153
Object Classification 140, 141, 157
Object Classification Definition File 142
Object Data 54, 57, 67, 164, 359
Objects 189
ODBC (Open Data Base Connectivity) 208, 209
Online Map 231
Planning and Analysis 7
Point Feature Styles 247
Polygon Feature Styles 248
Polygon Overlay 410
Polygon Topologies 397
Projection 15
Properties Palette 76
Property Alteration 368
Property Queries 339, 343
Pseudo Nodes 35
Quick View 331
Ranges and Styles 266
Raster 218, 220, 234
Raster Feature Layers 237
Raster Feature Source 235
Raster Metadata 222
Raster Surface 234, 236
Raster Surface Styles 257
Raster Surface Themes 259
Reference Grid 425
Reference Management 228
Reference System 425
Refresh Annotation 118
Relational Data Base Management Systems 191
Ribbon 3, 203
Save-Back 372
Save-Back Options 375
Saved Queries 345
Scale Bar 424
Scale Dependent Styles 264
Scale Ranges 246
Schema 319
Schema Editor 312
Shortest Path 408
Source Drawings 328
SQL Queries 360
Style Editor 244
Style Editor Palette 246
Style Scale Ranges 244
Styles 246
Stylize Raster Surfaces 256
Stylizing features 244
Surface Exaggeration 238, 257
Task Pane 4, 204, 332
Theme Feature Labels 274
Theme Legend Labels 274
Theme Ramps 274
Themes 271, 368
Tolerance 36
Topology Analysis 407
Topology Object Data 390
UDL file 85
Update Annotation 118
User Interface 1
Validating Standards 151, 310, 313, 368
Vector Objects 219
Viewing Linked Data 103
Workspaces 7